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Groundwater Potential Evaluation in the Kompienga Dam Basin by Chloride Mass Balance Approach

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Abstract

Water scarcity constrains socio-economic development in the sahelian country of Burkina Faso. During dry periods, residents have utilised groundwater to secure access to drinking water. Groundwater is accessed via hand-dug wells and, since the 1970's, first via modern wells and later on boreholes equipped with manual pumps provided by governmental and non-governmental organisations. Insufficient knowledge of groundwater resources has led to low success rates in exploitation, however, and groundwater resource evaluation appears to be a prerequisite for sustainable water management. This article presents an evaluation of groundwater potential within a watershed of 5900 ha in Eastern Burkina Faso. The results are derived from 18 months of field work in which water was sampled monthly during the rainy season from rain gauges, piezometers and boreholes with hand pump. Deep groundwater from boreholes was also collected during dry season. More than 100 samples were collected from 4 characteristic sites in the research watershed and sent for laboratory analysis for chloride ion concentration.

The climatic water balance was determined based on careful field measurements. Stream discharges were measured using divers, precipitation and other climatic data were collected from rain gauges and weather station. In addition, Eddy Correlation (EC) data were used to infer evapotranspiration.

These data have supported an estimate of groundwater potential using chloride mass balance approach, which has been supplemented and validated using the equations of water balance method. The groundwater potential which reflects the annual recharge estimates will assist in efforts to provide sustainable and reliable water supplies within the basin and the country.

Keywords: Chloride mass balance, groundwater potential, water balance