



#### OPEN ACCESS

SUBMITTED 24 December 2024

ACCEPTED 26 January 2025

PUBLISHED 28 February 2025

VOLUME Vol.05 Issue02 2025

#### COPYRIGHT

© 2025 Original content from this work may be used under the terms of the creative commons attributes 4.0 License.

# Fish Technology Development in Uzbekistan

Narmirzayeva Nasibaxan Baymirzayevna

Senior Teacher, The Branch of Astrakhan State Technical University in Tashkent region, Uzbekistan

Toshtayeva Kamilla Yodgor qizi

4th course student of BA, The Branch of Astrakhan State Technical University in Tashkent region, Uzbekistan

Umarxonova Madinaxon Avazxon qizi

4th course student of BA, The Branch of Astrakhan State Technical University in Tashkent region, Uzbekistan

**Abstract:** The article provides a brief information about current conditions in Uzbekistan for fish technology development and their types. The development of fish farming industry and some challenges also discussed in this article.

**Keywords:** Fish farming, aquaculture, RAS, FAO, IMTA.

**Introduction:** Fish farming, also known as aquaculture, plays a pivotal role in addressing global food security, providing a significant source of protein and income for millions worldwide. In Uzbekistan, a landlocked country in Central Asia, the development of fish farming technologies has been a crucial step in diversifying agricultural production and supporting rural economies. The President Sh.M.Mirziyoyev mentions that the fishing industry is one of the strategic directions for ensuring food security. Thanks to recent measures, the share of fish farming in the structure of the country's economy is consistently increasing. At the same time, there are still many shortcomings and problems in the fishing industry, the effective solution of which will help increase business activity, attract investment, introduce advanced technologies for growing fish, increase export potential, and create new jobs.

In recent years, Uzbekistan has made significant strides

in modernizing its fish farming industry by adopting new technologies and practices. The introduction of modern fish hatcheries, advanced pond management techniques, and recirculating aquaculture systems (RAS) has contributed to the steady growth of fish production. The adoption of these technologies has allowed for better control over water quality, improved fish health, and higher yields. The government has also played a crucial role in fostering the development of the industry by investing in research and development, infrastructure, and training programs for fish farmers. Several important milestones have marked Uzbekistan's transition from traditional fish farming to a more technologically advanced aquaculture industry:

- 2008: The government initiated the "State Program on Fishery Development" to increase fish production and modernize the sector.
- 2017: The establishment of the "Uzbek Fisheries Association" marked a turning point for coordinating national efforts to promote aquaculture.
- 2019: Uzbekistan's Ministry of Agriculture announced a national plan to triple fish production by 2025 through technology adoption and private sector investment.
- Recent Developments: Partnerships with international organizations, including the UN's Food and Agriculture Organization (FAO), have supported the introduction of new fish farming techniques and training programs.

### **Current Fish Development Technologies in Uzbekistan**

In recent years, Uzbekistan has embraced a range of modern technologies to enhance fish production and efficiency in its aquaculture industry. These advancements are key factor to meet the rising demand for fish, both domestically and internationally, while ensuring the sustainability of the sector. The following sections outline some of the most significant technologies and practices currently used in fish development in Uzbekistan.

### **Hatchery Systems and Fingerling Production**

Modern hatchery systems play a crucial role in Uzbekistan's aquaculture industry, facilitating the controlled breeding and rearing of fish in their early stages. These systems have enabled fish farmers to optimize breeding conditions, ensuring a high survival rate of fish larvae. Species such as common carp, grass carp, and tilapia are widely produced in hatcheries.

### **Technologies in hatchery systems include:**

- Temperature control systems that maintain the optimal water temperature for spawning and larval development.

- Automated feeding systems that improve the efficiency of feeding larvae and fry, reducing waste and improving growth rates.
- Selective breeding programs aimed at producing fish that grow faster and are more resistant to disease.

### **Pond Management Systems**

Pond-based aquaculture is one of the most common methods of fish farming in Uzbekistan. The introduction of modern pond management systems has led to improved water quality and the efficient use of feed and other resources. Key advancements include:

- Aeration systems that ensure adequate oxygen levels in the water, promoting healthier fish and higher yields. These systems are particularly important in areas with limited water flow or high fish stocking densities.
- Biofiltration technologies used to manage waste products and maintain water quality by filtering out harmful substances, such as ammonia and nitrites.
- Integrated multi-trophic aquaculture (IMTA) systems that allow fish farming alongside other species such as shrimp or aquatic plants, which can help balance nutrient levels and reduce environmental impacts.

### **Recirculating Aquaculture Systems (RAS)**

Recirculating aquaculture systems (RAS) have become increasingly popular in Uzbekistan, especially for intensive fish farming operations. RAS allows fish to be farmed in a closed environment where water is continuously filtered and recirculated, reducing water usage and allowing for greater control over environmental conditions.

Key benefits of RAS in Uzbekistan include:

- Efficient use of water, which is particularly important in Uzbekistan due to its arid climate and limited water resources.
- Enhanced disease control, as water quality can be tightly regulated to reduce the risk of disease outbreaks.
- Higher stocking densities, enabling farmers to produce more fish in a smaller area compared to traditional pond systems.

