Application of spatial quantitative methods to study the dynamics of relations between socioeconomic and natural systems

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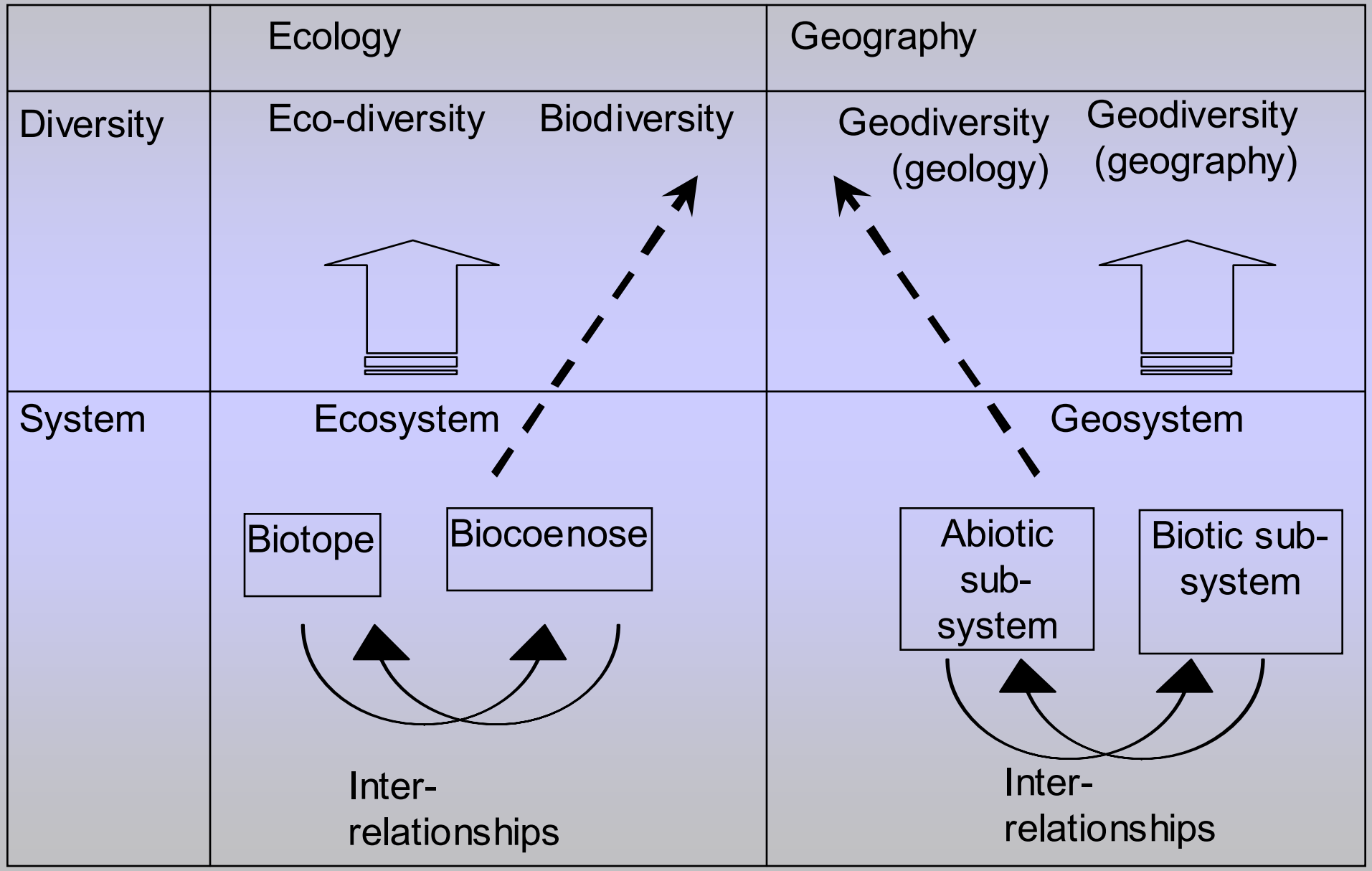
Research directions

- '*Application of spatial quantitative methods to study dynamics of relationships between socioeconomic and natural systems*'
  - D1. Theoretical issues: natural & man-dominated systems
    - Ecology of territorial systems
    - Microbial Geographical Information System
    - Transformation of former military units into entrepreneurial centers
    - Relationship between ecology and theology
  - D2. Methodological elements for D1
    - Spatial statistics, geo- and biostatistics
    - Management of electronic health records
  - D3. Educational principles and methods for D1 & D2

Ecology of territorial systems: Personal views

- Basic principles: systemic approach, critical reasoning, quantitative & spatial thinking
- System: functional structure
  - Structure: elements & relationships
- Diversity as a key feature of systems
  - Spatial interpretation
- Urban systems *vs*. ecosystems
- Temporal & spatial scale of landscapes
- Extension of ‘land use’ to natural systems

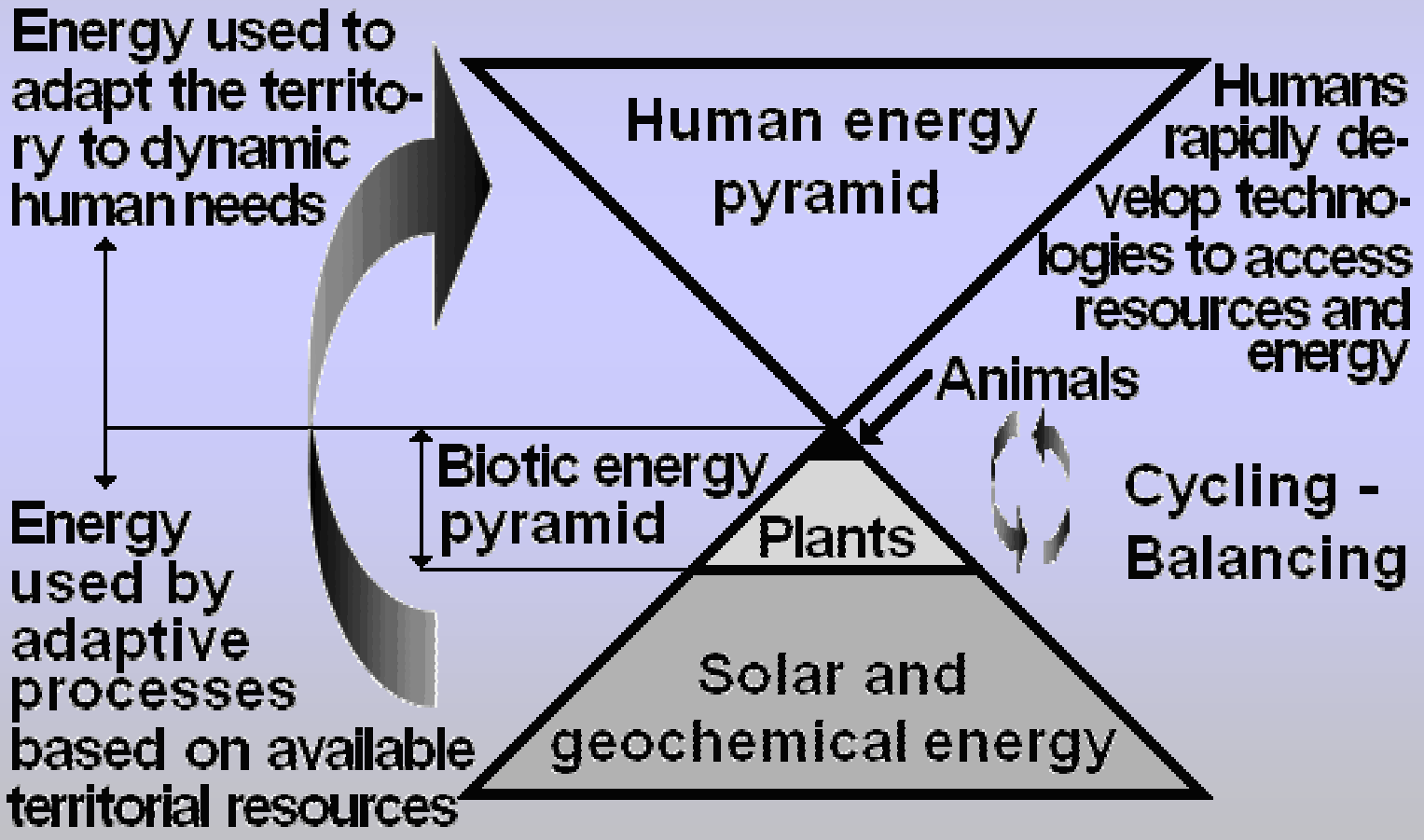
Ecology of territorial systems: Diversity



Ecology of territorial systems: Correspondence of the hierarchies of systems in geography, ecology and spatial planning and spatial diversity

