

Identification of deep groundwater recharge system in an intermontane basin

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This study focuses on identifying the deep groundwater recharge system in Kathmandu Valley, Nepal using various environmental tracers. The Kathmandu Valley is one of the largest intermontane basin that covers an area of 625 km². The average altitude of the valley floor is 1350 m above sea level and is surrounded by the hills rising more than 2800 m. Rainfall in the basin is mostly seasonal with roughly 80% of the 1755 mm average annual total arriving between June and September during monsoon season. Groundwater samples were collected from 10 deep tube wells covering almost all parts of the valley and 2 shallow dug wells located at the central part of the valley. All the collected samples were then subjected to the analysis of major dissolved ions, hydrogen and oxygen stable isotopes and radiocarbon.

Groundwater ion composition using Hexa-diagram showed that the deep groundwater of the Kathmandu Valley tends to be relatively young in the outer peripheral area. Meanwhile for the groundwater located in the central area tends to be older. However, for the shallow wells located at the central area, the higher values of ion composition were derived from the effect of human activities. Relatively high pMC values obtained from radiocarbon were detected from the shallow groundwater at central part of the valley and from the deep groundwater samples those were collected from the peripheral area. On the other hand, the deep groundwater at the central part of valley was observed with low pMC values.

Relatively heavier stable isotopes of hydrogen were observed from both the deep groundwater and the shallow groundwater in the central part of the valley. Along with the pMC values, these results also suggests the possibility of vertical groundwater recharge from the shallow groundwater to the deep groundwater in central part of the valley. However, isotopically depleted groundwater recorded from the peripheral areas also concludes the recharge in this basin occurs from the mountain areas.

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