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FISH FARMING IN ARTIFICIAL BASINS ECONOMIC EFFECTIVENESS

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Abstract

This article analyzes the status of fish production per capita, the total volume of fish caught in the Andijan region, and the distribution of farmed fish across different economic categories. The economic efficiency of fish farming in artificial reservoirs, as well as the area of land allocated for fish farming throughout the region, is also presented.

Keywords: *artificial ponds, volume of fish caught, distribution of fish harvested by economic categories, fish harvest per capita, land area allocated for fish farming, efficiency of fish farming in artificial ponds.*

Introduction. Considering the possibilities of developing the fishing industry in our republic and the volume of fish production per capita, the industry is developing due to extensive factors. According to the medical standard established by the Ministry of Health of the Republic of Uzbekistan, one person consumes an average of 13.37 kg of fish and fish products per year. Based on this medical standard, our analysis reveals that in recent years, the volume of fish produced per capita across the republic has been 2.5 times lower than the recommended norm. In particular, if in 2020 the average fish production per capita in the republic was 4.2 kg, then in 2023 this figure was 5.4 kg.

In the Andijan region, according to medical standards, 6.4 kg of fish per capita was produced in 2023. This figure has increased by 2.4 kg or 60 percent compared to 2020. In the Andijan region in 2023, the volume of fish production increased by 69% compared to 2020, reaching 21,672.1 tons. During this period, fish production rose sharply in the districts of Asaka, Balykchi, Bulakbashi, Altynkul, Pakhtaabad, Khojaabad, and Kurgantepa. The districts of Ulugnar, Markhamat, and Asaka account for 75.8% of the fish produced in the region. Furthermore, 60.6% of the total fish harvested in the region was produced by farms in the Ulugnar district (Table 1).

Table 1.

Volume of caught fish in Andijan region, tons

Territory names	Years				Ratio of 2023 to 2020, %
	2020	2021	2022	2023	
Andijan city	100,0	-	-	-	-
Xonobod city	20,0	-	14,1	20,3	101,5
Andijan district	607,8	259,9	667,0	428,3	70,5
Asaka district	255,6	591,1	2417,1	1379,8	5,4 times
Balykchi district	344,0	423,6	538,7	736,6	2,1 times
Buston district	197,3	227,5	233,9	231,3	117,2
Bulakbashi district	159,4	268,9	332,3	347,6	2,2 times
Jalakuduk district	231,0	342,0	418,9	451,8	195,6
Izboskan district	428,0	530,2	580,0	550,4	128,6
Markhamat district	1609,4	1625,9	1702,8	1915,4	119,0
Altynkul district	168,6	540,3	563,8	539,3	3,2 times
Pakhtaabad district	151,8	223,8	384,5	470,4	3,1 times
Ulugnar district	7802,1	11378,8	12550,8	13135,5	168,4
Khojaabad district	259,0	248,8	642,8	628,8	2,4 times
Shakhrikhan district	407,5	337,8	533,5	475,3	116,6
Kurgantepa district	86,0	664,2	358,6	361,3	4,2 times
Total	**12827,5**	**17662,8**	**21938,8**	**21672,1**	**169,0**

In Andijan region, while farms accounted for 44.2 percent of the total fish harvested in 2020, this figure rose to 73.9 percent in 2023. Compared to 2020, farms produced 2.8 times more fish in 2023, amounting to 16,010.6 tons (Table 2).

Table 2.

Distribution of caught fish by economic categories in Andijan region, tons

Farm categories	Years				Ratio of 2023 to 2020, %
	2020	2021	2022	2023	
For all categories of farms	12827,5	17662,8	21938,8	21672,1	169,0
including: farmers farms	5669,7	7223,4	14962,0	16010,6	2,8 times
share, %	*44,2*	*40,9*	*68,2*	*73,9*	-
dekhkan and household farms	551,6	555,2	570,0	717,0	130,0
share, %	*4,3*	*3,1*	*2,6*	*3,3*	-
organizations engaged in agricultural activities	6606,2	9884,2	6406,8	4944,5	74,8
share, %	*51,5*	*56,0*	*29,2*	*22,8*	-

As shown in the table, 51.5% of the total fish harvested in 2020 was produced by organizations engaged in agricultural activities (limited liability companies). This figure decreased to 22.8% in 2023. Organizations engaged in agricultural activities (limited liability companies) produced 4,944.5 tons of fish in 2023, which is 1,661.7 tons or 25.2 percent less than in 2020.

