

Fisheries and Aquaculture



■ A fisher removing flounder from a net pulled from a hole in the ice in the northern section of the now divided Aral Sea. The northern Aral Sea is rebounding and catches are increasing year by year. **Upper right:** Mixed harvest from the northern Aral Sea, where catches have been growing in diversity and quantity since the Aral Sea was divided by a dike in Kazakhstan in 2005. **Lower right:** The herbivorous grass carp (*Ctenopharyngodon idella*), successfully introduced into Central Asian rivers, is a commercial species with ecological benefits; it also helps to keep waterways clear by eating aquatic weeds.



Central Asia's major source of fish is the Caspian Sea. During the Soviet period, more than half a million tons of fish were harvested from the sea each year by the five countries surrounding it, the main species being sturgeons, beluga, and sterlet; sprat and herring; zander or pike-perch; common carp; bream; catfish; and the Caspian roach. Other commercially important species are the shads: blackback shad, dolginka shad, and Caspian shad; and the asp (a carp).

Catches of most of these fish have fallen dramatically since the beginning of the 1960s, as large reservoirs and canals were constructed on rivers flowing into the Caspian basin for irrigation, especially of cotton farms. These prevented many anadromous species, especially the sturgeons, from completing their life cycle throughout most of their range. Pollution from agricultural and industrial effluent and from oil production on and around the sea has also degraded many fish habitats.

The Aral Sea was also a source of fish. However, its reduction in size accompanied by increased salinity and pollution reduced catches there to almost zero. Other sources of fish production are natural fisheries in all freshwater bodies and aquaculture, or fish farming, in lakes, ponds, and reservoirs.

At present, fish production is at a low ebb, with regional production at 50,000–60,000 tons, plus

a significant but unknown illegal catch. Between 1989 and 2006, fisheries and aquaculture harvests in Kazakhstan, Turkmenistan, and Uzbekistan fell by 60%–72%, while in the Kyrgyz Republic and Tajikistan they fell even more dramatically, by 98% and 94%, respectively.

Fish consumption now is only a tenth of that in the 1980s. At that time in the Kyrgyz Republic, for example, Thursday was “fish day,” when all restaurants served fish dishes. After independence, as fish became scarcer and more expensive, this tradition vanished. Consumption there is now less than 1 kilogram per person per year, and less than half a kilogram in Uzbekistan. Kazakhstan's (mainly Caspian) fisheries provide its population with about 8 kilograms per person per year on average.

The main reasons for declining production are overfishing; poor management; large decreases in investment in research, production facilities, and maintenance of fleets and hatcheries; and pollution of water bodies. Some details follow.

The fisheries sector in Kazakhstan was very important during the Soviet period, with production exceeding 80,000 tons per year, 90% of which came from the Caspian Sea. In 2006, total production was about 35,000 tons, almost all from the Caspian. Exports remain significant. Aquaculture during the Soviet period contributed 8,800 tons of fish per year but has virtually





Top left: Fresh fish for sale in a street in Almaty, Kazakhstan.
Top middle: People fishing at a trout farm in Turgen Gorge near Almaty.
Top right: Fish being prepared for canning at a factory in Turkmenbashi on the Caspian Sea, Turkmenistan.
Middle: Dried fish for sale at a roadside store near Naryn, Kyrgyz Republic.
Bottom: The asp (*Aspius aspius*) is a fish-eating carp, found in most of Asia and eastern Europe; it grows to 9 kilograms and is a game fish as well as a commercial species in Central Asia.

disappeared. In 2003, a Fish Farming Committee was established to revive the industry. Hatcheries for carp and sturgeon are being set up and long-term land leases made available to encourage private investment.

A new development is boosting Kazakhstan's fisheries. The waters of the northern Aral Sea have been rising since Kazakhstan separated it from the larger southern part by a dike in 2005,

and fish catches have been booming. The annual harvest increased from 52 tons in 2004 to 1,490 tons in 2008. And with plans in hand for other dikes and canals, catches could multiply again.

Fish production in the Kyrgyz Republic was mainly in Lake Issyk-Kul, with annual harvests approaching 1,500 tons. Production began to fall. In the 1970s and 1980s, 70% of the annual harvest of 1,400 tons came from pond culture on state-run farms. After independence, the farms were privatized and production declined. Kyrgyz Republic's 1,900 lakes and 30,000 rivers longer than 10 kilometers produce very little at present, but could produce significant quantities—given cost-benefit studies and enforced regulations, especially on illegal fishing. However, the opening of reservoirs for hydropower interferes with fish reproduction and habitats, and stocking will be needed to increase catches.

Tajikistan's fish production from its extensive rivers and reservoirs is quite low. Reservoirs have been stocked with a variety of species, including snow trout, Amudarya trout, Tibet char, Tajik char, Turkestan bullhead, Amudarya goby, and topminnows, among others. The Kayrakkhum Reservoir, for example, currently provides 150 tons of fish per year.

