



## Vegetable Terracing Philippines

**Vegetable terracing is a technology practiced at which point terraces are established from the contours along mountain slope for crop production.**

Vegetables are mostly produced in the mountains of the Cordillera Administrative Region (CAR). It is extensively practice in the Municipalities of Atok, Buguias, Mankayan, Kibungan, Bakun, Kabayan in Benguet; Bauko in Mountain Province and Tinoc in Ifugao. Benguet is known as the "Salad Bowl of the Philippines" and major producer of temperate vegetables. This is mainly due to the climatic condition of the province which is suitable for vegetable production. Vegetable industry in Benguet is very vital in the country since it supplies 60-70% of the total sub-tropical vegetables in the Philippines. Major vegetable crops grown are potato, cabbage, chinese cabbage, carrots, chayote, beans, lettuce and broccoli. These are sold to traders, consolidators, wholesalers who transport the produce at the La Trinidad Vegetable Trading Post or other local markets in the region.

Available arable lands are not expanding but the population is increasing. This situation contributes to the conversion of sloping areas to a suitable land for agricultural production, thus, the technology was developed. This had become an economic practicality to the land user as source of livelihood and income. Vegetable terracing is also a conservation measure to minimize soil degradation by varying the terrace type and plot orientation. Some follow the contour while other plots are parallel to the slopes. Prior to terrace establishment, vegetation is partly removed. Residues are cleared for the establishment of the contour lines of the area. From the established contour lines, terraces will be graded and leveled depending on the slope of the area. Most of these activities are done manually. After the establishment of the terraces, land preparation is done followed by planting of the vegetables.

The area is under humid agro-climate condition with an average annual rainfall of approximately 100-1500 mm per year. Its elevation ranges from 2000-2500 meter above sea level. Majority of the population is dependent on agricultural activities as their source of income and livelihood. The average farm size of the land users ranges from 0.5 to 1 hectare. Most of these lands are not owned by the farmers but have a tax declaration. These are owned by the government classified as forest reservations or watershed areas.

**left:** Terraces vegetable farm within a forest. (Photo: Engr. Djolly Ma. Dinamling)

**right:** Planted vegetables ready for harvest in Atok, Benguet. (Photo: Engr. Djolly Ma. P. Dinamling)

Location: Atok and Buguias

Region: Benguet

Technology area: 0.1 - 1 km<sup>2</sup>

Conservation measure: agronomic, structural

Stage of intervention: mitigation / reduction of land degradation

Origin: Developed through land user`s initiative, traditional (>50 years ago)

Land use type:

Cropland: Annual cropping

Land use:

Forests / woodlands rests / woodlands:

Natural (before), Cropland: Annual cropping (after)

Climate: humid, tropics

WOCAT database reference:

T\_PHI052en

Related approach:

Compiled by: Cirilo, Jr. Lagman, Benguet State University

Date: 2015-11-23


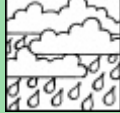
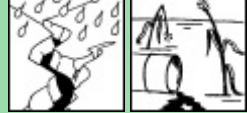
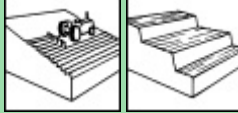
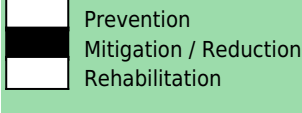
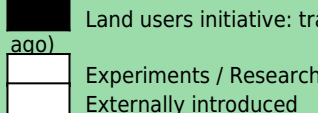
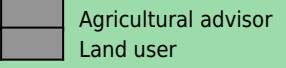
Contact person: Dr. Cirilo Lagman, Jr., Benguet State University, La Trinidad, Benguet, cirilolagman@hotmail.com