During the analyzed periods, the volume of fish production in dehkan and household farms has been decreasing year by year. However, in 2023, dekhkan and household farms produced 717.0 tons of fish, which is 30.0% more than in 2020. The decline in fish production by dehkan and household farms is directly linked to the development of fish farming in artificial reservoirs.

In fish farming, fish are bred using extensive and intensive methods. With a comprehensive method, the fish does not eat. It grows only by consuming natural food. This is mainly pasture fish farming. This allows you to get fish products at a minimum price. This direction is considered promising in the southern regions of our country and in large water bodies where carp can be effectively bred together with herbivorous fish.

The intensive cultivation method involves feeding fish, creating a rich food base with the help of fertilizers,

and bringing water reservoirs to a reclamation state. In modern fish farming, various technologies exist for intensive fish production. The most commonly used are artificial ponds, which typically involve a two- or three-year fish rearing cycle.

In artificial ponds, carp and herbivorous fish are typically raised. Various types of water bodies are utilized for different purposes, including fertilization, spawning, rearing, overwintering, and feeding. Each category of pond is designed to perform a specific technological cycle. At a high intensity level (involving repeated feeding and co-cultivation of several fish species at high density), it is possible to obtain 5-6 tons/hectare of fish products. The effectiveness of this cultivation method requires adherence to a number of conditions, including constant water flow, technical aeration of water, regular liming of ponds, and other measures. It is advisable to properly prepare ponds and implement technically sound management of fish farming, primarily through the use of a comprehensive set of measures related to systematic land reclamation.

Thus, comprehensive intensification of fish farming in reservoirs means simultaneous and comprehensive impact on the reservoir and the fish farmed in it, which is carried out by all known methods that increase the fish productivity of the reservoir.

In 2023, 3,682.9 hectares of land were allocated for fish farming in artificial reservoirs in the Andijan region. This indicator in 2020 amounted to 2619.2 hectares, and in 2023 increased by 1063.7 hectares or 40.6 percent. In the region in 2023, compared to 2020, the area of land allocated for fish farming in artificial reservoirs increased in the Andijan, Asaka, Balykchi, Bulakbashi, Jalakuduk, Izboskan, Markhamat, Altynkul, Ulugnar, and Shakhrikhan districts (Table 3).

As can be seen from the table, the area of land allocated for fish farming in artificial reservoirs has increased significantly across several districts: in Asaka district by 8.8 times, in Bulakbashi district by 3.5 times, in Jalakuduk district by 2 times, in Izboskan district by 13.3 times, in Markhamat district by 9.5 times, and in Shakhrikhan district by 4.5 times. Additionally, the area of land allocated for fish farming in artificial reservoirs has decreased in 2023 compared to 2020 in the following districts: Andijan city (19.8%), Buston (49.1%), Pakhtaabad (85.7%), Khojaabad (86.7%), and Kurgantepa (66.4%).

As fish farming in artificial reservoirs in the Andijan region has primarily developed in the Ulug'nor district, this district accounts for nearly 74.5 percent of the total area allocated for fish farming throughout the region. In 2020, 2281.0 hectares of land were allocated for fish farming in artificial reservoirs in the Ulugnfr district, while in 2023, this figure was 2742.1 hectares. According to the analysis results, we can see that this indicator increased by 20.2 percent in 2023 compared to 2020. This demonstrates that the practice of fish farming in artificial reservoirs is well-developed in the Ulugnar district of Andijan region.

Table 3.
Land area allocated for fish farming in artificial ponds in Andijan region, ha

