

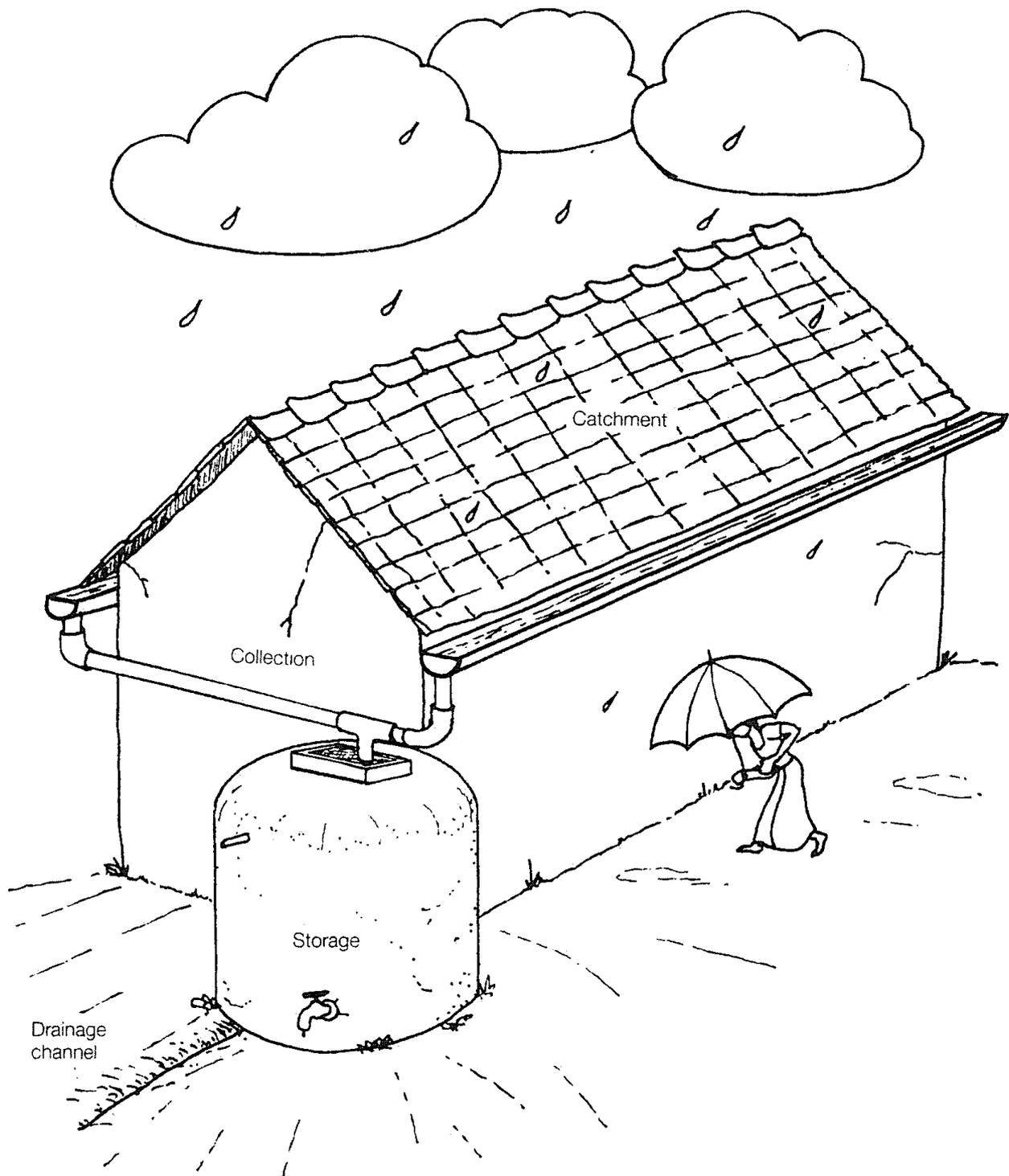
# 11. Rainwater harvesting

Rainwater harvesting is a method of collecting and using precipitation from a small catchment area.

Stored rainwater can be a valuable supplement to other, possibly inadequate, domestic water sources, and also for irrigation.

Its use is particularly appropriate in parts of the world where heavy, intense storms are followed by prolonged periods of little or no rainfall.

An adequate household supply system needs a CATCHMENT AREA, a means of COLLECTION and good STORAGE facilities.



