

Left: Different grasses on terrace risers (Juerg Merz)
Centre: Broom grass growing in the forest (Juerg Merz)
Right: Napier grass growing on a terrace riser (Juerg Merz)

Cultivation of fodder and grasses

Nepal: डालेघाँस तथा भूईघाँस प्रवर्द्धन

Cultivation of fodder crops on marginal lands and terrace risers

Fodder plays a major role in the crop-livestock-manure-soil nutrient cycle on farms in the middle mountains of the Himalayas. Livestock convert fodder shrubs and grasses from the forest, crop residues, and other fodder into manure through digestion. However, in the middle hills of Nepal the lack of availability of good quality fodder often limits not only, the productivity of livestock, but also reduces the nitrogen content of animal dung if, for example, only cereal crop residues, are fed to the animals.

In earlier times, livestock were left to graze in the forests and on community lands. The animals sought out their own food and were only assembled for milking and to protect them from wild animals. With the introduction of stall-feeding, the demand for fodder has increased greatly with a subsequent large increase in women's workload as it is they who are responsible for collecting the fodder.

Most fodder is collected in forest areas, and most livestock manure is applied to arable land, in particular to rainfed fields. This results in a net transfer of nutrients from forest areas to arable lands. It is estimated that, in this way, about 3 to 7 ha of forest land is needed to maintain 1 ha of arable land without degrading the state of the forest. In addition to reducing the availability of forest resources, the widespread closure of community forests has diminished access to fodder during certain times of the year. All this is putting serious pressure on the remaining unprotected forest resources.

Marginal lands and terrace risers offer an opportunity to reduce this pressure. The planting of grasses and shrubs suitable for fodder on these areas not only increases fodder availability but also reduces erosion and landslides that originate in these areas. If leguminous fodder species are planted, they increase soil fertility by increasing the nitrogen content in soils.

The Sustainable Soil Management Programme (SSMP) implements its projects in several midhills districts of Nepal
(dark green: previous working districts;
light green: districts in 2007)

WOCAT database reference: QT NEP23
Location: Nepal midhills
SWC measure: Vegetative
Land use: Annual cropping on rainfed agricultural land
Climate: Humid subtropical
Related approach: Farmer-to-farmer diffusion (QA NEP1), Farmer-led experimentation (QA NEP3), Farmer field school on integrated plant nutrient systems (QA NEP4)
Compiled by: SSMP
Date: January 2007

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Classification

Land use problems

Increasing livestock numbers causing the degradation of unprotected forest areas. The closure of large areas of community managed forests to grazing and fodder collection is putting more pressure on unprotected forest areas and increasing the demand for alternative sources of fodder and better quality fodder.

Land use

Annual crops: maize-wheat, potato, mustard, different types of vegetables

Climate

Humid subtropical

Degradation

Chemical degradation: soil fertility decline, soil nutrient mining

SWC measures

Vegetative: fodder and grasses `

Technical function/impact

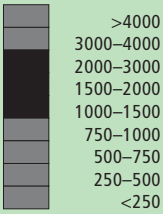
Main: - increased availability of fodder
- improved manure quality
- increased quantity of manure
- increased soil fertility

Secondary: - nitrogen fixation (if leguminous species are planted)

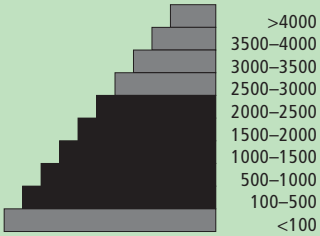
Environment

Natural environment

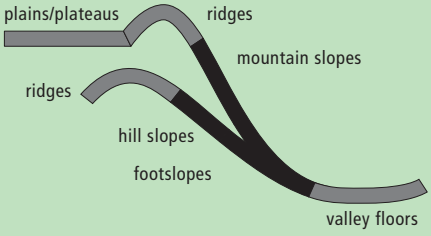
Average annual rainfall (mm)



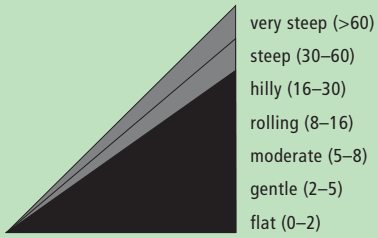
Altitude (masl)



Landform



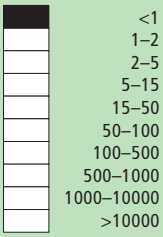
Slope (%)



