A Water Catchment System

Unless you have a good spring or a year-round creek flowing across your property, catching rainwater is often the simplest and least expensive way to secure the water that you need.

My friend, Glen Eitemiller, is dedicating his life to the poor, helping them have clean water. Here are his words: "I am increasingly a believer in rain water harvesting! It is such a no brainer! It's free, easy to collect, and in most cases it's the best water available."

Advantages

- Rain is often the cleanest water source available if harvested before touching the ground.
- Rain is naturally distilled through evaporation.
- Rain is soft due to lack of calcium carbonate or magnesium in solution, and is excellent for cooking and washing.
- Rain is natural fertilizer. It contains sulfur, microorganisms and mineral nutrients collected from dust in the air.
- Rain has the lowest salt content of natural fresh water sources, making it excellent for plants.
- Rain is a free gift from God.

Source

Rainwater Harvesting for Drylands and Beyond, vol. 1, by Brad Lancaster, 2006, p. 6&7.

Disadvantages

- Your water supply is affected by drought.
- You must ingest minerals to replace those typically found in well water.

Synergy

- A deep well requires a large electric pump, which requires a large solar array with lots of batteries.
- A catchwater system requires a small pump (or no pump at all), which works well with a very small solar array and a few batteries (or no batteries at all).

Roofing Materials for Water Catchment Systems

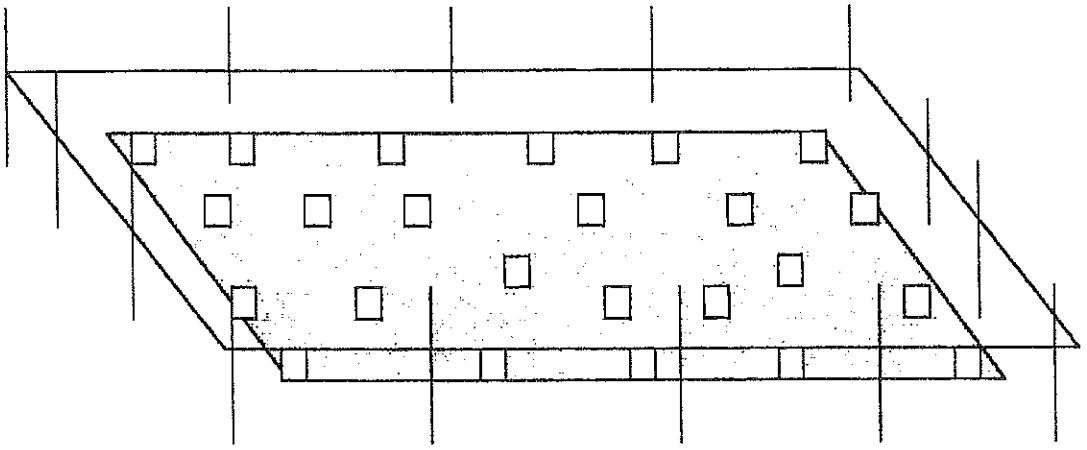
1. Unpainted galvanized metal
2. Painted metal roofing with lead-free baked enamel
3. EPDM (rubber) roofing
4. Slate, tile, or concrete
5. Untreated wood

Note: If your roof is covered by tree limbs, leaves and bird droppings can contaminate your water.

Safety Alert: Make sure no lead is used in paint or solder that is used to make gutters.

Safety Alert: Make sure any containers used for rainwater were not used previously for toxic materials.

