

Current water balance of Balkhash Lake

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Given work was done within the framework of the research program “Assessment of resources and forecasting of natural water use in Kazakhstan under human- and climate induced changes” [1].

Balkhash lake is a unique natural site, which forms the basis for a vast ecosystem. Monitoring of the lake and maintenance of its current level is a complex challenge, meeting of which determines guarantee of water (and, as the Aral Sea case shows, of survival) for future generations.

Among final stages of monitoring is the generation of the lake’s water balance, which evaluates inflow and outflow, i.e. inflow to the lake of surface and ground waters, precipitation falling onto lake surface, evaporation from the water surface, level changes, and, finally, volume changes. In the given work we estimated water balance of Balkhash lake over the period since 2000 till 2009, and analyzed changes in balance components in different periods, starting since 1937 (water balances for the period 1937-1999 were estimated by KazNIEK and given in [2]). The following significant periods were selected: 1937-1969 – before construction of Kapshagai HPP; 1970-1986 – before degradation of glaciers, which affected the river runoff; and, 1987-2009 – recent period.

Table 1. Water balances of Balkhash lake over different periods, km³/yr

Water balance item	Period			
	1937...1969	1970...2009	1970...1986	1987...2009
Inflow	18.59	16.73	15.15	17.99
Outflow	18.17	17.73	18.18	17.36
Changes in water quantity from water balance equations	0.44	-0.99	-3.02	0.63
Actual changes in water quantity	0.73	-0.39	-2.46	1.28

The research showed that the lake’s water balance was affected heavily by an increased anthropogenic load on basin water resources and, particularly, by constructed Kapshagai reservoir. According to [1], even despite the expected growth of natural inflow and precipitation in the basin area as a result of climate change, further decrease in inflow of water into Western Balkhash would lead to lowering of the lake level below a critical mark and to considerable increase in salinity in this part of the lake. This, in turn, may cause great damage to water supply, industry, and environment as a whole in the region.

References

1. Research report «Assessing present and future hydrological dynamics in Balkhash lake, Caspian Sea, and Aral Sea». TOO «INSTITUTE OF GEOGRAPHY». – Almaty, 2010 – 187 p.
2. Issues of hydro-ecological sustainability in the basin of Balkhash lake/Edited by Samakova A.B. - Almaty: Publishing house «Kaganat» 2003 – pp.126-152.