Regeneration of a degraded pastureland in Kasristskali that is part of a rotational grazing system (paddock system). Left side of the fence: degraded pastureland. Right side of the fence: managed paddock after the first mowing. (Hanns Kirchmeir)

Establishment of a paddock system and improvement of degraded pastureland. (Georgia)

DESCRIPTION

In a pilot project, degraded pastureland near the settlement of Kasristskali was regenerated by introducing a fencing, mowing and grazing regime that favours the growth of forage plants instead of weeds and, where necessary, reseeding forage plants.

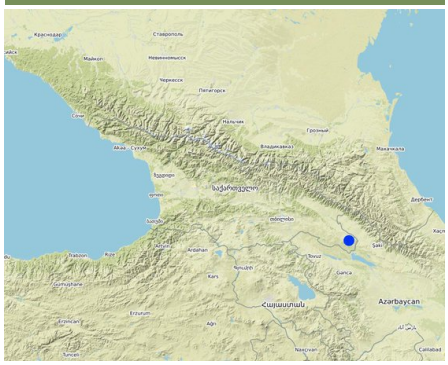
This showcase is part of the project "Applying Landscape and Sustainable Land Management (L-SLM) for mitigating land degradation and contributing to poverty reduction in rural areas", implemented by the Regional Environmental Center for the Caucasus (REC C).

The implementation site was selected by national experts together with stakeholders from the village. This site is located close to the settlement Kasristskali. It is community pastureland, which was abandoned and not maintained for many years. The site had been dominated by thistles and weeds before the intervention took place and was not suitable for grazing. 30% of the area was previously used to store manure and is rich in nutrients. To reclaim the pastureland for cattle, an area of 6.1 ha was mowed twice and equipped with an electric fence (two lines of electric wire and a solar-powered energizer brand Voss). This was done to regenerate the area so that a grazing regime could be introduced later. An electric fence was chosen because wood is not available in the area and a wire mesh fence would be more expensive. Furthermore, an electric fence is flexibly adjustable, which is essential for a rotational grazing system. It is important to remove the residues after the mowing to reduce the amount of weed seed. The time of mowing should be before the flowering of the most common weed species. An ongoing mowing and grazing regime was set up to favour fodder plants instead of weeds: Since the cows only eat the fodder plants and leave the weeds standing, the weeds have a clear advantage. To counteract this, the weeds are mowed, and fodder plants are sown. Mowing is needed for the first 2 years and after that, it is enough to control the quality of pastureland by a grazing system. For maintenance purposes, the area was cut once in early spring and a second time in summer. The evaluation in September, after the pastureland was recultivated, showed that the northern and eastern parts now have a grass and herb cover suitable for grazing, while the central, western and southern parts are still overgrown by weeds. This is due to the fact that these parts were very rich in nutrients from the very beginning and consisted exclusively of thistles. In order to improve the productivity of the site, it is recommended to cut the vegetation again in autumn, remove the residues, open the soil with a harrow and sow a pasture seed mixture adapted to the climatic conditions in February.

The local community farmers were involved in all activities. They were participated in development of local pasture management plan. The plan was approved by the community members and they are ready to follow the applied methodology and maintain the pastureland after the project completion. The farmers acknowledged the benefit from the proposed methodology and they invested to rehabilitate the additional area (6 ha) of pastureland with their own financial sources.

The 6.1 ha plot which was restored as pastureland with this technology is planned to be used as a paddock for alternating grazing between free-range and the paddock.

LOCATION



Location: Municpalty of Akhmeta, Kasristskali village, Kakheti, Georgia

No. of Technology sites analysed: single site

Geo-reference of selected sites
- 46.47182, 41.28533

Spread of the Technology: applied at specific points/ concentrated on a small area

In a permanently protected area?: No

Date of implementation: 2018

Type of introduction
- ☐ through land users' innovation
- ☐ as part of a traditional system (> 50 years)
- ☐ during experiments/ research
- ☑ through projects/ external interventions

Site of intervention (right) in comparison to weed-dominated common pasture land (left) in Kasritskali (Hanns Kirchmeir)

Energizer for an electric fence powered by solar energy (Hanns Kirchmeir)

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

Land use mixed within the same land unit: No

Unproductive land - Specify: The area east of the village is rich in nutrients but was not maintained. A dense weed layer of milk thistle (Silybum marianum) was established.

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

biological degradation - Bs: quality and species composition/ diversity decline, Bp: increase of pests/ diseases, loss of predators

SLM group

- area closure (stop use, support restoration)
- pastoralism and grazing land management

SLM measures

agronomic measures - A7: Others

vegetative measures - V2: Grasses and perennial herbaceous plants, V4: Replacement or removal of alien/ invasive species

management measures - M2: Change of management/ intensity level, M5: Control/ change of species composition, M7: Others

TECHNICAL DRAWING

Technical specifications

The area on which the technology is applied is 6.1 ha. The paddock is on community rangeland and managed by the village people. It is located on a slightly north-oriented slope near the village. The area was used to store manure. The high nutrition values led to the enormous growth of weeds, especially thistles.

