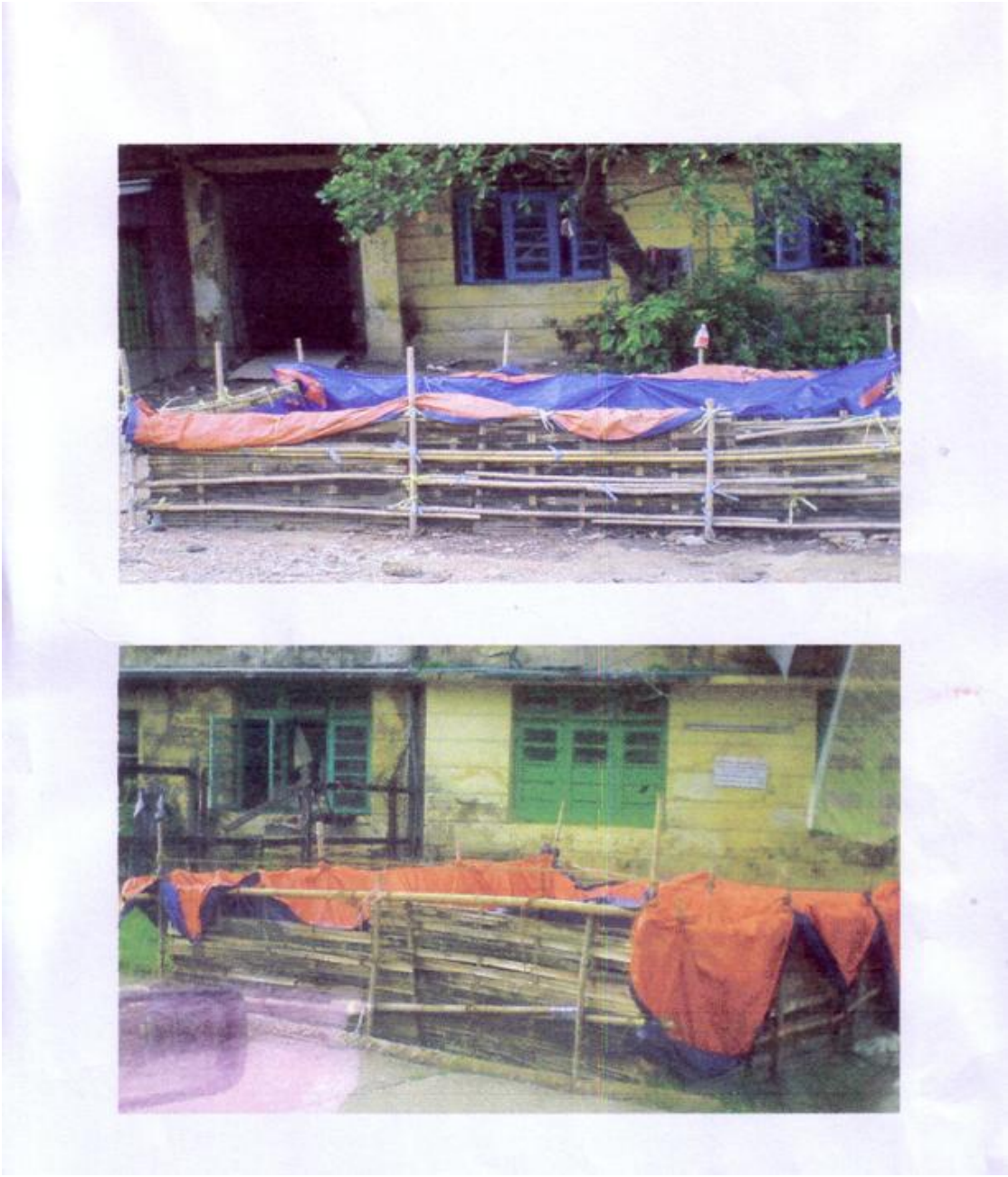
Proposed methods for rainwater harvesting and pond rehabilitation

Rainwater harvesting (RWH)

RWH should be done at household level. Recently IDE have introduced a prefabricated basin made of tarpaulin (3 X 3 X 3 ft), mounted in a bamboo frame together with a collector tarpaulin.

