VolkswagenStiftung

Between Europe and the Orient –
A Focus on Research and Higher Education
in/on Central Asia and the Caucasus

Midterm-Meeting Gießen

(18th – 20th May 2016, Castle Rauischholtzhausen)

AMIES II

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

Justus Liebig-University

JUSTUS-LIEBIG-UNIVERSITÄT GIESSEN

In cooperation with

Centre for International Development 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

Timetable and Programme

Time	Wednesday 18th	Thursday 19th	Friday 20th
8:00 a.m.			Departure
9:00 - 9:45 a.m.	Introduction	Synthesis A-D and Scenarios	Bus-Excursion Biosphere Reserve Rhoen
09:45 - 10:30 a.m.	Project unit A	How to Transfer Results of AMIES II?	
10:30 - 11:00 a.m.	*Coffee break*	*Coffee break*	Rhoen Biosphere Hessian Administration at 'Groenhoff House Wasserkuppe'; *Sustainable Tourism, Agrotourism, Gliding Airfield*
11:00 - 11:45 a.m.	Project unit B	Direct Marketing – example of an organic farm 'Bioland' in Rauischholzhausen	
11:45 - 12:30 p.m.	Project unit C1		
12:30 - 2:00 p.m.	*Lunch*	*Lunch*	Touristic and Local Marketing Enterprises; *Trout Farming* ***Lunch in the field***
2:00 - 2:45 p.m.	Project unit C2	Integrative Political and Social Discussion	
2:45 - 3:30 p.m.	Poster presentation		Natural Habitat 'Black Moor' ***Bog & Wetland Complex***
3:30 - 4:00 p.m.	*Coffee break*	*Coffee break*	
4:00 - 4:45 p.m.	Project unit D1	Publishing Project Results	
4:45 - 5:30 p.m.	Project unit D2	Final Project Steps	Consuming Regional Products ***Dinner at Hotel 'Röhnschaf' (Seiferts)***
6:00 p.m.	*Joint Dinner*	*Joint Dinner*	
7:30 p.m.		Experimental farm 'Rauischholzhausen' of the Agricultural Faculty (JLU)	Return to Rauischholzhausen (arrival around 9:30 p.m.)

Agenda Midterm-Meeting in Rauischholtzhausen

Wednesday, 18th May 2016 *(9:00 a.m. – 5:30 p.m.)*

- Welcome and who is who ?

Agenda Midterm-Meeting in Rauischholtzhausen

Wednesday, 18th May 2016 *(9:00 a.m. – 5:30 p.m.)*

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

Thursday, 19th May 2016 *(9:00 a.m. – 5:30 p.m.)*

- How to Transfer Results of AMIES II?
- Excursions in Rauischholtzhausen

Friday, 20th May 2016 *(7:30 a.m. – 9:00 p.m.)*

- Bus-Excursion to UNESCO Biosphere Reserve Rhoen

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

AMIES: the **a**nalysis of the **i**nterrelationship between **e**nvironmental and **s**ocietal 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)

Project units and sub-projects

A Integrative landscape analysis and normative scenarios

B Soil functions for sustainable land use

- B1 Quaternary sediment deposits
- B2 Soil productivity and ecological soil functions

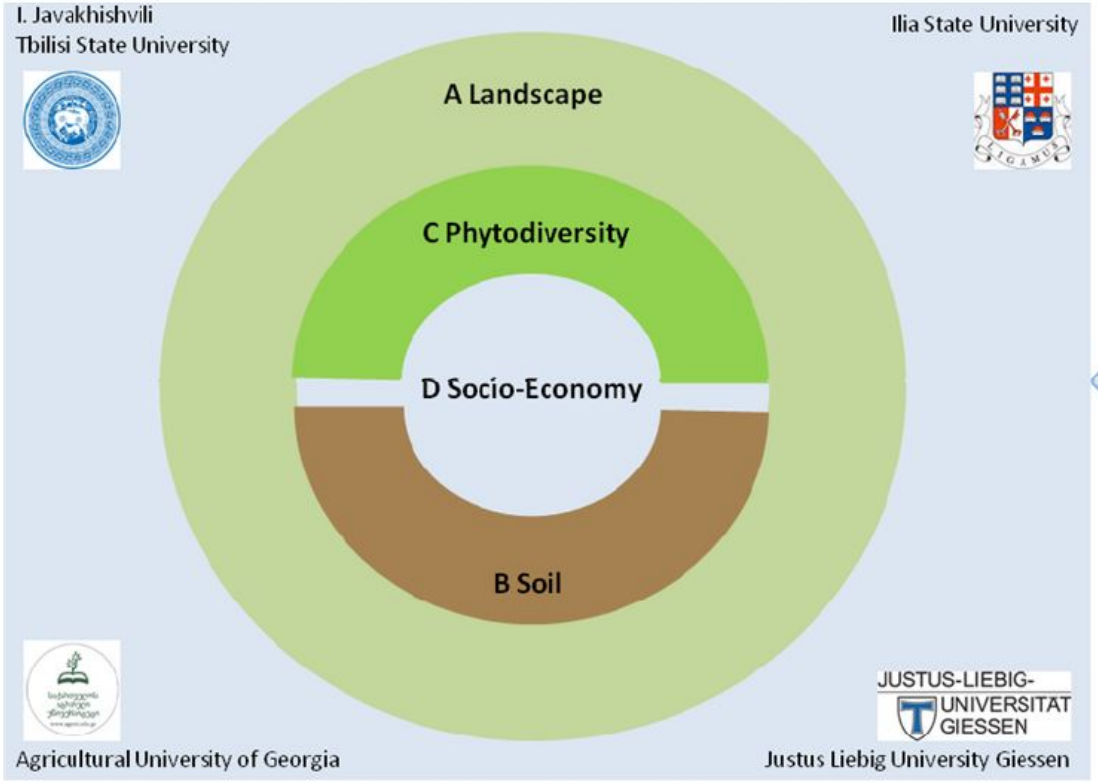
C Phytodiversity-related options for sustainable land use

