



## **Modeling unsaturated zone of floodplain wetlands in the white volta basin, Ghana**

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In the White Volta Basin within the Upper East Region of Ghana, West Africa, rainfed cultivation supplemented by shallow groundwater is an important source of livelihood for rural inhabitants. These areas experience highly erratic rainfall patterns often resulting in seasonal crop failure. As a result, supplementary irrigation is practiced to offset the negative effect of insufficient rainfall. Water movement in the unsaturated zone of floodplains along the White Volta River affects the viability of crop cultivation during both wet and dry seasons. The unsaturated zone provides an inextricable link between basin hydrology and sustenance of crop growth, but it is also affected by agro-chemical inputs such as fertilizers and pesticides, which move below the root zone and contaminate underlying groundwater reservoirs. To understand the hydrological complexities of the unsaturated zone of Pwalugu floodplain wetland systems, HYDRUS-1D model was used to derive water budgets and to estimate fluxes. The model results indicated temporal and spatial variation in the volume of vertical fluxes. The flow moving through the unsaturated zone and discharging into the sub-surface water system has a high dependency on both the soil structure and the volume of water infiltrating the surface; the highest discharge is within the period of highest water input. However, recharge from below due to upwelling of ground water plays an important role in maintaining the moisture content of the unsaturated zone.