
Application of manual drilling in Africa

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Short summary

In the framework of the programme for the achievement of MDG (Millennium Development Goals) for water supply, UNICEF is promoting manual drilling throughout Africa with different activities: advocacy, mapping of suitable zones, technical training and institutional support.

Manual drilling refers to those techniques of drilling boreholes for groundwater exploitation using human or animal power (not mechanized equipment). These techniques are well known in countries with large alluvial deposits (India, Nepal, Bangladesh, etc). They are cheaper than mechanized boreholes, easy to implement as the equipment is locally done, able to provide clean water if correctly applied.

But manual drilling is feasible only in areas with suitable hydrogeological conditions (shallow layers not too hard and groundwater not too deep). With the aim to improve the current data analysis methodologies used for area selection, the proposed research has two goals: first, contributing to define an improved methodology for the characterization of shallow geological conditions integrating other sources of indirect data; and second, producing more detailed suitability maps in the selected area, with the goal of supporting the implementation of manual drilling construction program.

Issues addressed:

Water resources management (water-use efficiency, integrated water resources management, transboundary cooperation, sustainable extraction and supply of freshwater)

Exploration of the potential for remote sensing and hydrogeological data to identify suitable zones for manual drilling, a potential strategy for low cost water supply in Africa.

Tools for implementation

Technology: Optical and Radar Remote Sensing,

Who is involved?: partners from Italy (University Milano Bicocca), Senegal (University Cheikh Anta Diop-Dakar and UNICEF) and Guinea (SNAPE- Service National de Points d'Eau, and UNICEF)

What were the objectives of the intervention?: The main goal of the proposal is to explore the potential of optical, thermal and radar remote sensing and terrain modeling to gain new insight of shallow geology and potential aquifers for manual drilling. Specific objectives of this study are:

- To define an improved methodology for the characterization of shallow geological conditions integrating other sources of indirect data (e.g. remote sensing of vegetation and soil moisture)
- To produce more detailed suitability maps in the selected area, with the goal of supporting the implementation of manual drilling construction program.
- This proposal will bring some scientific improvements:
- To downscale the analysis, from a general identification of potentially suitable regions to a more precise identification of drilling locations in those areas classified with high potential
- The integration in the procedure of other sources of data that can give indirect information on shallow geology in those zones where direct data coming from existing boreholes or detailed geological studies are limited.

Implementation challenges: Difficulties of coordination and efficient communication between 3 countries and different types of institutions.

Main task/activities undertaken: Setup, organization and interpretation of hydrogeological data with a specific designed software at the University Milano Bicocca.

Tools used:

- Extraction of environmental indicators from radar and optical satellite images with methods elaborated at University Milano Bicocca and Cheikh Anta Diop Dakar, as well as thematic maps.
- Field data collection in Senegal.

Lessons learned

Barriers:

- The logistic difficulties to carry out research in two countries,
- The definition of a common working system between universities, UN agencies and national water institutions
- The Ebola outbreak in the study area

What has worked well?:

- Good integration of different methods of exploration, from hydrogeological survey to remote sensing, with a common goal.
- The collaboration in the technical team of three countries.

What can be improved?: More coordination with direct programs to implement manual drilling in the field, interchanging information between scientific interpretation and field activities.

The way forward: We are finalizing field data collection in Senegal, to validate our interpretation. We hope to carry out field activities in Guinea, suspended for the ebola outbreak. This data will allow a final validation of the interpretation model, and results will be disseminated from March, 2015.

Links:

<http://upgro.org/2014/09/29/high-tech-meets-low-tech-using-remote-sensing-to-help-manual-drilling/#more-255>