WATER PURIFICATION
By Charles Bonaventure – ECHO

Introduction

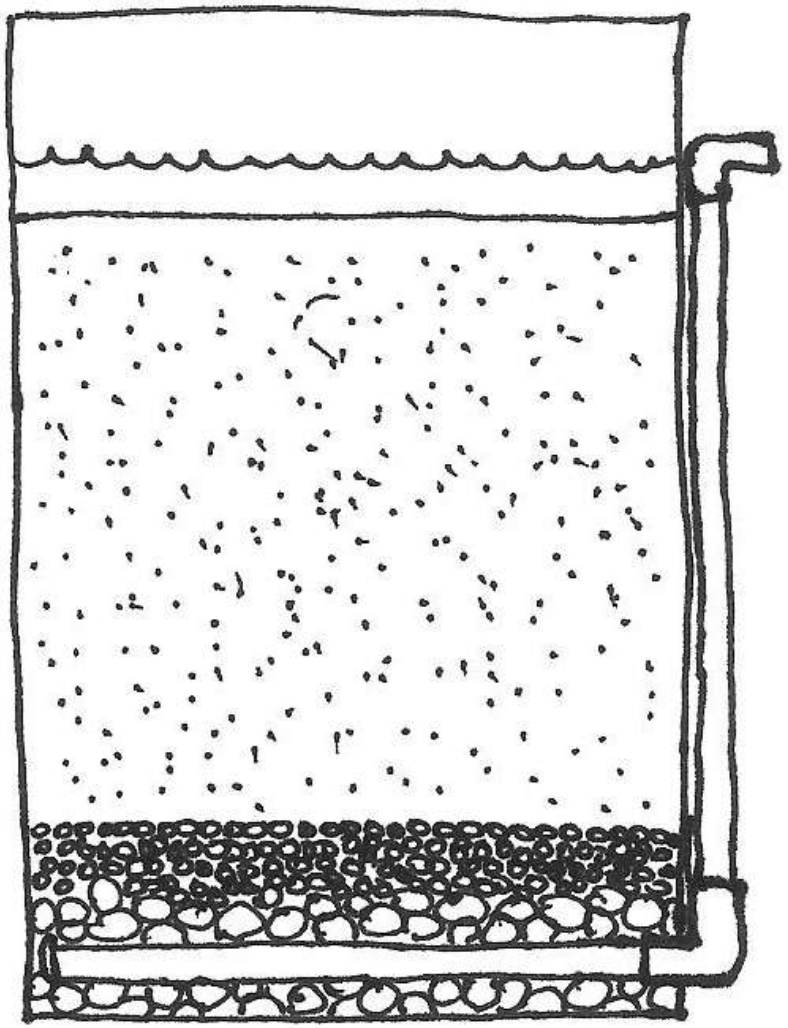
- Water is absolutely necessary for all human, plant and animal life.

- Access to clean drinking water remains one of the greatest challenges in most of areas.

- The biosand, and using of moringa seeds are some of the methods that can be used for purifying water at the household level.

Biosand Filter

- With this filter, contaminated water is filtered through a natural biological layer and then layers of sand, pebbles and stones.



Biosand Filter

- The biosand Filter can be made using local materials and is a low-cost system that removes suspended sediments and other impurities from water in order to make it safer for human consumption.

REFERENCES:

AGRICULTURE OPTIONS FOR SMALL SCALE FARMERS pg 369 English
OPTIONS AGRICOLES POUR LES AGRICULTEURS DE PETITE ECHELLE pg 365 French
WATER FILTER
By Beth Doerr and Nate Lehmkuhl published 2008

Harvesting water from rains, furrows, rivers, lakes and wells may have problems of quality, especially the presence of excess minerals hence need to be treated.

ECHO would like to encourage use of hafir for water storage and moringa seeds for water purification.

A hafir is a trench lined and covered with plastic sheeting costing around 100 USD. It is a home water cistern filled by rain surface water from the ground or from the house roof or a well-designed trench. It is very practical in highland.

A 10,000 litre hafir can be constructed for 20 USD less than the cost of a goat!

Such cheap water even can allow rural and urban people to keep small vegetable gardens irrigated throughout the year.

The following are directions for constructing a hafir.

