



GEOINFORMATION

in der Umweltplanung | Environmental Planning

Technische Universität Berlin



Land Cover and Landscape Diversity Changes at the *Caatinga* (2001-2012)

***Landscape Pattern Analysis with MODIS Land
Cover Products***

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Research site
Caatinga SDTF



Data

MODIS Land Cover (MCD12Q1)

Quality aspects

- Temporal scale
- Spatial scale
- Thematic scale
- Availability, Pre-processed...

Land use

Landscape
diversity

Landscape sciences

Method

Qualitative
Indicators

Quantitative
Indicators

Up-Scaling Problem!

Global threat of woodlands

- Land change
- Climate change
- Loss of biodiversity
- Desertification & Land degradation

Landscape pattern analysis (LPA)

- Quantitativ-descriptive approach
- based on landscape metrics
- widely approached in landscape ecology
→ *pattern-process relationships* (Turner 1989)

Research site: *Caatinga* biome

~ 850.000 km²

~ 27 Mio. inhabitants

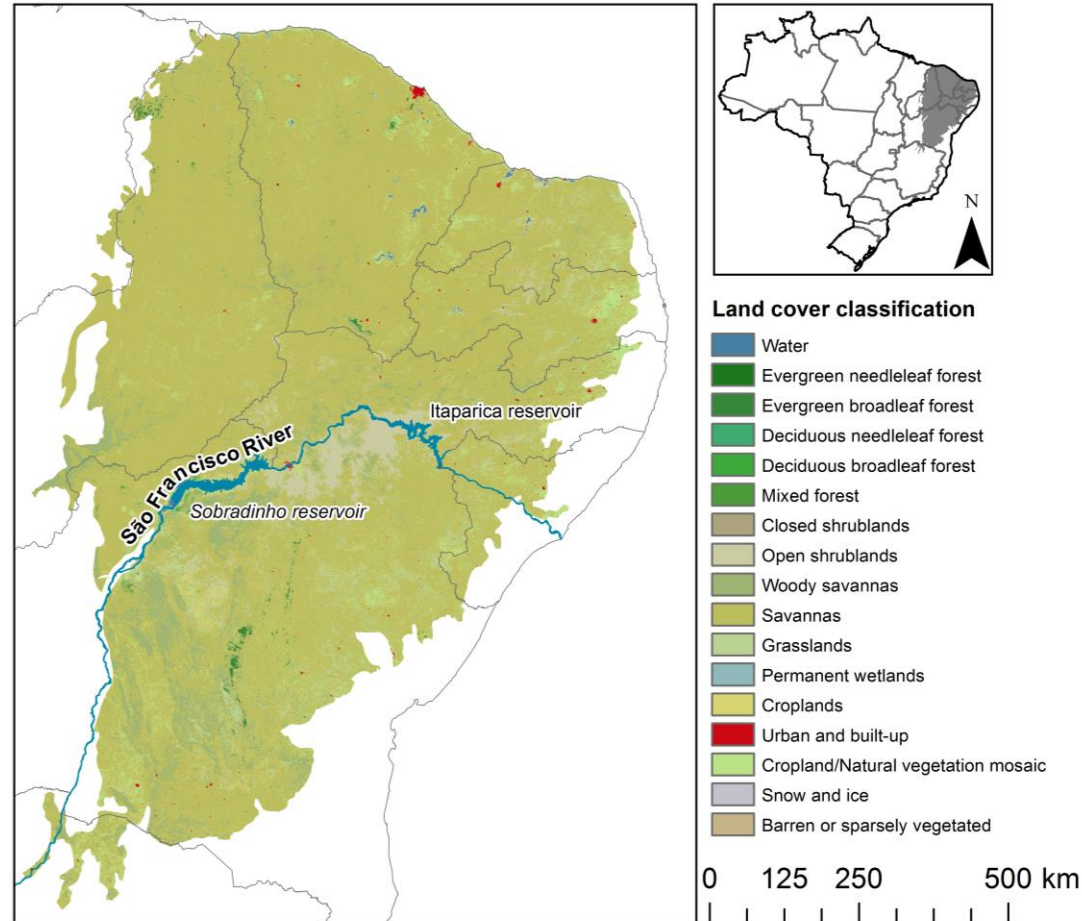
~ 2000 species

Semi-dry climate:

- extreme variations in rainfall
- irregular droughts

Human impact:

- slash-and-burn
- livestock production
- fuelwood extraction

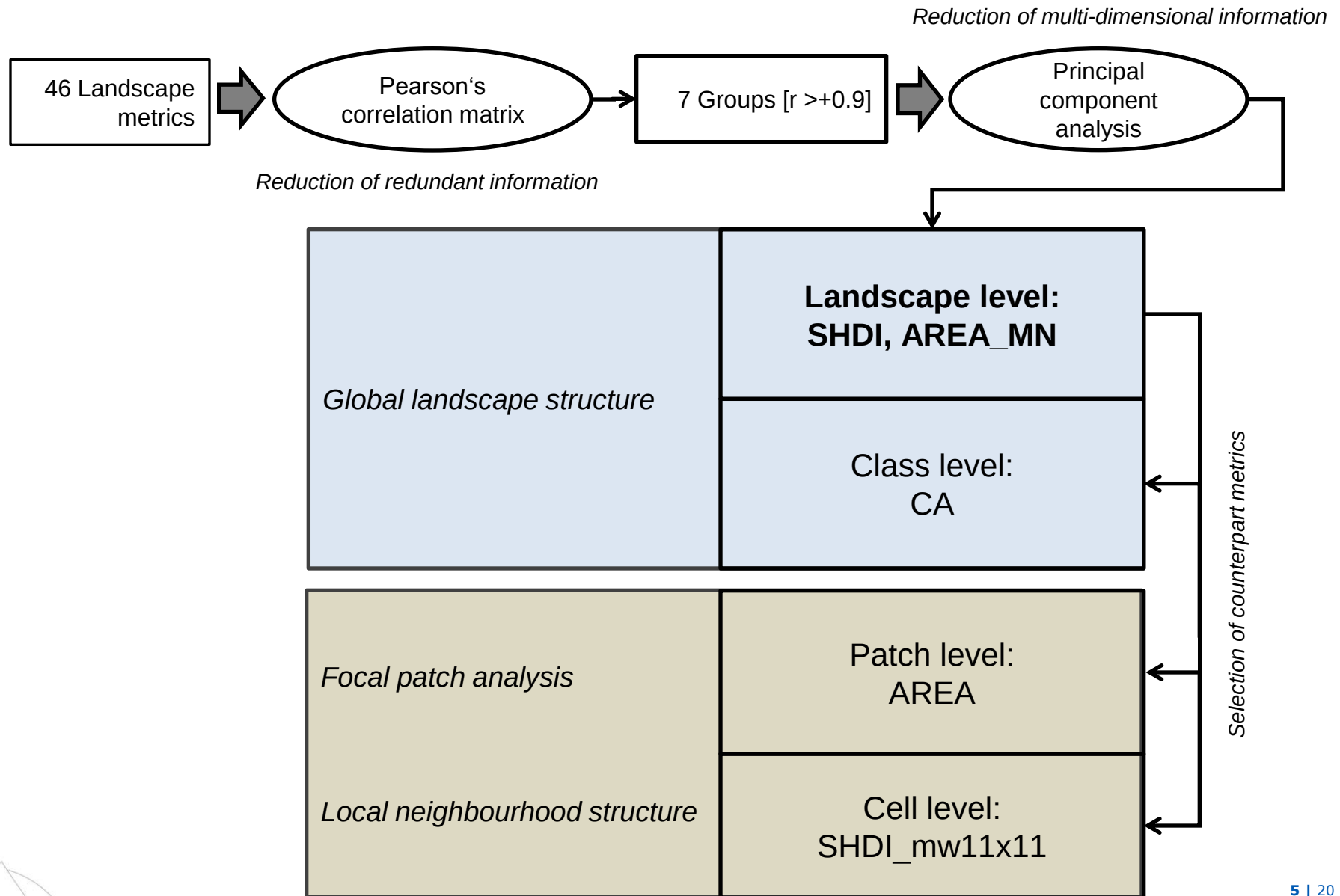


Key questions

- How has land change been distributed?
- How has landscape diversity and fragmentation changed?
- Which regions are threatened by land degradation and desertification?