The capacity of the producers can not meet the demand, why it is suggested that temporary small collection dams (see separate sketches attached to this document) for up to maximum 5 families to share water from could be an alternative, as well as other, larger, collection buckets and tanks. Tarpaulin is available on rolls (100 yards long and 6 ft wide; approximately 90 metres long and 1.8 m wide), and could be pre-cut or cut to length in situ. Any container and plastic sheeting used for collecting and storing drinking water should be cleaned before taking into use. This should be done as per instructions in the chlorination guidelines (see separate document).
Purification should be done at household level and in accordance with the adopted chlorination guidelines. In the event that rainwater from existing ponds is used, sedimentation is normally required, and it is recommended that is carried out in the household storage containers, why those should be large (50 litres; 12 gallons). The process is accelerated by adding limestone.
Attached to this document are the IDE Rainwater Catchment guidelines.

Below some other pictures of RWH examples.



Pond rehabilitation

There are several types of RWH ponds in the villages, whereof some are especially for drinking water. The pond walls can be as high as 6 ft., and are normally protected so that domestic animals can not enter. This protection is most likely damaged, why a new fence could be required.

General recommendations:

- Always engage the local community in the work, they are by tradition experienced in all issues in this regard;
- Chlorination directly in the pond is not recommended as this is an uncontrollable and potentially dangerous process;

Recommendations for ponds only contaminated by debris:

- Consult with the local community if they are accepting to use the water and just removing debris;
- In case it is not accepted, engage the local community to break up the pond wall at suitable place/s and drain the pond. The community should be provided with necessary tools such as spades, hoes and sturdy buckets;
- In the event that it is not possible to drain the pond by gravity, pumping will be necessary;
- When the pond has been drained repair where needed and commence RWH;

Recommendations for ponds contaminated with dead bodies and debris:

It is highly unlikely that dead bodies are still to be found in any drinking water pond. However it could be a sensitive issue that there have been dead bodies inside the pond.

- Consult with the local community if they are accepting to use the water and just removing debris;
- In case it is not accepted, engage the local community to break up the pond wall at suitable place/s and drain the pond. The community should be provided with necessary tools such as spades, hoes and sturdy, traditional type, bamboo baskets;
- In the event that it is not possible to drain the pond by gravity, pumping will be necessary;
- When the pond has been drained repair where needed and commence RWH;

Recommendations for ponds flooded with seawater:

- Ensure that the drained seawater will not cause any potential, further, damage. It is recommended that saltwater is drained to a low, preferably non-agricultural area. Always consult with the local community, and if uncertain, urgently consult specialist agronomists prior to moving any water;
- In the event that the seawater can not be removed safely, discuss the issue with the community and the possible construction of a substitute drinking water pond;
- In the event it is considered safe to drain the pond, proceed as described above;

For use in areas where all surface and all well water is SALINE

Rainwater catchment is often the only source of water when all water is saline. However, it takes large catchment areas to collect enough water to satisfy the needs of large numbers of people. If non-saline water is available, even smelly and dirty water, it is far easier to obtain much more water through treatment with Water Guard or purification tablets.

In places where water is saline, people have already been practicing rainwater harvesting and will know how to do it with far more expertise than is presented here. However, it is likely that materials are not available. For a relief effort, plastic tarpaulins and storage containers are essential components.

Some possibilities are presented here. IDE is currently producing portable collapsible 650 litre water storage tanks (Water Baskets) and various sizes of tarpaulin fitted with grommets for easy mounting.

Collection

Pathein Rainfall

	mm	days	
May	271	16	17
June	444	21	21
July	702	26	27
August	598	26	23
AVERAGE	2015	89	**23** mm

The table to the right shows monthly rainfall for Pathein. The average rainfall per event in monsoon is 23mm. Hopefully, it will rain more than 2 days out of every 3.

The table below shows how many litres will be collected for a rainfall event for various rainfall amounts and a collection efficiency of 80% (20% is lost). 6 foot widths are the most commonly available that do not require heat sealing.

