

19 Programmy podderzhki biznesa. Sajt Gosudarstvennye instituty podderzhki predprinimatel'stva v Respublike Kazakhstan. □Текст□ / Business.gov.kz. 2018. URL: <https://www.business.gov.kz/business-support-programs> (data obrashcheniya: 17.03.2022).

20 Maloe i srednee predprinimatel'stvo v Respublike Kazakhstan: statisticheskij sbornik □Текст□ / Komitet po statistike Ministerstva nacional'noj ekonomiki Respubliki Kazakhstan. - Astana, 2017. - 59 s.

21 Kirillov A.V. Stimulirovanie kooperacii malogo, srednego i krupnogo innovacionnogo biznesa v zarubezhnyh stranah. □Текст□ / A.V. Kirillov // Vestnik universiteta (Gosudarstvennyj universitet upravleniya. –A., 2016. - № 1, - S. 198-201.

РЕЗЮМЕ

В условиях нарастающей глобализации, взаимозависимости экономик стран мира, усиления экологизации, обострения глобальной конкуренции за ресурсы (прежде всего за интеллект) и рынки сбыта кластерные модели получили широкое признание как одно из важнейших направлений экономической работы, в том числе сельскохозяйственный сектор.

Мировой опыт последних двух десятилетий свидетельствует о том, что в условиях рыночной глобализации, быстрый подъем ведущих секторов экономики может осуществляться путем применения положительного опыта создания социально-интеграционных систем и их наиболее эффективной формы – инновационных кластерных объединений. Кластеризация предприятий является сложным и многоплановым процессом, учитывающий потенциал производственно-коммерческой взаимодействия отдельных субъектов хозяйствования. И имеет целью распространение их управленческих достижений и преимуществ и повышения индивидуальной и суммарной конкурентоспособности в результате взаимовыгодного кооперационного сотрудничества в рамках приграничных регионов.

Реализация кластерного подхода повышает эффективность бизнеса за счет усиления кооперации производственных предприятий, образовательных и научных организаций; между малыми, средними и крупными предприятиями; эффективность расходования бюджетных средств повышается за счет приоритета получателей государственной поддержки (т.е. участников деятельности с потенциалом развития) среди уже действующих компаний и инфраструктуры, что стимулирует появление новых предприятий в регионе), что особенно важно в условиях сокращения расходов бюджета.

UDC 338.43 (639)
SCSTI 69.25.99

DOI 10.56339/2305-9397-2023-1-3-291-299

Okumbekova M. B., Master of Technical Sciences, **the main author**, <https://orcid.org/0009-0007-1687-262X>

Financial University under the Government of the Russian Federation, Moscow, Leningradsky Avenue, 49/2, 125167, eagle4free@bk.ru

Aidaraliyeva A. A., Candidate of Economic Sciences, <https://orcid.org/0000-0002-7291-2426>

NJSC «West Kazakhstan Agrarian and Technical University named after Zhangir khan», Uralsk, st. Zhangir khan 51, 090009, aizhamal_a@mail.ru

Bazarova B.T., Master of Economic Sciences, <https://orcid.org/0000-0001-5197-6001>

NJSC «West Kazakhstan Agrarian and Technical University named after Zhangir khan», Uralsk, st. Zhangir khan 51, 090009, Baktigulbazarova@mail.ru

PROSPECTS FOR REGIONAL FISH FARMING IN THE REPUBLIC OF KAZAKHSTAN

Annotation

Ability to meet the demands of the population in fish and fish products and its food security is one of the most acute problems in the Republic of Kazakhstan.

Objective – the current state of the fisheries of the Republic of Kazakhstan was studied and proposals for the development of the fisheries in the West Kazakhstan region were made.

Methods – statistical methods of data analysis were used to study the state of the fisheries of

the Republic of Kazakhstan, and exclusively the catch of fish and other aquatic animals, as well as the dependency of the physical volume of fish farming production from the total amount of products made.

Results - the study discusses topical issues of the production capacity of fisheries and fish canneries, by types and volumes of output products, economic indicators, as well as by enterprises engaged in the purchase and sale of fish products, wholesale and retail trade, problems of marketing research in the field of fish products production and safety.

