

Uzbekistan

Background

The Republic of Uzbekistan became an independent nation on August 31, 1991. It has an area of 447,291 km² – about the size of Sweden - and a population of 31 million. It consists of twelve provinces. Tashkent is the capital and largest city. Uzbekistan shares its borders with Kazakhstan, Tajikistan, Kyrgyzstan, Afghanistan, and Turkmenistan.

The Aral Sea today has broken into sections - Northern (Kazakhstan) and Southern (Uzbekistan), and it has been reported that the southern sector split again, with one section completely drying up in 2014, exposing the Aralkum (Akkum), the "white desert", a vast, salt-covered land. Large windstorms have swept the area which have affected the health of residents and the quality of drinking waters. In 1970-1980s the fisheries reported reached upwards of 40,000 MT/year. All fisheries have collapsed as the ecosystem dried and water salinities reached 60 ppt (the average ocean salinity is 45ppt). In the 1990s, the introduction of flounder (*Platichthys flesus*) from the Sea of Azov temporarily revived fishing; however, by the end of that decade, rising salinity levels rendered the South Aral Sea uninhabitable leading to another collapse in fisheries. As with other drying salt lakes at these high salinities the only remaining aquatic resource is brine shrimp (*Artemia*), which is being harvested and is the subject of pond aquaculture developments, see <https://www.youtube.com/watch?v=tkMJfoeF518>).

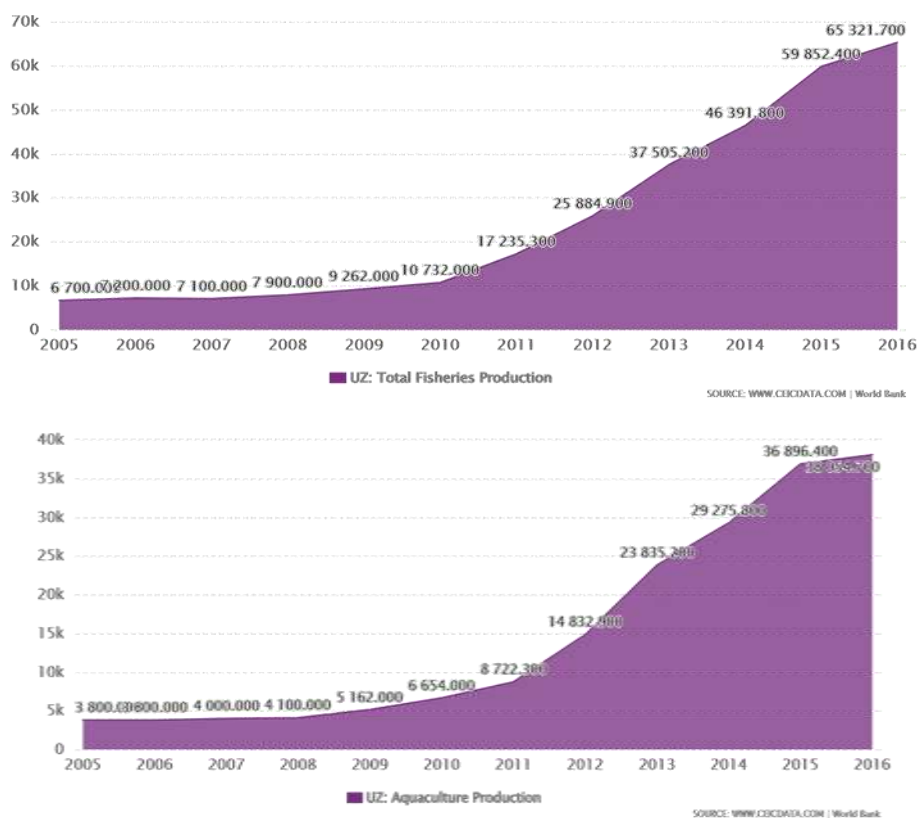
In 2024 Kazakhstan became leader of the International Fund for Saving the Aral Sea, and ~1.3 billion m³ of water was directed into the Aral Sea from October 2023 to April 2024. As a result, the water volume in the Northern Aral Sea has been reported to increase to ~22 billion m³ (<https://www.waterdiplomat.org/story/2024/07/waters-rising-northern-aral-sea> and https://en.tengrinews.kz/kazakhstan_news/efforts-to-increase-aral-sea-water-volume-have-been-revealed-265316/).



Image from <https://www.youtube.com/watch?v=RhxS1sF8hBk> with a summary available at <https://www.youtube.com/watch?v=tkMJfoeF518>

Uzbekistan Fisheries and Aquaculture Outside the Aral Sea

Uzbekistan's fisheries production has been reported to increase from 2016 to 2017, from 103,377 MT to 172,000 MT, with aqua culture most of the production (60-69%) (<https://www.ceicdata.com>; World Bank Agricultural Production and Consumption).



