PROGRESSIVE TERRACES

This document has been produced by Rwanda Organic Agriculture Movement (ROAM) with the financial support of GIZ under the Knowledge Hub in the Eastern Africa (KHEA Project).

Rwanda Organic Agriculture Movement – Kigali , Rwanda - www.roam.org.rw - info@roam.org.rw

Summary

One of the core interventions of the project is the construction of progressive terraces in the Gicumbi District, a hilly and erosion-prone area in Northern Rwanda. According to FONERWA (2022), progressive terraces are a soil conservation technique designed to mitigate land degradation caused by water erosion, particularly in areas with slopes ranging from 5% to 30%. Progressive terraces differ from radical or bench terraces in that they are developed gradually over time through the planting of soil-retaining grasses and hedgerows, rather than being excavated mechanically. This approach aligns with Rwanda's broader Green Growth and Climate Resilience Strategy, which emphasises sustainable land management and climate-smart agriculture.

The terraces not only help conserve soil and water but also serve as platforms for integrating agroforestry and climate-resilient crops, thereby increasing farm productivity and promoting food security (MINAGRI, 2021).

Methods

The construction of progressive terraces under the Green Gicumbi Project follows a participatory, step-by-step approach that blends traditional knowledge with scientific techniques for soil and water conservation. Unlike bench terraces that require heavy excavation, progressive terraces are developed incrementally over time through biological stabilization using grass strips and agroforestry species.

The process begins with site selection and land preparation, where agricultural plots with moderate slopes (5–30%) are identified by project agronomists in collaboration with local authorities and farmer cooperatives. Once the plots are selected, contour lines are drawn using simple tools such as A-frames or line levels. These lines follow the natural contour of the land to prevent water from flowing directly downhill.

Along each contour line, farmers plant grass hedgerows such as vetiver (Chrysopogon zizanioides) or elephant grass (Pennisetum purpureum). These grasses have dense root systems that help stabilize the soil. In some cases, agroforestry species such as calliandra, leucaena, or grevillea are also interplanted to serve as nitrogen fixers and sources of fodder, fuelwood, and green manure.

After the hedgerows are established, they act as natural barriers that trap soil and organic matter carried by runoff. Over time, sediment accumulates behind these hedges, gradually forming small natural steps or terraces. Farmers then use hoes or spades to level the land between hedgerows as needed, particularly where sediment buildup is slow.

To enhance water infiltration and reduce runoff, infiltration ditches or trenches are sometimes dug upslope of the hedgerows. Organic materials such as manure, compost, and crop residues are added regularly to improve soil fertility. Mulching is also encouraged to retain moisture and suppress weeds.

Throughout the process, farmer training and follow-up are provided by agricultural extension agents. Farmers are taught to maintain the terraces by trimming hedgerows, replanting grasses when needed, and preventing livestock damage through fencing or controlled grazing.

This low-cost, labour-intensive approach not only protects the land from erosion but also allows for continuous agricultural use during and after terrace formation, making it ideal for smallholder farmers.

Example of constructed progressive terraces

Benefits

The benefits of progressive terraces under the Green Gicumbi Project are multifaceted, spanning environmental, economic, and social dimensions.

Environmentally, the terraces significantly reduce soil erosion and surface runoff, which are major challenges in the steep landscapes of Gicumbi District. By slowing down the movement of water and enhancing infiltration, terraces help recharge groundwater and maintain soil moisture, especially critical during dry spells (NISR, 2020). In addition, the integration of agroforestry on terraces enhances biodiversity, sequesters carbon, and contributes to microclimate regulation.

Economically, the project has led to noticeable improvements in crop yields. Farmers report increased productivity of key crops such as beans, maize, and Irish potatoes, thanks to better water retention and nutrient availability on terraced land (MINAGRI, 2021). The project also encourages intercropping with fodder and fruit trees, diversifying income sources for households. Some households have started producing and selling surplus produce, thereby improving food security and market participation.

Socially, the terraces have strengthened community cohesion and resilience. The implementation model emphasises community-based participatory planning, whereby farmers collectively decide on work schedules, site management, and rotational labor systems known as “umuganda.” Moreover, the project has generated temporary employment for youth and women through paid labour in terrace construction, thereby contributing to poverty reduction and local economic development.

The use of terraces has also been linked with enhanced adaptive capacity to climate change. Terraced plots are less vulnerable to drought and heavy rainfall, which are becoming increasingly frequent due to changing climate patterns. Furthermore, by stabilising agricultural land, the terraces contribute to long-term land tenure security and reduced migration pressures.

Conclusion

The progressive terraces established under the Green Gicumbi Project demonstrate a successful model for sustainable land management and climate adaptation in Rwanda's highland areas. By combining traditional knowledge with ecological principles and modern project management, the initiative effectively addresses the dual challenges of land degradation and rural poverty. The integration of agroforestry and climate-resilient crops within terraced landscapes further enhances ecosystem services and food security.

However, sustaining the impact of the terraces will require ongoing investment in farmer training, maintenance, and scaling to other erosion-prone areas. Future directions should include integrating terracing with other conservation agriculture practices such as minimum tillage, mulching, and cover cropping. Additionally, linking terrace development with access to markets and value chains could further increase the economic returns for smallholder farmers. As climate change continues to impact agricultural systems, progressive terraces stand out as a resilient and inclusive solution with potential for replication across Rwanda and beyond.

References

1. FONERWA. (2022). Green Gicumbi Project Progress Report 2021–2022. Kigali: Rwanda Green Fund.

2. Green Gicumbi Project. (2022). Community Resilience Through Terracing: Technical Manual. Kigali: FONERWA.

3. MINAGRI. (2021). Strategic Plan for Agriculture Transformation (PSTA IV) 2018–2024. Kigali: Ministry of Agriculture and Animal Resources.

4. National Institute of Statistics of Rwanda (NISR). (2020). Land Use and Soil Erosion Statistics in Northern Rwanda. Kigali: NISR.

5. Rwanda Agriculture and Animal Resources Development Board (RAB). (2021). Sustainable Land Management Practices in Rwanda. Kigali: RAB.

.