## Classification

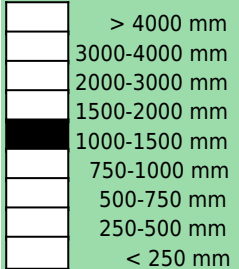
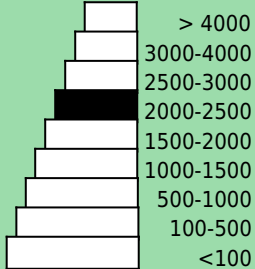
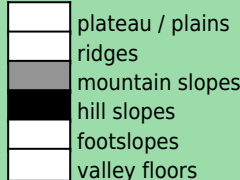

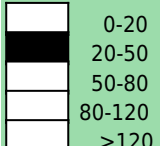
### Land use problems:

- low productivity, intensive land cultivation (expert's point of view)
- Soil erosion, decreased soil fertility and excessive chemical inputs (land user's point of view)

<b>Land use</b>  Annual cropping Forests / woodlands rests / woodlands: Natural (before) Cropland: Annual cropping (after) rainfed	<b>Climate</b>  humid	<b>Degradation</b>  Soil erosion by water: loss of topsoil / surface erosion, Chemical soil deterioration: fertility decline and reduced organic matter content	<b>Conservation measure</b>  Structural: Bench terraces (slope of terrace bed <6%) Agronomic: Vegetation/soil cover
<b>Stage of intervention</b> 	<b>Origin</b> 	<b>Level of technical knowledge</b> 	
<b>Main causes of land degradation:</b> Direct causes - Human induced: soil management			
<b>Main technical functions:</b> <ul style="list-style-type: none"> <li>- control of dispersed runoff: impede / retard</li> <li>- control of concentrated runoff: impede / retard</li> <li>- reduction of slope angle</li> </ul>		<b>Secondary technical functions:</b>	

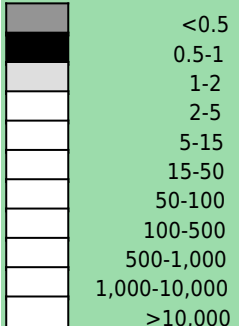
## Environment

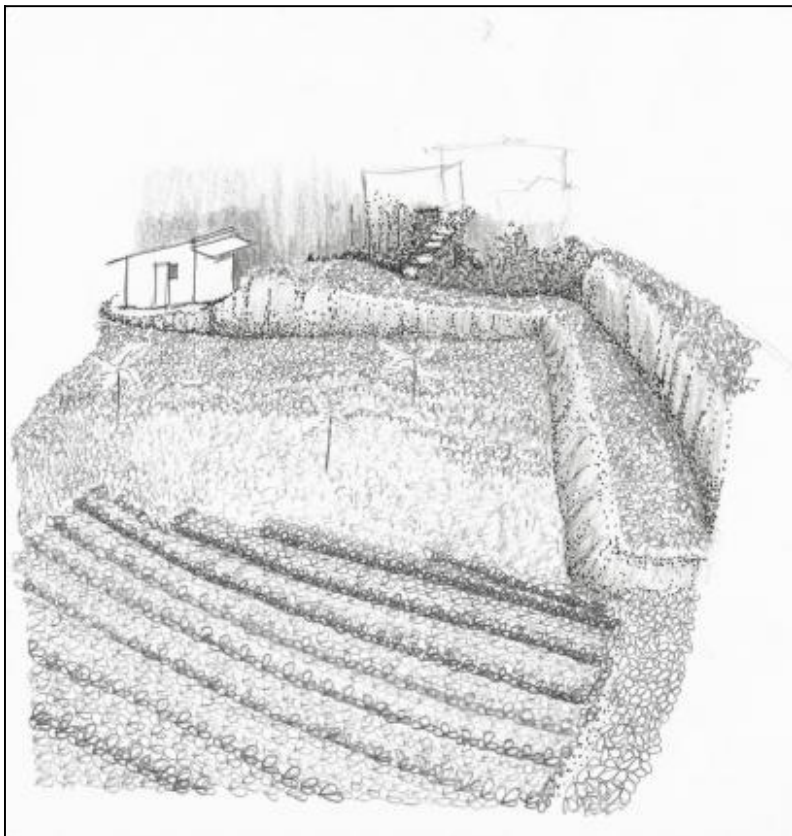
### Natural Environment

<b>Average annual rainfall (mm)</b> 	<b>Altitude (m a.s.l.)</b> 	<b>Landform</b> 	<b>Slope (%)</b> 
<b>Soil depth (cm)</b> 	<b>Soil texture:</b> medium (loam) <b>Soil fertility:</b> low <b>Topsoil organic matter:</b> low (<1%) <b>Soil drainage/infiltration:</b> medium		<b>Soil water storage capacity:</b> medium <b>Availability of surface water:</b> medium <b>Water quality:</b> good drinking water