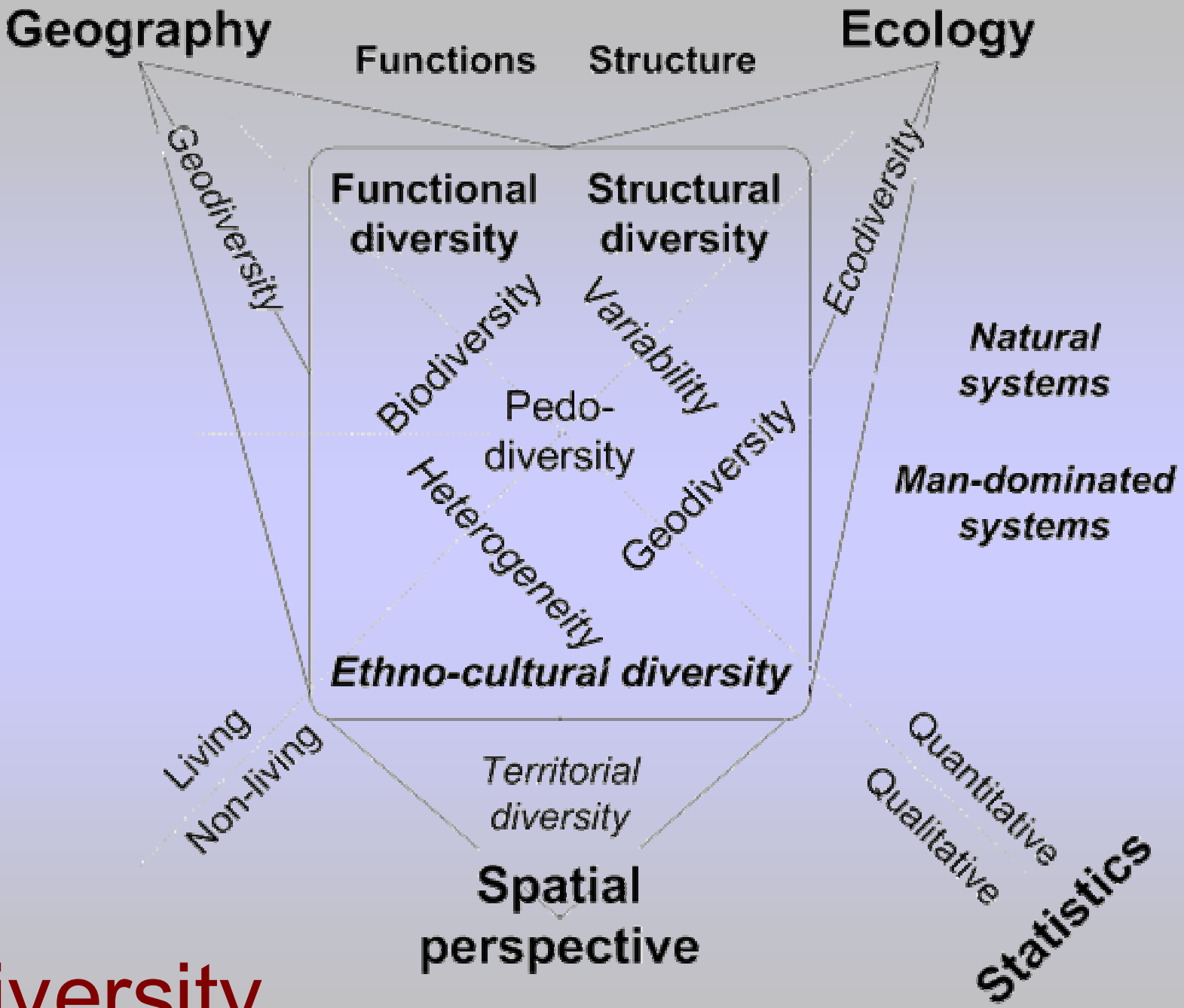
Hierarchy of ecological systems	*Hierarchy of geographic systems*	*Hierarchy of territorial systems*	*Spatial diversity*
Structural & functional subunits of ecosystems	Nano- & micro-structures, house/ block, company/ unit/ section, street/street segment	-	α, ω
Ecosystem	Geosystem, geofacies, geotope, local system	NUTS V (LAU II)	α, ω
Regional ecological complex	Natural region, geographical region, regional system	NUTS III	ß, γ, ω
Macro-regional ecological complex	Domain, zone, national/ supra-national, continental system	NUTS II/ I, national territory, continent	γ, δ, ε, ω
Ecosphere	Geosphere, planetary system	Globe	ω

Ecology of territorial systems: Reverted energy pyramid



Ecology of territorial systems: Spatial approach to diversity based on the Nomenclature of Territorial Units for Statistics

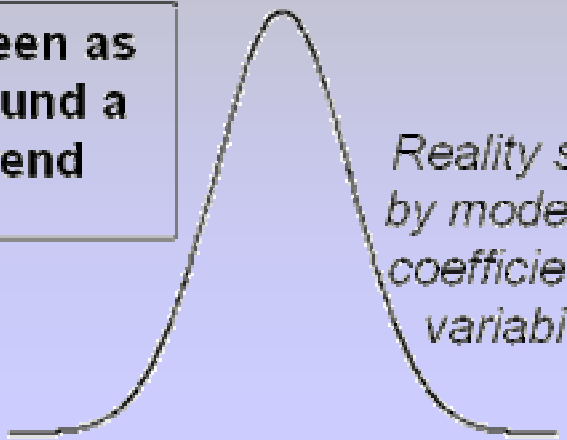
Diversity	*NUTS levels*			
	I	*II*	*III*	*IV-V/ LAU I-II*
Hydro-geomorphologic units (relief)	x	x	x (by case)	
Biogeographical regions	x	x		
Ecological regions	x	x	x (by case)	
Types of ecosystems and/or habitats	CORINE I Anderson 1	CORINE I/II Anderson 1	CORINE II Anderson 2	CORINE III Anderson 2
x – indicates that diversity can be approached at a given spatial scale.				


Geography
Ecology
Functions
Structure
Geodiversity
Ecodiversity
Functional diversity
Structural diversity
Biodiversity
Variability
Pedo-diversity
Heterogeneity
Geodiversity
Ethno-cultural diversity
Natural systems
Man-dominated systems
Living
Non-living
Territorial diversity
Quantitative
Qualitative
Spatial perspective
Statistics

Diversity

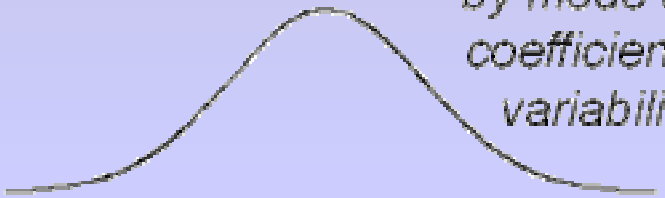
Ecology of territorial systems: Diversity

Diversity seen as scatter around a central trend



Reality seen by mode and coefficient of variability

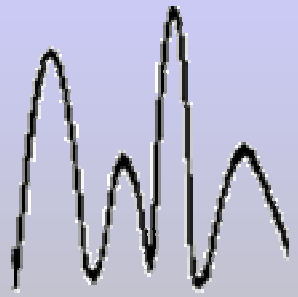
Maximum homogeneity expressed by unique mode and low coefficient of variability



Reality seen by mode and coefficient of variability

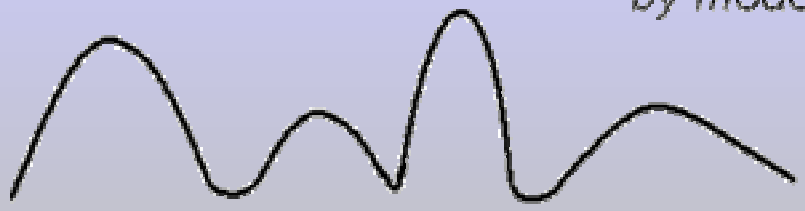
Homogeneity expressed by unique mode, heterogeneity by low coefficient of variability

Diversity as a collection of homogeneities



Reality seen by mode only

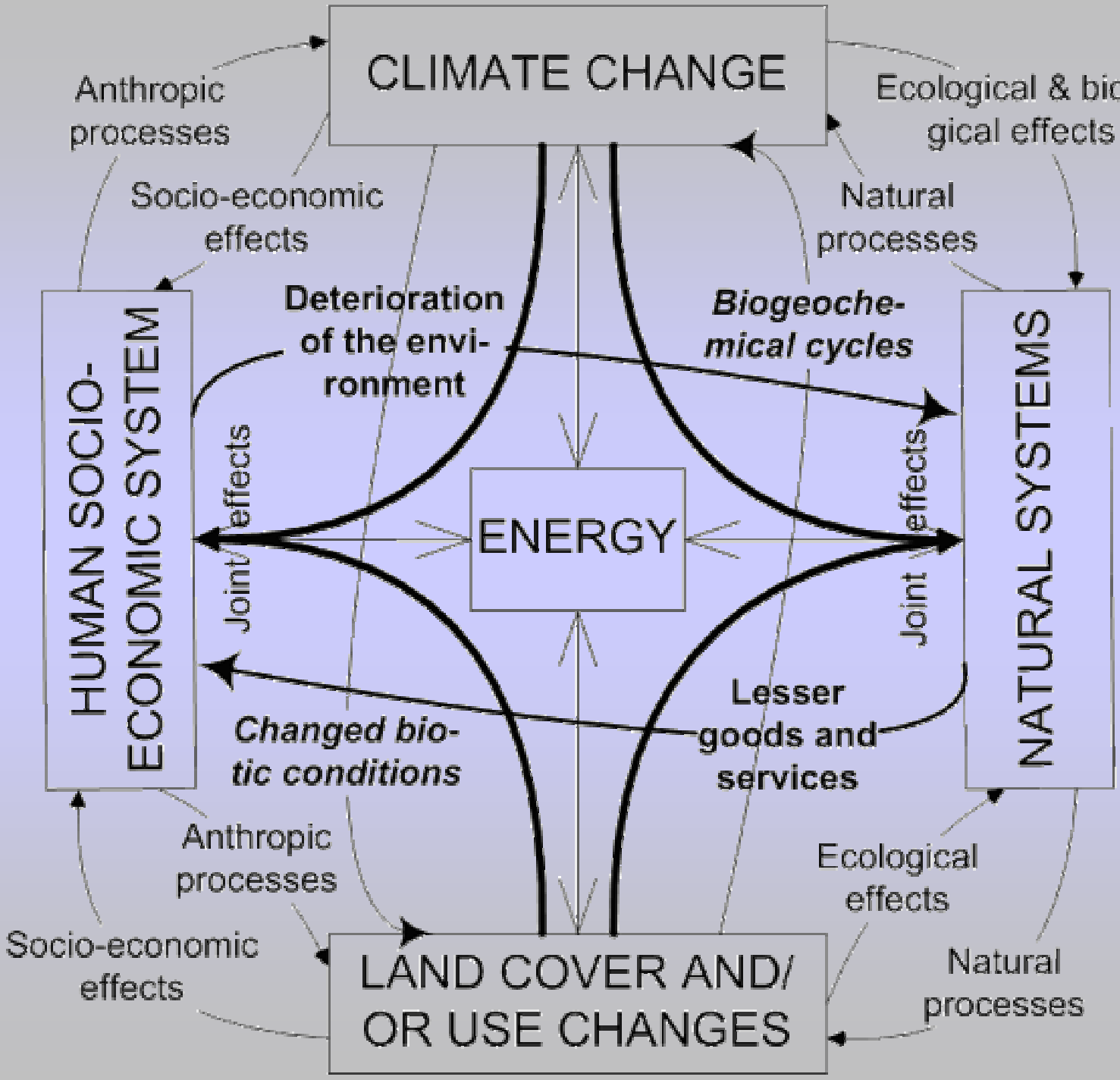
Heterogeneity expressed by more modes, but a low coefficient of variability



