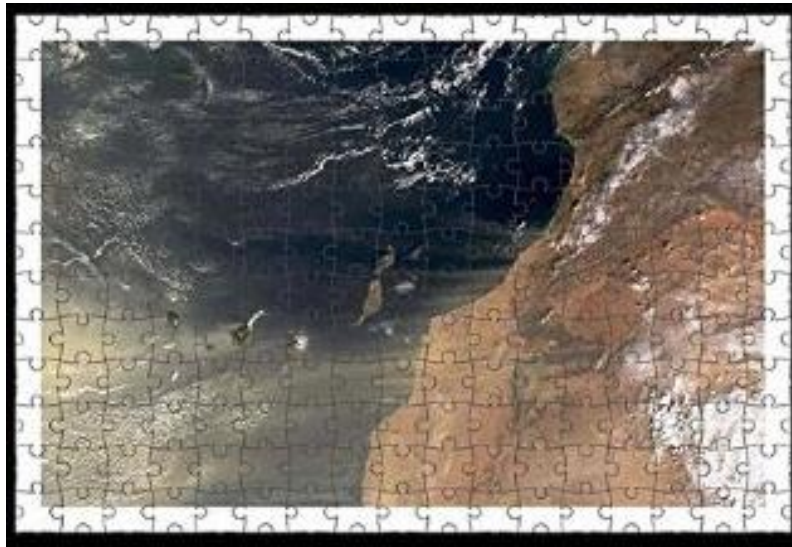


Identifying the potential of green infrastructure planning in rural and peri-urban informal settlements of South Africa

Mandré Joubert -North West University, Potchefstroom
Contact details: rom8.1john4.4@yandex.com

Identifying the potential

- ▶ Capacity is not potential
- ▶ Identifying the GI potential = focus is placed on space
- ▶ The influence on space



Green Infrastructure planning

Nine points of Benedict et al., (2012:15) what GI is not

A program. It is a philosophy of organized strategy that provides a framework for planning conservation and development.

A panacea. It cannot be everything to everyone. In all planning systems and processes, GI planning is associated with trade-offs to higher efficiency and effectiveness.

A short-term solution. Long-term commitment is non-negotiable, in order to suits ecological systems comprehensively.

An isolated effort. Coordination of many people is needed.

A government program. Although led by the state, regional or local government, it relies on all sectors of the community, both private and public.

Smart growth, no growth or anti-development. By identifying the key ecological processes and functions in GI planning, the delineation of a sustainable relationship between humans and nature emerges (Ahern, 2007:2).

Elitist. All people within a community of region benefit from GI planning. As well as the implementation thereof, which is an aspect highly valued by RPU informal settlements.

A system of greenways. Greenways are a component/asset of GI, for there are broader ecological sustainability goals

Schoolyards, playgrounds or other parcels of green space.

Green Infrastructure planning

Humans are the instigators in relation to GI. If not planned and integrated we have not GI planning

- ▶ Ahern et al., (2014:256), GI is the “spatially and functionally integrated systems and networks of protected landscapes supported with protected, artificial and hybrid infrastructures of built landscapes that provide multiple, complementary ecosystem and landscape functions to the public, in support of sustainability”
- ▶ Benedict and McMahon (2012:3) referring to GI as the “interconnected green-space network (including natural areas and features, public and private conservation land, working lands with conservation values, and other protected open spaces) that is planned and managed for its natural resource values and for the associated benefits to human populations”

GI theme: Strategic spatial planning

Core aspect GI is socio-ecological resilience development

Bohemen (2002:193)

- ▶ • Make abstractions (thoughts, ideas, and concepts) placed onto land visible and discernible
- ▶ • Make complex natural processes visible and comprehensible
- ▶ • Expose systems and processes that were previously hidden
- ▶ • Emphasize the anthropogenic connection with nature

Foundational for GI to be applied to GI planning is achieved through GI principles

Hansen & Pauleit (2014:517) and Roe et al., (2013:653)

GI structure

Holistic, comprehensive, flexible and integrated approach:

Multifunctionality:

Connectivity/Linkage:

Multi-scale approach:

Multi-object approach:

The primary importance of green infrastructure:

Evidence-based approach:

Governance process

Strategic approach:

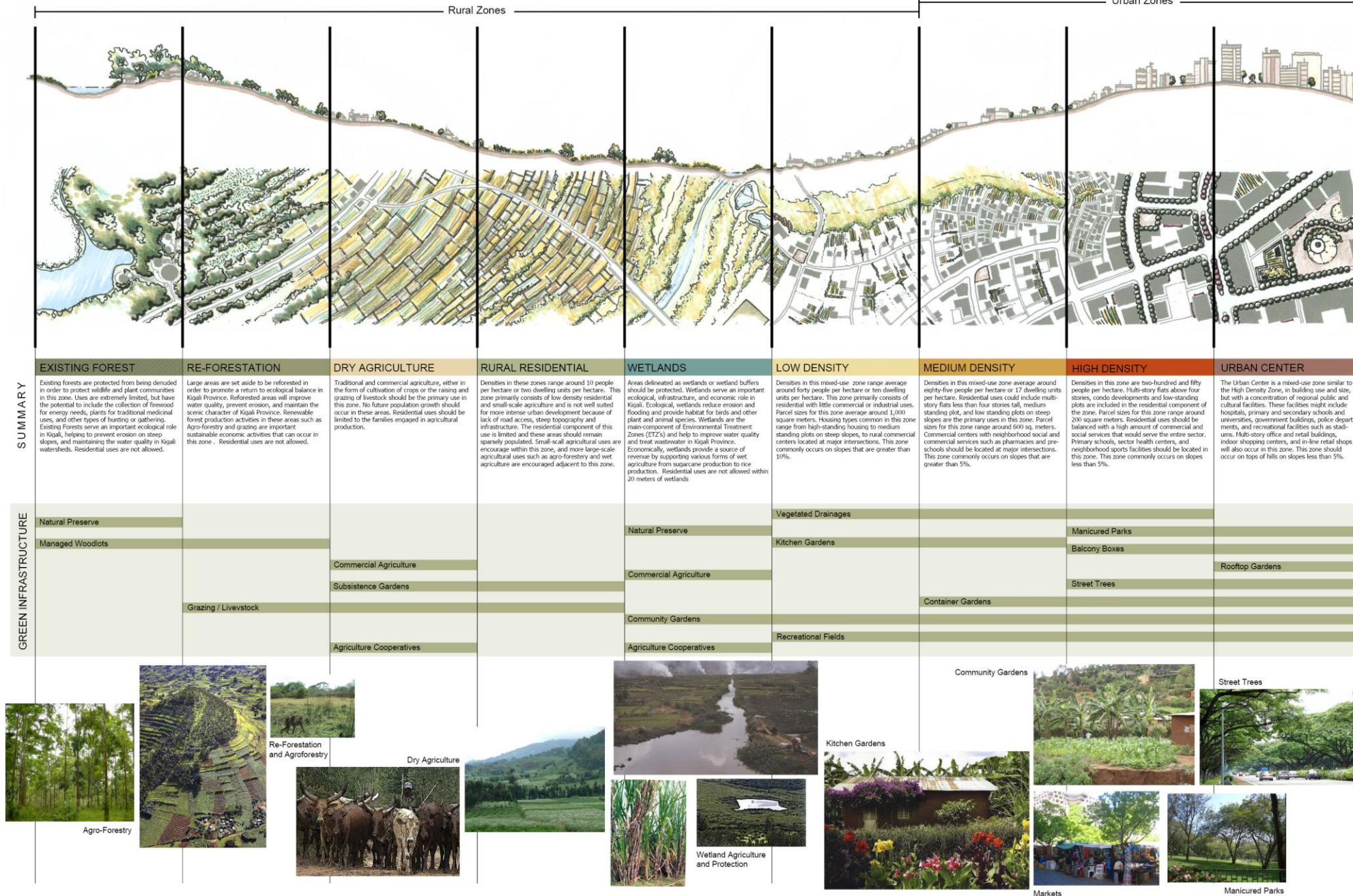
Social inclusion (partnership and participatory):

Transdisciplinarity:

Long-term approach:

Rural and peri-urban

- ▶ Basically rural is not built space, rather the peri-urban that locates in urban and between urban and rural regions.
- ▶ Accessibility and opportunity to services are difficult for people in these areas
- ▶ Collectively each city define its own rural, urban and peri-urban areas practically



