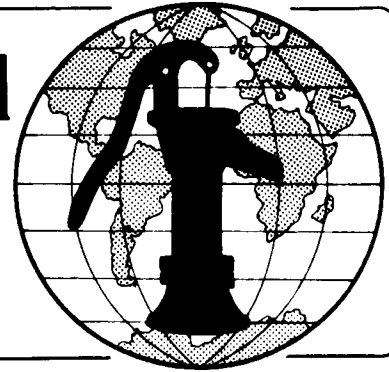


# Water for the World

## Constructing, Operating and Maintaining Roof Catchments Technical Note No. RWS. 1.C.4



The construction of a roof catchment in an individual home is not difficult and generally no special skilled labor is required. With the necessary tools and materials, a catchment system can be installed by a family at a modest cost. This technical note outlines the steps for installing roof catchments. Read the entire technical note before beginning the construction of the system.

### Useful Definitions

**CAULKING COMPOUND** - A filler that seals cracks and seams and makes them watertight.

**CISTERN** - A storage tank for water.

**FOUL FLUSH** - The first run-off from a roof after a rainfall.

Before construction begins, the project designer should give you two items:

1. A list of all labor, materials and tools needed for construction similar to the sample list in Table 1.

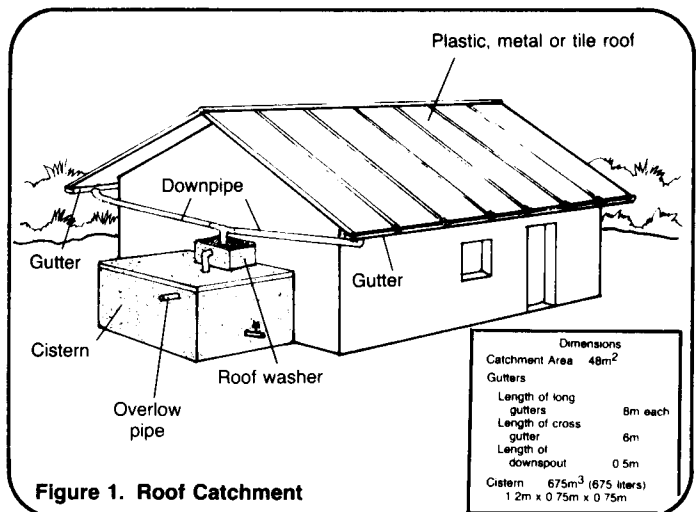
2. A plan of the roof catchment system with all measurements as shown in Figure 1.

Obtain all materials needed for construction so delays can be prevented.

Construction of the cistern should begin at the same time as construction of the catchment system. For information about constructing cisterns, see "Constructing a Household Cistern," RWS.5.C.1.

**Table 1. Sample Materials List**

Item	Description	Quantity	Estimated Cost
Labor	Foreman Laborers	____ ____	____ ____
Supplies	Corrugated sheet metal, plastic or tiles (for roofing) Metal gutters, wood or bamboo (for gutters) Wire, rope or local fiber (to secure gutters to roof) Tar or caulk (to seal gutter connection to downpipe) Nails Wire screen	____ ____ ____ ____ ____ ____ ____	____ ____ ____ ____ ____ ____ ____
Tools	Hammer Machete (to split bamboo) Wire cutters Saw Chisel	____ ____ ____ ____ ____	____ ____ ____ ____ ____



**Figure 1. Roof Catchment**

### Installation

The installation process consists of three steps: construction of roof catchment structure, installation of gutters and connection of the downpipe to the cistern, and construction of a means to dispose of the foul flush.