# Rainwater harvesting

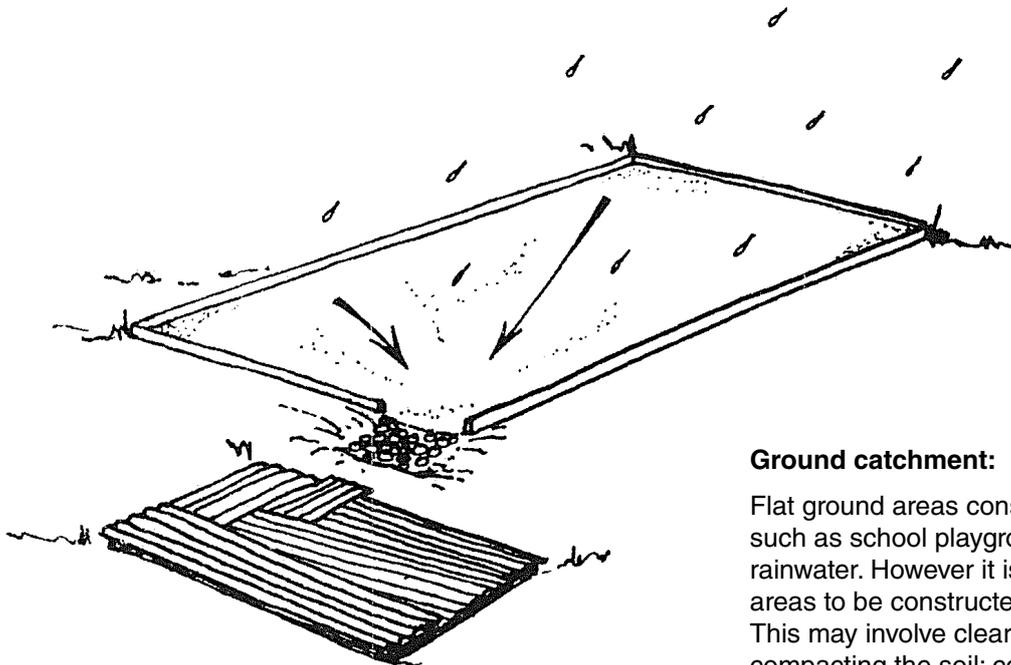
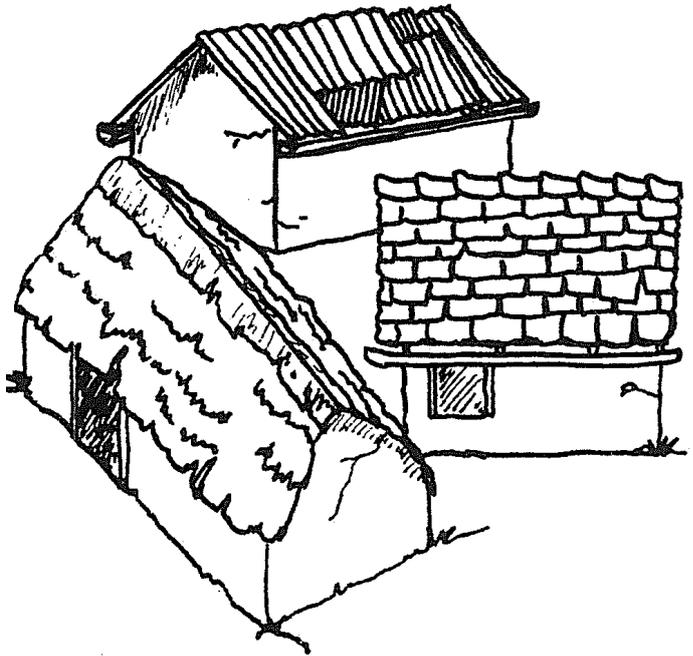
## Catchment

The catchment area may be a roof or an area of ground.

### Roof catchment:

Corrugated iron roofs are often used. They are cheap, durable and easily maintained. Costs may also be kept down by the use of local materials such as clay tiles, sisal-cement tiles or thatch. However, water collected from thatch is discoloured and usually contaminated. An improvement is to use plastic sheet over the thatch. Tiled or metal roofs give the cleanest water.

Collection of rainwater from a roof is the cheapest form of rainwater harvesting since the additional costs are then limited to the collection and storage elements.