Conclusions - creation of the laboratories and fish breeding in autonomous facilities will allow development of the innovative technologies for rearing, preservation, and replenishment of fish resources in water bodies of the region, will provide a training base for the future specialists training, will create prerequisites for preservation and multiplication of fish resources in Kazakhstan, will improve the food security of the country, and will resolve the key problems of the fish industry development.

Artificial fish farming involves interfering with the development of organisms to increase their production, such as regular restocking, feeding, protection from predators, etc.

Key words: *fish resources, analysis, development, innovative technologies, production, water supply, fish products, market, laboratory, services.*

Introduction. To meet the global demand for fish in 2030 its annual production must increase by 23 million tons. At the same time, stocks of wild fish are depleted and, according to experts studying the fish breeding industry, by 2050 it may disappear altogether. New technologies of artificial fish farming will help to fill the demand of the population for this product.

There is a tendency in the world to decrease fish catching and development of fish farming under conditions of closed water supply. Aquaculture is one of the main drivers of the fishing industry. Cultivation increases the volume of wild fish catch and makes it possible to provide fresh products to consumers from regions remote from marine areas [1].

Artificial fish farming involves interfering with the development of organisms to increase their production, such as regular restocking, feeding, protection from predators, etc.

Aquaculture in Kazakhstan is developed in two main directions - artificial reproduction of aquatic bioresources and commercial fish farming, including pasture aquaculture.

The most important factors constraining the development of aquaculture include:

- insufficient regulatory and legal support;
- low investment attractiveness of the industry;
- insufficient level of material-technical and scientific support.

For the determination of a set of measures for the development of aquaculture, it is necessary, first of all, to formulate the main goal and define the tasks that need to be solved. The main goal of the development of fish farming in Kazakhstan is to provide the population of the country with a wide range of fish products of domestic aquaculture at prices accessible to the population with different levels of income [2].

Within the Program of Fisheries Development by 2030, to achieve this goal it is necessary to increase the production of fish products by at least 270 thousand tons per year.

Material and methods of research. In Kazakhstan, it is necessary to take measures for the transition of aquaculture to an innovative way of development. Special attention should be paid to technical and technological modernization, and the introduction of modern technologies in production to reduce the cost of finished products in the consumer market. It is desirable to pay attention to the increase in funding of scientific research in the field of aquaculture.

Unfortunately, at the moment fishery science has an acute shortage of qualified personnel, which cannot but affect the quality of ichthyological research, including fish farming research. The research requires quality improvement and emphasis on applied research in part of issuing recommendations for making management decisions.

To provide fish-breeding enterprises and farms with qualified personnel it is necessary to organize fish-breeding training at existing universities, and the state educational order should envisage up to 400 places annually.

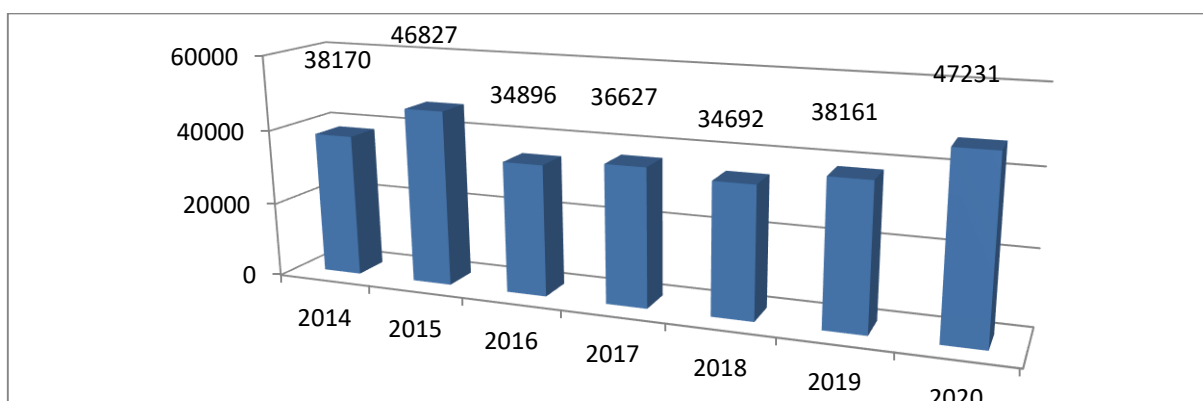
Also, at the moment aquaculture enterprises experience significant difficulties with obtaining loans. Banks do not accept fish and other assets of aquaculture enterprises as security. The next problem hindering fish farming is the lack of planting material, in particular fertilized eggs and juvenile fish (especially sturgeon and whitefish species, salmon, trout).

