Napier Grass cultivation area (Latsamone Vongphosy)

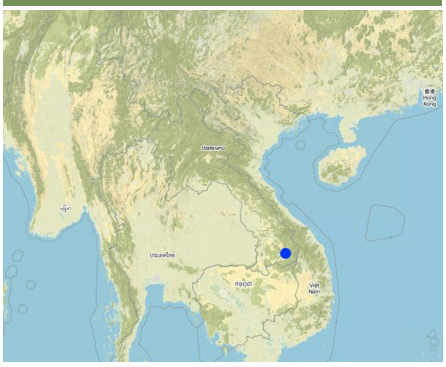
Conversion of rocky area to grazing area for livestock management (Lao People's Democratic Republic)

DESCRIPTION

Forage and Livestock Management

One of the main causes of land degradation in the Tadseng village (Sansay district, Lao PDR) is the flow of storm water that results in sediment run-off which leaves only rocks behind. It is estimated that approximately 20% of clay soils on the top soil have been washed away in recent years. In 2009 The Sustainable National Resources Management Product and Enhancement Project supported by Asia Development Bank (ADB) encouraged villagers to set up cow and forage farms. Ten cow breeding groups were established in the village. The cow farming group had used the communal land with a total 15 ha. After four years of implementation, some group members ignored their responsibilities and the group experienced a number of difficulties in both the management of the livestock and grass, which finally led to the collapse of the system. However, by 2014, one of the former members regained his interest in cow farming. He was able to rent the former 15 ha of land and he re-established the cow farm to a herd of 130 heads. At the beginning he only chose the healthiest stems of grass that remained from the old farm and replanted these. Three grass species were planted in rows on one area, namely Nepir, Guinea and Paspalum. It took thirty days to plow and prepare the land using a tractor and a labour force of more than fifty workers. For about five days, ten of these laborers had to remove the forage roots from the old fields. Generally, mid-May is the most suitable time to plant the grass as there is only a small amount of rain. Work begins by clearing the land and plowing the soil and then leaving it to dry for 15 days in order to get rid of some of the weeds and pests. During this period, some of the organic matter decays and develops into green compost which helps to improve the soil's structure. This subsequently successfully regenerates the growth of the grass as its roots are able to easily expand throughout the soil. Whilst waiting for the soil to dry fences will be constructed around the plot. Then 40 tons of manure should be transported to the field using a two-wheel tractor. After, the manure has to be distributed and plowed into the soil. At the beginning of June grass can be planted by digging holes in rows, as to place the grass suckers into the ground at a depth of 5 cm. Irrigation is unnecessary as rain is expected in June. Optionally the farmer can use a gravity fed irrigation, if necessary. The forage can be harvested around 90 – 100 days after plantation. There are two options regarding the feeding of livestock: First option involves hired labourers to harvest the grass. The second option is to allow the livestock to graze freely in the field, 6 months after grass plantation. However, this can only be undertaken on a bi-weekly basis so as to allow the grass to regenerate. It is important to extract the weeds and apply organic fertilizer or green manure after the grass has been cut. Maintenance may also involve the repairing of fences. Advantages of this planting grass are the reduction of soil erosion and preventing nutrients from being washed out during heavy rains, as well as reducing soil compaction. Meanwhile the organic matter in the soil increases due to the decay of dead leaves of grass and roots. Further advantage is to grow up stronger and healthier cows. This also means that the farmers get higher household revenue from the sale of his livestock which on average amounts up to 80,000,000Kip/annum. Family members also have more time for other household activities because cows are released in the early morning and called back in late afternoon. However, one of the disadvantages could be a reduction in the local

LOCATION



Location: Tadseng village Sansay district, Attapue province, Lao People's Democratic Republic

No. of Technology sites analysed: single site

Geo-reference of selected sites

- 106.97136, 14.98797

Spread of the Technology: evenly spread over an area (approx. 0.1-1 km2)

In a permanently protected area?:

Date of implementation: 2011; less than 10 years ago (recently)

Type of introduction

- [x] through land users' innovation
- [ ] as part of a traditional system (> 50 years)
- [ ] during experiments/ research
- [x] through projects/ external interventions

biodiversity such as edible insects and crickets. Furthermore the availability and variety of non-timber forest products declines such as Hed Amanita hemibapha, broom grass and rattan. Wildlife numbers have also reduced as people used to find and squirrels in this region. Another challenge may be that households have limited labour power to maintain fences and the forage fields, as it is relatively expensive to hire workers at 50,000 Kip/day. Difficulties in carrying out weeding include Nga Nam Keo. It should be noted that farmer make significant savings by not having to buy grass seeds as he can collect grass rhizomes from the old farm area.