- Step 1: Care is needed in constructing the hafirs and placement of the ‘hafir’ is important. There must be enough water harvested to fill the tank, but the filling water must not overly exceed the capacity of the ditches, settling pool, and tank, so there must be an outlet which can prevent erosion of the actual tank area. The water should enter at a slow speed to allow sediment to settle out before entering the tank.

- Step2: Measure an area 1.5 meter wide by however many meters long. (We use 4 meters long for a 5,000 ltr demonstration tank, but the length is up to you—the width is important; it depends upon the width and depth you desire for safety and strength, and upon the width of the plastic sheets. We have joined two sheets to 4 meters wide, with plastic sheets and adhesive which is currently available.

- Step3: For this size, dig an area 1 meter deep by 1 meter wide the entire length of the trench, and put the earth at least half a meter away from the edge of the hafir. Digging deep down first will make it easier to loosen and remove the balance of the earth and to shape the hafir by tapering the sides. Place the removed dirt off to the sides and on one end, leaving at the other end an inlet. The overflow outlet can be placed at either the same or the other end.

- Step4: Loosen the balance of the earth and dig out the rest of the tank so that it is 1 meter wide at the base and 1.5 meters wide at the top. At one end you may dig a little bit deeper so that the water will be easier to extract at the deeper end when the hafir water level is low. Tapering the earthen sides reduces the chance for the sides to cave in when the hafir is filled with water. Pound the earth at the floor of the hafir so that there are no sharp points but only a soft gravel-like base.

- Step5 When the hafir is nicely shaped with vertical ends, dig a small trench all around the edge of the hafir, 30cms (1 ft) from the hafir edge, where the plastic sheet ends will be buried, held by rocks or clods of earth and then packed earth. This will prevent the sheet from pulling out of the ground on the edges. At the inlet point, dig a deeper hole to bury the plastic corner which has been rolled around a stick and buried so as not to be washed upwards when water passes into the tank.

- Step6: If the plastic sheet needs to be glued together, tape it with a 5cm overlap, and then glue the other side with a strong adhesive which is water proof. When ready, place the seam in the centre of the hafir lengthwise, and use a blunt stick or bear feet to push the sheet into the corners. The plastic sheet should lie loosely in the trench, to allow for some stretching when filled with water, and reduce the strain on the plastic especially where it has been glued.

- Step7: Place clods of earth or rocks on the sides of the plastic sheet along the small trench around the hafir edge so that the plastic sheet edges will be kept buried. Have someone barefoot descend into the hafir and to fold the corners nicely so that there are as few folds as possible.

- Step8: Create the small trench inlet and outlet so that water can flow slowly into the hafir. Near to the inlet, dig a round sediment basin at least two meters diameter and 30cm deep. Here water will collect and sediment will settle out before it flows into the hafir. The more slowly the water flows, the less sediment will be carried into the hafir. If the hafir is built on a slope, make a contour above the hafir to catch water and prevent flowing full force into the hafir. It is hard to take sediment back out of the hafir again, although it does no harm; prevention is the key so that the hafir will not be filled with earth sediment.

- Step9: Dig ditches with small slope [1%-2%] flowing into the sediment basin. If the hafir is built near to your house, try to channel the water from the roof directly into the hafir; this will be cleaner water than from the other catchment area. Place another layer of plastic sheet over the top of the hafir to prevent evaporation of water. Covering the hafirs to reduce evaporation which otherwise can reduce the storage life by 25%-50%. Low cost materials like bamboo, sisal or wood poles are enough to hold the top cover out of the water, and small holes in the top cover will allow rainfall to enter from the top without putting too much weight on the plastic cover.

- Step10 DANGER – WARNING – AVOID DROWNING: Place thorns around the hafir, and for the long-term, plant a living fence, such as Jatropha, Minyara, or other hedge to prevent children, animals and fowl from falling into the hafir. In areas with elephants and other wild animals, plant a combination of these plants to prevent access. Only allow mature people to draw water from the hafir. If built higher on a slope, you can use a long hose to siphon water out of the hafir without going too near the edge. If drawing with a pail, use a smooth edged pail so as not to cut the plastic sheet when lifting. Place a stone to stand on at the edge. Help your neighbors to build hafirs to avoid jealousy.

Moringa

USING MORINGA SEEDS IS ONE WAY OF WATER PURIFICATION by Rogers Sharland