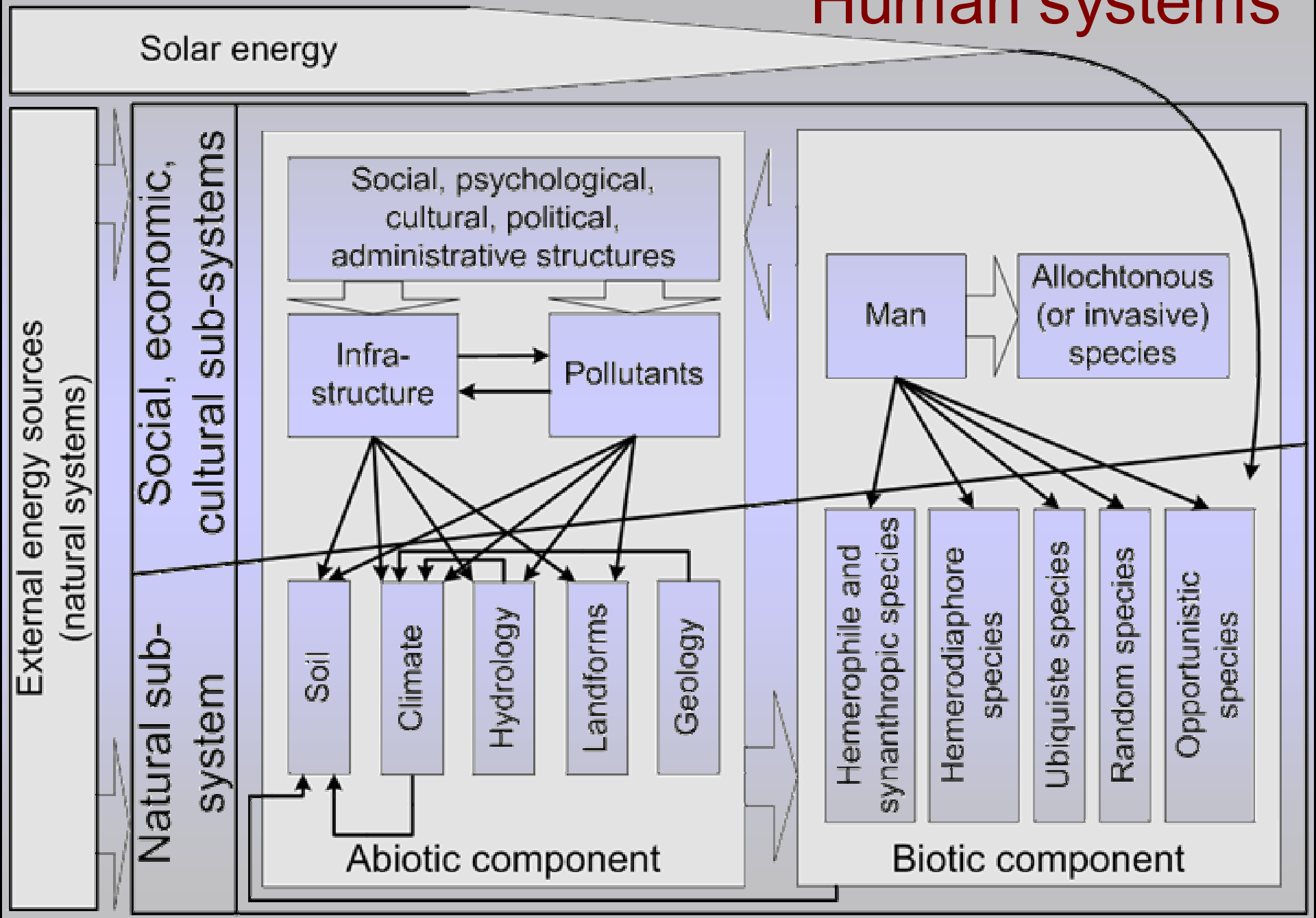
Reality seen by mode only

Maximum heterogeneity expressed by more modes and a high coefficient of variability

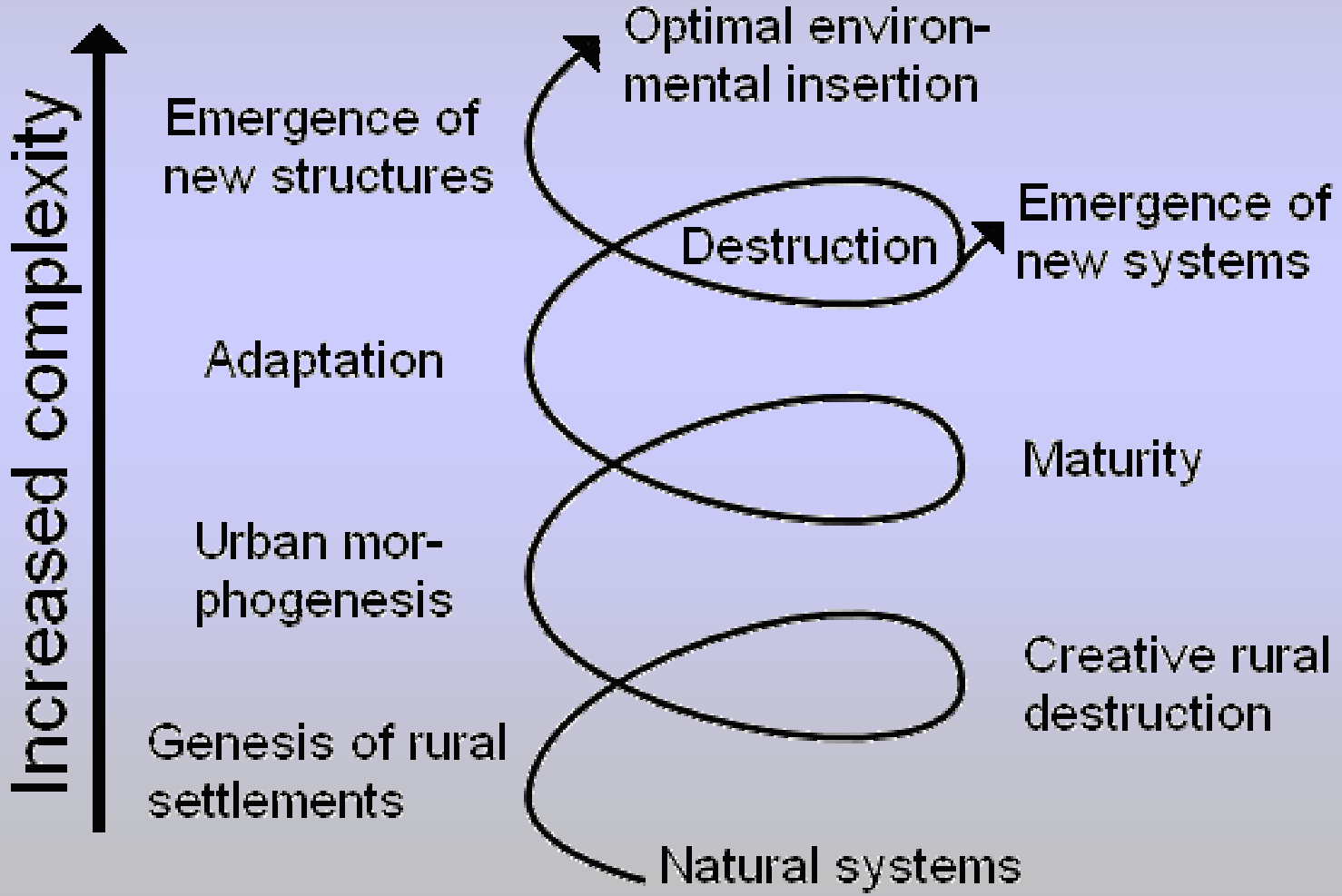
Ecology of territorial systems: Human impact