Using Sheathing as Part of Your Catchment System



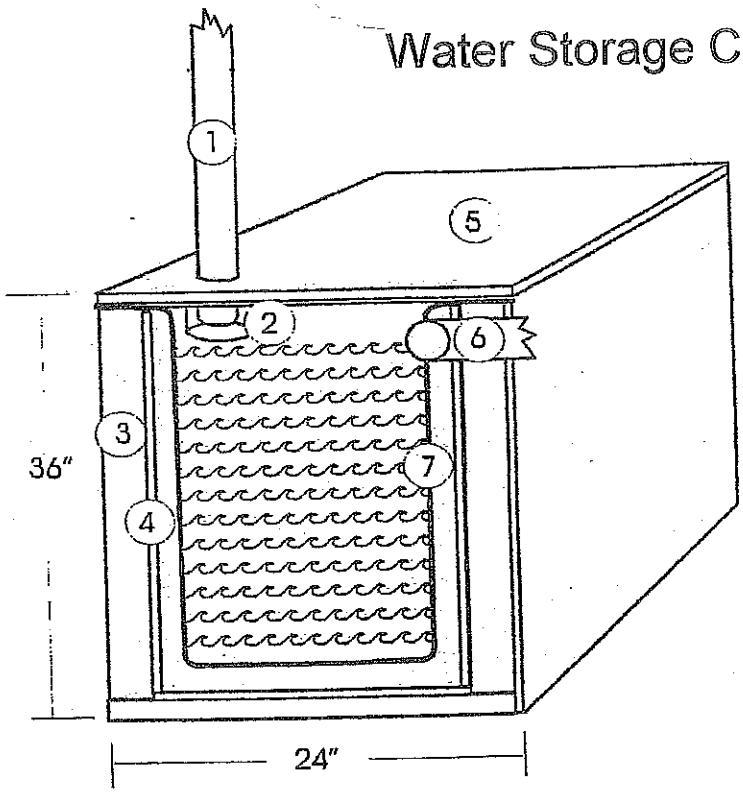
1. Use black 6 mil. or heavier polyethylene sheathing.
2. Put the catchment area away from trees.
3. Hold the sheathing in place with stones, bricks, concrete blocks, etc. (Don't use old tires; they make breeding places for mosquitoes).
4. Fence off the catchment area.

(Not shown: A tank to store the water that falls on the sheathing.

Building a Holding Tank for Water Catchment

Note: Water weighs about 8 pounds per gallon. Your floor must be able to support the weight of your holding tank.

1. Build a box frame with 2 x 4's on 12 inch centers. The box shall be 24" wide and 36" high and as long as is needed and/or practical. The box shall have a removable lid.



1. Fill pipe
2. Filter
3. 2x4 Frame
4. 7/16 OSB board
5. Lid
6. Overflow
7. 6 mil poly liner (doubled)

2. Cover the 2x4 frame with 1/2 inch to 3/4 inch O.S.B. board or plywood.

3. Glue and screw the OSB or plywood to the 2 x 4 frame,

4. Check the box for any sharp objects or rough areas that could puncture or tear the poly liner.

5. Line the box with one continuous piece of black 6 mil. polyethylene sheathing. Black is less affected by ultraviolet light and lasts longer than clear. Use two thicknesses for safety. This sheathing is often called Visqueen and is sold in hardware stores and garden shops.

**Consider FDA approved, food quality sheathing.

Note: 6 mil. polyethylene is usually available in 10 foot widths. A 10 foot section will fit nicely into the 2' x 3' box you have built.

Note: During manufacture, 6 mil. sheathing can develop small holes. Lay out the sheathing for the holding tank and check it carefully before lining the holding tank.

6. Fill the holding tank very slowly the first time and check it for leaks.

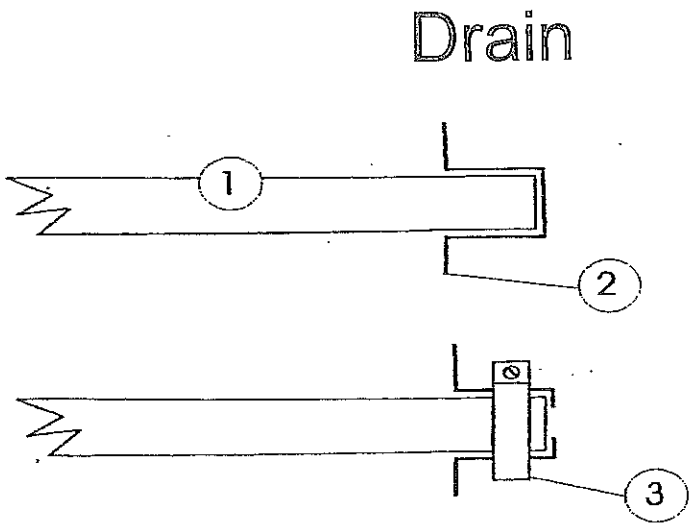
7. Build an overflow for the holding tank. **If you have a 3-inch pipe filling the tank, you need two 3-inch pipes for the overflow.**

   A. Place the pipe through the wall of the tank at the highest point possible.

   B. Stretch the sheathing around the overflow pipe.

   C. Use a stainless steel clamp to secure the sheathing.

   D. Cut out the sheathing that is stretched over the overflow pipe.



1. Pipe.

2. Poly liner.

3. Stainless steel clamp.

Note: The top of the holding tank is the standard height of a kitchen cabinet. It makes an excellent work surface or plant shelf.

