Overview on the multi-functional landscape of Arkhiloskalo (Hanns Kirchmeir)

Community Land Use Planning in Arkhiloskalo (Georgia)

DESCRIPTION

Unsustainable land use practices, such as deforestation, overgrazing and improper agricultural management systems are triggering the loss and degradation of valuable land resources in Georgia. Land use planning is one of the measures among others to contribute to support the integration of good Landscape and Sustainable Land Management (L-SLM) principles and practices into national policy and institutional framework to ensure the adoption of economically viable practices by rural communities. This technology is demonstrated in an application in Arkhiloskalo community in Eastern Georgia.

The globally ongoing degradation of land resources is threatening our food security and functioning ecosystem services. Therefore, restoration of degraded land as defined by the Sustainable Development Goal (SDG 15.3) has become a strategic objective of the UNCCD. To achieve Land Degradation Neutrality (LDN), action on the national level is needed. Georgia is one of the 113 countries (as of Sept. 2017) willing to take part in the Target Setting Program (TSP).
One of the major problems which Georgia is facing today is an absence of a comprehensive and integrated approach in the land management sector. In addition, an irrelevant legal framework sometimes leads to additional "conflicts" with the evolved national strategy and policy packages.
The land-use planning in the village of Arkhiloskalo, Dedoplistskaro Municipality is one of the pilot activities linked to LDN (Land Degradation Neutrality). The project financed by Global Environment Facility (GEF) / UN Environment Programm (UNEP) was implemented by local partner REC Caucasus (The Regional Environmental Centre for the Caucasus) through E.C.O. Institute of Ecology (Austria).
The land-use plan documents the status quo of the current land use. It is a baseline that can be used to steer and monitor future developments. The land-use plan is based on field assessments made in summer 2019 and builds a baseline for future assessments/monitoring. The land-use plan on the village level helps to break down national LDN targets to the local level. The plan and the development of land-use scenarios help to anticipate the future gains and losses of land resources and reflect the national LDN-target on the local level. Local stakeholders can identify areas of degradation risk and areas which can be rehabilitated. The Arkhiloskalo land-use plan contributes to sustainable land use by recognizing the current situation of land use and its spatial distribution as well as identifying the strength and weaknesses of the current situation.

Methodology:
Mapping for Arkhiloskalo land use plan: The mapping result is a detailed documentation of size and spatial distribution of land cover categories. Change in land cover is an important indicator to monitor the loss and gains of land resources according to the LDN monitoring concept.
For the mapping of the settlements, arable land and gardens, maps from Google Earth and digital cadastre of parcels were used. In the field maps, each polygon has an assigned Map-ID number, which is unique for each village. Polygons with the same land use category and land-use intensity can have the same Map-ID. Next to the drawing of the polygon on the map, in a field form each polygon is described by:
- Map-ID;

LOCATION

Location: The Village of Arkhiloskalo is locted in the Municipality of Dedoplitskaro., Kakheti, Georgia

No. of Technology sites analysed: single site

Geo-reference of selected sites
- 46.44597, 41.40364

Spread of the Technology: evenly spread over an area (49.7 km²)

In a permanently protected area?:

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

- Current Land use category;
- Current Land-use intensity;
- Remark (a specification of the polygon if needed).

Classifications of land use categories: The land-use classification is based on the CLC - Corine Land Classification System (The CORINE Land Cover is a vector map with a scale of 1:10 000, a minimum cartographic unit (MCU) of 100 m². It maps homogeneous landscape patterns). The Corine Land Classification system classifies urban fabric, mine, dump and construction sites, arable land, permanent crops, pastures, forests, shrubs and herbaceous vegetation associations, Open spaces with little or no vegetation, inland wetlands and waters.
The pastureland was differentiated into different productivity classes. In the field three classes of vegetation cover and species composition: low, medium, and high productivity were assessed.
For the mapping in Arkhiloskalo the following land use categories were selected: Settlements and human infrastructure (Code from the Corine Land Classification system – e.g. SHR, name – e.g. Houses); Forests and shrub-land; Agricultural managed land; Natural and semi-natural habitats.

