

Learning Note 4: What do Governments Love and Hate about Manual Drilling? — Niger, Guinea & Ethiopia (4 March 2014)

The fourth in the series of 2014 webinars on manual drilling explored the question "What do governments love and hate about manual drilling?" Three presenters, from Guinea, Niger and Ethiopia presented their experiences and perspectives manual drilling technology. In all cases, national governments have been part of the process of introducing and promoting the technology, and in the case of Ethiopia, want to be even more involved. Desk studies to identify areas with the potential for the technology have been undertaken in all three countries. In Guinea and Niger, the wells are being financed by donor support, whereas in Ethiopia manual drilling is financed through local government, as well as through the Self Supply approach, where households pay for the wells.

All three countries applaud the fact that manual drilling can provide safe drinking water for remote, or difficult to serve populations which are being left behind. Lower costs are highly appreciated, as is the creation of local employment. All countries recognise that manual drilling technologies should only be used in areas where formations are relatively soft and groundwater is relatively shallow. Nevertheless, the techniques are being adapted to suit the local context. Rope pumps are being installed on these wells in Ethiopia; Niger has switched from the rope pump to the India Mark II, and the Kardia and Vergnet are being installed in Guinea.

Governments in all three countries express major concern about potential contamination of the shallow aquifers that have been tapped. However, there is an overall desire to continue to use the technology, improve it further and ensure that drillers are skilled, properly supervised and that contracts are appropriate and can be properly managed.

Case Study

Case Study 1: Niger

There is need to improve drinking water in the many small villages and hamlets of Niger, where people mainly drink from open ponds or traditional wells. Despite the dangers of consuming such water, communities that do not meet the national criteria of being populated by 250 or more inhabitants are not eligible for current approved water supply improvements (Table 1). Another problem is the per capita cost of improving water is high for these small villages and hamlets.

Manual drilling is particularly suitable for the sandy, alluvial and soft formations of Niger, where groundwater is shallow (less than 40m). Low cost, manually drilled wells could be a solution for small villages and hamlets where the technology is feasible. The application of manual drilling for drinking water has been tested.

Figure 1: Children in Niger se water form an unprotected well

However, national authorities need to be more convinced of the performance and the effectiveness of the technology before incorporating it into the national strategy for drinking water.

Manual drilling is used extensively in Niger in for irrigation (Danert 2006), with some manually drilled wells that were constructed in 1990 still in operation (Naugle 2014). Since 2005 efforts have been taken to utilise manual drilling to provide drinking water.

Table 1: Approved Infrastructure for Drinking Water in Niger by Ministry of Water

Type	Population served	Discharge (m3/h)
Cement well type OFEDES	250	Less than 0.6 m^3/h
Mechanically drilled borehole with handpump	250	Less than 0.6 m^3/h
Autonomous water point	1,500 to 2,000	2.5 to 5 m^3/h
Mini piped water supply	2000 and more	Less than 5 m^3/h
Pumping station for pastoralists	Pastoral areas (for human and animal needs)	Less than 5 m^3/h

UNICEF and its partners have focused on Maradi and Zinder regions, where 290 and 35 wells respectively had been drilled by March 2014. These have been mainly drilled in the sedimentary formations, where there are shallow water tables (<40m). Drill depths range from 10m to 38m, providing 0.5 to 1.6m^3/h of water in Maradi and more than 4m^3/h in the Koromas in Zinder Region. There has been a focus on policy and institutional development from the outset. Key milestones are:

- 2007 - An Open Day on manual drilling for national and regional authorities as well as NGOs and other partners. This opened the eyes of many stakeholders who were not familiar with the technology.
    - Training of artisan drillers and government staff on manual drilling.
- 2009 – study of the performance of the technology in order to integrate it into the national strategy, including:
    - Mapping of manual drilling potential, indicating many areas in the south of Niger are favourable, or moderately favourable for the technology (MEELCD no date).
    - Water quality testing (by the regional Directorate of Water)
    - Proposed technical standards for manual drilling for drinking water.