Note: Having the holding tank in your living space is a great way to moderate air temperatures. Make sure that air can move easily around the box. Do not set it directly against a wall; leave a gap of one or two inches to encourage air movement.

Maintaining the Holding Tank

1. The water coming directly from your roof should be clean enough for bathing and washing dishes. **It must be purified for drinking.**

2. Over time, sediment will develop on the bottom of the holding tank. Unless it is very deep, this sediment layer can be ignored. If too much sediment collects in the tank, it can be cleaned out carefully to avoid tearing the liner. (Jack's Note: After eight years in a very dusty area, less than an inch of sediment has collected.)

3. Occasionally, the water in the holding tank will develop a musty odor. This occurs because of the bacteria in the tank. A small amount of chlorine bleach will eliminate the problem. An inexpensive swimming pool test kit will allow you to test for bacteria.

4. Always keep the holding tank covered and not exposed to sunlight. Sunlight will encourage algae growth.

More Information About Holding Tanks

As more people in the United States are harvesting rain water, there are many websites that offer education on many different types of holding tanks. Use keywords "rainwater harvesting" to find information.

Another Type of Holding Tank – The Buried Holding Tank

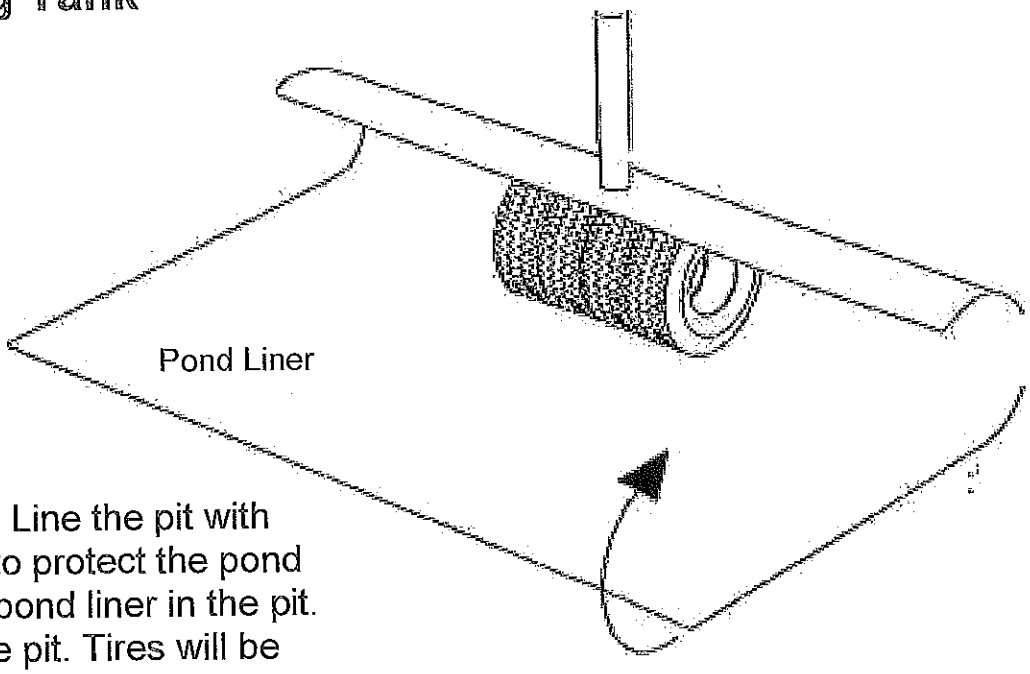
Advantage
Since it is buried, it does not take up space in a building.

Disadvantages
Since it is buried, it is difficult to maintain.

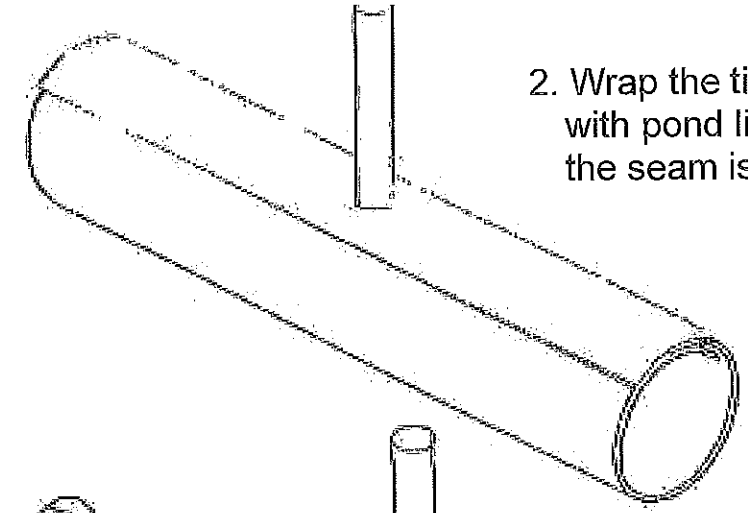
Since it is not in the living space, it will not help moderate living space temperatures.