Informal settlement of SA

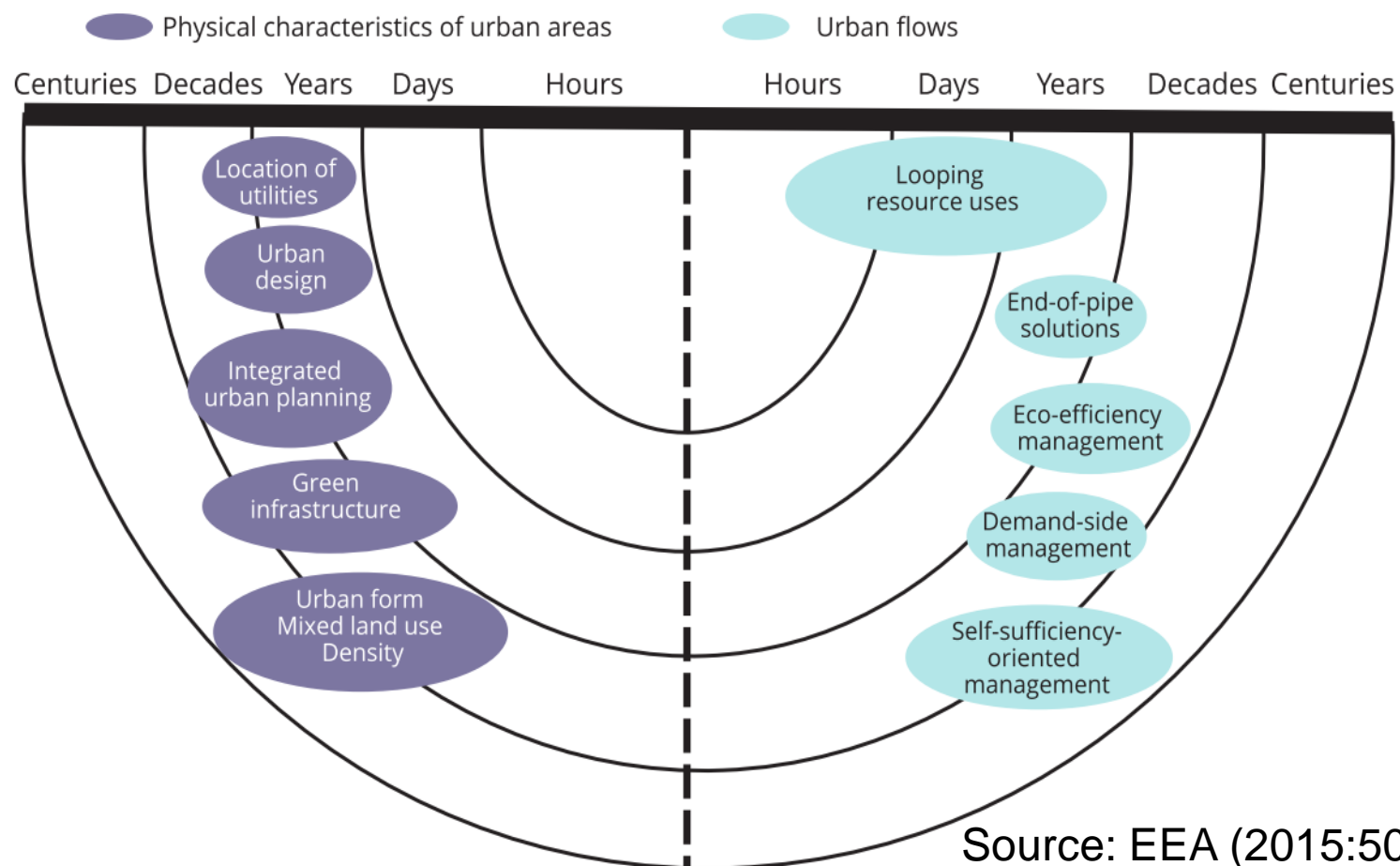
- ▶ Lack of basic infrastructure
- ▶ A disconnection of municipal services is much different than services not connected to households at all
- ▶ No shelter and municipal services as water, electricity, sewage
- ▶ Spatial Land Uses determine rural or peri-urban informal settlement

Methodology

1. **Scale:** GI minded not human bound but multifunctional between humans and nature
2. **Identify GI:** vegetation types (e.g grassland, wetlands)
River network (perennial) and Human settlement activities (transport networks)
3. **Identify the influence:** of GI from RPU informal settlements
4. **Applying GI principles** to identified GI
5. **Results and recommendations:** the potential of GI planning.

Scale: GI minded not human bound but multifunctional between humans and nature

Regional planning scales most suitable. Includes the scale of natural multifunctionality (GI)



Scale	Examples of scale types	Time lapse (interval)
Global	Transnational, international scales e.g. climate change	Very long term e.g. decades- centuries
National	e.g. economic, transport and housing policies	Long term e.g. decades
Region	Sectoral, regional and sub-regional scales e.g. employment opportunities, water catchment	Long term e.g. decades to years
Metropolitan area	City scale and naturalistic corridors e.g. urban services and amenities	Moderate to long-term e.g. decades to years
District	Community and neighbourhood scales e.g. zoning,	Moderate time period e.g. years
House/block	Project and site-specific scale e.g. individual building	Short to moderate time period e.g. years to months

Source:

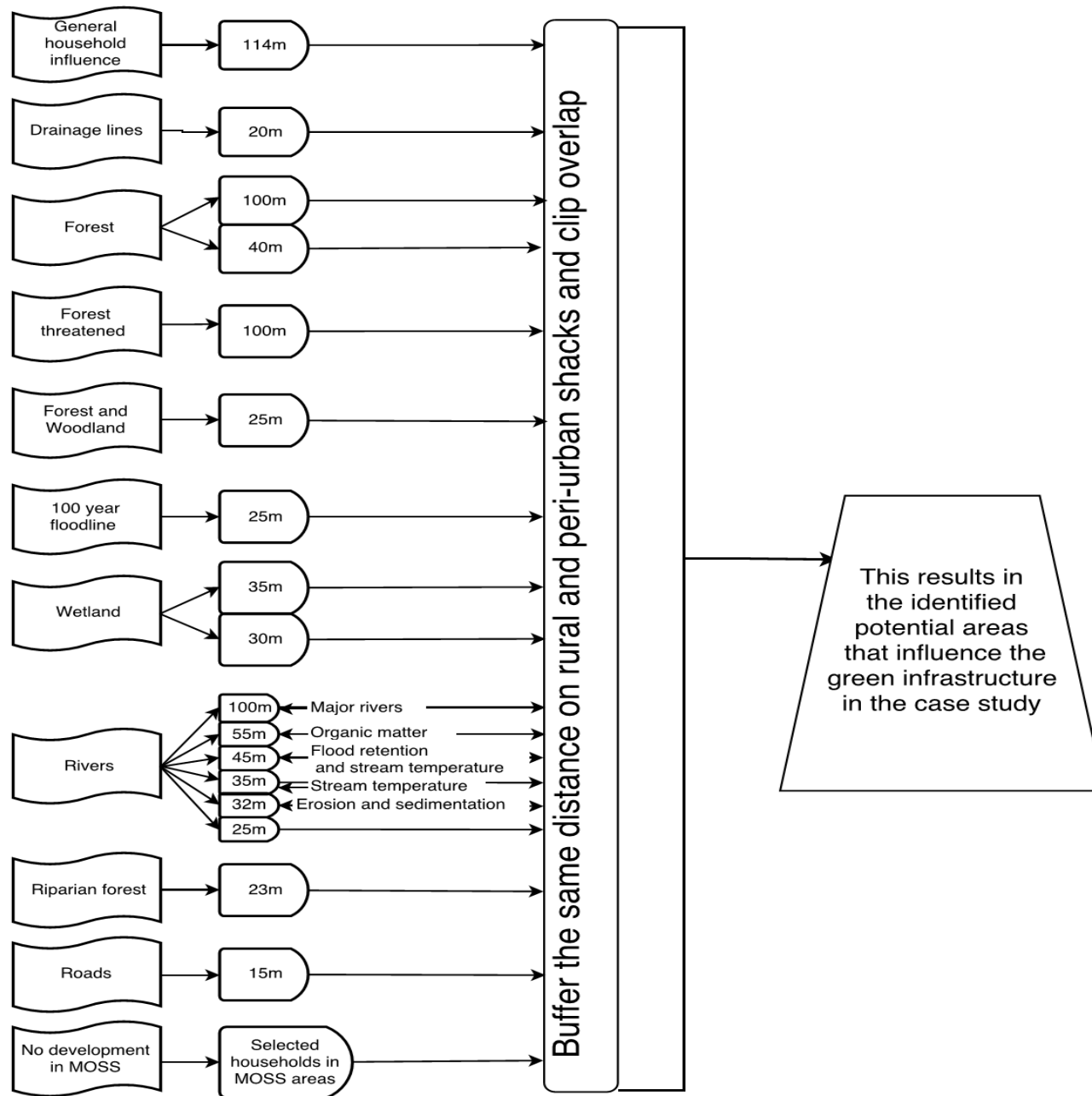
Adapted from
(Connop *et al.*,
2015:2;
Corbridge,
1998:45; EEA,
2015:49; Mell,
2014:615;
Naumann *et al.*,
2011a:17;
Young *et al.*,
2014:2573)

Identify GI:

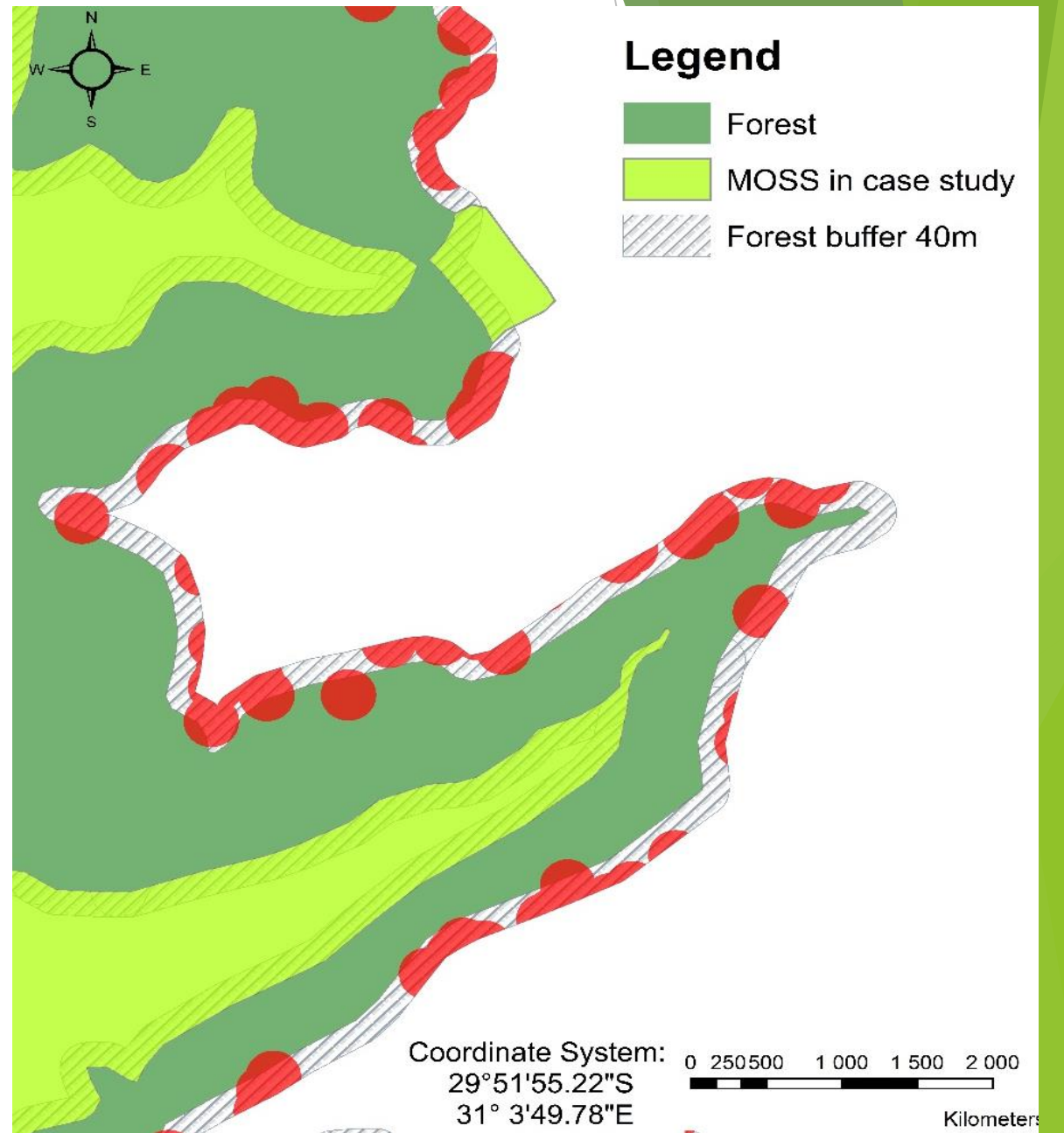
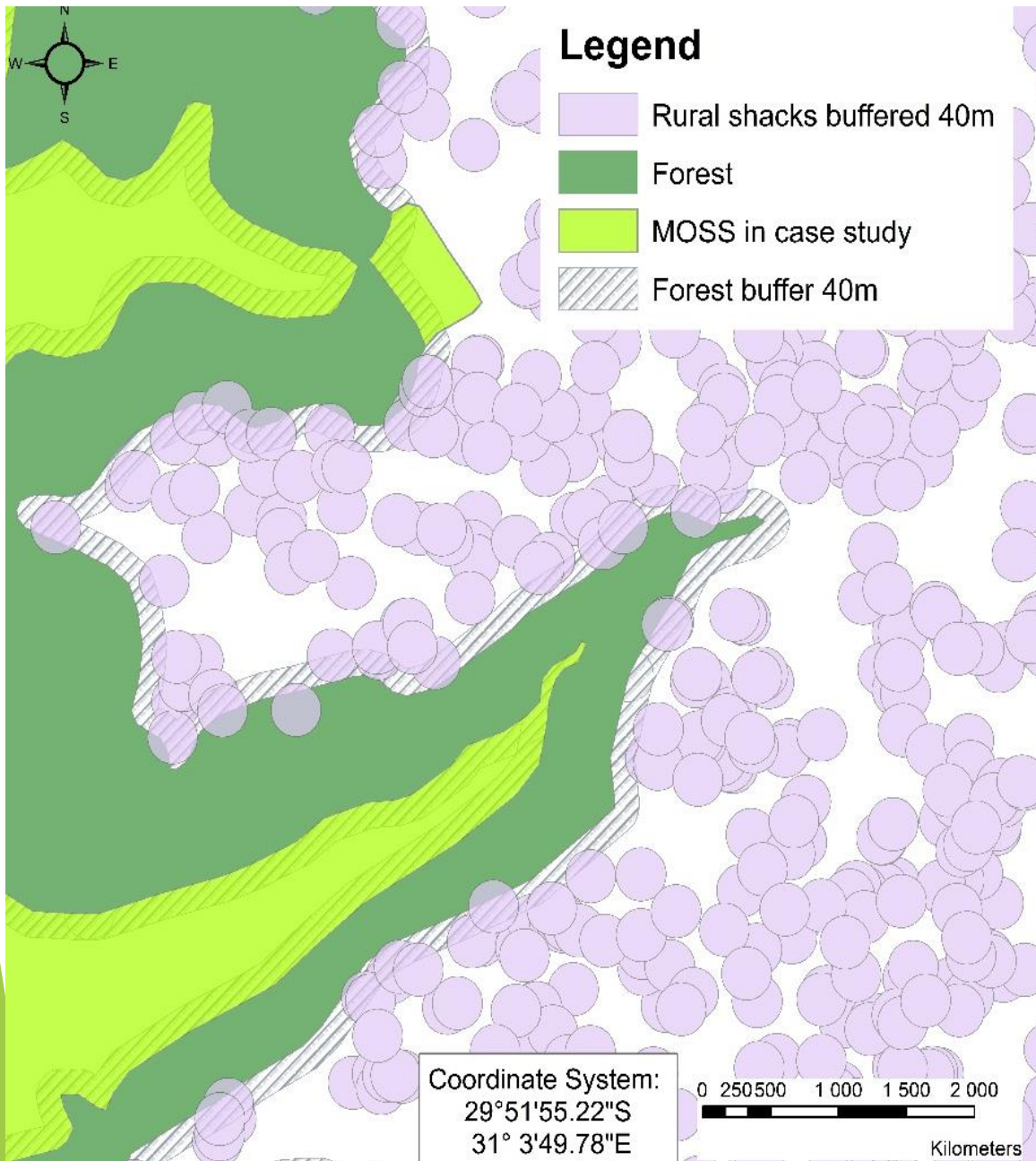
- ▶ Vegetation types (grasslands, wetlands, forests e.t.c)
MOSS (Metropolitan Open Space System)
- ▶ River networks (perennial river networks)
- ▶ Human settlement activities (gardens, parks, vegetation strips)

