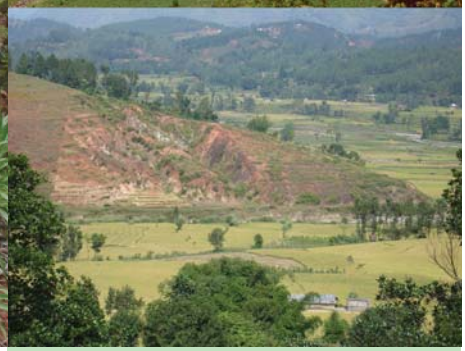


**Left:** Eyebrow pit and drainage trench with grasses along the ridges of eyebrows and trenches (K.M. Sthapit)
**Right:** View of degraded site before rehabilitation (PARDYP photo file) and after two years of rehabilitation (K.M. Sthapit)

# Rehabilitation of degraded communal grazing land

**Nepal:** क्षतिग्रस्त सामुदायिक चरण भूमिको पुनर्उत्थान

## Rehabilitation measures, including eyebrow pits and live fencing, were implemented on degraded communal grazing land to reestablish a protective vegetative cover

An area of heavily degraded grazing land was rehabilitated by establishing eyebrow pits to control and harvest runoff, planting trees and grasses, and fencing the site to control grazing. The main purpose was to re-establish vegetative cover on the almost bare, overgrazed site. The site is community land of the 40 households (240 people) of Dhotra village in the Jhikhu Khola watershed. These people are very dependent on this area due to the lack of alternative grazing sites. The rehabilitation site is surrounded by irrigated cropland downstream, grazing land, and degraded sal *(Shorea robusta)* dominated forest. Rainfed forward-sloping terraces immediately adjoin the site.

About 130 eyebrow pits were dug, together with catch drainage trenches. Several species of grass and fodder were planted along the ridges of the eyebrows and drainage trenches. Contour hedgerows were established between the eyebrow pits and trenches, and trees were planted just below the pits. The maintenance is quite easy: the vegetation needs to be cut back from time to time and the pits cleaned before the pre-monsoon period. The remaining bare areas should be revisited each year and replanted.

The area has a distinct dry season from November to May and a wet monsoon period from June to October. Annual rainfall is around 1200 mm. The site has red soils that are highly weathered and, if not properly managed, are very susceptible to erosion.

**WOCAT database reference:** QT NEP13
**Location:** Dhotra village, Jhikhu Khola watershed, Kabhrepalanchok district, Nepal
**Technology area:** ~ 0.019 km$^2$
**SWC measure:** Structural, vegetative, and management
**Land use:** Grazing land
**Climate:** Humid subtropical
**Related approach:** Local initiatives for rehabilitation of degraded communal grazing land, QA NEP13
**Compiled by:** Nicole Guedel, Switzerland
**Date:** November 2004, updated October 2006

The technology was documented using the WOCAT (www.wocat.org) tool.
ICIMOD
Swiss Agency for Development and Cooperation SDC
WOCAT

## Classification

### Land use problems

The major land use problem is the small per capita landholding size for cropping. These holdings are mostly rainfed, have a low soil fertility status and acidity problems, and are susceptible to erosion. Intense rainfall at the beginning of the rainy season causes considerable soil loss (rill and gully erosion).

**Land use**

Grazing land: extensive grazing

**Climate**

Humid subtropical

**Degradation**

Water erosion: loss of top soil and offsite degradation effects

Physical deterioration: aridification and soil moisture problem

**SWC measures**

Structural: eyebrow pits with drainage chanels

Vegetative: hedgerows across slope

Management: live fence

**Technical function/impact**

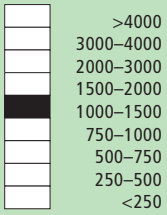
**Main:**
- harvesting of water
- improvement of ground cover
- increase/maintenance of water stored in soil

**Secondary:**
- reduction of slope angle
- reduction of slope length
- increase in organic matter

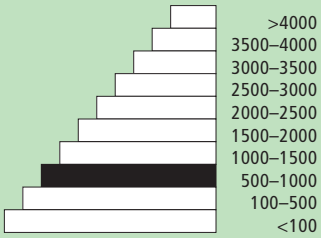
## Environment

### Natural environment

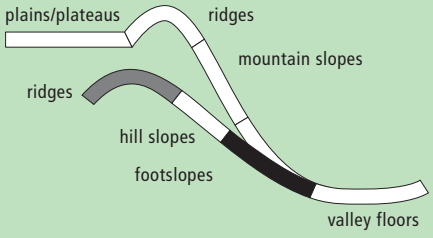
**Average annual rainfall (mm)**



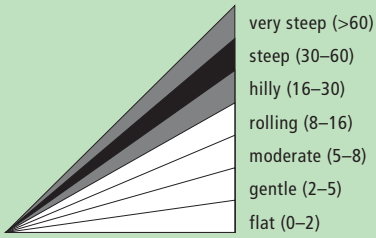

**Altitude (masl)**




**Landform**

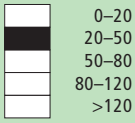



**Slope (%)**




Applied (large extent) Applied (medium extent)