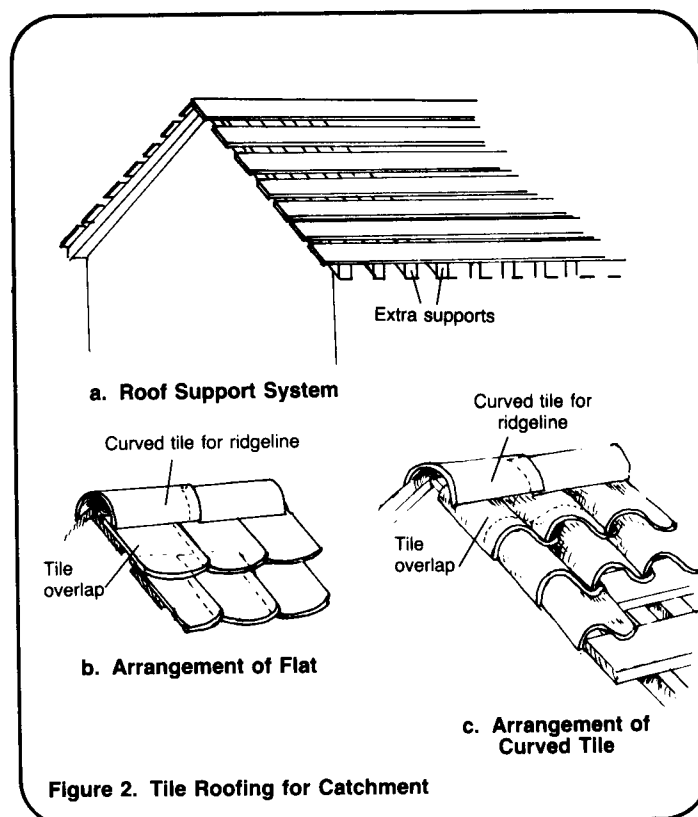
**Catchment Installation.** For pre-existing houses, check the roof structure for strength. If the structure appears weak, it should be changed or reinforced. In new houses, or where an existing roof cannot be used, a completely new structure must be installed. The material used for roofing will determine the sizes and spacing of the rafters and cross-supports. Table 2 shows the dimensions of various types of roofing materials.

**Table 2. Roofing Material Sizes**

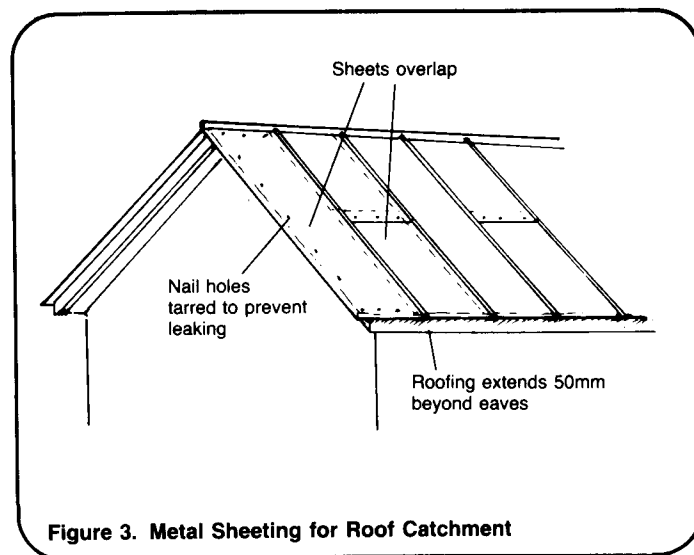
Materials	Width	Length
Galvanized steel roofing	0.6m	2.5-3.75m
Aluminum sheeting	0.9m or 1.2m	2.5-6.5m
Fiberglass sheeting	0.65m	2.5-3.75m
Tile	0.2m	0.4m

Place the roofing material on the structure starting from the bottom and working up. Tiles and sheets should overlap to prevent leaking. For tile roofs, cross-pieces should be placed close together so that all tiles have a firm base to rest on. For sheet metal or fiber glass roofs, use roofing nails to secure the sheets to the cross-pieces. If any leaking occurs through nail holes, seal them with a small amount of tar. See Figures 2 and 3 for examples of the installation of roofing materials.

**Gutter Installation.** Gutters must be installed to collect water from the roof surface. They can be made of metal, plastic, wood or bamboo.



**Figure 2. Tile Roofing for Catchment**



**Figure 3. Metal Sheeting for Roof Catchment**

Metal or plastic gutters must be bought, while wood or bamboo gutters can be made locally. If wood is used, it must be nailed into a trough and sealed with tar or a deep channel must be cut into the piece of wood to be used as a gutter. This channel must be deep enough to hold the collected water