Grass cultivation area that shows the soil mixed with larger stones (Latsamone Vongphosy)

CLASSIFICATION OF THE TECHNOLOGY

Main purpose

- improve production
- ✓ reduce, prevent, restore land degradation
- conserve ecosystem
- protect a watershed/ downstream areas – in combination with other Technologies
- preserve/ improve biodiversity
- reduce risk of disasters
- adapt to climate change/ extremes and its impacts
- mitigate climate change and its impacts
- ✓ create beneficial economic impact
- ✓ create beneficial social impact

Land use

Grazing land

- Ranching
- Improved pastures

Water supply

- rainfed
- ✓ mixed rainfed-irrigated
- full irrigation

Purpose related to land degradation

- prevent land degradation
- reduce land degradation
- ✓ restore/ rehabilitate severely degraded land
- ✓ adapt to land degradation
- not applicable

Degradation addressed

physical soil deterioration - Pc: compaction

biological degradation - Bc: reduction of vegetation cover, Bf: detrimental effects of fires

water degradation - Ha: aridification

SLM group

- pastoralism and grazing land management
- improved ground/ vegetation cover

SLM measures

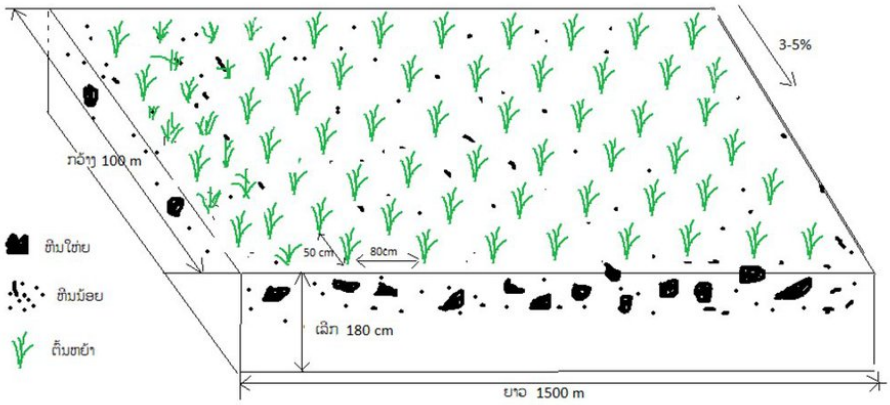
management measures - M2: Change of management/ intensity level

TECHNICAL DRAWING

Technical specifications

Density of plants is 37,000 plants/ha
Planting area wide is 100 m, the length is 1500 m
The grass stems should be planted at a distance of 50 cm from each other and there should be a distance of 80 cm between the rows.
The land is in foot slop with slop about 3 - 5%
Plant varieties in use are e.g. Napir, Guinea, Paspalum
Growing period is 90 - 100 day before it can be cut.
Around the plot a barbed wire has been installed fore livestock control and to prevent other animals from outside. The fence was 1.5 m high with 5 lines of barbed wire from the top of the posts to the surface.

Further technical specifications: Land preparation involved the use of a tractor with 4,000 horse power engines. This grass cultivation technology is practiced around the foot slopes with an average gradient of 3-5%. Weeding and the application of fertilizer are required twice a year in May and December. The grass can be harvested around 90 – 100 days after it has been planted.



