A landscape view of a fanya juu terrace stabilized with nappier grass on the upper slope and sweet potatoes on the lower side (Paul Kahiga (8444-00300 Nairobi))

Fanya Juu Terraces - Nappier grass+Swetpotatoes (Kenya)

Fanya Juu Terraces - Nappier grass+Swetpotatoes

DESCRIPTION

Fanya juu terraces stabilized with nappier grass and sweet potatoes are earth bunds created by digging a trench along a contour and throwing the soil up slope to form an embankment that is stabilized with nappier grass and during maintenance phase, the accumulated sediments are removed and thrown on the lower side and stabilized with sweet potatoes.

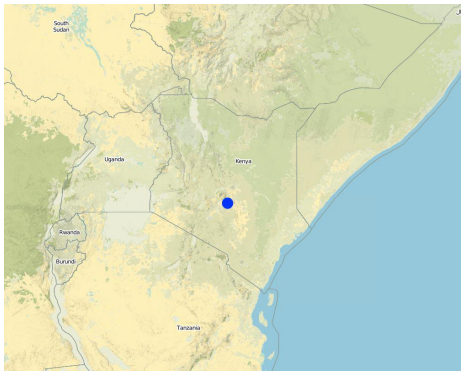
The cross-sectional profile of a fanya juu terrace comprises an embankment to impound water, soil and nutrients, a storage area above the embankment to prevent overtopping by runoff and a berm or ledge to prevent the embankment soil from sliding bank into the trench. The trench below the embankment may or be retained. A Fanya juu terrace is often the first stage in the development of a bench terrace.

Purpose of the Technology: They effectively reduces slope-length, and hence soil erosion from steep croplands. In some cases, enlarged embankments are made to allow ponding of harvested runoff and, therefore, the structure can be used in water harvesting systems having external catchments. The soil bund retains water and thereby, safeguards yields even during droughts. In Embu County, farmers are very innovative. They ussually stabilize the up slope soil with nappier grass (fodder) and during the maintenance phase, the silt/sediments in the trench is scoped and thrown on the lower side where is stabilized with sweet potatoes vines.

Establishment / maintenance activities and inputs: The construction of fanya juu terraces is labor intensive and involves digging a trench on the contour and throwing the soil up slope to form an embankment. Construction is carried out after laying out pegs on the contour, or at a gradient, as required. A berm of 15cm to 30 cm is left to prevent the embankment soil up slope to form an embankment, which should be stabilized with grass. The excavated trench should be as narrow as possible to reduce wastage of cultivated land. Where the trench can be used for planting tree crops such as bananas, it should be wide enough to accommodate the crop. The embankment should be planted with perennial grass to stabilize it.

Natural / human environment: Fanya juu terraces are popular in smallholder farms particularly in semi arid areas where they are quite effective in conserving moisture and nutrients. They are applicable in areas where soils are too shallow for level bench terracing and on moderately steep slopes (e.g. below 20%) They are not suitable for stony soil. They normally develop into out ward sloping bench terraces after a few years depending on the amount of soil which moves down slope and lodges above the embankment.

LOCATION



Location: Mbere South District, Eastern Province, Kenya

No. of Technology sites analysed:

Geo-reference of selected sites
- 37.65791, -0.57822

Spread of the Technology: evenly spread over an area (approx. < 0.1 km2 (10 ha))

In a permanently protected area?:

Date of implementation:

Type of introduction
- [x] through land users' innovation
- [ ] as part of a traditional system (> 50 years)
- [ ] during experiments/ research
- [ ] through projects/ external interventions

The photograph on the right side shows a freshly planted sweet potatoe vines planted during maintenance phase. (Paul Kahiga (8444-00300 Nairobi Kenya))

