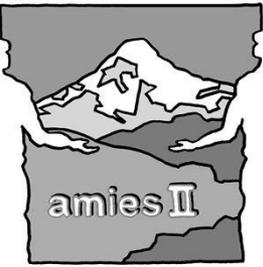


Final-Meeting in Tbilisi (28th – 29th September 2017, Goethe Institute Tbilisi)

AMIES II
**Scenario development for sustainable land use
in the Greater Caucasus, Georgia**
- interdisciplinary research to foster quality of life



Justus Liebig-University

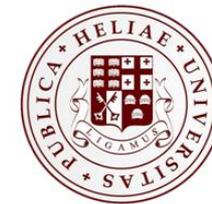
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and Environmental Research



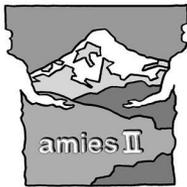
Ivane Javakhishvili Tbilisi
State University



Ilia Chavchavadze
State University



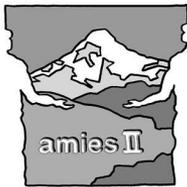
Agricultural University
of Georgia



Scenario development for sustainable land use in the Greater Caucasus, Georgia

Time table, programme overview

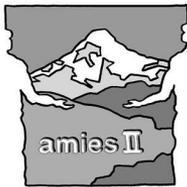
Time	Thursday 28 th	Friday 29 th
8:00		
09:00 - 09:30		Summary of the previous day
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1:00 - 1:15	Introduction	<i>Excursion of Project Partners to Dmanisi</i>
1:15 - 2:45	Project Results, Land Use (A) and Phytodiversity (C)	
2:45 - 3:15	<i>Coffee break</i>	
3:15 - 5:15	Project Results, Phytodiversity (C) and Agricultural Production (D)	
7:30	<i>Joint Dinner ('Keto und Kote')</i>	



Agenda Final-Meeting in Tbilisi

Thursday, 28th September 2017 (1:00 p.m. – 5:15 p.m.)

- Welcome and who is who ?



Agenda Final-Meeting in Tbilisi

Thursday, 28th September 2017 (1:00 p.m. – 5:15 p.m.)

- General Introduction
- Overview of Project Aims, Results, Discussion

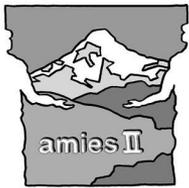
Friday, 29th September 2017 (9:00 a.m. – 12:15 a.m.)

- Soil functions for sustainable land-use (Project unit B)
- Development of normative land-use scenarios and discussion

Common Lunch at Café Goethe (12:15 a.m. – 1:00 p.m.)

Friday, 29th September 2017 (1:00 p.m. – 6:30 p.m.)

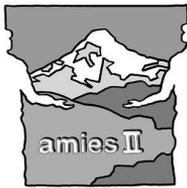
- Bus-excursion with project partners to Dmanisi



Overall aims of the projects AMIES (2010 – 2013) and AMIES II (2014 – 2016)

AMIES: the analysis of the interrelationship between environmental and societal processes in the Greater and Lesser Caucasus of Georgia

AMIES II: the development of sustainable agricultural land-use scenarios for the rural development of the marginal Kazbegi region (Greater Caucasus)



Topic of Final Meeting: Normative scenario development

based on project units and sub-projects

A Landscape structure analysis

B Soil functions for sustainable land use

B1 Quaternary sediment deposits

B2 Soil productivity and ecological soil functions

C Phytodiversity-related options for sustainable land use

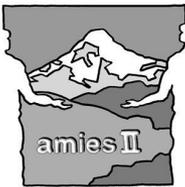
C1 Relating phytodiversity to productivity