Author: Sinnalong Vongkhamdy

ESTABLISHMENT AND MAINTENANCE: ACTIVITIES, INPUTS AND COSTS

Calculation of inputs and costs
- Costs are calculated: per Technology area (size and area unit: **ha**; conversion factor to one hectare: **1 ha = 15**)
- Currency used for cost calculation: **kip**
- Exchange rate (to USD): 1 USD = 8000.0 kip
- Average wage cost of hired labour per day: 50000

Most important factors affecting the costs
The high cost for fencing and the construction material are the most important factors

Establishment activities
1. land estimation (Timing/ frequency: January-Febuary)
2. land preparation (Timing/ frequency: None)
3. Planting (Timing/ frequency: None)
4. Fertilizing (Timing/ frequency: None)
5. Fencing (Timing/ frequency: None)

Establishment inputs and costs (per ha)

Specify input	Unit	Quantity	Costs per Unit (kip)	Total costs per input (kip)	% of costs borne by land users
Labour					
planting labour	person-day	20.0	50000.0	1000000.0	100.0
fencing labour	person-day	30.0	50000.0	1500000.0	100.0
fertilizing labour	person	60.0	50000.0	3000000.0	100.0
Equipment					
Hummer	piece	6.0	35000.0	210000.0	
Draper Fence Wire Tensioning Tool	piece	3.0	170000.0	510000.0	
Manure transfer by tractor	trip	60.0	35000.0	2100000.0	
Glass packing machine	Machine	3.0	1500000.0	4500000.0	
Plant material					
Paspalum seeds	Kg	55.0	50000.0	2750000.0	
Guniea seeds (Megathyrsus maximus)	Kg	40.0	50000.0	2000000.0	
Napier seeds (Pennisetum purpureum)	Kg	35.0	50000.0	1750000.0	
Fertilizers and biocides					
Manure	ton	40.0	200000.0	8000000.0	100.0
Construction material					
Nail	box	1.0	80000.0	80000.0	
Wire	roll	48.0	250000.0	12000000.0	
Post hole	hole	1600.0	10000.0	16000000.0	
Fence post	piece	1600.0	3000.0	4800000.0	
Total costs for establishment of the Technology				**60'200'000.0**	
Total costs for establishment of the Technology in USD				*7'525.0*	

Maintenance activities
1. Fertilizing (Timing/ frequency: annually, each cultivating season)
2. Cutting the grass (Timing/ frequency: during growing period)
3. Weeding (Timing/ frequency: after harvest)
4. Fence repair (Timing/ frequency: after harvest)

Maintenance inputs and costs (per ha)

Specify input	Unit	Quantity	Costs per Unit (kip)	Total costs per input (kip)	% of costs borne by land users
Labour					
Labor	person-day	50.0	30000.0	1500000.0	100.0
Equipment					
Hoe	piece	25.0	30000.0	750000.0	
Total costs for maintenance of the Technology				**2'250'000.0**	
Total costs for maintenance of the Technology in USD				*281.25*	

NATURAL ENVIRONMENT

Average annual rainfall
- < 250 mm
- 251-500 mm
- 501-750 mm
- 751-1,000 mm
- 1,001-1,500 mm
- 1,501-2,000 mm
- ✓ 2,001-3,000 mm
- 3,001-4,000 mm
- > 4,000 mm

Agro-climatic zone
- humid
- ✓ sub-humid
- semi-arid
- arid

Specifications on climate
Average annual rainfall in mm: 2500.0
The driest month is January. There is 7 mm of precipitation in January. With an average of 501 mm, most of precipitation falls in June/August. Annual rainfall is 2300 mm
Name of the meteorological station: Sanxai natural resource and environmental district office
With an average of 28.4 °C May is the warmest month. January has the lowest average temperature of the year. It is 22.6 °C

Slope
- flat (0-2%)
- ✓ gentle (3-5%)
- moderate (6-10%)
- rolling (11-15%)
- ✓ hilly (16-30%)
- steep (31-60%)
- very steep (>60%)

Landforms
- ✓ plateau/plains
- ridges
- mountain slopes
- hill slopes
- footslopes
- valley floors

Altitude
- 0-100 m a.s.l.
- ✓ 101-500 m a.s.l.
- 501-1,000 m a.s.l.
- 1,001-1,500 m a.s.l.
- 1,501-2,000 m a.s.l.
- 2,001-2,500 m a.s.l.
- 2,501-3,000 m a.s.l.
- 3,001-4,000 m a.s.l.
- > 4,000 m a.s.l.

