

Rainwater collection

Rainwater is collected and used for domestic purposes in many parts of the world. This is normally done by individual households.

Rainwater collection can be practised under a variety of conditions in both urban and rural areas. Rainwater collection has been successfully used as a short-term measure following disasters in which water supplies were disrupted or contaminated.

Rainwater collection is possible in most areas. Its practicality depends on the expectations of the users and on rainfall.

Rainwater collection systems have three major components :

- A hard impenetrable surface such as a roof or concrete slab onto which rain falls.
- A storage container. In practice, storage at household level is limited to a few thousand litres (a few cubic metres).
- A means for collecting water from the collection surface and passing it to the storage container, such as a gutter and down pipe. This should include a filter for removing any solids from the water.

Where a suitable collecting surface already exists, rainwater collection can provide a safe, low cost source of water, or a supplement for an inadequate or contaminated public supply, at household level. On a larger scale, however, the cost of the storage tank may be prohibitive.

Rainwater that is stored for long periods of time may deteriorate in quality if bacteria are allowed to grow. Household rainwater collection systems nevertheless have the advantage that quality and storage are controlled by the users. If there are worries about water quality, it may be useful to read Fact Sheet 2.34 which describes household treatment and storage of water.

Sanitary inspections of rainwater collection systems

Rainwater collection systems should be inspected regularly to ensure that an adequate and safe water supply is maintained (see Fact Sheet 2.1). A suggested frequency of inspection is at least twice a year by the household and an annual inspection by an external surveillance agency. The household should conduct a sanitary inspection during the dry season to identify any repairs that may be required, to clean any sediment and, during the wet season, to check that the collection system is functioning correctly. Where rainwater is collected by households, a surveillance agency should carry out a water quality analysis of some of the tanks in a community. If different collection surfaces or materials are used, then samples should be taken from each type. Where rainwater collection is used to supply a community, water quality tests will be required once, preferably twice, a year.

The key points and observations to be made when conducting a sanitary inspection of a rainwater collection system are summarized in Figure 1.

