

Developing scenarios for sustainable land use in the Kazbegi region, Georgia – an interdisciplinary and normative approach –

Project Unit A (R. Waldhardt)

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In cooperation with



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and Environmental Research



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Approaches and aims of AMIES I and AMIES II

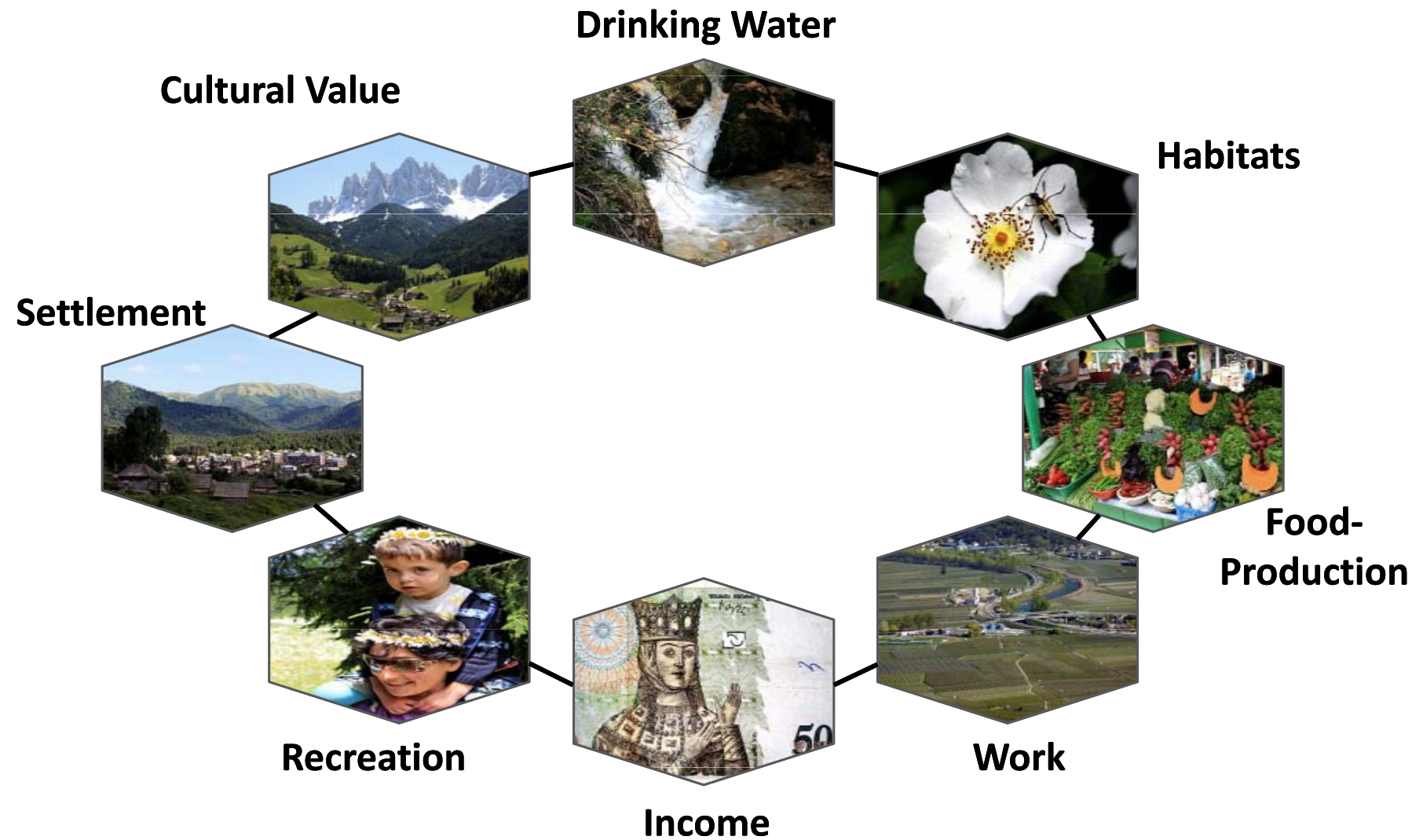
- From 2010 to 2016, disciplinary and interdisciplinary **analyses** were conducted in AMIES I and II.
- According to the proposal of AMIES II ,The ... project ... aims **to develop scenarios** which utilize hidden agricultural and economic potentials of the Kazbegi region.’ and **‘to evaluate the sustainability of land-use options’**.

