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SUMMARY REPORT

CONCERNING A REPORT COMMISSIONED UNDER
THE SWISS AGENCY FOR DEVELOPMENT AND COOPERATION PROJECT
THE MERCY CORPS GEORGIA IMPLEMENTED ALLIANCES PROGRAMME



A REMOTE SENSING STUDY INTO THE RANGLAND CONDITION IN KVEMO KARTLI AND SAMSTKHE JAVAKHETI REGIONS OF GEORGIA



Introduction

The *Remote Sensing Study into the Rangeland Condition of in Kvemo Kartli and Samtskhe Javakheti Regions of Georgia* study was undertaken under the Swiss Agency for Development and Cooperation (SDC) Project the Mercy Corps implemented Alliances Programme; a market development programme working in the beef, sheep and dairy sectors in Samtskhe Javakheti and Kvemo Kartli. Alliances conducted an international invitational tender which was awarded to Environment Systems who were commissioned to undertake the study. This briefing paper represents a summary of the key findings and recommendations to be found in the full report and does not include the in-depth methodology, maps, or discussion including a deeper discussion of the livestock sector in Georgia. To receive a full version of the report please contact liasonkk@alliances.ge or download the report in the downloads page of our website www.allianceskk.ge.

The Importance of Rangeland

Rangeland condition is a key concern underpinning the traditional pastoral system. It has often been assumed that where livestock are present they cause rangeland degradation through overgrazing. The study was undertaken with the primary aim of determining preliminary information on the current rangeland condition, historical trends and factors contributing to condition and from this to provide a baseline from which to inform and guide programme policy and future programme interventions.

The Importance of the Rangeland to the Rural Poor.

Rangeland is the key nutritional resource underpinning the farming system of livestock producers in Georgia without which they would be unable to sustain their livelihoods. Poorer farmers in Kvemo Kartli and Samtskhe Javakheti can be described as small scale livestock producers who own fewer than five breeding cows or 13 breeding sheep and own up to 2ha of land with access to additional pasture, who process their own dairy products for home consumption with surpluses sold and comprise 70% of the population in the project area. Livestock is housed during the winter months November to April and fed with hay, the animals are herded on rangeland pasture for the summer months. The baseline information provided by this study will inform a whole set of interventions surrounding access to pasture and improved nutrition for small scale livestock producers, with ***the overall aim of helping to ensure the future sustainability of the livelihoods of the local rural population.*** Sustainable management of pasture is also a ***key environmental concern*** of far reaching impact in Georgia.

Methodology: Why Remote Sensing

The study utilised Earth observation (EO) data, derived from the Landsat satellites, within remote sensing object-orientated rulebase classification techniques to map rangeland condition into three classes of good, moderate and poor, supported and confirmed by targeted ground truthing and discussions with local officials, farmers and graziers. This enabled the generation of detailed land cover maps and the separation of varying rangeland condition levels in the regions Samtskhe-Javakheti and Kvemo Kartli in Georgia

across a 27 year period. Accurate maps such as these are important for rangeland management and were generated in areas that are difficult to access on the ground providing efficient, up-to-date preliminary information on the condition of rangeland environments preliminary baseline information enabling the future targeting and application of traditional classification methodologies which reduces time and labour costs. Use of Landsat images also enables the use of data available over decades rather than years. One drawback however, given the susceptibility of optical sensors to cloud and other atmospheric phenomena a large range of scenes have to be assessed for suitability and that of the scenes available, a number were compromised by the extent of cloud cover. Regardless, there was still a time-series of suitable satellite imagery available. The data extracted from the Landsat imagery can capture differences in the seasonal growing cycles of the vegetation associated with rangelands providing information on the condition and phenological behaviour of the rangeland environment.

Key Results

1. There is no evidence of widespread current overgrazing, except locally along the transhumance routes and around the summer encampments. Rangelands in early summer generally have good or moderate vegetation cover with a good diversity of grass and forb (wildflower) species. On the higher peaks good condition occurs later in the summer, due to a later snow melt. If anything there has been an overall improvement in rangeland condition in early summer between the earliest available imagery (1984) and 2011; although with some regional variation.
2. There is evidence, from both imagery and ground truthing, of widespread seasonal change in rangeland condition, related to climate, with declining rangeland grazing quality through grass burn-off and die-back in mid to late summer. This is worse on the lower pastures, but does extend up into the higher pastures, especially where soils are shallow or very rocky. In particular, there was evidence of an altitudinal delay in the behaviour of the flora in the two regions whereby vegetation at higher elevations flourished later on in the calendar year as a result of temperature gradients and remnant snow.
3. There was also a significant indication that the climate experienced over the 27 years has changed both with regards to average monthly weather patterns and with regards to the onset of the different seasons. In order to fully understand the spatial and temporal dynamics of rangeland condition it is necessary to explore these influences in more detail.
4. There is some evidence, from both field observations and stakeholder consultation, supported by meteorological data that the climate in the study areas is becoming warmer and drier, contributing to greater seasonal change in rangeland condition.
5. There is a suggestion from the analysis that erosion may be occurring on some steeper slopes and valley sides, presumably the result of heavy rain falling on dry ground, which contributes to a degradation of rangeland condition.
6. There is some evidence from ground truthing of differences in rangeland quality and condition locally within the study area, reflecting intra-regional changes in bioclimate locally, which are difficult to map accurately and consistently.