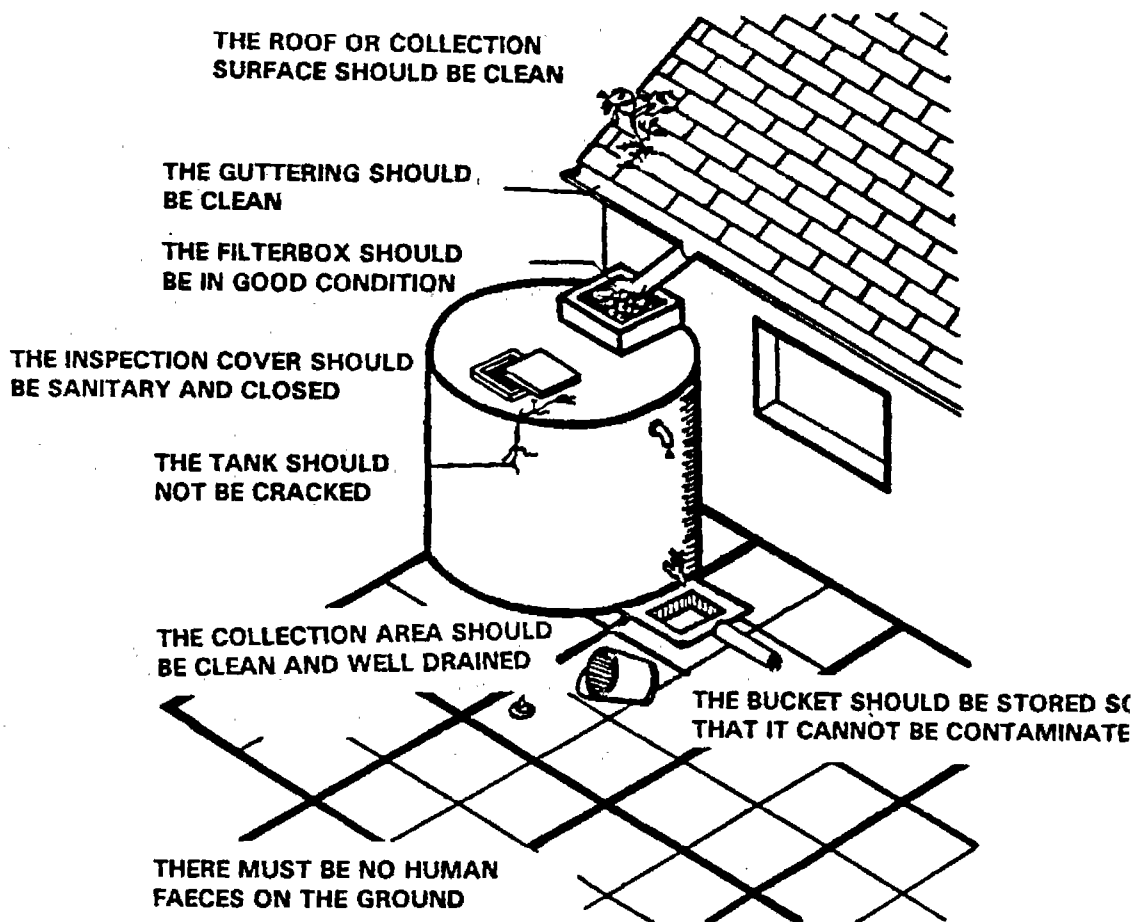


Figure 1. Aspects of a rainwater collection system to be checked during a sanitary inspection

Collection surfaces

The simplest form of rainwater collection is from roofs. This can be done using traditional roofing materials such as thatch (although discolouration of water will occur), improved local materials such as fibre-cement tiles or materials such as corrugated iron sheeting. Guttering for carrying water down the collection surface to the storage tank may be adapted using traditional materials, such as split bamboo, or modern plastic gutters. Improvements in roofing and guttering for rainwater collection may be linked to general housing improvement programmes, for example in peri-urban areas and poor rural areas. Figure 2 shows one method for roof collection of rainwater with connected tanks for increased rainwater storage.

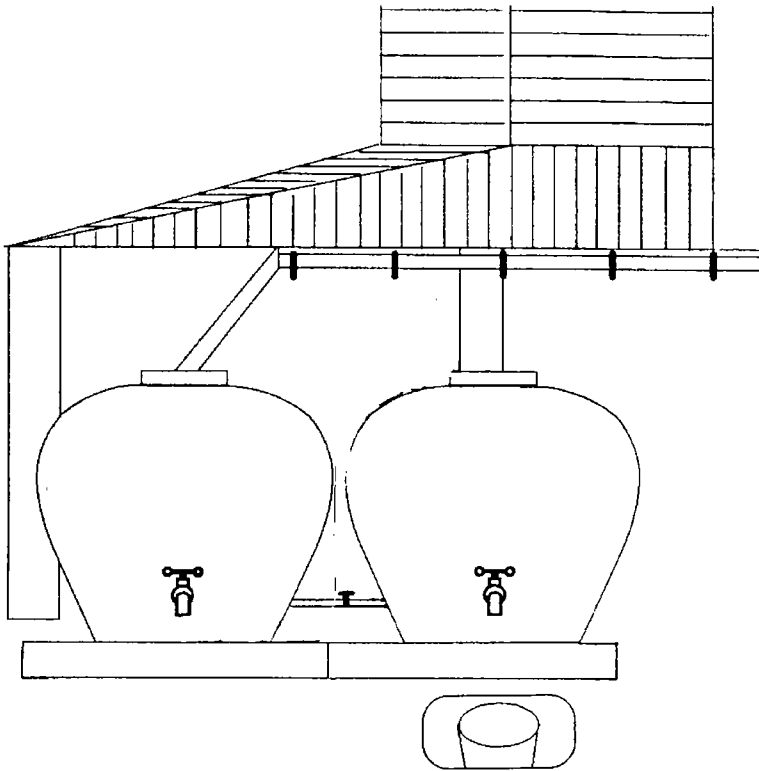


Figure 2. Connected tanks for increased rainwater storage

Collection of rainwater at ground level is often used on a large scale to store water for irrigation during the dry season. This Fact Sheet only covers ground collection of rainwater on a small scale for domestic use.

Some households in rural areas have a threshing area or grain drying area, which is used only during harvest time when there is little or no rainfall. This area can be used to collect rainwater during the wet season, which can be stored in an tank. It is important that the tank has watertight cement-plaster walls, a strong raised sanitary cover, and a trap to stop dirt and solids entering the tank.