Normative scenario approach

- The design of alternative futures 'that portray futures that should be' (Nassauer and Corry 2004)
- A design of alternative futures, which are based on scientific analyses (*scientifically sound ,planning process'*)
- An approach, which may inspire policy makers and land users by providing alternative multifunctional futures

NASSAUER, J. I., and R. C. CORRY. 2004. Using normative scenarios in landscape ecology. - Landscape Ecology 19:343-356.

Multifunctionality of land use / landscapes



Normative scenario approach

See also:

WALDHARDT, R., BACH, M., BORRESCH, R., BREUER, L., DIEKÖTTER, T., FREDE, H.-G., GÄTH, S., GINZLER, O., GOTTSCHALK, T., JULICH, S., KRUMPHOLZ, M., KUHLMANN, F., OTTE, A., REGER, B., REIHER, W., SCHMITZ, K., SCHMITZ, P.M., SHERIDAN, P., SIMMERING, D., WEIST, C., WOLTERS, V. & ZOERNER, D: Evaluating today's landscape multifunctionality and providing an alternative future: a normative scenario approach. - Ecology and Society 15(3): 30.

<http://www.ecologyandsociety.org/vol15/iss3/art30/>

Implementation of the normative scenario approach in AMIES II



Normative scenario approach in six steps

- I. documentation of today's land use and site conditions at the scale of uniformly managed land units
- II. detection of functional deficits of today's land use considering environmental, social and economic attributes
- 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 normative scenarios
- V. rule-based modification of today's land-use pattern in normative scenarios
- VI. evaluation of the normative scenarios against today's landscape (reference) with respect to multifunctionality

I. documentation of today's land use and site conditions at the scale of uniformly managed land units

air photo interpretation and field work (A)

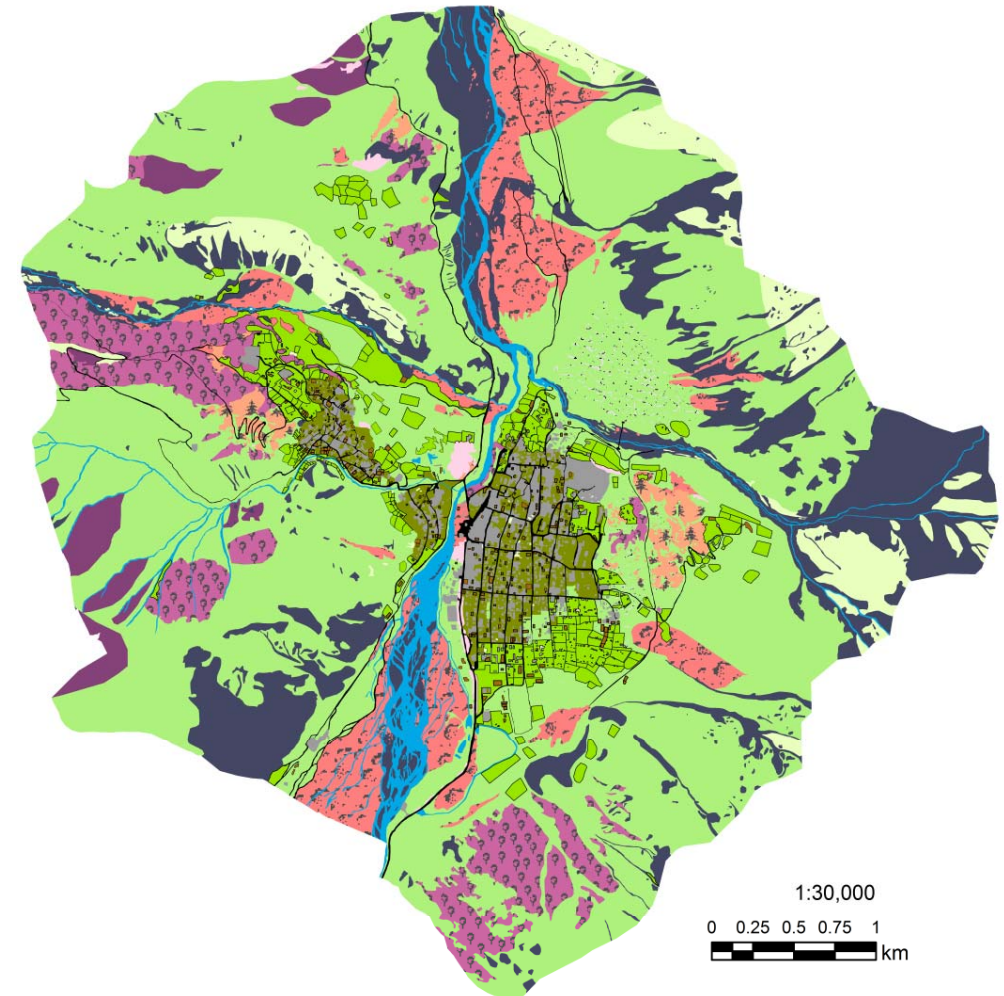
consideration of site information
(e.g., soil distribution and properties) (B)

