FARMING-SYSTEM SPECIFIC EXTENSION CONTENT FOR ENHANCING CLIMATE CHANGE ADAPTATION AND RESILIENT FOOD SYSTEMS IN SORGHUM-BASED DRYLAND FARMING SYSTEMS OF TANZANIA AND BURKINA FASO

BUNDS ALONG THE CONTOURS AND SPILLWAYS FOR DIRECTING WATER TO PONDS WATER MANAGEMENT

CLIMATE CHANGE ADAPTATION AND RESILIENT FOOD SYSTEMS ISSUE

How to overcome water loss through evaporation and runoff and also mitigate the effects of insufficient and erratic rainfall

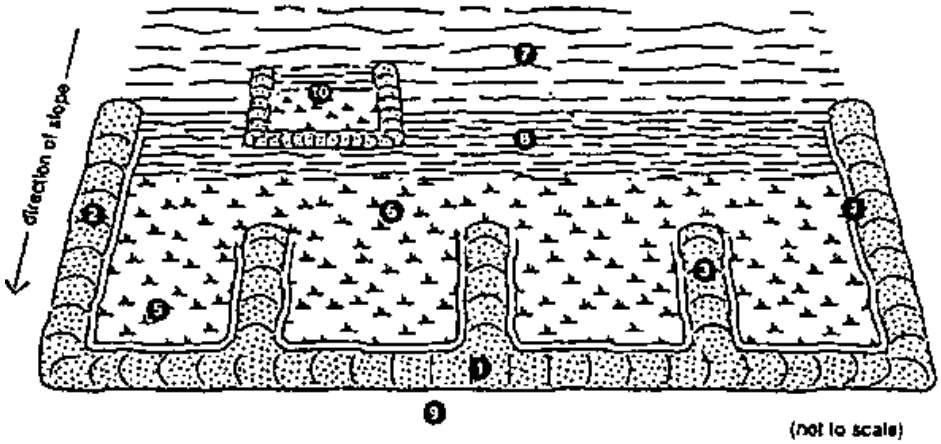
ESSENTIAL TECHNICAL INFORMATION

Earthen bunds are one of the options for overcoming the above issues

1.1. What are earthen bunds?

Earthen bunds are essentially an external catchment, long slope technique of water harvesting. Typically, a u-shaped structure of earthen bunds which farmers build on their cultivated lands to harvest runoff from adjacent upslope catchments, this technique usually collects rainwater and, sometimes, floodwaters (Figure 1).

Figure 5: Typical element of the *teras* water harvesting structure (van Dijk, 1995).



1. Base contour bund
2. Outer collection arm
3. Inner collection arm
4. Shallow channel
5. Basin 6. Cultivated area
7. External catchment
8. Internal catchment
9. 'Mother' (main structure)
10. 'Child'

1.2. Effectiveness of the Technology

The technique allows the production of a crop of millet or sorghum. Based on data from Sudan, yields may reach 750 kg/ha in a good year. Quick maturing sorghum or millet should

be planted immediately after the water from a storm has subsided. This crop grows and matures in about 80 days.

1.3. Environmental Benefits

Use of this technology reduces land degradation and improves water infiltration.

1.4. Suitability

This technology is appropriate for areas of the sorghum-based farming system where the foothills reinforce high intensity and short duration rainfall, with 150 to 400 mm rainfall, annually.

1.5. Advantages

The technology is entirely farmer managed and, therefore, not subject to the organizational problems of other soil and water conservation techniques. Socio economic surveys have indicated that application of soil and water conservation practices contributed about an additional 75% to the total household crop production income in the 1980s and 1990s.

1.6. Disadvantages

The lack of a spillway can result in breached bunds.

HOW TO USE THE EARTHEN BUND TECHNOLOGY

1.7. How are earthen bunds constructed?

The base bund approximately follows the contour line and impounds the runoff. Two outer arms fulfil the same function and also act as conveyance structures which direct water to the cultivated lands. Sometimes, shorter inner arms are added which divide the land into smaller basins and improve the spread of captured runoff. A shallow channel is left on the inside of the bund to support the conveyance and circulation of runoff. Excess water is normally drained along the tips of the outer arms which are reinforced with materials such as stones, brushwood or old tyres. Bunds are usually 0.5 m high and 2 m deep at the base, but these dimensions can vary greatly depending on both the slope and the amount of runoff expected in the area. The base can be between 50 to 300 m long, while the arms are usually 20 to 100 m long. The size of the cultivated area serviced by such a structure is 0.2 to 3 ha.

1.8. Operation and Maintenance

This is a labour-intensive technique. Generally, between 3 and 18 days/ha of work is required to ensure that the system runs efficiently. However, breaches of the bunds will require additional work to effect repairs. The local dynamics of a drainage system may also require that the conservation structures be continuously adjusted for best performance.

1.9. Level of Involvement

Entirely traditional and farmer-managed, earthen bunds may be built by hand using simple tools, although the use of hired tractors is becoming more common.