



Deep Bed Farming

How Smallholder Farmers become
the Key Water Managers

Challenges to robust rural livelihoods in Sub Saharan Africa



- **Drought**
- **Flooding**
- **Soil loss and siltation**
- **Water shortage**
- **Failing crops**
- Human induced hardpan**
- High surface runoff**
- Severe erosion**
- Failing aquifers**
- Loss of fertility**

Africa's increasing disasters: Flood. Erosion. Siltation.....
directly leading to hunger, poor health and poverty



Malawi – on a knife edge. (FAO 2014 states 29 tons of topsoil lost *per hectare! per annum!*)

The hidden problem in agriculture that is not being addressed:-

Human induced Hardpan.

Roots and water cannot penetrate the compacted layer.

The result?

- 1. Fast runoff**
- 2. Erosion**
- 3. Flooding**
- 4. Siltation**
- 5. Loss of topsoil**
- 6. Spoilt Crops**
- 7. Depleted aquifers.**

POVERTY



DEEP BED FARMING:- Widespread adoption addresses these challenges.

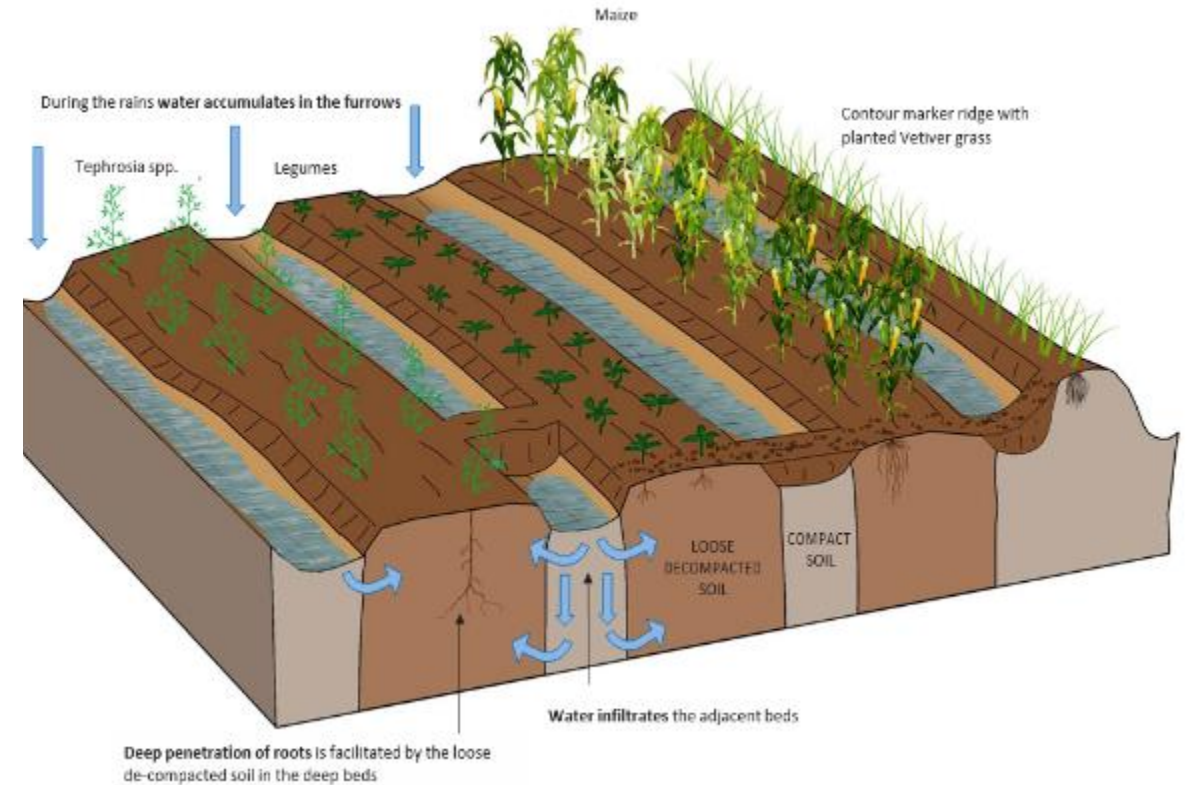
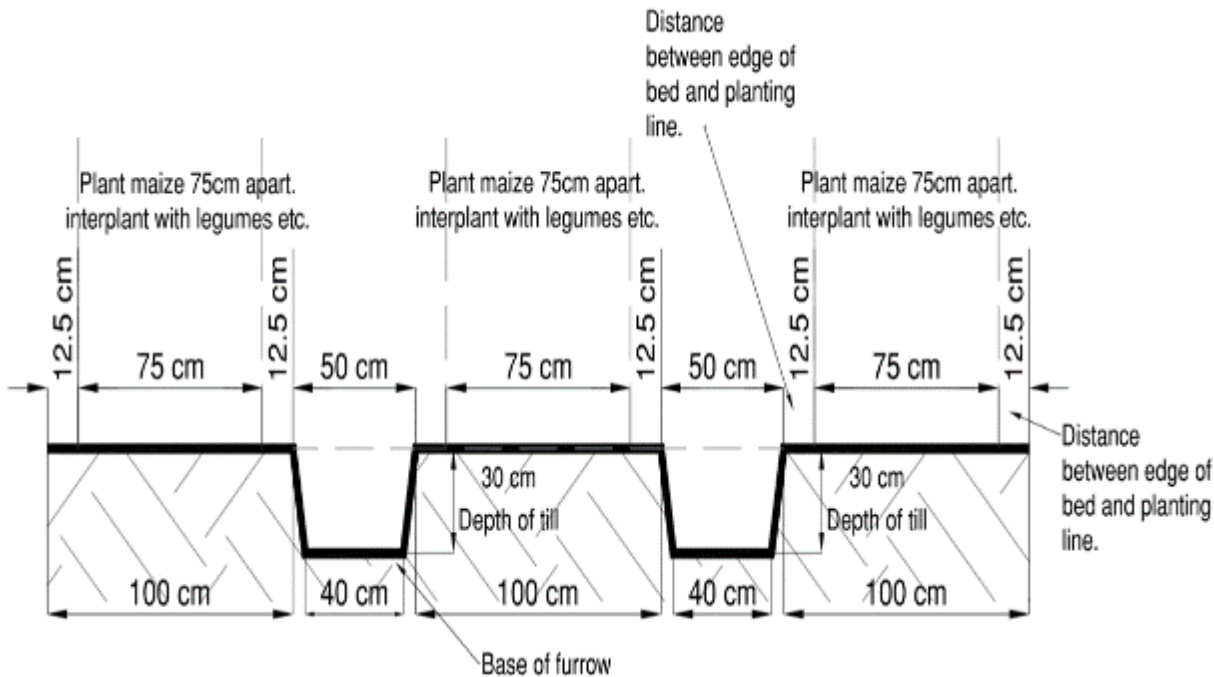
Break the hardpan: Stop water running downhill: Encourage percolation and then.....

