Technology Fact Sheet for Adaptation

DRILLING OF BOREHOLES [i]

5. TECHNOLOGY:	DRILLING OF BOREHOLES
Introduction	Groundwater abstraction is the process of taking water from a ground source, either temporarily or permanently. Abstraction can be either manual, where water table is high or mechanized, usually by using a rotary drilling rig which is able to reach deep aquifers of several hundred meters.
Technology Characteristics	A water borehole is a specially engineered hole in the ground, making provision for water to flow into this hole and allowing for a pump to be installed inside the hole to allow abstraction of water. There are several borehole drilling methods, the two most common being rotary and air percussion methods (Aqua Earth, 2011). In rotary drilling, a drill bit, made of tough metals such as tungsten, is attached to a length of connected drill pipe and as the drill is rotated the bit grind up the rock. Air percussion technique utilizes compressed air to operate a down-hole air hammer on the end of the drill string that helps to break up the rock formation. The compressed air that is used to operate the down-hole air hammer also blows the crushed rock fragments out of the hole to the surface along with any water that flows into the hole during drilling (Aua Earth 2011). Typically, a borehole is completed by installing a vertical pipe (casing) and well screen to keep the borehole from caving and help prevent surface contaminants from entering the borehole and protect any installed pump from drawing in sand and sediment.
Country Specific Applicability & Potential	Groundwater is more immune to the effects of climate fluctuation compared to other sources of water, especially surface water. Therefore, groundwater abstraction will be a vital water source option in the countries adaptation to water shortages occasioned by climate change. The government is encouraging individuals, groups and communities, through development of appropriate policies and provision of financial assistance to utilize groundwater, especially in the ASAL areas where surface water is in short supply or unavailable.
Status of Technology in Kenya	Ground water abstraction is common is Kenya, and in many rural and urban areas with shallow water tables hand dug shallows wells are important domestic water sources. In most areas, the bore-holes needed to abstract groundwater would require a depth of as much as 260 m and the cost of sinking such a bore-hole is high. Drilling of boreholes has continued to increase as an option by the government and private developers to address increasing water demand accession by population growth and supply unreliability occasioned by frequent draughts. For example ground water abstraction in the City of Nairobi has steadily increased and currently account for 25% of the overall water-supply of the population of Greater Nairobi.
Benefits to Economic/ Social and Environ-mental Development	• Availability of good quality water for domestic and agricultural purposes • Women empowerment by providing readily available water and committing time spent looking for water to family and other socio-economic activities • Reduced incidences of water born diseases

Climate Change Adaptation Benefits	Climate Change in Kenya is projected to result to more frequent and severe droughts and associated increased water resources stress, particularly in arid and semi-arid areas. Ground water is relatively less likely to be affected by climate change compared to surface water sources and will therefore be a good water source option especially in arid and semi-arid areas (MW&I, 2010).
Financial Requirements and Costs	The costs of drilling new boreholes vary widely depending on many factors such as aquiver depths, design and the difficulty to construct a borehole in a specific geological formation. However, in Kenya the average cost of drilling and equipping a borehole to serve 200 households is estimated at US$ 37500

[i] **This fact sheet has been extracted from TNA Report – Technology Needs Assessment Reports For Climate Change Adaptation – Kenya. You can access the complete report from the TNA project website http://tech-action.org/**