Catchment opportunities

collection efficiency 80%

Average Liters of Water Collected per Day

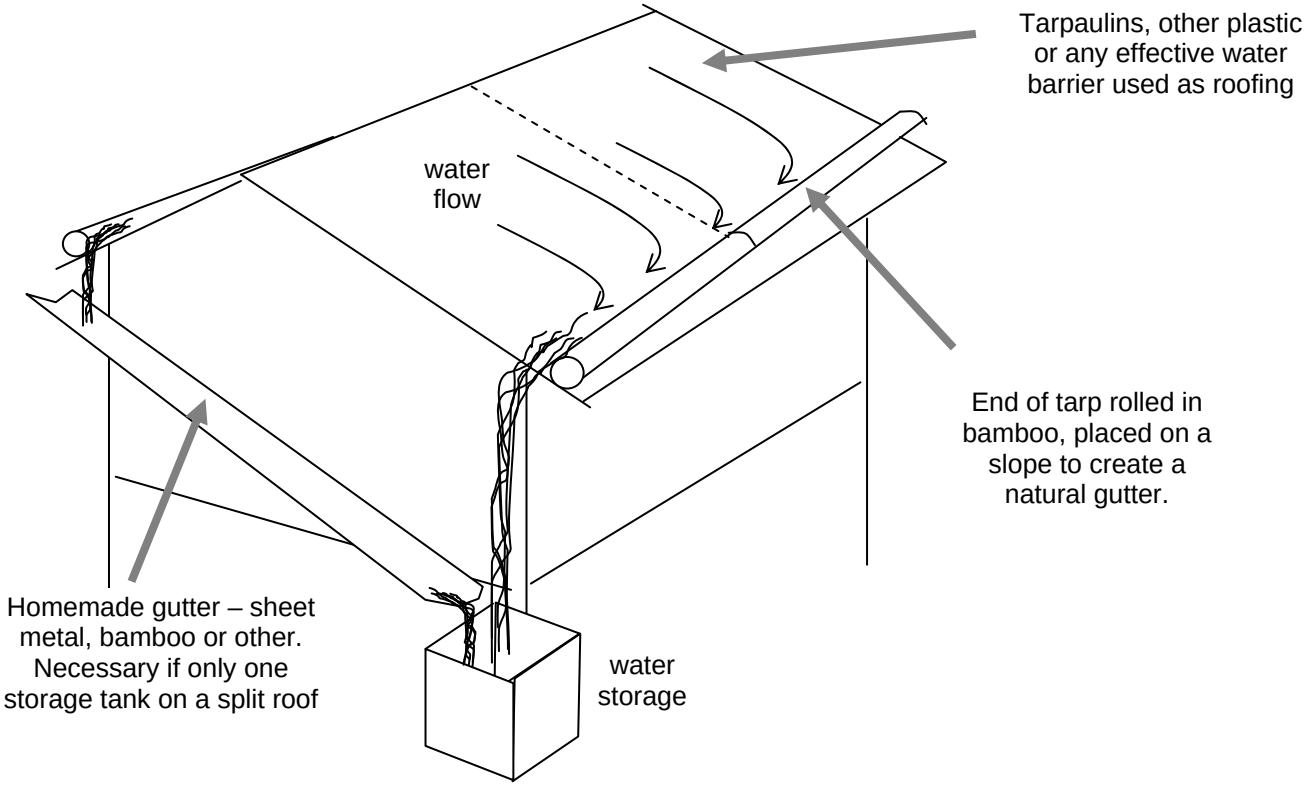
	Tarpolin size length (ft)	width (ft)	area $(ft)^2$	area $(m)^2$	Rainfall Event (mm) 5	10	15	20	25	30	35	40	No. per WB
	10	6	60	5.6	22	45	67	89	112	134	156	179	3
	12	6	72	6.7	27	54	80	107	134	161	188	214	3
	14	6	84	7.8	31	63	94	125	156	188	219	250	3
	16	6	96	8.9	36	71	107	143	179	214	250	286	2
	18	6	108	10.0	40	80	121	161	201	241	281	321	2
Standard sheet for WB	**20**	**6**	**120**	**11.2**	**45**	**89**	**134**	**179**	**223**	**268**	**313**	**357**	2
	22	6	132	12.3	49	98	147	196	246	295	344	393	2
	24	6	144	13.4	54	107	161	214	268	321	375	429	2
	10	8	80	7.4	30	60	89	119	149	179	208	238	3
	12	8	96	8.9	36	71	107	143	179	214	250	286	2
Standard sheet for WB	**14**	**8**	**112**	**10.4**	**42**	**83**	**125**	**167**	**208**	**250**	**292**	**333**	2
	16	8	128	11.9	48	95	143	191	238	286	333	381	2
	18	8	144	13.4	54	107	161	214	268	321	375	429	2
	20	8	160	14.9	60	119	179	238	298	357	417	476	2
	22	8	176	16.4	65	131	196	262	327	393	458	524	2
	24	8	192	17.9	71	143	214	286	357	429	500	572	2

The highlighted rows and column are for the standard 20 x 6 foot tarps or 14 x 8 foot tarps and a rainfall of 25mm. One tarp has the potential to collect more than 200 liters, enough clean water for 100 people for one day at a basic survival rate. Two standard tarps can be connected to one water basket (WB) without much chance of overflowing. The most plentiful tarp width is 6 ft. Other lengths of 6 or 8ft tarp may also be used and the table shows expected water collections. The benefit of the tarps from

IDE is that they are strengthened with connecting grommets. When the grommets are used to tie to a bamboo frame, the full area of the tarp can be used to collect rain. Otherwise, any tarp can be used.

