

# Anthropogenic changes of the Aral Sea ecosystem

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Until the middle of the XX century the Aral Sea was one of the largest salt lakes in the world. Only the Caspian Sea, the Great American lakes, and the Victoria Lake in Africa exceeded the Aral Sea area. Salinity in this lake was about 10 g/l, but in the inflow sites of Syr-Darya river in the North-East and the Amu-Darya river in the South, it was even lower. Contemporary Aral Sea appeared about 10 thousand years ago. Several periods of transgressions and regressions occurred in Holocene. The Aral Sea was always characterized by low species diversity. Before the anthropogenic salinization the Aral Sea was inhabited by fresh water and brackish water origin animals.

The first significant change in the biodiversity of the Aral Sea in the XX century was connected with man-made acclimatization. In the period from the 1930s till the 1970s a lot of fishes and invertebrates were introduced into the Aral Sea, many of them acclimatized and started to influence on the aboriginal species. In 1954-1959 Baltic herring was introduced. After acclimatization of this plankton-eating fish some planktonic crustaceans decreased in numbers or completely disappeared. Large zooplankters: *Arctodiaptomus salinus*, *Moina mongolica* and some other large forms are completely gone due to predator's impact. At the same period together with mullets from the Caspian Sea to the Aral was introduced a shrimp *Palaemon elegans*. In 1958-1960 4 species of opossum shrimps were introduced by man, but naturalized only 2: *Paramysis (Mesomysis) intermedia* and *P. (M.) lacustris*. In 1965-1970 to the Aral Sea was introduced planktonic copepod *Calanipeda aquaedulcis*. In the middle of 70's a crab *Rhithropanopeus harrisi tridentatus* was introduced by accident.

Other large changes of the biodiversity were connected with anthropogenic desiccation and salinization of the Aral Sea, which occurs due to redirection of Amu-Darya and Syr-Darya riverine waters to irrigation fields. Increasing salinity first killed all freshwater and then some brackishwater species. Completely disappeared all Sididae, Chydoridae, Bosminidae, Daphnidae, Cercopagidae and some Cyclopoidae and Harpacticoida. In the Aral Sea disappeared 10 species of freshwater and brackishwater origin Ostracoda. Only one salt tolerant ostracod *Cyprideis torosa* survived in the Aral Sea. Due to salinization and competition with introduced species completely disappeared *Dikerogammarus aralensis*. Salinity increase killed all aboriginal fishes except stickleback *Pungitius platygaster*.

Since 1989, the Aral Sea has ceased to exist as one lake. Because of desiccation, it was divided into two parts: the northern Small Aral and the southern Large Aral. Contemporary hydrology of these lakes is different.

The Small Aral Sea has a lower salinity of water (about 20-30 g/l); its level is rather stable (+40 m asl) and 5-6 meters higher than that of the Large Aral Sea. Nowadays, due to reconstruction of a dam between the Small and Large Aral in the area of the Bergs strait, there is an opportunity to freshen the water and increase the level of the Small Sea. If complete reconstruction of the dam will be happen the biodiversity in this part of the Aral will be improved. Unfortunately, similar favorable conditions are absent for the Large Sea. Large Aral still is shrinking and its salinity already is about 70-80 g/l. Recently in this part of Aral appeared brine shrimp *Artemia salina*. In the nearest future when salinity will exceed 100 g/l this species probably will be the only one Metazoa in the Large Aral Sea. Salt tolerance algae and Protozoa (*Fabrea salina*) will be also numerous. Harvesting of *Artemia* cysts could be a profitable business in the southern part of Aral in the nearest future.

This study was supported by INTAS grant ARAL SEA 1053.