Note: In non-freezing climates or where digging is too difficult, the tank may be placed on the surface and then covered with soil. It must be covered to prevent solar disintegration of the pond liner.

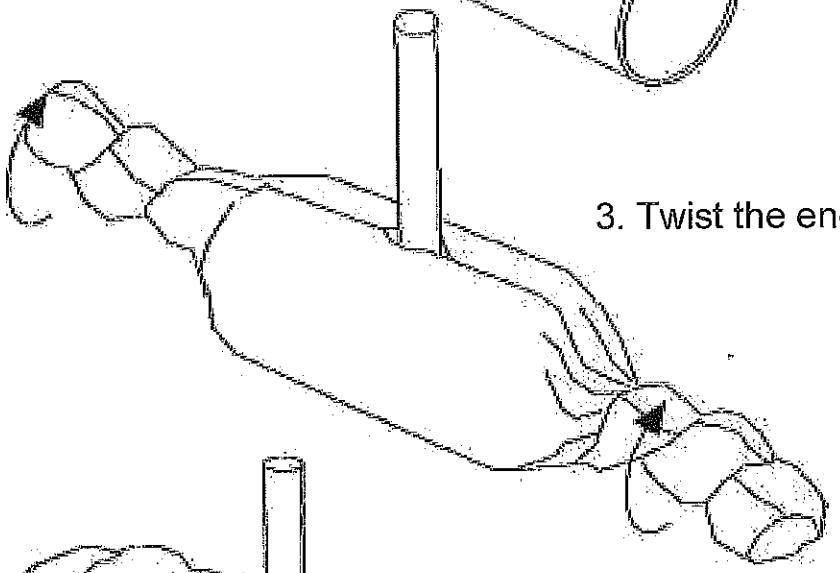
Buried Holding Tank



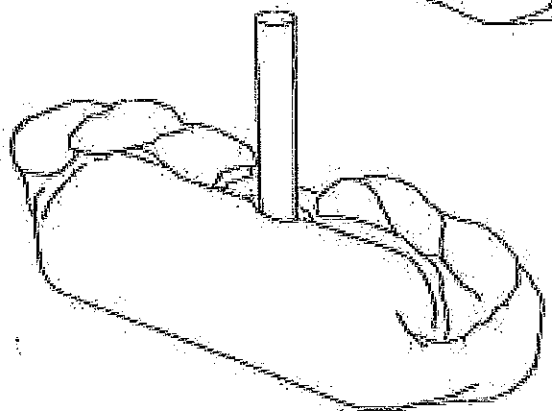
1. Dig a pit a bit wider than the diameter of the tires to be used. Line the pit with old carpet, etc. to protect the pond liner. Place the pond liner in the pit. Place tires in the pit. Tires will be wrapped like a Tootsie Roll.



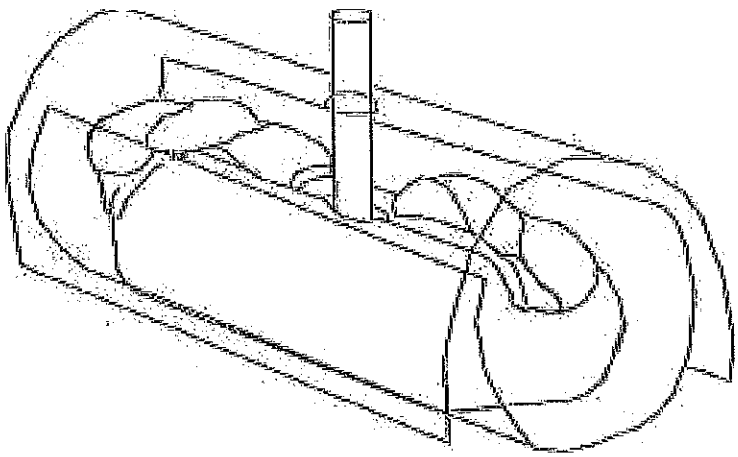
2. Wrap the tires completely with pond liner, Make sure the seam is at the top



