Contour Farming using hedgerows

Philippines - Contour Farming

Contour farming is a technology practiced in sloping areas in which hedgerows are established along the contours and other annual/cash crops are grown in the alleys between the hedges.

Contour farming is being practiced by the farmers in sloping areas to prevent or control soil erosion. Hedgerows are established along contour lines using napier grass and permanent crops like banana and coconut. In between contour lines, corn is inter-cropped with peanut. It is a traditional practice of farmers and one of the conservation techniques for the Conservation Farming Village Approach (CFV).
This is practiced by farmers to control surface run-off, erosion and to conserve natural soil fertility. Napier grass is also planted as source of feeds for the livestocks. The technology controls dispersed runoff, reduce slope angle and length.
Contour lines were established using an A-frame to determine the location of the hedgerows to be planted. Napier grasses are planted along the contour at 8x8m and 4X4m distance. Grafted cacao trees are also inserted in between banana at 4X4 distance. The alleys between hedges measuring 4m wide and 30m long are planted with corn and peanut. Napier grass is regularly trimmed to maintain a height of not more than a meter, using the cuttings as livestock fodder.
The area is under a humid cilmate condition with an average annual rainfall of 1000-1500 mm per year. Its elevation is 500-1000 m above mean sea level.The average cropland size of land users is less than or equal to 0. 5 hectare with a slope ranging from 18-25%. Income of land users are derived from the crops sold.The Local Government Unit (LGU) provides truck to transport the harvested crops of the farmers from the village to the town market twice a week.

left: Napier grass, banana and coconut as hedgerows.Corn is planted in between hedges. (Photo: Engr. Djolly Ma. P. Dinamling)

Location: La Libertad
Region: Negros Oriental
Technology area: 0.0025 km^2
Conservation measure: agronomic, vegetative
Stage of intervention: rehabilitation / reclamation of denuded land
Origin: Developed through land user`s initiative, traditional (>50 years ago)
Land use type:
Cropland: Annual cropping
Climate: humid, tropics
WOCAT database reference: T_PHI051en
Related approach: Conservation Farming Village (A_PHI008en)
Compiled by: Philippine Overview of Conservation Approaches and Technologies, Bureau of Soils and Water Management
Date: 2015-05-27
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Classification

Land use problems:

- Soil erosion and soil fertility decline. (expert's point of view)
Lack of animal grazing areas and limited plain or level areas for crop production. (land user's point of view)

Land use

Annual cropping
rainfed

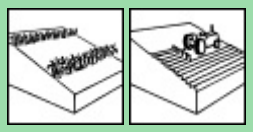
Climate

humid

Degradation

Soil erosion by water: loss of topsoil / surface erosion,
Chemical soil deterioration: fertility decline and reduced organic matter content

Conservation measure



Agronomic: Vegetation/soil cover
Agronomic: Organic matter / soil fertility
Agronomic: Soil surface treatment
Agronomic: Subsurface treatment
Vegetative: Tree and shrub cover
Vegetative: Grasses and perennial herbaceous plants

Stage of intervention

- Prevention
- Mitigation / Reduction
- Rehabilitation

Origin

- Land users initiative: traditional (>50 years ago)
- Experiments / Research: recent (<10 years ago)
- Externally introduced

Level of technical knowledge

- Agricultural advisor
- Land user

Main causes of land degradation:
Direct causes - Human induced: soil management, crop management (annual, perennial, tree/shrub), deforestation / removal of natural vegetation (incl. forest fires), over-exploitation of vegetation for domestic use

Main technical functions:

- control of raindrop splash
- control of dispersed runoff: retain / trap
- Minimize soil erosion due to runoff
- Serve as soil nutrient traps

Secondary technical functions:

- reduction of slope angle
- reduction of slope length
- stabilisation of soil (eg by tree roots against land slides)

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

Soil texture: medium (loam)
Soil fertility: medium
Topsoil organic matter: medium (1-3%)
Soil drainage/infiltration: medium

Soil water storage capacity: low
Ground water table: 5 - 50 m
Availability of surface water: good
Water quality: good drinking water
Biodiversity: low

Tolerant of climatic extremes: seasonal rainfall increase, seasonal rainfall decrease
Sensitive to climatic extremes: temperature increase, heavy rainfall events (intensities and amount), floods, droughts / dry spells

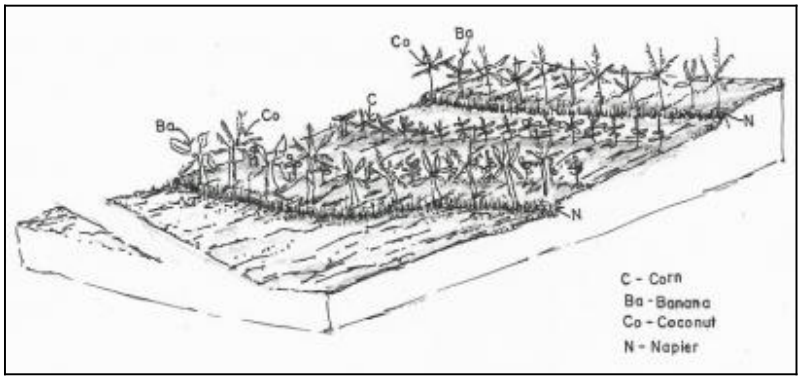
Human Environment

Cropland 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, disadvantaged land users, men and women
Population density: 10-50 persons/km2
Annual population growth: 1% - 2%
Land ownership: individual, not titled
Land use rights: individual
Water use rights: communal (organised)

