



## **Groundwater resources monitoring and population displacement in northern Uganda**

K. Chalikakis (1), Y. Hammache (2), A. Nawa (3), K. Slinski (3), G. Petropoulos (3), and A. Muteesasira (3)

(1) CNRS, LTHE, HGP, France (chalikakis@hmg.inpg.fr), (2) Action Against Hunger (ACF), New York City, USA (yh@aah-usa.org), (3) Action Against Hunger (ACF), Kampala, Uganda, (washco.ug@acf-international.org)

Northern Uganda has been devastated by more than 20 years of open conflict by the LRA (Lord's Resistance Army) and the Government of Uganda. This war has been marked by extreme violence against civilians, who had been gathered in protected IDP (Internally Displaced Persons) camps. At the height of the displacement in 2007, the UN office for coordination of humanitarian affairs, estimated that nearly 2.5 million people were interned into approximately 220 camps throughout Northern Uganda. With the improved security since mid-2006, the people displaced by the conflict in Northern Uganda started to move out of the overcrowded camps and return either to their villages/parishes of origin or to resettlement/transit sites. However, basic water, sanitation and hygiene infrastructure in the return areas or any new settlements sites are minimal. People returning to their villages of origin encounter a situation where in many cases there is no access to safe water. Since 1998 ACF (Action Against Hunger, part of the Action Contre la Faim International Network) activities have been concentrated in the Acholi and Lango regions of Northern Uganda. ACF's WASH (Water, sanitation and hygiene) department interventions concern sanitation infrastructure, hygiene education and promotion as well as water points implementation. To ensure safe water access, actions are focused in borehole construction and traditional spring rehabilitation, also called "protected" springs. These activities follow the guidelines as set forth by the international WASH cluster, led by UNICEF.

A three year project (2008-2010) is being implemented by ACF, to monitor the available groundwater resources in Northern Uganda. The main objectives are: 1. to monitor the groundwater quality from existing water points during different hydrological seasons, 2. to identify, if any, potential risks of contamination from population concentrations and displacement, lack of basic infrastructure and land use, and finally 3. to provide a guideline for a sustainable exploration of groundwater resources within the investigated regions, relating to population movements and potential of aquifers. To achieve these objectives a) groundwater samples are collected and analyzed (microbiologically, chemically and physically) from all types of water points, boreholes and "protected" springs, during rainy, dry and intermediate seasons, b) a network of piezometers is being installed for monitoring groundwater level, and comparison with available rainfall data will define groundwater balance. During these steps results are compared with the population's displacement and density in order to quantify the consequences towards the groundwater resources.

Preliminary results after microbiological analysis show the inadequacy of traditional "protected" springs in providing safe water. Faecal pollution is observed in "protected" springs even though it was not being observed before and during rehabilitation. It is mainly due to recent population concentration around the available water resources and the lack of comprehensive hydrogeological study of the functioning of the near surface aquifers. Accordingly all operations concerning spring rehabilitation are on hold. No evidence regarding microbiological contamination was found from borehole water samples. However, high concentration in ferrous iron and total iron was found in several boreholes. Concentrations in the water of weathered bedrock are expected and specific treatment is necessary.