3. Twist the ends of the pond liner



4. Pull the twisted ends up and over the top of the tires. Carefully install vent/fill/access/overflow.



5. Cover the top of the wrapped tires with carpet to protect the liner.

6. Fill the tank with water and test for leaks.

7. Carefully bury the tank.

8. Keep cars and trucks from driving over the tank.

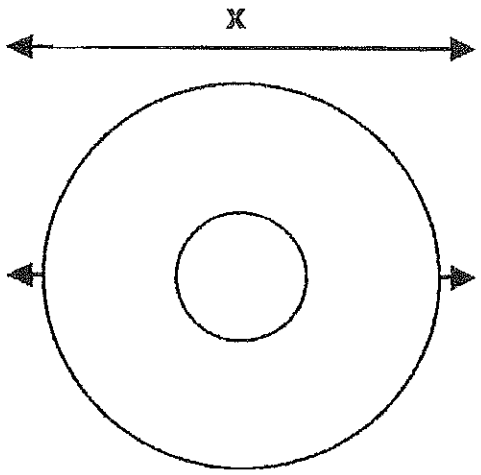
Constructing the Buried Holding Tank

Materials Needed:

- Old tires
- Old cardboard, plastic sheathing, tarps, carpet, etc.
- PVC pipe and fittings
- Pond liner

How to Construct a Buried Holding Tank

1. Dig a trench just a bit wider than the diameter of the tires being used.



Locate the tank a safe distance from the living structure. Think ahead. What will happen if it leaks?

Note: In cold climates, the tank may need to be six feet deep to prevent freezing.

Note: In areas that are difficult to dig, the tank can set on the surface. It must be completely covered with soil to protect the poly liner from ultraviolet rays.

2. Once the trench is dug, it shall be lined with a pond liner. Be careful not to tear or puncture the liner.

3. The tires shall be placed into the lined trench carefully, so as not to puncture the pond liner.

4. The tires placed on each end of the trench shall have sheet metal placed over the wheel hole. This will keep dirt from filling in the tires. Another method uses tires placed horizontally at each end of the trench. The horizontal tires must be filled with compacted soil.

5. The pond liner shall be carefully wrapped about the tires to create a tank that will hold water. (see diagrams)

6. The vent/fill/access/overflow pipe shall be put in place from the top of the tires through a carefully made slit.

7. Fill the tank and test for leaks before burying.

8. The pond liner shall be covered from the top with old cardboard or sheathing or carpet or an old tarp, etc. This will protect the sheathing when the tires are carefully buried.

9. Bury the tank. Compact the soil gently. Leave a mound over the tank - it will settle over time.

10. Place markers or a fence around your buried tank so that it will not be driven over. You can walk over it with no problems.

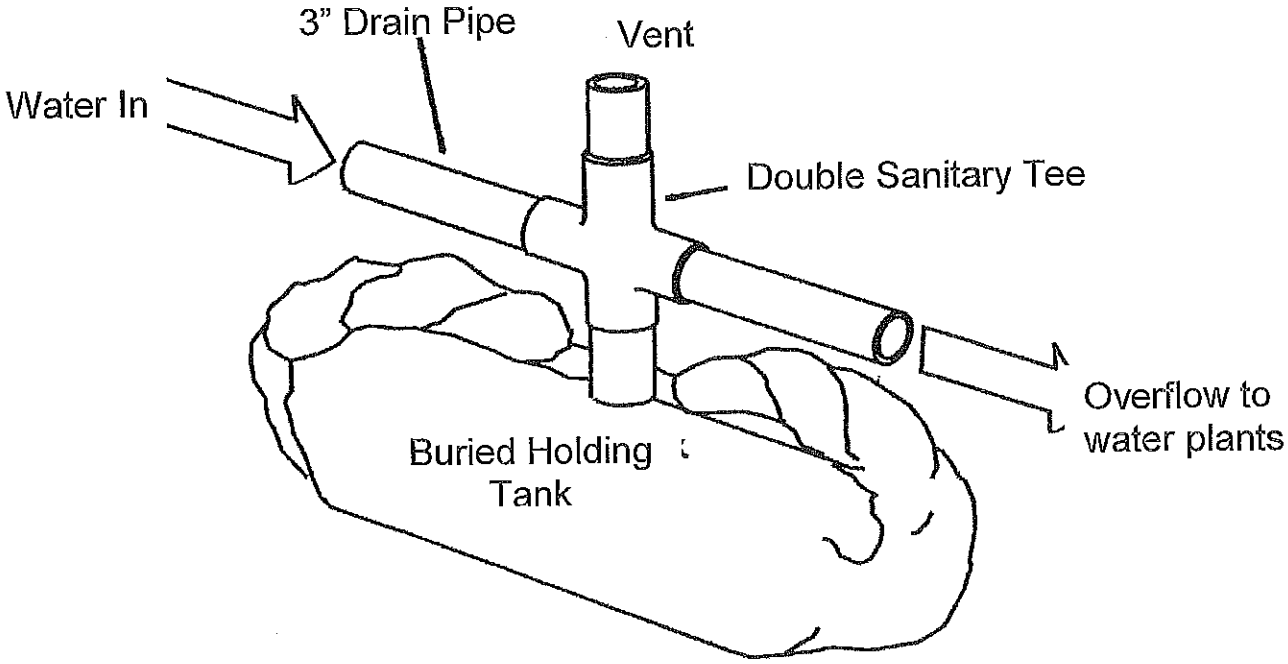
Note: One of the most inert objects on the planet is an old tire. Tests have not yet been done to see how the water would be tainted in a buried holding tank constructed with old tires. The water will certainly be acceptable for watering plants. What type of purification is necessary to make the water potable is a question that needs to be answered.

