Improved grazing land management

Ethiopia - Gitosh masheshal

Rehabilitation of communal grazing lands, through planting of improved grass and fodder trees and land subdivision, to improve fodder and consequently livestock production.

This case study focuses on the highly populated, humid highland regions of Ethiopia that experience serious shortages of pasture. Due to rapid population growth, communal grazing areas are increasingly being converted into cropland. This has led to enormous pressure on the little remaining grazing land, through overstocking of dairy cows and oxen, and thus overgrazing, resulting in considerably decreased productivity. Improved grazing land management is vital to increase food security and alleviate poverty, as well as to bring environmental rewards. To address these problems, the national SWC programme in Ethiopia initiated a grazing land management project over a decade ago. Implementation of the technology includes the initial delineating of the grazing land, and then fencing to exclude open access. This is followed by land preparation, application of compost (and, if necessary, inorganic fertilizers) to improve soil fertility, then planting of improved local and exotic fodder species, including multipurpose shrubs/trees such as Leucaena sp. and Sesbania sp. and the local desho grass (Pennisetum sp.). Desho has a high nutritive value and regular cuts are ensured. It is planted by splits, which have high survival rates and establish better than grasses which are seeded. Other grass seeds, as well as legumes, including alfalfa (lucerne: Medicago sativa) and clovers in some cases, are mixed with fodder tree seeds and then broadcast. Maintenance activities such as weeding, manuring and replanting ensure proper establishment and persistence. Fodder is cut and carried to stall-fed livestock. Once a year, grass is cut for hay, which is stored to feed animals during the dry season. Experience shows that such grazing land is best managed when individually owned and used. In the study area, the community has distributed small plots (<0.5 ha) of communal grazing land to individual users to develop, manage and use. The overall purpose of the intervention is to improve the productivity of grazing land and control land degradation through the introduction of productive techniques and improved fodder species, which consequently improve livestock production. Commercialisation of animals and marketing of their products increases the income of farmers. The government provides technical assistance, close follow-up, and some inputs for initial establishment. Land users are trained in compost/ manure application, planting of seeds, splits and seedlings, and general maintenance.

left: Desho grass (Pennisetum pedicellatum) and multipurpose trees established to increase productivity of grazing lands. (Photo: Daniel Danano)
right: Cut and carry of grass for stall-feeding from improved pasture. (Photo: Daniel Danano)

Location: Chencha
Technology area: 20 km²
Conservation measure: agronomic, vegetative, management
Stage of intervention: mitigation / reduction of land degradation
Origin: Developed externally / introduced through project,
Land use type:
Mixed: Silvo-pastoralism
Land use:
Grazing land: Extensive grazing land (before) (after)
Climate: humid
WOCAT database reference: T_ETH026en
Related approach: Local level participatory planning approach (LLPPA) (ETH25)
Compiled by: Daniel Danano, Food and Agriculture Organization of the United Nations - FAO
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Classification

Land use problems:

- Population growth has resulted in a substantial reduction in land holdings (<0.5 ha per family) and this in turn has led inevitably to encroachment onto communal grazing lands for cultivation. Livestock numbers on the other hand have remained unchanged, and this has led to overstocking of the few areas left. Livestock production, which accounts for 40% of the average household income, is thus reduced and farmers' income declines correspondingly. (expert's point of view)

Land use

Silvo-pastoralism
Grazing land: Extensive grazing land (before)
mixed rainfed - irrigated extensive grazing land, mixed grazing land
rainfed

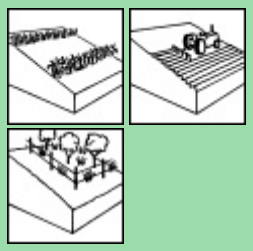
Climate

humid

Degradation

Soil erosion by water: loss of topsoil / surface erosion, gully erosion / gullying, Chemical soil deterioration: fertility decline and reduced organic matter content, Biological degradation: reduction of vegetation cover, quality and species composition /diversity decline

Conservation measure



Agronomic: Organic matter / soil fertility
Vegetative: Tree and shrub cover
Management: Change of management / intensity level

Stage of intervention

- Prevention
- Mitigation / Reduction
- Rehabilitation

Origin

- Land users initiative
- Experiments / Research
- Externally introduced

Level of technical knowledge

- Agricultural advisor
- Land user

Main causes of land degradation:

Main technical functions:
- improvement of ground cover
- control of dispersed runoff
- increase in soil fertility

Secondary technical functions:
- increase of infiltration
- improvement of soil structure
- control of concentrated runoff

Environment

Natural Environment

Average annual rainfall (mm)

- > 4000 mm
- 3000-4000 mm
- 2000-3000 mm
- 1500-2000 mm
- 1000-1500 mm
- 750-1000 mm
- 500-750 mm
- 250-500 mm
- < 250 mm

Altitude (m a.s.l.)