Technology is applied in
- convex situations
- concave situations
- ✓ not relevant

Soil depth
- very shallow (0-20 cm)
- shallow (21-50 cm)
- moderately deep (51-80 cm)
- deep (81-120 cm)
- ✓ very deep (> 120 cm)

Soil texture (topsoil)
- coarse/ light (sandy)
- ✓ medium (loamy, silty)
- fine/ heavy (clay)

Soil texture (> 20 cm below surface)
- coarse/ light (sandy)
- ✓ medium (loamy, silty)
- fine/ heavy (clay)

Topsoil organic matter content
- high (>3%)
- ✓ medium (1-3%)
- low (<1%)

Groundwater table
- on surface
- < 5 m
- ✓ 5-50 m
- > 50 m

Availability of surface water
- excess
- good
- ✓ medium
- poor/ none

Water quality (untreated)
- good drinking water
- poor drinking water (treatment required)
- ✓ for agricultural use only (irrigation)
- unusable

Water quality refers to:

Is salinity a problem?
- Yes
- ✓ No

Occurrence of flooding
- Yes
- ✓ No

Species diversity
- high
- ✓ medium
- low

Habitat diversity
- high
- ✓ medium
- low

CHARACTERISTICS OF LAND USERS APPLYING THE TECHNOLOGY

Market orientation
- subsistence (self-supply)
- mixed (subsistence/ commercial)
- ✓ commercial/ market

Off-farm income
- ✓ less than 10% of all income
- 10-50% of all income
- > 50% of all income

Relative level of wealth
- very poor
- poor
- ✓ average
- ✓ rich
- very rich

Level of mechanization
- manual work
- animal traction
- ✓ mechanized/ motorized

Sedentary or nomadic
- ✓ Sedentary
- Semi-nomadic
- Nomadic

Individuals or groups
- ✓ individual/ household
- groups/ community
- cooperative
- employee (company, government)

Gender
- women
- ✓ men

Age
- children
- youth
- ✓ middle-aged
- elderly

Area used per household
- < 0.5 ha
- 0.5-1 ha
- 1-2 ha
- 2-5 ha
- 5-15 ha
- ■ 15-50 ha

Scale
- small-scale
- medium-scale
- ✓ large-scale

Land ownership
- state
- company
- ✓ communal/ village
- group
- individual, not titled
- individual, titled

Land use rights
- open access (unorganized)
- communal (organized)
- leased
- ✓ individual

Water use rights

50-100 ha
100-500 ha
500-1,000 ha
1,000-10,000 ha
> 10,000 ha

open access (unorganized)
communal (organized)
leased
✓ individual

Access to services and infrastructure

health	poor	✓ good
education	poor	✓ good
technical assistance	poor	✓ good
employment (e.g. off-farm)	poor	✓ good
markets	poor	✓ good
energy	poor	✓ good
roads and transport	poor	✓ good
drinking water and sanitation	poor	✓ good
financial services	poor	✓ good

IMPACTS

Socio-economic impacts

Crop production	decreased	✓ increased
fodder production	decreased	✓ increased
fodder quality	decreased	✓ increased
animal production	decreased	✓ increased
risk of production failure	increased	✓ decreased
product diversity	decreased	✓ increased
production area (new land under cultivation/ use)	decreased	✓ increased
land management	hindered	✓ simplified
expenses on agricultural inputs	increased	✓ decreased
farm income	decreased	✓ increased
diversity of income sources	decreased	✓ increased

Previously the soil was mixed with rocks and big stones, so that it was difficult for planting. By applying the grass cultivation method and gradually remove of those stones and rocks crop production is increased.

Before the land user let his animals take up only natural grass from the sourroundings. After, by cultivating different grass varieties in a large area the fodder production increased substantially

Natural grass is low in nutrients and proteins necessary for animal growth compared to the high potential grass varieties planted by the farmer. This grass varieties have many nutrients and proteins required for animal husbandry.

Previously the lack of fodder for animal husbandry resulted in low animal production. From the moment the farmer was able to get enough fodder from his grasslands the animal production increased significantly.

Because limited fodder especially in dry season the animal production failure quit a problem. From the moment he was able to produce high valued animal fodder on a large area the risk of production failure decreased to some extent.

Before the farmer got only natural grass from the surroundings, but now he produce Napir grass, Guinea grass, Paspalum grass by himself.

Before animal husbandry is dependet from natural forests and from rice fields. After the farmer was able to expand the productive area by 15 square metres of grassland.

