Captive Water Table

It occurred to me that I might be able to save water by creating a plastic-lined bowel under a garden space. So I dug out a garden bed with a vee shaped bottom. The oval area was approximately 5’x7’.

I laid some perforated drain pipe, connected a riser for access from the surface level, and bedded it in gravel. The riser allows the monitoring and control of this artificial water table.

After back filling the bed, fifteen gallons of water were poured down the riser. A water depth of about a foot was measured by a wooden dipstick.

The next morning gave me my first lesson (besides the aches in my seventy-something body from all that work). The water was all gone except for about an inch visible down the riser. I assumed that it had been wicked up by the soil, but there was also the possibility that it simply leaked out. Upon refilling it, there was water visible for days, so apparently the first fifteen gallons had been absorbed.

A raised portion was developed for some squash plants – that promptly expressed their approval with abundant growth.

That same year I topped a plastic- lined trench with a row of cement blocks and planted sunflowers in alternate holes. The cement blocks had been sealed to prevent water from soaking up into them and evaporating. The shorter sunflowers shown here are at least 6’ tall.

The following summer when that part of the yard was generally ignored, a crescent of much richer growth testified to the water-saving benefits of the membrane beneath the former crop of sunflowers.

A Few Years Later:

The original ovoid section eventually featured a combination of vegetables and decorative plants

We left town for a couple of weeks immediately after adding a few bedding plants of tomatoes and squash along with a few flowers. The garden would go sixteen days with no care.

The garden didn't miss us a bit. Upon return the bedding plants seemed to have doubled in size, and the petunias were very happy. Nothing more was done that year other than to harvest a few tomatoes and butternut squash.

The next step was a larger version of this water table that is initially 16' long by 6' wide.

To allow for future expansion it would slope to a depth of 3-1/2' along one side. This is so that at a later time an additional segment of this garden can meet in the middle at the 3' depth, sloping from the other direction (probably from a distance of about 10'. Even if unplanted, this will enhance rainwater catchment.

A section of 4" perforated drain pipe sloping slightly to the center from each end of the 3' section was added. It has a riser to the surface at this midpoint. There are also a few loose smaller diameter pieces traveling up the slope at right angles to the bottom pipe, to allow a broader expanse of draining and access to the air.

These bottom pieces were all covered with weed block (AKA landscape fabric) to keep them from becoming clogged with earth.

A surrounding retaining wall, additional soil, and compost were added to extend the bed upward above grade by several inches

. While digging, I kept the top soil separate from the sub soil so I could return the sub soil first while back-filling.

The bottom of this excavation is sloped to one side. This will allow me to expand the garden later by sloping the bottom upwards in the opposite direction from this lowest point.

I've created an impervious liner for this garden, by painting a tough (15-year guarantee) weed block material to 6 mill black plastic, using a solar roof coating material (10 year guarantee). On a later experiment I painted the material to the plastic with an asphalt emulsion – which was quite a bit cheaper than the roof coating.

Whether roof coating or emulsion, you need to use a 4" wide putty knife to force the material through the landscape fabric so it can stick to the plastic beneath.

I then refilled the hole (all 6,000 pounds of it) with the top soil where it belongs. Note the difference in color between the top soil on the left, versus the sub soil on the right.

Initial results are in:

Sunflowers are on the left (north), and are interspersed with pole beans that hopefully will climb the sunflowers without strangling them. Bush beans are in the foreground. On the right we have both summer and winter varieties of squash, water melon, and cantaloupe.

A Different Scale

My to-do list visualizes a garden of a scale that could grow a significant portion of our total food needs. A cone-shaped pit would require the minimum amount of excavation, and perhaps a shallow well in the center could be pumped to an elevated storage to provide a drip cycle for some plants, if desired.

The minimal needs of pumping this short distance might well be managed by a small off-grid solar electric system. Since the need would roughly coincide with the solar intensity, a system might be designed without the need of an environmentally disastrous battery.

Some form of tank beneath the garden might be sized to store much of a season's water requirements. The main drain pipe in the garden format I am working on might be expanded in diameter to become this storage tank. Initial calculations reveal that a hundred feet of 4" perforated drain pipe, covered with weed block could store a little over 65 gallons of water.

In contemplating a commercial scale, extending the ends of this garden style into long trenches would be much easier to excavate with equipment. A field laid out as a row of trenches may be capable of storing a significant portion of the seasons need for water during the winter months.

Captive Water Table Garden Phase 3

The following year the 6’X16’ area was expanded into a half-oval 16’ long by 10’ wide.

A hundred feet of 4” perforated drain pipe was purchased for subterranean water storage. The pieces were lashed together, and then enshrouded in landscape fabric. This would be able to store about sixty five gallons.

The vertical portion of the previous membrane was then laid down in the new section of the excavation, and the sections of 4” drain pipe were laid upon it, and buried.

Unfortunately, a leak seems to have occurred, so in future projects I will always leak check the bottom with at least a foot of water.

Additional membrane material was attached, and the enclosed area was back filled to the former grade. A pile of leaves was spaded into the newly back filled portion.

Earth from another source was added to raise the bed another eight inches. The initial phase of this garden is just to the left of this photo.

A low retaining barrier was placed between the new and previous sections.

Although a token couple plant varieties were started in the additional area, more significant gardening in this area would take place later.

As this project wound down, I began to consider the problem of minimizing water loss by surface evaporation as well.