

# Comparison of Water Budget among Major Agricultural Land Uses in The Heihe River Basin of Northwest China

# Yusuke Yamazaki[1]; Jumpei Kubota[2]; Masayoshi NAKAWO[2]; Takahisa Mizuyama[1]

[1] Forestry and Biomaterials Sci., Kyoto Univ; [2] RIHN

The Heihe River Basin situated in the Northwest China is the second largest inland river basin in China. Its basin area is thirteen thousands square kilometers. The Heihe River runs from the Qilian Mountains to terminal lakes located in hyper arid area through oases. Most of the water sources of the Heihe River come from precipitation and melted water of glaciers of the Qilian Mountains. Surface water of the river is the very important easy-accessible water resources not only to the people who living in the region but also to the ecosystem. The middle reaches of the Heihe River Basin is famous for high harvest yield of crops in China. The most typical agricultural land use before 1980 was for wheat field. From 1980's to 1990's, intercropping, which is a system to plant two or more different species alternately in each row at the same time, with wheat and maize, had increased. Now, twenty percent of the agricultural land is wheat field, forty percent is maize field, and forty percent is the intercropping with wheat and maize (w-m intercropping field). Recently, the amount of discharge flowing into the lower reaches has decreased very drastically. Possible shortage of water resources threatens both people's life and the ecosystem of the basin. The objective of this paper is to clarify hydrological processes on the oasis areas in the middle reaches of the Heihe River basin, focusing on differences of water use and water budget among three major agricultural land uses; wheat field, maize field and w-m intercropping field.

Both meteorological and hydrological observations, including information of irrigation such as amount, numbers and interval, were carried out on wheat, maize and w-m intercropping fields in Zhangye oasis of the middle reaches of the Heihe river basin from September 2003 to September 2004. Sensible heat flux and latent heat flux in the w-m intercropping field were estimated by the Bowen ratio method. In the wheat and maize field, bulk transfer formulas were applied.

Evapotranspiration during the growing period were 313 mm in the wheat field, 502 mm in the maize field, and 558 mm in the w-m intercropping field respectively. Irrigated water at a time on all the fields was approximately 120 mm. During the growing period, numbers of irrigation were 4 times both in the wheat and the maize field, and 7 times in the w-m intercropping field. Because the amount of rain during the growing period was 68 mm, the amount of water input for the wheat and the maze filed was 548 mm, 908 mm for the w-m intercropping field. Intercropping with wheat and maze provides farmers with better income. But at the same time, intercropping is the most water consuming.