SMART Centres

Tube recharge

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The SMART Centre Group

Tube recharge. SHIPO model

Artificial infiltration of rainwater in the ground to recharge shallow aquifers

1 Copyright and disclaimer

Tube recharge systems have details which can be best learned with practical training. Therefore it is highly recommended to use this manual in combination with practical hands-on training that can be provided by a SMART Centres in Tanzania, Malawi, Mozambique, Zambia and in the future in other countries.
Please feel free to contact us via www.smartcentregroup.com

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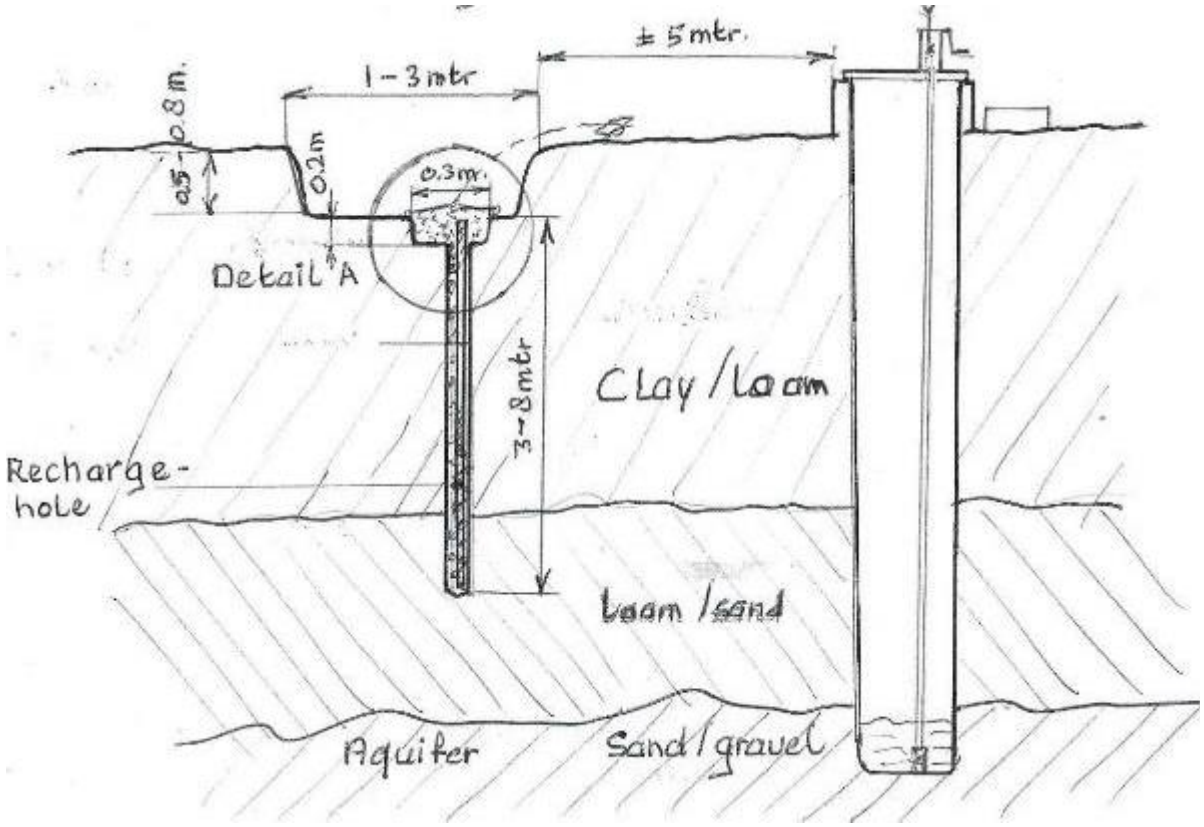
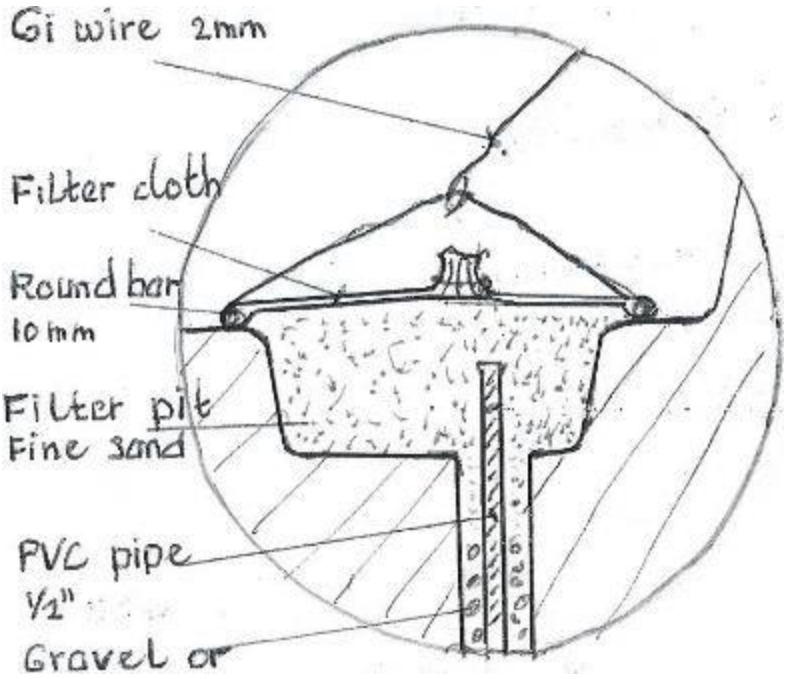
3 Context

