

■ **Module 3: PHFS03M**  
Sustainable Natural Resources Use



The rural women's group, whom Mma Tshepo worked with, declared 'War on Hunger'. The first strategy is in what they call: 'My Four Corners', meaning their own homestead yards. They feel that in their own yards they are fully in control – they can take decisions without having to consult other members, as in any communal project, and they can move at their own pace. In her 'Four Corners' her potential additional water sources and their uses are:

- recycling of household water (e.g. water used for washing can be used to grow plants);
- surface run-off can be turned into 'run-on' and channelled to ditches around her garden beds – preferably intensive beds like deep trenches;
- an underground Rain Water Harvesting (RWH) tank, as supported by DWAF (Department of Water Affairs and Forestry) can store enough water for year-round vegetable and fruit production of 100m<sup>2</sup>, or for other productive uses; and
- clean water harvested from the roof into an above-ground water tank can be used for drinking and cooking.

The DWAF Homestead RWH Programme supports the rural household within its 'Four Corners.'

### 3.5.1 Farming with Water Case Study: Mr Phiri

Mr Zephaniah Phiri Maseko has lived and worked on his family land holding (3 hectares), in one of Zimbabwe's driest regions for over 30 years. He has created his "garden of Eden" and over the years has taught many others to do the same.

The farm is on a north to east sloping face of a hill (providing good winter sun). The top of the hill is a large, exposed rock (a granite dome) that creates a lot of storm water run-off. The average annual rainfall in the area is around 570mm. Droughts occur often.



**Figure 3.24 Water, soil, seeds and life gather where water flow slowly across the land.**

and plants (where the rainfall runoff is slowed down and can infiltrate between rocks and plants). He realised that he could mimic or copy this process and enhance areas of his land where soil was remaining moist for longer. Thus began his water farming.

Beginning at the top of his catchment, Mr Phiri built low stonewalls here and there on the contours. These 'check dam walls' slow down and spread the flow of storm run-off water. This controlled run-

When Mr Phiri began, it was very difficult to grow crops successfully, let alone make a profit. He had no money for deep wells, pumps, fuel and other equipment. Mr Phiri started his farming with long and careful observation. He noticed that where the run-off from rain went unchecked (not slowed down) very little infiltration took place. He then noticed that the soil remained moist for longer in small hollows/depressions. This also happened up slope of rocks

off from the large rock (at the top of the hill) is then directed to two earth dams just below (one large and one somewhat smaller). These dams were dug out by hand.

The water in the larger dams seeps straight into the ground over a period of time. The overflow from the smaller dam is directed via a short pipe to an above ground ferrocement (steel reinforced concrete) tank that feeds the family's vegetable garden during dry times. Another tank, shaded and cooled by a granadilla vine, collects drinking water from the roof of the house. Besides these two tanks, all water harvesting structures on the farm directly infiltrate water into the soil.

Numerous water harvesting structures act as nets that collect the flow of the surface run-off and quickly infiltrate the water into the soil, before it can evaporate.

These include:

- Check dams (small stone walls placed within drainages across the waters' flow)
- Vegetation planted on contours
- Terraces (built-up level fields or beds)
- **Berm-n-basins** (dug out basins with earth and plant banks, laid out on contour)
- Infiltration basins
- 'Fruition pits'. These are large basins dug out in the bottom of drainage lines (3 metres long, 2 metres wide and about 2 metres deep). When it rains, the pits fill up with water and the overflow fills one pit after another. Long after the rain stops, water remains in these pits, infiltrating into the soil. These fruition pits feed the **groundwater table** as well as the plants.

Thatch grass, fruit trees and timber trees have been planted in and around the fruition pits. Mr Phiri explains with a smile: " I am digging fruition pits and **swales** to plant the water, so that it can germinate elsewhere.

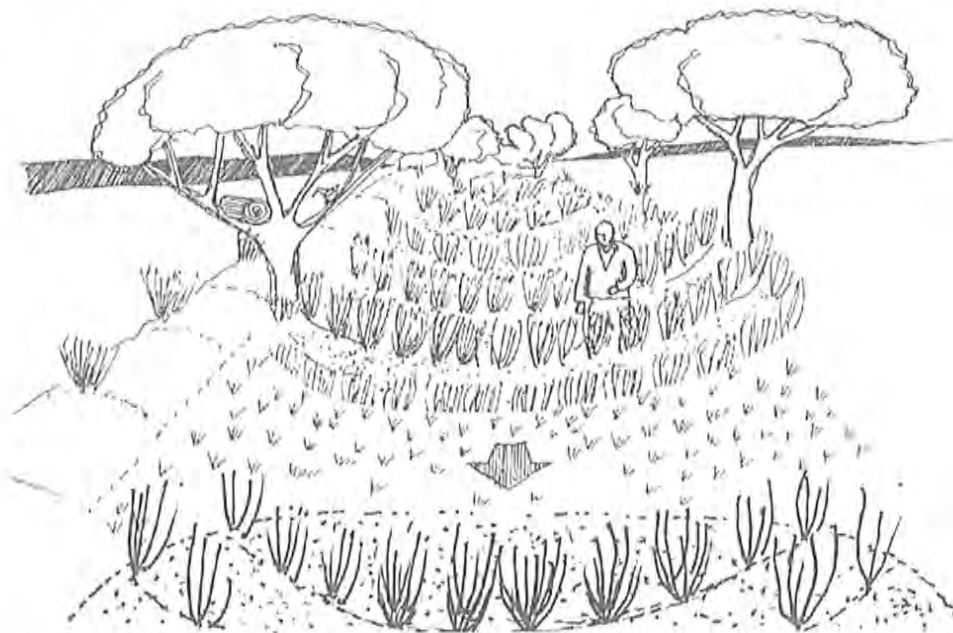


Figure 3.25 Sketch of Mr Phiri standing in a "fruition pit" full of thatch grass.