Uzbekistan Food Systems

Meat is the dominant protein source in Uzbek diets, but the growing fish farming industry and increased legume consumption do contribute to regional dietary diversity. The major sources of protein consumed in Uzbekistan include:

1. Meat – Beef, lamb (mutton), and poultry. Horse meat is eaten in traditional dishes (*bashbarmak*).
2. Dairy – Milk, yogurt, kefir, sour cream, and cheeses (*qatiq*, *kurt*).
3. Legumes – Lentils, chickpeas, and beans in soups, stews, and side dishes.
4. Eggs – Often eaten for breakfast and in dishes like *non to'g'ora* (flatbread with eggs).
5. Fish – Carp, catfish, and sturgeon from aquaculture, and imported fish.
6. Nuts and Seeds – Walnuts, almonds, and sunflower seeds.
7. Grains – Wheat (bread, noodles, plov) and rice.

Uzbek fish traditions

Per capita consumption of fish and fish products is low, ~4 kg in 2019 but this has increased from only 0.1 kg about 10 years ago.

There is a rich culinary heritage of Uzbekistan to build on for increased aquaculture development, as fish is substituted for terrestrial meats in some dishes and traditional fish dishes are often enjoyed alongside traditional side dishes like *achichuk* salad, pickled vegetables, and non (Uzbek bread). Carp (*sazan* in Uzbek) is a popular fish prepared in various traditional ways: (1) Sazan Kabob (Grilled Carp), (2) Sazan Palov (Carp Pilaf), similar to traditional Uzbek *plov*, but made with carp instead of lamb or beef, (3) Balykcha Shurva (Carp Soup), a rich fish soup made with whole carp or carp fillets, potatoes, carrots, onions, and tomatoes, (4) Sazan Dimlama (Stewed Carp with Vegetables), (5) Tandoor-Baked Carp, whole carp is marinated with a blend of yogurt, garlic, and spices.

Social Ecology of Uzbekistan Fisheries & Aquaculture

In 2021, Uzbekistan fisheries and aquaculture employed ~10,600 people, with most in aquaculture 7,380 (11% women) vs. 3,250 fishers. Fisheries and aquaculture play a social role in maintaining rural populations, especially in lower Amu Darya River delta and middle Syr Darya in Karakalpakstan, where “dozens of families declared that if fisheries were to cease, they would leave their native villages for better job opportunities” (Diffey and Kurbanov, 2020).

In the Amu Darya River delta region fisheries have been a main economic activity for centuries. Today, fisheries are carried out in two major lake systems: the Amu Darya delta and the Aydar-Arnasay Lake. Fish companies have contractual rental agreements with local administrations for periods of more than ten years. Aquaculture is practiced in the Amu Darya delta and adjacent areas. Key initiatives include government-backed and international cooperative programs to develop aquaculture, improve hatchery production and restock native fish species in aquaculture enhanced fishery programs and to develop full cycle aquaculture.

Uzbekistan Aquaculture and Aquaculture-Enhanced Fisheries

There are four typologies of aquatic food systems - capture fisheries, capture based aquaculture, aquaculture enhanced fisheries, and full cycle aquaculture (Costa-Pierce et al., 2022). Uzbekistan has three of these – capture fisheries, aquaculture enhanced fisheries, and full cycle aquaculture

Common carp (*sazan*, *Cyprinus carpio*) and imported Chinese carps (silver carp, *Hypophthalmichthys molitrix*, bighead carp, *Hypophthalmichthys nobilis*, grass carp (*Ctenopharyngodon idella*), are the main species produced. Extensive and semi-intensive carp polyculture systems in ponds are the main aquaculture systems. Silver carp accounts for ~50% of aquaculture production and grass carp ~18%. *Sazan*, the common carp in Uzbekistan, is an ancient variety native to the Sea of Azov, Black Sea, Caspian Sea, Aral Sea, Balkhash Lake, and the Amu Darya river. *Sazan* is the original wild subspecies of carp that has survived for thousands of years in the Danube and its tributaries. Today, the purity of this important wild type is under threat from genetic mixing in aquaculture.