Note: It may make financial sense to build two separate holding tanks, a smaller tank for drinking water only and a larger tank for other purposes. The larger tank would not need to be built of expensive materials that meet potable water standards.

Extracting Water from the Buried Holding Tank

A hand pump, a submersible electric pump powered by a solar panel, a gas-powered trash pump, or a dirty water pump will remove water from the buried holding tank. Tank access is through the vent/fill/access/overflow. **Choose your method of extraction and make sure it will work before you bury the holding tank.**

Constructing the Vent / Fill / Access / Overflow



Calculating Water Needs and Availability

One inch of rain on one square foot of catchment surface will yield .623 gallons.

Note: Allows for 1/3 of water being wasted due to leakage, roof washing, and evaporation. Based on recommendation of Harry L. Garver, *Safe Water for the Farm,* F.B. 1978, 1948.

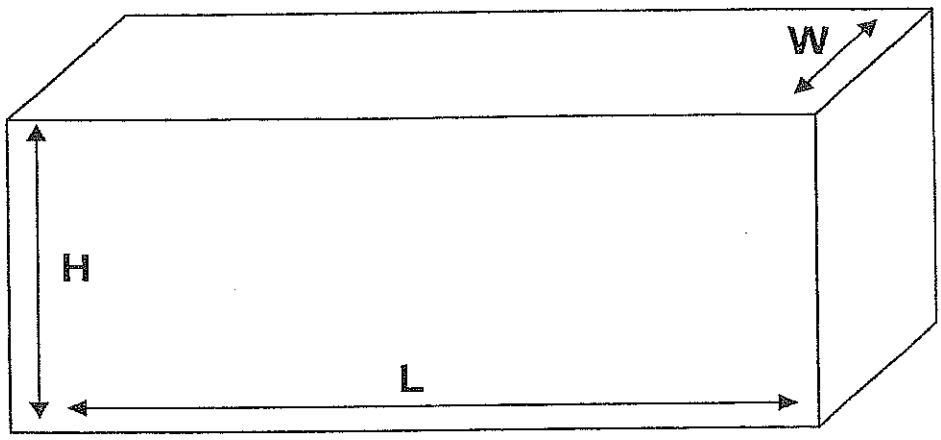
Important Questions to Consider About Water Catchment

1. What is the average rainfall in your area?
2. Does the rain come in a very short period of time, or does it rain throughout the year?
3. What is the size of your catchment area?
4. How much water do you use daily?
5. How large a holding tank is needed?

Calculating the Size of the Holding Tank

One cubic foot of water is approximately 7.5 gallons.

To calculate the volume of a square or rectangular box:
multiply width x height x length = cubic feet.



Cubic feet x 7.5 equals the number of gallons that can be contained in a square or rectangular box.

It is often necessary to measure the holding tank in inches. One cubic foot contains 1728 cubic inches.

A Practice Problem

You have a home that is 16' x 20'. You also have an area in a field beside your home that is covered with black 6 mil. sheathing. It is 20' x 50'. It rains 12 inches annually in your area, usually in just two consecutive months. The rest of the year is very dry.

Discover the following:
How many gallons of water will fall on your roof and sheathing in an average year?

How large a holding tank will you need?