

**Draft
Short Manual
On
Tube Recharge Methodology**



*Making a borehole for the tube recharge system with a step Auger
in Chimoio Mozambique, June 2006*

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Tube Recharge **Rainwater recharge in ground water**

Many wells in Africa dry up at the end of the dry season, because more water is taken out than is coming in by natural recharge. Problems with recharge are: compact topsoil layers, loss of vegetation, increasing erosion, etc.

There are many ways to increase the recharge of groundwater such as underground and above ground dams, planting trees or Vitiver graas that have long roots. Another option is artificial recharge such as "Tube Recharge". This is a new low cost option to recharge groundwater aquifers by means of plastic tubes, protruding through the impermeable layers, making direct connection with the aquifers possible. Rain water that would otherwise run off to rivers (on sloped terrains) is caught in contained holes (dug out or dams) provided with a recharge tube.

The recharge tubes are closed by a cover tube, which is only taken of after the collected water has settled for some time, allowing particles to settle down at the bottom of the hole and the water has become clear. After having taken of the cover, the collected water flows through the recharge tube into the aquifer.

When these recharge tubes are installed about 10 to 20 m away from wells, they can increase the water available in the aquifer for the well. A minimum distance of 10 m should be kept, in order to filter the water before it reaches the well.

Care should be taken that they are placed such that they do not interfere with latrines outlets.

The holes can be drilled manually by means of sludging or other low cost methods, if soil conditions allow.

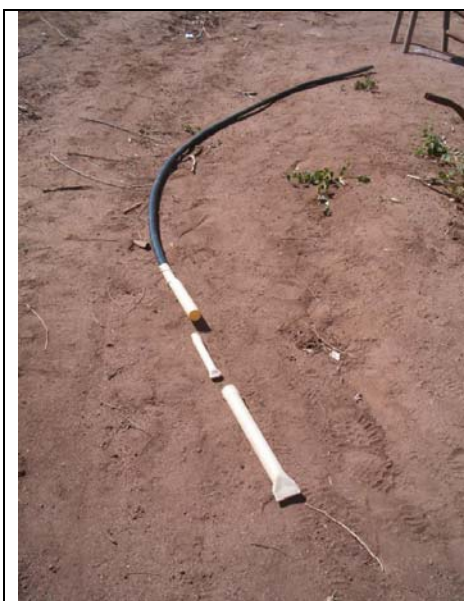
Method of Installation:

- Drill a 2 inch borehole in an area where water otherwise runs off. Use an auger or the Baptist method and drill through the compact layers until layers are reached that are permeable (close to the aquifer)
- Cover the borehole and dug a hole around the borehole for instance 0.5 m deep, 4 m wide and 5 m long (volume 10 cubic meter)
- Prepare a pressure tube (1 or ¾ " PVC tube) of necessary lengths and connect it with a top pipe of 1.5 " and 0.3 m long.
- Insert a slotted filter pipe of 1" into the top pipe and put a piece of cloth into this filter pipe that serves as a filter for the incoming water. This cloth can be cleaned when filthy or renewed.
- Make also a cover tube of 1.5 " of 0.5 m long or of sufficient length to stay above water level when the hole has been filled up.
- Place the set of tubes in the borehole in such way that the top pipe is just above the bottom level of the drain hole.
- Fill the space around the tube up with gravel or coarse sand and seal top part with clay.
- With the rain, the drain holes will fill up; leave it for 1 day or more to allow dirt and dust to settle.
- Then take of the cover tube and water will flow via the tube into the ground.
- When the drain hole is empty, check the filter cloth first, then put back the cover tube and wait for the next rain.
- Repeat with every rain.

In this way, every times it rains, 10 cubic meter water can flow back into the acquifer close to the well, which serves a s a storage. Depending on capacity and flow pattern of the ground water, this water can be pumped up in the dry season.

The cost of drilling will depend on the geological situation, but in many cases a 10 m hole can be made in half to one day.

Cost of material of the pressure tube and filter can be reduced by using black low cost hose.



A complete system before installation



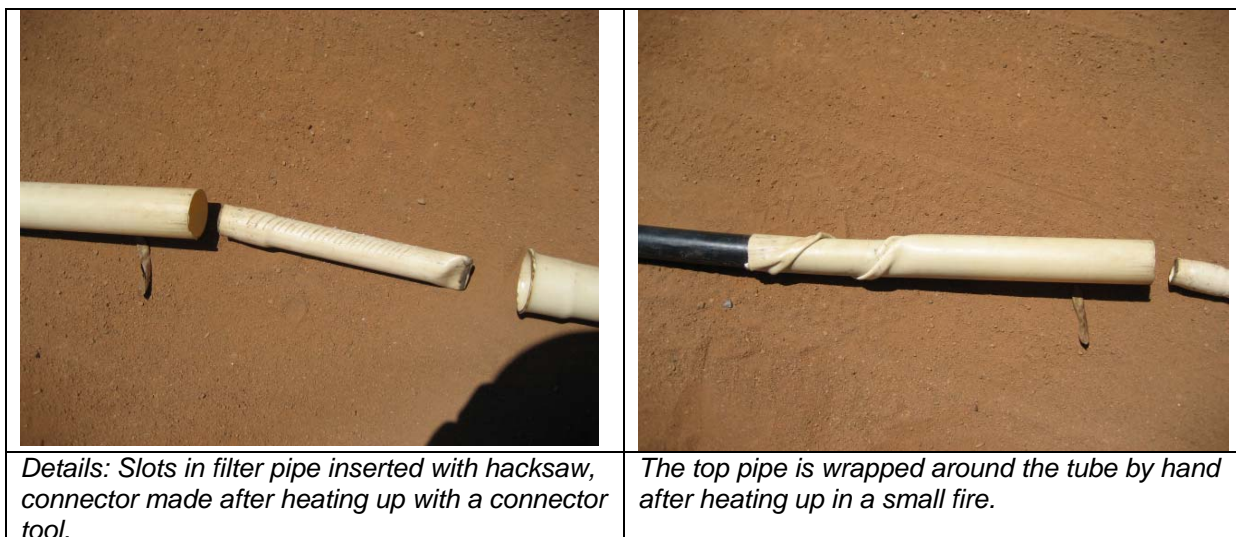
The system has been inserted and gravel can be added plus clay to seal it of.



Main tube with slots of filter made with a hacksaw



The system in closed position



Materials:

MATERIAL LIST						
Nr.	Part	Material	Size	Part	Nr	Added
				Length		Parts
				(m)		Length
						(m)
1	Recharge tube	PVCTube	¾"	15	1	15
2	Top tube	PVC tube	1 ½ "	0.5	1	0.5
3	Filter pipe	PVC tube	¾ "	0.5	1	0.5
4	Cover tube	PVC tube	1 ½ "	0.5	1	0.5
5	Bags of gravel or course sand		50 kg bags		2	2