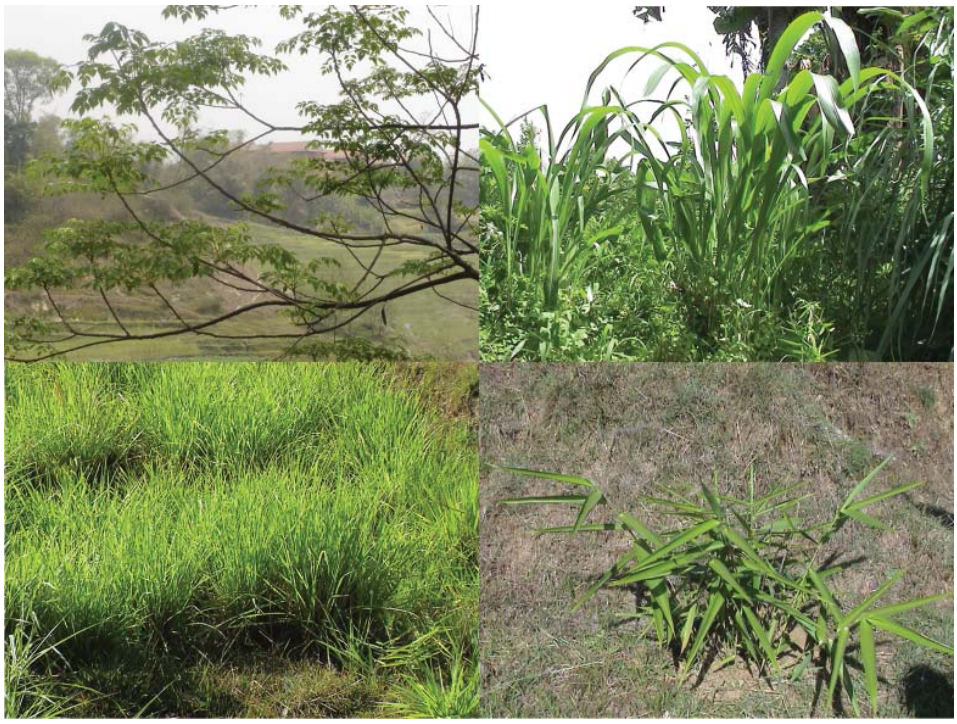
Applied Potential

Human environment

Cultivated land per household (ha)



Land use rights: individual, leased (sharecropping between owner and tenant)
Land ownership: individually owned, titled and not titled
Market orientation: subsistence, commercial, and mixed (subsistence/commercial)
Level of technical knowledge required: low
Number of livestock: poor households usually have some goats and one cow or buffalo, weathier households often own several cattle, buffaloes, and a pair of oxen for ploughing.
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.



Fodder and grass species promoted by SSMP

Tree species:
badahar *(Artocarpus lakoocha)*
dudhilo *(Ficus nemoralis)*
nemaro *(Ficus roxburghi)*
tank *(Bauhinia purpurea)*
bakaino *(Melia azedarach)*
neem *(Melia azadirachta)*
raikhanayo *(Ficus semicordata)*
mulberry *(Morus spp.)*
ipil ipil *(Leucaena diversifolia)*
gajuma *(Gauzuma ulmitolica)*

Shrub species:
bhatamase *(Flemingia congesta)*

Grass species:
stylo *(Stylosanthes spp.)*
dinanath *(Penisetum spp.)*
molasses, Napier grass NB21 *(Penisetum purpureaum)*

Implementation activities, inputs and costs

Establishment activities

1. Establish nursery for saplings/seedlings, and procure seed of appropriate species
2. Transplant at appropriate time on wasteland areas around houses and terrace risers as given in the Agroforestry Training Manual (NAF, SSMP 2002)

Duration of establishment: depends on species

Establishment inputs and costs per ropani

Inputs	Cost (US$)[1)]	% met by land user
Seeds or saplings/seedlings	depends on species	100%
Labour (~2-3 days)	4-6	0%
TOTAL	**< 10**	**100%**

[1)] Exchange rate US$ 1 = NRs 67 in January 2007

Maintenance/recurrent activities

1. Depending on species, newly established trees and shrubs need to be pruned, pollarded, or coppiced; grasses need no further agronomic practices
2. Replace dead plants and ones that failed to establish

Maintenance/recurrent inputs and costs per ha per year

Inputs	Cost (US$)[1)]	% met by land user
Labour (~ 2–3 days)	4-6	100%
TOTAL	**4-6**	**100%**

[1)] Exchange rate US$ 1 = NRs 67 in January 2007

Assessment

Acceptance/adoption

The widespread need for more and improved fodder means that 80% of the farmers exposed to this technology by SSMP adopted it. For farmers who participated in SSMP's activities, with or without direct reference to fodder promotion, about 30% have planted a variety of new fodder species on their private land. About 10% of local farmers not involved in SSMP have adopted the technology. Some of the farmers say that the health of their livestock improved and milk production increased after they were fed with the improved fodder.

Drivers for adoption

- Inexpensive technology
- Improved fodder availability
- Improved livestock health and productivity
- Reduced workload for women

Constraints to adoption

- Availability of seeds/seedlings/slips

Benefits/costs according to land users	**Benefits compared with costs**	**short-term**	**long-term**
	establishment	positive	positive
	maintenance/recurrent	positive	positive

Impacts of the technology*

Production and socioeconomic benefits	**Production and socioeconomic disadvantages**
+ + + Increased fodder availability	- - Reduced crop production due to shading effect
+ + + Improved fodder quality	
+ + + Increased milk production	
+ Increased manure availability	
+ Better livestock health	
+ Some of the new species provide inputs for organic pest management	
Socio-cultural benefits	**Socio-cultural disadvantages**
+ + Reduced workload, mainly for women	none
Ecological benefits	**Ecological disadvantages**
+ + + Reduced need for free grazing	- In places, increased incidence of rodents
+ + + Reduced erosion from terrace bunds and marginal lands	- In places, increased incidence of snakes
Off-site benefit	**Off-site disadvantages**
+ + + Reduced pressure on forest resources	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
Improves fodder quantity and quality with a positive impact on livestock health and productivity	In places fodder grasses and shrubs have increased the incidence of rodents and snakes
Increased fodder availability near the house reduces the workload of women to collect fodder and grass for livestock	Shading effect on field crops → select appropriate species; pruning and pollarding to manage height of the plants
Feeding of improved fodder and grasses improves quality of farmyard manure and thereby reduces need for mineral fertiliser	Host of insect pests
Different species provide source of mulching and staking material	Some species (e.g. bamboo, eucalyptus) have alleopathic effects that inhibit the growth of crop and other plants → only plant such species on wastelands or along river banks

Key reference(s): NAF; SSMP (2002) *Agroforestry Training Manual* (in Nepali). Kathmandu: Nepal Agroforestry Foundation and Sustainable Soil Management Programme

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