- > 4000
- 3000-4000
- 2500-3000
- 2000-2500
- 1500-2000
- 1000-1500
- 500-1000
- 100-500
- <100

Landform

- plateau / plains
- ridges
- mountain slopes
- hill slopes
- footslopes
- valley floors

Slope (%)

- flat
- gentle
- moderate
- rolling
- hilly
- steep
- very steep

Soil depth (cm)

- 0-20
- 20-50
- 50-80
- 80-120
- >120

Growing season(s): 210 days(March - September)
Soil texture: medium (loam)
Soil fertility: medium
Topsoil organic matter: medium (1-3%)
Soil drainage/infiltration: good

Human Environment

Mixed per household (ha)

- <0.5
- 0.5-1
- 1-2
- 2-5
- 5-15
- 15-50
- 50-100
- 100-500
- 500-1,000
- 1,000-10,000
- >10,000

Land user: Individual / household, Small scale land users
Land ownership: state
Land use rights: open access (unorganised)

Importance of off-farm income: 10-50% of all income: source of off-farm income includes petty trade and weaving
Access to service and infrastructure:
Market orientation:

Technical drawing

Splits of desho grass (Pennisetum pedecillatum) are plantet in lines, using a hand hoe, after good seedbed preparation. Spacing between grass splits is 10 x 10 cm. The white line is a boundary between two households' plots (width of plot: 15-20 m). Trees are planted at rirregular spacing (around 5 m apart), layout is not specified. (Daniel Danano)

Implementation activities, inputs and costs

Establishment activities

- Delineation of the area to be conserved and establishment of a fence
- Subdivision of communal land into individual plots of 0.3–0.5 ha.
- Planting material preparation in nurseries: grass splits (desho)
- Good seedbed preparation
- Planting of grass splits and tree/shrub species in lines; sowing of grass
- Weeding.

Establishment inputs and costs per ha

Inputs	Costs (US$)	% met by land user
Labour	320.00	100%
Equipment		
- animal traction	17.00	100%
- tools	5.00	50%
Construction material		
- fencing with deadwood	55.00	100%
Agricultural		
- seedlings	5.00	0%
- fertilizer	60.00	100%
- compost/manure	140.00	100%
- grass splits (tillers)	450.00	0%
TOTAL	**1052.00**	**56.51%**

Maintenance/recurrent activities

- Compost/manure preparation. Material used includes animal manure,
- Compost application
- Cut-and-carry, to stall-fed animals, begins when fodder is ready.
- A final cut for hay is taken early in the dry season when the grass has matured well.
- Weeding
- Compost/manure application, mixed with soil, during seedbed preparation (only where plants have died and need replacement and fertilisation).
- Enrichment planting and gap filling

Maintenance/recurrent inputs and costs per ha per year

Inputs	Costs (US$)	% met by land user
Labour	35.00	100%
Equipment		
- tools	4.00	100%
Construction material		
- fencing with deadwood	5.00	100%
Agricultural		
- seeds	30.00	100%
- seedlings	2.00	100%
- fertilizer	15.00	100%
- compost/manure	35.00	100%
TOTAL	**126.00**	**100.00%**

Remarks:

Seedlings are given by the government for initial establishment. For further extension of area and replanting, the land users set up their own nurseries. After 2-3 years maintenance costs decrease substantially as the grass cover closes up and maintenance activities such as replanting/enrichment planting and compost application are reduced or cease. The local daily wage is about US$ 0.70 a day, but varies depending on the intensity of the work. In this calculation the standard rate has been applied. Farmers usually cannot afford fertilizers. Milk production compensates for some of the high investment costs (previously, production was low).

Assessment

Impacts of the Technology

Production and socio-economic benefits

+++ increased fodder production
+++ increase in livestock production
++ increased fodder quality
++ increased farm income
+ increased wood production

Production and socio-economic disadvantages

+++ initial dependence on incentives
++ increased labour constraints
++ decrease in size of grazing plots due to land fragmentation

Socio-cultural benefits

+++ community institution strengthening
+++ national institution strengthening
+++ improved conservation / erosion knowledge

Socio-cultural disadvantages

Ecological benefits

+++ improved soil cover
+++ reduced soil loss
+++ increase in soil fertility
++ increased soil moisture
++ biodiversity enhancement

Ecological disadvantages

Off-site benefits

+++ reduced transported sediments
++ reduced downstream flooding
++ increased stream flow in dry season
++ reduced downstream siltation

Off-site disadvantages

++ grazing pressure on remaining open access grazing land

Contribution to human well-being / livelihoods

Benefits /costs according to land user

Benefits compared with costs	short-term:	long-term:
Establishment	slightly positive	very positive
Maintenance / recurrent	positive	very positive

Acceptance / adoption:

There is strong trend towards (growing) spontaneous adoption of the technology. The rate of spontaneous adoption is very high. At present over 500 households have taken up the technology and the total area covered is about 20 km2.

Concluding statements

Strengths and → how to sustain/improve	Weaknesses and → how to overcome
Availability of fodder (grass, hay, shrubs) in sufficient quantities, and all year round → Increase the area under such development.	At the initial stage of establishment it is very labour intensive → Use of improved land preparation methods such as oxen ploughing.
Reduction in soil loss and land degradation → Maintain adequate cover by planting more grass.	Substantial cash for inputs, particularly seedlings, is required → Produce seedlings of improved species and making compost in backyards.
Introduction of high yielding species as well as increase in land productivity and livestock production → ntroduce bigger variability of quality species and improve maintenance activities such as weeding and cultivation.	Needs high fertilizer application → Focus more on organic fertilizers.
Improved diet: livestock by-products such as milk, butter and cheese are essential food items required by the households → Keep on increasing/improving quantity/quality of livestock feed.	High pressure on remaining grazing areas → Keep animals in stall (stable) or park, at least part of the day and during the night, and introduce cut-and-carry more widely.
Increased income through commercialisation and marketing of animals and their by-products. Meets financial needs for paying taxes, school fees, clothes etc. →	
Increased national income due to export of animals and their products. →	