consideration of data on biodiversity
in open land and forests (C)

consideration of data on productivity
and quality of grassland (A, C)

documentation of production systems
and livelihood of people based on interviews
and statistics (D)

► **common high-resolution GIS-database
on land use and site conditions**



Legend

Forest and shrubland

- Crookstemmed *B. litwinowii* forest and *R. caucasicum* scrub
- B. litwinowii* forest with *S. caprea* and *S. aucuparia*
- Populus tremular* forest (planted)
- Pinus sylvestris* forest (planted)
- Shrubland with *E. rhamnoides*

Agricultural used land

- Pasture
- Meadow
- Garden
- Arable land

Sparsely to non-vegetated

- Sparsely vegetated (slope, gravel)
- Clearance cairn
- River, creek

Settlement

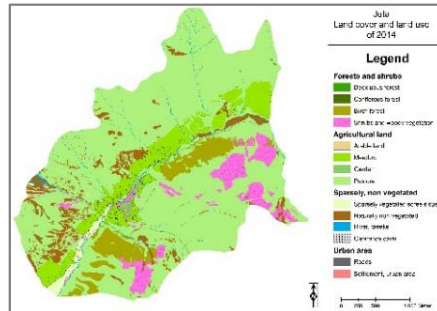
- Settlement
- Road

Scenario approach

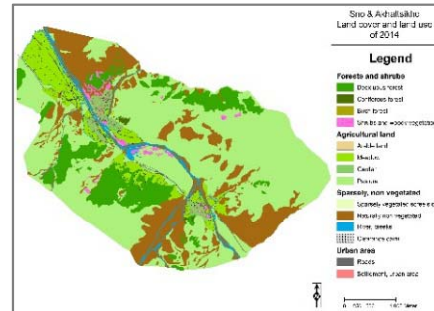
- Additional arable land (PROT-REG & PROT-MAX threshold T 1 and for LIM-MAX T 2)
- Water pollution control (reduced grazing within 30 m radius)
- Excluded area (PROT-REG & PROT-MAX slopes >30°; for LIM-MAX slopes >40°)

