Research Plan of Water Budget and Water Use in an Inland River Basin of Western CHINA

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This study focuses the changes in the hydrological cycle during the past fifty years cased by the water resource 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 Zangye 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. The degradation of vegetations and the difficulties of the usage of shallow groundwater in terms of not only quantity, but quality have become serious problems. Even in the middle oasis area, over 80% of the total discharge has been diverted from main river courses to many irrigation canals, resulting in not only the rise of groundwater level inside the cultivated oases, but also the increase of soil salinization area. At the same time, the decrease of discharges in the main river courses have formed deserted area. Based on both field investigations of the hydrological processes, including stable isotopic analysis, and information of irrigation systems, a distributed hydrological model with the grid based will be developed to understand the spatial distributions of water budget in the Heihe River basin. The effects of the water resource development on the hydrological cycle in the Heihe River basin will be discussed by the model. The detailed research plan and some preliminary results will be presented.