C2 Potentials of agrobiodiversity

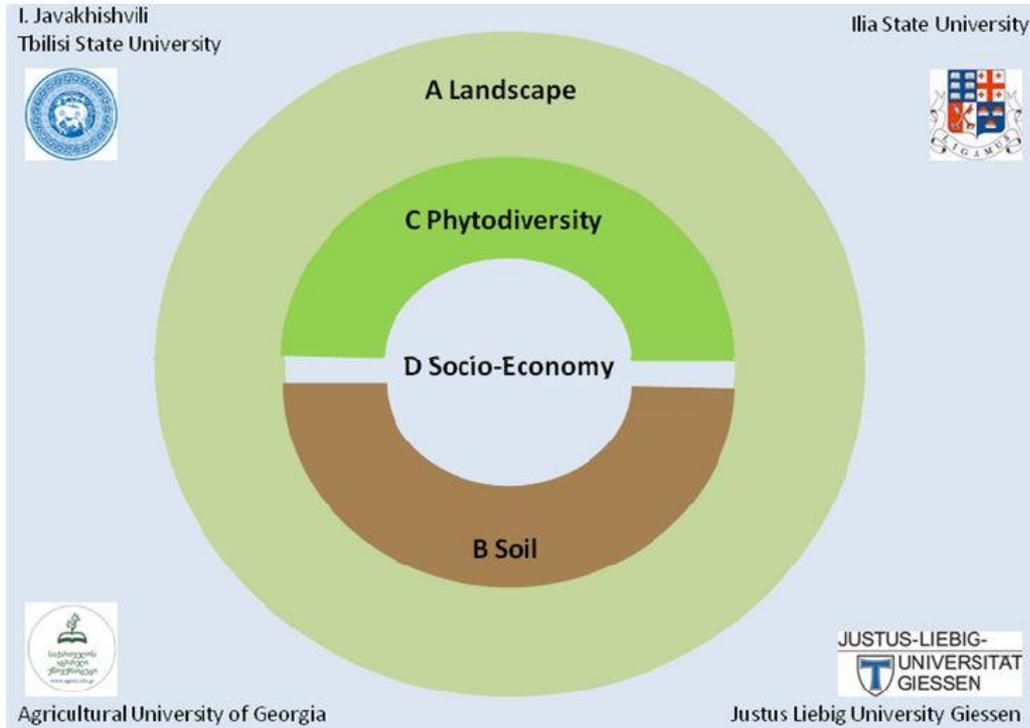
D Development of a sustainable, market-oriented supply system for agricultural products

D1 Food provision and needs for agricultural products

D2 Agricultural production potential and economic viability



Step 1 Analysis and Evaluation of Land Use Options



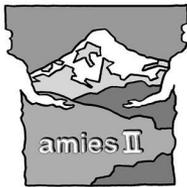
NGOs

and

Advisory
Board

Step 2 Scenario development for sustainable land use

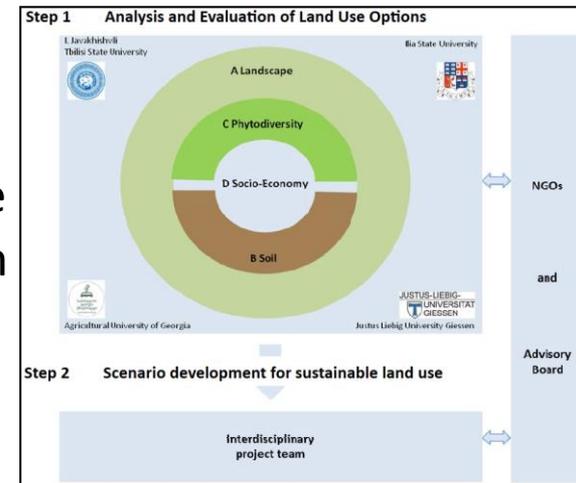


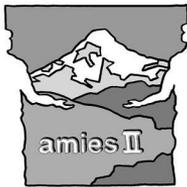


Focus of research

1. Land-use options to improve the livelihood of the local population will be analysed from the human perspective in the socio-economic project unit **D**.
2. Land use affects the soil potentials of the region, which are at the focus of project unit **B**.
3. Both - soils and land use - determine the rich phytodiversity and vegetation of the region (project unit **C**), whereas the vegetation pattern affects the carrying capacities for domestic animals and thus the agronomic potentials.

These interdependencies need to be studied in disciplinary detail by project units **A, B and C**.





