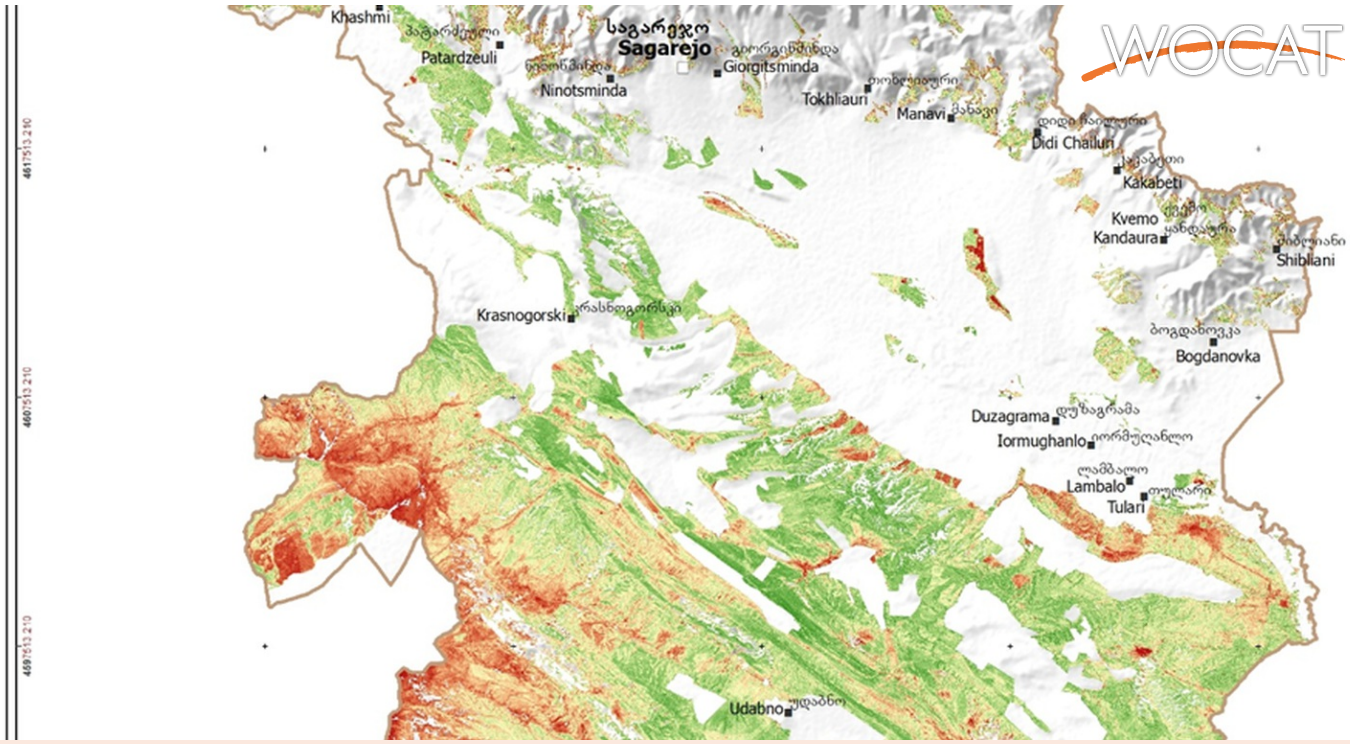


Pasture degradation map depicting the Pasture Degradation Index (PDI) for Sagarejo municipality. (Giorgi Mikeladze)

Pasture condition and management in Sagarejo Municipality (Georgia): Ecological and socio-economic assessment integrating remote sensing (Georgia)

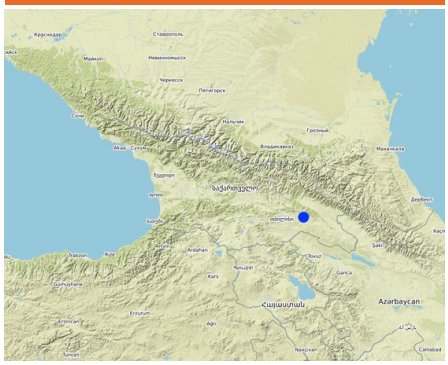
N/A

DESCRIPTION

The Approach assesses the condition of the pasture land in Sagarejo Municipality, Georgia by scaling up the methodology of estimation of grassland quality under pasturing using multispectral remote sensing data and ground assessment (originally described by Etzold & Neudert, 2013) including a socio-economic assessment by focus group discussions and questionnaires with pasture users.