I. documentation of today's land use and site conditions at the scale of uniformly managed land units

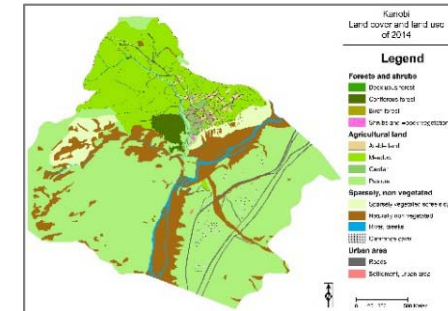
Juta



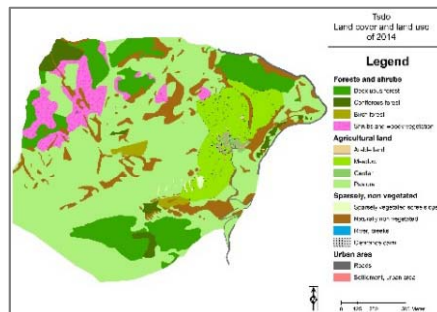
Sno & Akhaltsikhe



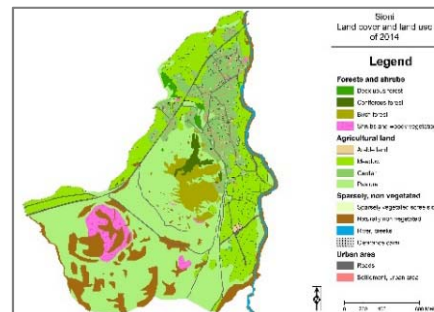
Kanobi



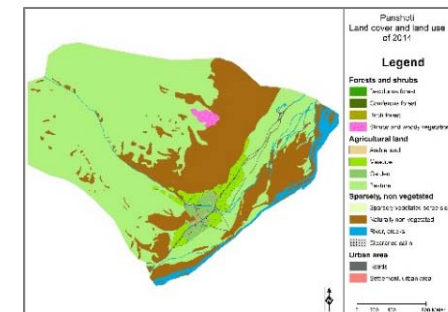
Tsdo



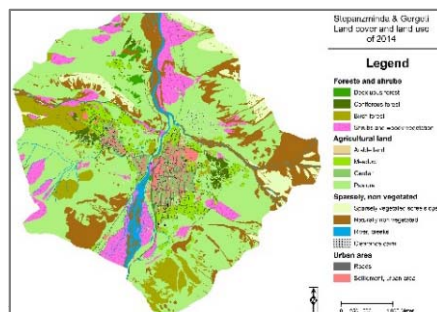
Sioni



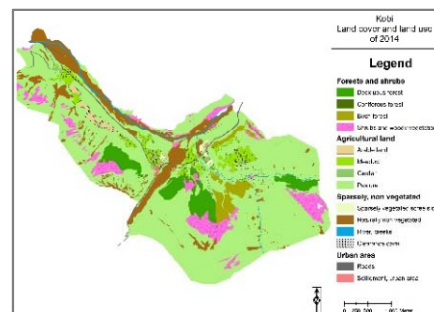
Pansheti



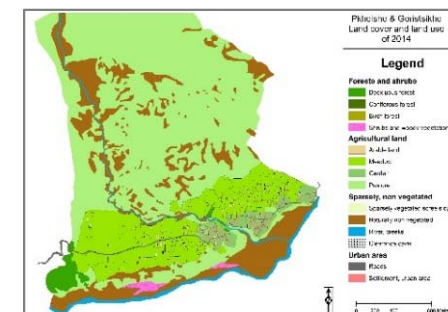
Stepanzminda & Gergeti



Kobi & Ukhati

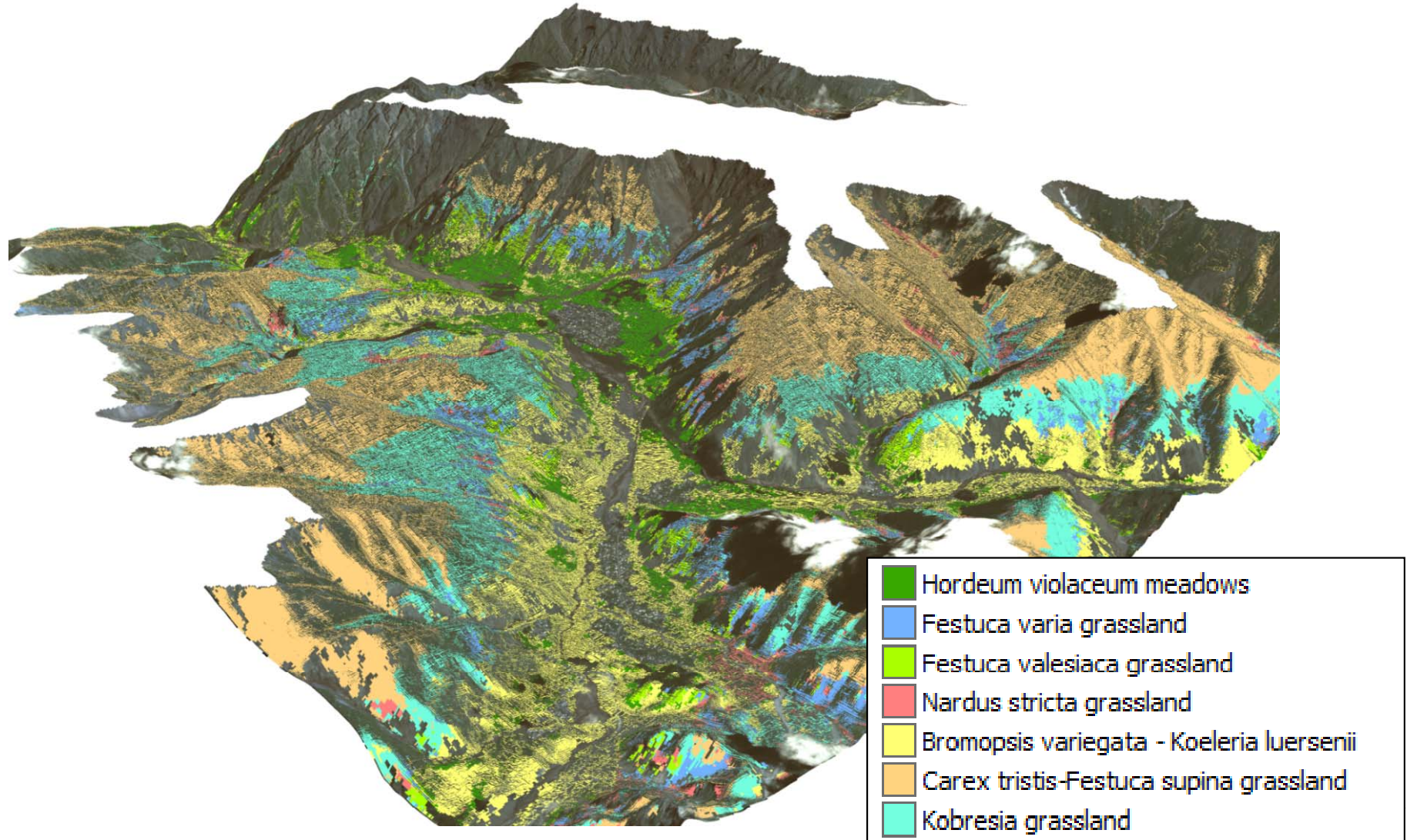


Pkhelshe & Gorisikhe



I. documentation of today's land use and site conditions at the scale of uniformly managed land units

Modelled soil map, modelled map of grassland productivity, modelled vegetation map,



II. detection of functional deficits of today's land use considering environmental, social and economic attributes

Example: field research on grassland vegetation, considering production systems and site conditions (habitat types)



► **disciplinary qualitative and quantitative analysis of landscape attributes**

II. detection of functional deficits of today's land use considering environmental, social and economic attributes

- vulnerability of soils (potential sites of soil erosion / degradation) (B)
- ‚inefficient use‘ of sites with fertile soils (A, B, C)
- lack of woody vegetation (C)
- (in)adequate biomass of mountainous grassland (A, C)
- (in)adequate nutritional quality of hay (B, C, D)
- technical (in)efficiency of farming (D)
- (in)efficiency of touristic activities (D)
-

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 normative scenarios

interdisciplinary expert discussions on regionally-applicable production systems and landscape structure

These steps were done between summer 2016 and summer 2017 in joint meetings of the project units A to D in Giessen (and to some extent with input of project partners and experts in Georgia)

► **(inter)disciplinary ideas for alternative futures**

IV. determination of rules for the incorporation of alternative land uses in normative scenarios

| | | Ecological limits | |
|--------|----------------------------|-------------------|-----------------|
| | | strong protection | moderate limits |
| Cattle | maximum cattle | PROT-MAX | LIM-MAX |
| | regionally oriented cattle | PROT-REG | |