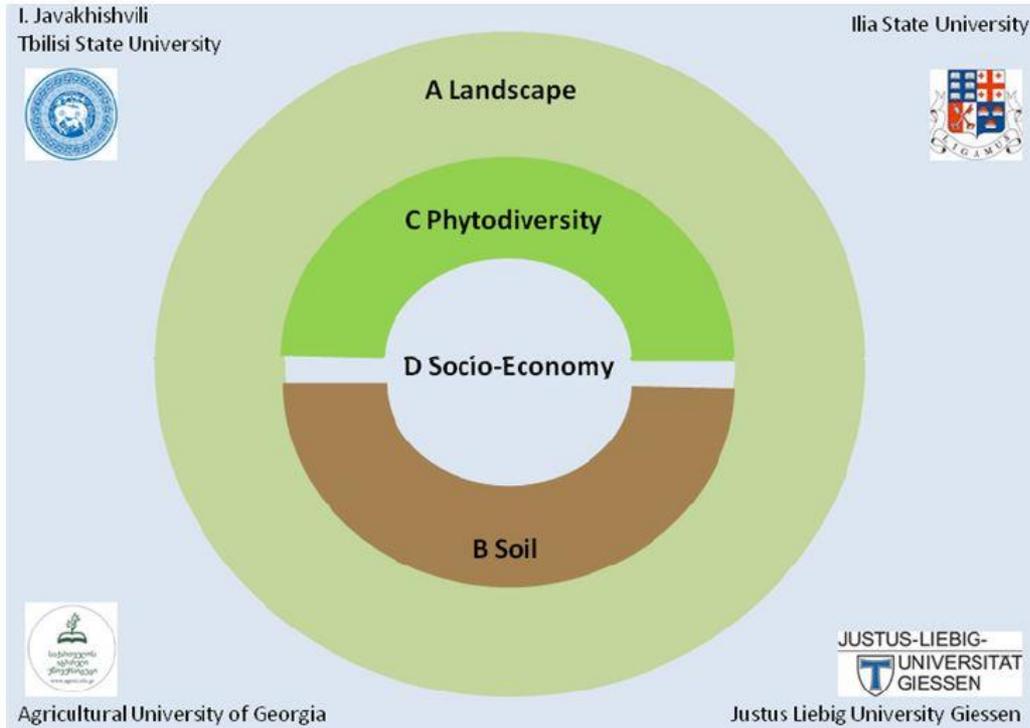
Project unit **A** integrates the disciplinary results from a landscape perspective and provides detailed maps of *landscape potentials* (e. g. *soil productivity, phytodiversity, agrobiodiversity*) based on the results gained in projects **B to D**.

Project unit **A** further prepares an interdisciplinary development of normative scenarios, which is the topic for tomorrow.

The **Board members** from relevant institutions should help as multipliers of the gained results, to transfer them to institutional experts and potential users.



Step 1 Analysis and Evaluation of Land Use Options



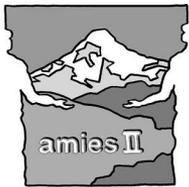
NGOs

and

Advisory
Board

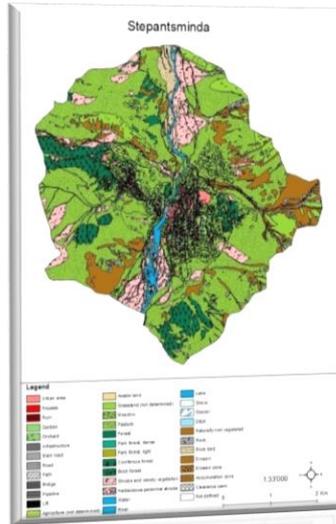
Step 2 Scenario development for sustainable land use





Step 1 **Analysis and Evaluation of Land Use Options**
to develop regionally differentiated recommendations for
sustainable land use and land development

A



Evaluation of current land use and land cover:

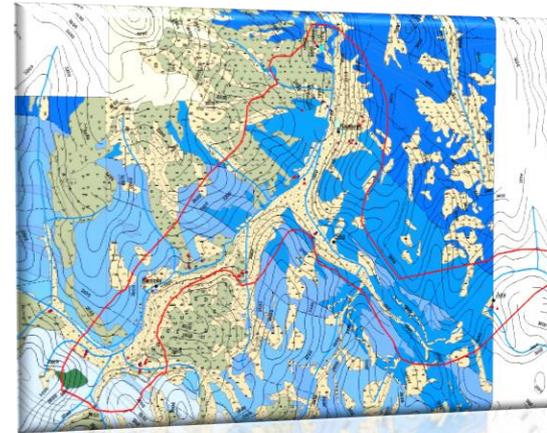
Agricultural land

- Distribution of meadows and pastures
- Localization of arable fields/ glasshouses
- Distribution of historic arable fields
- Livestock in the settlements