- 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**



Step 2 **Scenario development for sustainable land use**

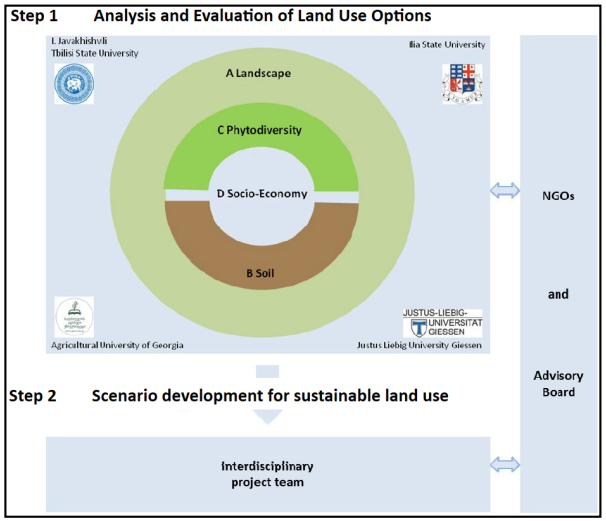
Interdisciplinary
project team

NGOs

and

Advisory
Board

Center 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.

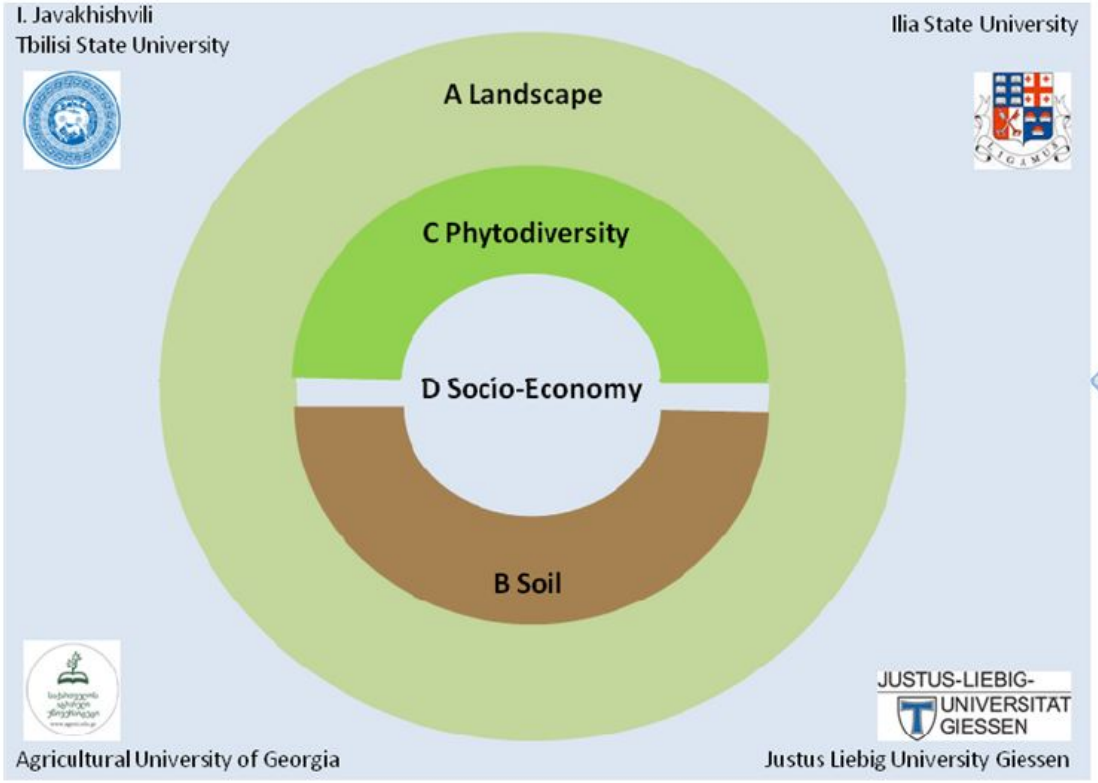
These interdependencies need to be studied in disciplinary detail by project units **A, B and C.**

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 intended for the third year of the project.

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.