Figure 2: India Mark II Pump installed on Manually Drilled Well, Village de Saoulawa, Madarounfa, Région de Maradi, Niger

Figure 3: Rope Pump and Cement Superstructures on Manually Drilled Well at a health centre, Magaria, Zinder, Niger

- Improving the superstructure from using local to stronger materials (Figure 2) and changing from the rope pump to the India Mark II pump due to concerns about robustness and water quality (Figure 3).

Drilling is undertaken by private enterprises, under the supervision of the regional directorates of water, who also undertake water quality testing. In terms of design, the specifications for manually drilled wells, including well diameter, type of casing, gravel pack and sanitary seal and bottom plug are the same as for conventional wells.

Looking forwards, there is a need to improve the technical specifications, further build the capacity of the drillers, continue to check water quality and make better use of the drilling data to improve understanding of which areas are suitable for manual drilling.. It should also be noted that manual drilling can provide a village water supply as well as for health centres, schools and even in emergency situations.

Manual Drilling in Niger: Key information	
Type of manual drilling	Augering, which is sometimes combined with percussion
Type of Pump	India Mark II or the Rope Pump
Drilling Costs	~US$ 1,700 (25 m depth installed with rope pump); US$ 3,700 (India Mark II pump and local superstructure); US$ 6,300 (India Mark II pump and improved superstructure)
Types of pumps:	Thousands of agricultural wells; < 500 manually drilled wells for drinking water

Case Study

Case Study 2: Guinea

It is estimated that 35% of Guinea's rural population do not use an improved water supply (Ministère du Plan 2013). In fact 15% of the rural population of Guinea (about 1.1 million people) rely on surface water, primarily from rivers (Ministère du Plan 2013).

The first introduction of manual drilling in 2011 comprised of using imported equipment to drill ten boreholes. In 2012 UNICEF supported a more systematic process, based on the *Technical Manuals for the Professionalization of Manual Drilling in Africa* (UNICEF et al 2010):

- Suitable areas for manual drilling in the country were mapped (Fussi no date).
- In 2012 four local companies were selected (two in the coastal area and two in Forest Guinea). They were trained in the jetting and rota sludge techniques, equipped, and drilled twenty wells as part of the training. Participants at a workshop in Conakry were also trained to manufacture drilling equipment.
- In 2013 four other enterprises were given drilling training, and a workshop was trained in equipment manufacture to cover the eastern region of Guinea.

The professionalization of manual drilling in Guinea has involved four main actors (Service National d'Aménagement des Points d'Eau – SNAPE), UNICEF, Gestione e Ricerca Ambientale Ittica Acque - GRAIA and Practica Foundation are working with the local enterprises. To ease repairs, manufacturing workshops and drilling enterprises are located in the same areas. Over a three year period, 116 wells have been drilled, of which 71 have been successful. A total of 45 wells were not equipped with handpumps due to hard formation (34 wells). Low yields and salinity problems along the coast were also encountered.

Figure 4: Drill bit, jetting and tripod in Guinea

Currently, the drilling methods and tools are being adapted to suit the particular geological settings of the country including the introduction of percussion technology for harder rock types. Manual drilling operations along the coastal zone have been suspended due to salinity and rocks at shallow depth.

Looking forwards, there is still need to confirm the potential of manual drilling technologies and identify areas with high feasibility. Coordination, supervision and monitoring of manual drilling operations also need to be improved. To date UNICEF has undertaken the role of oversight and coordination. It is worth considering whether an NGO could take on this role. The main outstanding questions for Guinea concern the contractual arrangements for the drilling enterprises, and who should bear the cost of a non-successful well.

Manual Drilling in Guinea: Key information	
Type of manual drilling:	Jetting and rota sludge.
Scale:	Around 100 wells
Regulation	None as yet
Types of pumps:	Vergnet/Kardia
Drilling costs:	Technology introduction still too early to set down costs.

Case Study

Case Study 3: Ethiopia

In Ethiopia, manual drilling is primarily considered as a suitable technology within the context of the country's Self Supply approach. Self Supply is defined as "improvement to water supplies developed largely or wholly through investments by households or small groups of households". Manual drilling is considered to be an acceptable technology within the national strategy and is expected to contribute significantly to raising drinking water coverage.