Author: Hanns Kirchmeir

ESTABLISHMENT AND MAINTENANCE: ACTIVITIES, INPUTS AND COSTS

Calculation of inputs and costs
- Costs are calculated: per Technology area (size and area unit: **ha**)
- Currency used for cost calculation: **USD**
- Exchange rate (to USD): 1 USD = n.a
- Average wage cost of hired labour per day: 13 USD/day

Most important factors affecting the costs
The most important factor was the equipment for the electric fence. Electric fencing material is not common in Georgia and there are no relevant national suppliers.

Establishment activities
1. First mowing of the site, clearing from thistles and removal of hay/residuals (Timing/ frequency: Early spring (March))
2. Establishment of electric fence (Timing/ frequency: June)
3. Opening the soil with a harrow (Timing/ frequency: February of following year)
4. Seeding of fodder plants (Timing/ frequency: February of following year)

Establishment inputs and costs (per ha)

Specify input	Unit	Quantity	Costs per Unit (USD)	Total costs per input (USD)	% of costs borne by land users
Labour					
Setup of fence	person-days	2.0	13.0	26.0	
Open the soil with a harrow	person-days	1.0	13.0	13.0	
Seeding of fodder plants	person-days	1.0	13.0	13.0	
Mowing (1st time) an manual removal of thistles	person-days	18.0	13.0	234.0	
Equipment					
Equipment for 1200m electric fence including energizer	set	1.0	2547.0	2547.0	
Machinery for mowing (rental)	days	1.0	400.0	400.0	
Machinery for harrowing (rental)	days	1.0	400.0	400.0	
Plant material					
Seeds (Onobrychis)	kg	300.0	1.5	450.0	
Total costs for establishment of the Technology				**4'083.0**	
Total costs for establishment of the Technology in USD				*4'083.0*	

Maintenance activities
1. Second mowing and removal of hay (Timing/ frequency: July)
2. Third mowing and removal of hay (Timing/ frequency: September)

Maintenance inputs and costs (per ha)

Specify input	Unit	Quantity	Costs per Unit (USD)	Total costs per input (USD)	% of costs borne by land users
Labour					
Mowing (2nd and 3rd time)	person-days	2.0	13.0	26.0	
Equipment					
Machinery for mowing (rental)	days	2.0	400.0	800.0	
Total costs for maintenance of the Technology				**826.0**	
Total costs for maintenance of the Technology in USD				*826.0*	

NATURAL ENVIRONMENT

Average annual rainfall
- ☐ < 250 mm
- ☐ 251-500 mm
- ☑ 501-750 mm
- ☐ 751-1,000 mm

Agro-climatic zone
- ☐ humid
- ☐ sub-humid
- ☑ semi-arid
- ☐ arid

Specifications on climate
Average annual rainfall in mm: 697.0
The driest month is January, with 25 mm of rainfall. The greatest amount of precipitation occurs in June, with an average of 108 mm. The difference in precipitation between the driest month

- [ ] 1,001-1,500 mm
- [ ] 1,501-2,000 mm
- [ ] 2,001-3,000 mm
- [ ] 3,001-4,000 mm
- [ ] > 4,000 mm

and the wettest month is 83 mm.
Name of the meteorological station: Dedoplistskaro Met. Station
The climate is warm and temperate in Dedoplistskaro. The average annual temperature in Dedoplistskaro is 11.3 °C. The warmest month of the year is July, with an average temperature of 22.7 °C. The lowest average temperatures in the year occur in January, when it is around 0.1 °C.

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

Landforms
- [x] plateau/plains
- [ ] ridges
- [ ] mountain slopes
- [ ] hill slopes
- [ ] footslopes
- [ ] valley floors

Altitude
- [ ] 0-100 m a.s.l.
- [x] 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
- [x] not relevant

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

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

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

Topsoil organic matter content
- [x] high (>3%)
- [ ] medium (1-3%)
- [ ] low (<1%)

Groundwater table
- [ ] on surface
- [ ] < 5 m
- [x] 5-50 m
- [ ] > 50 m

Availability of surface water
- [ ] excess
- [ ] good
- [ ] medium
- [x] poor/ none

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

Water quality refers to: ground water

Is salinity a problem?
- [ ] Yes
- [x] No

Occurrence of flooding
- [ ] Yes
- [x] No

Species diversity
- [ ] high
- [ ] medium
- [x] low

Habitat diversity
- [ ] high
- [ ] medium
- [x] low

CHARACTERISTICS OF LAND USERS APPLYING THE TECHNOLOGY

Market orientation
- [ ] subsistence (self-supply)
- [x] mixed (subsistence/ commercial)
- [ ] commercial/ market