Step 1 **Analysis and Evaluation of Land Use Options**



Step 2 **Scenario development for sustainable land use**

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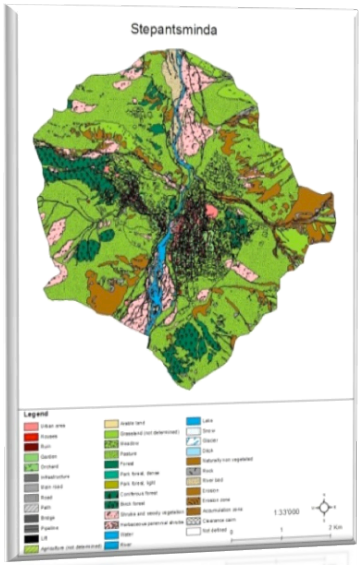
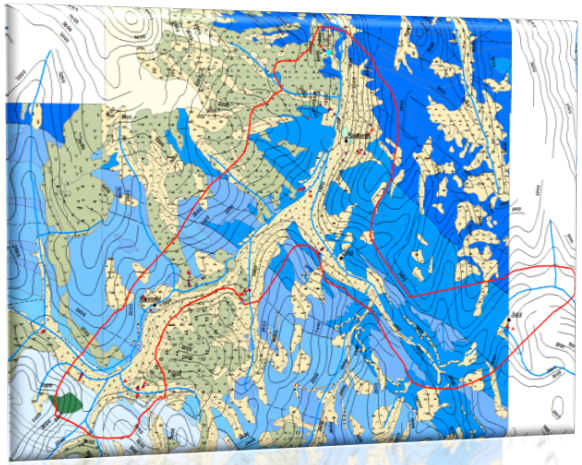
Step 1 **Analysis and Evaluation of Land Use Options**
to develop regionally differentiated recommendations for sustainable land use and land development

A



B



Evaluation of
<u>current land use and land cover</u>:

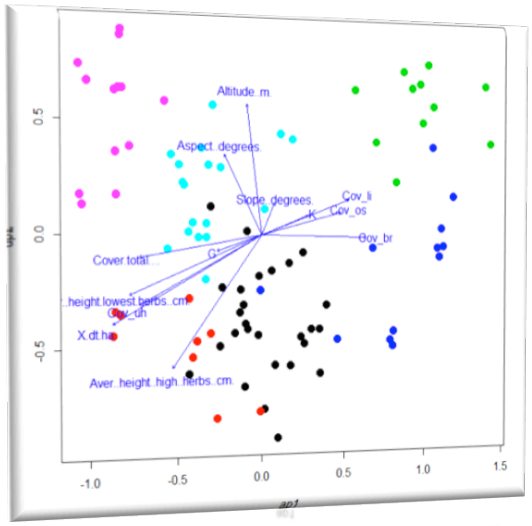
Agricultural land
- Distribution of meadows and pastures
- Localization of arable fields/ glasshouses
- Distribution of historic arable fields
- Livestock in the settlements

Reforestation, succession
- Birch-*(Betula*-) forests are spreading

<u>Soil descriptions</u> 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*

C



Local <u>vegetation</u> and features of grassland, arable fields and homesteads:

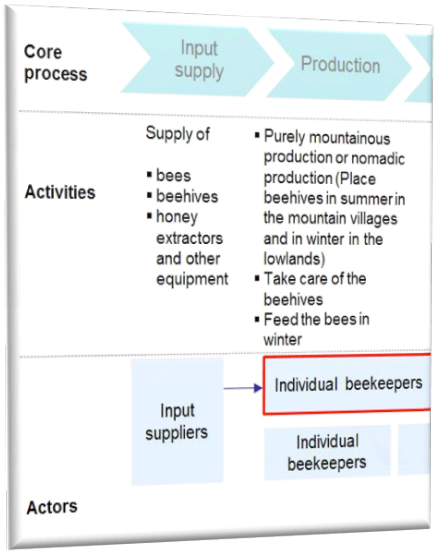
C1

- Generating a <u>vegetation</u> map
- Grassland biomass to estimate the amount of fodder (spectral data, biomass harvesting)
- Recording the tracks of cattle herds show a grazing distance of 12 – 13 km /day-
- Effects on re-forestation?

C2

- <u>Agrobiodiversity</u>: Cultivated & non-cultivated plant species in arable fields and home gardens