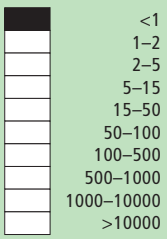
**Soil depth (cm)**



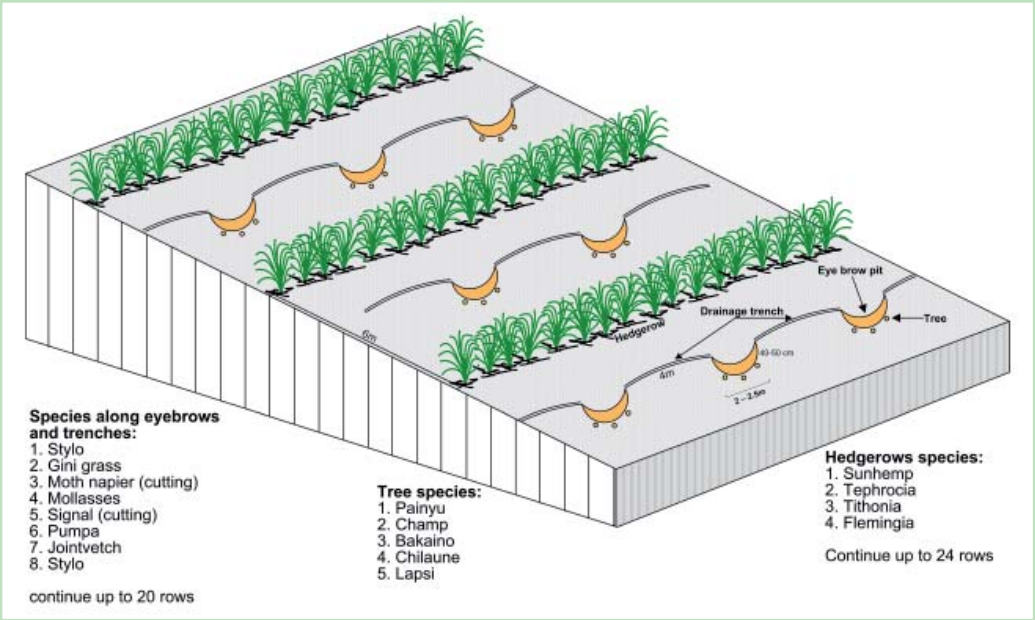

**Growing season:** 150 days (June to October) and 120 days (November to February)
**Soil fertility:** very low before implementation of rehabilitation activities
**Soil texture:** mostly fine (clay), red soils with high clay content
**Surface stoniness:** some loose stone
**Topsoil organic matter:** low
**Soil drainage:** poor
**Soil erodibility:** very high

### Human environment

**Grazing land per household (ha)**




**Land use rights:** communal (organised)
**Land ownership:** state
**Market orientation**: subsistence (self-supply)
**Level of technical knowledge required:** field staff/extension worker: low, land user: low
**Number of livestock:** not relevant
**Importance of off-farm income:** in most farm households, off-farm income plays at least a minor and increasingly a major role. Occasional opportunities for off-farm income present themselves in the form of daily labour wages. Some households' members receive regular salaries, whilst an increasing number of Nepalis are working in India, the Middle East, Malaysia, and elsewhere and sending remittance incomes home.




**Technical drawing**
Technical drawing of layout of vegetative and structural measures

## Implementation activities, inputs and costs

### Establishment activities

Rehabilitation activities for the following three measures were carried out in June before the onset of the monsoon using local agricultural tools and manual labour.

