IMPACT ASSESMNET OF COMMUNITY-LED TOTAL SANITATION ON WATER QUALITY IN THE KORAMA RIVER BASIN IN THE ZINDER REGION, NIGER

EXECUTIVE SUMMARY

Poor water quality continues to pose a major threat to human health not only in Niger but in many other countries around the world and in Africa in particular. According to the World Health Organization data (2014), inadequate drinking-water, sanitation, and hygiene are estimated to cause 842,000 diarrheal disease related deaths globally per year. This includes 361,000 deaths of children under the age of five, mostly in developing countries. In Africa, the population growth rate exceeds the rate of development of public services. The existing infrastructures are not able to meet public demand of key services such as drinking water supply and sanitation. In Niger, access to clean drinking water is a challenge. In Niger, after malaria, water borne diseases such as diarrhea, cholera, and typhoid are one of the main causes of mortality and infant morbidity. The USAID West Africa Water Supply, Sanitation, and Hygiene (USAID WA-WASH) Program aims to increase access to safe drinking water and sanitation in West Africa.

In Niger, the potential of ground water at shallow depths is enormous particularly in the departments of Kantché and Magaria in the Zinder region. However, most villages do not have access to safe drinking water sources. The communities use traditional hand-dug shallow wells for domestic water needs. The construction of conventional water points such as boreholes in the communities requires a high investment. In addition, the low capacity of the communities to mobilize the financial resources needed for the maintenance of such systems contributes to reduced sustainability of boreholes. The low-cost technologies provide rural populations with alternative, sustainable, and cost effective sources of water. In the country, particularly in the Zinder region, low cost boreholes are ideal due to the favorable hydro-geological environment which is characterized by the existence of groundwater resources under permeable rock formations of the Korama river basin. In this region, the depth of the water table ranges between zero (where it emerges at the surface) and 15 meters.

The major sources of groundwater pollution are the presence of heavy metal, synthetic matter, and other waste that infiltrate into the soil. Further, more than 85% of the population in the country does not have access to sanitation facilities and practice open-defecation. As a result, the risk of water contamination with fecal matters is a challenge to water supply through low-cost technologies. The situation is more critical in rural areas in the departments of Kantché and Magaria where the water table is shallow (less than 15 meters deep) and contaminants potentially infiltrate through the permeable rock formations into the aquifer. Therefore regular surveillance of groundwater quality supplied through the low-cost technologies is imperative to ensure that the communities have access to safe drinking water.

To prevent water contamination from fecal matters, the USAID WA-WASH Program implemented the community-led total sanitation (CLTS) in the region of Zinder. Community-led total sanitation is an innovative approach that aims to promote low-cost adequate sanitation facilities (latrines) at the community level. The approach also aims at collective sanitation behavior change in the target population. It raises the awareness in the community on the negative impacts of fecal contamination on health. The approach results in a clean environment and reduced illnesses related to poor sanitation. The combined actions of the CLTS approach, construction of low cost boreholes, and regular water quality analysis contribute to improved health and better livelihoods of the beneficiaries.

In 2012, the Regional Directorate of Water Resources in the Zinder region analyzed the quality of water from the low cost boreholes. The results indicated that water points were polluted by nitrates from organic matter in the zone where CLTS was implemented. The findings could not sufficiently demonstrate water pollution in the aquifer. These results necessitated a further study in order to establish the sources and degree of pollution in the water points, hence this study. This study aims to analyze the quality of water from low cost boreholes in the municipalities of Doungas and Yaouri where CLTS was implemented and in non-CLTS areas in the municipality of Bandé. The study methodology included a literature review that facilitated a better knowledge of the study area and informed the choice of communities for the study. Secondly, water samples were collected from 25 low cost boreholes in 12 CLTS villages and eight non-CLTS villages. The water samples were comparatively analyzed in the laboratory. Further, an environmental situational assessment of the villages and the water points was conducted to investigate the risks of pollution around each water point using the standard sanitary inspection approach adopted from the World Health Organization (WHO) and UNICEF.

The results of this study show nitrate pollution and traces of bacteriological contamination in the water and concurs with the findings of the 2012 study. The laboratory analysis showed water pollution in water points in both CLTS and non-CLTS zones. The mean values of various parameters including the presence of E.coli, the water pH level, and presence of nitrates, nitrites, and chlorine showed above contamination/pollution levels. Pollution levels were higher in non-CLTS zone as compared to the CLTS zones. The lower rates of pollution in CLTS zones could be explained by the fact that the environment is kept clean, minimizing surface contaminants as compared to non-CLTS zone where surface contamination is elevated. Further, the CLTS zones had protected conventional boreholes in addition to the low-cost boreholes whereas non-CLTS zone had only shallow low-cost boreholes.

The origin of the pollution in both the CLTS and the non-CLTS zones could be attributed to various factors including shallow depth of the water table. The shallow depth of static water level, for example of less than five meters for rope pump boreholes contribute to the contamination of water. Another factor that could explain the infiltration of pollutants in the aquifer is the sandy soil structure with large capillaries that allow leaching of pollutants. Shallow-pit latrine structures also allow seepage of waste to the aquifer. Further, the pollution could be as a result of un-hygienic conditions of water withdrawal from the boreholes. The combination of these factors makes the aquifer more susceptible to contaminants due to the increased infiltration speed, especially in periods of high recharge -- for example during the rainy season.

Thus, this study is significant especially in for rural water supply and sanitation sector where necessary measures such as appropriate design of latrines should be taken into account to minimize the risk of water contamination. Further, the results of the study emphasize the acceleration of implementation of the CLTS approach in all the villages. Other recommendations include treatment of drinking water to minimize the risk of water borne diseases, use of appropriate technologies in the construction of low-cost boreholes to protect the water from contaminants and finally, regular monitoring of water quality from the low-cost boreholes.

The full report is available (in English) upon request via our website. For more details about our program activities and other reports please visit http://wawash.fiu.edu/

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