D



***Face-to-face <u>interviews</u>* with local farmers:**

D1

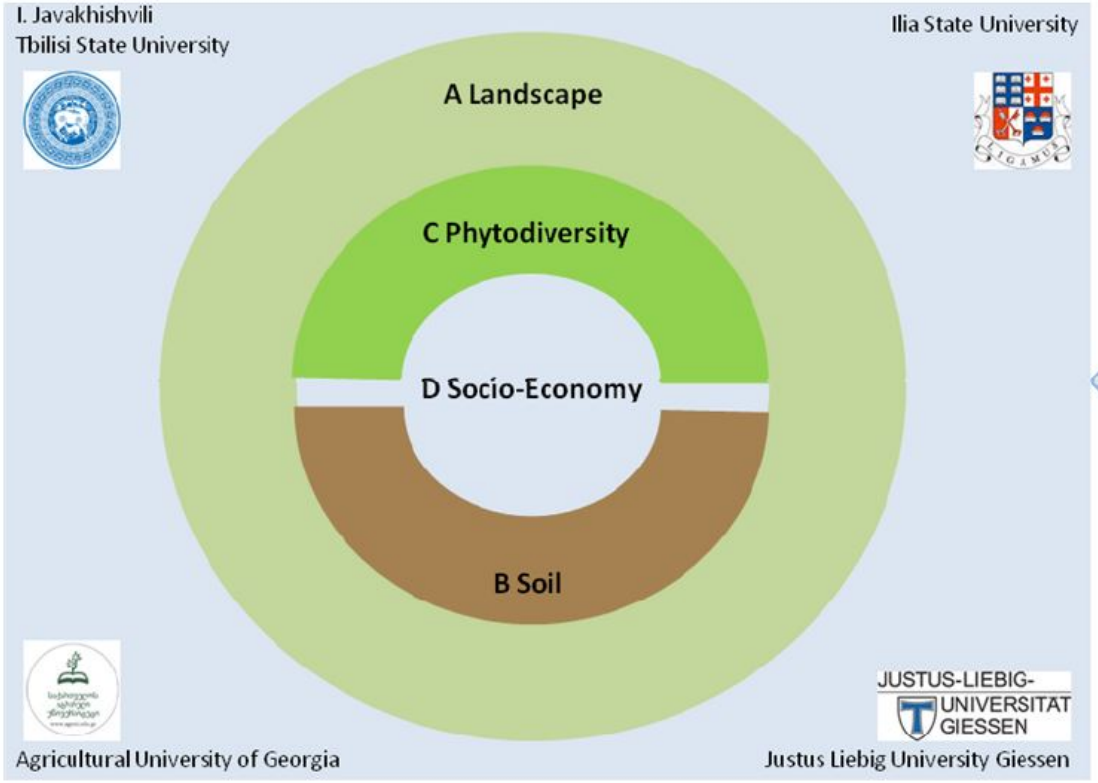
- Local socio-economic conditions in <u>agricultural production</u>
- Data about the agricultural food production
- Product demand data

D2

- Work out dependencies between the food production and the local increasing <u>tourism</u> sector

Step 2 Scenario development for sustainable land use

Step 1 Analysis and Evaluation of Land Use Options



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Step 2 Scenario development for sustainable land use

Interdisciplinary project team

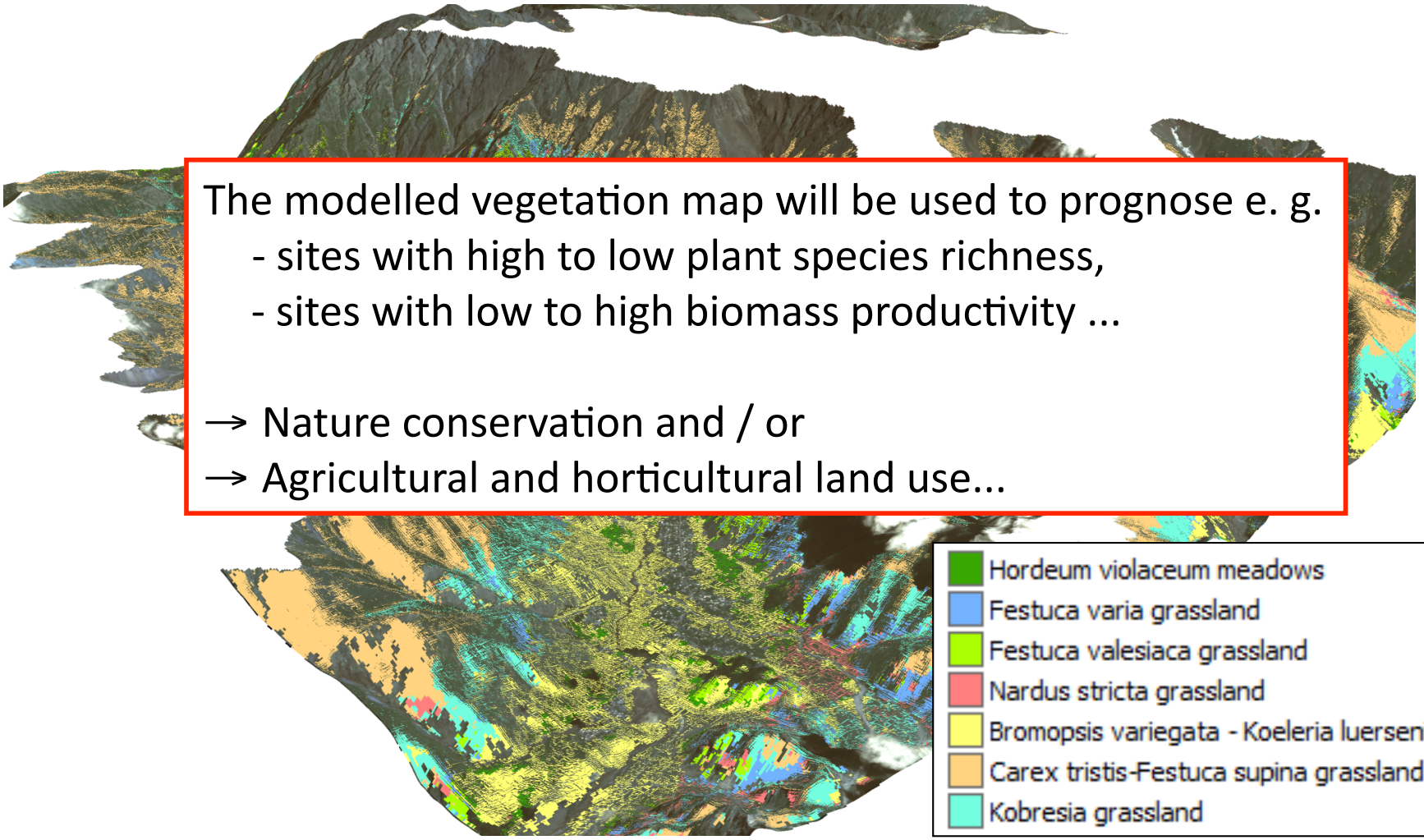
Steps of joint scenario development

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

Developing regionally differentiated recommendations for sustainable land use and development