1. The main characteristic of the approach is the assessment of pasture condition by scaling up the methodology of estimation of grassland quality under pasturing using multispectral remote sensing data and ground assessment including a socio-economic assessment by focus group discussions and questionnaires with pasture users.
2. The main aim is to provide management recommendations for sustainable pasture use to maintain and enhance the condition of pastures in the future.
3. Methods used
3.1 Pastureland delimination
Initially, the processing of multi-spectral satellite images of Sentinel-2 was to create an unsupervised classification, after which pasture/grassland boundaries and clusters for a study area were defined, by also considering cadastral data. By using a classification raster, 385 sampling points were generated, taking into account the spectral characteristics of the area.
3.2 Pasture assessment and indices calculations (following Etzold & Neudert, 2013; Etzold et al., 2015)
The sampling plot measures 10 x 10 m and is ideally located in a circle with a radius of 50 m, meeting the homogeneity criteria in terms of inclination, aspect and the kind of vegetation cover. Information collected on each plot encompasses physical site parameters, unalterable under human or livestock-related impact (e.g inclination, aspect, slope configuration). These parameters are used to calculate the potential erosion on site, expressed in a Susceptability to Erosion-Index (SEI).
Furthermore, parameters that can be affected by man and livestock are collected, reflecting the current state of the pasture. These parameters include those expressing erosion phenomena (e.g. bare soil/stones, livestock tracks) and such representing the state of vegetation (e.g. browsing tracks, cover of grazing indicator/valuable plant species groups). These parameters are used to calculate a Pasture Degradation Index (PDI). Both indices are expressed in the three colours of the traffic light, and translated to numeric figures (low risk to erosion (SEI)/ degradation (PDI) level: green/ 5; medium: yellow/ 2.5; strong: red/ 0). The numeric traffic light figures of SEI and PDI are combined to the State of Pasture-Index (SPI).
3.3 Multispectral analysis of ground assessment data
By means of Remote sensing-analyses, a map depicting the SPI values with high accuracy rates both for the lowland and highland pastures could be created (see Figure 3). The remote sensing-analyses allowed for upscaling the plots' SPI values to the whole grassland area in Sagarejo Municipality and by this determine areas (in ha) for each of the PDI classes. As these classes are underpinned with recommended stocking rates, more accurate estimations on sustainable livestock numbers can be derived (s. Table 1). Furthermore, this SPI map (Figure 3) and a similarly obtained PDI map (see title figure)

LOCATION



Location: Sagarejo Municipality, Kakheti, Georgia

Geo-reference of selected sites
- 45.33561, 41.72448

Initiation date: 2010

Year of termination: n.a.

Type of Approach
- ☐ traditional/ indigenous
- ☐ recent local initiative/ innovative
- ☑ project/ programme based

highlight areas with strong degradation signs, where shifts in stocking capacities and grazing regimes are most urgently needed to preserve pasture ressources.
3.4 Socio-economic assessment
The involvement of local actors is of utmost importance for achieving a more sustainable pasture use. A precondition for the understanding and joint implementation of results and recommendations is besides an initial stakeholder analysis the collection of information on pastoralist perceptions, knowledges and actual pasture-use and management practices by means of socio-economic assessment. The methodology comprised mapping techniques and questions for focus group discussions as well as a questionnaire using multiple-choice or short-form open numeric responses aimed at assessing the willingness, preconditions and feasibility for the potential implementation of measures of pasture use and management like rotational grazing schemes, self-organization and rule development by local actors.
3.5 Validation Workshop
In October 2019 a Validation Workshop: "Create Enabling Conditions for Establishment of State Program on Sustainable Pasture Management" was held, presenting results to stakeholders.
4. Stages of implementation
The Approach was implemented by following the five methodological steps 3.1-3.5. The latter step facilitated the revision of policies for sustainable pasture management and the creation of a pasture management platform in October 2019, supporting the collaboration between relevant actors in the field.
5. Stakeholders involved
The stakeholder analysis revealed different categories of pastures users (differences in size, strategies etc.) and external stakeholders like administrational bodies on different levels and extension services.