Cover crops: Never burn: Rotate crops: Compost: Minimal tillage: incorporate agroforestry: limit chemicals: avoid monocropping



What a Deep Bed Farm (DBF) looks like.....

- Deep Bed farming



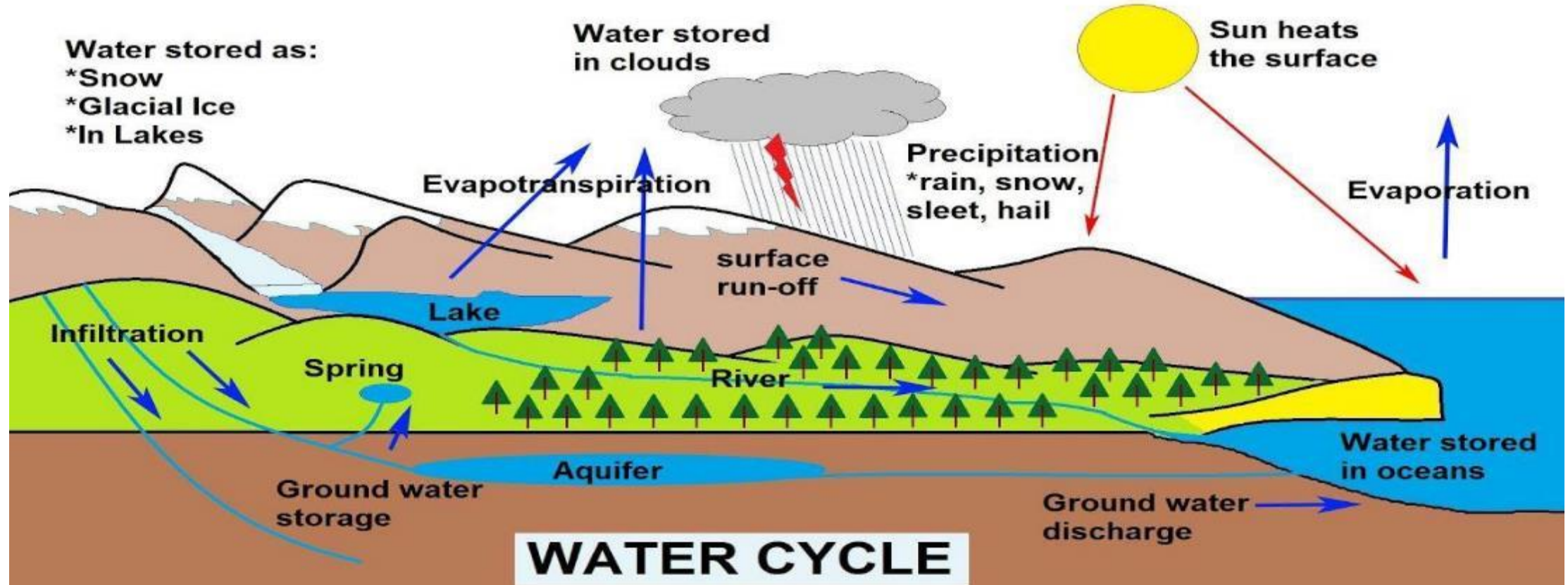
NO SURFACE RUNOFF, NO SOIL EROSION. REDUCED FLOODING AND ITS ECONOMIC DAMAGE (DESTRUCTION OF AQUATIC ECOSYSTEMS). REDUCTION IN SILTATION OF LOWLAND FARMS, STREAMS, RIVERS AND LAKES