Importance of off-farm income: less than 10% of all income: Hired laborers for the Department of Environment and Natural Resources (DENR) Project on National Greening Program
Access to service and infrastructure: low: health, education, employment (eg off-farm), market, energy, financial services; moderate: roads & transport; high: technical assistance, drinking water and sanitation
Market orientation: mixed (subsistence and commercial)
Mechanization: manual labour
Livestock grazing on cropland: yes



Technical drawing

Crops planted in the contour. (Mr. Patricio A. Yambot)

Implementation activities, inputs and costs

Establishment activities

-
- Laying out and establishment of contour lines/hedgerows
- Planting of hedgerows (Napier grass)
- Planting of perennial crops along contour

Establishment inputs and costs per unit

Inputs	Costs (US$)	% met by land user
Labour	28.89	100%
Construction material		
- bamboo sticks/pegs	0.56	40%
- A-frame	0.44	40%
Agricultural		
- seedlings	75.11	100%
- herbicides	17.78	100%
TOTAL	**122.78**	**76.00%**

Maintenance/recurrent activities

- Land clearing/ preparation (plowing, rotavating, harrowing) of alleys between contours
- Furrowing
- Planting of corn (first cropping)
- Weeding, insect control
- Harvesting of first crop
- Land Preparation for the second cropping (plowing, harrowing/rotavating, furrowing)
- Planting of corn + Planting of peanut (second cropping- corn + peanut)
- Weeding / Insect control
- Harvesting of corn and peanut

Maintenance/recurrent inputs and costs per unit per year

Inputs	Costs (US$)	% met by land user
Labour	41.32	100%
Equipment		
- animal traction	5.34	100%
Agricultural		
- seeds	4.44	100%
- fertilizer	40.00	100%
TOTAL	**91.10**	**100.00%**

Remarks:
The slope of the area contributes to the additional labor cost in the establishment of contours.The steeper the slope, the higher labor cost will be incurred.

Assessment

Impacts of the Technology

Production and socio-economic benefits

- +++ increased crop yield
- +++ increased fodder production
- +++ increased fodder quality
- +++ increased farm income
- +++ diversification of income sources
- +++ increased product diversification

Production and socio-economic disadvantages

Socio-cultural benefits

- +++ community institution strengthening
- +++ national institution strengthening
- +++ improved situation of disadvantaged groups
- + increased recreational opportunities
- + improved conservation / erosion knowledge

Socio-cultural disadvantages

Ecological benefits

- +++ improved soil cover
- +++ increased biomass above ground C
- +++ increased nutrient cycling recharge
- +++ increased soil organic matter / below ground C
- +++ reduced emission of carbon and greenhouse gases
- +++ reduced soil loss
- +++ increased plant diversity
- ++ reduced wind velocity
- ++ increased / maintained habitat diversity

Ecological disadvantages

Off-site benefits

Off-site disadvantages

Contribution to human well-being / livelihoods

++ Farmers in the areas were capacitated on conservation techniques to improve their farming system thus leading to a better income.

Benefits /costs according to land user

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

More income added from Napier grass

Acceptance / adoption:

78% of land user families have implemented the technology with external material support. Single farmer focused on napier production and used as hedgerows
22% of land user families have implemented the technology voluntary. Practiced contouring but some are partial adoption (rock wall)
There is strong trend towards (growing) spontaneous adoption of the technology. Additional barangays will be adopting the technology.

Concluding statements

Strengths and → how to sustain/improve	Weaknesses and → how to overcome
Soil erosion was reduced because of the presence of the hedge rows that traps eroded soil. → Include other structural technologies such as silt traps and brush dams to trap silts.	Lack of irrigation system in the cropping area → Provision of irrigation system such as solar pump and small farm reservoir for water embankment.
The kind of hedgerows planted depends on the need of the landusers. Farmers with livestock used napier and forage grasses as hedges while others planted perennial and cash crop to supplement their food requirement. → To engage in crop suitability in terms of adaptability, productivity and marketability	Poor road network from the center of the town to the barangay. → Construction of farm-to-market road to improve the accessibility of the barangay.
Availability of labor force in the community. → Farmers acceptance, receptivity and hardwork in adopting the technology being advocated by the CFV program.	
The technology generated jobs and increase the income of the landusers practicing the technology. → To conduct continuous capacity building to land users and their children to ensure sustainability.	