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GROUNDWATER MANAGEMENT

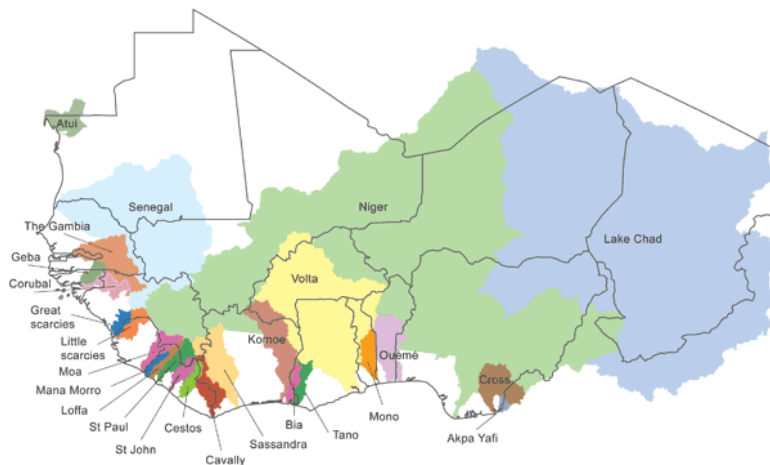
ADDRESSING THE THREATS OF CLIMATE CHANGE

CONTEXT

Rural populations in West Africa rely heavily on groundwater resources to sustain themselves and their economic activities. For example, with only a few exceptions, groundwater provides a far better option for safe drinking water than surface water. Nevertheless, groundwater resources are finite and are only sustainable as long as annual depletion, particularly during the dry season, does not exceed replenishment during the subsequent rainy season or two.

The region's groundwater is stored in both the large sedimentary basins of the major rivers, which have continuous aquifers, and in limited underground reservoirs contained in the basement rocks, which are discontinuous. Demand on groundwater resources has increased significantly recently, primarily because of efforts to achieve the Millennium Development Goal for drinking water and because of growing populations. As rainfall has become less reliable, especially in the Sahel, there has also been a growing demand for an increase in irrigation using groundwater. Changing climatic patterns and land use have affected the amount of runoff that filters down to groundwater aquifers, often increasing the depth to which wells need to be dug.

RIVER BASINS OF WEST AFRICA



FINDINGS

West Africa's groundwater resources will continue to be threatened in a number of ways. First, the predicted rise in temperatures and changes in rainfall patterns due to climate change are likely to reduce the recharge of aquifers while also increasing the demand for stable groundwater resources. Second, population growth projections indicate that about twice as much drinking water will be required in 25 years. Third, the increasing promotion of powered wells, particularly on large commercial farms, will put a high degree of added stress on the aquifers.

Source: *West Africa Gateway of Club du Sahel, 2011*

In West Africa, current water management initiatives mainly consist of a national dialogue and do not reach down to the local level, where water is used and managed. Groundwater monitoring, where it is done, is underfunded and does not always monitor the most critical locations. What databases on groundwater do exist are generally kept by national institutions and typically are not available to those at the local level who manage water resources. Furthermore, institutional and scientific capacity to manage groundwater effectively is generally weak.

Because groundwater and surface water are connected hydrologically, they cannot be managed independently. Therefore, the sustainable management of groundwater will likely require an Integrated Water Resources Management approach (IWRM). This approach involves managing surface water and groundwater together in a manner that seeks to address both the demand for and the supply of water. IWRM is a participatory process that requires the involvement of all stakeholders, from national government departments and agencies down to individual users. In IWRM, users help to define management targets and help to regulate and police water use. It addresses demand through education, changes in cropping patterns, water pricing, and regulation and addresses supply through improved resource management, soil conservation, and augmenting groundwater recharge. Effective management systems help create a stable production system with the capacity to respond to threats and changing conditions, including those posed by climate change.

When planning effective utilization of groundwater resources, it is important to understand the overall hydrogeologic setting of any particular area within the West African context. Too often, generalizations are made about groundwater without clear reference to hydrogeology, which may result in misunderstandings about potential and risk.

RECOMMENDATIONS

IWRM could be implemented in rural West Africa using the Multiple-Use Services model that has been piloted in Niger. IWRM can also be added as a component to agriculture and food security programs to properly integrate water, agriculture, and human development. Both demand and supply need to be managed, assisted by local monitoring of water table conditions and improved access to data. Central government support for IWRM should focus on policy, research, and the regulatory framework. Because IWRM is a participatory process, efforts must include the creation of appropriate institutions at all levels of civil society.

ADDITIONAL INFORMATION

This brief highlights key conclusions from Hammond Murray-Rust, D., and Fakhrudin, S.H.M. (2014). *Climate Change and Water Resources in West Africa: An Assessment of Groundwater Management*. USAID. Interested readers are invited to review the full paper at <http://community.eldis.org/ARCC/>.

MAJOR AQUIFERS OF WEST AFRICA