Problems of fish stocking material shortage are partially solved by partial subsidizing of expenses on maintenance of pedigree repair and breeding herds and purchase of such material with funds, allocated from the budget of the Republic of Kazakhstan.

Because of the persisting shortage of fish stocking material enterprises cannot increase production volumes. It is necessary to create a network of nurseries (multipliers), focused on the production of juvenile sturgeon, salmon, whitefish, and carp fish at branch institutes of Kazakhstan. [3]

Results and discussions. The use of available capacities with the direct participation of the government in the creation of the reproduction base fully complies with the provisions already laid down in the Program of Fisheries Development by 2030. A similar practice has been successfully implemented in Japan, where the government was the main customer in the creation of reproduction centers at the initial stages of the formation of the aquaculture system.

Most of the fish caught in the Republic of Kazakhstan is consumed by the population and does not go to processing enterprises.



Source: 1

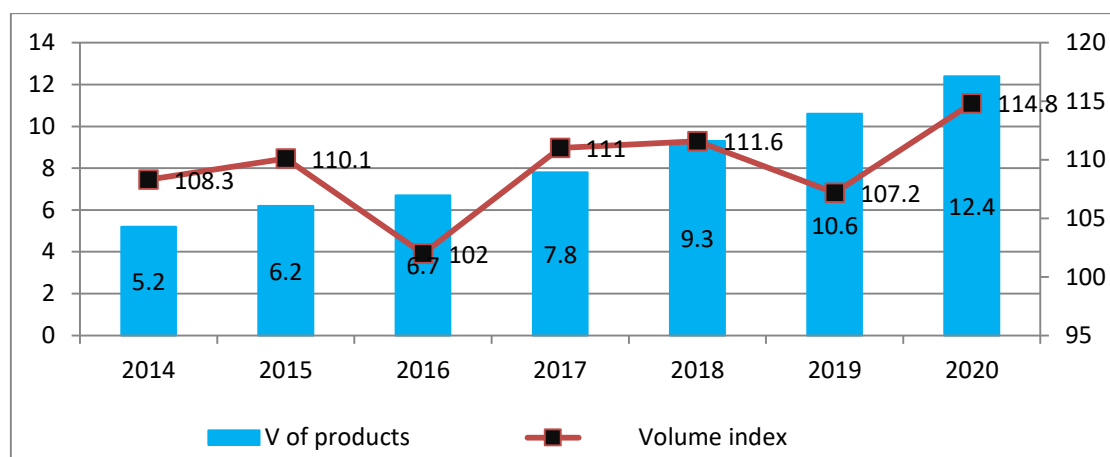
Figure 1 - Catch of fish and other aquatic animals by fisheries in Kazakhstan (2014-2020) in tons.

In comparison, in the early 90s, about 100 thousand tons of fish per year were caught in our territory, including sturgeon species. In 2019, it was possible to catch only 35-40 tons of fish (according to official statistics), and the main catch was bream, which is not big-bodied fish like sazan, pike-perch, catfish, and small fish. In 2000, only three Kazakhstani enterprises Atyraubalyk, Balkhashbalyk, and Rybprom were included in the list of numbered enterprises that had the right to export their products to Europe. The sale of products abroad at one time allowed the fishing industry of Kazakhstan to develop thanks to the inflow of currency, and investments, including in fish farming.

More than one thousand fishery entities are engaged in fisheries in Kazakhstan, and 1,646 fishery reservoirs and their lots are attached to them. The industry employs 11 thousand of people.

Kazakhstan also has a great potential for the development of fish farming. Over the last 7 years, the volume of fish cultivated increased by 9 times - from 800 tons to 7.4 thousand tons. 180 fish farms are engaged in fish farming in the country, where more than 1 thousand (1 126) people are engaged.

