

7. Fence the pond using wire mesh/bamboo/wooden poles/timber to prevent mishaps or accidents as shown in the figure 12. Fill the pond with water only after fencing. Galvanized wire mesh is preferable.

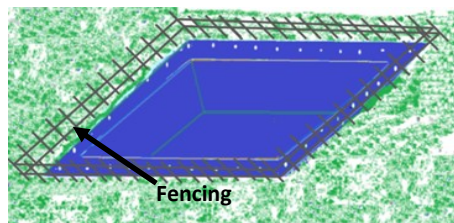


Figure 10

Cost of construction:

Particulars	Quantity	Unit	Rate (Nu.)	Total Cost (Nu.)	Remarks
Pit digging	8	Working days	500	4000	<i>Differs from place to place</i>
Plastic sheet: 9mx7m (250-300 GSM)	1	No.	7500	7500.00	<i>Prices vary according to size and quality</i>
HDPE pipe (PN:12)	100	Meter	40	4000.00	<i>Length varies with location</i>
Wire mesh (galvanized)	233	Meter	30.04	7000.00	<i>Fence may be made from different materials as well</i>
Wooden post	14	No.	60	840.00	<i>Hardwood if available</i>
Total				23340.00	

Using water:

Water from the pond can be used in the following ways:

- Directly siphoning off with a pipe
- Pumping up with a small motor pump
- Taking out with suitable containers
- Inserting a drain out pipe at one of the base corners.

The insertion of the drain out pipe should be done during the construction of the pond.

Keeping mosquitoes away:

Use mosquito net of the pond surface size. If nets are unavailable, the pond requires regular cleaning using skimmer net to remove the fallen leaves and grasses. Use oar like planks to create water movement so that mosquitoes do not lay eggs. Clean any algal or plankton growth from the pond as it serves as food for mosquitoes in the pond.

Plastic specifications and different pond dimensions:

To make a plastic lined pond water harvesting of different dimension, different sizes of plastic sheets are required. The details are as provided in table 1

Table 1: Plastic specifications, pond dimensions and water volumes.

Note: Units of all dimensions are in 'm'. Volume unit is 'm³'.

Plastic length (l)	Plastic breadth (b)	Top side Anchor Length	Height (h)	Border Length (g)	Base Length (l)	Base Breadth (b)	Top Length (tl)	Top Breadth (tb)	Total volume
9	9	0.5	1.2	0.44	5.45	5.45	6.33	6.33	41.60
9	8	0.5	1.2	0.44	5.45	4.45	6.33	5.33	34.54
9	7	0.5	1.2	0.44	5.45	3.45	6.33	4.33	27.37
9	6	0.5	1.2	0.44	5.45	2.45	6.33	3.33	20.43
9	5	0.5	1.2	0.44	5.45	1.45	6.33	2.33	13.37
8	8	0.5	1.2	0.44	4.45	4.45	5.33	5.33	28.69
8	7	0.5	1.2	0.44	4.45	3.45	5.33	4.33	22.92
8	6	0.5	1.2	0.44	4.45	2.45	5.33	3.33	16.97



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LOW COST PLASTIC LINED WATER HARVESTING POND



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Background

Irrigation water shortage is one of the main constraints in crop production. Although we receive abundant rainfall in the summer, rainwater and runoff water go untapped in absence of suitable water harvesting technology. Therefore, low cost plastic lined water harvesting pond technology is promoted and supported to store water which can be used during dry or lean season for agricultural as well as household purposes. Though a similar technology is said to have introduced in the country many years ago, the present form of the technology was introduced to Bashong gewog in Tsirang Dzongkhag by 'Himalica' pilot project in 2014. However, the technology has been modified and improved to suit to the topography and needs of farmers in Bhutan.

Site selection:

Choose a site for the pond at the top of the farm for easy flow/use of water to the agricultural fields. Select the site only at the stable soils to avoid collapse, and bursting of the pond. Water sources for the pond may be perennial water source, rain water gutter system, water from tap-stand, and waste water from farm house or combination of the different sources.

Materials: The materials required for making the pond are:

1. Plastic sheet [250-300 GSM (gram per square meter)] of desired length and breadth and UV protected
2. Measuring tape (30m)
3. Shovel, spade, and crowbar
4. Mosquito net or similar ones
5. HDPE pipes, gates valves
6. Fencing materials (bamboo poles, wooden poles, barbed wire, nails, wire mesh, binding wire) - fence height should be not less than 1.2m.