Identify the influence of GI from RPU informal settlement

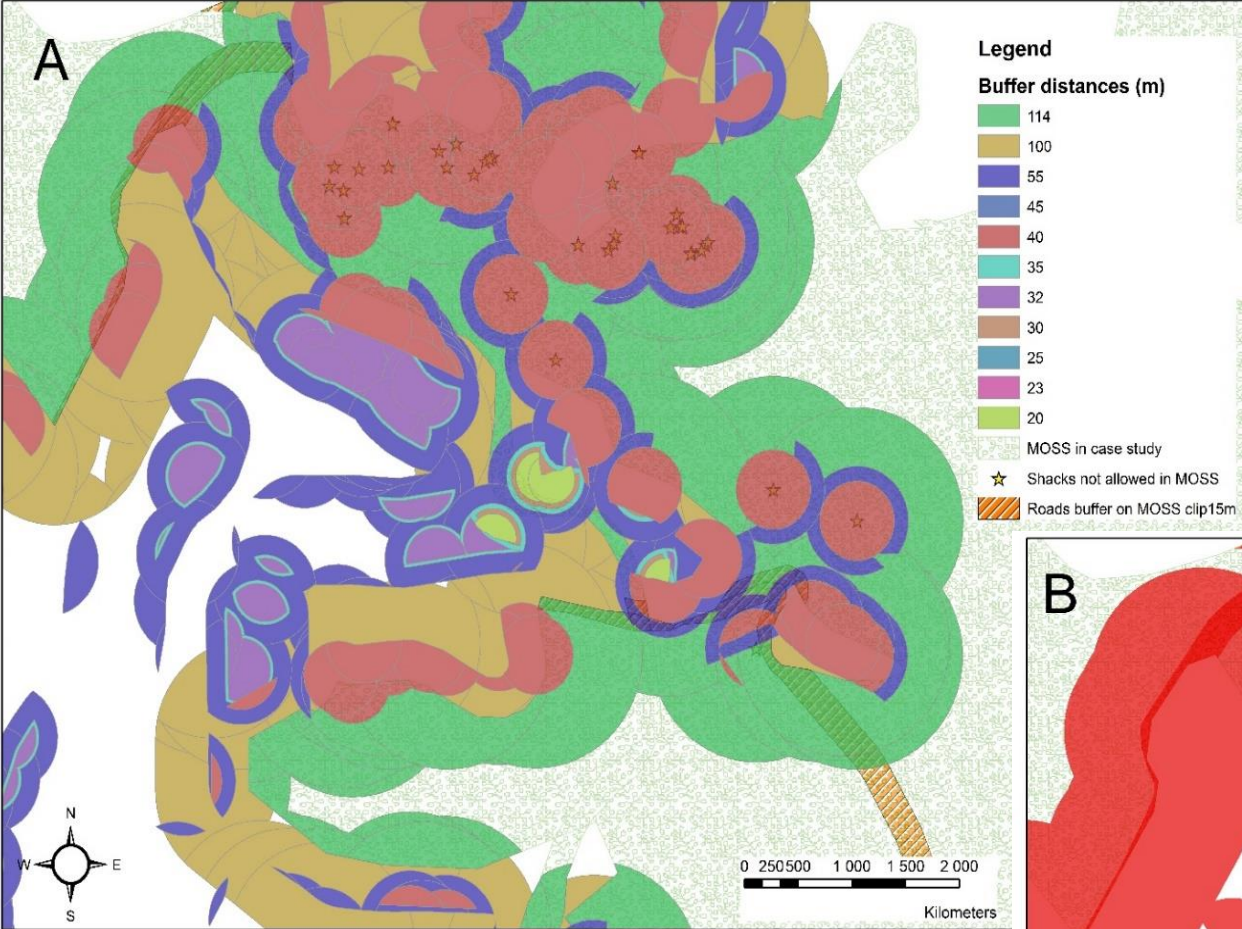
- ▶ Buffer standards: Bohemen (2002:193)
- ▶ Same buffers were applied to informal settlement points
- ▶ Overlap is vegetation types, river networks and human settlement activities is grouped together to portray the identified GI potential from RPU influence