From 1990 to 2020, fish farming was steadily growing (there are 184 fish farms in the Republic of Kazakhstan, including 99 lake-commodity fish farms, 55 pond farms, 10 cage culture fish farms, 20 RAS and basin farms), and this growth is directly related to the state subsidization of costs (for feed).



Source: 1

Figure 2 - Volume of production in fisheries and aquaculture in 2014-2020

According to statistics in 2020, the volume of products and services in fisheries and aquaculture amounted to 12.4 billion tenge, compared with 2019 there was an increase of 1.8 billion tenge. During the analyzed period, the volume of production increased by 7.2 billion tenge. This is due to the dynamic development of fish farming, as for the period from 2014 to 2020, the volume of farmed fish increased from 800 tons to more than 40 thousand tons. The diagram also shows the dependence of the index of physical volume of fish farming products on the output, which fluctuates from year to year; there is no certain stability.

The State program of development of the agro-industrial complex of the Republic of Kazakhstan for 2017-2021 envisages a significant increase in aquaculture production: in 2021 the production of marketable fish will be 5 thousand tons (an increase of 6.8 times), including sturgeon - up to 0.7 thousand tons (an increase of 6.8 times), whitefish - up to 1.2 thousand tons (an increase of 11.6 times), carp - up to 1.7 thousand tons (an increase of 5.6 times). [4,5]

The main challenge in the development of aquaculture in the Republic of Kazakhstan is to attract fishing enterprises to commercial fish farming. Currently, despite all the difficulties associated with fishing, fishing enterprises do not seek to diversify their business through aquaculture. This is due not so much to the high costs of building fish farming facilities as to the long payback period, as well as the shortage of innovative projects in this area.

The plan of development of commercial fish farming should involve measures that will ensure the transition of the industry to an innovative way of development. It is necessary to assure investors that aquaculture is profitable.

50 years have passed, and a qualitatively new system of fisheries and ecological and ameliorative use of inland water bodies of the country is required.

According to estimates, to meet the projected global demand for fish, production in fish farms should increase by more than twice: it should be about 140 million tons in 2050. Such an increase will largely ensure food security and development opportunities. Also, aquaculture will help increase incomes and provide employment, especially in developing countries, where most of the industry's products are produced.

Kazakhstan is characterized by low fish consumption per capita. For example, WHO recommends consuming not less than 16 kg of fish production per capita per year, while in Kazakhstan the consumption is less than 4 kg. Meanwhile, neighboring Russia and China consume 20-40 kg per capita respectively. Thus, taking into account the border areas, the potential niche for the export of fish products could amount to more than 3 million tons.

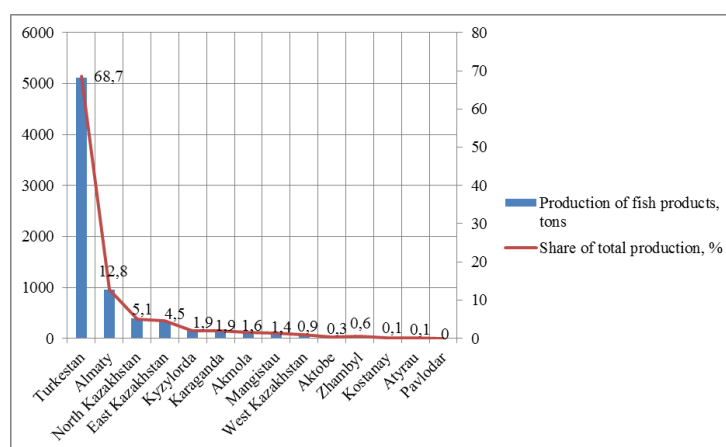
The number of artificial farms should increase by many times. To achieve the WHO recommended consumption rate of 16 kg per capita, it is necessary to grow about 300 thousand tons of fish.

In February 2020, at an offsite meeting on the development of fisheries in Atyrau, Prime Minister Askar Mamin gave instructions aimed at identifying the main barriers to the development of

the industry. The Ministry of Ecology, Geology, and Natural Resources of the Republic of Kazakhstan together with the business studied these instructions and identified 3 blocks of issues, which should be emphasized. These are - the reorientation of water bodies from fishing to fish farming, legal deficiencies, and insufficiency of state support measures.