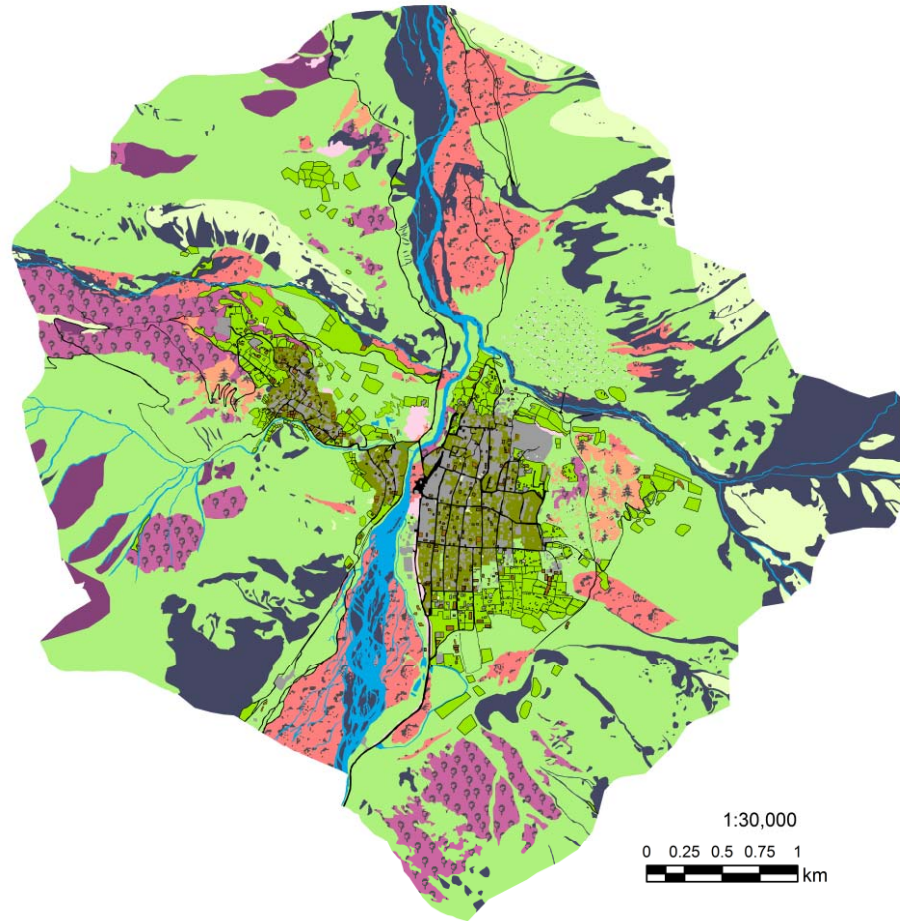
Scenario 'Ecological Protection and Maximum Cattle' (PROT-MAX)

Scenario 'Ecological Protection and Regional Orientation' (PROT-REG)

Scenario 'Ecological Limits and Maximum Cattle' (LIM-MAX)