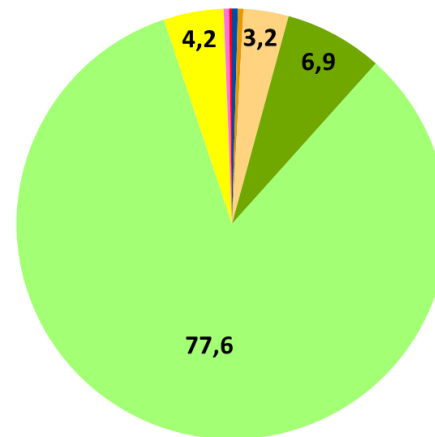
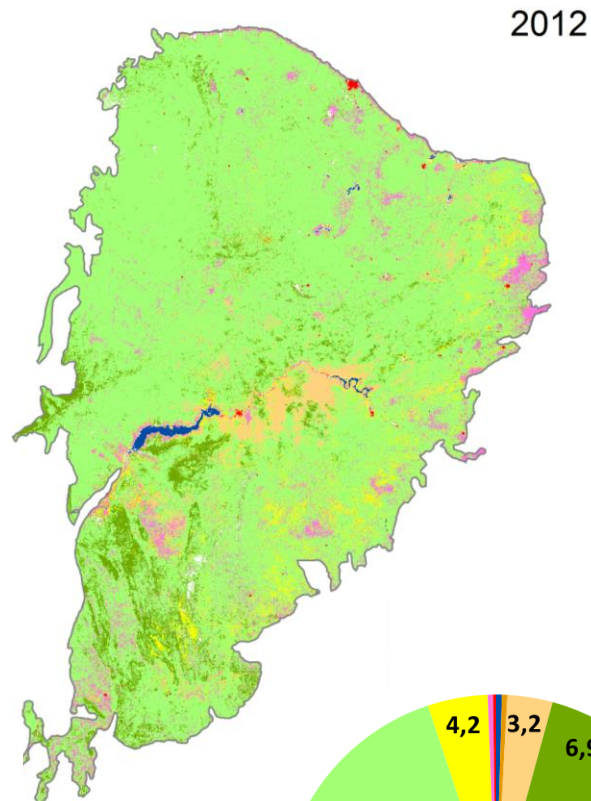
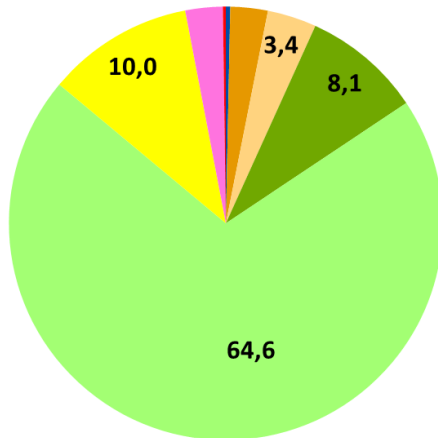
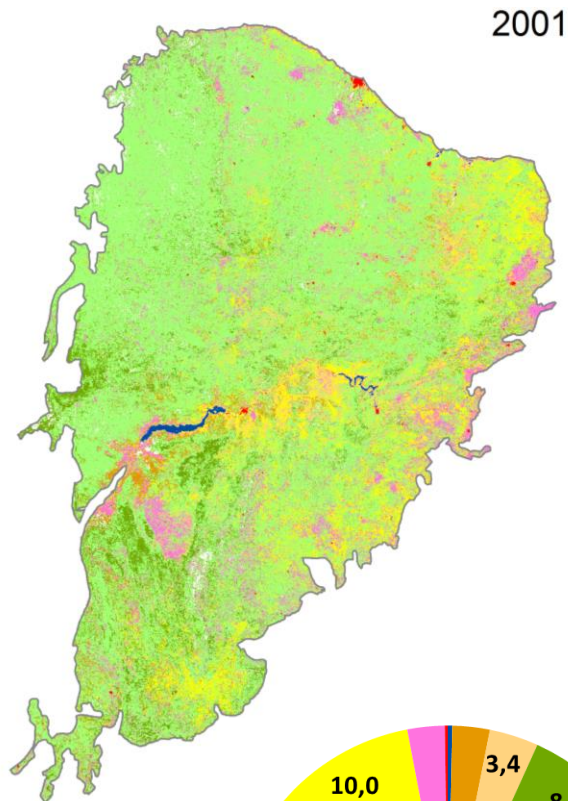
Landscape metrics selection scheme