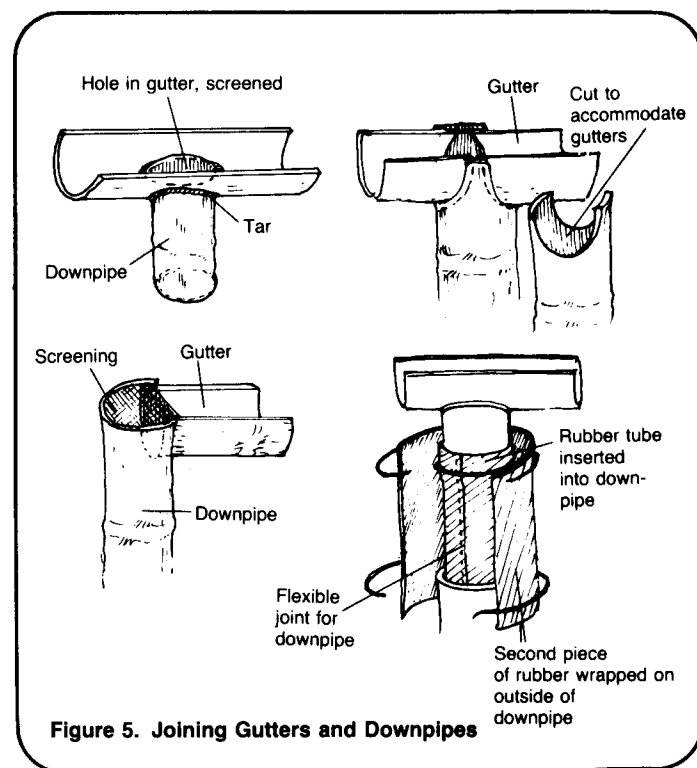
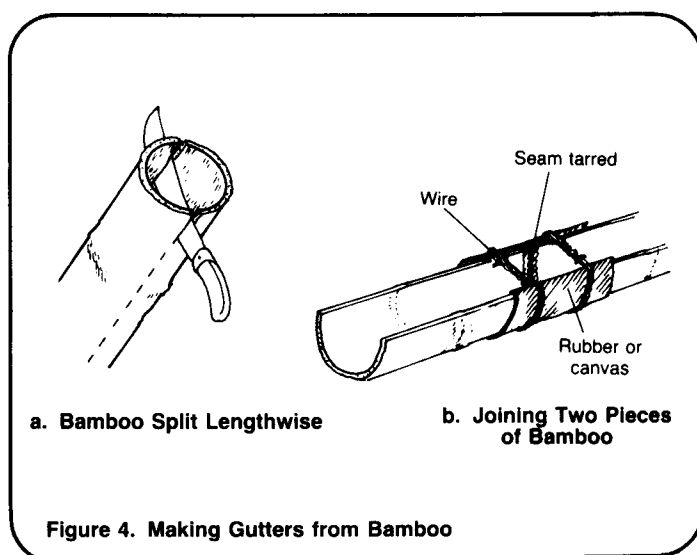
and prevent it from spilling out onto the ground. Bamboo gutters are made by splitting long lengths of bamboo down the middle and removing the inside joint partitions. The cut halves form very good collecting troughs, as shown in Figure 4. Follow these steps as you install the gutters.

1. Tie pieces of wire to the roof structure to support the gutters. The wires should be located 50cm apart to provide adequate support. Extra support should be given to wooden gutters because of their weight. Wrap the wire around the gutters to hold them in place.

2. Join the gutter sections together. Use specially made joints for metal and plastic gutters. There are several techniques for joining bamboo gutters. One simple method is to place a piece of rubber at the joint to hold the two pieces together. The rubber fits underneath the gutters and is secured to them with wire. Tar or caulking can then be used to seal the connection and make it watertight. Figure 5 illustrates this technique. Be sure that the two pieces of bamboo fit together closely before sealing the joint.

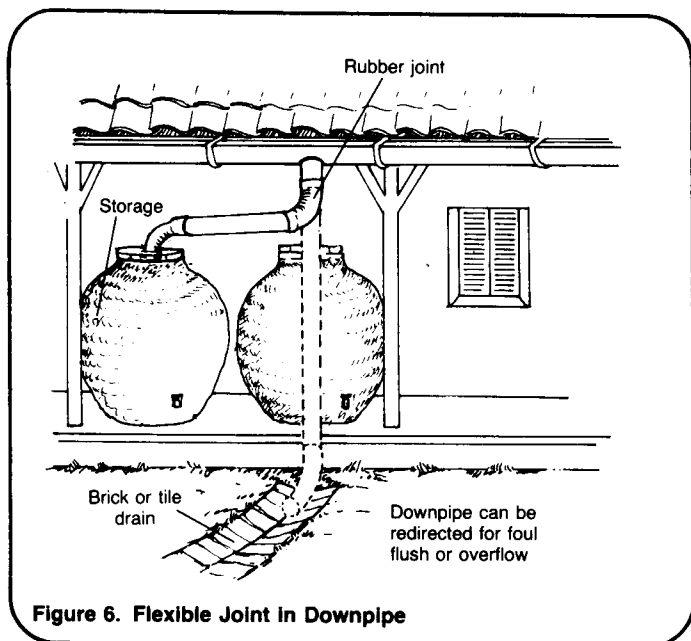
3. Begin installing the gutters on the side of the house opposite the cistern and install the downpipe on the third side. The gutter should slope enough so that all water flows from the roof to the downpipe. The required slope is 0.8-0.10m per meter of gutter. Another method of installation is to place the cistern on a side of the house where the roof peaks. Place gutters on both sides of the house sloping toward the cistern. Water runs from both gutters into a single downpipe. Gutter slope is very important since without enough slope, water will stand in the gutters. If the time between rains is more than eight to ten days, mosquitoes will breed in the standing water.