Territory names	Years				Ratio of 2023 to 2020, %
	2020	2021	2022	2023	
Andijan city	4,2	2,5	1,3	0,83	19,8
Xonobod city	-	-	0,2	0,2	-
Andijan district	25,0	21,5	30,6	30,6	122,4
Asaka district	20,0	19,8	178,0	177,0	8,8 times
Balykchi district	42,0	81,9	75,5	75,5	179,8
Buston district	22,0	20,5	10,8	10,8	49,1
Bulakbashi district	13,0	3,7	15,2	45,0	3,5 times
Jalakuduk district	18,0	25,1	36,6	36,6	2,0 times
Izboskan district	17,0	145,6	226,0	226,0	13,3 times
Markhamat district	13,0	69,7	123,0	123,0	9,5 times
Altynkul district	51,0	40,0	55,0	55,0	107,8
Pakhtaabad district	7,0	9,7	6,0	6,0	85,7
Ulugnar district	2281,0	2486,1	2742,1	2742,1	120,2
Khojaabad district	54,0	48,0	46,8	46,8	86,7
Shakhrikhan district	19,0	18,0	85,6	85,6	4,5 times
Kurgantepa district	33,0	22,7	21,9	21,9	66,4
Total	**2619,2**	**3014,8**	**3654,6**	**3682,9**	**140,6**

The monographic study was conducted at "Andijonbaliq" LLC and "Valley Fish" LLC in the Andijan region. According to the research results, in 2023, the total land area of "Andijonbaliq" LLC amounted to 1,309.1 hectares, of which 1,012.3 hectares are occupied by artificial reservoirs used for fish farming. n 2020, this farm produced 3504.0 tons of fish. This indicator in 2023 amounted to 2089.5 tons, which is 40.4% less than in 2020.

Also, in 2020-2023, a decrease in the indicators of the cost of gross output, gross profit, and gross profit per 1 ha of pond area was observed in the farm over the years. In particular, if the gross product of the farm in 2020 amounted to 7587.9 million soums, then by 2023 this indicator decreased by 29.9 percent and amounted to 5317.3 million soums. During these periods, a sharp decrease in gross profit and gross profit per 1 ha of pond area was observed.

That is, we can observe that these indicators decreased by 90.3 percent in 2023 compared to 2020. Specifically, while the gross profit of the farm amounted to 5,159.8 million soums in 2020, this figure equaled 499.9 million soums in 2023. We can also see that the gross profit per 1 hectare of pond area correspondingly decreased from 5,097.0 million soums to 494.0 million soums.

At the same time, an analysis was conducted on the economic efficiency of carp cultivation in artificial ponds at "Valley Fish" LLC in the Andijan region. The total land area of "Valley Fish" LLC is 13 hectares, of which 6 hectares are occupied by artificial ponds. Carp is being raised in these artificial ponds. In 2023, the volume of fish stocking on the farm amounted to 250 million units, which is 25% more than in 2020. Additionally, the volume of mixed feed and mineral fertilizers used for fish increased from 400 tons in 2020 to 465 tons in 2023, representing a 16.3 percent increase.

During this period, the production of pond fish on the farm increased from 280 tons to 320 tons, representing a 14.3 percent rise. In 2020, net revenue from fish sales amounted to 8,960.0 million soums. This figure reached 13,671.0 million soums in 2023, which is 52.6% higher than in 2020. The cost of goods sold was 25.1 million soums in 2020 and increased to 35.7 million soums in 2023, showing a 42.2 percent increase over the same period. Gross profit in 2023 totaled 13,635.3 million soums, which is 52.6% more than in 2020.

Furthermore, current production costs amounted to 5,700.0 million soums in 2020 and 6,820 million soums in 2023. This indicator increased by 19.6% in 2023 compared to 2020. We can observe that during these periods, the profitability level of the farm increased from 156.7% to 199.9%, respectively.

At the same time, the gross profit per 1 hectare of pond area, the cost of 1 kg of fish, and the selling price of 1 kg of fish showed an increasing trend during the analyzed periods. Specifically, the farm's gross profit per 1 hectare of pond area amounted to 1,956,100 soums in 2020, while in 2023 this indicator increased by 62.4 percent, reaching 3,177,800 soums. Furthermore, the cost of 1 kg of fish in 2023 increased by 24.4% compared to 2020, reaching 11,170 soums. The selling price of 1 kg of fish also rose by 31.2% during this period. Specifically, while this figure stood at 32,000 soums in 2020, by 2023, 1 kg of fish was being sold for 42,000 soums.

In conclusion, it can be stated that, based on the analysis of the economic efficiency of fish farming at "Andijanbaliq" LLC and "Valley Fish" LLC in the Andijan region, "Valley Fish" LLC demonstrates a higher level of profitability. This is due to the well-established cultivation of carp on the farm, which has resulted in its high economic efficiency.

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