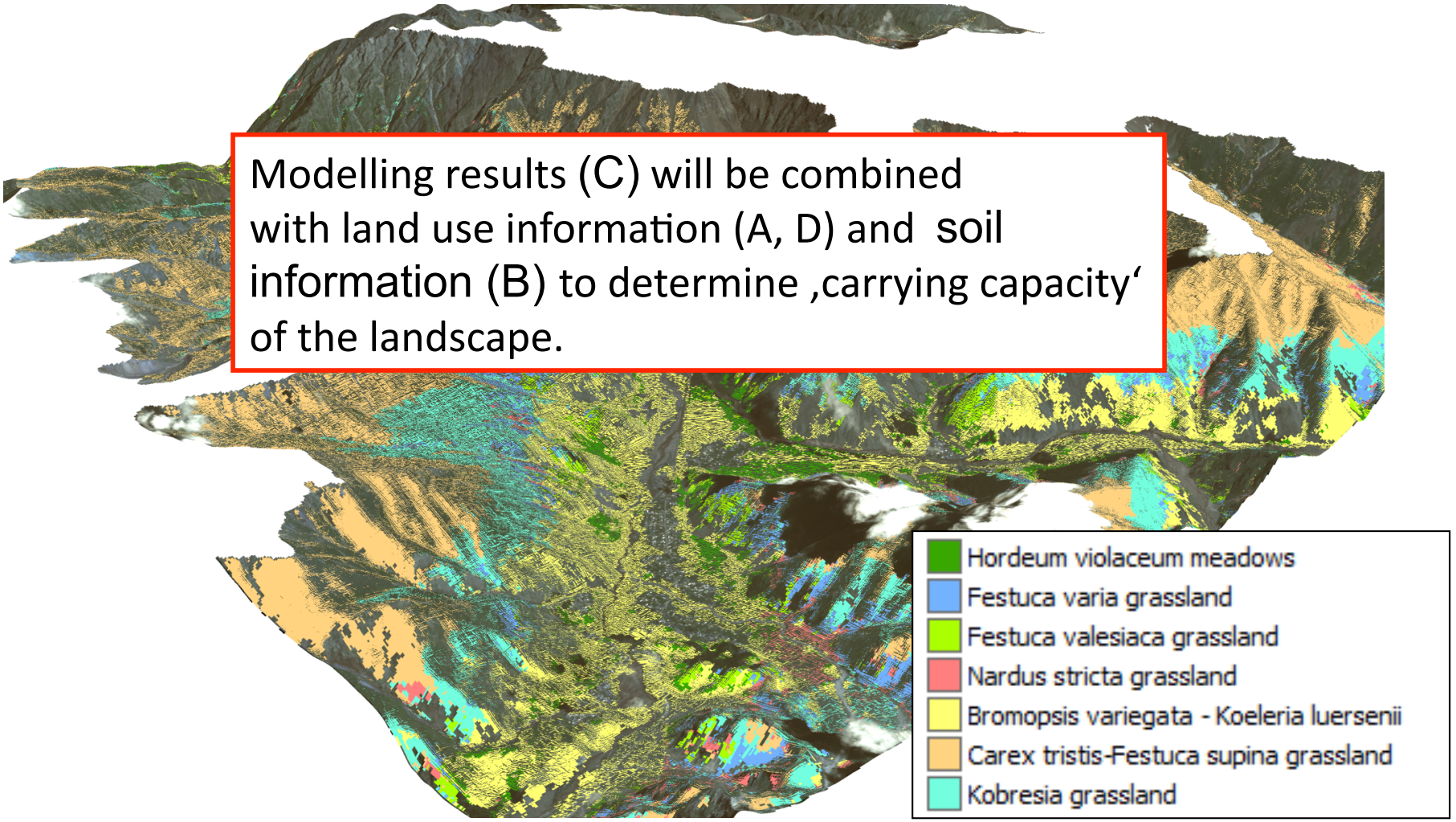
The modelled vegetation map will be used to prognose e. g.
- sites with high to low plant species richness,
- sites with low to high biomass productivity ...

→ Nature conservation and / or
→ Agricultural and horticultural land use...