4. Install a downpipe from the gutter to the cistern. Connect the downpipe directly to the gutter. The downpipe can either be placed at the end of the gutter or a hole can be made in the gutter where the downpipe is connected. Seal the joint where the downpipe meets the gutter with tar or caulking compound.



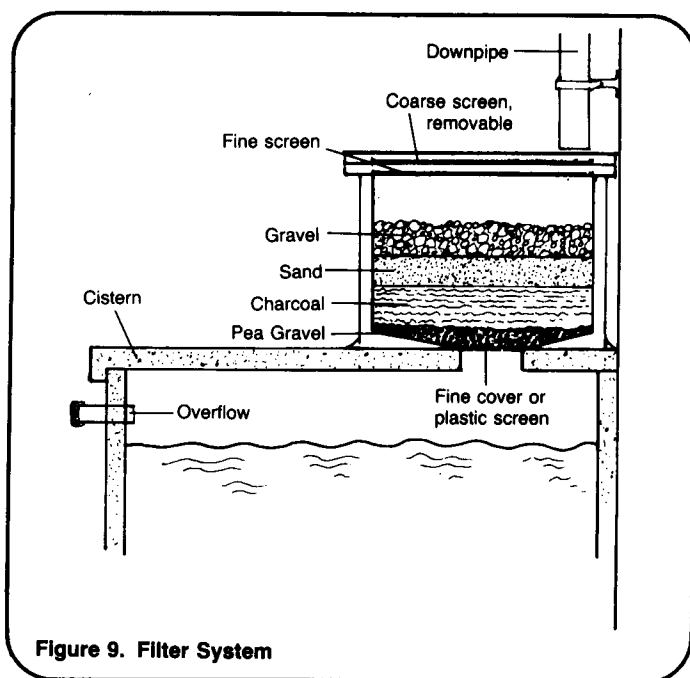
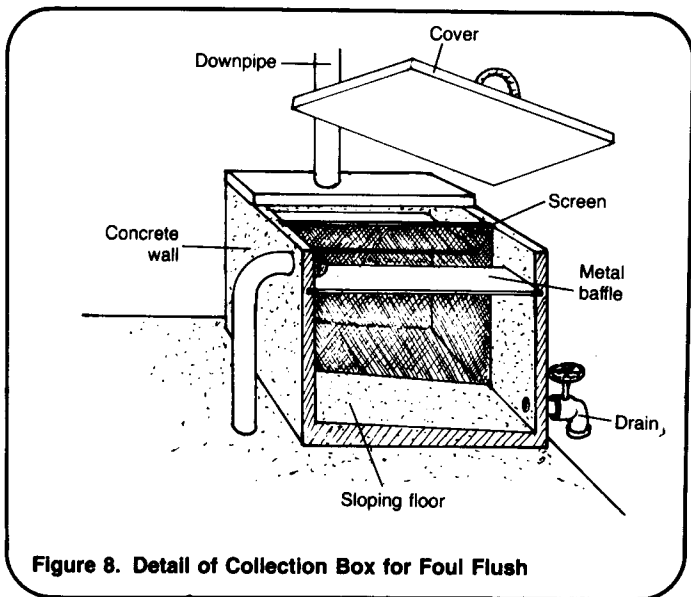
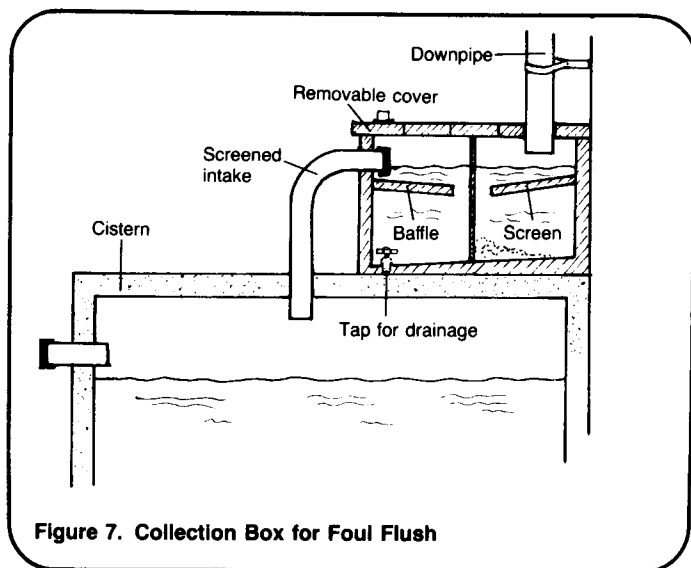
5. Place a small mesh wire screen over the opening of the downpipe so that leaves or other debris which could contaminate the water do not enter the cistern. The mesh should be large enough so that leaves and debris are caught but water continues to flow through.