1

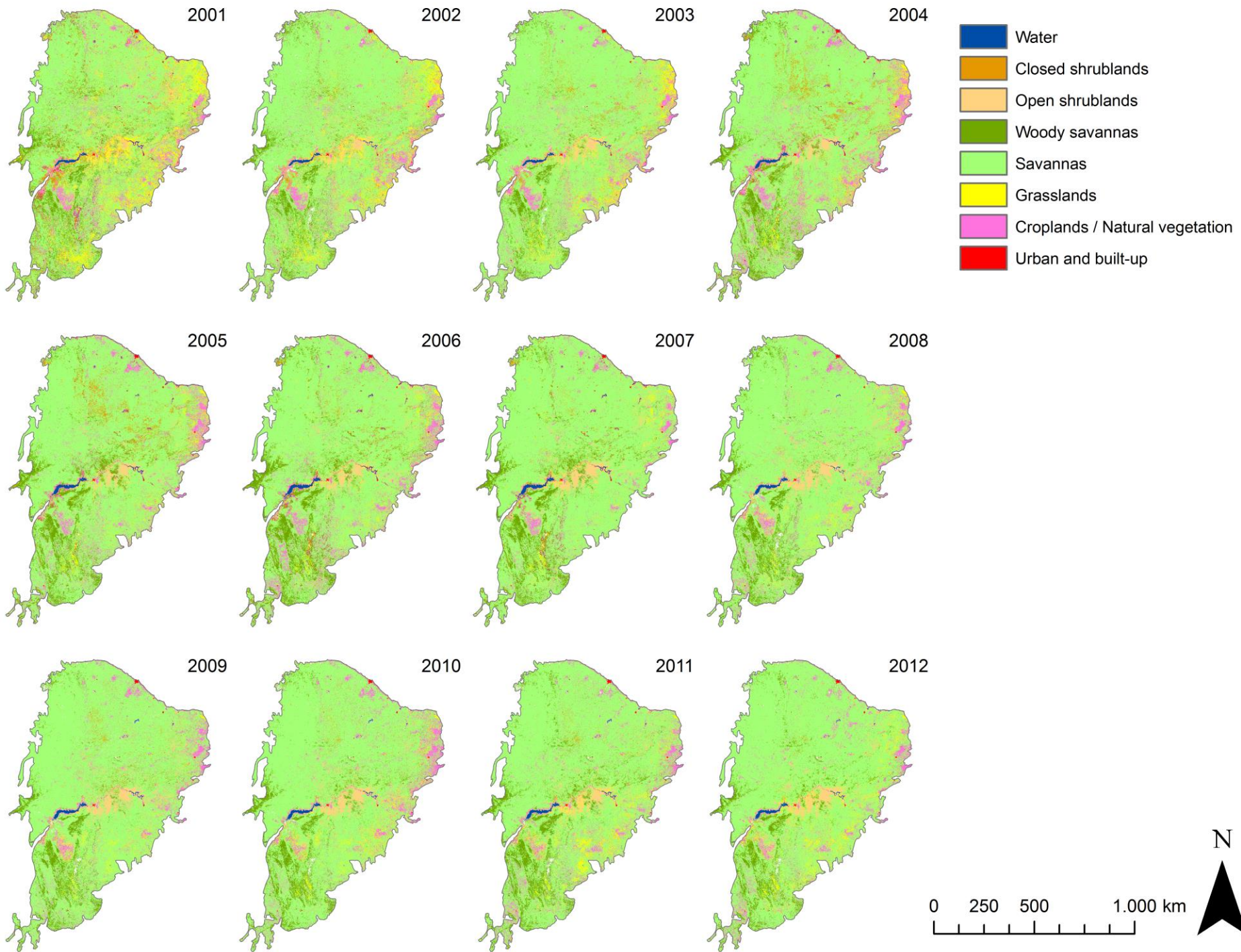
Land change





LULC classes

-  Water
-  Closed shrublands
-  Open shrublands
-  Woody savannas
-  Savannas
-  Grasslands
-  Croplands / Natural vegetation
-  Urban and built-up

