

## Quantitative evaluation of the contribution of artificial recharge for water budget : A case of Rokugo alluvial fan, Japan.

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<http://www.sci.kumamoto-u.ac.jp/~hydrolab/index.html>

The purpose of this study is to evaluate the contribution of artificial recharge in Rokugo alluvial fan constructing four artificial recharge ponds. In this study, one year divided into six periods based on seasonal fraction of groundwater levels. The input and output component for water budget were estimated in each period.

Compared to 1972 and 2005, land use of paddy field area has decreased of 9.5%. On the other hand, residential area has increased of 10.9%. Decrease of paddy field area effects recharge to groundwater. Besides, increase of residential area causes both decreasing of groundwater recharge and increasing of pumpage rate. Residential area has increased especially in the spring discharge area.

Estimated quantity of paddy field irrigation as the input component is about 3.4 times bigger than precipitation component in a year. This result shows big function of paddy field for groundwater recharge. People in this area use groundwater by pumping for melting snow because groundwater temperature is about 12 degree throughout year. Although groundwater pumping for melting snow performs only in winter season, this amount is bigger than that of daily use of groundwater in a year.

Based on evaluated quantity (unit in  $m^3$ /year), each component rate versus total amount in percentage were measured.

It is found that the input components Precipitation, Paddy field irrigation and Artificial recharge has 21.2%, 72.8% and 6.0% contribution to groundwater recharge respectively. On the other hand, the output components Evapotranspiration, Daily use, Groundwater pumping for melting snow, Spring discharge and Groundwater flow out are 8.8%, 1.3%, 1.6%, 17.9% and 70.4% respectively.

The annual contribution of artificial recharge is estimated to 6.0%. The artificial recharge is a precious input resource especially in winter season.