Many of the millions of hand dug wells in Africa dry up in the dry season. Often this can be avoided with simple and low cost technologies like a Tube recharge.
With this option each rain season 50 to 250 cubic meter of rainwater can be “injected” in the ground near wells, which can prevent a well from drying up.
Material cost of a Tube recharge systems is around 10US$ and after training masons or families themselves can make it. Where this option was applied, wells that before went dry now have water all year round. Some observations:

1. Although simple, a lesson learned is “Simple is not easy”. To guarantee quality training is needed. Welders in quality drill tools; masons or families in installation and maintenance.
2. A Tube recharge can be made with local materials and are affordable for families. The effect of family wells with water all year round is: time saving (no need to walk to communal wells), more hygiene, options for food production so extra income
3. To convince families to install this system it is needed to install a so called critical mass in each area.
4. If water from wells with a Tube recharge is used for drinking, it is strongly recommended to treat that water with, Boiling, Chlorine or a Household water filter.
5. Large scale implementation can reduce effects of climate change
6. More investigation is needed to measure effect in different hydro-geological situations and on impact on water quality.

4 Schematic drawing





Schematic drawing of a Tube recharge. See page 8 for an updated drawing

After making a pit, a recharge hole is made with a Core auger or Stone punch. The volume of the pit can be 1 to 10 m3 or more. The size of the pit increases if frequency of rain is less. To see the effect of a Tube recharge it near a wells that dries up.