Turkmenistan's entire western border faces the Caspian Sea. Yet, the only fishery of any significance now is that for the small Black Sea

Central Asia Fish Production, 1996 and 2006, tons

	1996			2006		
	Capture	Aquaculture	Total	Capture	Aquaculture	Total
Kazakhstan	44,273	1,682	45,955	35,148	528	35,676
Kyrgyz Republic	160	185	345	7	20	27
Tajikistan	40	93	133	184	26	210
Turkmenistan	9,014	307	9,321	15,000	16	15,016
Uzbekistan	1,494	5,006	6,500	3,400	3,800	7,200

Sources: *FAO Yearbook of Fishery and Aquaculture Statistics*, 2006.
 FAO Fisheries and Aquaculture - Global Statistical Collections. www.fao.org/fishery/statistics/en



Central Asia Fish Trade, 1996 and 2006, \$ '000

	Trade 1996		Trade 2006	
	Imports	Exports	Imports	Exports
Kazakhstan	16,881	19,017	33,738	50,589
Kyrgyz Republic	1,435	–	3,949	18
Tajikistan	114	–	954	–
Turkmenistan	223	293	617	27
Uzbekistan	1,553	534	1,213	444

Sources: *FAO Yearbook of Fishery and Aquaculture Statistics*. 2006. FAO Fisheries and Aquaculture - Global Statistical Collections. www.fao.org/fishery/statistics/en

sprat, about 15,000 tons annually. Its erstwhile lucrative sturgeon fishery for caviar has dwindled to almost nothing as the sturgeon species have become almost extinct. The country's harvest from lakes and reservoirs is very low, less than 500 tons per year, yet there is potential to produce six times that amount. Harvests are now increasing with the successful introduction of algae-eating silver and grass carps from the People's Republic of China into the Amu Darya River Basin. An added benefit is that these carps keep the canals clear of aquatic weeds and prevent damage from water eutrophication.

Before the 1960s, the Aral Sea provided 25,000 tons or 60% of Uzbekistan's annual fish catch but by the early 1980s, the Aral Sea catch declined to zero. Total fish production in 2006 was only 7,200 tons, around half from 800,000 hectares of lakes and reservoirs and the remainder from aquaculture. The lakes and reservoirs could provide three times this amount, while the 10,000 hectares of aquaculture ponds could produce 20,000 tons annually. The subsector was privatized in 2003 and more than half a million hectares have been leased out for aquaculture. Commercially important species include common carp, pike-perch, common bream, catfish, asp, goldfish, silver carp, grass carp, snakehead, and pike.

Beluga Sturgeon

Caviar, one of the world's most exotic and expensive foods, is the eggs or roe, of sturgeons. The slightly saline Caspian Sea is the favorite haunt of sturgeons. Six species live there and in the many rivers that flow into it from the surrounding countries—Azerbaijan, Iran, Kazakhstan, the Russian Federation, and Turkmenistan. The Beluga sturgeon (*Huso huso*) yields the most expensive caviar of all, selling at two to three times the price of other sturgeon caviar. And it is an impressive fish to say the least, growing to 6 meters or more and weighing up to 2 tons, making it far bigger than most sharks. After reaching maturity at around 2 meters long and 13 years of age, mature female Belugas head into the freshwater rivers annually to spawn.

The Caspian Sea accounts for 80%–90% of all sturgeons caught. The catch of Belugas fell from nearly 3,000 tons in 1970 to about 300 tons in 2003. The reasons are a microcosm of many similar problems faced by inland fisheries everywhere. First, many rivers have become blocked with hydropower dams since the 1950s, and said to have affected by now 90% of the spawning grounds. Second, heavy fishing even of small sturgeon that had not yet spawned meant there were insufficient numbers of young fish replacing those caught. Third, the Soviets built hatcheries but most of these fell into disrepair after independence of the Russian republics. Fourth, there is no Caspian-wide management of the fisheries. They are managed by the individual countries. Finally, restrictions on catch have led to much illegal fishing, and no wonder. Recent prices of Beluga caviar were about \$3,000 for a 0.25 kilogram (kg) pack, translating into a retail value of up to \$360,000 from a single moderate (250 kg) size fish. Fifth, the Caspian rises and falls in a cyclic pattern over decades. It reached its lowest level in recent times in 1977, meaning less food—small fish, crustaceans, and worms—for the sturgeon. By 1995, the sea had risen substantially, flooding lands by then contaminated with agricultural residues like pesticides, oil, and metals from mining wastes.

Since 1998, official international trade has been regulated by the Convention on International Trade in Endangered Species (CITES) so that all caviar has to have an export permit and be from a legal fishery. Regulations under CITES closed the trade from the Caspian and other areas in 2006 but allowed it to re-open in 2007. Meanwhile, the sturgeon populations show no signs of recovery and could eventually become extinct.

Beluga Sturgeon Catch



Source: Larissa J. Graham and Brian R. Murphy. 2007. The Decline of the Beluga Sturgeon: A Case Study about Fisheries Management. *Journal of Natural Resources and Life Sciences Education*. 36: 66–75.



Upper: In the past decade, fishers have rarely seen mid-sized Beluga sturgeon like the one pictured here, captured from the Volga River in the Russian Federation. Lower: A Beluga sturgeon from Kazakhstan's Ural River undergoes a nonlethal method of egg extraction.