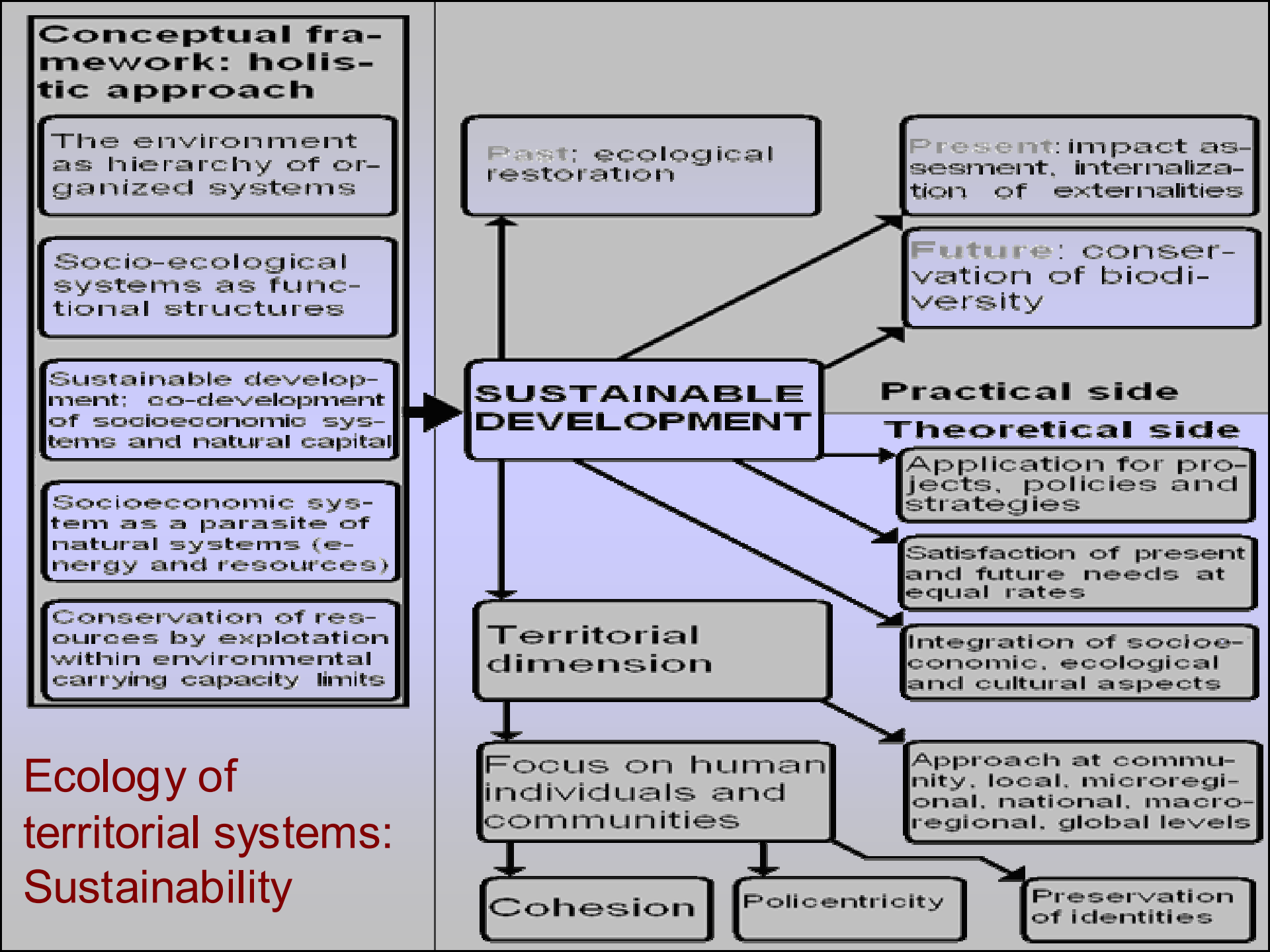


Human systems



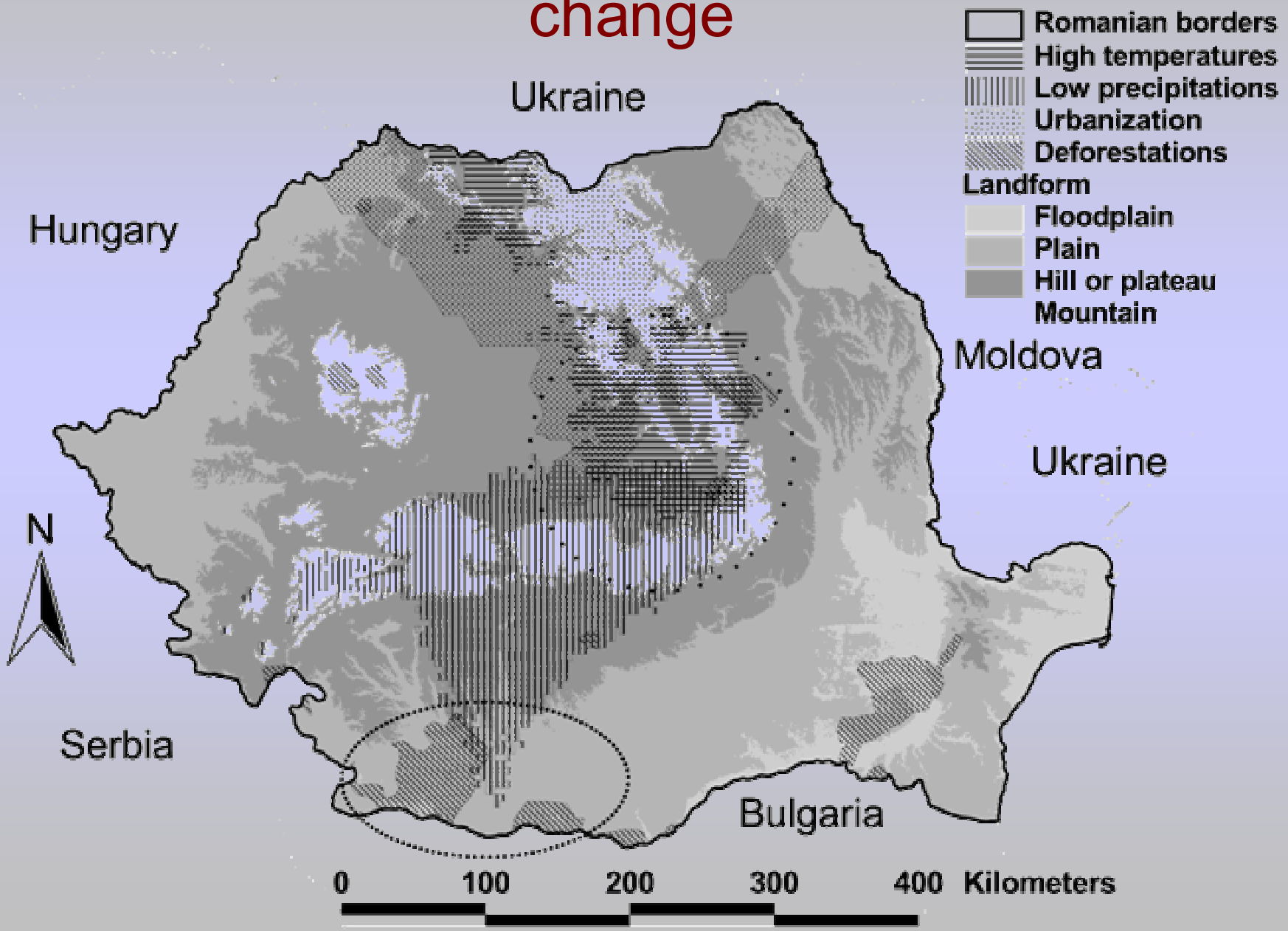
Ecology of territorial systems: Dynamics of human systems