CLASSIFICATION OF THE TECHNOLOGY

Main purpose

- [x] improve production
- [x] reduce, prevent, restore land degradation
- [ ] conserve ecosystem
- [ ] protect a watershed/ downstream areas – in combination with other Technologies
- [ ] preserve/ improve biodiversity
- [ ] reduce risk of disasters
- [ ] adapt to climate change/ extremes and its impacts
- [ ] mitigate climate change and its impacts
- [x] create beneficial economic impact
- [ ] create beneficial social impact

Land use

Cropland

- Annual cropping: fodder crops - grasses, root/tuber crops - sweet potatoes, yams, taro/cocoyam, other

Number of growing seasons per year: 1

Water supply

- [ ] rainfed
- [x] mixed rainfed-irrigated
- [ ] full irrigation

Purpose related to land degradation

- [x] prevent land degradation
- [ ] reduce land degradation
- [x] restore/ rehabilitate severely degraded land
- [ ] adapt to land degradation
- [ ] not applicable

Degradation addressed

soil erosion by water - Wt: loss of topsoil/ surface erosion

SLM group

- cross-slope measure

SLM measures

structural measures - S2: Bunds, banks

TECHNICAL DRAWING

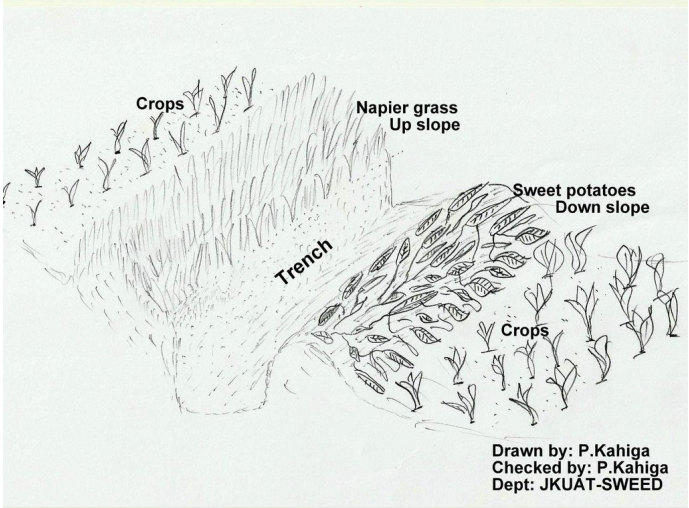
Technical specifications

The technical drawing on the left hand side shows a typical fanya juu terrace stabilized with nappier grass on the upper slope and sweet potatoes vines on the lower down slope.

Location: Ena Location. Eastern Province
Date: 12.11.2012

Technical knowledge required for field staff / advisors: moderate (The extension officers need to demonstrate on how to construct the terraces)
Technical knowledge required for land users: high (The technology is good because it completely reduces soil losses)

Main technical functions: control of concentrated runoff: retain / trap



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ESTABLISHMENT AND MAINTENANCE: ACTIVITIES, INPUTS AND COSTS

Calculation of inputs and costs

- Costs are calculated:
- Currency used for cost calculation: **Kshs**
- Exchange rate (to USD): 1 USD = 100.0 Kshs
- Average wage cost of hired labour per day: 5.00

Most important factors affecting the costs

labour

Establishment activities

1. Setting out the contours (Timing/ frequency: Initial stages)
2. Digging out the trench (Timing/ frequency: After setting the contour)
3. Planting nappier grass (Timing/ frequency: on the up slope)
4. Removing the sediments (Timing/ frequency: maintenance phase)
5. Planting of sweet potatoes (Timing/ frequency: maintenance phase)

Establishment inputs and costs

Specify input	Unit	Quantity	Costs per Unit (Kshs)	Total costs per input (Kshs)	% of costs borne by land users
Labour					
Labour	ha	1.0	200.0	200.0	100.0
Equipment					
Tools	ha	1.0	25.0	25.0	100.0
Other					
Cuttings	ha	1.0	30.0	30.0	100.0
Total costs for establishment of the Technology				**255.0**	
Total costs for establishment of the Technology in USD				*2.55*	

Maintenance activities

n.a.