Reforestation, succession

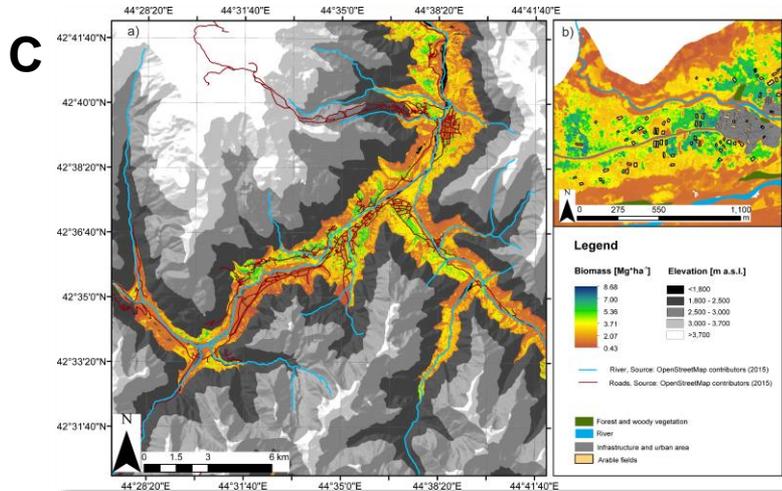
- Birch-(*Betula*-) forests are spreading

B

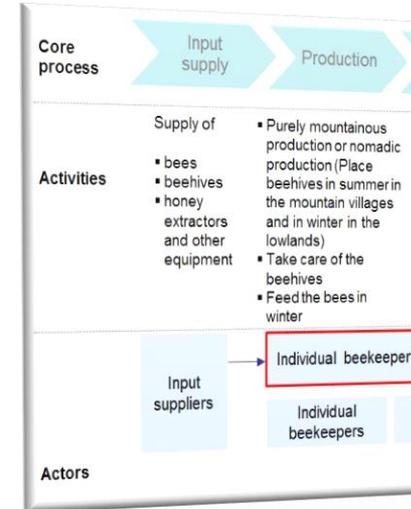


Soil descriptions based on soil profiles and augers:

- High diversity of substrates & soil forming processes
- Settlements on Talus fans with relatively good soils
- Soil quality (SQR): poor – moderate rating
- First draft of ‘synthetic concept soil map’ based on *geology, elevation, aspect & slope*



D



Local vegetation and features of grassland, arable fields and homesteads:

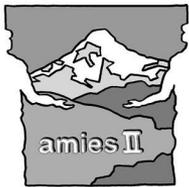
- C1
- Generating a vegetation map
 - Grassland biomass to estimate the amount of fodder (spectral data, biomass harvesting)
 - Effects on re-forestation?

- C2
- Agrobiodiversity: Cultivated & non-cultivated plant species in arable fields and home gardens

Face-to-face interviews with local farmers:

- D1
- Local socio-economic conditions in agricultural production
 - Data about the agricultural food production
 - Product demand data