Mounting Tarpaulins

Most people that depend on rainwater already have good ideas about how to collect and store it. The most common frame for mounting a rainwater collection surface is a house. A typical rainwater system is shown below. In places where such housing exists, the owners may simply need some tarpaulin sheeting (without grommets) or other plastic, and perhaps a storage tank.



Basic collectors with minimum local materials

Now that many houses and building materials have been destroyed, it may be necessary to develop rainwater collection systems that are separate from shelter. The ones presented here are made from 6 foot wide tarpaulin material that is most commonly available on the market, although shortages are now common. There are various ways in which the standard tarps can be mounted. Some possibilities are shown here. Many other creative ways are possible.
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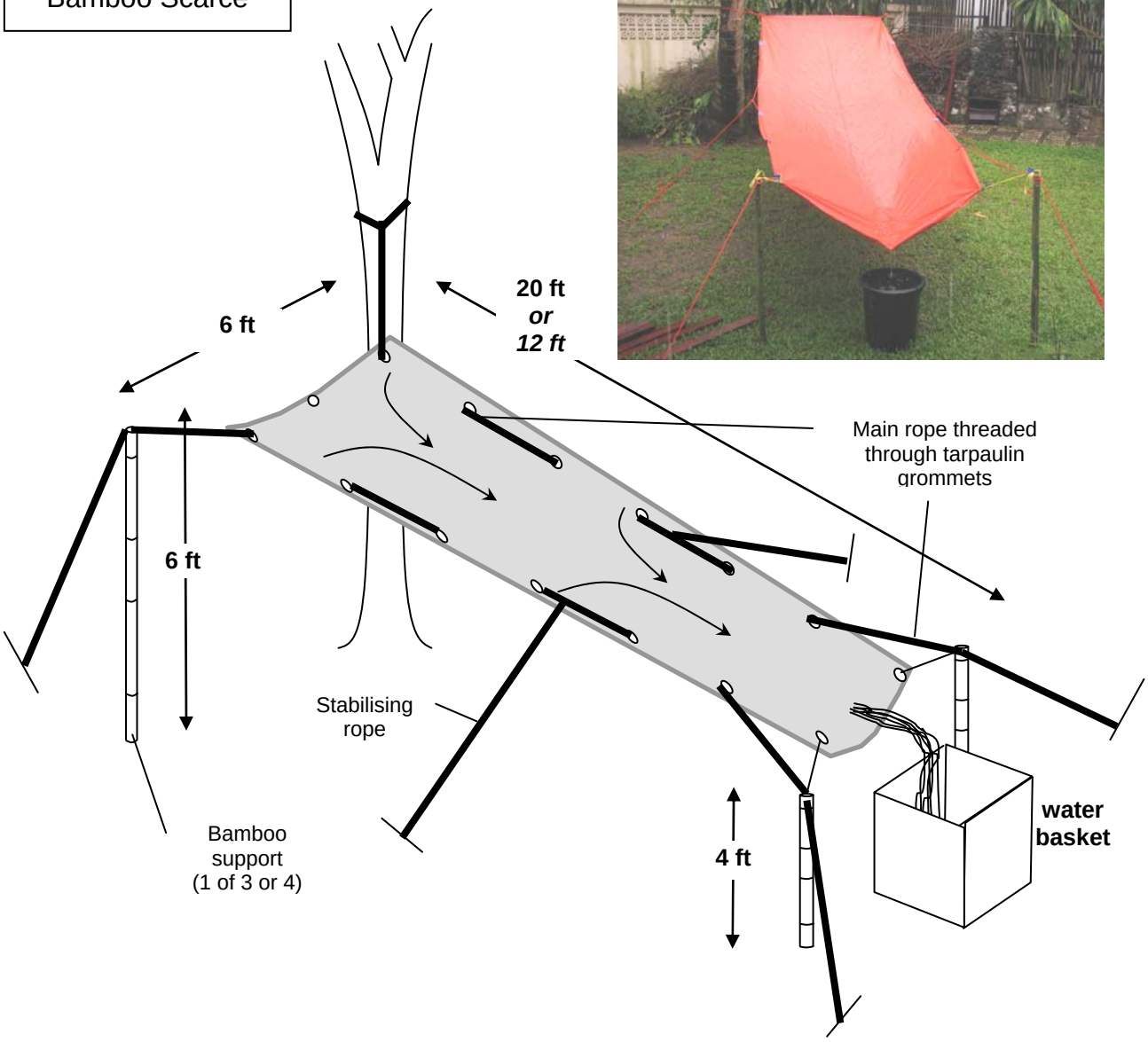
The first examples are for places in which building materials are scarce, and the main support for a catchment tarpaulin is rope.