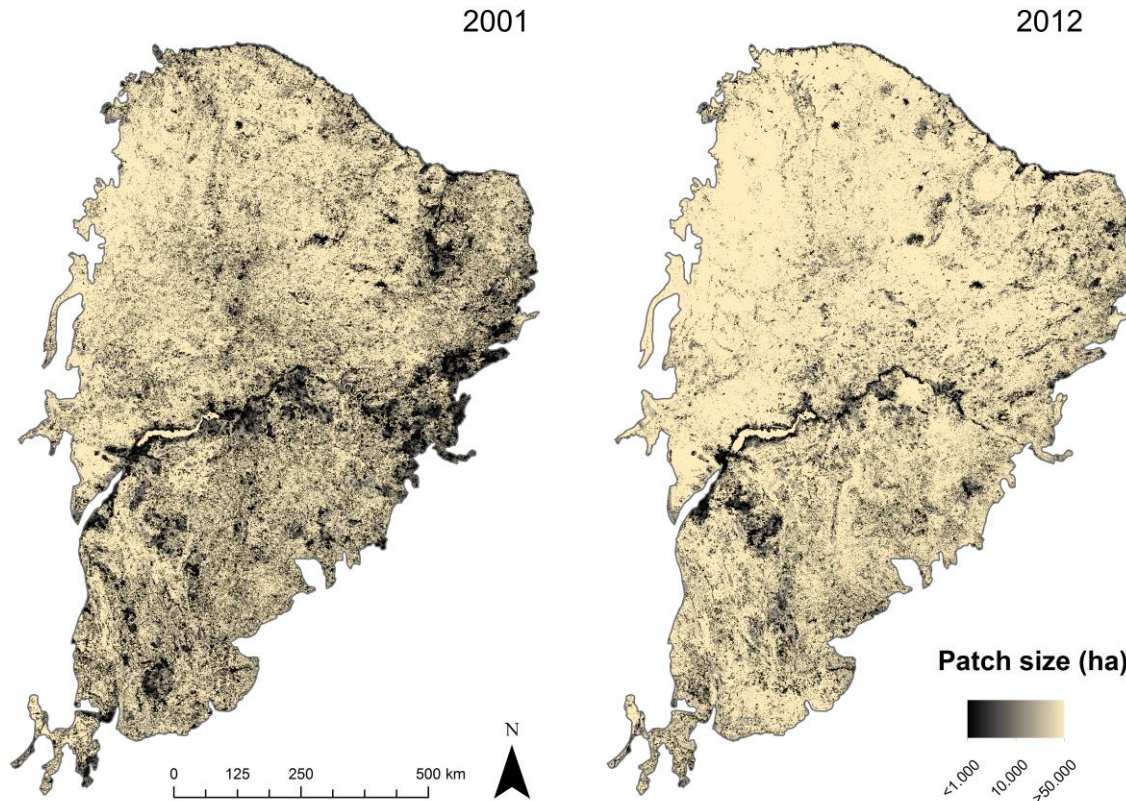


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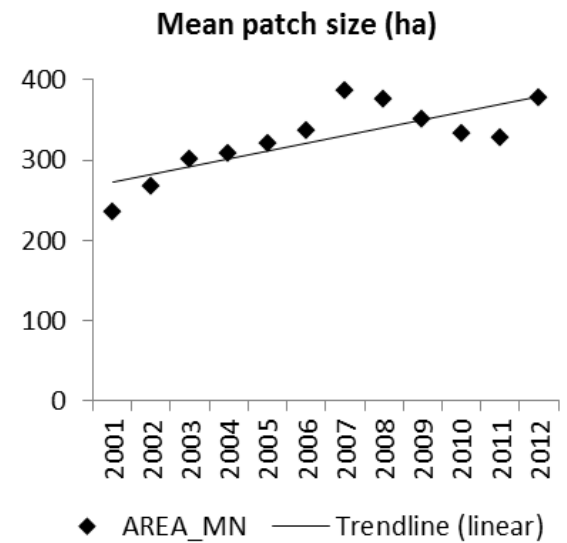
Landscape fragmentation