Steep slope to the Alasani Valley in the North (Hanns Kirchmeir)

Renewal of the main road in the village (Zone B) (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: Yes - Agroforestry

Cropland
- Annual cropping: cereals - wheat (spring), cereals - wheat (winter), oilseed crops - sunflower, rapeseed, other
- Tree and shrub cropping: fruits, other, grapes

Number of growing seasons per year: 1
Is intercropping practiced? No
Is crop rotation practiced? No

Grazing land
- Ranching
- Cut-and-carry/ zero grazing
- Improved pastures

Animal type: cattle - dairy and beef (e.g. zebu)
Is integrated crop-livestock management practiced? No

Species	Count
cattle - dairy and beef (e.g. zebu)	982

Settlements, infrastructure - Settlements, buildings, Traffic: roads, railways

Water supply
- ☑ rainfed
- ☐ mixed rainfed-irrigated
- ☐ full irrigation

Purpose related to land degradation
- ☑ prevent land degradation
- ☐ reduce land degradation
- ☐ restore/ rehabilitate severely degraded land

Degradation addressed

adapt to land degradation
not applicable

soil erosion by wind - Et: loss of topsoil

SLM group
- windbreak/ shelterbelt
- rotational systems (crop rotation, fallows, shifting cultivation)
- waste management/ waste water management
- Land use planning

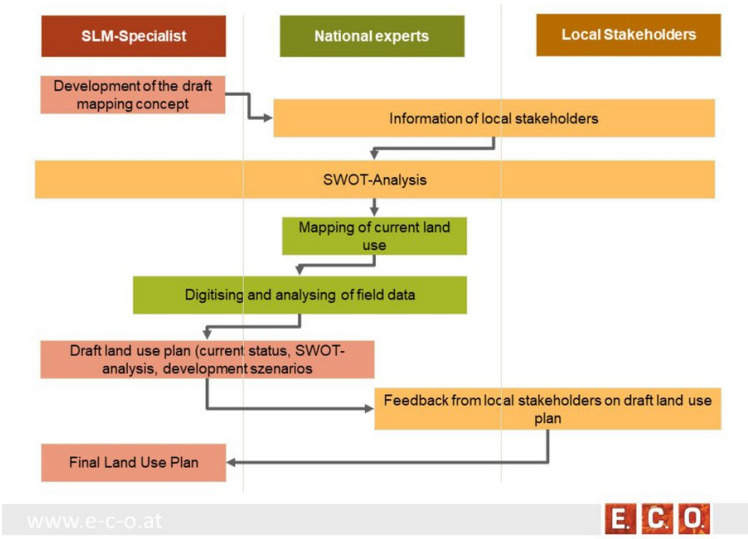
SLM measures

management measures - M2: Change of management/ intensity level, M7: Others

TECHNICAL DRAWING

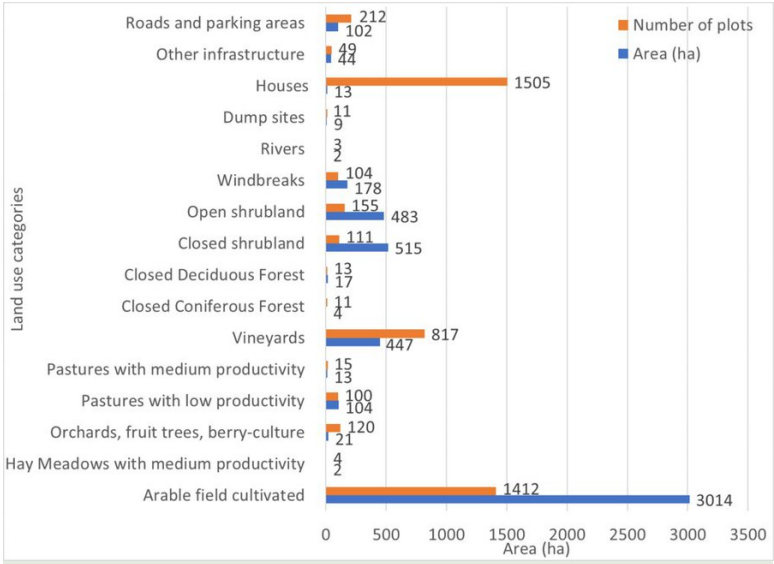
Technical specifications
Key stages of implementation:

The land-use planning in the village of Arkhiloskalo, Dedoplistskaro Municipality is one of the pilot activities linked to LDN.
Together with the local stakeholders, a land-use plan has been worked out. The procedure of defining a spatial development plan for a municipality goes along three stages:
• Stage 1: Gather background information & implement pre-design studies and development of a mapping concept
• Stage 2: Information of local stakeholders on this activity and implementation of an SWOT analysis (Strength, Weaknesses, Opportunities, Threats) related to the land use of the village
• Stage 3: Mapping and analyzing the current land use
• Stage 4: Preparation of a draft land use plan
• Stage 5: Reflection of the draft land use plan with local stakeholders
• Stage 6: Preparation of the final land use plan



