

Article

Water Consumption of Agriculture and Natural Ecosystems along the Ili River in China and Kazakhstan

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Abstract: The Ili River is a transboundary river shared by China, upstream, and Kazakhstan, downstream. The Ili is the main water supplier to Lake Balkhash, the largest lake in Central Asia after desiccation of the Aral Sea. Agreements over water allocation have not been concluded between China and Kazakhstan. This paper investigated water consumption of agriculture and riparian ecosystems in the Ili river basin, to provide information for further debate on water allocation, through the Simplified Surface Energy Balance Index (S-SEBI) approach using Moderate Resolution Imaging Spectroradiometer (MODIS) satellite images. The overall water consumption in the Ili river basin was 14.3 km³/a in 2000, 17.2 km³/a in 2005, and 15 km³/a in 2014. In 2000, China and Kazakhstan consumed 38% and 62% of the water, respectively. By 2014, the relative share of China's water consumption increased to 43%. In China, 80% of the water consumption is due to agriculture. High runoff during the past 10 years enabled increasing water consumption in China and sufficient water supply to agriculture and riparian ecosystems in Kazakhstan. When runoff of the Ili River decreases, as expected for most rivers in Central Asia, then irrigation efficiency has to be further increased in China, and irrigation systems in Kazakhstan have to be restored and modernized in order to reduce water consumption and protect Lake Balkhash and the riparian ecosystems.

Keywords: transboundary river; upstream-downstream conflict; remote sensing; evapotranspiration; MODIS; wetland; Central Asia; Lake Balkhash