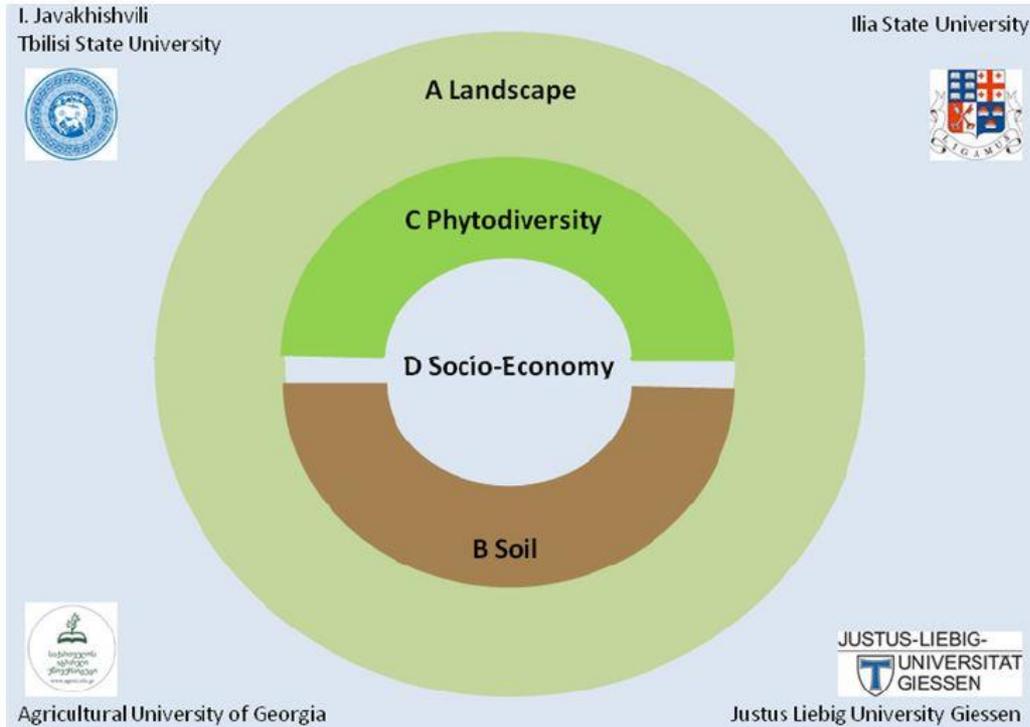
- D2
- Work out dependencies between the food production and the local increasing tourism sector



Step 2 Scenario development for sustainable land use



Step 1 Analysis and Evaluation of Land Use Options



NGOs

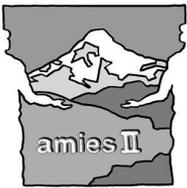
and

Advisory
Board

Step 2 Scenario development for sustainable land use



Advisory
Board



Working steps of joint normative scenario development

- I. documentation of today's land use, site conditions, biodiversity, and livelihood
- II. detection of (functional) deficits
- III. compilation of a catalogue of alternative land uses suitable to minimise the detected (functional) deficits
- IV. determination of rules for the incorporation of alternative land uses in a normative scenario
- V. rule-based modification of today's land use pattern in normative scenarios
- VI. evaluation of today's landscape against the normative scenarios (references) with respect to multifunctionality



Scenario development for sustainable land use
in the Greater Caucasus, Georgia

Thank you very much
for kind attention !



Foto Prof. Dr. Rainer Waldhardt

Funded by



VolkswagenStiftung

Justus Liebig-University



Centre for
International Development
and Environmental Research

In cooperation with



Ivane Javakhishvili Tbilisi
State University



Ilia Chavchavadze
State University



Agricultural University
of Georgia



Scenario development for sustainable land use
in the Greater Caucasus, Georgia

Thursday, September 28th, 2017; Conference room (1:00 p.m.– 6:00 p.m.)

Overview of Project Results

1:00 – 1:15 p.m. General Introduction

Prof. Dr. Dr. habil. Dr. h.c. (TSU) A. Otte, JLU

A: Integrative Landscape Analysis and Normative Scenarios

apl. Prof. Dr. R. Waldhardt, JLU, Prof. Dr. Dr. habil. Dr. h.c. (TSU) A. Otte, JLU

1:15 – 1:45 p.m. T. Theissen (Landscape Ecology & Landscape Planning, JLU): *Landscape Analysis in GIS – Land-Cover Pattern Investigations in the High-Mountains Based on Spatial Data*

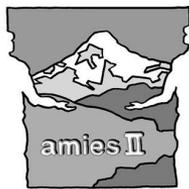
C: Phytodiversity-related Options for Sustainable Land Use

Prof. Dr. Dr. habil. Dr. h.c. (TSU) A. Otte, JLU, Prof. Dr. G. Nakhutsrishvili, Prof. Dr. M. Akhalkatsi, ILIA,
apl. Prof. Dr. R. Waldhardt, JLU

1:45 – 2:45 p.m. G. Tedoradze, M.Sc. (Institute of Botany, ILIA): *Relating Phytodiversity to Productivity*

A. Magiera, M.Sc. (Landscape Ecology & Landscape Planning, JLU): *Modelling biomass of mountainous grasslands by including a species composition map*

2:45 – 3:15 p.m. *Coffee break*



Thursday, September 28th, 2017; Conference room (1:00 p.m.– 6:00 p.m.)