>11 types
>18 buffer widths
>one collective
identified GI
potential



A

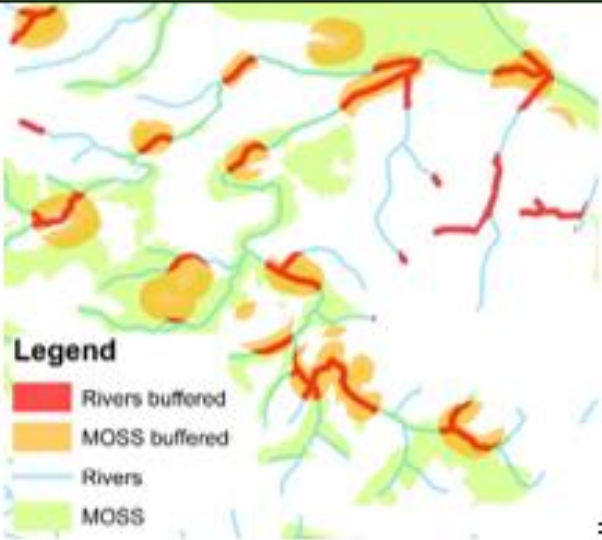
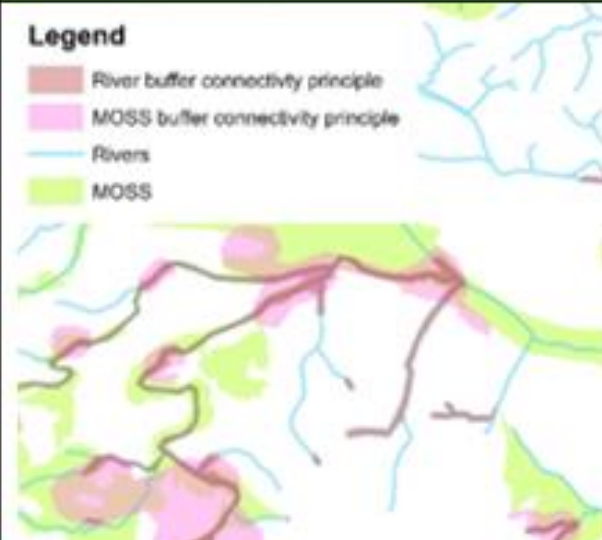
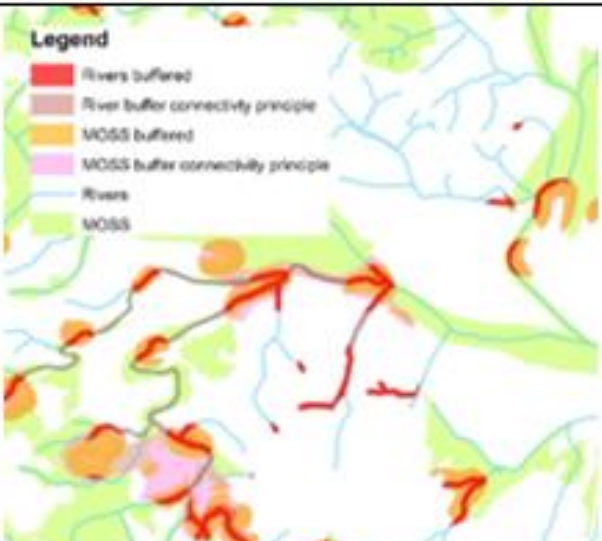
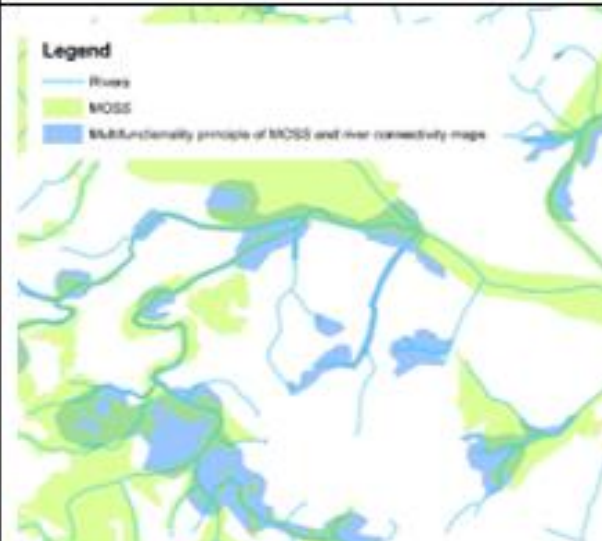


B

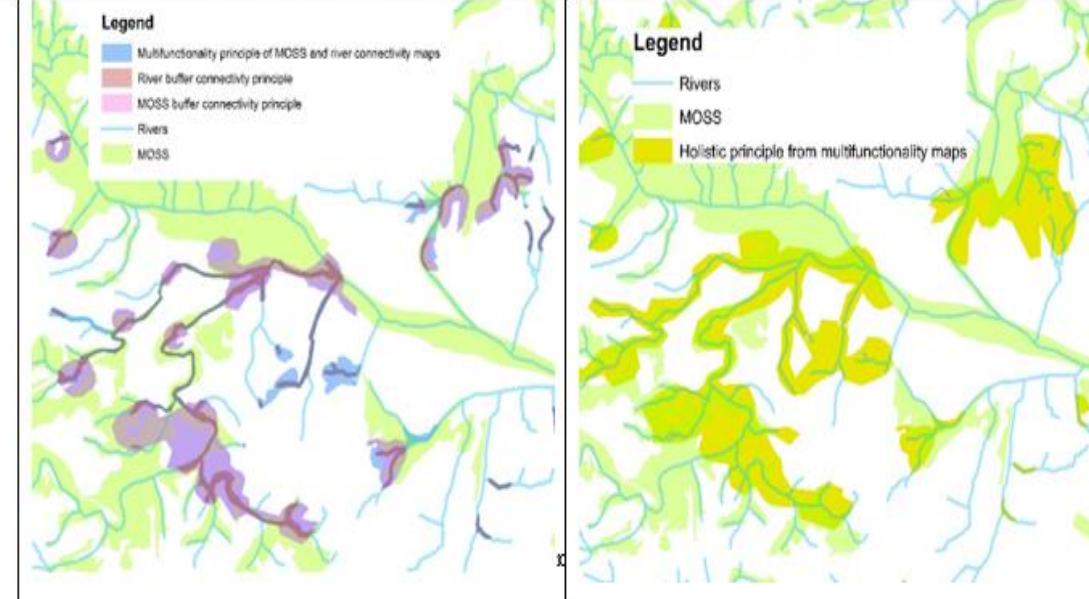


Applying GI principles to identified GI

- ▶ GI principle covers a local to national scale of GI application
- ▶ To identify the potential of GI on a regional planning scale required three main GI principles (out of 9 principles)
- ▶ Drawing polygon features to turn identified existing GI influence into GI planning potential. This is called strategic spatial planning of existing GI into GI planning.

