



## Water resources regulation based on ET management - A case study on Huabei Plain in China

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Because of the unreasonable exploitation and use of water, the problems such as shortage of water amount and deterioration of water quality are prominent on Huabei Plain in China. In this region the conflicts arose among the domestic, industrial and agricultural water use, and the proportion of the agricultural water consumption is more than 70%. Therefore it is very important to well regulate the water resources in this region, especially the agricultural water use. Since the actual consumption of regional water resources over agricultural area is evaporation and transpiration (denoted as ET), regional net water consumption (i.e. ET<sub>total</sub>), which is estimated by ET of plowland, represents the actual water consumption of the region as well as the effects of water saving.

In this paper the idea of the ET management is to combine the reduction of the exploitation of groundwater with the resource saving, and to integrate the engineering water-saving measures, agricultural water-saving measures with water-saving management. The aim of the ET management is to reduce the present ET to the objective ET, and it is represented by the objective indexes, e.g. the regional ET<sub>total</sub> is reduced to the multi-year-mean recharged water amount, the recharge of groundwater is dynamical balanced with the exploitation, and finally the zero-over-exploitation of groundwater is achieved.

The objective ET is determined by the regional available water amount, which is calculated based on precipitation and available water amount recharged from outside the region, as well as other factors such as the allocation scheme of water resources. The key technical points of distribution method of water rights based on objective ET are: 1) the objective-ET distribution schemes of water rights in wet year and dry year are added to the water-right distribution based on multi-year-mean objective ET; 2) the distribution methods of surface-water rights and groundwater rights are explored to match the objective-ET distribution method, and the connections and interactions among ET water rights, surface-water rights and groundwater rights are studied. A case study is carried out to test the ET method over an agricultural area on Huabei Plain. SWAT model is employed to compare three water-saving scenarios. The results will lead to the practical water allocation scheme that is suitable in the study area.