

Sustainable water supplies

The potential for groundwater development in eastern Nigeria

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The provision of adequate supplies of drinking water is a priority in Africa. Despite major government and donor investment in the 1980s roughly two thirds of the rural population still lack access to safe supplies.

In rural areas, groundwater is of extreme and often underestimated importance, as aquifers buffer rainfall variability and provide some insurance against drought. Moreover, groundwater from wells, springs and boreholes can be managed by the community at relatively low cost. However, in some areas groundwater resources are limited and difficult to find. One result is that communities, governments and aid organisations spend money they can ill afford to waste on unproductive drilling programmes.

Assessing the potential for groundwater development can allow targeting of areas where there is a good chance of finding groundwater, and the most appropriate techniques can be used to site water points. Equally important is the identification of areas where groundwater is unlikely to exist in usable quantities. In such areas scarce resources can better be used to develop alternative water sources, such as rainwater harvesting.

The Oju area of eastern Nigeria is a very difficult area for finding sustainable rural water supplies. Low permeability rocks such as mudstones and siltstones underlie much of the area. During the annual (November to April) dry season, unprotected ponds, seepages and hollows are the main sources of domestic water. Most of these sources dry up by February, and those that remain are frequently far from the villages and often contaminated. As a

consequence, much of the population (300 000) is badly affected by water related illnesses such as guinea worm, dysentery, cholera and typhoid. The UK Department for International Development (DFID) commissioned the BGS to carry out hydrogeological exploration of the area and devise appropriate and effective methods for siting wells and boreholes. The information gathered from the study is being used by WaterAid and the Local Government to help communities develop sustainable water supplies.

A wide range of techniques has been applied including the drilling of exploratory boreholes, taking core samples, surface geophysics and surveys, test pumping, water chemistry monitoring and remote sensing. The primary aim is to understand the complex hydrogeology of the area in sufficient detail to produce easily understandable groundwater potential maps and guidelines to help WaterAid and the Local Government effectively manage groundwater development throughout the area.

A simple method termed 'Geological Triangulation' has been developed to help Local Government staff investigate the geology at village level. This combines map information with simple geological field techniques and geophysics to give a reliable indication of groundwater potential without the expense of drilling exploratory boreholes. Standard geophysical equipment, such as resistivity and EM34-3, have been used, both of which are widely available in Nigeria. However, the survey and interpretation methods have been adapted so that they can be used for locating the typical groundwater targets found within the low permeability

sediments of Oju. Simple test pumping methods have also been developed to help the community assess the yield of a borehole before going to the expense of fitting a hand pump.

A systematic study of the groundwater potential has shown that sources exist close to most villages. Only a few villages will need to rely on a more difficult option, such as rainwater harvesting. The results of the investigations are applicable to areas underlain by similar geological formations showing that the problems faced in developing groundwater in the low permeability sediments of eastern Nigeria are not insurmountable.

Main picture: *Local government staff using the groundwater potential map to help identify villages where boreholes or wells may be feasible.*

Inset picture: *Women collecting water from a pond in northern Obi.*

