



Hararghie Soil Bund (Ethiopia)

Daga Biyye (Oromigna)

DESCRIPTION

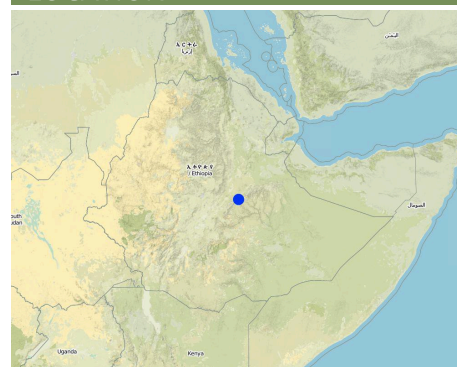
an embankment of soil constructed along the contour to reduce runoff and maintain soil moisture.

Soil bund is an earth embankment constructed along the contour in order to avoid runoff down slope and shorten the slope length. Ditch/basin is dug at the upper side of the bund.

Purpose of the Technology: To obtain the maximum sustainable level of production from a given area of land by reducing soil loss below a threshold level and maintaining soil moisture.

Establishment / maintenance activities and inputs: During establishment and maintenance the materials needed are graduated poles, pegs, plastic string and water level and other materials related to the work.

LOCATION



Location: Habro, West Hareghe/Oromia, Ethiopia

No. of Technology sites analysed:

Geo-reference of selected sites

- 40.5, 8.8333

Spread of the Technology:

In a permanently protected area?:

Date of implementation: more than 50 years ago (traditional)

Type of introduction

- ☐ through land users' innovation
- ☐ as part of a traditional system (> 50 years)
- ☐ during experiments/ research
- ☒ through projects/ external interventions

CLASSIFICATION OF THE TECHNOLOGY

Main purpose

- ☐ improve production
- ☐ 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

Land use



Cropland

- Annual cropping: cereals - maize, cereals - sorghum, haricot bean, teff, chickpea
 - Tree and shrub cropping: coffee, open grown, Catha edulis
- Number of growing seasons per year: 1
Is intercropping practiced? Ja

- mitigate climate change and its impacts
- create beneficial economic impact
- create beneficial social impact



Grazing land

- Semi-nomadic pastoralism
- free grazing, stall feeding

Water supply

- rainfed
- mixed rainfed-irrigated
- full irrigation

Purpose related to land degradation

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

Degradation addressed



soil erosion by water - Wt: loss of topsoil/ surface erosion, Wg: gully erosion/ gullying



water degradation - Ha: aridification

SLM group

- cross-slope measure

SLM measures

TECHNICAL DRAWING

Technical specifications

Oromia

Technical knowledge required for field staff / advisors: high

Technical knowledge required for land users: high

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

Secondary technical functions: reduction of slope angle, reduction of slope length, increase / maintain water stored in soil

Relay cropping

Material/ species: maize, teff and chick pea

Mixed cropping / intercropping

Material/ species: haricot bean and maize

Bund/ bank: level

Vertical interval between structures (m): 1m

Spacing between structures (m): 10m

Depth of ditches/pits/dams (m): 0.5m

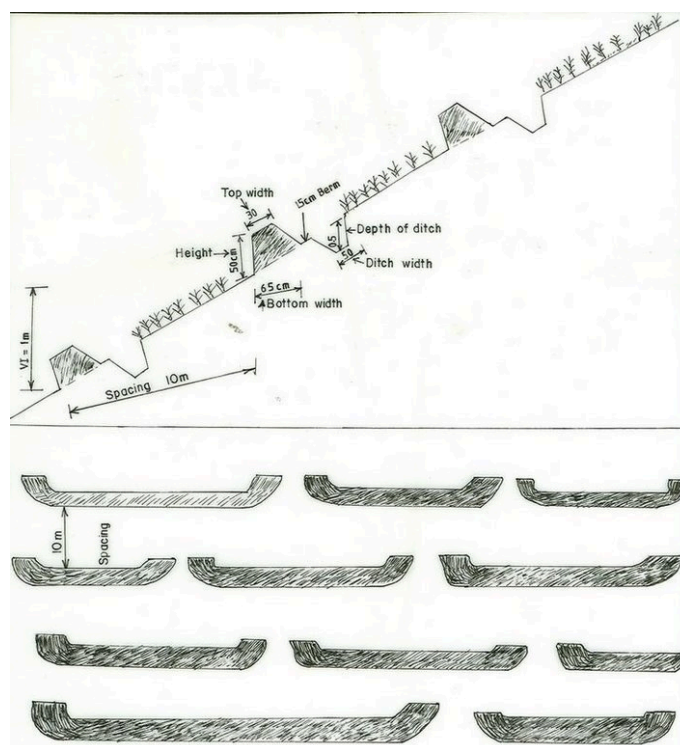
Width of ditches/pits/dams (m): 0.5m

Height of bunds/banks/others (m): 0.5m

Width of bunds/banks/others (m): 0.5m

Slope (which determines the spacing indicated above): 12%

Lateral gradient along the structure: 0%



ESTABLISHMENT AND MAINTENANCE: ACTIVITIES, INPUTS AND COSTS

Calculation of inputs and costs

- Costs are calculated:
- Currency used for cost calculation: **Birr**
- Exchange rate (to USD): 1 USD = 8.5 Birr
- Average wage cost of hired labour per day: 0.94

Most important factors affecting the costs

excavation work requires more labour and it affects the cost of construction and maintenance

Establishment activities

- surveying and layout (Timing/ frequency: dry season)
- excavation work (Timing/ frequency: onset of rain)