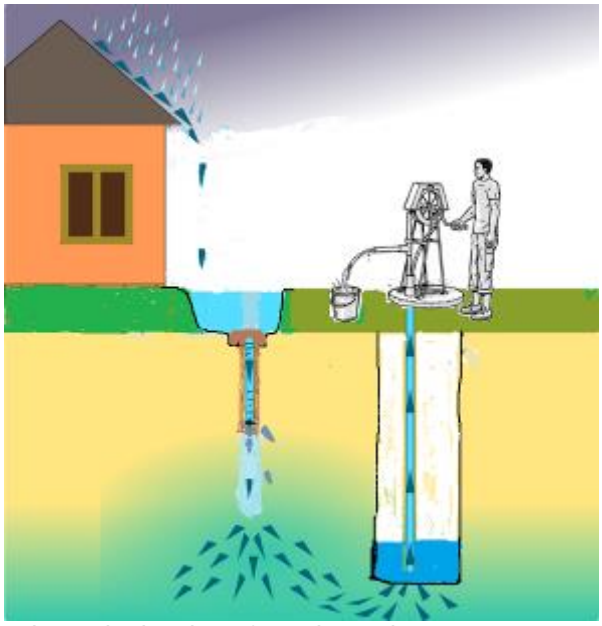
The diameter of the recharge hole can be 2 to 3 inch and the hole should pass the top compact layer. In this case it is 6 m. deep. The PVC pipe should be 15 cm more than the length of the hole. See page 4 how to make the PVC tube.

Place the PVC tube in the hole and fill the space besides the with gravel or sand. Make sure the PVC pipe is at least 5 cm beneath the surface of the sand.
NOTE; Here the large pit is square but it is recommended to make it round

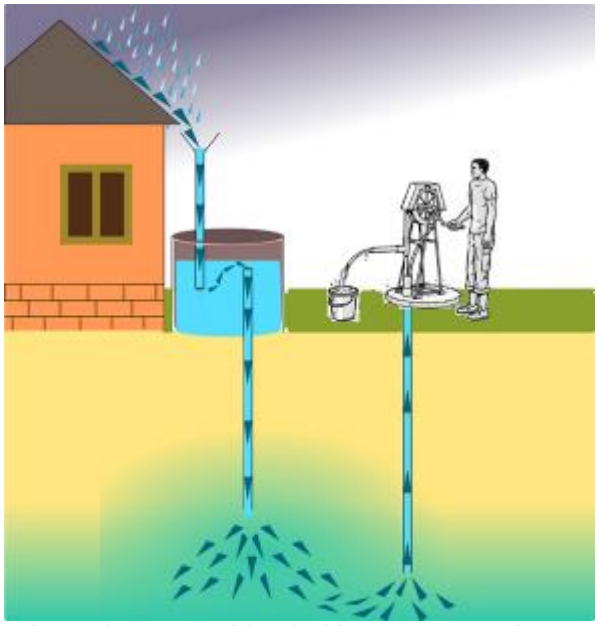
The **Filter pit** is covered with a **Cloth filter** made of synthetic cloth and round bar 10 mm.
Note. See also page 8 for an updated drawing

This pit has a catchment area of 200m2. During rain the pit fills up and after some hours the water has infiltrated in the ground via the cloth filter and sand filter. This is repeated every time it rains.

Because the run off water is dirty, the cloth filter gets clogged and has to be cleaned regularly.
Material cost of this tube recharge 10 US$
Labour to dig the pit and hole 2 to 4 man days



Schematic drawing of a Tube recharge near a hand dug well. In this case it is combined with water coming from a roof.



Tube recharge combined with a storage tank. Rainwater is stored in the tank. When the water level is higher than 70% of the tank it flows over into the recharge hole / pipe.

Where the recharge uses ground run off it is recommended to make 2 pits. The first pit is to let sand or clay settle so the water that flows into the second pit is relatively clean.

In general it is recommended to make round pit which are stronger. Make the sides a bit sloped so there is less danger of collapsing.