Fig. 1: Field staff receiving training on pasture assessment methodology. (Ronald Kruwinus)

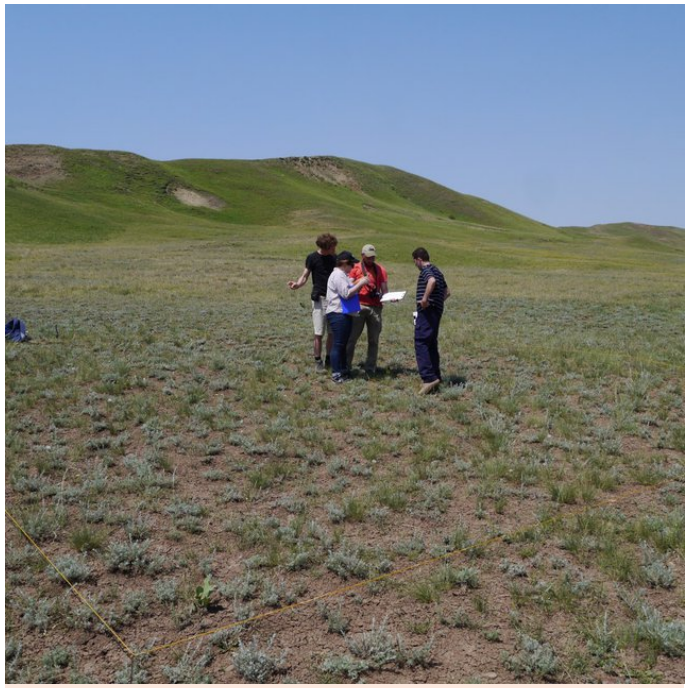


Fig. 2: Plot assessment during initial training (Jonathan Etzold)

APPROACH AIMS AND ENABLING ENVIRONMENT

Main aims / objectives of the approach
The main aim is to provide management recommendations for sustainable pasture use to maintain and enhance the condition of pastures in the future.

Conditions enabling the implementation of the Technology/ ies applied under the Approach
- **Collaboration/ coordination of actors**: great range of stakeholders are knowledgeable or acquainted with the technology. In addition platform for sustainable pasture management has been created in October 2019, which is supporting the collaboration between relevant actors in the field
- **Policies**: policies for sustainable pasture management are being revised at the moment. pasture management platform has been created in October 2019, is supporting the collaboration between relevant actors in the field

Conditions hindering the implementation of the Technology/ ies applied under the Approach
- **Legal framework (land tenure, land and water use rights)**: gaps in the cadastral system

PARTICIPATION AND ROLES OF STAKEHOLDERS INVOLVED

Stakeholders involved in the Approach and their roles

What stakeholders / implementing bodies were involved in the Approach?	Specify stakeholders	Describe roles of stakeholders
local land users/ local communities	1. Local and permanent livestock farmers (farming cooperatives, individual farm owners, individual smallholders) 2. Temporary/seasonal herders (semi-stationary livestock herders, transhumant)	1. May use common village pastures for individual or community-based common animal husbandry or private pasture lands. Additionally, in autumn and winter hay meadows (private) and agricultural land can be used. Livestock is driven to the pasture during daytime and kept in staples at night. 2. Use summer and winter pastures of different ownership status (state, municipal or private land).
local government	3. Municipal Council ("Sakrebulo") 4. Agricultural Information-Consultative Center	3. Legislative body (with elected representatives) 4. Provision of "Extension Service" (central government body at the municipal level)

Lead agency
REC-Caucasus

Involvement of local land users/ local communities in the different phases of the Approach

	none	passive	external support	interactive	self-mobilization
initiation/ motivation		✓			
planning	✓				
implementation	✓				
monitoring/ evaluation	✓				

Flow chart

Decision-making on the selection of SLM Technology

Decisions were taken by
- land users alone (self-initiative)
- mainly land users, supported by SLM specialists
- all relevant actors, as part of a participatory approach
- mainly SLM specialists, following consultation with land users
- SLM specialists alone
- politicians/ leaders

Decisions were made based on
- ✓ evaluation of well-documented SLM knowledge (evidence-based decision-making)
- ✓ research findings
- personal experience and opinions (undocumented)

TECHNICAL SUPPORT, CAPACITY BUILDING, AND KNOWLEDGE MANAGEMENT

The following activities or services have been part of the approach
- ✓ Capacity building/ training
- ✓ Advisory service
- ✓ Institution strengthening (organizational development)
- ✓ Monitoring and evaluation
- ✓ Research

Capacity building/ training

Training was provided to the following stakeholders
- land users
- ✓ field staff/ advisers

Form of training
- ✓ on-the-job
- farmer-to-farmer
- demonstration areas
- public meetings
- courses

Subjects covered
Vegetation (composition/indicators), Land use, Topography, (2) Socio-economy

Advisory service

Advisory service was provided
- on land users' fields
- ✓ at permanent centres

Institution strengthening

Institutions have been strengthened / established
- no
- ✓ yes, a little
- yes, moderately
- yes, greatly

at the following level
- local
- regional
- ✓ national

Describe institution, roles and responsibilities, members, etc.
REC Caucasus

Type of support

- [ ] financial
- [x] capacity building/ training
- [ ] equipment

Further details

Monitoring and evaluation

The Approach could be rolled out to become a powerful tool for monitoring the pasture conditions in the region.