In this connection, the Program of Fisheries Development by 2030 was approved in December 2020. Within the Program of Fisheries Development by 2030, it is planned to increase fish production by almost 30 times - from 9 thousand to 270 thousand tons; more than 500 new farms and 50 thousand jobs will be created. Export of fish products will increase from 30 to 136 thousand tons per year, the import will drop from 45 thousand to 25 thousand tons per year. At the same time, domestic fish consumption will increase twice - from 67 thousand tons in 2020 to 134 thousand tons in 2030. [6,7]

For the development of fish farming, it is important to attach fish-processing capacities to large fishery reservoirs. Atyrau, Almaty, East Kazakhstan and Kyzylorda regions process the major volume of fish. In 2019, fishing enterprises produced 2,700 tons of marketable fish. They grow mainly sturgeon, trout and carp species of fish using proven biotechnologies of cultivation.



Source: 1

Figure 3 - Production of fish products in the Republic of Kazakhstan by region

Enterprises in the West Kazakhstan region are also engaged in the processing and cultivation of fish products.

A total of 323 fishing companies are registered in Kazakhstan,

The main companies in the West Kazakhstan region engaged in the production of fish products are Educational and Scientific Complex of Experimental Production and Aquaculture LLP and IE Marchenko:

Table 1 - Comparative characteristics of fishing companies in the West Kazakhstan region

Name	Advantages	Disadvantages
Educational and Scientific Complex of Experimental Production and Aquaculture LLP	- regular customers; - participation in tenders; - production of food sturgeon caviar and sturgeon.	- lack of ichthyological and hydrobiological research laboratories; - lack of tested technology for growing carp, crustaceans and clary catfish.
IE Marchenko:	- availability of pond stock for carp cultivation; - sale of pond fish; - organization of sport and recreational fishing.	- lack of ichthyological and hydrobiological research laboratories; - lack of tested technology for sturgeon, carp, crustaceans and catfish cultivation in pools; - lack of fish-farming services; - lack of research development in the field of fish farming.

As you can see from Table 1, companies in the West Kazakhstan region have both disadvantages and advantages in the development of the industry. Therefore, according to the results of the study, it is necessary to ensure state support and investment in the economic development of aquaculture in the region.

Fisheries science has repeatedly pointed to the importance of acclimatization works and mass stocking of inland water bodies with stocking material of herbivorous fish. However, no significant progress has been made. Stocking with herbivorous fish has practically stopped, and the scale of stock of sturgeon species is insignificant and is determined not so much by the possibilities of fish stocking material production as by the state order [8,9].

There is no doubt that the application of commercial aquaculture methods in inland water bodies will make it possible to significantly increase the commercial stocks of valuable fish species and increase their natural fish productivity.

At the same time, it should be noted that when the question arises about the prospects of aquaculture development in inland water bodies by methods of pasture fish farming, there is no exact data on the needs for stocking material. It becomes obvious that for the development of pasture (feeding) fish farming which ensures significant production the main limiting factor is the shortage of stocking material of whitefish, salmon, carp, sturgeon and other fish species [10].

To start with, the West Kazakhstan region (the city of Uralsk) can become such a testing ground. With natural and climatic features, development of pond fund, an abundance of water bodies of different types, presence of powerful scientific potential and valuable results of long-term observations of ichthyofauna, it is the most suitable region for the implementation of the concept of a new type of inland water bodies exploitation, development of pasture fish farming and aquaculture [11,12].

Besides growing fish in closed water supply systems, there is a need to create a laboratory, which will be fully equipped production premises with training and laboratory rooms. The following sectors will function in the laboratory:

- artificial reproduction of freshwater fish,
- ichthyology and hydrobiology,
- fish ichthyopathology,
- the cultivation of crustaceans and live feed.

There is no such laboratory in Kazakhstan. The creation of the laboratory will contribute to the effective implementation of the Program of Fisheries Development by 2030.

