Stone bunds and small basins

Philippines - Pamugong sa yuta (Cebuano)

Piling of stones and rocks along the contour to control run-off and soil erosion. It is also about the creation of small basins by removing stones and using them as barriers.

This is a low-cost erosion control technology by piling stones/rocks along the contour. The spacing of the piles depends on the slope and the availability/abundance of surface rocks. The stone bunds, usually 0.4 meter wide is intended to slow down run-off and catch/impound soil that moves downslope, etiher by water or by gravity. The technology is also about the creation of small basins by removing rocks and using them as barrier. In these small basins, water is impounded and allow to infiltrate. Soil carried with the run-off is deposited in these basins for the raising of high value crops. The technology is most especially applicable in areas where limestone and other rock outcrops and where the soil is commonly shallow and skeletal. With time, natural terraces can form. Limestone/rock outcrops are also used in the construction of check dams along small waterways. These check dams will result in the formation of flat-bottom valleys where transplanted rice is usually grown. Series of check dams will form terraces along valley floor in the long run.

left: Earth and stone bunds for erosion control in a hilly area. (Photo: Jose D. Rondal)
right: Stone walls/small basin (Photo: Jose D. Rondal)
Region: Siquijor, Cebu, Bohol, Negros Oriental
Technology area: 31 km²
Conservation measure: structural
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_PHI010en
Related approach:
Compiled by: Not registered
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Classification

Land use problems:

- Soil erosion/degradation, soil fertility decline (expert's point of view)
productivity decline, increasing levels of input to maintain yield. (land user's point of view)

Land use

Annual cropping
rainfed

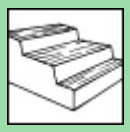
Climate

humid

Degradation

Soil erosion by water: loss of topsoil / surface erosion

Conservation measure



Structural

Stage of intervention

- Prevention
- Mitigation / Reduction
- Rehabilitation

Origin

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

Level of technical knowledge

- Agricultural advisor
- Land user

Main causes of land degradation:

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

Secondary technical functions:
- reduction of slope length

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): 270 days(May - Jun), 240 days(May - Dec)
Soil texture: fine / heavy (clay)
Soil fertility: low
Topsoil organic matter: medium (1-3%)
Soil drainage/infiltration: good

Soil water storage capacity: low

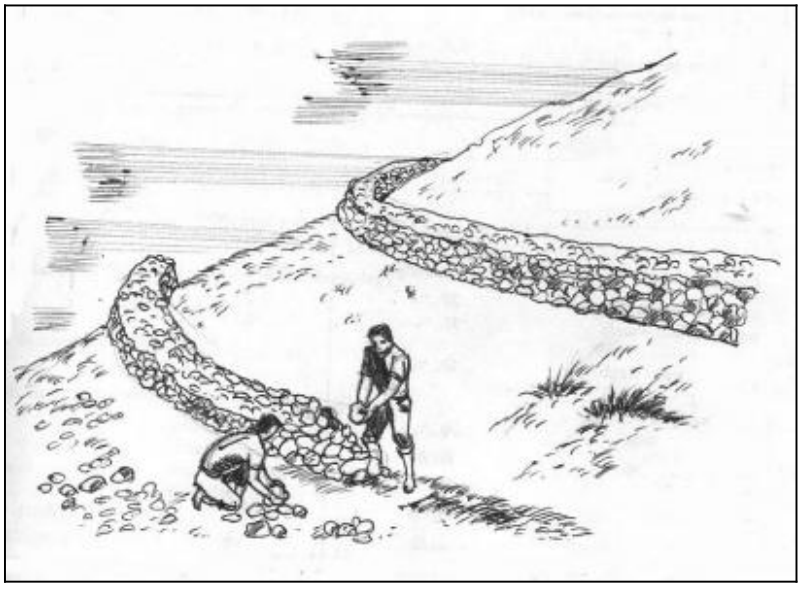
Human Environment

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

Population density: 100-200 persons/km2
Annual population growth: 2% - 3%
Land ownership: individual, titled
Land use rights: individual
Relative level of wealth: average, which represents 10% of the land users; 30% of the total area is owned by average land users

Importance of off-farm income: 10-50% of all income: retailing, carpentry, dressmaking, fishing, overseas employment, etc.
Access to service and infrastructure:
Market orientation: mixed (subsistence and commercial)
Mechanization: manual labour
Livestock grazing on cropland:



Technical drawing

Construction of stone bunds along the contour for run-off and erosion control (Lorenzo Co)

Implementation activities, inputs and costs

Establishment activities

Establishment inputs and costs per ha

Inputs	Costs (US$)	% met by land user
Labour	1000.00	100%
Equipment		
- tools	20.00	100%
TOTAL	**1020.00**	**100.00%**

Maintenance/recurrent activities

Maintenance/recurrent inputs and costs per ha per year

Inputs	Costs (US$)	% met by land user
Labour	40.00	100%
TOTAL	**40.00**	**100.00%**

Remarks:
Labor for the removal and collection of stones for piling.
The volume of stones to be removed, gathered and piled to create a wall.

Assessment

Impacts of the Technology

Production and socio-economic benefits

+++ increased crop yield
+++ increased farm income

Production and socio-economic disadvantages

++ hindered farm operations

Socio-cultural benefits

+++ improved conservation / erosion knowledge

Socio-cultural disadvantages

Ecological benefits

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

Ecological disadvantages

Off-site benefits

++ reduced downstream siltation

Off-site disadvantages

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	positive

Acceptance / adoption:

100% of land user families (200 families; 20% of area) have implemented the technology voluntary. estimates
There is moderate trend towards (growing) spontaneous adoption of the technology. When other farmers saw the effect of the technology, they adopted spontaneously.

Concluding statements

Strengths and → how to sustain/improve	Weaknesses and → how to overcome
Once established, it becomes permanent → Adequate maintenance	Stone wall serve as sanctuary for pests like rats and snakes → Cleanliness of the surroundings
Very effective in trapping sediment → Adequate maintenance	Stone wall can be an obstruction in cultivation and mobility →
Permanent → maintenance	Sancturies for pests → Cleanliness of the surroundings
Clears the land for cultivation →	Laborious during establishment → labor sharing