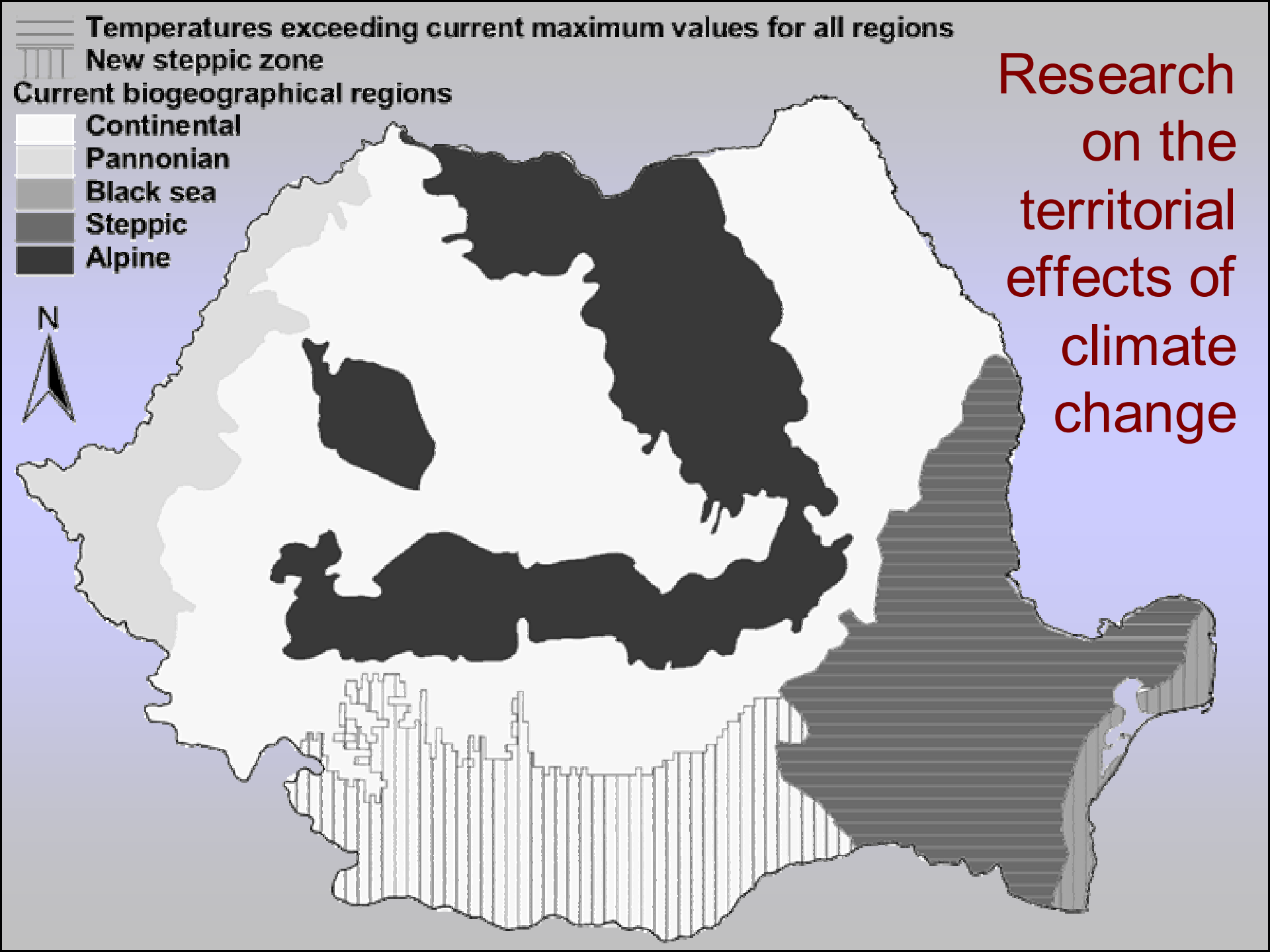




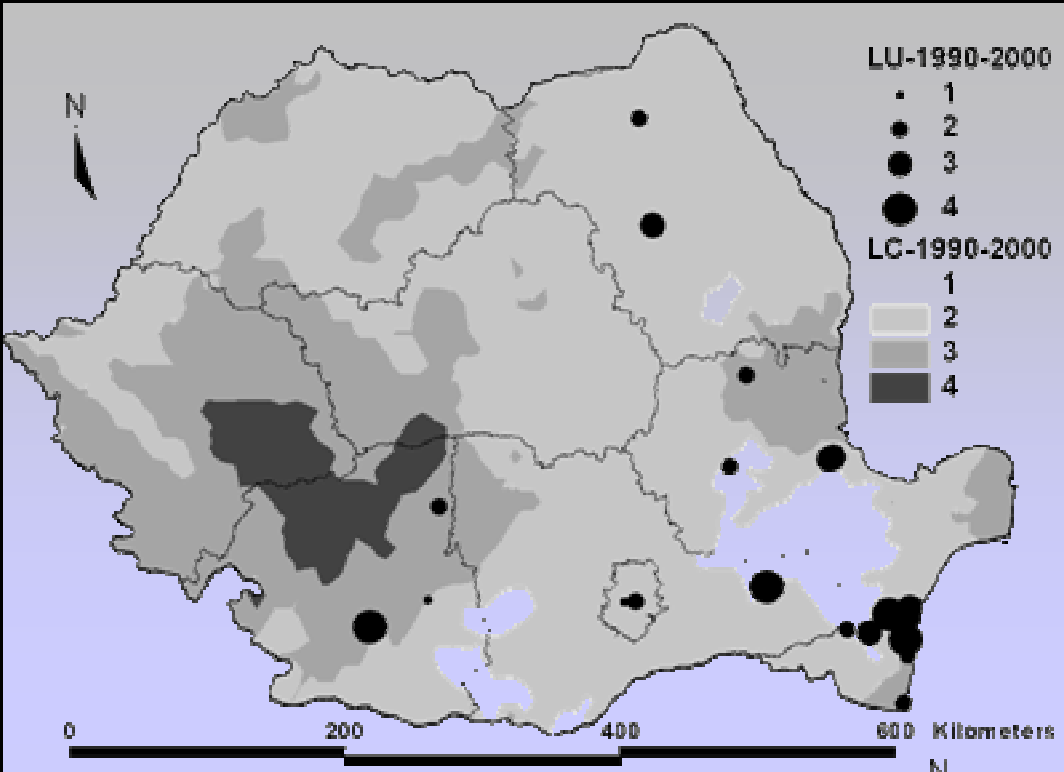
Ecology of territorial systems: Sustainability

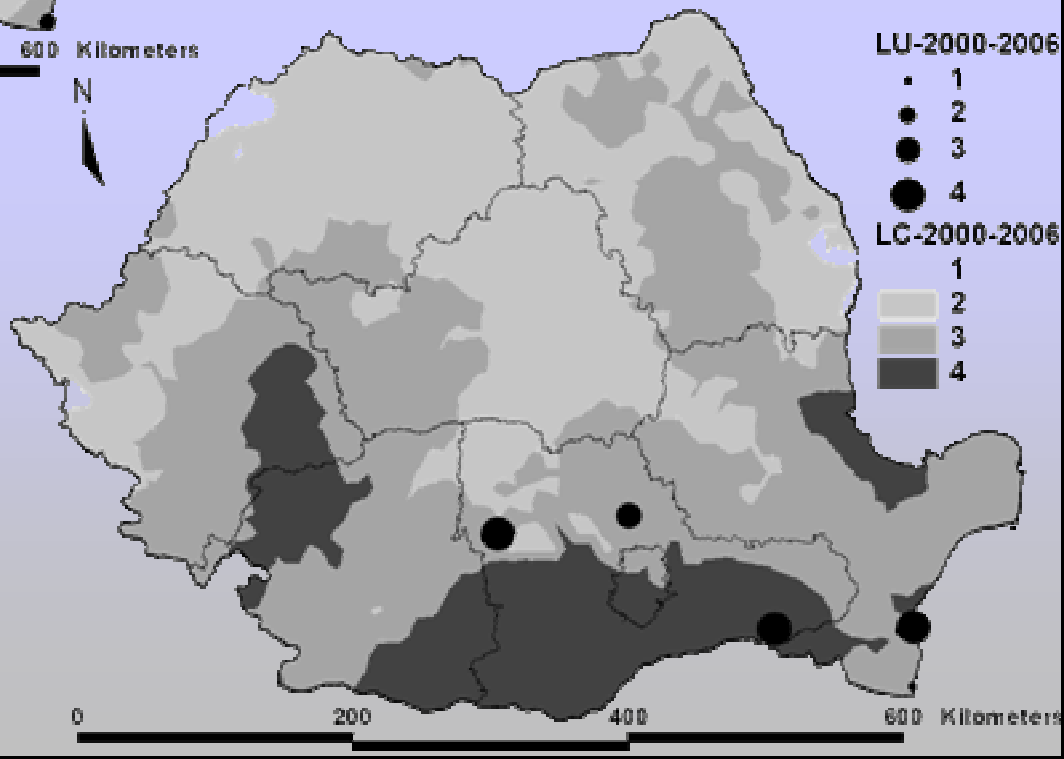
Research on the territorial effects of climate change



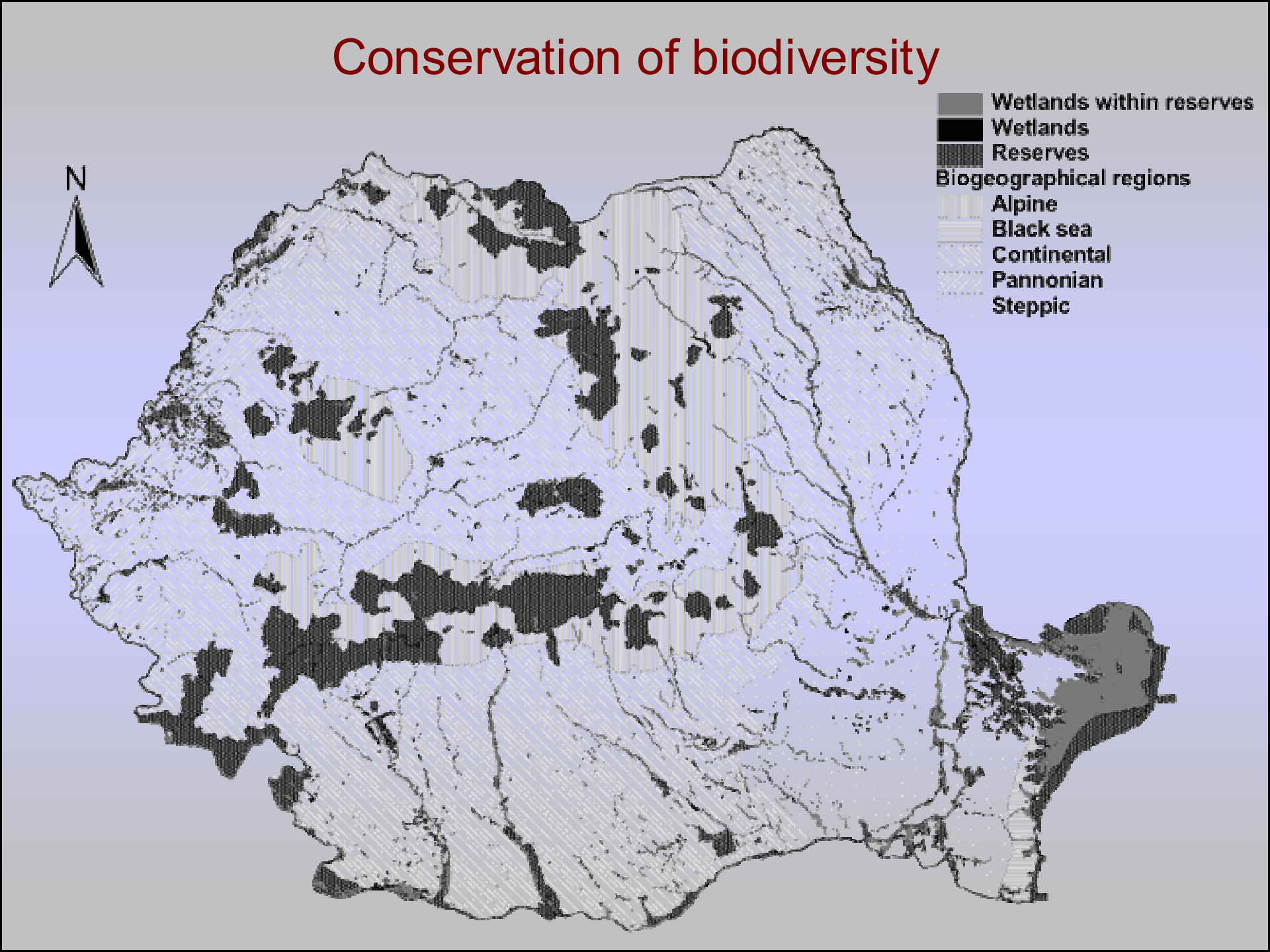

Temperatures exceeding current maximum values for all regions
New steppic zone
Current biogeographical regions
Continental
Pannonian
Black sea
Steppic
Alpine
N
Research on the territorial effects of climate change