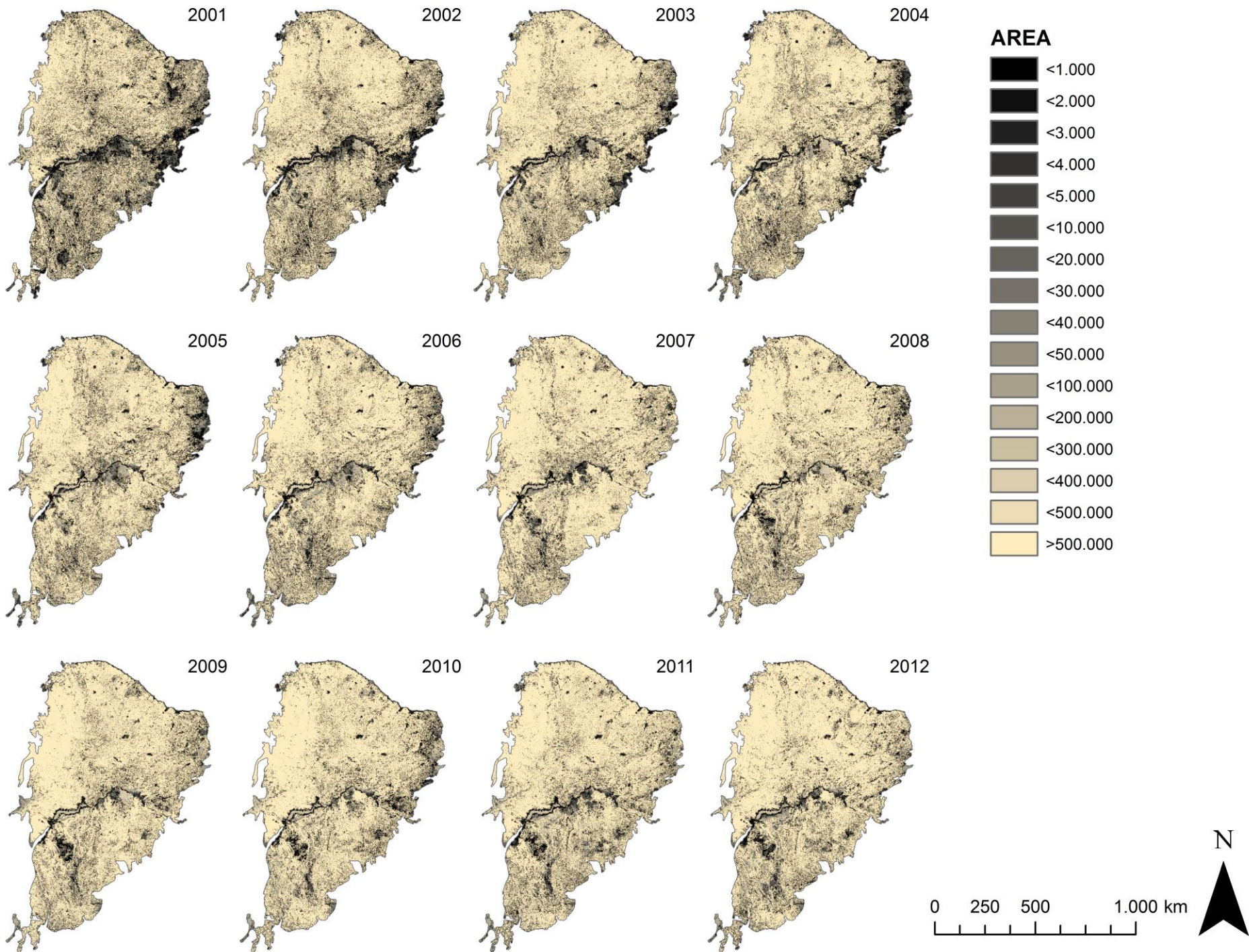


Patch level



Landscape level



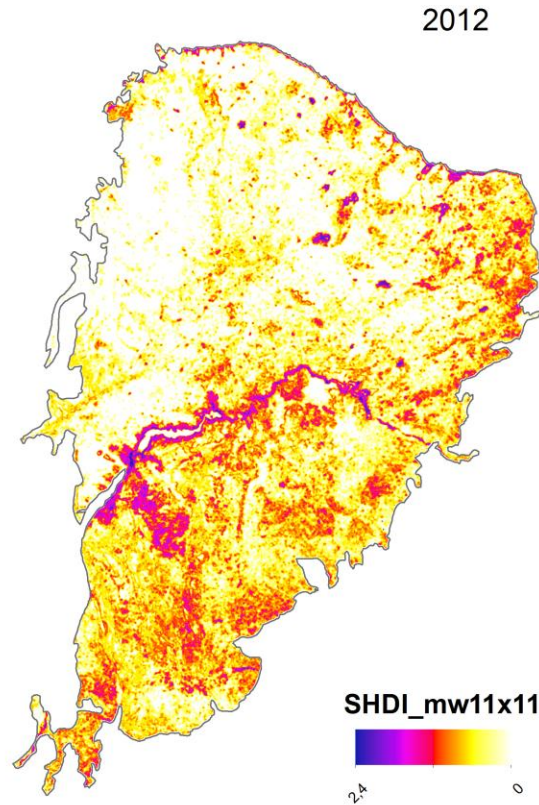
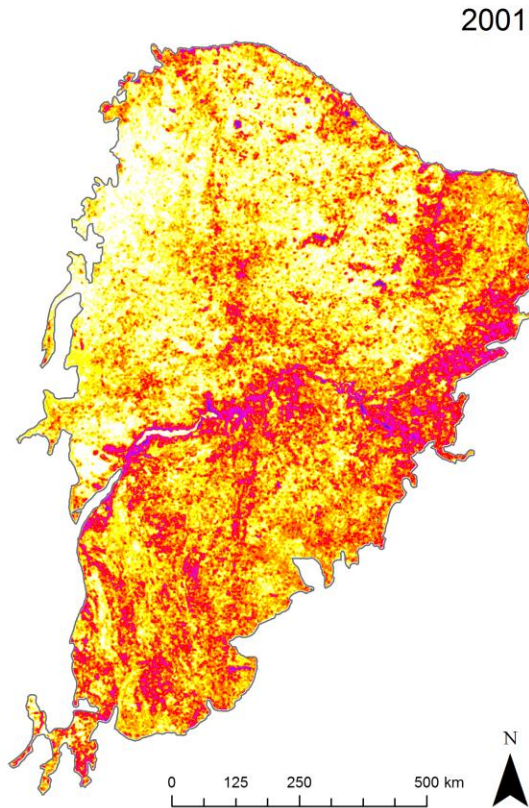