5 Technical details

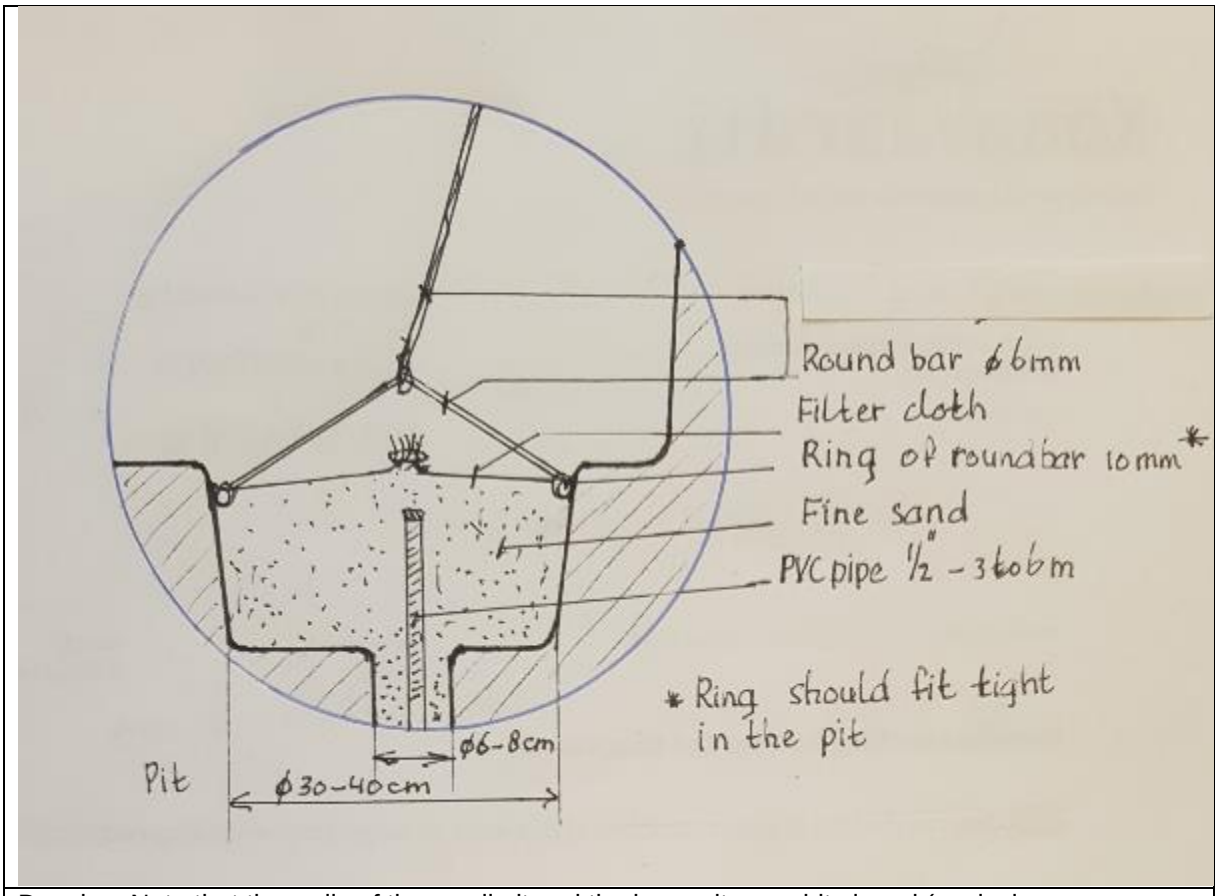
The recharge hole is made with a Core auger of 2 or 3 inch. The Auger is turned around with handles
See also manual of the Mzuzu drill.

The Core auger has drill pipes of 3 meters long which can be extended with another pipe of 3m. Eventually a step can be mounted for a person to increase the weight on the auger.

PVC pipe of ¾" and 3 meter length. Ends are closed. Each side has 0.5 m or more length of slots made with a hacksaw.

After the PVC pipe is placed, the hole is filled. If gravel is used fill up until 1 meter from the top and fill rest with sand. As used for construction.

	
Installing the PVC pipe	The hole is filled, if available use small gravel. If not available use sand. Make sure the PVC pipe is covered.
	
Do not completely fill the small pit Make a cloth filter that has a tight fit in the hole. The sides of the holes are a bit conical.	If ready, test the recharge capacity by pouring a few buckets of water



Drawing. Note that the walls of the small pit and the large pit are a bit sloped (conical_.