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Past and present Aral Sea

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The tragedy of disappearing of Aral Sea is well known to the World. Before and after collapse of Soviet Union, a huge quantity of scientific and popular editions described with grief the situation around the Aral Sea. After the NIS states became independent, World Bank, UNDP, UNEP in proper competition with each other had provided some assessment of the situation through presentation of some small and medium grants, but after 2000, the local population remained alone with own problems. Although on the eyes of the present generation a unique transformation of great water body into deserts took place, the global scientific community did not find forces and financing for real and detail investigation of the processes accompanying the Sea shrinking and land formation. We should acknowledge and give big respect to NATO, later to German Government that through GTZ (now GIZ) – German International Collaboration Agency – and GFZ (Potzdam) paid attention to this area of environment crisis and organized scientific and protective design in the so-called Priaralie – the territory around the drying Sea and delta of the two rivers – Amudarya and Syrdarya. Thank to this assistance, the local specialists in collaboration with limited a number of foreign scientists (N.Aladin, P.Zavialov, Joop de Schutter, Hans Wilps, Hedi Oberhansli) organized significant works for detail socioeconomic, ecological and hydrological assessment situation in Priaralie and on the Aral sea coast. On this base, Ministry of Agriculture and Water resources of Uzbekistan and State Committee of Water resources of Kazakhstan developed a plan of rehabilitation of Amudarya and Syrdarya deltas and started implementation of these projects. If Kazakh water authority moved ahead in wetland restoration faster, a forestation of delta and drying bed of Aral Sea got big success in Uzbek territory. 244 thousands hectares of saxsaul and tamarix were planted for protection of the Priaralie.
By request of GTZ SIC, ICWC organized in 2005-2009 sixth expeditions for complex remote sensing and ground investigations Aral Sea former bottom that were complemented in 2010 -2011 by two expeditions with GFZ. As a result, the landscape, soils and environment mapping was done with determination of ecologically unstable zones and assessment total change of lands situation compared with the pre-independence time. Moreover – methodic of monitoring water, environment and hydro geological indicators on the all deltas area was elaborated, organized its testing and combined with remote sensing data on Amudarya delta for 2009-2012. It permits to SIC ICWC to organize systematic permanent (decadal) monitoring and recording of size, volume and level of water in Aral Sea.

Since the beginning of regular observations over the Aral Sea level, 2 periods can be emphasized:

1. Conditionally natural period - 1911-1960 - characterized by a relatively stable hydrological regime, with fluctuations in the level around 53 m and the range of inter-annual fluctuations at no more than 1 m., when the sea received annually about a half of the run-off in the Syrdarya and Amudarya Rivers, i.e. 50-60 km3/yr.

2. Intensive anthropogenic impact period - since the 1960s, a vast extension of irrigable land was carried out in Central Asia that resulted in intensive diversion of river run-off.

Since then, the sea level has been falling steadily, causing a dramatic reduction in the water surface area, a decrease in water volume and depths, great changes in shoreline configuration and an expansion of the desert areas adjacent to the Aral Sea. From 1960-1985, when the sea was an integral water body, slight lowering in the sea level took place until the 1970s, when the sea-level decreased with the mean level lowering 1 m. The desiccation process accelerated visibly from the mid 1970s. In 1975-1980, the level decreased by 0.65 m a year on average. Moreover, the level dropped greatly, when the run-off of the Amudarya did not reach the Aral Sea any more (1980-1990).

Kokaral was the first of the large islands becoming a peninsula, separating the Small Aral Sea in the north-east by joining the shoreline in the west. By 1986, the peninsula practically detached the small Aral Sea from the large Aral Sea, leaving only a narrow flow passage in the east. Since that time, the hydrological regimes of the Small and Large Seas have become separated. The construction of Kokaral dam in Kazakhstan, 12 km long and 8 m high, then completely separated the small Aral Sea from the large Aral Sea and changed the hydrological

regimes of the water bodies. Level of this part of Sea became from this moment permanently higher than in the large Aral Sea on 42 m a.s.l.

The eastern part of the sea, where the bed is much shallower and the slope is gentler is more subjected to shrinking then the western part. 2005 year became threshold, from which Eastern Aral Sea began new story – deviation from almost empty water body to almost 4 meters depth.

Present assessment of water balance of Aral Sea and delta at whole dependent from delivery water river and drainage flow through control section of Samanbay on the Amudarya and some cross sections on the enter main collectors to the delta boundary. These hydrological characteristics accepted on the base of information from BWO Amudarya and our monitoring of allocation of different waters on the delta. Water volume and water surface area of Eastern and Western Aral Sea bowls were definite on the result RS data from Landsat. Bathymetric curves gave ability to assess dynamic levels of Seas. After series of enough water years 2002 – 2005 with average water income to south Priaralie 12.5 km3 period of water scarce years lead to sharp decrease of surface water area of the Eastern bowl from 1010,5 th.ha on average on two time with failure of level from 31,1 m up to average 28,5 m. But phase of permanent reducing all indicators water body changed in 2008 on deviation in range from 26.3 m to 29.5 m. Some time sharp changes in the level of water in 2.0 m take place in time one year. These changes same as degree of deltas' watering depends fully from inflow water to boundary of deltas.

At the same time, the Western bowl remained more or less stable and without direct flow of surface water supported own water stability based on balance between evaporation and precipitation plus presumably the inflow of deep ground water.