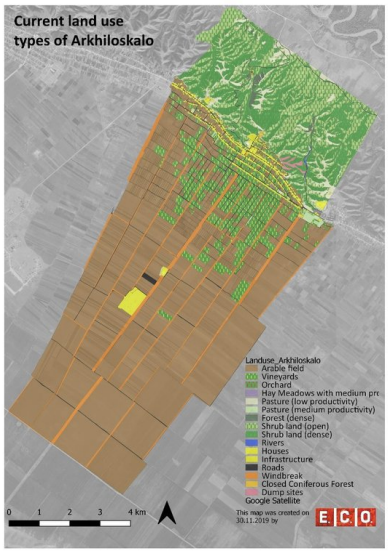
Author: Hanns Kirchmeir

Absolute area sizes. The largest land use category is arable land (3,014 ha) followed by closed and open shrubland (515 ha and 483 ha, respectively). Vineyards cover a total of 447 ha whereas windbreaks cover 178 ha. Pastures with low productivity (104 ha) and roads and parking areas (102 ha) use almost the same amount of land. Other infrastructure covers 44 ha of land. Orchards, fruit trees and berry-culture use 21 ha of land. Closed deciduous forest (17 ha) covers only a few more hectares than pastures (13 ha). Houses are the most common plot category in Arkhiloskalo but use only around 13 ha of land which puts them on the same land-use level as pastures. Dumpsites (9 ha) use more than twice the area of closed coniferous forest (4 ha). Hay meadows and rivers cover around 2 ha of the area.



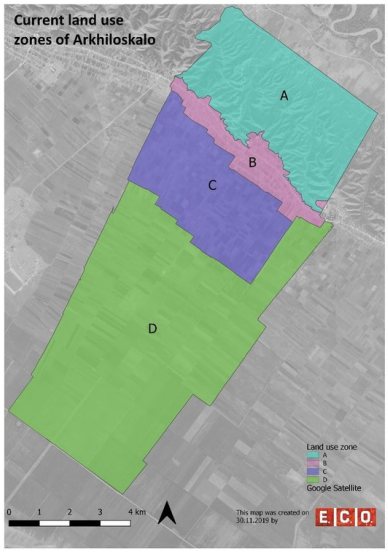
Author: Hanns Kirchmeir

Map of current land-use categories in Arkhiloskalo. The land-use classification in this approach is based on the Corine Land Classification System. It was split into sub-categories where needed to meet the needs of local land use practices.



Author: Hanns Kirchmeir

Based on the different land use, 4 different zones have been separated:
•Zone A: Steep North Slope
•Zone B. Settlement Area
•Zone C: Zone of perennial Crops
•Zone D: Zone of annual Crops



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: **50 km²**)
- Currency used for cost calculation: **USD**
- Exchange rate (to USD): 1 USD = n.a
- Average wage cost of hired labour per day: national expert 100 USD

Most important factors affecting the costs
The field work of mapping and analysis of results took a lot of time as well as the stakeholder meetings.

Establishment activities
1. Gather background information & implement pre-design studies and development of a mapping concept (Timing/ frequency: Winter/spring)
2. Information of local stakeholders on this activity and implementation of an SWOT analysis (Strength, Weaknesses, Opportunities, Threats) related to the land use of the village (Timing/ frequency: Spring)
3. Mapping and analyzing the current land use (Timing/ frequency: Summer)
4. Preparation of a draft land use plan (Timing/ frequency: Autumn/Winter)
5. Reflection of the draft land use plan with local stakeholders (Timing/ frequency: Autumn/Winter)
6. Preparation of the final land use plan (Timing/ frequency: Autumn/Winter)

Total establishment costs (estimation)
15000.0

Maintenance activities
n.a.

NATURAL ENVIRONMENT

Average annual rainfall
< 250 mm

Agro-climatic zone
humid

Specifications on climate
The driest month is January, with 25 mm of rainfall. The greatest

- [ ] 251-500 mm
- [x] 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

- [ ] sub-humid
- [x] semi-arid
- [ ] arid

amount of precipitation occurs in June, with an average of 108 mm. The difference in precipitation between the driest month 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%)
- [x] hilly (16-30%)
- [ ] steep (31-60%)
- [ ] very steep (>60%)

Landforms
- [x] plateau/plains
- [ ] ridges
- [ ] mountain slopes
- [x] 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)
- [x] medium (loamy, silty)
- [ ] fine/ heavy (clay)

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

Habitat diversity
- [x] high
- [ ] medium
- [ ] 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
- [x] 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
- [ ] small-scale
- [x] medium-scale
- [ ] large-scale

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

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

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

Access to services and infrastructure

health	poor		✓	good
education	poor		✓	good
technical assistance	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	Effects will be visible based on the implementation of selected development scenario provided by Land use plan.
product diversity	decreased	increased	Effects will be visible based on the implementation of selected development scenario provided by Land use plan.
diversity of income sources	decreased	increased	Effects will be visible based on the implementation of selected development scenario provided by Land use plan.