Maintenance inputs and costs

Specify input	Unit	Quantity	Costs per Unit (Kshs)	Total costs per input (Kshs)	% of costs borne by land users
Labour					
Labour	ha	1.0	150.0	150.0	100.0
Equipment					
Tools	ha	1.0	150.0	150.0	100.0
Other					
Cuttings	ha	1.0	150.0	150.0	100.0
Total costs for maintenance of the Technology				**450.0**	
Total costs for maintenance of the Technology in USD				*4.5*	

NATURAL ENVIRONMENT

Average annual rainfall

- ☐ < 250 mm
- ☐ 251-500 mm
- ☐ 501-750 mm
- ☐ 751-1,000 mm
- ☑ 1,001-1,500 mm
- ☐ 1,501-2,000 mm

Agro-climatic zone

- ☐ humid
- ☑ sub-humid
- ☐ semi-arid
- ☐ arid

Specifications on climate

Thermal climate class: subtropics

- [ ] 2,001-3,000 mm
- [ ] 3,001-4,000 mm
- [ ] > 4,000 mm

Slope
- [ ] flat (0-2%)
- [ ] gentle (3-5%)
- [x] moderate (6-10%)
- [ ] rolling (11-15%)
- [ ] hilly (16-30%)
- [ ] steep (31-60%)
- [ ] very steep (>60%)

Landforms
- [ ] plateau/plains
- [x] ridges
- [ ] mountain slopes
- [ ] hill slopes
- [ ] footslopes
- [ ] valley floors

Altitude
- [ ] 0-100 m a.s.l.
- [ ] 101-500 m a.s.l.
- [ ] 501-1,000 m a.s.l.
- [x] 1,001-1,500 m a.s.l.
- [ ] 1,501-2,000 m a.s.l.
- [ ] 2,001-2,500 m a.s.l.
- [ ] 2,501-3,000 m a.s.l.
- [ ] 3,001-4,000 m a.s.l.
- [ ] > 4,000 m a.s.l.

Technology is applied in
- [ ] convex situations
- [ ] concave situations
- [ ] not relevant

Soil depth
- [ ] very shallow (0-20 cm)
- [ ] shallow (21-50 cm)
- [x] moderately deep (51-80 cm)
- [ ] deep (81-120 cm)
- [ ] very deep (> 120 cm)

Soil texture (topsoil)
- [ ] coarse/ light (sandy)
- [x] medium (loamy, silty)
- [ ] fine/ heavy (clay)

Soil texture (> 20 cm below surface)
- [ ] coarse/ light (sandy)
- [ ] medium (loamy, silty)
- [ ] fine/ heavy (clay)

Topsoil organic matter content
- [ ] high (>3%)
- [x] medium (1-3%)
- [ ] low (<1%)

Groundwater table
- [ ] on surface
- [ ] < 5 m
- [x] 5-50 m
- [ ] > 50 m

Availability of surface water
- [ ] excess
- [x] good
- [ ] medium
- [ ] poor/ none

Water quality (untreated)
- [x] good drinking water
- [ ] poor drinking water (treatment required)
- [ ] for agricultural use only (irrigation)
- [ ] unusable

Water quality refers to:

Is salinity a problem?
- [ ] Yes
- [ ] No

Occurrence of flooding
- [ ] Yes
- [ ] No

Species diversity
- [ ] high
- [x] medium
- [ ] low

Habitat diversity
- [ ] high
- [ ] medium
- [ ] low

CHARACTERISTICS OF LAND USERS APPLYING THE TECHNOLOGY

Market orientation
- [ ] subsistence (self-supply)
- [x] mixed (subsistence/ commercial)
- [ ] commercial/ market

Off-farm income
- [x] less than 10% of all income
- [ ] 10-50% of all income
- [ ] > 50% of all income