**Sensitive to climatic extremes:** seasonal rainfall increase, heavy rainfall events (intensities and amount), floods

### Human Environment

<b>Cropland per household (ha)</b> 	<b>Land user:</b> Individual / household, Small scale land users, common / average land users, men and women <b>Population density:</b> 10-50 persons/km <sup>2</sup> <b>Annual population growth:</b> 1% - 2% <b>Land ownership:</b> individual, titled <b>Land use rights:</b> individual <b>Water use rights:</b> open access (unorganised) <b>Relative level of wealth:</b> average, which represents 60% of the land users; 60% of the total area is owned by average land users	<b>Importance of off-farm income:</b> less than 10% of all income: <b>Access to service and infrastructure:</b> low: employment (eg off-farm); moderate: health, education, roads & transport; high: technical assistance, market, energy, drinking water and sanitation <b>Market orientation:</b> commercial / market <b>Mechanization:</b> manual labour <b>Livestock grazing on cropland:</b>
---	---	---



### Technical drawing

Vegetables planted in raised beds. (Mr. Patricio A. Yambot)

## Implementation activities, inputs and costs

### Establishment activities

- Establishment of terraces

### Establishment inputs and costs per ha

Inputs	Costs (US\$)	% met by land user
Labour	533.30	100%
<b>TOTAL</b>	<b>546.63</b>	<b>100.00%</b>

### Maintenance/recurrent activities

- Land Preparation
- Application of chicken manure
- Planting
- Side raising including application of fertilizer
- Weeding
- Spraying of insecticide
- Harvesting

### Maintenance/recurrent inputs and costs per ha per year

Inputs	Costs (US\$)	% met by land user
Labour	310.00	100%
Agricultural		
- fertilizer	106.67	100%
- compost/manure	782.22	100%
- Insecticides	32.89	100%
<b>TOTAL</b>	<b>921.78</b>	<b>100.00%</b>

Remarks:

## Assessment

## Impacts of the Technology

### Production and socio-economic benefits

- +++ reduced risk of production failure
- +++ increased production area
- ++ diversification of income sources

### Production and socio-economic disadvantages

### Socio-cultural benefits

- +++ increased recreational opportunities
- ++ community institution strengthening
- ++ improved food security / self sufficiency

### Socio-cultural disadvantages

### Ecological benefits

- ++ reduced soil loss
- + reduced surface runoff

### Ecological disadvantages

- ++ decreased vegetation

### Off-site benefits

### Off-site disadvantages

- ++ increased downstream flooding
- ++ decreased buffering / filtering capacity

### Contribution to human well-being / livelihoods

- ++ The technology is the major source of livelihood in the province of Benguet.

## Benefits /costs according to land user

### Benefits compared with costs

#### Establishment

#### Maintenance / recurrent

### short-term:

slightly positive

neutral / balanced

### long-term:

slightly positive

neutral / balanced

## Acceptance / adoption:

100% of land user families have implemented the technology voluntary.  
There is little trend towards (growing) spontaneous adoption of the technology.

## Concluding statements

### Strengths and → how to sustain/improve

Source of livelihood for the landusers in the mountainous area.  
→ It should be balanced by relevant environmental protective measures and alternative farming systems such as agroforestry.

Minimize soil erosion → Construction of Small Water Impounding System (SWIS) and proper drainage canal.

### Weaknesses and → how to overcome

Vegetation is partially removed for vegetable production. → Protection of remaining areas through crafting and implementing laws.



Copyright (c) WOCAT (2016)