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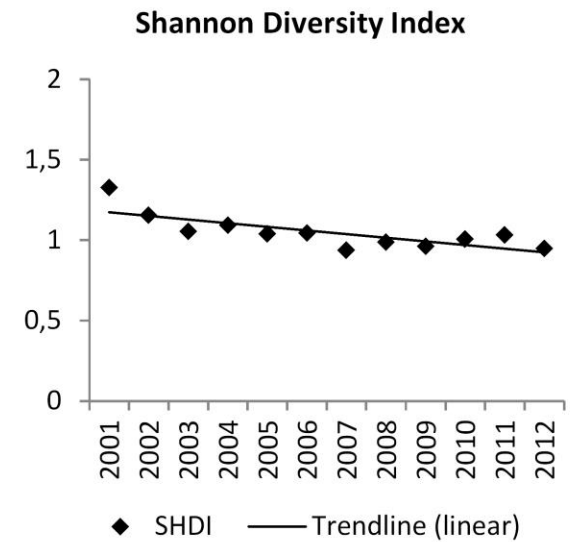
Landscape diversity

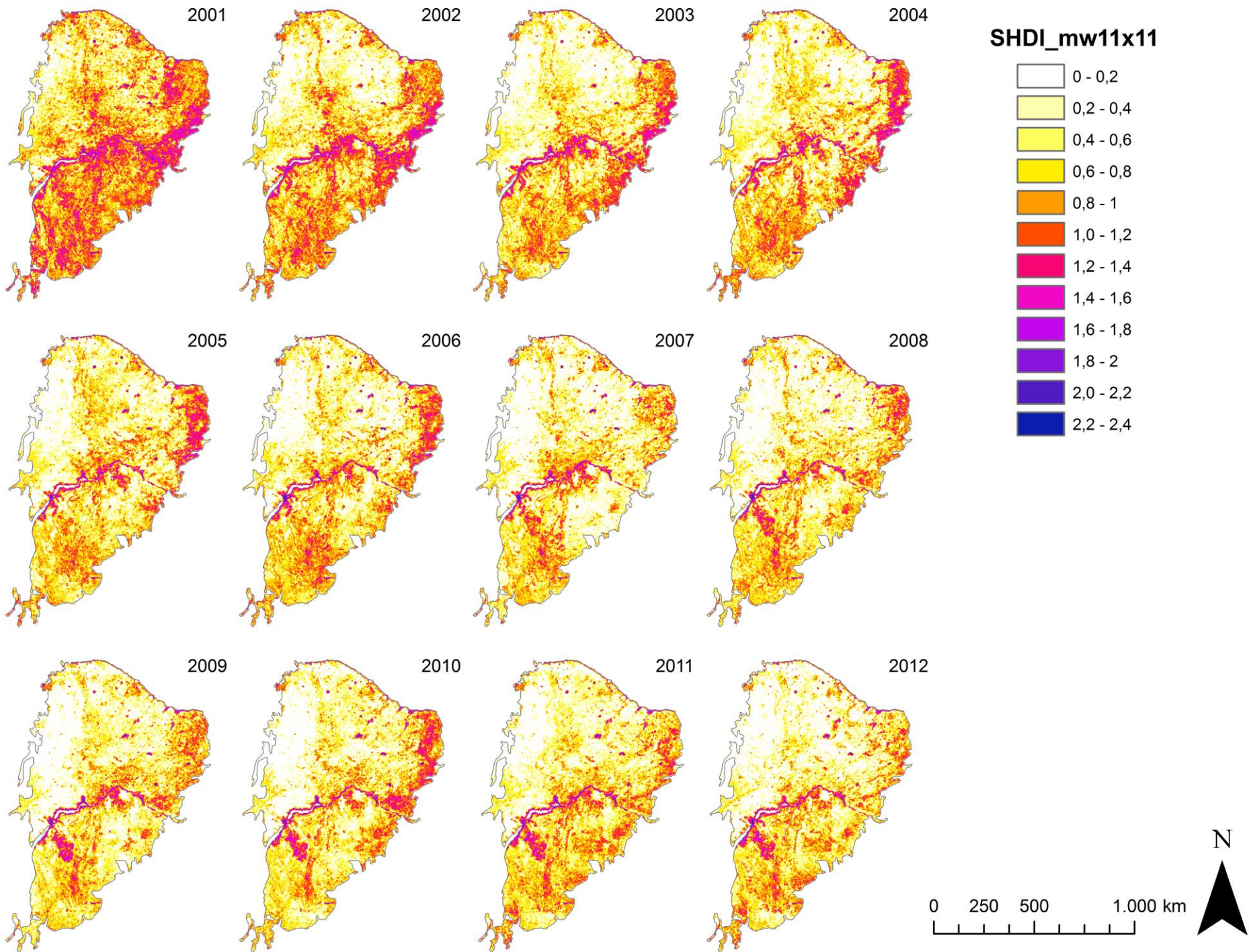


Cell level



Landscape level





4

Desertification & Land degradation





Temporary flooding



Permanent flooding



Overgrazing/Wood extraction



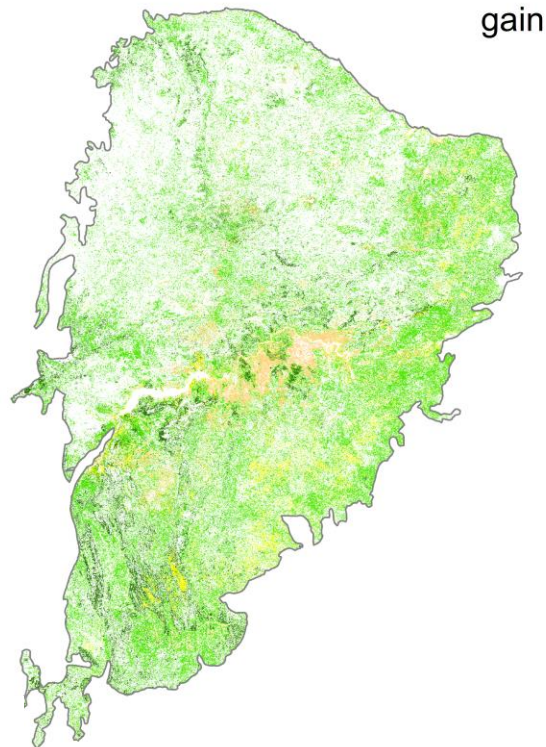
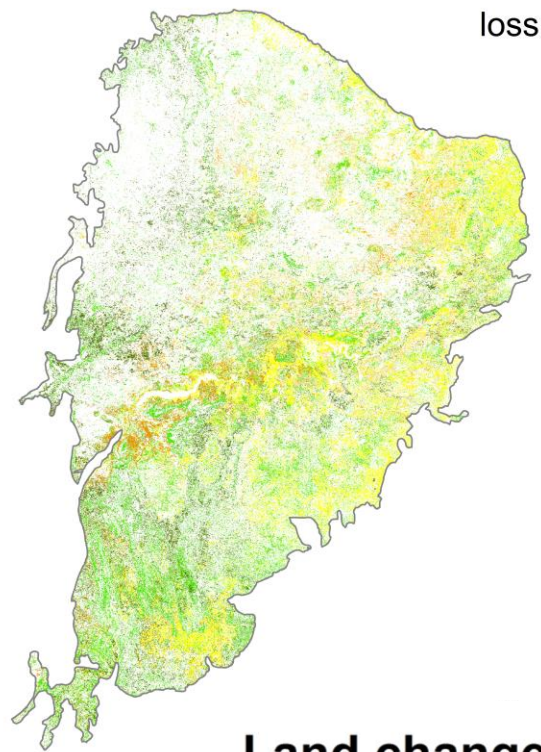
Soil salinization

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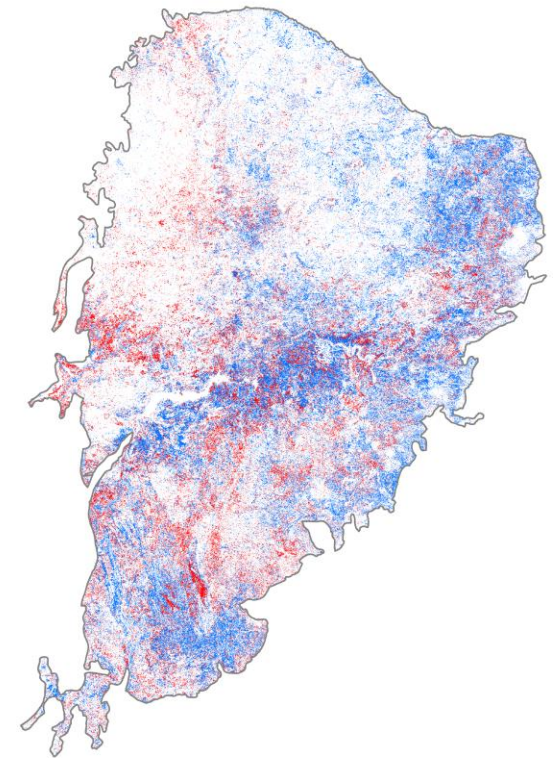
Types of land degradation at the Itaparica reservoir (Project site)



Degradation and recreation of vegetation!



Land change



Woody vegetation change



5

Conclusion



+ – Data – quality depends on *resolution* and *extent*!

+ Information – spatially explicit and quantitative information on different levels of heterogeneity

! Decision making – finding well-adapted land use solutions in a long term



Celebration of the Tacaratu in honor of the Umbuzeiro tree (*Spondias tuberosa*)



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Herzlichen Dank. Thank you.

Christian Schulz

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Interplay among multiple uses of water reservoirs
via innovative coupling of substance cycles
in aquatic and terrestrial ecosystems