Relative level of wealth
- [ ] very poor
- [ ] poor
- [x] average
- [ ] rich
- [ ] very rich

Level of mechanization
- [x] manual work
- [ ] animal traction
- [ ] mechanized/ motorized

Sedentary or nomadic
- [ ] Sedentary
- [ ] Semi-nomadic
- [ ] Nomadic

Individuals or groups
- [x] individual/ household
- [ ] groups/ community
- [ ] cooperative
- [ ] employee (company, government)

Gender
- [x] women
- [x] men

Age
- [ ] children
- [ ] youth
- [ ] middle-aged
- [ ] elderly

Area used per household
- [ ] < 0.5 ha
- [x] 0.5-1 ha
- [ ] 1-2 ha
- [ ] 2-5 ha
- [ ] 5-15 ha
- [ ] 15-50 ha
- [ ] 50-100 ha
- [ ] 100-500 ha
- [ ] 500-1,000 ha
- [ ] 1,000-10,000 ha
- [ ] > 10,000 ha

Scale
- [x] small-scale
- [ ] medium-scale
- [ ] large-scale

Land ownership
- [ ] state
- [ ] company
- [ ] communal/ village
- [ ] group
- [ ] individual, not titled
- [x] individual, titled

Land use rights
- [ ] open access (unorganized)
- [ ] communal (organized)
- [ ] leased
- [x] individual

Water use rights
- [ ] open access (unorganized)
- [ ] communal (organized)
- [ ] leased
- [x] individual

Access to services and infrastructure

health	poor	✓	good
education	poor	✓	good

IMPACTS

Socio-economic impacts

Crop production	decreased	✓	increased
fodder production	decreased	✓	increased
land management	hindered	✓	simplified
farm income	decreased	✓	increased
workload	increased	✓	decreased

Socio-cultural impacts

health situation — worsened ... improved

SLM/ land degradation knowledge — reduced ... improved

Ecological impacts

harvesting/ collection of water (runoff, dew, snow, etc) — reduced ... improved

soil loss — increased ... decreased

pest/ disease control — decreased ... increased

Quantity before SLM: moles
Quantity after SLM: None
Moles

Off-site impacts

COST-BENEFIT ANALYSIS

Benefits compared with establishment costs

Short-term returns — very negative ... very positive

Long-term returns — very negative ... very positive

Benefits compared with maintenance costs

Short-term returns — very negative ... very positive

Long-term returns — very negative ... very positive

CLIMATE CHANGE

Climate-related extremes (disasters)

local rainstorm — not well at all ... very well

ADOPTION AND ADAPTATION

Percentage of land users in the area who have adopted the Technology

- single cases/ experimental
- 1-10%
- 11-50%
- > 50%

Of all those who have adopted the Technology, how many have done so without receiving material incentives?

- 0-10%
- 11-50%
- 51-90%
- 91-100%

Has the Technology been modified recently to adapt to changing conditions?

- Yes
- No

To which changing conditions?

- climatic change/ extremes
- changing markets
- labour availability (e.g. due to migration)

CONCLUSIONS AND LESSONS LEARNT

Strengths: land user's view

Strengths: compiler's or other key resource person's view

- Fanya juu terraces stabilized with nappier grass prevents soil erosion by trapping and concentrating the runoff in the trenches.
- They are source of nappier grass that is used for feeding farm animals.
- They are source of food i.e. sweet potatoes.

Weaknesses/ disadvantages/ risks: land user's viewhow to overcome

Weaknesses/ disadvantages/ risks: compiler's or other key resource person's viewhow to overcome

- Danger of soil turning back in the trenches while harvesting the sweet potatoes. Care should be taken to avoid the soil from falling back in the trenches.
- Habitat for pest like moles that are very fond of sweet potatoes Use of appropriate methods to eliminate the moles.

REFERENCES

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Full description in the WOCAT database
https://qcat.wocat.net/en/wocat/technologies/view/technologies_1243/

Linked SLM data
n.a.

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