Augering

A low cost and widely applicable manual drilling technique

Product Sheet

Augering has proven to be a successful, low-cost approach to machine drilling and hand digging wells. Drilling shallow water wells by hand reduces the price of a well by a factor of 4 to 10, enabling rural people to have access to water independently through the private sector.

Context

Drilling with the auger method is a fast and cheap way to make sustainable shallow water points. The technique is often combined with other manual drilling techniques to make quick starter holes. The tools are simple and cheap to make and the drilling process is easy to understand. Augering is used in soft formations up to 25 meters.

Variations of the basic Hand Auger have been developed in several countries. The Vonder Rig makes use of a tripod and working table. The technique is more expensive, but ensures a straight borehole. Driven Wells are sometimes used in combination with augers in collapsing sand layers. If augers cannot penetrate further into a collapsing sand layer and a temporary casing cannot be used, a well point and well screen can be driven into the ground.

Technology

Manual drilling must (a) break or cut the formation, (b) remove the cut material (the soil) from the hole, and (c) if necessary provide support to the walls of the hole, to prevent collapse during drilling. **The hand auger** does this by cutting, digging out and lifting sections of soil to the surface.

It consists of extendable steel rods, rotated by a handle. A number of different steel augers (drill bits) can be attached at the bottom end of the drill rods. The augers are rotated into the ground until they are filled, and then lifted out of the borehole to be emptied. A different auger can be used for each formation (soil type). Above the water table, the borehole generally stays open without the need for support. Below the water table a temporary PVC casing may be used to prevent the hole from collapsing, and can be emptied either with an auger or a bailer. The permanent well casing is then installed, while the temporary casing has to be removed.

Advantage: Easy to use above the groundwater table. Quick for shallow wells.

Disadvantage: It may be very difficult to remove the temporary casing, if clay layers are penetrated. It can become slower with depth.

Limitation: If a collapsing sand layer is encountered below a clay layer, it becomes difficult to bring the temporary casing down and keep the borehole open. It takes quite some expertise to drill a completely straight borehole.

The facts	
Application	Suitable for unconsolidated formations: Sand, silt & soft clay. Stiff clays, hard materials and gravels are difficult or impossible to drill through and to remove.
Range	Augering can be used in the range 15-25 meters.
Costs	Costs of 25 meter bore holes vary from about US$ 100 – 2500, depending on geology, country and application
Speed	1-4 days for a 25 meter bore hole, depending on quality, geology, tools, logistics and experience of the drilling teams.
Equipment	Equipment is very cheap and can be produced and repaired locally.
Country	Main application in Niger, Chad, Senegal, The Gambia, Uganda, Zimbabwe, Tanzania, Nigeria, Central America and western countries.

Support

PRACTICA assists NGOs and governments with the design and implementation of manual drilling projects. This includes feasibility and mapping studies, hands-on training and technical support to the local private drilling sector (technical capacity building) and guidance of the implementing organizations to scale up their water supply programs. We can help you get broader water access for cheaper, while building local technical and managerial capacity.

The experiences

It is estimated that at least 16,000 manually drilled wells have been made in Niger.
Initially, water points were for small-scale irrigation but people also use the water for domestic use. Some wells have been drilled specifically for drinking water, both at the household and community levels.
About 70 small enterprises undertake hand augering. This is an excellent example of the impact that a sustainable manual drilling sector can have.

PRACTICA Foundation develops and disseminates low-cost appropriate technology in water and renewable energy in developing countries. We focus on technology that responds to local cultural contexts, can be locally produced and maintained, and leverages existing market systems.

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