Other important food species are crucian carp (*Carassius carassius*), pike-perch (*Sander lucioperca*), European and white breams (*Abramis brama* and *Parabramis pekinensis*), European and African catfish (*Silurus glanis* and *Clarias gariepinus*), and snakehead (*Channa argus warpachowskii*). Sturgeon (*Acipenser spp.*) are farmed mainly for caviar production. Tilapia (*Oreochromis spp.*) farming, though not traditionally farmed, is expanding. There are some intensive rearing systems for African catfish, sturgeon and trout. Reservoir aquaculture enhanced fisheries are very important in rural areas. Reservoirs are stocked with silver carp and grass carp from hatcheries for the aquaculture enhanced fishery, in addition to accidental introductions that of fish which established. Introduction of Chinese carps and breams have added to aquaculture and reservoir capture fisheries (Kamilov et al., 2021). In 2008, white Amur bream, was first found in Uzbekistan. Kamilov et al. (2021) stated that “It is known that during the introduction of Chinese cyprinids into the fish farms of Turkmenistan in the early 1960s, this species was unauthorizedly introduced, and...took root, penetrated the irrigation canals and reservoirs of Turkmenistan, gradually penetrated the middle reaches of the Amu Darya, and from there into the Amu-Bukhara machine channel.” In 2014-2015, white Amur bream was found in fishery landings in the Tudakul reservoir.

Aquaculture Enhanced Fisheries (AEF)

There are 26 irrigation reservoirs in Uzbekistan (not including Karakalpakstan) covering 170,600 ha, plus 13,000 km of canals and collected into 12,700 km of drains. Aquaculture hatcheries and nurseries are used to stock lake systems and rivers, with good results. Production is estimated at 53,000 MT compared to only 2,000 MT after independence.

Two lake systems are of major importance for AEF: (1) lakes in the Amu Darya delta, (2) the Aydar-Arnasay Lake System, situated in the middle of the Syrdarya River, and (3) lakes and reservoirs on the plains of the Kashkadarya and Zarafshan rivers, and in the Khorazm region. A major problem of the Aydar-Arnasay Lake System /Syrdarya River is that the water supply and reliability can change considerably according to irrigation needs, affecting fish reproduction. It has been estimated that 660,000 ha are suitable for AEF. Fish capture in reservoirs and lakes is carried out by fishery enterprises that conclude contractual rental agreements with local administrations for periods of more than ten years.

Kamilov (1995) stated that fish yields of Uzbekistan reservoirs was low, ranging from 7 to 30 kg/ha, and called for individual, specific, applied research and development to transform them into semi-intensive well managed fisheries bodies as each reservoir and lake system are diverse and unique.

Aquaculture in Rivers and Irrigation Canals

Cage and pen aquaculture in rivers and irrigation canals is a profitable activity in Indonesia, Vietnam, Egypt, Thailand, and China. Cage culture in rivers could be expanded if the high silt load, turbidity and as well as rapid changes in discharge rates of the rivers Zarafshan, Surkhan-Darya and Kashka-Darya could be better managed. Constraints are pesticide residues and high levels of silt in source waters, and the need for continuous, preferably constant, water flows throughout the fish culture periods (Redding and Midlen, 1990).



Tuatortar Canal to the Jizzakh Reservoir (Esonovich and Khotamovich, 2020).

Recreational Fishing

This provides avenues for foreign exchange earnings and an opportunity for the rural population to diversify their economic activities and earn additional income. Recreational and sport fishing is carried out by members of hunting and fishing clubs.

Governance

Management of the fishery sector is entrusted to the Ministry of Agriculture and Water Management (MAWR). Government policy places fish farms situated in rural areas and those involved in aquaculture are on an equal basis to agricultural enterprises in terms of obtaining credits, and purchasing fuel and oil, mixed feeds, mineral fertilizers, agricultural equipment and other production inputs. Aquaculture farms can apply to the MAWR and the Cabinet of Ministers of the Republic of Uzbekistan for beneficial credit. Ministerial Decree No. 350 on reforms to the fisheries sector of 2003, for the purpose of regulating fisheries and the trade of fish products, establishes that fishing water bodies shall be leased through tender to fishing enterprises for ten-year periods. Fishing under such leases shall not be subject to quotas but shall consider demand for and conservation of fishery resources. Fishing enterprises must strictly observe environmental legislation, fishing rules and regulations, and shall take measures to enhance the fish stock annually.

Fish Markets and Trade

Uzbekistan a net importer of fishery products. Imports of fishery products were US\$ 27 million in 2022, with the Russian Federation as main supplier. Exports of fishery products are US\$ 1 million. The main product imported was frozen Alaska pollock from the USA. Viet Nam is #2 of frozen pangasius fillets. Frozen salmon from Norway is the third major import.