One
6 ft by 12 or 20 ft
tarpaulin for Rain

Bamboo Scarce

This is quick and relatively easy to set up. It does not rely on the availability of building materials – it uses mostly rope. With a rainfall of 25mm, one can expect over 200 litres. It can be stored in any vessel.



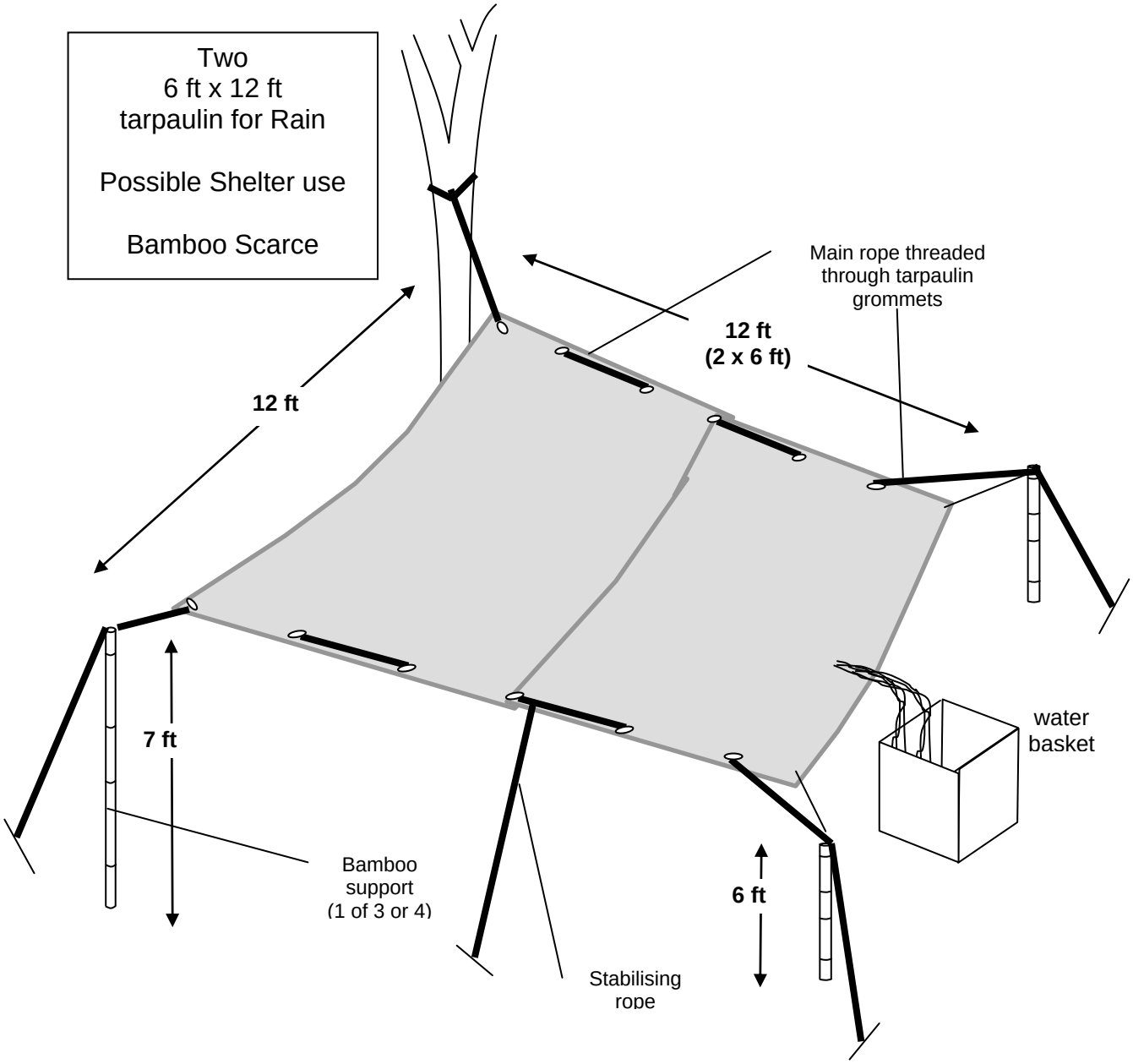
IDE produces a 650 litre (160 gallon) water basket (shown here), potentially serving large numbers of people. The Water basket is simply a folded tarpaulin fitted with mounting grommets and a water tap. IDE is also exploring a smaller 200 litre (50 gallon) tank in anticipation of greater needs at the household level.