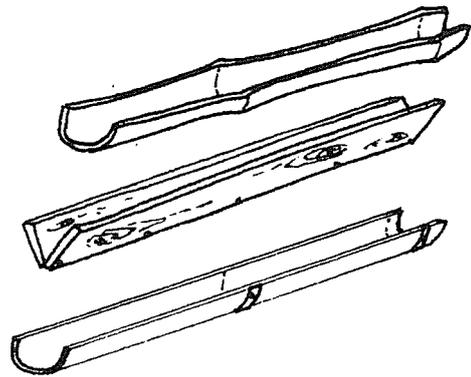
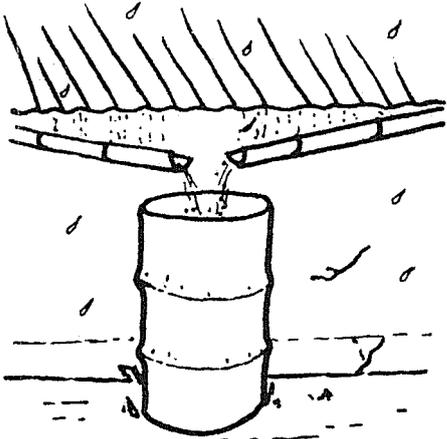
### Ground catchment:

Flat ground areas constructed for other purposes, such as school playgrounds, are ideal for collection of rainwater. However it is more usual for special catchment areas to be constructed by adapting the ground surface. This may involve clearing of vegetation; smoothing and compacting the soil; covering the area with asphalt, stone, paving material, or any suitable rigid or flexible material.

Use of a ground catchment area can be much more expensive to construct and maintain than roof catchments. There may also be considerable pollution problems, and unless adequate treatment is available, water collected in this way should only be used for irrigation and cattle.

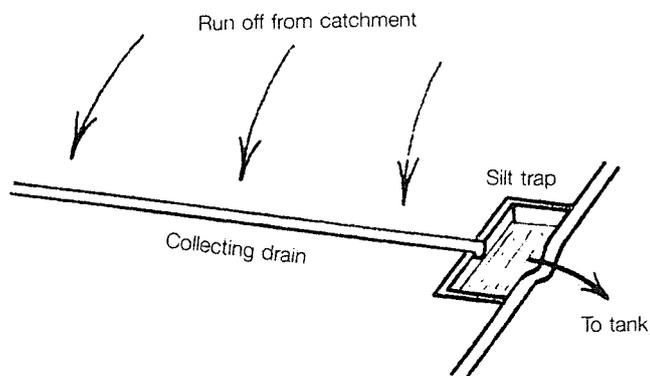
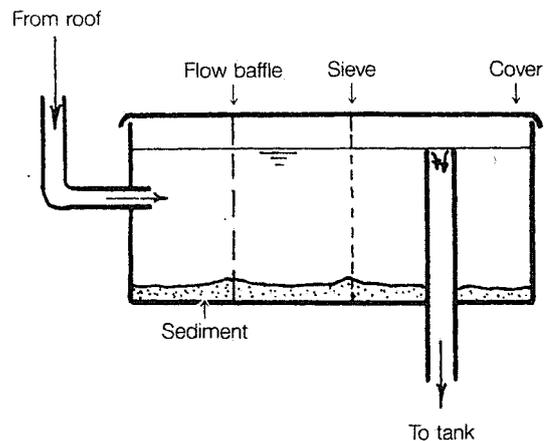
## Collection

From roofs: This is usually done by means of a gutter and downpipe system. Gutters may be made from local wood or bamboo, or they can be preformed galvanised iron or PVC. The use of guttering may be a problem for some households, especially in low-income areas, but costs can be kept down if local materials are used.



Water must be carried from the eaves to the storage tank, and the simplest gutter and downpipe systems will be the cheapest to construct and maintain. The eaves gutter must be large enough to carry the run off expected during heavy rainfall. In general semi-circular gutters of about 200mm width will cope with all but the heaviest rainfall, although if local materials are used this may not be possible. The gutters must also be firmly supported or attached to a roof or wall, since they become very heavy when full of water. They should be fixed to slope slightly towards the storage tank so that no stagnant pools can form.