Manual drilling is currently supported by the Government of Ethiopia, UNICEF and International Development Enterprises (iDE) water supply programme. The technology is being introduced into areas where groundwater is shallow within four regions (Amhara; Oromia; Southern Nations, Nationalities, and Peoples - SNNP and Tigray). The partnership focuses on Self Supply, water services for multiple use (e.g. irrigation, livestock and drinking water), household water treatment and marketing technologies to householders.

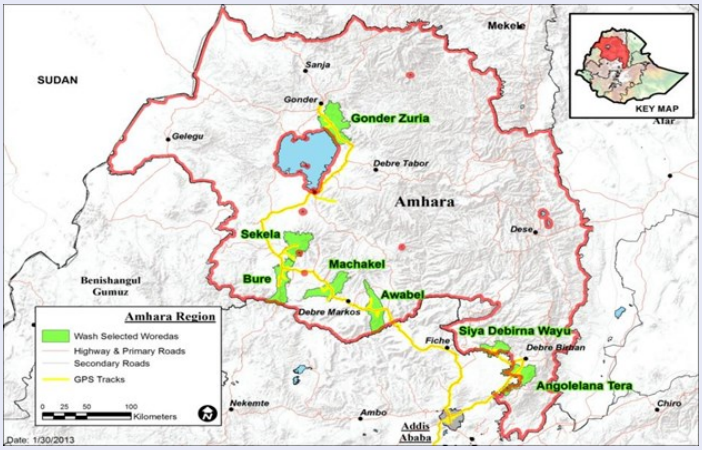

Figure 5: Map Showing Areas of Potential for Manual Drilling in Amhara Region

Figure 6: Rope Pump Manufacture, Ethiopia

Since 2012, the following activities have been undertaken with respect to manual drilling:

- Areas with potential for manual drilling, i.e. where the groundwater is shallow, have been mapped in 15 Woredas (districts) of the four regions (Figure 5).
- Well designs have been prepared.
- Rope pump has been adapted to be suitable for drinking water (from an irrigation pump).
- Training tools have been developed.
- A total of 35 manual drillers have been trained, with a view to becoming local (Woreda/district level) service providers. They are not formally legalised, but are certified by iDE.
- Test drilling has been undertaken, with varying degrees of success, helping the identification of suitable Kebeles (sub-districts) for manual drilling.
- 22 manufacturers have been trained in the manufacture of rope and washer pumps and are now producing the pumps (Figure 6).
- Certification of the manufacturers is being undertaken (by iDE).
- Work is on-going with JICA to standardise the rope and washer pump in Ethiopia.

In Ethiopia, the manual drilling initiative is still in its infancy, having only started in 2012. However, government policies and programmes are favourable for manual drilling, both with respect to drinking water and for irrigation, thus boosting food security. Manual drillers are able to register as “small and micro-enterprises” and are doing so in some regions. They receive work from the Woredas (districts) as well as directly from households. UNICEF is concerned about inadequate quality control and supervision of manually drilled wells, which is also a problem for conventional drilling and other construction.

Overall, the Government would like to be more involved in manual drilling, with more skills transfer within the current iDE partnership. The Government sees a need to improve the selection of areas for manual drilling and siting, so that failure rates are reduced, as well as to standardise manual drilling equipment for the country. The Government would also like to see more uptake of water treatment options in conjunction with the technology so as to ensure compliance with national water quality standards (zero FC/100ml). Finally, there is need to explore how the micro enterprises that are undertaking drilling can compete with larger contractors.

What governments love and hate about manual drilling?

The two tables below set out what Governments presented as liking and disliking about manual drilling.

Love (or like)	Guinea	Niger	Ethiopia
The simplicity of the system (locally made)	✓	✓	
The speed of construction & ease of installation of boreholes	✓		
Training time of the workers is relatively short	✓		
The local production of the rigs	✓		✓
Wealth creation, employment and the development of micro-enterprises	✓		✓
Affordability & the low cost of the wells (also for households themselves)	✓	✓	✓
The opening up/reaching otherwise inaccessible areas	✓		✓
Solution for small communities , scattered hamlets and camps of less than 250 people without improved drinking water supplies		✓	
The linkage between manual drilling, irrigation, multiple use of water and food security (which makes it interesting for household investment)			✓