Establishment inputs and costs

Specify input	Unit	Quantity	Costs per Unit (Birr)	Total costs per input (Birr)	% of costs borne by land users
Labour					
Labour	ha	1.0	89.0	89.0	100.0
Equipment					
Animal traction	ha	1.0	67.0	67.0	
Tools	ha	1.0	23.5	23.5	100.0
Plant material					

Seeds	ha	1.0	18.8	18.8	
Fertilizers and biocides					
Fertilizer	Ha	1.0	35.3	35.3	
Other					
cultivation cost	ha	1.0	36.5	36.5	
Total costs for establishment of the Technology				270.1	
<i>Total costs for establishment of the Technology in USD</i>				<i>31.78</i>	

Maintenance activities

1. ploughing along the contour (Timing/ frequency: dry season / 4 times)
2. Sowing (Timing/ frequency: onset of rain / each cropping season)
3. Digging the ditch/basin (Timing/ frequency: dry season/two times)
4. maintain the height of the bund (Timing/ frequency: dry season/two times)

Maintenance inputs and costs

Specify input	Unit	Quantity	Costs per Unit (Birr)	Total costs per input (Birr)	% of costs borne by land users
Labour					
Labour	ha	1.0	11.75	11.75	100.0
Equipment					
Animal traction	ha	1.0	56.0	56.0	100.0
Tools	ha	1.0	2.3	2.3	100.0
Other					
cultivation cost	ha	1.0	109.4	109.4	
Total costs for maintenance of the Technology				179.45	
<i>Total costs for maintenance of the Technology in USD</i>				<i>21.11</i>	

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
- ☐ 2,001-3,000 mm
- ☐ 3,001-4,000 mm
- ☐ > 4,000 mm

Agro-climatic zone

- ☐ humid
- ☒ sub-humid
- ☐ semi-arid
- ☐ arid

Specifications on climate

n.a.

Slope

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

Landforms

- ☐ plateau/plains
- ☐ 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.
- ☐ 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)
- ☒ moderately deep (51-80 cm)
- ☐ deep (81-120 cm)
- ☐ very deep (> 120 cm)

Soil texture (topsoil)

- ☒ coarse/ light (sandy)
- ☒ 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%)
- ☒ medium (1-3%)
- ☐ low (<1%)

Groundwater table

- ☐ on surface
- ☐ < 5 m
- ☐ 5-50 m
- ☐ > 50 m

Availability of surface water

- ☐ excess
- ☐ good
- ☐ medium
- ☐ poor/ none

Water quality (untreated)

- ☐ good drinking water
- ☐ poor drinking water (treatment required)
- ☐ for agricultural use only (irrigation)
- ☐ unusable

Is salinity a problem?

- ☐ Ja
- ☐ Nee

Occurrence of flooding

- ☐ Ja
- ☐ Nee

Species diversity

- ☐ high
- ☐ medium
- ☐ low

Habitat diversity

- ☐ high
- ☐ medium
- ☐ low

CHARACTERISTICS OF LAND USERS APPLYING THE TECHNOLOGY

Market orientation

- ✓ subsistence (self-supply)
- ✓ mixed (subsistence/ commercial)
- commercial/ market

Off-farm income

- less than 10% of all income
- 10-50% of all income
- > 50% of all income

Relative level of wealth

- very poor
- ✓ poor
- ✓ average
- rich
- very rich

Level of mechanization

- ✓ manual work
- ✓ animal traction
- mechanized/ motorized

Sedentary or nomadic

- Sedentary
- Semi-nomadic
- Nomadic

Individuals or groups

- individual/ household
- groups/ community
- cooperative
- employee (company, government)

Gender

- women
- men

Age

- children
- youth
- middle-aged
- elderly

Area used per household

- < 0.5 ha
- 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

- small-scale
- medium-scale
- large-scale

Land ownership

- state
- company
- communal/ village
- group
- individual, not titled
- individual, titled

Land use rights

- open access (unorganized)
- communal (organized)
- leased
- individual

Water use rights

- open access (unorganized)
- communal (organized)
- leased
- individual

Access to services and infrastructure

IMPACTS

Socio-economic impacts

Crop production	decreased		increased
production area (new land under cultivation/ use)	decreased		increased
land management	hindered		simplified
farm income	decreased		increased
workload	increased		decreased

Socio-cultural impacts

Ecological impacts

surface runoff	increased		decreased	Quantity before SLM: 20 Quantity after SLM: 10
excess water drainage	reduced		improved	
soil moisture	decreased		increased	
soil loss	increased		decreased	Quantity before SLM: 42 Quantity after SLM: 20
Soil fertility	decreased		increased	
Waterlogging	increased		decreased	

Off-site impacts

reliable and stable stream flows in dry season (incl. low flows)	reduced		increased
downstream flooding (undesired)	increased		reduced
downstream siltation	increased		decreased
groundwater/ river pollution	increased		reduced

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

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?

- ☐ Ja
- ☐ Nee

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

- reduce soil erosion

How can they be sustained / enhanced? frequent maintenance of the structure

- maintain soil moisture

How can they be sustained / enhanced? upgrading of ditches and embankment

- increase production

How can they be sustained / enhanced? increasing the productivity of land per unit area

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

- erosion control

How can they be sustained / enhanced? frequent maintenance of the structure

- moisture maintenance

How can they be sustained / enhanced? frequent maintenance of the ditches

- reduction of slope length
- increasing of infiltration rate

Weaknesses/ disadvantages/ risks: land user's view how to overcome

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

REFERENCES

Compiler

Unknown User

Editors

Reviewer

Fabian Ottiger
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Resource persons

Tshome Nigusie - SLM specialist

Full description in the WOCAT database

https://qcat.wocat.net/af/wocat/technologies/view/technologies_1045/

Linked SLM data

n.a.

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Project

- n.a.

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