Rainwater and Water Guard

Although rainwater should not need any treatment, PSI recommends that rainwater be treated with Water Guard at a rate of 1 to 4000 to eliminate any contamination that may occur

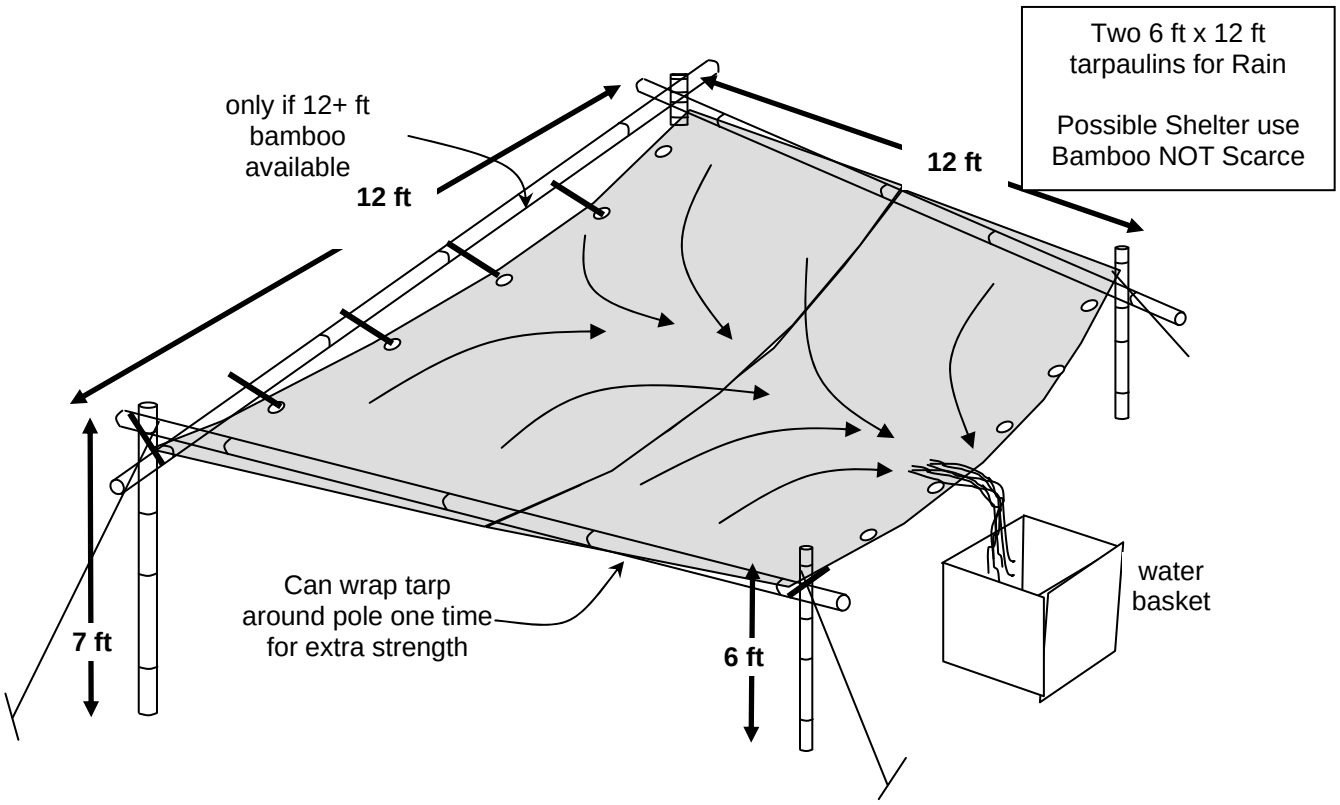
if people use contaminated vessels to take water out of the water basket.
Many people question the logic of making rainwater collectors separate from shelter. The urgency of water needs and field experiences will tell more aboutthe practicality of integrating shelter and rainwater collection.