Hate (or don't like)	Guinea	Niger	Ethiopia
The technology is considered to be basic (and old fashioned)		✓	
The limited scope of application/high failure rate in some areas	✓		✓
The low yield from the wells	✓		
Inadequate protection of the aquifer/ high risk of pollution/risk of contamination	✓	✓	✓
Inadequate attention to contamination of the well, e.g. if it is constructed close to the house or other sources of contamination			✓
Concern that manual drilling is carried out by persons without adequate skills and knowhow, which may create an environmental problem.			✓
Scaling up the initiative is considered before embarking on the experiment	✓		
Resistance of beneficiaries	✓		
Fear to penalize villages with this technology so that they do not benefit from other new modern water points		✓	
The durability of the technology is not satisfactory		✓	
The rope pump is used to lift the water		✓	
Not enough involvement of government with respect to site identification, training and test well drilling			✓
Difficult for the micro enterprises to compete with middle and higher grade contractors			✓

Did you miss the webinar?

You can watch the webinar on http://vimeo.com/88240563

A summary as well of all presentations and scripts (English and French) is available on: http://www.rural-water-supply.net/en/resources/details/565

Additional Resources

ALRAI, M. I. S, GOSSA, T and PABA M (2014) *Promotion of Manual Well Drilling under the Self-Supply Initiative: Go ernment of Ethiopia's Perspective / Promotion du forage manuel via l'initiative d'auto-approvisionnement: Point de vue du Gouvernement éthiopien,* Presentation at the 4th UNICEF-RWSN Webinar on Manual Drilling, 4th March 2014, Available on: http://www.rural-water-supply.net/en/resources/details/565

CAMARA, E. S. (2014) *Guinée: Ce que les Gouvernements aiment et détestent concernant les forages manuels ?/ Guinea: What do governments love and hate about manual drilling?*, Presentation at the 4th UNICEF-RWSN Webinar on Manual Drilling, 4th March 2014, Available on: http://www.rural-water-supply.net/en/resources/details/565

DANERT, K (2006) A Brief History of Hand Drilled Wells in Niger, Only the beginning, Water and Sanitation Programme/Rural Water Supply Network, Available on http://www.rural-water-supply.net/en/resources/details/129

FUSI, F (no date) Identification des Zones Favorables aux Forages Manuels au Guinee, Rapport Final, GRAIA s.r.l. Available from fabio fussi <fabio.fussi@usa.net>

KALLA, L (2014) *Technologie des forages manuels pour l'eau potable au Niger/ Manual Drilling for Drinking Water in Niger,* Presentation at the 4th UNICEF-RWSN Webinar on Manual Drilling, 4th March 2014, Available on: http://www.rural-water-supply.net/en/resources/details/565

NAUGLE, J (2014) *Personal Communication in Webinar chat,* 4th UNICEF-RWSN Webinar on Manual Drilling, 4th March 2014

MEELCD (no date) *Etude de Faisabilite des Forages Manuels Identification des Zones Potentiellement Favorables*, Ministere de l'eau, le L'environnement et de la lutte contre la desertification, Republique du Niger, Available from from *http://www.unicef.org/wash/files/Niger_rapport_final_identification_des_zones_favorables_aux_forages_manuels_Niger_%28FINAL%29.pdf*

MINISTÈRE DU PLAN (2013) *2012 Enquête Démographique et de Santé et à Indicateurs Multiples (EDS-MICS)*, Institut National de la Statistique Ministère du Plan Conakry, Guinée, Available on http://dhsprogram.com/pubs/pdf/FR280/FR280.pdf

UNICEF/PRACTICA FOUNDATION/ENTERPRISE WORKS (2010) *Technical Manuals for the Professionalisation of Manual Drilling in Africa,* Series of Publications can be downloaded from http://www.unicef.org/wash/index_49090.html (follow link: *Technical Manuals)*

UNICEF/PRACTICA FOUNDATION/ENTERPRISE WORKS (no date) *REPUBLIQUE DU NIGER CARTE D'APTITUDE AUX FORAGES MANUEL,* UNICEF/PRACTICA FOUNDATION/ENTERPRISE WORKS, *Available from* http://www.unicef.org/wash/files/NIGER_Carte_finale_aptitude_aux_forages_manuels.pdf