Research on urban development analyzed via LC&U changes

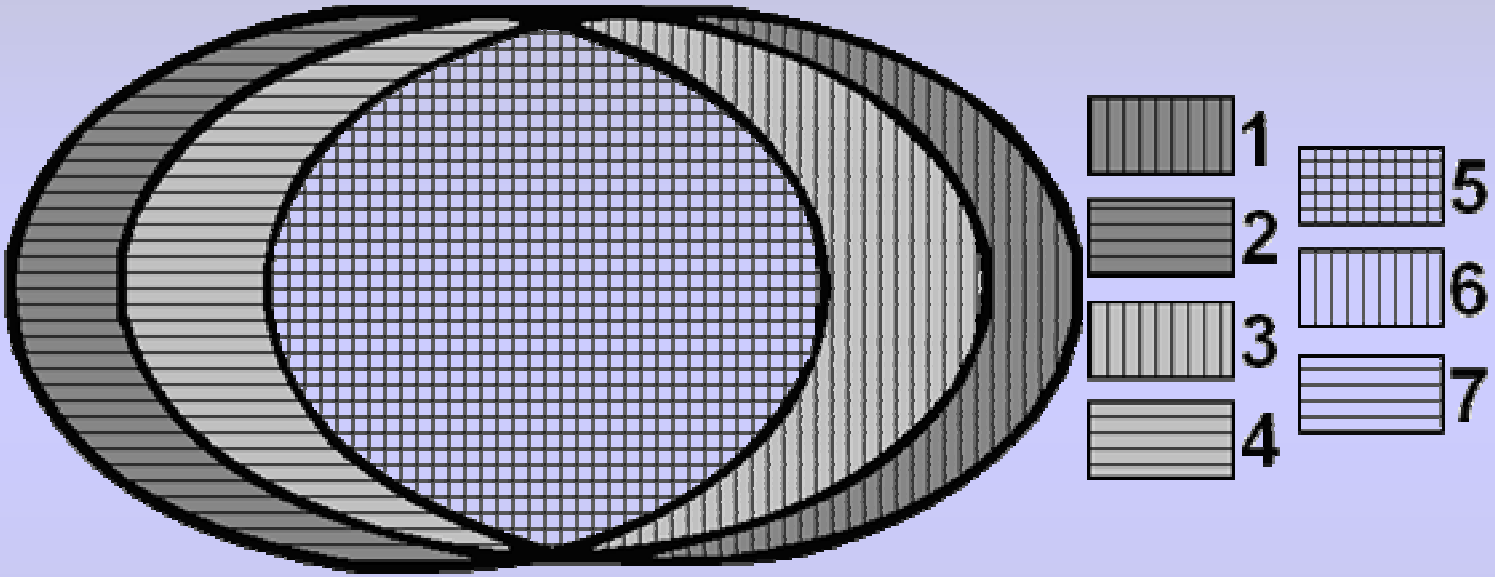




Conservation of biodiversity



Geostatistical methods: Redefining the concept

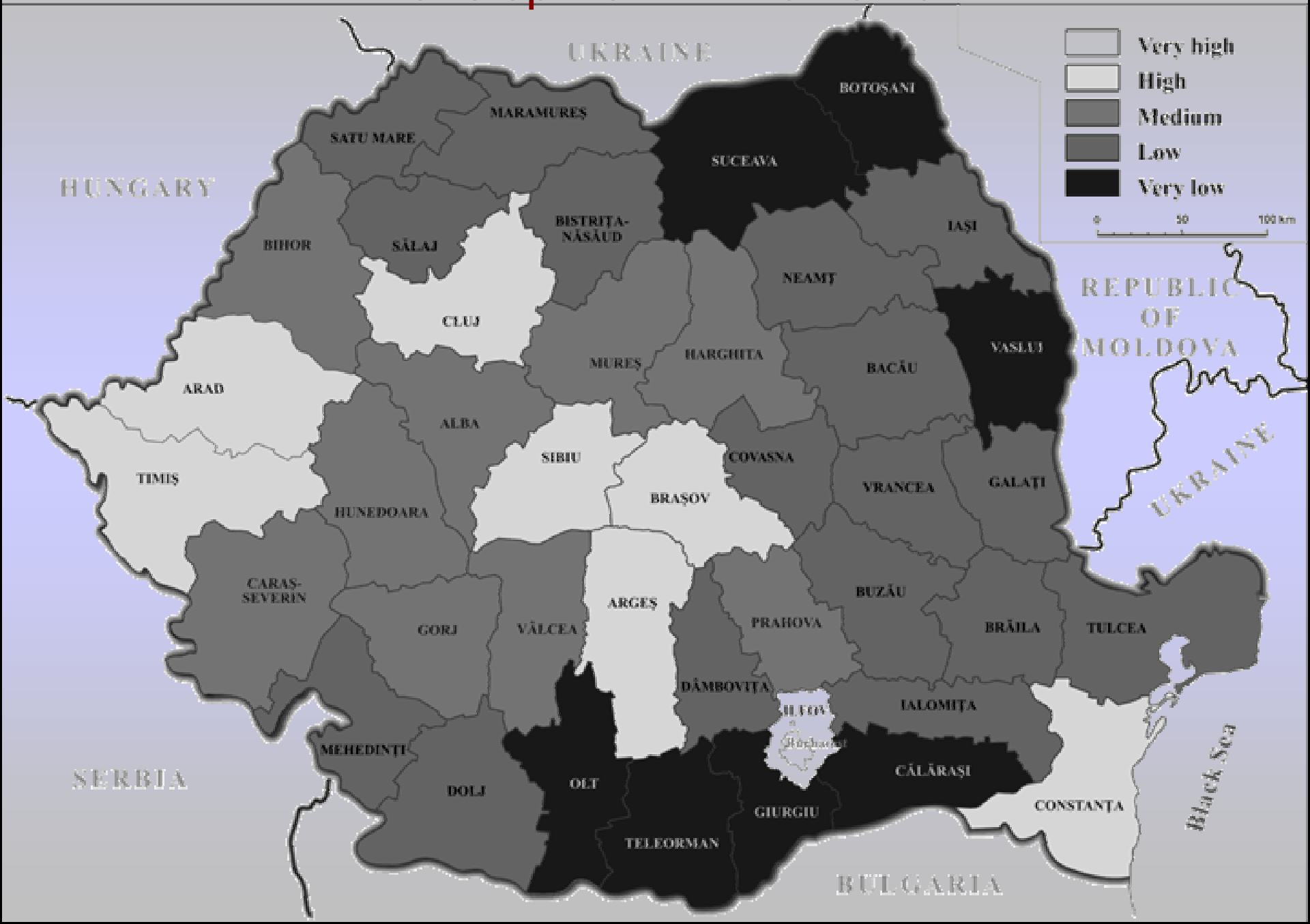


Hierarchy of geographical, statistical and geostatistical methods: (1) "pure" statistical methods; (2) "pure" geographical methods; (3) very abstract geostatistical methods, belonging more to statistics; (4) less abstract geostatistical methods, belonging more to geography; (5) geostatistical methods equally distanced from statistics and geography – interference area; (6) statistical methods; (7) geographical methods

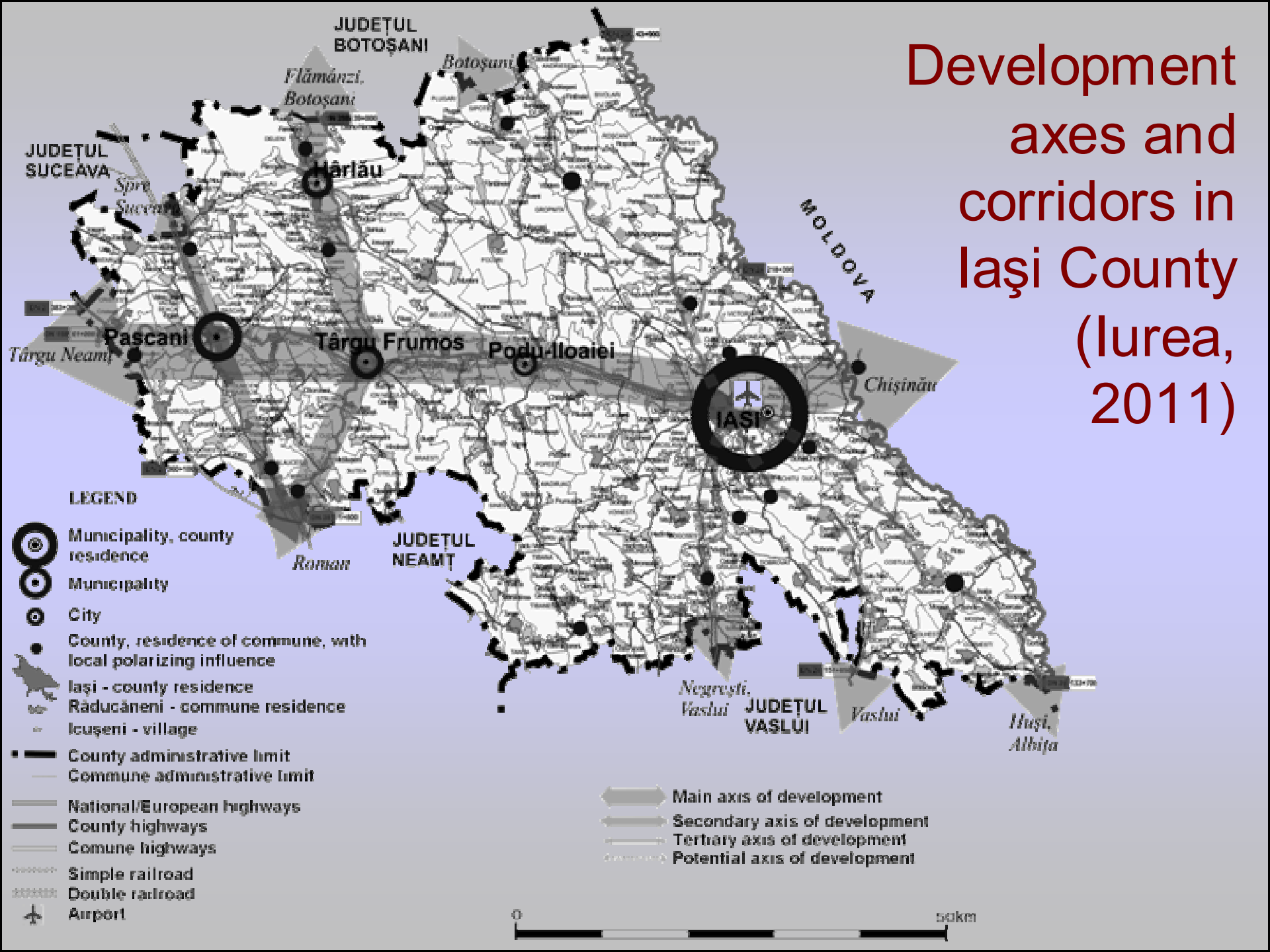
Methodological developments

- Regression of individual units
- Geo-statistical analysis of time series
- Potential accessibility
- Path efficiency
- Principal Component Analysis integrated with GIS

