NURI Practical Guide Series, No. 1

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Planting the rain for increased soil and crop productivity

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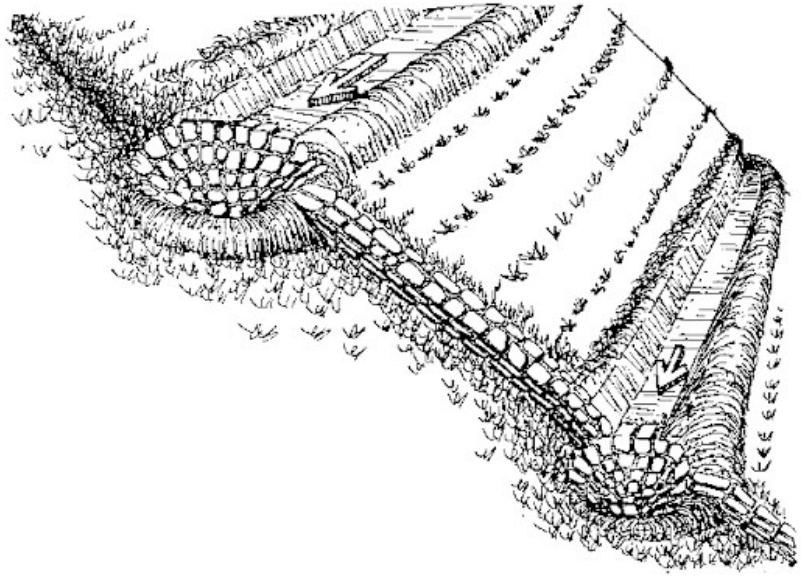
This is one in a series of fact sheets developed by NURI Coordination function for practical use. You can follow us on: www.nuri@ag

Climate-smart farming elements

One of the main pillars of climate-smart agriculture is crop productivity which has been greatly hindered by effects of climate change. Attempts to increase water availability to crop will not only address this challenge but also increase the resilience of the soil for crop productivity. The concept of **Resilience Designs** is an integration of several researched approaches aimed at improving soil productivity including; permaculture, conservation agriculture, climate-smart agriculture, bio-intensive planting and agroecology.

What about resilience designs?

- Involves increasing productivity of soils for increased food security.
- Core to resilience design are soil-based designs structures such as double dug beds, bioswales, and smiley berms etc.
- Resilience design concept is based on integration of water, landscape and agroecosystem.



[1]Chitata, et al., 2014. Estimation of Small Reservoir Sedimentation in Semi-Arid Southern Zimbabwe

[2]Climate-Smart Agriculture manual for Agriculture Education in Zimbabwe

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Planting the rain

Planting the rain is a technique of collecting and storing rainwater for subsequent productive use. From the three methods of rainwater harvesting including in-situ (rainfall stored in the soil), external (run-off water collection) and domestic water harvesting (collection of water from roofs, streets/roads and courtyard runoff), this guide will focus on external water harvesting

Climate-smart structures for planting the rain

In the resilience design context, water management is achieved by a myriad of engineering structures that help not only capture water but also nutrients among which include;

Bioswales/Fanyachini & Fanyaju

Bioswale is a flat-bottomed trench designed to concentrate and convey runoff water. It is established on contour across slopes with the purpose of maximizing the time water spends in the swale. Bioswales functions based on the 4S's principles

of slowing, spreading, sinking and saving of the water for hydration of the berm and subsequent crop utilization.

Smile or boomerang berms

Boomerang berm is a half-moon structure that is placed around an established tree or seedling to capture water and nutrients specifically within the rhizosphere of the plant. A series of boomerang berms allow overflow from one berm to descend into the catchment area of the next downhill berm. This concept is mainly used in the establishment of food forests.

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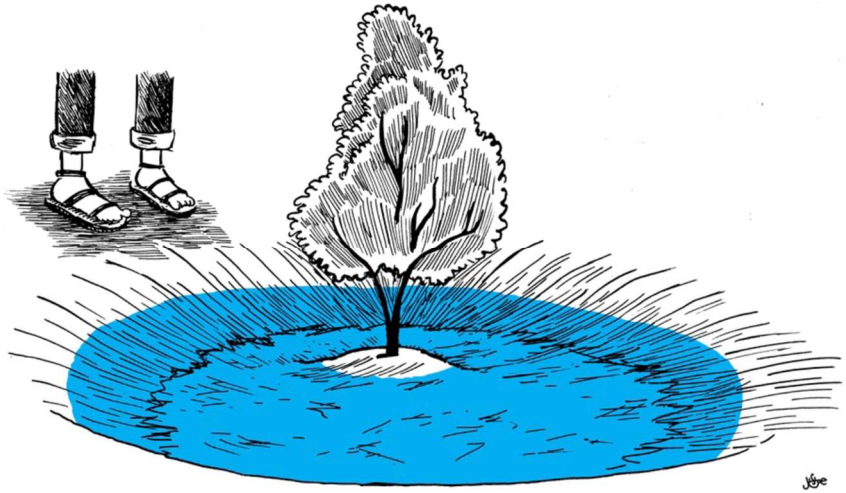
Infiltration basins/pits

These are grass armored or vegetated depressions designed to hold runoff from impervious surfaces allowing water infiltration into the underlying soils and aquifers 9 (groundwater) and used as nutrient capture structures as well as soil erosion control measure.



Terrace cultivation.

It is a method of cultivation on sides of hills and mountains by planting on graduated terraces built into the slopes. Terraces are built along contour lines at suitable intervals, and generally sustained by stone walls. Although labor-intensive, this method has effectively worked out to maximize arable land area in variable terrains and to reduce soil erosion and increase the water-retention capacity of the soil.

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Buffers

Buffers are areas or strips of land maintained under permanent vegetation or armored with stones referred **"one rock check dams"** in resilience context. They can be used along streams, lakes, contours, field (demonstration field) borders, or even within fields. They may reduce the effects of water and wind erosion. Accordingly, buffers can significantly reduce the volume of sediment and nutrients transported by agricultural runoff to water bodies, or prevent the drift of pesticides from fields into water bodies, roads or other areas.

Double digging

Deep soil quality is important for good plant root growth. The average tilth depth of a small holder garden is about 20cm equivalent to the size an average hand hoe blade. With successive tillage, a nearly impermeable subsoil "hardpan" develops blocking movement of air and water through the soil profile. Double digging not only increase the plant rooting depth of the soil but aeration. However, in dry areas finished beds should not be raised; rather, they should be kept at soil level, or even slightly sunken, to help conserve moisture.

Functions of double digging

- Allows closer spacing as plant roots grow down rather than sideways.
- Permanent beds allow for soil structure improvement to sustain crops for a longer period of time and effective water retention.
- Can be amended with nutrients and soil organic matter sourced locally.

Can planting the rain work out?

In the perspective of the NURI programme, whether in supporting better in-field moisture retention, water for livestock and household use - the practice of planting the rain is essential to increase water use efficiency in the face of changing climate. With declining water resources as one of the most disconcerting impacts of climate change, competences in managing water resources are top on the priority lists of prerequisites for transition to climate-smart agriculture. The potential is huge and we are only starting to tap into this precious resource. Imparting the skills that farmers need to analyze their circumstances and invest appropriately into water harvesting techniques needs to be top among the support provided by the government and development practitioners.