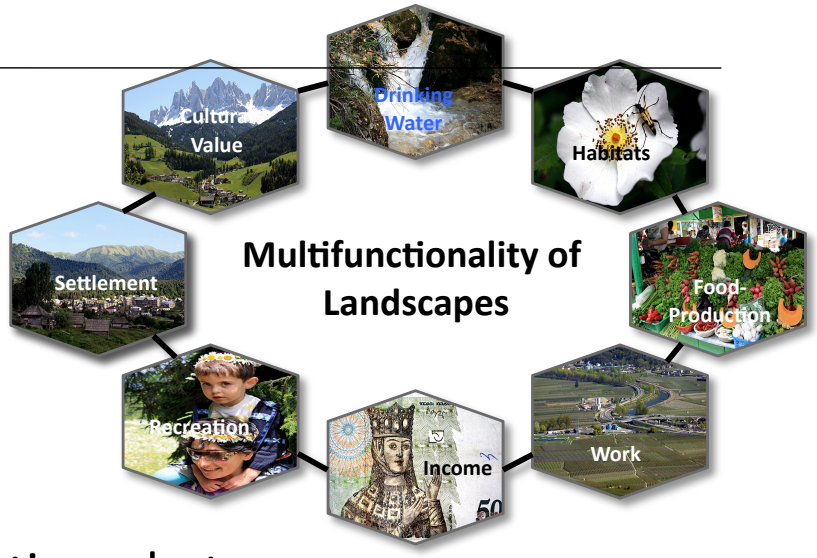


Developing regionally differentiated recommendations for sustainable land use and development

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



Conclusions



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

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

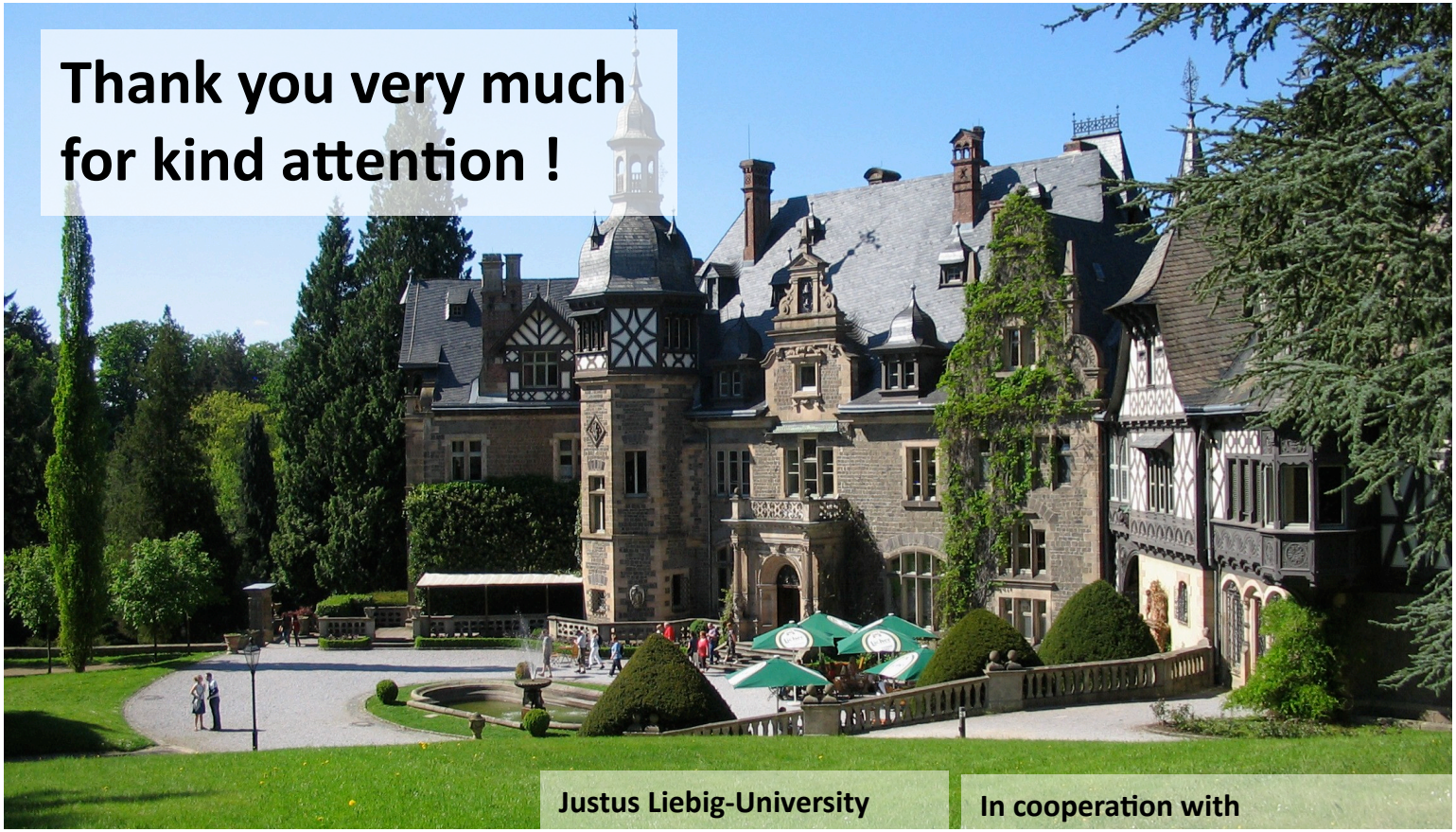
3 Together
with stakeholders (local and regional administration, NGOs, ..) and local people scientific sound and socially acceptable options for sustainable land development will be found.

Waldhardt et. al. - Ecology and Society 15 (2010)

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

JUSTUS-LIEBIG-UNIVERSITÄT GIESSEN

Thank you very much for kind attention !