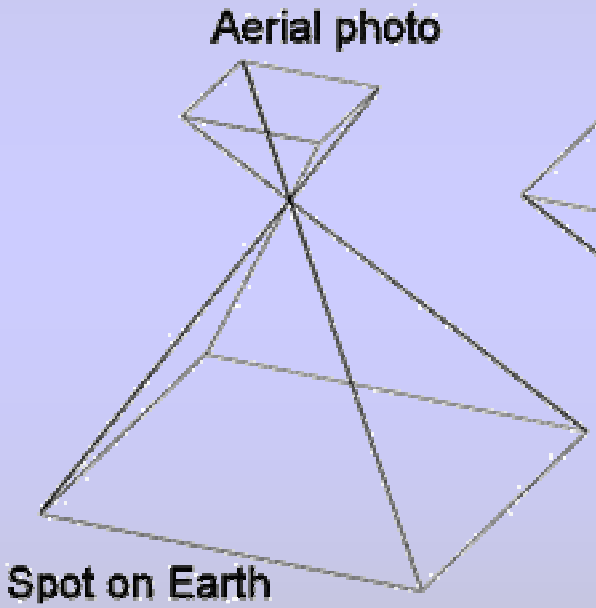
Development in Romania

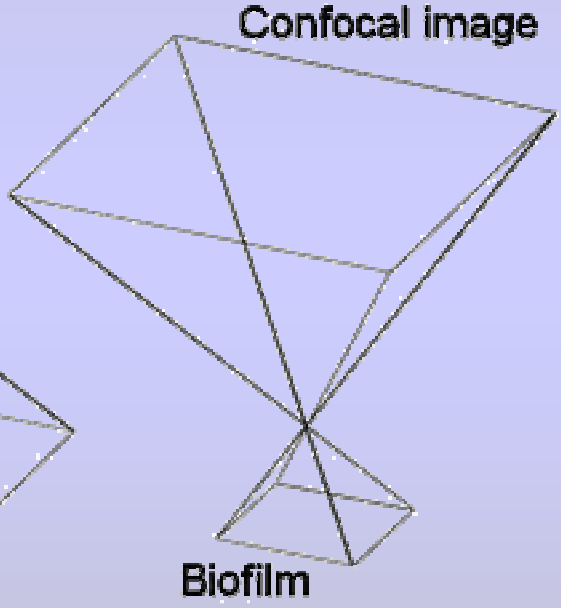


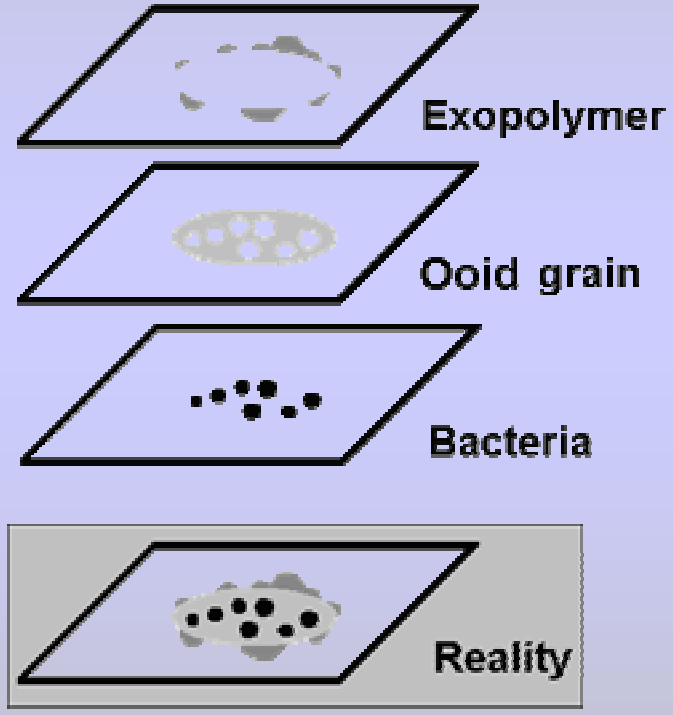
Development axes and corridors in Iaşi County (Iurea, 2011)



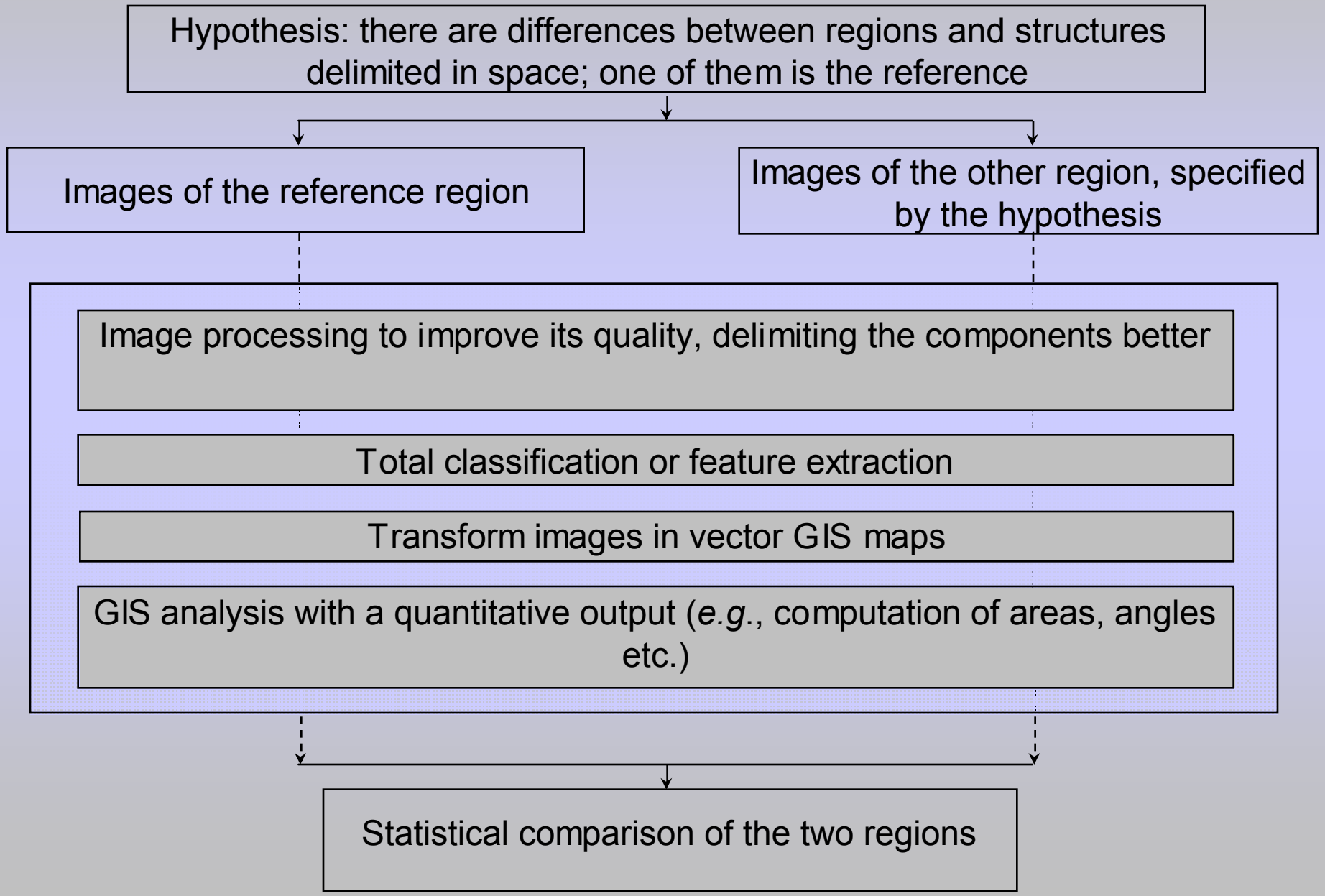
Microbial Geographical Information System: Theoretical background