"As Mr. Phiri explains, 'I am digging fruition pits and swales to plant the water so that it can germinate elsewhere.'"

1. Granite dome
2. Unmortared stone walls
3. Reservoir
4. Fence with unmortared stone wall
5. Contour berm/terrace
6. Outdoor wash basin
7. Chickens and turkeys run freely in courtyard
8. Traditional round houses with thatched roofs
9. Main house with vine-covered cistern and ram
10. Open ferro-cement cistern
11. Kraal—cattle and goats
12. Courtyard garden
13. Contour berm
14. Dirt road
15. Thatch grass and thick vegetation
16. Fruition pit in large diversion swale
17. Crops
18. Dense grasses
19. Well and hand pump
20. Donkey pump
21. Open hand-dug well
22. Reeds and sugar cane
23. Dense banana grove

(Illustration by Silvia Rayces from a drawing by Brad Lancaster)

**Figure 3.26 Layout of Mr Phiri's farm.**

(Adapted from Lancaster, 2008)

Mr Phiri plants a diverse range of crops on his farm: basket reeds, pumpkin (squash), maize, peppers, eggplant, lettuce, spinach, peas, garlic, onions, beans, granadilla, mangoes, guavas and paw-paws, as well as a number of different types of indigenous trees. Indigenous trees are those that occur naturally in the area. They are the best suited to dealing with the particular natural conditions. (Exotic trees come from other places and may not grow as well. Sometimes exotic trees grow too well and compete with indigenous trees. They are then called invasive. This can be a big problem). Mr Phiri's crops are planted on the terraces formed between the contour bunds and the swales. This diversity provides food security for his family: even if some crops fail, others will survive.

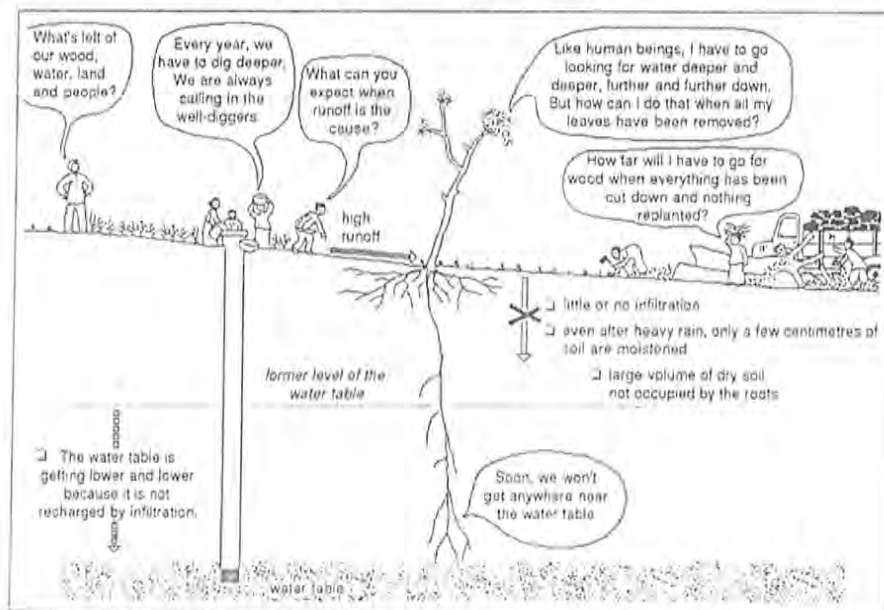
He only uses **open pollinated varieties** of crops and collects, keeps and plants his seed from one year to the next. Over time these crops become adapted to the drier conditions on the farm.

Mr Phiri has found that soils amended (improved) with local organic matter and **nitrogen fixing** plants (such as Pigeon Peas) infiltrate and hold water a lot better than those amended with **synthetic/commercial fertilizers**. He says: "You apply fertilizer one year but not the next and the plants die. Apply manure once and plant nitrogen fixing plants and the plants continue to do well year after year". Note that another advantage of manure is that it is usually free manure compared to the costs of synthetic, commercial fertilizers.

Towards the bottom (the lower lying areas) of the farm are hand-dug, unlined wells (except for one, which is lined and has a small hand pump, for household use). These wells are situated in the wetland in the low-lying area. The wetland helps to filter and clean the water. That is why it is good for household use as well. There is almost always water in these wells and even during a drought it is possible to pump water up from the wells for irrigation. Mr Phiri uses a donkey-driven pump for his purpose. Below, in the box on the next page, is a further explanation of how management of your resources influences the groundwater table.

A **wetland** lies below the wells at the lowest point. Here three aquaculture (fish-farming) ponds/dams are surrounded by a soil-stabilising grove of bananas, sugar cane and reeds. The fish are harvested for food and their manure enriches the water used to irrigate the fields. The taller vegetation creates a windbreak around the ponds (reducing **evapotranspiration**). The shorter grasses filter incoming run-off water into the ponds and feed his cows when in calf.

For years, Mr Phiri found himself in opposition to the international aid and government programs that were pushing for ground water extraction and export crops as opposed to rainwater harvesting and local food production and distribution. As a response Mr Phiri formed a non-government organisation called the Zvishavane Water Resources Project that is spreading his techniques well beyond his area. He says: "It's a slow process. But that's life. Slowly implement these projects and as you begin to rhyme with nature, soon other lives will start to rhyme with yours".



**Figure 3.27 The water table and resource management.**

A. The water table with deforestation and reduced groundcover.

(Dupreiz and De Leener, 1992)