2:45 – 3:15 p.m. *Coffee break*

3:15 – 4:15 p.m. W. Hansen, M.Sc. (Landscape Ecology & Landscape Planning, JLU): *Analyzing Betula litwinowii shrub encroachment and reforestation in the Kazbegi region*

Prof. Dr. Dr. habil. Dr. h.c. (TSU) A. Otte (Landscape Ecology & Landscape Planning, JLU): *Evaluating the ornamental value of the Caucasian flora in Georgia*

D: Development of a Sustainable, Market-oriented Supply System for Agricultural Products

D1: Food Provision and Needs for Agricultural Products

Prof. Dr. I.-U. Leonhäuser, JLU, Prof. Dr. J. Salukvadze, TSU

4:15 – 4:45 p.m. Prof. Dr. I.-U. Leonhäuser (ZEU – Section II: *Nutrition Security*, JLU): *Linking agricultural food production and rural tourism in the Kazbegi district - A qualitative study*

D2: Agricultural Production, Potential, and Economic Viability

Prof. Dr. J. Aurbacher, JLU, Prof. Dr. D. Bedoshvili, AUG

4:45 – 5:15 p.m. R. Shavgulidze, M.Sc. (Institute of Farming, AUG): *Technical efficiency of potato and dairy farming in mountainous Kazbegi district, Georgia*

5:15 – 5:45 p.m. *Concluding Discussion*

6:00 – 7:30 p.m. *Joint Dinner of project partners*



Friday, September 29th, 2017; Conference room (9:00 a.m. - 12:00)

Normative Scenario Development in the Kazbegi Region

9:00 – 9:30 a.m. **Summary of the previous day**

B: Soil Functions for Sustainable Land Use

Prof. Dr. P. Felix-Henningsen, JLU, Prof. Dr. T. Urushadze, AUG

9:30 – 10:00 a.m. Dr. T. Hanauer, Prof. Dr. P. Felix-Henningsen, apl. Prof. Dr. R.-A. Düring (Speaker)
(Soil Sciences & Soil Conservation, JLU): *Soil Functions for Sustainable Land Use*

10:00 – 10:30 a.m. *Coffee break*

Project Units A to D:

10:30 – 11:00 a.m. **Joint Results and the Definition of Scenario Logics**

Prof. Dr. J. Aurbacher, JLU, T. Theissen (Landscape Ecology & Landscape Planning, JLU)

11:00 – 11:30 a.m. **Presentation of the Normative Scenarios**

apl. Prof. Dr. R. Waldhardt, JLU, Prof. Dr. J. Aurbacher, JLU

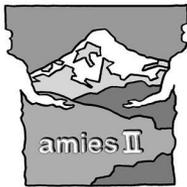
11:30 – 12:00 a.m. **Open Discussion with Advisory Board and External Experts**

Moderation: Prof. Dr. Dr. habil. Dr. h.c. (TSU) Dr. A. Otte, JLU

12:00 – 12:15 a.m. **Conclusions**

Prof. Dr. Dr. habil. Dr. h.c. (TSU) A. Otte, JLU

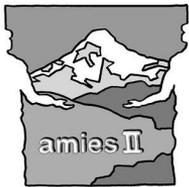
12:15 – 1:00 p.m. *Joint Lunch of all participants in Café Goethe*



Scenario development for sustainable land use in the Greater Caucasus, Georgia

Time table, programme overview

Time	Thursday 28 th	Friday 29 th
8:00		
09:00 - 09:30		Summary of the previous day
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7:30	<i>Joint Dinner ('Keto und Kote')</i>	



**Scenario development for sustainable land use
in the Greater Caucasus, Georgia**

amies II - Scenario development for sustainable land use in the Greater Caucasus, Georgia –

Interdisciplinary research to foster sustainable land use, land development, and quality of life
(2014 – 2016)

Motivation: In mountainous areas of Georgia, a constantly declining agricultural sector and rural poverty can be observed. In some mountain regions, the number of livestock is decreasing considerably. A further retreat of agriculture and pastoralism from these ancient cultural landscapes will have considerable negative impact on landscape functions such as agricultural and touristic production functions, biodiversity, the landscape's appearance and aesthetics - and would thus worsen the living conditions of the local population. Research on the potentials of rural development with a focus on agricultural land use is therefore highly relevant.