Local producers of live and frozen fish supply more than 90% of consumption; 10% is imported. Most fish (60%) are sold in markets; 15% is sold through shops and supermarkets; and about 25% (mainly frozen and processed) are sold from warehouses to special consumers and wholesale buyers

In Tashkent city, there are three to five shops selling imported high value fish and fish products from the Russian Federation and other former Soviet countries. The products are frozen, canned, salted or dried, and caviar is packed in convenient and attractive packets. In the town of Chinaz, Tashkent province, there is a wholesale fish market. From this market, fish is transported to Tashkent, which is 70 km away. Fish is transported to this market from the Aydar-Arnasay lake system and Chardara reservoir in Kazakhstan. There are refrigerators in the market with ice, as well as special places for selling fish. According to various unofficial

sources, on average 3-5 MT of fresh fish (maximum registered quantity 20 MT reported by fish sellers) are sold every day in this market.

Aquaculture farms are situated near cities and towns and sell their harvest in autumn. The trade in fish is seasonal; therefore, there are only a few enterprises specializing in fish trade. Fish are sold to traders in small lots (up to 200 kg) on the pond bank by contracts. From there, part of the fish is sold by farms in markets and shops. Aquaculture farms sell fish at prices proposed by producers, about half that of the wholesale price. All trade entrepreneurs have a license for trade. There is only one large-sized enterprise, Baliksavdo, which imports canned fish for special consumers (Home Ministry, Ministry of Defense and National Security Service). It has special shops in markets. There is also a shop processing imported herring into salted herring.

Capacity Development

The Ministry of Agriculture (MoA) developed an agriculture development strategy in cooperation with advisors from relevant ministries and the international donor community (the World Bank, European Union, FAO, etc.). The MoA is the responsible institution for the development of science, education, systems of information, and consulting services in the agriculture industry. Fish is mentioned under food security with reference to: “carrying out research aimed at increasing productivity in livestock production, sustainable intensification of fish and poultry meat production as well as milk production.” In the research literature, Tashkent State Agrarian University and the Navoi State Pedagogical Institute are cited as active in fisheries in Uzbekistan.

Presidential Decree No. PP-83 “on additional measures for the further development of the fishing industry” of 2022, approves the proposal of the Ministry of Economic Development and Poverty Reduction of the Council of Ministers of the Republic of Karakalpakstan, local government, and the Association “Uzbekbaliksanoat” on the introduction in each province of household fish farming clusters, as established in Sharaf-Rashidov district of Jizzakh region. It establishes procedures for cooperative household fish farming:

- (a) fish farms organize training for owners of household facilities for fish farming skills and supply them with equipment, fish fry, compound feed and mineral fertilizers required for fish farming as well as purchase from owners of household facilities grown fish at an agreed price, and
- (b) owners of household facilities supply fish, grown thereby with intensive methods and with the use of fish fry provided by fish farms, selling fish to fish farms at the agreed price.

International organizations (the World Bank, FAO, European Union and the United Nations Development Programme) have supported the development of aquaculture in Uzbekistan. Uzbekistan with FAO developed a National Strategic Plan for Aquaculture Development. The plan aims to increase efficiency and productivity across the fish value chain, thereby improving livelihoods for smallholder fish farmers and providing consumers with better access to healthy food. The strategic initiatives in the plan include:

- Launching a national marketing campaign to boost fish consumption.
- Exploring alternative distribution methods, such as mobile vending and e-commerce.
- Strengthening food safety regulations.
- Building capacity within the private sector.

These efforts are designed to address challenges identified in the aquaculture value chain, including low fish consumption due to cultural preferences for meat, develop food safety, address rising production costs and stagnant fish prices.

Summary of First Observations

Review of literature and assessments of Diffey and Kurbanov (2022) and others indicate that Uzbekistan has significant potential for aquaculture and aquaculture enhanced fisheries growth. A UN Department of Economic and Social Affairs (2021) review found Uzbekistan made much progress toward achieving the UN's Sustainable Development Goals. Some observations:

- Expansion of Aquaculture Enhanced Fisheries (AEF) for rural development – accelerate applied R&D to understand individual reservoir and lake fishery ecosystems and their fishery carrying capacities to increase production to 30-40 kg/ha.
- Expand cage culture in irrigation canals and drains with suitable water quality free from contamination.
- Develop recirculating aquaculture systems (RAS) hatcheries and nurseries for the expansion of AEF.
- Expand aquaculture species diversification with fed species (European and African catfish, trout, etc.) where local feed sources and mills are available.
- Expand work with bioflocs as alternatives to expensive feed imports.
- In all of these, strengthen partnerships with international organizations (World Fish Center, FAO, EU universities).
- Build a national fisheries and aquaculture extension service in each of the nation's 12 regions (*viloyats*), Tashkent City, and its autonomous republic, Karakalpakstan.

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