This system offers twice the water collection capacity and because its shape is more square, it might form the basis of temporary shelter where construction materials are scarce. This could collect more than 250 litres in a 25mm rain.



For extra strength in the corners, one can tie a knot in the corner of the tarpaulin, from which a rope can then be tied to the mounting frame.

Where bamboo is available, more sturdy structures can be built. More sturdy structures offer better opportunity to be used as the roofing part of a shelter. More field reports are needed to see if people accept such models or prefer more "house" shaped structures that will likely be less efficient as water collectors.



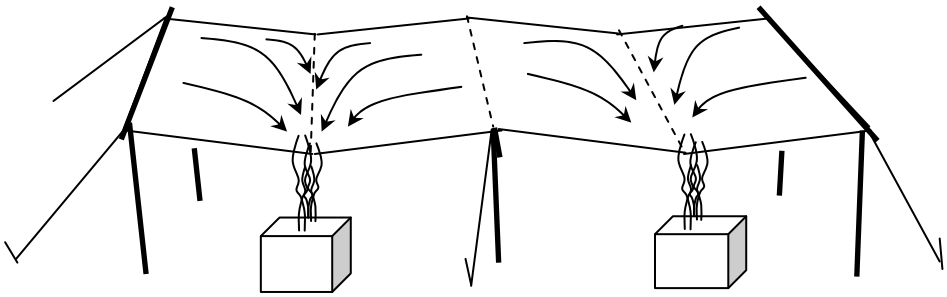
Using other size Tarpaulins

Other tarp sizes might also be used if they are available. It is anticipated that these will become more widely available when relief shipments start arriving. The table below shows expected collection from some other tarp sizes. Those tarps larger than 12 ft wide should be set up with two troughs and two water baskets as illustrated below. The advantage here is that the tarp would also provide shelter.

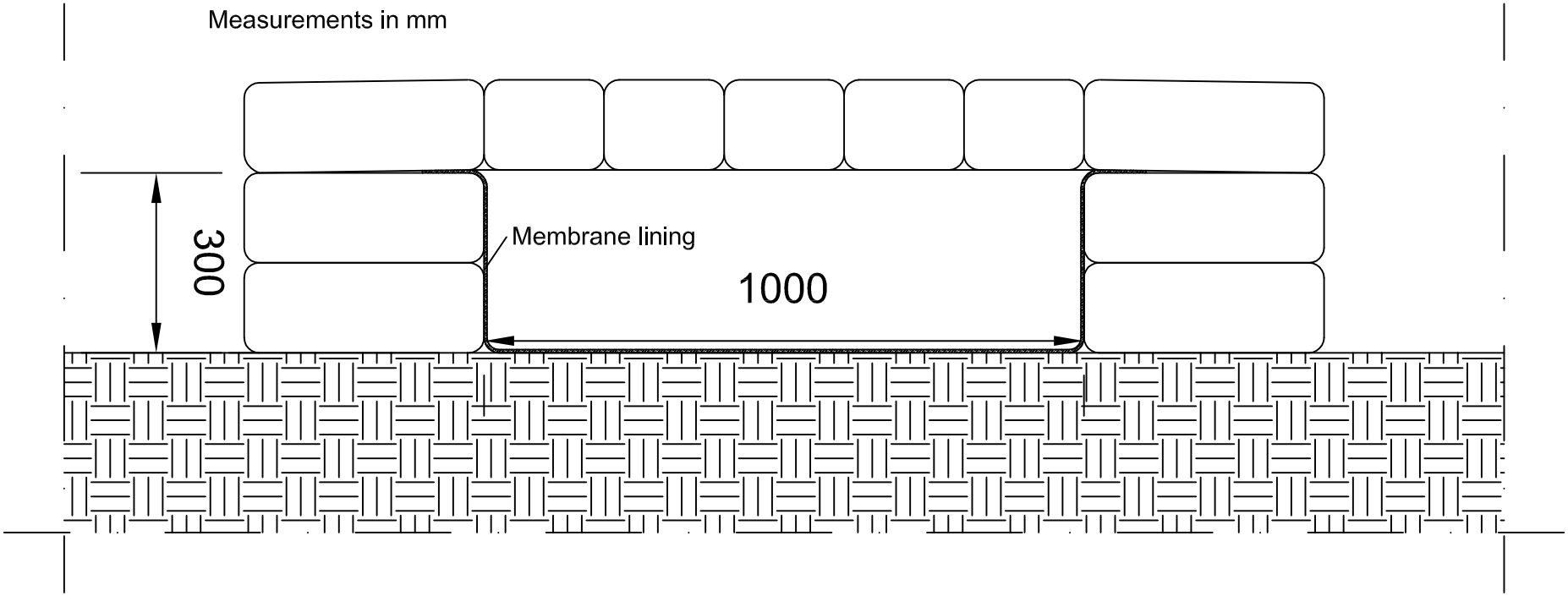
collection efficiency 80% **Average Liters of Water Collected per Day**

