

Saving soil and water on sloping ground

This Action Sheet is about working with the contours of a slope to save soils from being washed away when it rains. Anything that makes the ground surface more level or divides a slope into shorter lengths will slow down rainfall runoff. Slower runoff means less soil erosion. It also means that there is more time for the rainwater to soak into the ground, so water stays in the soil and helps plants to grow. It's worth applying these ideas anywhere you want to keep soil stable and save water – whether in a small sloping garden or a large hilly farm.

To break up the slope, farmers and gardeners make ditches and ridges along the contours, plant them up with trees and shrubs, and then plant their crops in between. For example, in East Africa, farmers dig Fanya Chini (downhill ridges) on gentle slopes and Fanya Juu (uphill ridges) on steep slopes. Contour barriers not only stop soils washing away – they can help harvest the rainwater for your crops.

What kinds of land are these ideas suitable for?

All over the world, people work with contours when they are farming. Soil and water conservation are particularly important in semi-arid lands which receive 300 – 700mm of rain each year. These areas are prone to drought and have soils that are easily eroded. Before construction of contour barriers, it is worth considering whether they will work well and be affordable. Three key considerations are:

1. The steeper the land, the more costly construction will be. In semi-arid areas, water harvesting methods are not recommended for land with a slope of more than 5% because the speed at which water runs off when it does rain means that construction must be very strong to avoid soil erosion.
2. Soils need to be deep enough to allow water to soak in, and should be fertile enough for crops to benefit from the extra water. More water means higher crop yields, so the nutrients in the soil are used up more quickly. It may be necessary to maintain or improve soil fertility – for example by applying green manure (See Action Sheet 39) or composting (Action Sheet 31). Sandy soils will not benefit from extra water unless soil fertility is also improved at the same time. They also need a low infiltration rate, ie. water should soak in slowly.
3. Once you have decided to go ahead, the first step is to mark the contour lines - the lines connecting points at the same level - on the slope.

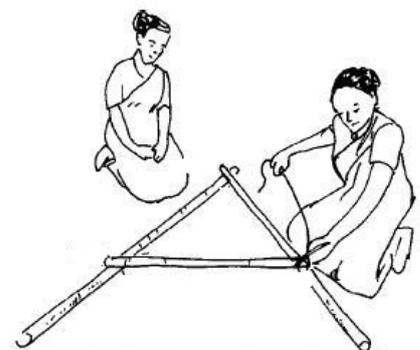
Agricultural Extension Officers should be able to give further advice.

Using a home-made A-frame to mark contour lines on a slope

You will need:

- 2 pieces of wood, approximately 5cm x 2.5cm and 2m long
- 1 piece of wood, 1m long
- 3 nails or screws, 5cm long (if unavailable use string instead)
- a short length of string
- a weight (for example a stone)

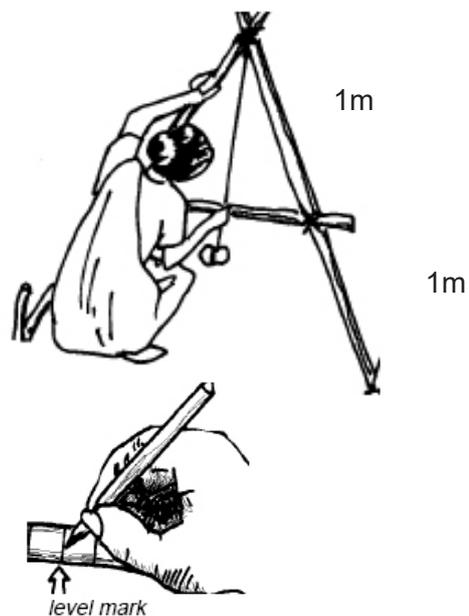
1. Place the two longer pieces of wood on the ground with their ends touching and the other ends 2m away apart. Fasten the 2 pieces together at one end with a nail or screw. If you have not got nails or screws, cut notches and use string to bind the two ends together. Fix them loosely at first.



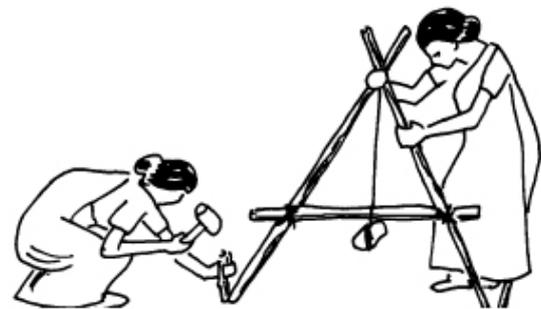
2. Fix the third piece of wood (1m) at exactly the middle of each of the long pieces. When the 3 pieces are in position, tighten all the screws or hammer the nails in firmly. If you are using string, tie them tightly.