INCREASED WATER INFILTRATION & PERCOLATION. HARVESTS RAINWATER AND INCREASES ABSORPTION INTO THE SOIL, ENHANCED RECHARGE OF AQUIFERS REVIVING WELLS, STREAMS, RIVERS, BOREHOLES AND LAKES

REDUCED SOIL DISTURBANCE

COMPACTED SOIL LAYER IS BROKEN **ONCE**. NO MORE TILLAGE AFTER THE 1ST YEAR.

The brown hills describe what is happening now. DBF aims to make those hills green!



Farmers catch the water...and watch it percolate.
They are the key Water Catchment Managers



These Deep Beds (and furrows) are designed by the farmers themselves, to withstand heavy rainfall and not spill a drop.



The farmers adopt this enthusiastically!



DBF started as a crop yield enhancer. Only then did people begin to see DBF effective in catchment management!

Where Deep Bed Farming breaks the hardpan down to 30 cms, roots have a bigger growing zone where they can break any remaining hardpan biologically – and water percolates.....

Where traditional ridges are scraped over last year's furrows, the rootzone is limited, and the consequent crop yield is reduced and often lacks enough moisture

Traditional ridge = 12.5 cms down to hardpan



Deep Bed Farm = 32 cms down to hardpan



Deep Bed Farming (DBF)

Increased yields are 2 to 5 times, in the first year

Comparison of 2 crops.....

.....showing why farmers adopt DBF

Left is Traditional

Right is Deep Beds



All rain on DBF fields percolates into the soil and recharges shallow aquifers.
This makes low cost farm wells possible for domestic use and irrigation

Water in = water out!

Domestic wells transform rural family livelihoods out of poverty



Survey results on DBF farmers and their yields

- **Emsizini 2018 – Profits: Traditional = \$76.18 DBF = \$553.33**
- **Mzimba 2019 – Average Traditional to DBF yield increase = 146%**
- **Mulange 2022. 78 Farmers. Trad = 2.157 t/ha. DBF = 6.398 t/ha**
- **Adopting Farmers by year**
- 2012 38 2016 1,244 2020 11,764
- 2013 81 2017 2,017 2021 17,361
- 2014 133 2018 3,658 2022 25,554
- 2015 275 2019 7,749 2023 ?

Tiyeni's direction of travel

- Already DBF is adopted by 25,000 smallholder farmers by and of 2022. Many more adopting in 2023.
- Supported by Government, with many Government Officers now trained in DBF
- Plans to scale to 1 million Malawi farmers
- Working with other organisations towards a full-scale catchment management scheme in Northern Malawi
- SIWI are carrying out a Zambezi Catchment wide survey (11 countries). They have selected Tiyeni's Deep Bed Farming to carry out 2 Catchment pilot studies in Malawi



<https://www.tiyeni.org>

Training smallholder farmers manage water and soil

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