Tarpolin size				Rainfall Event (mm)								
length (ft)	width (ft)	area $(ft)^2$	area $(m)^2$	5	10	15	20	25	30	35	40	No. WB per sheet
9	9	81	7.5	30	60	90	121	151	181	211	241	1
12	12	144	13.4	54	107	161	214	268	321	375	429	1
15	15	225	20.9	84	167	251	335	419	502	586	670	2
18	18	324	30.1	121	241	362	482	603	723	844	964	2
21	21	441	41.0	164	328	492	656	820	985	1149	1313	2
24	24	576	53.6	214	429	643	857	1072	1286	1500	1715	2

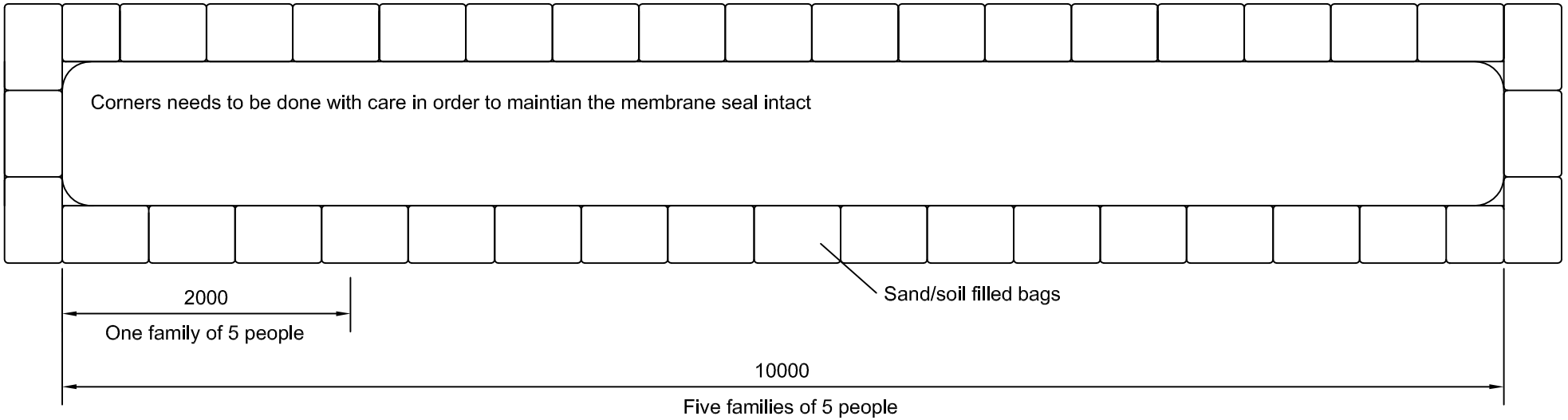
These larger tarpaulin sizes begin to offer better possibilities to integrate shelter (under the tarp) and rainwater water collection. The medium term possibility could be to give such a kit (tarp plus baskets) to extended family or other groupings of people, who would likely be able to manage the tarp for both shelter and water collection.



But the main purpose of rainwater catchment is to catch water, and the simplest way is to use the most widely available tarp (6 ft wide). Water collection is usually far less efficient if shelter is also a strong objective. Immediate term strategies should consider this if water needs are urgent.



Principal cross section temporary ponds



Principal plan temporary rainwater ponds