Fresh water

Fresh water is the water occurring naturally on the earth’s surface and underground in rivers, ice sheets, ponds, ice caps, glaciers, streams and rivers (Pielou 2000). Fresh water usually has a low concentration of dissolved salts. This paper assesses the feasibility of different techniques of providing fresh water to arid areas.

The first technique that should be mentioned is digging boreholes. Most of underground water can be found in aquifers. These formations allow water to travel through them. Water could also be contained in aquicludes (Pielou 2000). In contrast, these impermeable structures may have water, but have a limited capability of transmitting a considerable amount of water. Boreholes are typically 125 mm to 150 mm in diameter. These can be drilled to supply water for both domestic and household needs. Larger wells can be dug for irrigation needs. One method of sinking boreholes is through the percussion drilling method. This is where depths of up to 150 m and more are required. This method requires a highly skilled operator in order to ensure that the borehole is straight and vertical.

The other method is the rotary drilling method. This method requires the drilling bit spins in order to make a hole in the ground. Development and drilling of boreholes is a challenging task. Only contractors with wide-ranging experience should be used in order to test the sustainability of the borehole after completion (Simmers 2003). For example, they need to be able to conduct and draw down test. This entails calculating the rate by which the level of water drops at varying flow rates. The amount of time taken for it to return to its original dpth is calculated after pumping ends. After sinking the borehole, a system of water extraction needs to be installed and maintained

regularly. Depending on the area, windmills are ideal for this purpose. Alternatively, water pumps can also be used to draw water from the borehole.

Another viable technique is through rock catchment. In this technique, a concrete wall is built in front of a large boulder. The rock has to be porous so that it can hold water. When it rains, the water is trapped in this rock and later seeps out slowly. The concrete wall erected in front of the rock will then trap the water, which will be used for domestic purposes (Simmers 2003). This technique is relatively cheap in terms of construction and maintenance. However, the disadvantage is that it is most effective in areas that receive an above average quantity of rainfall; therefore, it might not be applicable in most arid areas of the world. In addition, water obtained using this technique might not be fresh. This is because the rock used to trap the rainwater might contain a high level of salts that dissolve into the water making it salty. The right type of rock needs to be identified. Rocks that are not porous or semi-porous are not considered appropriate for this purpose. Finally, there needs to be a covering preventing this trapped water from evaporation and contamination due to exposure.

Dams and water pans are other viable techniques. Earth dams are larger than water pans. The concept behind their construction is the same. It involves digging the ground to form a hole wide enough to trap water for domestic use, or even for irrigation. Areas with sandy soils are not suitable since they are porous. This means that the trapped water will seep into the ground (Wheater, Mathias and Li 2010). The best type of soil for this technique is clay soil. This is because clay soil has excellent water retention

capacity. In areas where clay and loam soils are hard to come by, the best solution would be to compact the soil after digging in order to reduce permeability. The advantage of digging earth dams is that they are large. This means that the water that it traps is more and can be used for an extended period. By contrast, water pans are smaller and easier to manage. They are also easier to maintain, for instance, when it comes to removing the silt that settles at the bottom with time. In order to prevent mud and other debris from being trapped together with the water, it is always necessary to position a sheet of wire mesh at the mouth of the earth dam or the water pan. This traps the unwanted materials that could contaminate the water. Some variations of the earth dams and water pans are constructed in such a way that there is a covering at the top to prevent contamination and evaporation. This essentially makes them underground water tanks. The disadvantage of this method is that this covering has to be removed and reconstructed every time the water requires de-silting (Pielou 2000). This becomes extremely expensive, especially for the earth dam given its enormous size. These techniques require areas with regular rainfall (Wheater, Mathias and Li 2010). The cost of maintenance is high. These techniques are also risky, and many pose a threat to life, as they are essentially gaping holes in the ground filled with water. People or livestock could fall into them and drown. Therefore, appropriate measures should be taken to avoid these accidents.