Negative impacts of cage aquaculture, arising from the lack of attention to environmental protection:

- organic pollution (eutrophication) - excess nutrients from food and fish excrement from farms increase organic levels in the water, which negatively affects marine ecosystems;
- chemical pollution - antiparasitic drugs, anti-fouling agents, antibiotics, feed dyes can have unpredictable effects on marine organisms and human health;
- genetic contamination - escaped farmed salmon can compete with wild fish and crossbreed with local wild stocks, degrading the genetic diversity of salmon;
- infectious diseases and parasites can be transmitted to wild populations.

The high profitability of cage aquaculture also entails economic and environmental risks that can cancel out all of its benefits. In the European Union, there are serious requirements for fish farms concerning the regulation of water areas.

Advanced technology and development are needed to reduce the environmental load of commercial cage aquaculture [13,14].

Fortunately for the aquaculture industry and the well-being of the planet, significant progress has been made in fish farming science and technology, in particular, ground aquaculture facilities based on water recycling technology, which eliminate the risks of cage farming and the emission of substances that harm the environment, are being widely developed and implemented.

Conclusions. Autonomous fish breeding units placed in the water area can become ecological solutions in aquaculture of the West Kazakhstan region. They will completely exclude any impact on the environment, as waste products of fish, uneaten food, phosphorus do not go directly into the water body, but are collected and disposed of with the help of special pumps. These and many other

inventions in aquaculture will help to make commercial fish farming as efficient and environmentally friendly as possible.

The authors also propose that the city of Uralsk can become a testing ground for the creation of the laboratory. With natural and climatic features, development of pond fund, an abundance of water bodies of different types, presence of powerful scientific potential and valuable results of long-term observations over ichthyofauna, it is the most suitable region for the implementation of the concept of a new type of inland water bodies exploitation, development of pasture fish farming and aquaculture.

The West Kazakhstan region (the city of Uralsk) can become such a testing ground. With natural and climatic features, development of a pond fund, an abundance of water bodies of different types, presence of powerful scientific potential and valuable results of long-term observations over ichthyofauna, it is the most suitable region for the implementation of the concept of a new type of inland water bodies exploitation, development of pasture fish farming and aquaculture.

Capabilities of the laboratory created in the city of Uralsk, equipped with the latest technology:

1. Development of innovative technologies for growing rare, endangered fish species, as well as promising aquaculture objects in artificial conditions.
2. Increasing the economic efficiency of fishery enterprises by stocking valuable fish species (sturgeons, carps).
3. Monitoring of ichthyological composition and assessment of food reserve of water bodies in the Western region.
4. Development of methods of breeding and feeding ten-legged crustaceans.
5. Systematic monitoring of the state of the natural microbiome of recycled water in RAS to assess the risk of emergence and spread of infectious pathology among the farmed fish;
6. Improving the system of anti-epizootic measures for infectious pathologies of fish, as well as measures to prevent diseases of non-contagious etiology.
7. Providing services and advice to farmers on the organization and management of fish farms.

Thus, the creation of laboratories and fish breeding in autonomous units will allow the development of innovative technologies for the cultivation, conservation and replenishment of fish resources in water areas. It will provide a training base for future specialists, and also will create prerequisites for the conservation and multiplication of fish resources in Kazakhstan, will improve the food security of the country, will reduce the shortage of fish products and provide access to international markets.