Study region (Fig.1): The study region is the Kazbegi district (population approx. 6,500),



Fig. 1: Study region in the Caucasus Mountains.

a complex system of mountain massifs and deep canyons stretching from the dividing Jvari pass (cross pass) to the Russian border (North-Ossetia and Ingushetia) on the northern slope of the Great Caucasian Ridge (Fig. 2 to 4).

Applicants and co-applicants:

Project Unit A: Rainer Waldhardt¹, Annette Otte¹, Otar Abdaladze², George Nakhutsrishvili²

Project Unit B: Peter Felix Henningsen¹, Tengiz Urushadze³, Besik Kalandadze⁴

Project Unit C: Annette Otte¹, Rainer Waldhardt¹, Maia Akhalkatsi², George Nakhutsrishvili²

Project Unit D: Ute Leonhäuser¹, Joachim Aurbacher¹, Joseph Salukvadze⁴, David Bedoshvili²

1 Justus Liebig University Giessen; 2 Ilia State University; 3 Agricultural University of Georgia; 4 Ivane Javakhsishvili Tbilisi State University



Fig. 2: Thrigi valley (1,700 m a.s.l.) next adjacent mountain massifs.



Fig. 3: Mount Kazbeg (3,047 m a.s.l.), the highest peak of the area.



Fig. 4: Kanobi village (2,000 m a.s.l.): farming at the margin.

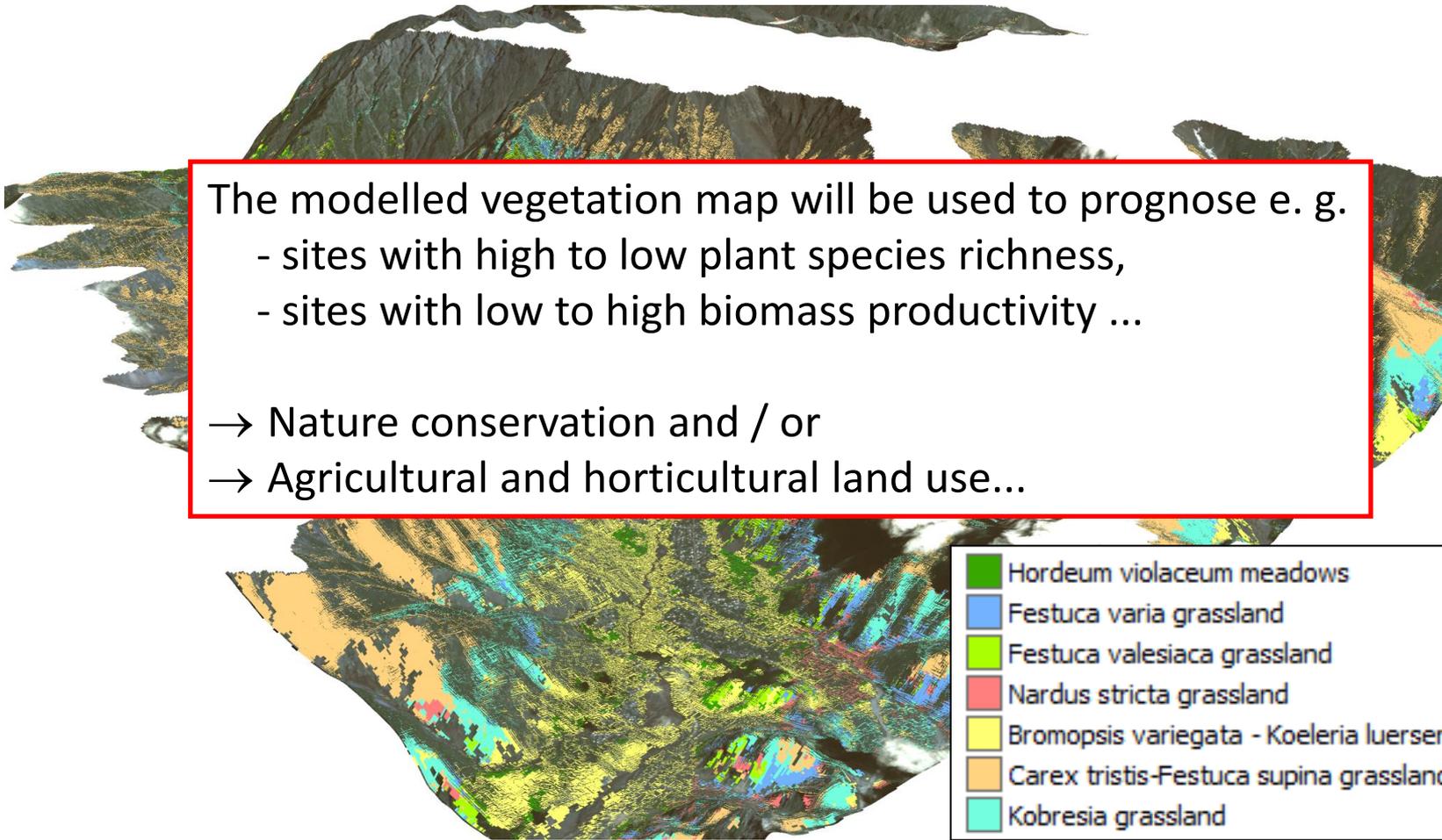
Methodological concept (Fig. 5): Land-use options to improve the livelihood of the local population are at the centre of research, and will be analysed from the human perspective in the socio-economic project unit D. Land use however depends on and, in turn, affects the soil potentials of the region, which are at the focus of project unit B. Both soils and land use determine the rich phytodiversity and vegetation of the region (project unit C), whereas the vegetation pattern affects the carrying capacities for domestic animals and thus the agronomic potentials.



