



WATER SUPPLY ECOSYSTEM SERVICE OF FORMER KAKHOVKA RESERVOIR

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Abstract

Kakhovka Reservoir (KR) on the Dnipro River was put into operation in 1956. Its full volume was 18,2 km³ and its usable storage was 6,8 km³. The area of the water surface, when a normal retaining water level was observed, was 2155 km². It was one of the largest reservoirs in Europe but for several reservoirs on the Volga River in Russia. On the 6th of June 2023 at 02:50 AM the Kakhovka dam was demolished by RF military forces and as a result, by June 18-20 the Kakhovka Reservoir ceased to exist.

In spite of its artificial origin, the KR supplied valuable ecosystem services (ESS) important for human being and natural aquatic and coastal ecosystems. In this paper, we evaluate the most significant ESS provided by the KR for the region. This is important for various reasons, but most importantly, such an evaluation can contribute to a discussion on the feasibility of restoring the dam after the war. Among the ESS provided by the KR were supporting and regulating ESS, providing water in the right amounts and at the right time to ensure the functioning of natural ecosystems downstream of the KR, in particular the lower Dnipro aquatic ecosystem, which in turn provides a number of important ESS. Fishing in the KR provided important provisioning ESS. By 2022, for example, up to 3,300 tons of fish annually were caught in the KR. The Reservoir created conditions for rest and recreation, which was used by hundreds of thousands of people (socio-cultural ESS). Arguably the most important ESS from the KR, however, was supply of water for households and diverse sectors of the economy (provisioning ESS). Our estimates of the needs and analysis of actual volumes of water consumption from the KR by the population of the region (for drinking and economic needs), power generating stations (Kakhovka hydroelectric power station, Zaporizhzhya NPP and TPP), industrial enterprises, the agricultural sector (mainly for irrigation) and water transport show that in low-water years before 2022 there was a shortage of water. In the absence of the Reservoir, the available resources of the Dnipro River cannot meet the water needs of the region, as defined by the pre-war situation, even if we do not take into account the water supply to the Crimea.

Keywords

Kakhovka Reservoir; ecosystem services; water supply and consumption; fishing; irrigation