REFERENCES

1. Agriculture, Forestry and Fisheries in West Kazakhstan region, 2015-2019. Statistical collection [Text] / 2020.-Uralsk: Department of Statistics of West Kazakhstan region of the Statistics Committee of the Ministry of National Economy of the Republic of Kazakhstan. - 107 p.
2. Demchuk, O.V. Economics of Fisheries [Text] / O.V. Demchuk, N. A. Sushko // Textbook - Simferopol: DIAYPI, 2013. - 311 p.
3. Isbekov, K.B. Scientific Research Results for Conservation and Restoration of Fish Resources in Water Bodies of Kazakhstan [Text] / K.B. Isbekov, S.Zh. Asylbekova, Ye.V. Kulikov, D.K. Zharkenov, V.N. Tsoy, A.I. Kim // - Almaty: Copyland, 2018. - 215 p. <http://nsau.edu.ru>
4. Kosolapova, M.V. Comprehensive Economic [Text] / M.V. Kosolapova, V.A. Svobodin // Analysis of Economic Activity: Textbook // Publishing House: Dashkov & K, 2016. - 248p.
5. Moiseenko, L.S. Breeding of Fish and Crayfish in Artificial Conditions [Text] - Book: Breeding of Fish and Crayfish in Artificial Conditions, Publishing House: Phoenix, 2013. – 190 p.
6. Ponomarev, S.V. Sturgeon Breeding on an Intensive Basis [Text] / S.V. Ponomarev, D.I. Ivanov // Publishing House: Lan, 2020. -360 p.
7. Shalgimbaeva, G.M. Spawning Grounds of Sturgeon Fish of the River Zhayyk. [Text] / G.M. Shalgimbaeva, S.Zh. Asylbekova, Ye.B. Bokova, A.I. Kim, N.B. Bulavina // Atlas:-Almaty, 2017. -157 p.

8. Anuryeva, A.N. Bioaccumulation of trace elements by benthic organisms and their migration in the biota of the lake [Text] / Balkhash / A.N. Anuryeva, T.Ya. Lopareva // Bulletin of the AGTU. Ser. Fish farm, 2015. - No. 1. - pp.86-92. <https://doi.org/10.24143/2073-5529>
9. Barmintseva, A.E. Genetic studies of the pike perch Sander Irnioperca (Linnaeus, 1758) and bersha Sander volgensis (Gmelin, 1789) of fishery reservoirs of Kazakhstan [Text] / A.E. Barmintseva, G. Shalgimbayeva, S. K. Koishybayeva, Sh. T. Sarbakanova, S. Zh Asylbekova, K. B. Isbekov, N. S. Muge // Genetics. - 2014. -Vol.50, No. 7. - 2014. - pp.853-861. DOI: [10.7868/S0016675814070042](https://doi.org/10.7868/S0016675814070042)
10. Ermakhanov, Z.K. On the loss of resources of the Syrdarya river runoff in its middle and lower reaches [Text] / Z.K. Ermakhanov, N.S. Sambaev // Bulletin of Agricultural Science of Kazakhstan. 2017. - No. 3-4.
11. Zharkenov, D. K. Technology of trout cultivation at the Mystery reservoir in the East Kazakhstan region [Text] / D. K. Zharkenov, A. N. Nevalenny, K. B. Isbekov, S. Zh. Asylbekova, T. S. Sadykulov, S. M. Anuarbekov, N.S. Badryzlova // Bulletin of the AGTU. - 2017. - No. 4. - pp.85-95. <https://doi.org/10.24143/2073-5529-2017-4-85-94>
12. Isbekov, K.B. On the issue of stocking reservoirs of Kazakhstan with high-quality fish-planting material of valuable fish species [Text] / K.B. Isbekov, E.V. Kulikov, S.Zh. Asylbekova // Bulletin of the AGTU, a series of Fisheries. - 2018. - No.2. - pp. 7-14. <https://doi.org/10.24143/2073-5529-2018-2-7-14>
13. Safronov, A.S. Features of the formation of a repair and brood stock of sturgeon fish in industrial fish breeding complexes using closed systems [Text] / A.S. Safronov, I.V. Burachenko et al. // Mater. International. Scientific and practical conference "Current state and prospects of aquaculture development in the Caspian region". - Makhachkala, 2016. - pp. 128-133.
14. Rogovtsov, S.V. Fish-breeding and technological parameters of whitefish cultivation in closed water supply installations [Text] / S. V. Rogovtsov, N.V. Barulin, V.G. Kostousov // Animal husbandry and veterinary medicine: scientific and practical. journal. / UO BGSMA. - 2018. - № 2 (29). - Pp. 18-25. <http://hdl.handle.net/123456789/1094>
15. Kopbulsynova, B.K. Assessment of the level of sustainability of agro-industrial production in West Kazakhstan region [Text] / B.K. Kopbulsynova, Zh.A. Aimesheva, B.T. Bazarova, A.A. Abdeshova, A.G. Tyumambayeva // AIP Conference Proceedings 2661, 020005 (2022) 6p; <https://doi.org/10.1063/5.0107476>
16. Ibyzhanova, A., Conference Paper. AIP Conference Proceedings this link is disabled [Text] / I. Bogdashkina, A. Jakupova, B. Kopbulsynova, B. Bazarova // 2022, 2661, 020001

РЕЗЮМЕ

Выращивание рыб и других водных животных является наиболее востребованным трендом в вопросах, как обеспечения пищевой безопасности, так и снятия антропогенной нагрузки с естественных водоемов в результате чрезмерной их эксплуатации.