### **Biotechnology and Genetic Engineering**

Biotechnology and genetic engineering have played a role in improving fish breeding and productivity in Uzbekistan. Selective breeding and the use of genetic markers have led to the development of strains that are faster-growing and more resistant to diseases. This has helped farmers increase productivity and reduce losses due to illness. Some of the key biotechnological approaches include:

- Genetic improvement of fish strains to enhance growth rates and feed efficiency.
- Vaccines and probiotics that improve fish health and reduce the need for antibiotics.
- Biotechnological feed additives, such as enzymes and amino acids, that enhance nutrient absorption and promote faster growth.

### Feed Technology

Advances in fish feed technology have greatly improved the efficiency and sustainability of aquaculture in Uzbekistan. Modern feeds are formulated to provide the optimal balance of nutrients required for rapid growth while minimizing waste and environmental impact.

Innovations in feed technology include:

- High-protein, low-cost feeds, often incorporating locally sourced ingredients to reduce dependence on imported fishmeal and soy.
- Automatic feeding systems, which ensure that fish are fed the right amount at regular intervals, reducing waste and promoting consistent growth.
- Functional feeds that include ingredients to enhance immunity, reduce stress, and improve overall fish health.

With the intensification of aquaculture, disease management has become a critical issue. Uzbekistan has adopted various technologies and practices to monitor and control fish health, ensuring sustainable production.

Key technologies in this area include:

- Automated water monitoring systems that track water quality parameters such as pH, temperature, oxygen levels, and ammonia concentrations in real time, allowing farmers to make adjustments as needed.
- Probiotic treatments that promote beneficial bacteria in fish ponds, reducing the risk of harmful bacterial or viral outbreaks.
- Vaccination programs for major diseases, helping to reduce losses due to infectious diseases and improve overall farm productivity

Several research institutions in Uzbekistan play a crucial role in driving technological advancements in aquaculture. The Research Institute of Fisheries of Uzbekistan has been at the forefront of research on fish breeding, hatchery management, and disease control. Collaborative projects between Uzbek researchers and international partners have resulted in the introduction of modern fish breeding techniques, including selective breeding programs that improve

growth rates and disease resistance.

The Ministry of Innovative Development of Uzbekistan has also provided funding for research into sustainable fish farming practices, with a focus on optimizing water use in the country's arid regions. This research has contributed to the development of water-efficient technologies, such as RAS, which reduce water consumption by recycling and filtering water within aquaculture systems.

Uzbekistan has also benefited from collaborations with international organizations such as the Food and Agriculture Organization (FAO), the United Nations Development Programme (UNDP), and the World Bank. These organizations have provided technical assistance, funding, and training programs aimed at improving aquaculture practices in Uzbekistan.

For example, the FAO has partnered with Uzbek authorities to implement projects focused on sustainable aquaculture development. These projects have included the introduction of environmentally friendly farming practices, disease management techniques, and improved feed formulations.

### CONCLUSION

Uzbekistan's fish farming industry is undergoing a transformation, driven by government policies, technological advancements, and international cooperation. The country's strategic initiatives in aquaculture reflect its recognition of the sector's potential to address food security challenges, create jobs, and generate export revenues. However, despite the progress made, the industry still faces challenges, including water scarcity, high production costs, limited access to modern technologies, and environmental sustainability concerns.

To address these challenges, Uzbekistan must continue to invest in water-efficient systems like Recirculating Aquaculture Systems (RAS), develop locally sourced fish feeds, strengthen biosecurity measures, and improve its infrastructure for fish processing and export. Public-private partnerships and international collaborations will be key in achieving these goals, allowing for the transfer of knowledge, technology, and funding.

As the industry evolves, sustainable practices and policy reforms must be prioritized to ensure that Uzbekistan's aquaculture sector not only grows but also contributes positively to the environment and local communities. By addressing these challenges and leveraging its resources, Uzbekistan is well-positioned to become a significant player in global aquaculture, enhancing its economic resilience and food security.

### REFERENCES

The Presidential Decree of 04.06.2018 № PD-3657 On

Additional Measures for the Accelerated Development of the Fishing Sector

2.F.U. Karshiev, F. Mamato, Sh. G`apparov, IOP Conf. Series: Earth and Environmental Science 1076 012024 (2022). <https://www.doi.org/10.1088/1755-1315/1076/1/012024>

A. Borotov, R. Choriev, U. Boykulov, A. Khatamov, E3S Web of Conferences 390 04038 (2023)

G.G. Fozilov, B. Koptileuov, A.T. Umirov, A.J. Kurbanov, F.K. Kurbonov, S. Mannobova, Sh. Gapparov, IOP Conf. Series: Earth and Environmental Science 1284 012034 (2023)

M. Shoumarova, T. Abdillayev, S. Yusupov, IOP Conf. Ser. Earth Environ. Sci. 1231 012003 (2023)

Sh.X. Gapparov, R.R. Karimov, R.M. Choriyeu, I.E. Musurmonov, E3S Web of Conferences 401 04041 (2023)

B. Mirzaev, F. Mamatov, U. Kodirov, X. Shirinboyev, IOP Conf. Series: Earth and Environmental Science 939 012068 (2021)

A. Tukhtakuziev, Sh. Ishmurodov, E3S Web of Conferences 390, 01039 (2023) 14. M. Shoumarova, T. Abdillayev, A.A. Duskulov, S.A. Yusupov, E3S Web Conf. 443 04014 (2023)