Activities for structural measures:

1. Drawing layout of eyebrow terraces, drainage ditches, and hedgerows on the bare land
2. Digging holes for eyebrow pits, and drainage ditches using hoe and spade

Activities for vegetative measures:

1. Planting of tree seedlings and cuttings and sowing grass seeds using hoe and spade

Activities for management measures:

1. Making sure that all livestock are stall-fed
2. Establishing small live fences with grasses and shrub cuttings

### Establishment inputs and costs per ha (2004)

| Inputs | Cost (US$) | % met by land user |
|---|---|---|
| Labour (52 person days) | 104 | 100% |
| Agricultural | | |
| - Fertilizer | 12 | 0% |
| - Grass seeds | 6 | 0% |
| - Grass seedlings | 23 | 0% |
| Others | | |
| - Transportation | 41 | |
| - Lunch and tea for farmers | 47 | |
| **TOTAL** | **233** | **45%** |

### Maintenance/recurrent activities

1. Cleaning of sediment-filled pits once a year before rainy season using manual labour and a spade and hoe
2. Cutting vegetation with a sickle three times per year
3. Each year, planting vegetation in any gaps before the monsoon using a spade

### Maintenance/recurrent inputs and costs per ha per year (2004)

| Inputs | Cost (US$) | % met by land user |
|---|---|---|
| NA | | |

**Remarks:** All costs and amounts were roughly estimated by the technicians and authors in 2004, exchange rate was US$1 = NRs 73.

## Assessment

### Acceptance/adoption

About 40 households actively participated during the rehabilitation activities and accepted the technology. Seeds, seedlings, and technical advice were provided by the project as incentives. Most of the grazing land users were also members of the local community forest user group, which is considering using a similar technology in the degraded parts of their forest. However, up to 2006, there was no spontaneous adoption of the technology. The technology benefits women as it increases fodder and fuelwood production near to their homes and reduces the time they have to spend fulfilling these basic needs. Women's priorities were considered while selecting the plant species; species preferred by women were *Michelia champaca, Melia azedarach, Schima wallichii, Choerospondias axillaris, Azadirachta indica* and *Emblica officinalis*.

***Drivers for adoption***

- Participation of land users
- Technical backstopping in the initial stages
- Need-based technology

***Constraints to adoption***

- Lack of seeds and seedlings
- Difficult for users to know where and how to start to rehabilitate a large site

### Benefits/costs according to land users

The high establishment costs of the technology means that the short-term benefit for the community only matches the costs involved. In the long-term the environmental benefit of rehabilitated land is high and economically it is positive.

| Benefits compared with costs | short-term | long-term |
|---|---|---|
| establishment | equal | positive |
| maintenance/recurrent | equal | positive |

### Impacts of the technology*

**Production and socioeconomic benefits**

+ Increased carrying capacity of land; increase in farm income – about $17 was collected from selling grass seeds and grass in the first 2 years

**Production and socioeconomic disadvantages**

none

**Socio-cultural benefits**

+ + + Strengthened community institution – money used for social work

+ + + Improved knowledge of soil and water conservation and erosion

**Socio-cultural disadvantages**

- Socio-cultural conflicts, at the beginning a few people were against the rehabilitation

**Ecological benefits**

+ + + Improved soil cover: about 80% of bare land covered by the various grasses

+ + + Increased soil moisture

+ + Reduced soil loss

+ + More efficient drainage of excess water

+ + Biodiversity enhanced

**Ecological disadvantages**

none

**Off-site benefit**

none

**Off-site disadvantages**

none

* All changes in technology may have gender and equity implications and potentially affect the members of disadvantaged groups differently. This has not been assessed here but should be considered when recommending technology use.

## Concluding statements

| **Strengths** and →how to sustain/improve | **Weaknesses** and →how to overcome |
|---|---|
| The technology package is easy to apply as it does not need much knowledge and is cost effective → Regular maintenance of the structure and grasses is required | None |
| Improvement can be seen fast and easily; the vegetation cover increased and the loss of top soil decreased →As above | |
| Reduced soil erosion, rill erosion, and top soil loss → As above | |
| The technology is effective against land degradation →More tree and fruit species should be added and grass species multiplied to cover the remaining bare land | |

**Key reference(s):** Nakarmi, G. (2000) *Soil Erosion Dynamics in the Middle Mountains of Nepal,* a report submitted to PARDYP, ICIMOD, Kathmandu ■ Schreier, H.; Brown, S.; Shah, P. B.; Shrestha, B.; Merz, J. (2002) *Jhikhu Khola Watershed – Nepal,* CD ROM. Vancouver: Institute for Resources and Environment, University of British Columbia ■ Shrestha, B. (2004) Progress Report PARDYP-Nepal. Paper presented at the PARDYP – Access Mid Year Meeting, 19-22 July 2004, ICIMOD, Kathmandu

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