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Flow processes in groundwater recharge to a crystalline basement aquifer in a semi-arid West African river basin

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Groundwater recharge occurs even in arid environments. The exact recharge processes vary according to climatic and geologic conditions as well as soil characteristics, topography and vegetation. In the semi-arid West African river basin of Kompienga in Burkina Faso, groundwater recharge studies were undertaken using the chloride mass balance and through the evaluation of water table fluctuations. In general, recharge makes up only a small part of the total water balance. Most of the rainfall is returned directly to the atmosphere and less than ten percent recharges groundwater. The studies revealed that two flow processes are of importance in recharge of the crystalline basement aquifer; preferential flow and matrix flow. Because the overall recharge is small, preferential flow can be relatively important in this river basin. Results from four research stations show that the predominance of one process over the other varies over short distances, leading to differences in recharge quantities to the basin aquifer.

These results contribute to national planning schemes for the exploration of groundwater resources for improved the supply of drinking water to rural areas. The research is part of the GLOWA Volta project.

Keywords:

Groundwater recharge, preferential flow, matrix flow, crystalline basement aquifer, semi-arid river basin