



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

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### **Abstract**

Groundwater recharge occurs even in arid environments. The specific recharge processes vary according to climatic and geologic conditions as well as soil characteristics, topography and vegetation. Groundwater recharge studies were undertaken in the semi-arid West African river basin of Kompienga (5911 km<sup>2</sup>) in South-Eastern Burkina Faso using chloride mass balance method and the evaluation of water table fluctuations method. In general, recharge makes up only a small part of the total water balance in this region. 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 to 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 of 5 km, leading to differences in recharge quantities to the basin aquifer of 1 to 3 times higher.

These results contribute to the improvement of national planning strategies for the exploration of groundwater resources and to improved access to drinking water supplies in rural areas of Burkina Faso. The research was conducted within the GLOWA Volta project, a 9-year project to improve the management of water and land resources under conditions of environmental change.

### **Keywords:**

Groundwater recharge, preferential flow, matrix flow, crystalline basement aquifer,

semi-arid river basin, Volta basin, West Africa