7. There is evidence from the stakeholder consultations of increasing local stock numbers recently, particularly sheep, a consequence of better lamb prices, which may become an influence on rangeland condition (particularly on municipal pastures) in the future.
8. There is also evidence from the stakeholder consultations of changing ownership and access arrangements for both rangelands and municipal pastures, generally part of a drive by government for increased private ownership, which again may have an influence on rangeland condition in the future.

Consequences for Rangeland Management

The key consequences of these results for rangeland management are:

1. The most productive summer grazing season is likely to start earlier and end earlier, and possibly become shorter, especially in dry years.
2. There is a longer period of seasonal grass burn-off and die-back, when there is less available grazing.
3. In drier years there is likely to be a higher risk of overgrazing and erosion.

If this trend to a drier and warmer climate continues, strategically there is a need to take more advantage of the time when rangeland and municipal grasses are at their most productive (spring/early summer) for both grazing and hay production. There may also be a consequence for both the timing (earlier in the season) and location (higher up the mountain) of summer transhumance. It would be useful to test and confirm these conclusions in other areas of Georgia, especially in the east, where the winter grazing is located. It would also be useful to examine more closely seasonal change in rangeland condition within each year, related to climate and rainfall in particular, which can be achieved by utilising lower spatial resolution data, but which is more frequently available temporally, from MODIS imagery, which orbit the earth every one to two days. It is also possible to use EO techniques to help map the distribution of semi-natural habitats on the rangelands, and provide a better estimation of the extent of woodlands, both of which are necessary in preparing a comprehensive biodiversity resource assessment of the area.

Key Recommendations for Future Work

It is important to stress that the results of the study form a basis for the development of other research. From discussion with and feedback from SDC, Mercy Corps Alliances and other stakeholders we recommend the following extensions to this work:

An extension of the methodology into other areas of Georgia

It is proposed that the use of EO for mapping and monitoring rangelands be extended across other areas of Georgia, especially the area of winter grazing in Kakheti which would provide a comparison in rangeland condition between winter and summer pastures. The major benefits would include establishing the current condition of the areas of winter grazing, the extent of transhumance and an assessment of the necessity of transhumance in order to enable winter pastures to recover.

An extension of the methodology to further examine seasonality in rangeland condition

From the available hydro-meteorological data, there is some evidence for a change in climate experienced within the study area as well as a change in seasonality. It is suggested that the use of EO could be extended to explore the influence of climate upon seasonality. This might involve the use of MODIS imagery which, although of poorer resolution, provides more frequent imagery that could be utilised to investigate seasonal patterns across Georgia.

An extension of the methodology to provide semi-natural habitat mapping across the rangelands

This project has successfully assessed the condition of rangelands within Kvemo Kartli and Samtskhe-Javakheti. In order to understand the types of vegetation and habitats present on the rangelands the methodology employed can be extended to incorporate other vegetation indices and texture measure analysis techniques that would be able to differentiate rangeland species. The EUNIS (European Nature Information System) habitat classification has mapped habitats across the whole of Europe while the Phase I Habitat Classification provides a standardised system to record semi-natural vegetation and wildlife habitats in the UK. A similar classification system in Georgia would assist in the development of environmental impact studies and other ecological baseline surveys. This would be useful in establishing whether or not the invasion of unpalatable species is occurring as a result of overgrazing.

An extension of the methodology to improve the mapping of forest and woodland areas

The date of the forestry layer provided by Mercy Corps and utilised as a masking layer in this study is unknown and its extent is generalised. A visual assessment of the forestry layer against aerial photography suggests that many changes have occurred since the forestry layer was captured. Since woodland exhibits very high NDVI values, it is proposed that a more accurate (and current) delineation of the forested areas located within the Samtskhe-Javakheti and Kvemo Kartli regions (and further afield within Georgia) can be provided, using the Landsat imagery.

The further investigation of climate data

A lack of comprehensive historic climate data has restricted the confidence of some of the conclusions in this report. A more detailed study into the climate history of Georgia involving the acquirement of mean monthly values for precipitation and temperature across the country would assist in the interpretation of the trends and features visible in the imagery. Currently, the availability of hydro-meteorological data for the years corresponding to the imagery is available at a cost of approximately 900USD. It is recommended that a full record of hydro-meteorological data is acquired and the trends in temperature and precipitation (both rainfall and snowfall) are investigated with regards to climate extremes (i.e. drought, floods) and shifts in seasonal patterns.

Capacity building in Georgian agricultural, environmental and rural development organisations

This project has created datasets providing information on rangeland condition during a number of years over the past 27 years, areas agricultural activity and on the indication of areas likely to be underutilised by livestock. These datasets did not previously exist and have the potential to aid the capacity and capability of key organisations in Georgia involved with environmental and rural development issues to analyse, understand and resolve such issues. Wide cooperation on ensuring data access, availability and updating is key to improving this capacity.