Socio-cultural impacts

SLM/ land degradation knowledge	reduced	improved	Improvements by training and workshops, awareness raising.

Ecological impacts

vegetation cover	decreased	increased	Reduced grazing in zone A (north slope) will increase the vegetation cover. Effects will be visible based on the implementation of selected development scenario provided by Land use plan.
biomass/ above ground C	decreased	increased	Reduced grazing in zone A (north slope) will increase the cover of shrubs and trees which will lead to increase of biomass. Effects will be visible based on the implementation of selected development scenario provided by Land use plan.
habitat diversity	decreased	increased	Diversification of land use and restoration of windbreaks will increase habitat diversity. Effects will be visible based on the implementation of selected development scenario provided by Land use plan.
wind velocity	increased	decreased	Improvement of windbreaks will reduce wind speed and topoil erosion. Effects will be visible based on the implementation of selected development scenario provided by Land use plan.

Off-site impacts

groundwater/ river pollution	increased	reduced	Removal of uncontrolled dump sites will reduce groundwater and river pollution especially in the Alasani floodplain north of the community.
wind transported sediments	increased	reduced	The rehabilitation of windbreaks will have a positive impact on neighboring fields.

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

The land use planning process is an investment in future developments. Return of investment can be expected in oncoming years. The mapping result is a detailed documentation of size and spatial distribution land cover categories. Change in land cover is an important indicator to monitor the loss and gains according to the LDN monitoring concept. The land-use plan is based on field assessments made in summer 2019 and built a baseline for future change assessments as it includes data on land-use intensity which will enable to consider change in time dynamics and to monitor changes on the ground.

CLIMATE CHANGE

-

ADOPTION AND ADAPTATION

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

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

- [x] single cases/ experimental
- [ ] 1-10%
- [ ] 11-50%
- [ ] > 50%

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

Number of households and/ or area covered
It was implemented as show case for one community

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
- The majority of the land users in village Arkhiloskalo have been using the same land and natural resources through decades and have good understanding of the natural conditions and climate change perspectives of the target area. The land use plan, the scenario development and the knowledge exchange in the workshops are have been considered as advantage for awareness raising, joint decision making and to start a positive change in short-term period.
- The successful land-use system with improved environment conditions and benefit to the local farmers can lead to be a perfect example for the whole municipality of Dedoplistskaro as most part of its territory is agricultural land in semi-arid environment facing some rapid and significant challenges caused by climate change.

Strengths: compiler's or other key resource person's view
- The land use plan will help to optimize the management and to eliminate present challenges in the 4 separate zones and promote improved sustainable land- use, land-management practices like crop rotation and re-establishment of windbreaks.
- The land-use plan helps to identify the strength, opportunities, weaknesses and threats and contribute to sustainable land-use and its management. E.g.: in the Zone A, Steep North Slope there is a high risk, that the waste in the dumpsites will be washed down in an uncontrolled manner into the natural and semi-natural habitats of the slope. The waste is partly burned and the wash out of toxic solute can harm nature and ground water.
- Application of the technology helps to optimize management measures, which will reduce costs and labour forces, e.g., by increasing productivity of land and productivity of vineyards in the Zone C: zone of perennial crops.
- The land-use map integrates climate mitigation. E.g. it helps to plan the re-establishment of the windbreaks, which significantly contributes to the reduction of wind erosion in the Zone D: Zone of annual crops.
- The terrestrial evaluation of the current land use can also serve to evaluate remote sensing technologies for semi-automatic classification of land cover categories.

Weaknesses/ disadvantages/ risks: land user's view → how to overcome
- Lack of dialogue and trust could be one of the risks to succeed with the introduction of advanced methods of sustainable land management. → The proposed sustainable land-use practices and pilot activities should be planned in a way to have results on the ground in a short-term period to keep local farmers motivated.

Weaknesses/ disadvantages/ risks: compiler's or other key resource person's view → how to overcome
- Risks: Land use plan Interest of farmers, guesthouse providers and local residents are conflicting. → This can be limited by good facilitation of focus group discussions between different stakeholder groups.
- Local actors (farmers, guest house providers ...) are not interested in participating in the joint land-use planning process. → It will need a well-coordinated communication design to include all the local stakeholders in the process of practical and theoretical introduction to the principles of sustainable land-use. The communication should emphasize potential economic benefits to the local households together with advantages of the sustainability. This can be a key factor to get most of the local stakeholders engaged with the proposed sustainable land-use practices.

REFERENCES

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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_5762/

Linked SLM data
n.a.

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)

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