Fig. 5: Project structure of amies II.

Project unit A integrates the disciplinary results from a landscape perspective and provides detailed maps of land-use potentials based on the results gained in projects B to D. Project unit A further prepares an interdisciplinary development of normative scenarios, which is intended for the third year of the project, and coordinates the installation of a German-Georgian Advisory Board. The Board members from relevant institutions are intended to act as multipliers of the gained results, who will transport them to other institutional experts and potential users.

Developing regionally differentiated recommendations for sustainable land use and development



The modelled vegetation map will be used to prognose e. g.

- sites with high to low plant species richness,
- sites with low to high biomass productivity ...

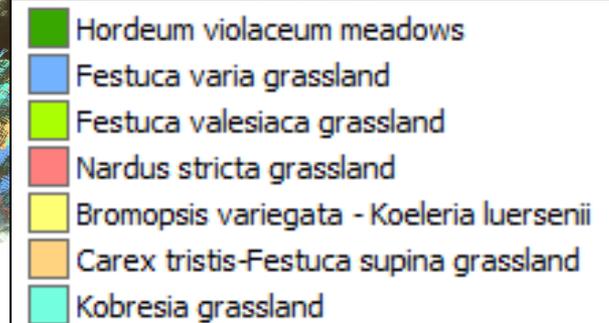
→ Nature conservation and / or

→ Agricultural and horticultural land use...

	Hordeum violaceum meadows
	Festuca varia grassland
	Festuca valesiaca grassland
	Nardus stricta grassland
	Bromopsis variegata - Koeleria luersenii
	Carex tristis-Festuca supina grassland
	Kobresia grassland

Developing regionally differentiated recommendations for sustainable land use and development

Modelling results (C) will be combined with land use information (A, D) and soil information (B) to determine 'carrying capacity' of the landscape.



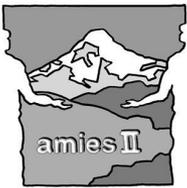


1 Landscape functions can be evaluated positively as well as negatively by indicators (e. g. nature value: biodiversity and species richness; agricultural productivity: yield).

2 The extent of positive and negative interrelations between landscape functions can be evaluated quantitatively and qualitatively via scenarios
(e. g. intensification of agriculture should have a positive effects on farmer ´s income, but could have negative impacts on soil stability, water quality, and biodiversity).

3 Together with stakeholders (local and regional administration, NGOs, ..) and local people scientific sound and socially acceptable options for sustainable land development will be found.

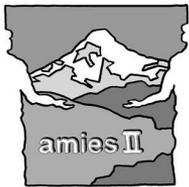




AMIES II

Project Units:

- A Integrative landscape analysis and normative scenarios
- B Soil functions for sustainable land use
- C Phytodiversity-related options for sustainable land use
- D Development of a sustainable, market-oriented supply system for agricultural products



**Scenario development for sustainable land use
in the Greater Caucasus, Georgia**