3. Hang a string down from the tip of the A frame, and attach a weight to it, so that it swings below the cross-bar.

4. Calibrate the A-frame by placing it upright on ground you know is level. When the stone stops swinging, mark the position where the string crosses the cross-bar. Turn the A frame around, putting the legs in exactly the opposite position, and measure the centre-point again. If it is in the same place, then it is the level ground marker. If it is in a slightly different position, then mark the point exactly between this point and the last, and use that as the level ground marker. Test it out again on another piece of ground.



You may want to cut a notch in the A-frame cross-bar to indicate the level ground marker, but be sure that the notch will not catch the string.



Using an A-frame

Start near the top of the slope. Stand on the hillside with the A-frame, adjusting it until you find level ground as indicated when the weighted string hangs at the level ground marker. Drive a stake in next to one foot of the A-frame. Keeping one of the feet in place, turn the A-frame across the hillside to find the next point along the level or contour line. Keep moving along the hillside with the A-frame, driving stakes in to mark the contour line, which should be smooth, with no sharp bends. When the line is finished, move down the hill to mark out the next contour line.



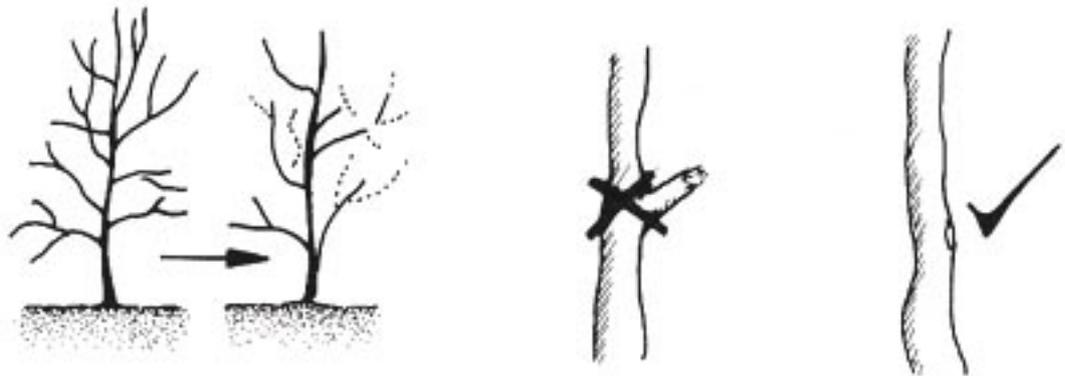
How far apart should the contour lines be?

The distance between contour lines depends on the steepness of the slope. It could be as little as 8 metres or as much as 30 metres. The steeper the slope, the closer the contour barriers have to be to prevent erosion. It also depends upon the amount of rain that falls, and on what you are going to do with the land.

Tree Husbandry

Like other plants and animals, fruit-trees will grow and produce better if they receive proper care.

Pruning. Some trees, such as citrus and mango, benefit from tree shaping. At planting, select the strongest upright branch of the seedling to become the future trunk of the tree. As the tree grows, carefully prune branches that are too close or rubbing together. This allows air and light to circulate through the tree, reduces diseases and can improve fruiting. Prune weak branches and those that let fruit hang too close to the ground where animals or soil diseases can attack them. Remove dead branches, where pests may be living. The cut surfaces can be covered with wood ash to seal the damaged tissues.



Feeding. Trees benefit from the application of compost or fertilizer, particularly at planting. Generally, 2 kg of good compost or a small handful of NPK fertilizer should be applied at planting, and then again every four months. Apply compost or fertilizer before (not during) tree flowering and again when the tree's fruit is half-mature. Put organic matter or mulch under a tree to provide nutrients, reduce weed competition and retain soil moisture.

Watering. Young fruit-trees are sensitive to drought and need daily watering during the dry season for the first year or two. Older trees are more resistant and may not need supplementary watering. Fruit-trees such as papaya benefit from daily watering throughout their lives. Not all trees, however, need supplementary water.

Some suggested trees: fruits, nuts and spices

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Acknowledgements

This Action Sheet is an edited version of FAO Home Garden Technology Leaflet 14. <http://www.fao.org/docrep/003/x3996e/x3996e38.htm>

More information

FAO: www.fao.org

Food and Trees for Africa: www.trees.org.za

Practical Action Technical Briefs on Food Processing have lots of ideas about ways to prepare fruit and nuts for preservation or sale: <https://answers.practicalaction.org/our-resources>

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