Procedure to dig the pond: (the specifications of the ponds and plastic sheet are given as variables in table 1)

1. Clear the vegetation and level the ground to construct the harvesting pond.
2. Measure the base length (l), and the base breadth (b) on the leveled ground (Figure 1). These length and breadth will be the length and breadth of the pond floor. Dig out the soil till 1.2 m height (h) to construct a cuboidal pond (Figure 2).

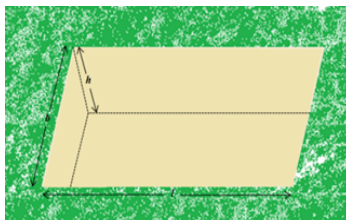


Figure 1

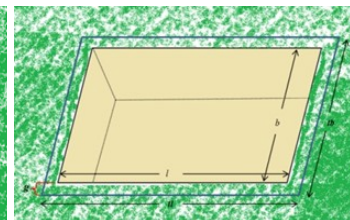


Figure 2

3. From the top edges of the cuboidal pond, measure distance ' g ' in all four sides as shown in the figure 3. Make slanting cuts from the top to the base on all four sides. Scrap off soils on all sides to obtain slope of 70° as shown in the figure 4. The gradient is made for slope stabilization and convenience to lay out plastic sheet.

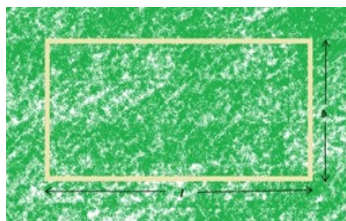


Figure 3

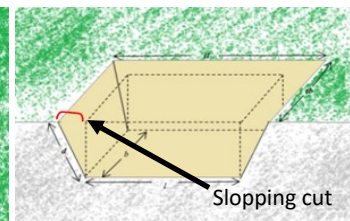


Figure 4

4. Make the cut surfaces including the floor smooth by using mud and cow dung paste or mud paste in order to avoid damages to the plastic sheet while laying out and when filled with water. The pit ready to lay out plastic sheets should have the dimensions as shown in the figures 5 & 6.

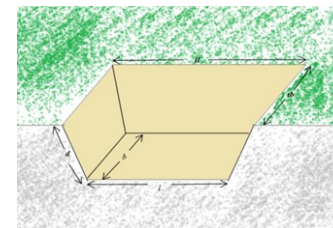


Figure 5

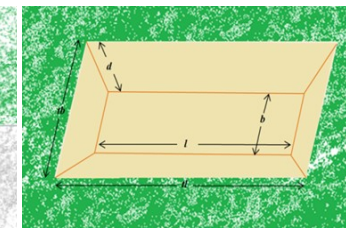


Figure 6

5. Carefully lay out the plastic sheet over the pit as shown in the figure 7. Keep an anchor length (overlap) of 0.5m on all sides of the pit. Fix wooden or bamboo pegs or iron rod through the eyelets of the plastic sheet and or cover the overlapping plastic edges by at least 10cm of mud or soil to strongly anchor the plastic sheet.

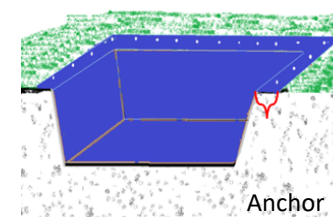


Figure 7

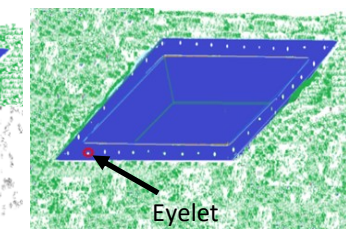


Figure 8

6. Construct a drain with 30cm width and 30cm depth around the edges of the plastic sheet which was covered with soil or mud as shown the figure 9. The drainage should slope towards a suitable drain out area.

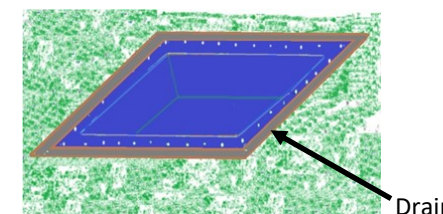


Figure 9