→ see the following presentation

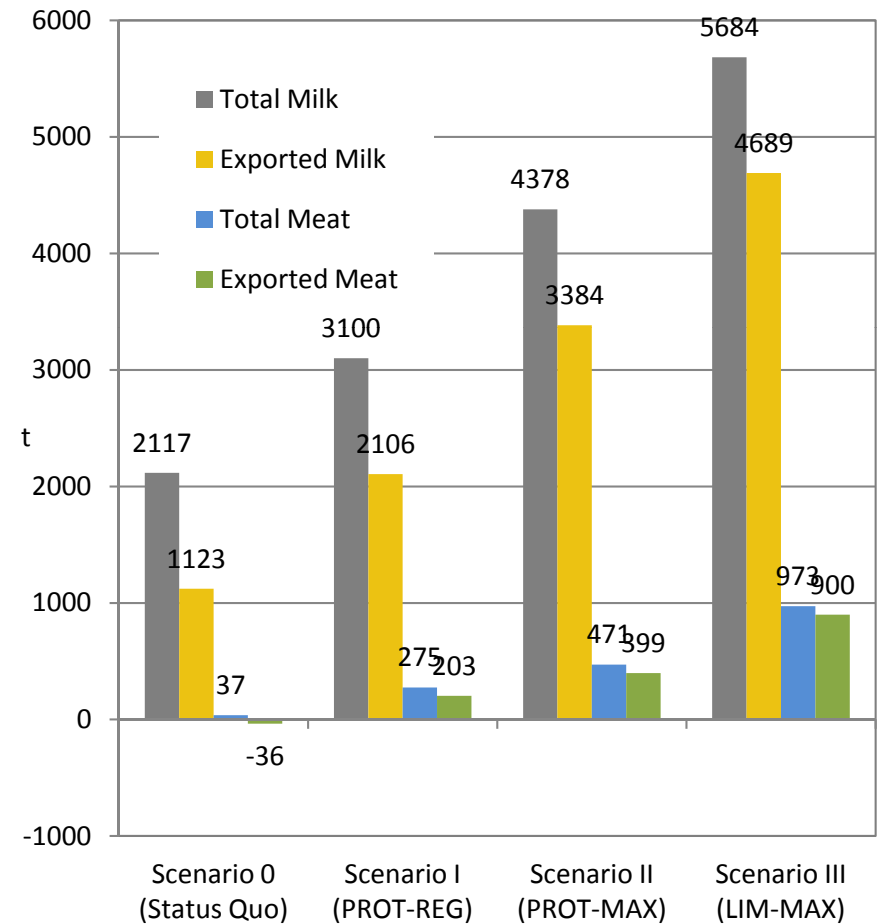
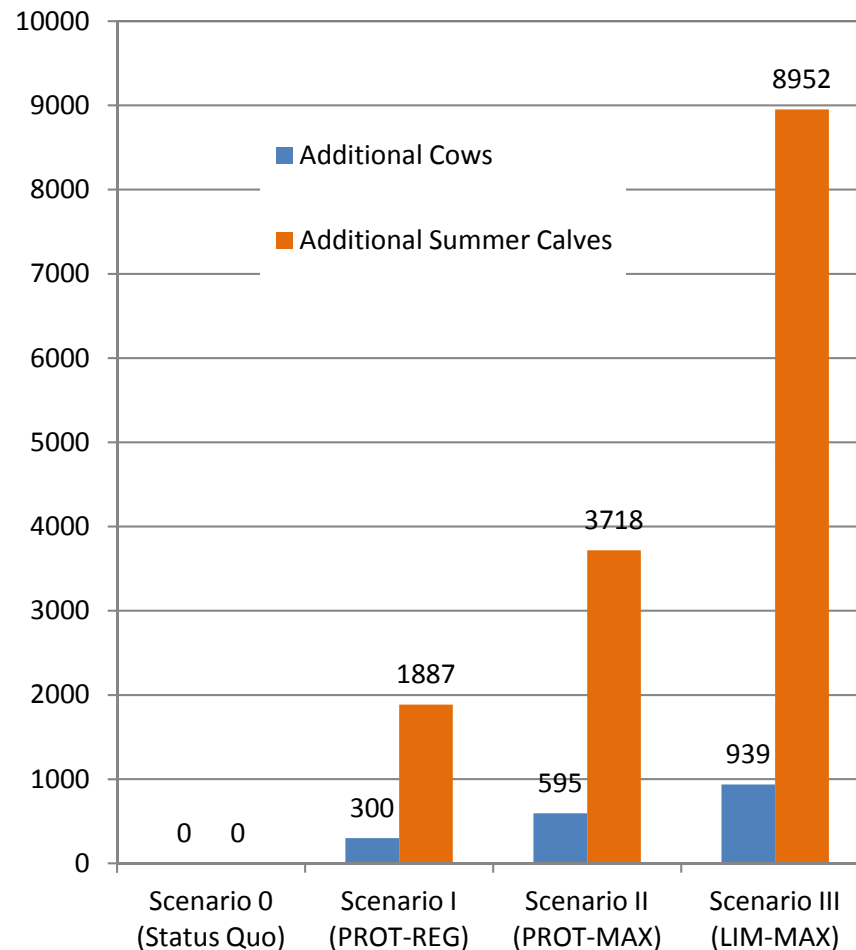
V. rule-based modification of today's land-use pattern in normative scenarios



► GIS realization of normative scenarios

→ see posters and the following presentation

VI. evaluation of the normative scenarios against today's landscape (reference) with respect to multifunctionality



► discussion of ecological, economic and societal effects of land-use changes

→ see the following presentation

One more step ...


- The results of the normative scenario approach will be published in an international journal (e.g. Ecology & Society).
- A first draft of the manuscript has been prepared in autumn 2017.
- The final manuscript will be submitted to the journal by the end of 2017.

Many thanks for your attention



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and filled with worries about the future