

Evaluation of Groundwater Recharge in a Sand Dune for the Arid Land Irrigation Agriculture.

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Dryland agricultural areas are blessed with sunshine but have low precipitation. Hetao irrigation of Inner Mongolia in China (1.19 M ha with irrigated land 0.57 M ha) is located in the middle basin of the Yellow river. There is little rain, thus they take irrigation water (about 5Gt/year) from Yellow river. In recent years, water uses other than agriculture, such as industrial and domestic, are increasing year by year. Thus water distribution is another issue for water use.

We focused on sand dune as another water resource. Because particles are sandy and show uniform distribution, infiltration would be easy and evaporation would be suppressed by sandy mulch. Moreover, we observed many sand dunes are close to lakes. Therefore, we estimated sand dunes would work as water recharge area. The objectives of this study were to evaluate infiltration and evaporation control by sand dune, and to estimate the amount of groundwater recharge by sand dune. We selected a research area in which sand dune, lake and saline land are closely located. Groundwater level sensors were placed at the middle and bottom of the sand dune, and also at the saline land. Volumetric water contents and meteorological data were measured. First, column experiments were performed to evaluate the infiltration and evaporation control by sand dune (A) and saline land (B). The results showed the sand showed high infiltration ability and evaporation were suppressed after capillary water was cut. Specific yield was calculated as 0.038 using water retention curve. Then, water storage capacities were estimated as 355 mm in sand dune and 488mm in saline land, respectively. We have not included evapo-transpiration yet in this study, however, the groundwater recharge would also be estimated from the water storage capacities.

Keywords: Groundwater, Water resources management, Sand dune