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Evaluation of Human Impacts on Water Balance in the Heihe River Basin, Western China

JUMPEI KUBOTA[1], TOMOHIRO AKIYAMA[2], YUSUKE YAMAZAKI[1], GENXU WANG[3]

[1] *Research Institute for Humanity and Nature*

[2] *Graduate School of Environmental Studies, Nagoya University*

[3] *Cold and Arid Regions Environmental and Engineering Research Institute, CAS*

This paper focuses changes in the water balance components during the past fifty years caused by the agricultural development in the Heihe River basin, an inland river of the arid region in the western China. The Heihe River basin consists of three parts, namely the upper mountainous area which is the source of the Heihe River by rather big amount of precipitation and glaciers, the middle oasis area like Zhangye and Jiuquan, and the lower terminal arid area like Ejina. Each area has independent hydrological condition and ecosystem. Surface runoff from the upper mountain area by rain and melt water of snow and glaciers is the only source of water available in the middle oases area and the lower arid area. The increase of water demand in the middle oases area mainly by irrigation for agricultural land has resulted in the decrease of surface water supply for the lower arid area. In the middle oasis area, most of surface water has been diverted from main river courses to many irrigation canals, resulting in the serious decrease of discharges in the lower deserted area. The increasing groundwater consumption in the middle reaches has cased the rapid decline of groundwater resources. Analyzing changes in water balance components during the past fifty years, human impacts on the hydrological cycle in the Heihe River basin has been evaluated. Also, Developing a distributed hydrological model with the grid based information of land use and irrigation systems, the spatial distribution water budget in the Heihe River basin has been investigated.