Let us speak about Caspian Sea

Generalities

The Caspian Sea is a remnant of the Para Thetys sea. It became landlocked about 5.5 millions years ago due to tectonic uplift and a fall in sea level. It is the largest closed sea of the world (1200 km length, 280 km average width) with a total surface of 371000 km^2. It lies 28 meters below the ocean level. Its shoreline extends over 5360 km.

Its level mainly varies according to evaporation (main outflow) and flow rate of the Volga river (main inflow) which represents 80 % of its fresh water supply, Due to this inflow of fresh water river, the Caspian Sea is nearly a fresh-water lake in its northern portion. It is more saline however on the Iranian shore. Average salinity is low (around 1,2 % that is one third of the salinity of most oceans).

Southern, middle and northern Caspian Sea

Caspian sea is also characterized by a very specific bathymetry dividing the whole area into a deep southern, a middle and a shallow Northern region. In particular the northern platform is very shallow with water thicknesses comprised between 2 and 10 meters. These shallow depths are reinforced by the supply of sediments provided by the Volga.

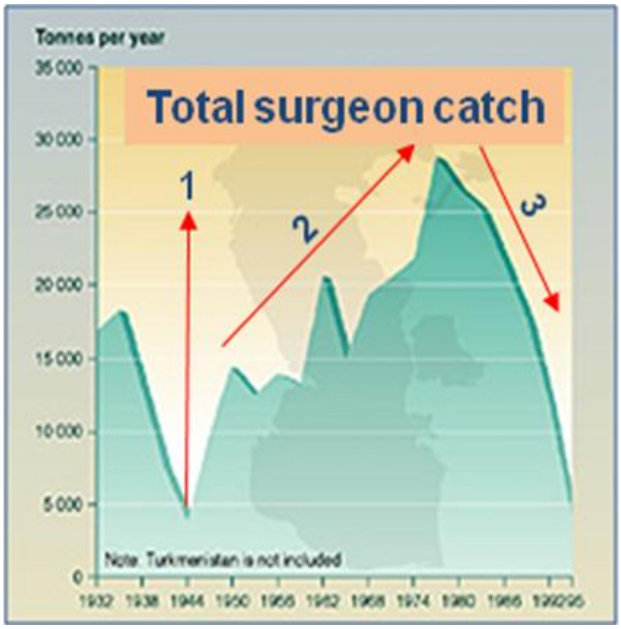
Finally, he Caspian region is also subjected to large temperature variations in particular in its northern part. In January temperature can drop to -30°C. Ice cover may form in all the three parts but is only present every year in the Northern part where shallow waters, low salinity and low temperatures favour early ice formation. It starts mid-November in north eastern regions then gradually spreads out to the west (the Volga delta) at the end of November. In December, ice covers all areas of the Northern Caspian with depths less than 5 m. In January, ice reaches an average of 40–50 cm which may increase up to 120 cm during severe winters. Ice decay starts in March and fully disappears early April. Winds are very strong and their influence results in intensive deformation of the ice cover and subsequent cracking, fracturing, rafting, as well as the formation of hummocks and ridges.

Biodiversity

The biodiversity of Caspian Sea is 2.5 times poorer than Black Sea and 5 times poorer than Barents Sea. The life is particularly poorer at depths of more than 100m: no abyssal fauna and flora are present in this lake. Salinity and temperature are the main factors impacting the biodiversity which is composed of three main ecosytems: fresh, brackish and marine. Water salinity is too high for fresh water fauna and flora but too low for marine species. The organisms require therefore very good osmo-regulatory abilities. It is the paradise for brackish water species, fishes and crustaceans which represent 66% of the total biodiversity. 75% of species in the Middle and South Caspian are Caspian indigenous organisms, 20% are fresh water species, 3% are Atlantic introduced species, and 2% are Arctic species. In the North Caspian fresh water species dominate but Caspian indigenous species are only 36%. Two species have been particularly under the spotlights for their rarefaction during the XXth century: sturgeons and seals.

Sturgeons

There are 25 different species of sturgeons in the world (Black Sea, Sea of Azov, Lake Baikal, and Mississippi River). Six species are found in the Caspian Sea including Beluga which is one of the largest freshwater fish on earth (6 meters in length, nearly 1,300 kg and 118 years old). All sturgeons reproduce in freshwater. Dams on Volga and Kura rivers have blocked sturgeons migration and do no longer support sturgeon reproduction. The Ural River is now the only river (no dam) supporting sturgeon reproduction. Adult sturgeon finds place in the Ural River for reproduction. The beluga sturgeon reproduces 500 km to 800 km from the river mouth.



Harvesting of surgeon in the Caspian Sea

Sturgeon are heavily harvested (for their eggs which are processed into caviar) which endangers the fish stocks, since it targets reproductive females. Sturgeon harvest highlight three main periods : 1. reduction in fishing during second world war 2. un-controlled overfishing between 1950 and 1980 3. dramatic decrease of catch (-88% from 30,000 tons in 1985 to 13,300 tons in 1990 and then to as low as 2,100 tons in 1994) during the last twenty years due to sturgeon rarefaction. Illegal fishing is still a problem in many areas. Only better control of fishing and international trade can ensure that sturgeons survive into the future.

Seals

Caspian Seal is one of only two fresh water seal species living in inland waters (the other is found in Lake Baikal) and the only mammal inhabiting the Caspian Sea. The population size was estimated at 1,000,000 in the early 1900s (250000 new born pups annually). Hunting has been the primary cause of the decline. Combined with other factors such as fisheries by-catch, disease, invasive species and industrial development the population has continued to decline. In 1980 number of seals was estimated at 400000. Today estimation is 100 000 with 12000 newborn pups/year.

Invasive species were particularly brought from the black sea when the Don Volga canal was opened in the mid 50s. They had a negative impact on the food chain in particular the jelly *Mnemiopsis* introduced into the Caspian during 20th century. It is predator of zooplankton and tulka eggs. It has a negatively influences on tulka populations and therefore on seals food chain. Seal survival may be impacted in the future by reduced winter ice cover on which depends successful reproduction.

Main threat to biodiversity

Many dams have been built on Caspian rivers for hydroelectric power & irrigation. They reduce annual flow of fresh water in the Caspian, modify salinity and consequently impact biodiversity which is salinity very sensitive. River regulation also reduces the area of delta vegetation & induce loss of aquatic and coastal fauna.

Apart the river regulation, hydropower plans create accidental discharges in spring damages coastal ecosystems and prevent spring spawning. They dry up the river downstream and plains during dry periods to keep water level. Furthermore turbines kill or badly damage species.

Even if catch of sturgeon have been reduced from 25000 tons per year to 1000 tons per year, illegal fishing remains the main threat for sturgeon. Problem also affects other species such as trout, bream, zander.

Other threats are changes in the level of the Sea that has also a non-direct impact on biodiversity via human activity and pollution sources from industrial, agricultural, sewage and accidental discharges.

Volga drains 20% of the European land area and is the source of 80% of the Caspian's freshwater inflow is also the principal sources of transboundary contaminants. Untreated waste from the Volga River, into which half the population of Russia - and most of its heavy industry - drains its sewage, empties directly into the Caspian Sea. Each year an average of 60,000 metric tons of petroleum byproducts, 24,000 tons of sulphites and 400,000 tons of chlorine are dumped into the sea. Volga creates 80% of the Caspian pollution