Groundwater Quality of the Aquifers Underlying the Mississippi Embayment and the Gulf Coastal Plain

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This project investigates the general water quality and major/minor ion chemistry in Arkansas aquifers given the ongoing depletion of the Mississippi River Valley Alluvial Aquifer and the resulting increase in pumping of water from older, underlying aquifers. The Mississippi River Valley Alluvial, Cockfield, Sparta, Cane River, Nacatoch, and Tokio Aquifers were studied. A total of 17 samples were collected from the Mississippi Embayment and Gulf Plain regions of eastern and southern Arkansas. The samples were tested for general water quality parameters including alkalinity, turbidity, pH, total dissolved solids, nitrate, and phosphate. Samples were also tested for trace elements (iron, arsenic and manganese) and major ions (sodium, potassium, calcium, chloride and sulfate). A majority of the samples were of calcium-bicarbonate type although a few in the Mississippi Alluvial and Cretaceous Nacatoch/Tokio Aquifers were of sodium-bicarbonate type. The Cretaceous Aquifers showed high alkalinity and TDS, which is expected due to dissolution of limestone and salt content left behind by marine transgression. Many of the Mississippi Alluvial Aquifer samples showed water quality concerns including high turbidity which can be accounted for by depletion of the aquifer and shallow depth of the wells, and high phosphorous, which is likely the result of agricultural contamination. Migration of saline water into the Mississippi Alluvial aquifer has also made the water unsuitable for drinking in many areas. As the nation’s rice producing capital, the depletion and associated decline in water quality of the Alluvial Aquifer raises serious concerns for the future sustainability of Arkansas agriculture.

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