Off-farm income
- [x] less than 10% of all income
- [ ] 10-50% of all income
- [ ] > 50% of all income

Relative level of wealth
- [ ] very poor
- [x] poor
- [ ] average
- [ ] rich
- [ ] very rich

Level of mechanization
- [ ] manual work
- [ ] animal traction
- [x] mechanized/ motorized

Sedentary or nomadic
- [x] Sedentary
- [ ] Semi-nomadic
- [ ] Nomadic

Individuals or groups
- [x] individual/ household
- [ ] groups/ community
- [ ] cooperative
- [ ] employee (company, government)

Gender
- [ ] women
- [x] men

Age
- [ ] children
- [ ] youth
- [x] middle-aged
- [ ] elderly

Area used per household
- [ ] < 0.5 ha
- [ ] 0.5-1 ha
- [ ] 1-2 ha
- [x] 2-5 ha
- [ ] 5-15 ha
- [ ] 15-50 ha
- [ ] 50-100 ha
- [ ] 100-500 ha
- [ ] 500-1,000 ha
- [ ] 1,000-10,000 ha
- [ ] > 10,000 ha

Scale
- [x] small-scale
- [ ] medium-scale
- [ ] large-scale

Land ownership
- [ ] state
- [ ] company
- [x] communal/ village
- [ ] group
- [ ] individual, not titled
- [ ] individual, titled

Land use rights
- [x] open access (unorganized)
- [ ] communal (organized)
- [ ] leased
- [ ] individual

Water use rights
- [x] 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

fodder production	decreased	increased	Quantity before SLM: 0 Quantity after SLM: 1-2 t/ha The fodder production will increase in the next few years as mowing and grazing affect weed control.
fodder quality	decreased	increased	The fodder production will increase within the next years when mowing and grazing shows effect in the decrease of weeds.
production area (new land under cultivation/ use)	decreased	increased	Quantity before SLM: 0 ha Quantity after SLM: 6 ha 6 ha of degraded and unused pastureland have been recultivated.
expenses on agricultural inputs	increased	decreased	Community is equipped with electric fencing infrastructure (including training)

Socio-cultural impacts

Ecological impacts

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

In the first two years, the forage harvest will be low, while the costs for erecting the fence and maintenance by mowing will be high. In the long run, unproductive land will be productive again. On the 6 ha, 6 to 12 tons of biomass per year can be expected (depending on rainfall in spring and summer). This is equivalent to 500-1000 USD/year.

CLIMATE CHANGE

Gradual climate change

seasonal rainfall decrease — not well at all — very well — Season: summer

ADOPTION AND ADAPTATION

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

- [x] 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?

- [x] 0-10%
- [ ] 11-50%
- [ ] 51-90%
- [ ] 91-100%

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

- [ ] Yes
- [x] No

To which changing conditions?

- [ ] climatic change/ extremes
- [ ] changing markets
- [ ] labour availability (e.g. due to migration)

CONCLUSIONS AND LESSONS LEARNT

Strengths: land user's view

- improved pasture quality and new fencing technology introduced
- raised production of fodder plants
- pasture management plan is developed and local farmers are able to manage the pasture rotational system themselves. Also the farmers were trained in installation and maintenance of el-fence.

Strengths: compiler's or other key resource person's view

- A fertile land near the village, which was unusable, was turned back into productive land.

Weaknesses/ disadvantages/ risks: land user's view → how to overcome

- The pasture land has already been severely degraded (mainly by weeds) and it will take time and more resources to restore it. → Small grants to support the rental of machines for mower maintenance (topping cuts).

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

- The investments for the fencing cannot be made by the villagers. → Long-term microloans with low interest rates.
- Seed of local, climate-adapted forage plants is not available. → Establishment of local seed suppliers in cooperation with the agricultural extension service.

REFERENCES

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Reviewer
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Date of documentation: Dec. 18, 2018

Last update: March 31, 2020

Resource persons
Hanns Kirchmeir - SLM specialist
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Full description in the WOCAT database
https://qcat.wocat.net/en/wocat/technologies/view/technologies_4276/

Linked SLM data
Approaches: Rehabilitation of Pasture Land through fencing https://qcat.wocat.net/en/wocat/approaches/view/approaches_3463/

Documentation was faciliated by
Institution
- Regional Environmental Centre for the Caucasus (REC Caucasus) - Georgia

Project
- Applying Landscape and Sustainable Land Management (L-SLM) for mitigating land degradation and contributing to poverty reduction in rural area (L-SLM Project)

Key references

- Applying Landscape and Sustainable Land Management (L-SLM) for mitigating land degradation and contributing to poverty reduction in rural areas: Final report. 2017. Kirchmeir, H., Joseph, A., Huber, M: RECC Caucasus