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Publishing Project Results

Theme Issue
***Annals of Agrarian Science* (Elsevier)**

'Environmental and socio-economic resources at the landscape level – potentials for sustainable land use in the Greater Caucasus'

A comprehensive overview of the AMIES-research results would give the readership a broad overview of methods and results generated in disciplinary as well as in interdisciplinary environmental research undertaken in mountainous regions of Georgia.

http://www.journals.elsevier.com/annals-of-agrarian-science/

Questions Otte; answers Urushadze (Editor-in-Chief)

1. How many pages are projected for theme issues in Elsevier´s journals and how many pages are in general foreseen for one contribution?
   We can publish 4 issues per year and each issue can be near 120 - 140 pages (means 10 – 12 articles / issue) .

2. Is it possible to publish a theme issue focussed on AMIES research results or are theme issues open for all contributions with concern to the volume´s topic?
   Yes, it is possible and theme issues are open for all contributions with concern to the volume's topic.

Questions Otte; answers Urushadze (Editor-in-Chief)

3. Deadlines – if you will get 'green light' for a theme issue what are the deadlines to collect and submit the contributions, and to finalise the volume?
   Journal have such: submit the articles (proposal of Elsevier) 4 times per year: 25 February, 25 of May, 25 of August, 25 of November.
   The editorial office will send them to 2 reviewers. The journal has a REVIEWER'S FORM and reviewer must return it within 3 weeks.
   So, this procedures may be finished till 25th of August (3rd issue), but in reality it may 25th of November (4th issue).

4. Deadline to submit contributions to be published in Issue 4 (2016) ?

Theme issue
***Annals of Agrarian Science* (Elsevier)**

Environmental and socio-economic resources at the landscape level – potentials for sustainable land use in the Greater Caucasus

Topics:
Environmental resources
- Climate, Climate change
- Surface water quality
- Soil properties and functions
- Biodiversity (Phytodiversity, Agrobiodiversity)
….
Socio-economic resources
- Population, income
- Land use, land use change
- Potentials for agricultural and horticultural productivity
- Income from tourism

Options for sustainable land use

What we have (working titles) **and what we could add:**

Environmental resources

- *Climate, climate change*:

ELISBRASHVILI, M. & KING, L. : not decided yet.

- *Surface water quality:*

?

- *Soil*:

HANAUER, T. et al.:
Soil distribution and soil properties in the subalpine Central Great Caucasus (Kazbegi region): Soil qualitity rating (SQR) of agricultural soils.

HANAUER, T. et al.:
Soil distribution and soil properties in the subalpine Central Great Caucasus (Kazbegi region): Distribution and genesis.

HANAUER, T. et al.:
Soil distribution and soil properties in the subalpine Central Great Caucasus (Kazbegi region): Physiochemicla and microbial properties.

- *Biodiversity*

SIMMERING, D. et al.:
Mapping floristic gradients in Caucasus grasslands based on vegetation-plot data, topography and remote sensing.

TEDORADZE, G. et al.:
Phytodiversity and biomass production of grassland at steep slopes in the subalpine Central Great Caucasus (Kazbegi region).

HANSEN, W. et al.:
Vegetation and site conditions of Betula litwinowii succession sites in the Kazbegi region

GAIDAMASHVILI, M.:
Tissue cultures for nature conservation?

- *Agrobiodiversity*:

AKHALKATSI, M., BRAGVADZE, T., TOGONIDZE, N., ASANIDZE, Z., ARABULI, G., CHIKHELIDZE, N., OTTE A.:
Agrobiodiversity and Genetic Erosion of Crop Varieties and Plant Resources in the Central Great Caucasus.

BEDOSHVILI, D.:
A review of wheat (or cereals) with brief characteristics and an updated taxonomy.

Socio-economic resources

- *Population, income*

D: HEINY, J., SCHMIDT, P., LEONHÄUSER, I.-U.:
Application of the Theory of Planned Behavior: Getting Data on the Intention of Private Households to Get Engaged in Agriculture and Tourism in the Kazbegi Region (**requested, not yet confirmed by JH and Peter Schmidt**)
D: HEINY, J., MAMNIASHVILI, G., LEONHÄUSER, I.-U.:
The Socioeconomic Situation of Private Households in the Kazbegi Region – First Insights on the Basis of Quantitative and Qualitative Data (**requested, not yet confirmed by JH and GM**)

- *Income from tourism*

D: HÜLLER, S., HEINY, J., LEONHÄUSER, I.-U.:
Linking Agricultural Food Production and Rural Tourism in the Kazbegi Region – A Qualitative Study
D: SALUKVADZE, J.:
working title will be sent.

- Land use, land use change

A: THEISSEN, T. et al.:
Analysis of the spatial pattern of land cover and land use in the Kazbegi region - based on remote sensing data. (2014; landscape statistics, overview: settlements, homegardens, arable land, meadows, pastures..)

A: THEISSEN, T., WIESMAIR, M., OTTE, A., WALDHARDT, R.:
Land Use Dynamics in the Central Great Caucasus (Kazbegi Region)

- Potentials for agricultural and horticultural productivity

D: SHAVGULIDZE, R., BEDOSHVILI, D., AURBACHER, J.:
Productivity and Efficiency of Montane Agriculture in the Kazbegi Region, Greater Caucasus

<u>Options for sustainable land use</u>

A - D : WALDHARDT, R. et al. :
Developing options to increase sustainability and productivity of agriculture in the Kazbegi region (Greater Caucasus, Georgia).