Цель – исследовано состояние рыбного хозяйства Республики Казахстан и дана оценка экономического потенциала развития отрасли рыбного хозяйства Западно-Казахстанской области.

Методы - на основе статистических данных проанализировано состояние рыбного хозяйства Республики Казахстан, непосредственно по улову рыбы и других водных животных, а также зависимость физического объема выпущенной продукции рыбоводства от общего количества произведенной продукции. Результаты- в исследовании обсуждаются актуальные вопросы и современные пути выращивания рыбы в установках замкнутого водоснабжения, а также решение проблем развития аквакультуры путем создания лаборатории в ЗКО, так как регион является наиболее подходящим для осуществления концепции нового типа эксплуатации внутренних водоёмов, развитию пастбищного рыбоводства и аквакультуры, по природно-климатическим особенностям, обилию водоёмов разного типа, наличию мощного научного потенциала и ценных результатов многолетних наблюдений за ихтиофауной.

Выводы - создание лабораторий и выращивание рыбы в автономных установках, позволит разработать инновационные технологии выращивания, сохранения и пополнения рыбных ресурсов водоемов области, обеспечить учебно-подготовительной базой для подготовки будущих специалистов, создаст предпосылки для сохранения и приумножения

рыбных ресурсов Казахстана, улучшит продовольственную безопасность страны, уменьшит дефицит рыбной продукции и обеспечит выход на международный рынок.

ТҮЙІН

Балық және басқа да су жануарларын өсіру азық-түлік қауіпсіздігін қамтамасыз ету, сондай-ақ оларды шамадан тыс пайдалану нәтижесінде табиғи су айдындарынан антропогендік жүктемені алып тастау мәселелерінде ең сұранысқа ие тренд болып табылады.

Мақсаты - Қазақстан Республикасының балық шаруашылығының жай-күйі зерттелді және Батыс Қазақстан облысының балық шаруашылығы саласын дамытудың экономикалық әлеуетіне баға берілді.

Әдістер - статистикалық деректер негізінде Қазақстан Республикасының балық шаруашылығының жай-күйі, тікелей балық және басқа да су жануарларын аулау бойынша, сондай-ақ шығарылған балық шаруашылығы өнімінің нақты көлемінің өндірілген өнімнің жалпы санына тәуелділігі талданады. Нәтижелер - зерттеуде тұйық сумен жабдықтау қондырғыларында балық өсірудің өзекті мәселелері мен заманауи жолдары, сондай-ақ БҚО-да зертхана құру арқылы аквамәдениетті дамыту проблемаларын шешу талқыланады, өйткені өңір ішкі су айдындарын пайдаланудың жаңа түрінің тұжырымдамасын жүзеге асыру, жайылымдық балық шаруашылығы мен аквакультураны дамыту, табиғи-климаттық ерекшеліктері, әртүрлі типтегі су айдындарының көптігі бойынша неғұрлым қолайлы болып табылады, ихтиофаунаны ұзақ мерзімді бақылаудың қуатты ғылыми әлеуеті мен құнды нәтижелерінің болуы.

Қорытынды - дербес қондырғыларда зертханалар құру және балық өсіру, облыс су айдындарының балық ресурстарын өсірудің, сақтаудың және толықтырудың инновациялық технологияларын әзірлеуге, болашақ мамандарды даярлау үшін оқу-дайындық базасымен қамтамасыз етуге, Қазақстанның балық ресурстарын сақтау мен көбейту үшін алғышарттар жасауға, елдің азық-түлік қауіпсіздігін жақсартуға, балық өнімдерінің тапшылығын азайтуға және халықаралық нарыққа шығуды қамтамасыз етуге мүмкіндік береді.