Separation of first-flush: The rainwater which first runs off a roof during a storm will be polluted by dust, leaves and other sediment from the roof. It is better to separate this water from the cleaner flow which follows. Valves and hoses are unreliable, and the best system to use is a simple automatic device, such as the swing funnel or possibly a small baffle tank, as shown.



Collection from the ground: The slope of the catchment surface directs rainwater towards the storage tank, possibly by means of collecting drains. Water collected in this way is bound to be polluted, especially by sediments, and the best way to remove some of this material is by means of a silt trap.

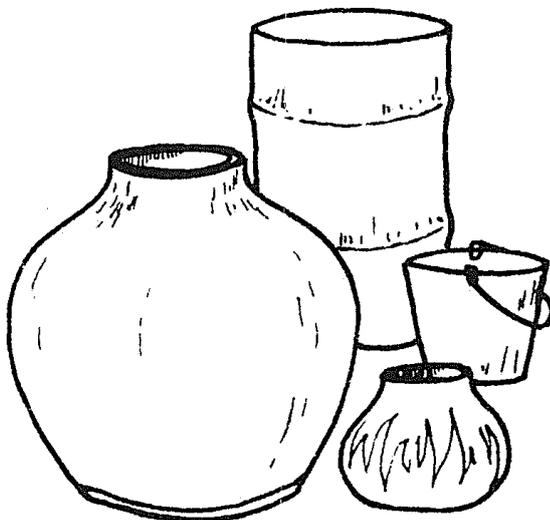
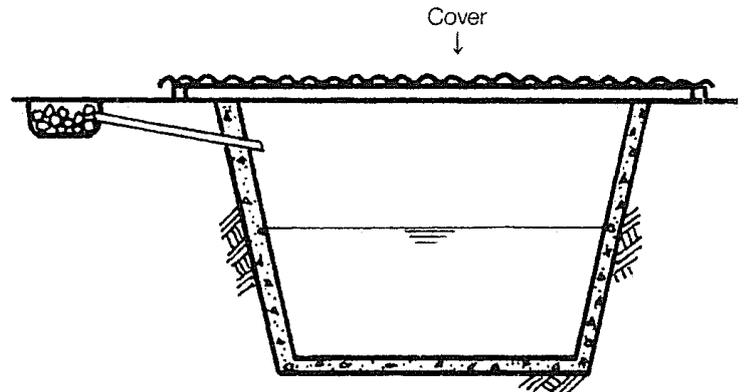
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## Storage

Rainwater can be stored in either underground or surface tanks of varying sizes. Whichever is used, it is necessary to completely enclose the tank and provide a tap or pump, in order to prevent pollution.

Underground storage: Large tanks can be built which are cool and easily protected, and which have almost no loss from evaporation. Also, by building underground, there is a considerable saving in space.

Materials used may vary from simple compacted earth (where ground conditions allow) and plastic sheets, to substantial reinforced concrete tanks.



Surface storage: The size of storage vessel used will depend to some extent on the amount of rainfall and the size of the roof catchment involved. It will also depend on the economic circumstances of the householders and the availability of local materials. Buckets, barrels, clay pots and oil drums are all common. Locally produced cement mortar jars may have quite a large capacity. Unreinforced jars and bamboo-cement tanks are possible up to about 4.5m. Larger sized tanks are usually made from ferrocement, concrete or brick.

(Domestic storage tanks will be dealt with in detail in a later Technical Brief).

## Water quality

Rainwater collected from roofs is usually much cleaner than that collected from the ground, and so is more suited to drinking and cooking purposes. It is however, still polluted to some extent by bird droppings, dust and leaves. Bird droppings can cause some bacterial contamination. Pollution can also occur during storage, if the tank is not properly covered or sealed. Organic matter will rot in the tank, and bacteria will multiply, and so it is important that a filter system or diversion of the first flush be used. In addition, the tanks should be kept cool and dark, and they should be regularly cleaned out.

Simple treatment of stored water might include boiling, pot chlorination or use of Moringa seeds as a coagulant.

## For further information:

1. Berkovitch I. *Harvests of rain.*, Waterlines Vol. 1, No. 1, July 1982
2. Dian Desa. *Water purification with Moringa seeds*, Waterlines Vol 3, No 4, April 1985.
3. Pacey A. *Rainwater Harvesting*, Intermediate Technology Publications, 1986.
4. United Nations Environment Programme. *Rain and Stormwater Harvesting in Rural Areas*. 1983.

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