Theme issue
Annals of Agrarian Science **(Elsevier)**

Environmental and socio-economic resources at the landscape level – potentials for sustainable land use in the Greater Caucasus

Topics:	Contributions:
Environmental resources	15
- Climate, Climate change	?
- Surface water quality	?
- Soil properties and functions	1 (2)
- Biodiversity (Phytodiversity, Agrobiodiversity)	6
….	
Socio-economic resources	
- Population, income	2
- Land use, land use change	2
- Potentials for agricultural and horticultural productivity	1
- Income from tourism	2

Options for sustainable land use	1

Thank you very much for a constructive discussion!

http://www.journals.elsevier.com/annals-of-agrarian-science/

Final Project Steps

a) Defining the Project´s Output

b) Analyzing Deficits

c) Task List up to the End of 2016

d) Schedule for the Final Output

VolkswagenStiftung

Between Europe and the Orient –
A Focus on Research and Higher Education
in/on Central Asia and the Caucasus

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).

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

Fig. 3: Mount Kazbeg (5,047 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**.

Appicants and co-applicants:

Project Unit A: Rainer Waldhardt[1], Annette Otte[1], Otar Abdaladze[2], George Nakhutsrishvili[2]

Project Unit B: Peter Felix Henningsen[1], Tengiz Urushadze[3], Besik Kalandadze[4]

Project Unit C: Annette Otte[1], Rainer Waldhardt[1], Maia Akhalkatsi[3], George Nakhutsrishvili[3]

Project Unit D: Ute Leonhäuser[1], Joachim Aurbacher1, Joseph Salukvadze[4], David Bedoshvili[3]

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

Project coordinator / Contact: Prof. Dr. Dr. Annette Otte,
Landscape Ecology and Landscape Planning, Justus Liebig University Giessen
Heinrich-Buff-Ring 26-32, D-35392 Giessen, Germany
Phone: +49 (0)641 / 99-37161, Fax: -37169, e-mail: annette.otte@umwelt.uni-giessen.de

We are indebted to the VolkswagenStiftung for their generous funding of the project.

JUSTUS-LIEBIG-UNIVERSITÄT GIESSEN

AMIES II

Project Units:

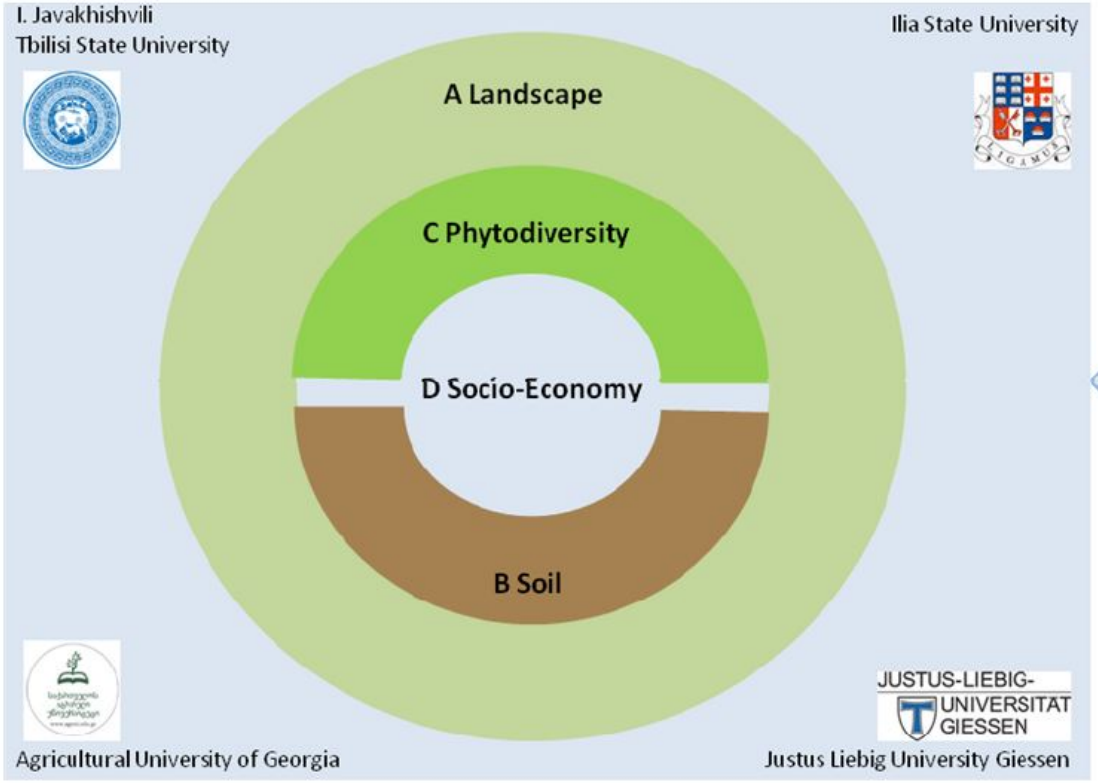
A Integrative landscape analysis and normative scenarios

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

Step 1 Analysis and Evaluation of Land Use Options



NGOs

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Step 2 Scenario development for sustainable land use

Interdisciplinary project team