Figure 3 shows a rock catchment system. Rainwater runoff is collected in a natural catchment basin from the surrounding bare rock. The water is directed from the catchment floor into a silt trap, and then into a sealed tank. The water may be drawn off by gravity-feed downhill, or by a pump.

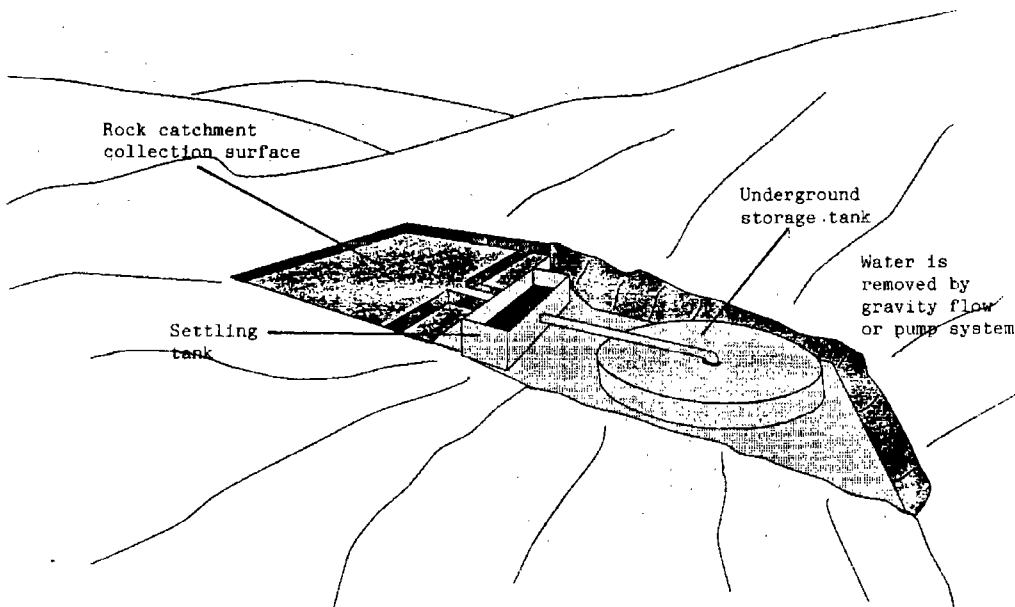


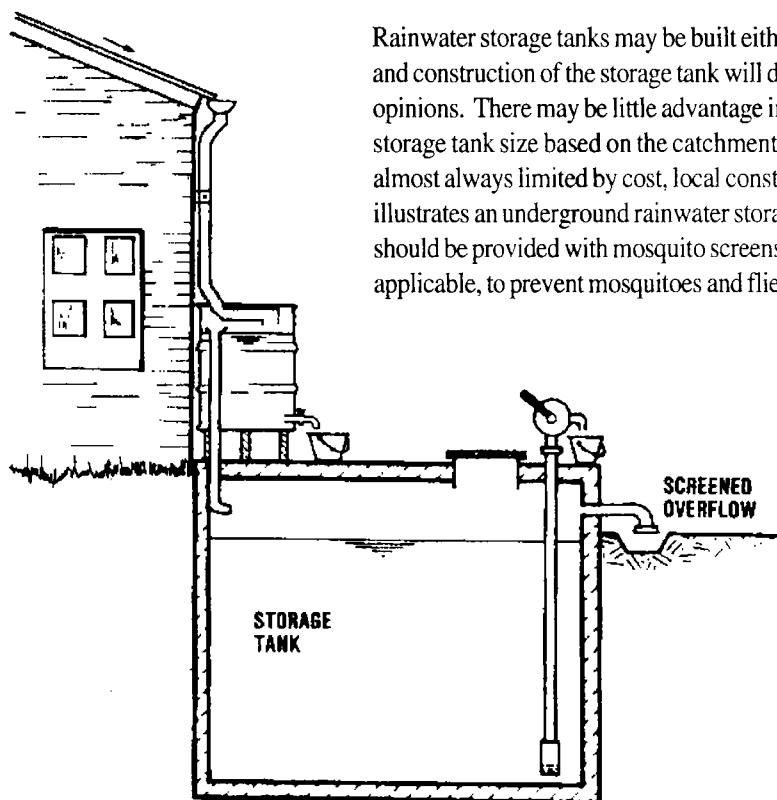
Figure 3. Rock catchment system with underground rainwater storage tank

The collection surface may be made of a variety of materials. The following table summarizes the efficiency of different materials.