Foul Flush Disposal. There are two ways to remove the foul flush or first wash from a roof. They are simple diversion and construction of a foul flush system.



For simple diversion, install a rope to the end of the downpipe. When the rain begins, the downpipe can be moved away from the cistern to let the dirty water flow to the ground. This method is useful when large jars are used for water storage. Someone must remember to move the spout at each rainfall. See Figure 6.

If the cistern and downpipe are connected, a small collection box can be built to collect the first run-off. See Figures 7 and 8 for details. The box can be as small as 250mm x 250mm x 250mm and should be made from impermeable material. Clean containers such as 20-liter cans can be used for receiving the first run-off from the roof. A filter system is made using a large can or filter box. Place a filter between the downpipe and the cistern. Line the filter bottom with pea gravel up to about 30mm, then place an equally thick layer of charcoal and on top of that a layer of sand 0.2-0.5mm in diameter. The sand layer should be between 30-50mm thick. On top of the sand place another layer of gravel as shown in Figure 9. Connect the downpipe to the box and connect an outlet pipe to the box and the cistern as shown. Place a screen at the very top of the box so that no large debris can enter. A tap or plug should be installed to empty out the dirty water after each rainfall. When the box fills, the cleaner water flows to the cistern.



## Maintenance

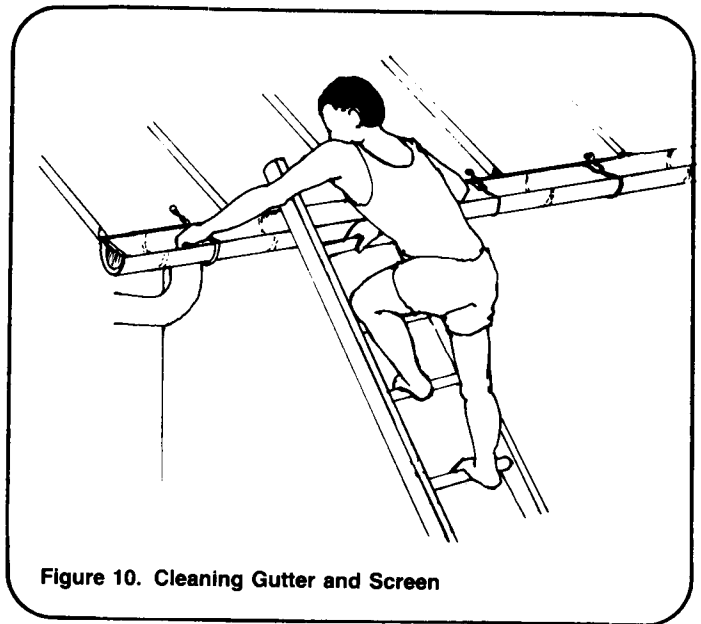
Adequate maintenance of the catchment assures that the maximum amount of rainwater is collected and that the water is of good quality. Keep the catchment well maintained by doing the following:

1. Keep the roof in good condition. Repair any holes in the roofing material and change any broken tiles to prevent leaking. Seal any nail holes that are leaking.

2. Clean the roof between rains. Much debris and fecal matter from birds can be removed by sweeping off the roof often enough to keep it looking clean.

3. Keep the gutters in good condition. Be sure they are firmly tied to the roof and that they are well joined to prevent spilling. Repair any holes. If bamboo or wood is used for gutters, check them once a year for rotting. If there is any sign of rot, replace them.

4. Remove leaves and other debris from the gutters to avoid clogging. Check the screen on the downpipe to be



sure it is not clogged. If a gutter clogs, water may spill over its sides and be wasted. Watch for leaks and overflow during a rain. See Figure 10.

5. If a collection box for foul flush is used, clean it out after each heavy rain to remove any sediment or scum.

6. If a filter is used, clean the filter every several months. Wash and change the sand in the filter at least every six months.