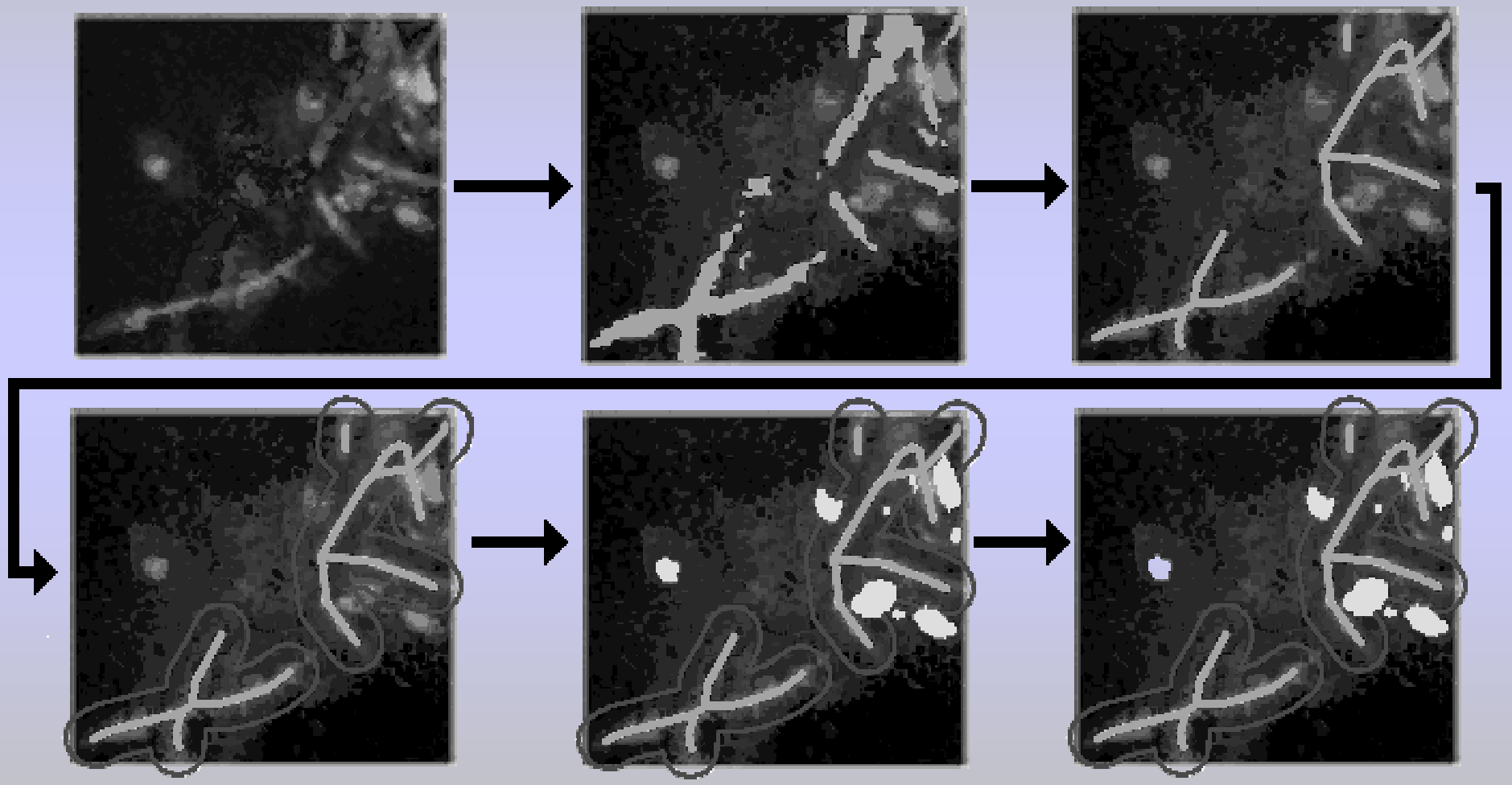




Microbial Geographical Information System: Methodology

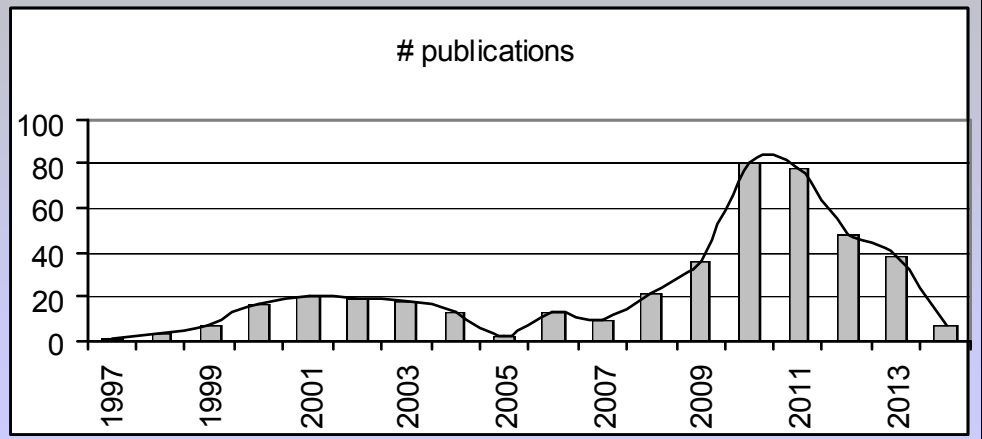


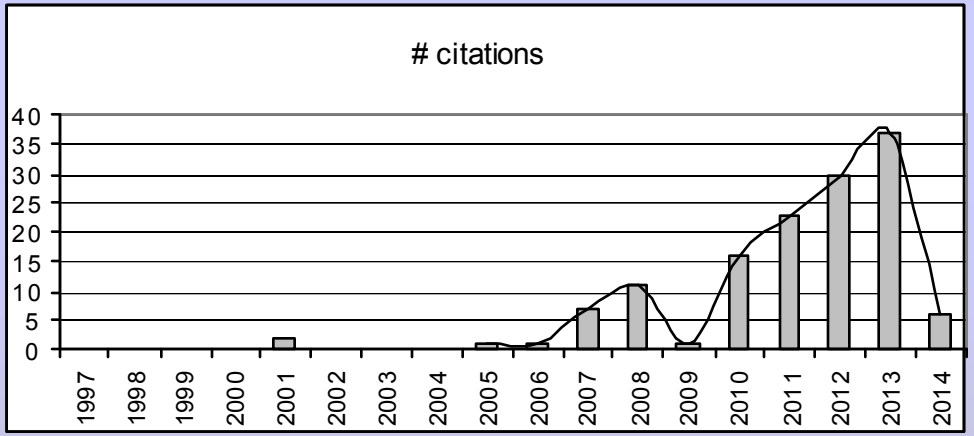
Microbial Geographical Information System: Results

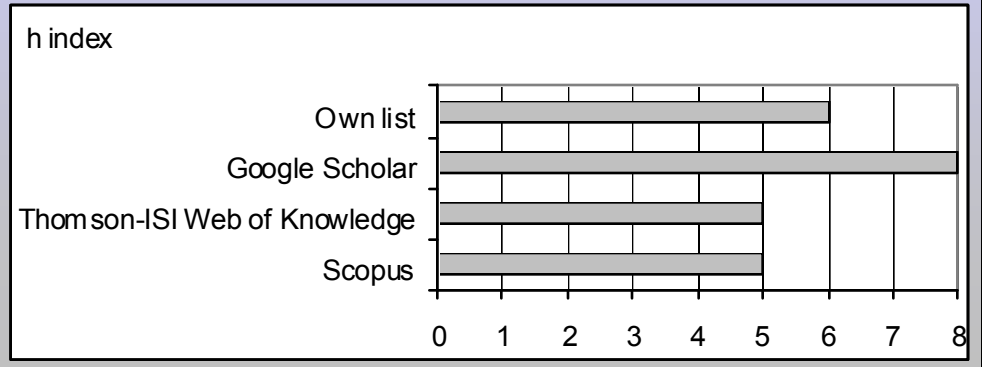


Summary

- Metrics (February 14, 2014)
  - 270 printed papers
    - 126 journal papers (110 cit., 29 mentions, 232 index.)
    - 29 books/chapters (14 cit., 23 mentions, 19 index.)
    - 5 theses (6 cit., 13 index.)
    - 22 conference papers (3 cit., 5 index.)
    - 65 conference abstracts (26 index.)
    - 3 Internet articles
    - 3 Internet abstracts
    - 17 research reports
  - 212 presentations
    - 28 posters (1 cit.)
    - 94 conference presentations (1 cit., 17 mentions)
    - 7 public presentations
    - 83 courses/lectures
  - 27 plans
  - 1 paper in progress







Future directions: Principles

Teaching

- Finding solutions to create quality
- Sending more students abroad
- Improving and updating my courses
- Promoting multi-, inter, and trans-disciplinary approaches

Research

- Integrating trans-disciplinary approaches
- Better subordination of teaching to research
- Completing all projects

Future directions: Projects

• Ecology of Human Settlements	☑	Petrişor AI (2014), *Ecology & Sustainability of Territorial Systems*, "Ion Mincu" University Press
• Applied statistics	☑	Ongoing / depends on collaborators; Polish study
• Research approach and methods II	☑	Petrişor AI (2014), *Research approach and methods. Second revised and extended edition*, "Ion Mincu" University Press
• Research on climate change impacts & bio-diversity at a large scale	☑	Grant submitted in 2013 competition, results due in 2013: "*Geographical Information System (GIS) for monitoring the dynamics of biodiversity within urban areas*" – URBIOGIS
• Research on microbial ecology	☑	Petrişor AI, Szyjka S, Kawaguchi T, Visscher P, Norman S, Decho AW (2014), *Changing Microspatial Patterns of Sulfate-Reducing Microorganisms (SRM) During Cycling of Marine Stromatolite Mats*, International Journal of Molecular Sciences (ISSN 1422-0067, IF=2.464), accepted with minor revisions
• New research areas	☑	Energy
• Third doctoral degree	☑	Habilitation in urban planning
• Editorial activity	☑	Research for Sustainable Settlements

Future directions: Advertisement

Senior researcher, holder of two PhDs (Ecology & Geography) and a Habilitation Attestation in Urban Planning, without any political affiliation, searching for a serious university able to allow for my career development through a position fitted to my professional achievements and aspirations. Serious offers only, please.

Thank you for your attention

and

Welcome your questions.