Siting Boreholes

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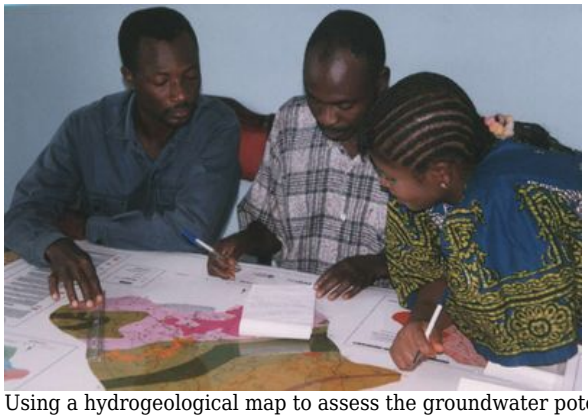
Siting Boreholes

Siting boreholes and wells successfully requires a good understanding of where groundwater occurs and how it behaves in the local environment. Developing this understanding starts with **reconnaissance**, and is refined by **hydrogeological fieldwork** and **geophysical surveying**. Only a very brief introduction is given here. More information can be found in the book Developing Groundwater: A guide for rural water supply by MacDonald et al. (2005) or the report Simple methods for assessing groundwater resources in low permeability areas of Africa by MacDonald et al. (2001), both of which are available online.

Reconnaissance

Reconnaissance is an essential first step in understanding groundwater resources and siting new water boreholes. It is a desk study: gathering any available relevant maps and information (e.g. from existing reports, academic papers etc) on geological and hydrogeological conditions.
An introduction to reconnaissance techniques that are useful for borehole siting can be found in the chapter **Reconnaissance** in MacDonald et al. (2005), which can be freely downloaded online.



Using a hydrogeological map to assess the groundwater potential of an area as part of reconnaissance work for siting new water boreholes. Photo credit: British Geological Survey.

Siting Boreholes: Hydrogeological Fieldwork

This involves making field observations of the local geology, hydrogeology and existing water sources, and gathering information from sources such as discussions with the local community. Local dry and wet season water sources should be visited, and discussions held with the community to find out more details: e.g. how much they yield; do yields fall or dry up in the dry season; are there water quality problems? Rock exposures(e.g. in river cuttings or cliffs) can give more information on local geology, as can chippings/cuttings from any local hand-dug wells or previously drilled boreholes (failed or working). It is also important to observe any local sources of pollution, such as pit latrines, burial grounds, cattle pens or market areas.
An introduction to hydrogeological fieldwork techniques that are useful for borehole siting can be found in the chapter **Finding Groundwater** in MacDonald et al. (2005), which can be freely downloaded online.

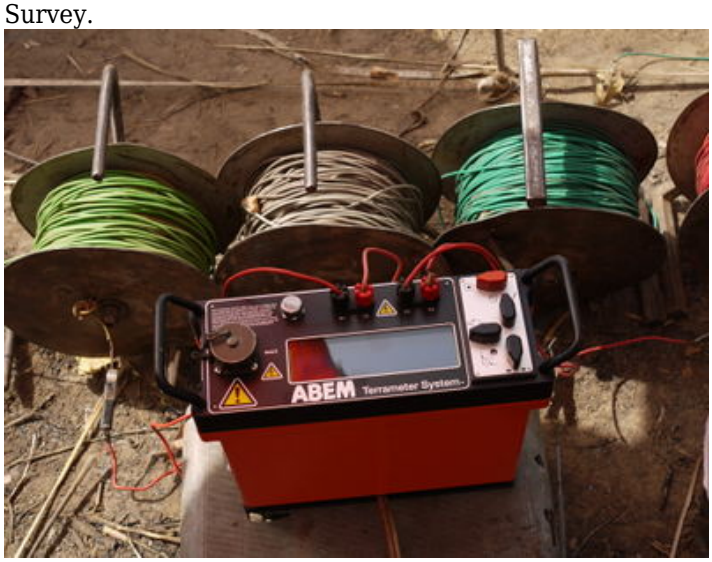
Geologists examining a surface outcrop of a local aquifer. Photo credit: British Geological Survey.

Hydrogeologists on a training course in Ghana investigating a hand dug well close to where a new borehole is planned, and collecting information from local well users about groundwater levels and quality. Photo credit: British Geological Survey.

Siting Boreholes: Geophysical Surveying

Geophysical surveying to support water borehole siting is often needed because the information collected during reconnaissance isn't enough to allow a confident assessment of where groundwater can be found. Geophysical surveying is a huge topic and only a very brief introduction is given here.
There are many different geophysical techniques and countless types of equipment. Two of the main geophysical techniques used in borehole siting are electrical resistivity; and ground conductivity using FEM (frequency domain electromagnetic).
It is important that geophysical techniques are carried out and interpreted carefully by well-trained personnel. If surveying is done wrongly or survey results interpreted wrongly, at best the information given will be of no help, and at worse it can lead to expensive mistakes in borehole siting.
A detailed introduction to geophysical techniques that are useful for borehole siting can be found in the chapter **Finding Groundwater** in MacDonald et al. (2005), which can be downloaded online.

Geophysical surveying for water borehole siting in Northern Ghana, using EM34. Photo credit: British Geological Survey.



Resistivity surveying equipment for geophysical surveying. Photo credit: British Geological Survey.

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