

The geochemistry of natural waters from rain, soil, the unsaturated zone, shallow aquifers, lakes and the stratified aquifer system of the Chad Basin sediments has been investigated to interpret modern hydrological processes and to reconstruct the palaeohydrology of NE Nigeria, a type region of the southern Sahel. Recharge to the confined Middle and Lower aquifers, recorded in NE Nigeria, occurred between 24 and 18.6 ka BP, prior to the last glacial maximum. The mean annual temperature at this time derived from dissolved noble gas ratios was at least 6°C cooler than at the present day. This groundwater is not coupled to the active modern recharge cycle and was not reactivated during the Holocene wet phases as elsewhere in the Saharan region, a reflection of changing lake levels and/or of changing climatic regimes. The absence of groundwater recharge at the time of the last glacial maximum supports other evidence for aridity at this time. Present day direct recharge rates in the Manga Grasslands are high (mean 44 mm a⁻¹). However, regional recharge in NE Nigeria at the present day is even higher (60 mm a⁻¹) emphasizing the importance of infiltration from surface runoff as input to groundwater. The present study confirms that the shallow aquifer in the region contains significant renewable groundwater resources. However the confined aquifer of the Chad Basin clearly contains palaeowater and this declining artesian basin will need careful conservation prior to a return to traditional water use methods via improved management of the renewable waters in the shallow phreatic aquifers