Collection materials

Type of material	Efficiency
Concrete	Very Good
Plastic sheet (ground covered)	Good
Butyl rubber	Good
Brick	Fair
Compacted, smooth soil	Fair
Clay/cow-dung threshing floors	Fair
Uncompacted soil	Poor

Storage



Rainwater storage tanks may be built either above or below ground. The size and construction of the storage tank will depend on local materials, skills and opinions. There may be little advantage in making detailed calculations for storage tank size based on the catchment area, rainfall and water use, as size is almost always limited by cost, local construction skills and materials. Figure 4 illustrates an underground rainwater storage tank. A rainwater storage tank, should be provided with mosquito screens fitted to the tank openings, where applicable, to prevent mosquitoes and flies from breeding in the tank.

Figure 4. Rainwater storage tank

It may not be cost effective to build a tank large enough to store water for the whole dry season. If a storage tank can provide water for the first weeks of the dry season when the household is busy with crop harvesting, it will make time consuming trips to local springs or wells unnecessary at least for this period.

Where the cost of individual household rainwater storage tanks is too high for local people, communal tanks may be built between several households or for a large public building such as a school. Local opinions are very important with regard to communal systems, and cleaning and maintenance responsibilities need to be clearly defined.

Need for a silt trap and foul-flush diversion

A means for diverting the first flush of water from the collecting surfaces and for separating solids should be incorporated into the system. The main reason for this is not to stop germs getting into the storage tank, but to keep dirt and other solid material out of the tank where it may give an unpleasant taste to the water. A simple trap, or coarse filter, is usually sufficient. Figure 5 shows a trench filled with rocks, which acts as a silt trap. This will remove the debris picked up from the collection area before the water enters the storage tank. The silt trap must be cleaned regularly to reduce contamination of the water.

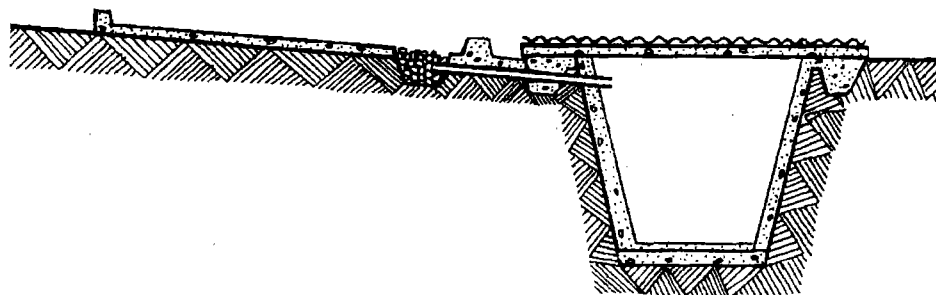


Figure 5. A simple silt trap

During the first few storms of the year and at the end of the rainy season as storms become less frequent, the first water that comes from the collection surface should be diverted from the tank because this water will carry dirt from the collection surface. This can be done either by using a swivel joint on the inflow pipe or by disconnecting the inflow pipe from the tank. It is a good idea to divert the first water even if a silt trap is built, as otherwise the trap may block quickly and overflow. Once the storms become more frequent, it is not necessary to divert the first flush away from the tank if the tank has a silt trap, as the amount of dirt brought from the collection surface will decrease.

Planning a rainwater collection system

When planning a rainwater collection system, it is important to assess both social and technical aspects. Social aspects include asking people about the following :

- How many local people collect rainwater, and by which methods ?
- What is the local opinion about rainwater quality and its use ?
- What is the local feeling with respect to individual or shared storage tanks ?
- How much time and money do local people wish to spend on rainwater collection as a water source ?
- What is the best time of the year to start a rainwater collection construction programme ? This is not, say, at harvest or planting time when people in rural areas are busy.

Technical aspects include :

- Obtaining official records of local rainfall, where possible.
- Asking local people about local rainfall and folklore about droughts and suchlike.
- Quality of available materials for catchment and guttering.

Operation and maintenance

Rainwater collection systems must be properly maintained if the water quality is to be acceptable. The following table summarizes the tasks which should be undertaken.