Before the animal had grazed freely in the village sourroundings and so the farmer had to guard them. After grass cultivation the animals graze on fenced grass lands on a bi-weekly basis. And futher the cattle can be fed by own freh or dried fodder grass.

There enlarged area called for more monetary inputs to establish the cattle farm and to cultivate the additionoal 15 ha (new expenses: cattle housing, fencing, grass varieties and farm maintenance).
Quantity before SLM: None
Quantity after SLM: 80,000,000 kip/annual
The increase in revenues base on the fact, that now the farmer can sell many healty and strong cows every year at a good price. Actually, he produces cows even for the export to Vietnam.

Before cows has been sold in few numbers. After the application of the technology the farmer raises besides of a larger amount of cows also goats, pigs, poultry for the market. In addition he can sell different grass seed varieties.

workload — increased ✓ decreased

Previously the animal raising based on free grazing in the village sourroundings. The establishment and maintenance of the new grassland area and the increased cow herd and other livestock resulted in increased workload.

Socio-cultural impacts

Ecological impacts

soil cover — reduced ✓ improved

The soil cover increased significantly because of the cultivation ot the strong and expansive grass varieties.

soil loss — increased ✓ decreased

The soil can be fixed by the expanding and deep roots of the different grass varieties. Furhtermore, grass residues promote better soil cover that reduces soil loss by water erosion too.

soil accumulation — decreased ✓ increased

During the rainy season the plant detritus and manure promote soil accumulation.

soil compaction — increased ✓ reduced

The expanding and deep root system of the grass cultivation improves the soil structure significantly.

Off-site impacts

COST-BENEFIT ANALYSIS

Benefits compared with establishment costs

Short-term returns — very negative ✓ very positive

Long-term returns — very negative ✓ very positive

Benefits compared with maintenance costs

Short-term returns — very negative ✓ very positive

Long-term returns — very negative ✓ very positive

CLIMATE CHANGE

Gradual climate change

annual temperature increase	not well at all	very well	Answer: not known
seasonal temperature increase	not well at all	very well	Season: dry season
annual rainfall decrease	not well at all	very well	
seasonal rainfall decrease	not well at all	very well	Season: wet/ rainy season
increase	not well at all	very well	Answer: not known

Climate-related extremes (disasters)

local rainstorm	not well at all	very well
local windstorm	not well at all	very well
extreme winter conditions	not well at all	very well
drought	not well at all	very well
insect/ worm infestation	not well at all	very well

ADOPTION AND ADAPTATION

Percentage of land users in the area who have adopted the Technology

- ✓ single cases/ experimental
- 1-10%
- 11-50%
- > 50%

Of all those who have adopted the Technology, how many have done so without receiving material incentives?

- 0-10%
- 11-50%
- 51-90%
- ✓ 91-100%

Number of households and/ or area covered

15

Has the Technology been modified recently to adapt to changing conditions?

- ✓ Yes
- No

To which changing conditions?

- climatic change/ extremes
- changing markets
- labour availability (e.g. due to migration)
- ✓ ownership and organization

At the beginning in 2009, the technology covered 15 ha of village land and had been established by project support and maintained by breeding groups. Later in 2014 - after project failure due to organizational and maintenance difficulties - one land user of the village rent this land from the local autorities and applied the Technology by himself.

CONCLUSIONS AND LESSONS LEARNT

Strengths: land user's view
- Initially the project (ADB) provided an equipment, grass seeds and land preparation
- Improved the livestock quality
- Increased household income from livestock

Strengths: compiler's or other key resource person's view
- Improved soil quality due to animal manure and plant detritus

Weaknesses/ disadvantages/ risks: land user's view → how to overcome
- Insufficient water in dry season which effects limited grass production → water harvesting area is required
- Difficult to control the animals in such large area → restrict the grazing areas
- Difficult to collect manure for fertilizing the soil

Weaknesses/ disadvantages/ risks: compiler's or other key resource person's view → how to overcome

REFERENCES

Compiler
kang phanvongsa

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Resource persons
Khamthy Keosymonkong - land user
Amphone Chaluensunk - SLM specialist

Full description in the WOCAT database
https://qcat.wocat.net/en/wocat/technologies/view/technologies_2891/

Linked SLM data
n.a.

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