Research

Research treated the following topics

- [x] sociology
- [x] economics / marketing
- [x] ecology
- [ ] technology

FINANCING AND EXTERNAL MATERIAL SUPPORT

Annual budget in USD for the SLM component

- [ ] < 2,000
- [ ] 2,000-10,000
- [ ] 10,000-100,000
- [ ] 100,000-1,000,000
- [ ] > 1,000,000

Time of implementation is unknown.

Precise annual budget: n.a.

The following services or incentives have been provided to land users

- [ ] Financial/ material support provided to land users
- [ ] Subsidies for specific inputs
- [ ] Credit
- [ ] Other incentives or instruments

IMPACT ANALYSIS AND CONCLUDING STATEMENTS

Impacts of the Approach

	No	Yes, little	Yes, moderately	Yes, greatly
Did the Approach empower local land users, improve stakeholder participation?	✓			
Did the Approach enable evidence-based decision-making? The Approach allows for an objective adjustment of stocking rates.				✓
Did the Approach help land users to implement and maintain SLM Technologies? Not yet.	✓			
Did the Approach improve coordination and cost-effective implementation of SLM? The integration of remote sensing and groundtruthing allows for cost-effective extrapolation of SLM.				✓
Did the Approach mobilize/ improve access to financial resources for SLM implementation?	✓			
Did the Approach improve knowledge and capacities of land users to implement SLM? Options of improvement were presented in workshops.		✓		
Did the Approach improve knowledge and capacities of other stakeholders? Institutional stakeholder are well informed due to workshop and reporting.				✓
Did the Approach build/ strengthen institutions, collaboration between stakeholders? Forum for dialogue.		✓		
Did the Approach mitigate conflicts?	✓			
Did the Approach empower socially and economically disadvantaged groups?	✓			
Did the Approach improve gender equality and empower women and girls?	✓			
Did the Approach encourage young people/ the next generation of land users to engage in SLM?	✓			
Did the Approach improve issues of land tenure/ user rights that hindered implementation of SLM Technologies? It demonstrates the importance of reliable cadastral data.		✓		
Did the Approach lead to improved food security/ improved nutrition?	✓			
Did the Approach improve access to markets?	✓			
Did the Approach lead to improved access to water and sanitation?	✓			
Did the Approach lead to more sustainable use/ sources of energy?	✓			
Did the Approach improve the capacity of the land users to adapt to climate changes/ extremes and mitigate climate related disasters? It allows land users to adapt to interannual fluctuations of pasture productivity.			✓	
Did the Approach lead to employment, income opportunities?	✓			

Main motivation of land users to implement SLM

- [x] increased production
- [x] increased profit(ability), improved cost-benefit-ratio
- [x] reduced land degradation
- [x] reduced risk of disasters
- [ ] reduced workload

Sustainability of Approach activities

Can the land users sustain what hat been implemented through the Approach (without external support)?

- [x] no
- [ ] yes
- [ ] uncertain

- [ ] payments/ subsidies
- [x] rules and regulations (fines)/ enforcement
- [ ] prestige, social pressure/ social cohesion
- [ ] affiliation to movement/ project/ group/ networks
- [x] environmental consciousness
- [ ] customs and beliefs, morals
- [x] enhanced SLM knowledge and skills
- [ ] aesthetic improvement
- [ ] conflict mitigation

CONCLUSIONS AND LESSONS LEARNT

Strengths: land user's view
- Strength: objective evaluation of site-specific pasture quality highlighting high-risk areas where adjustments in use intensity are indicated.
- Opportunity: Following recommendations for pasture care and rest safeguard the long-term producitivity

Strengths: compiler's or other key resource person's view
- Strenght: cost-effective approach for large-scale monitoring and derived management adaptations leading to improved pasture productivity and livelihoods of rural population while biodiversity is preserved.

Weaknesses/ disadvantages/ risks: land user's view → how to overcome
- Restrictions and reflection on business as usual. → Convincing explanation and demonstration of benefits, enabling long-term income security.

Weaknesses/ disadvantages/ risks: compiler's or other key resource person's view → how to overcome
- High initial efforts in training and supervision of field personnel. → Good institutional and financial framework

REFERENCES

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Reviewer

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Full description in the WOCAT database
https://qcat.wocat.net/en/wocat/approaches/view/approaches_5660/

Linked SLM data
n.a.

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- Regional Environmental Centre for the Caucasus (REC Caucasus) - Georgia

Project
- Integrated Biodiversity Management, South Caucasus (IBiS)

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