Principles	Principle-scoping maps	Principle-applied maps
Connectivity	 <p>Legend</p> <ul style="list-style-type: none"> Rivers buffered MOSS buffered Rivers MOSS 	 <p>Legend</p> <ul style="list-style-type: none"> River buffer connectivity principle MOSS buffer connectivity principle Rivers MOSS
	 <p>Legend</p> <ul style="list-style-type: none"> Rivers buffered River buffer connectivity principle MOSS buffered MOSS buffer connectivity principle Rivers MOSS 	 <p>Legend</p> <ul style="list-style-type: none"> Rivers MOSS Multifunctionality principle of MOSS and river connectivity maps

Holistically



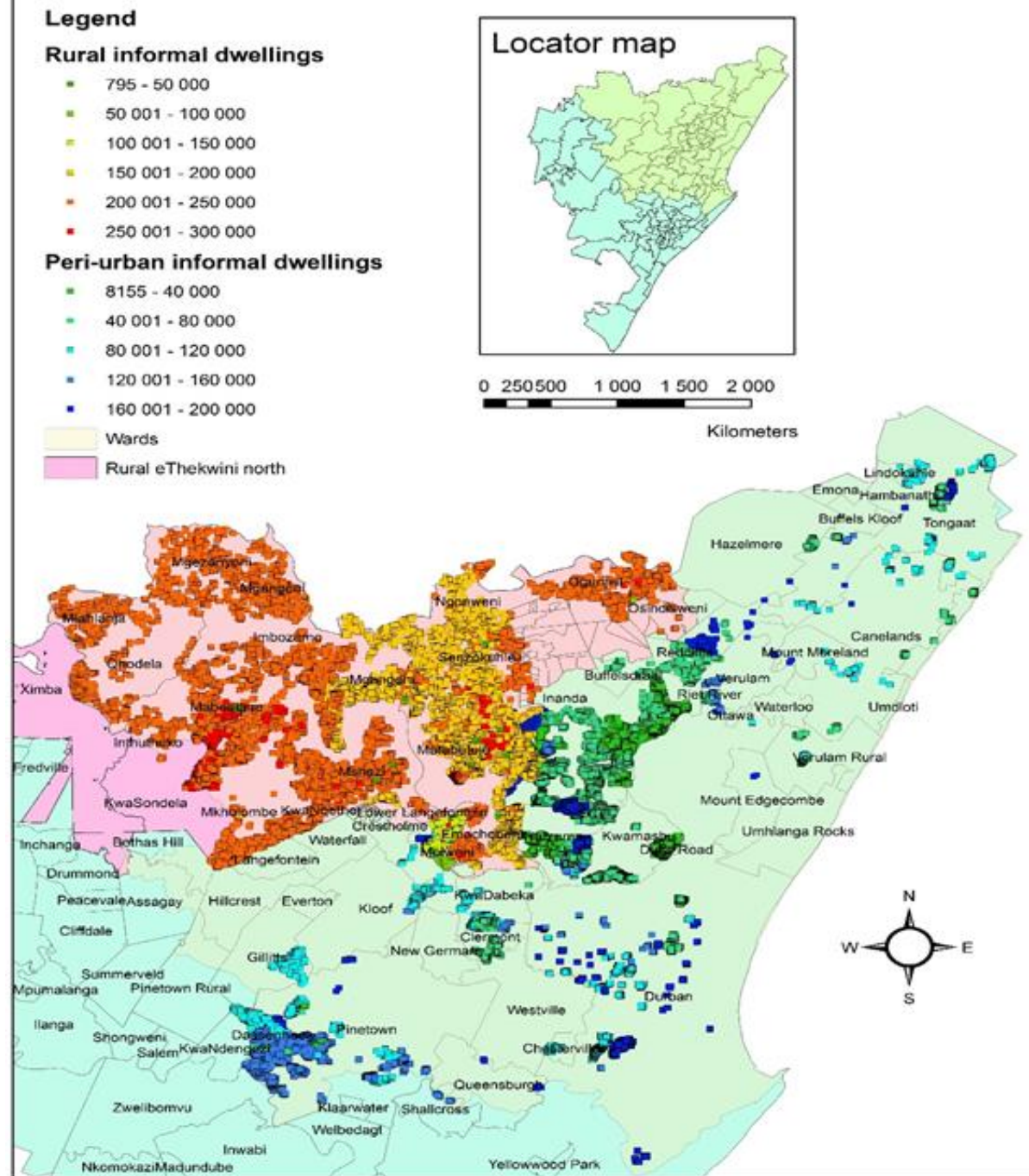
Source: Authors' creations (2017)

Result and recommendations: the potential of GI planning

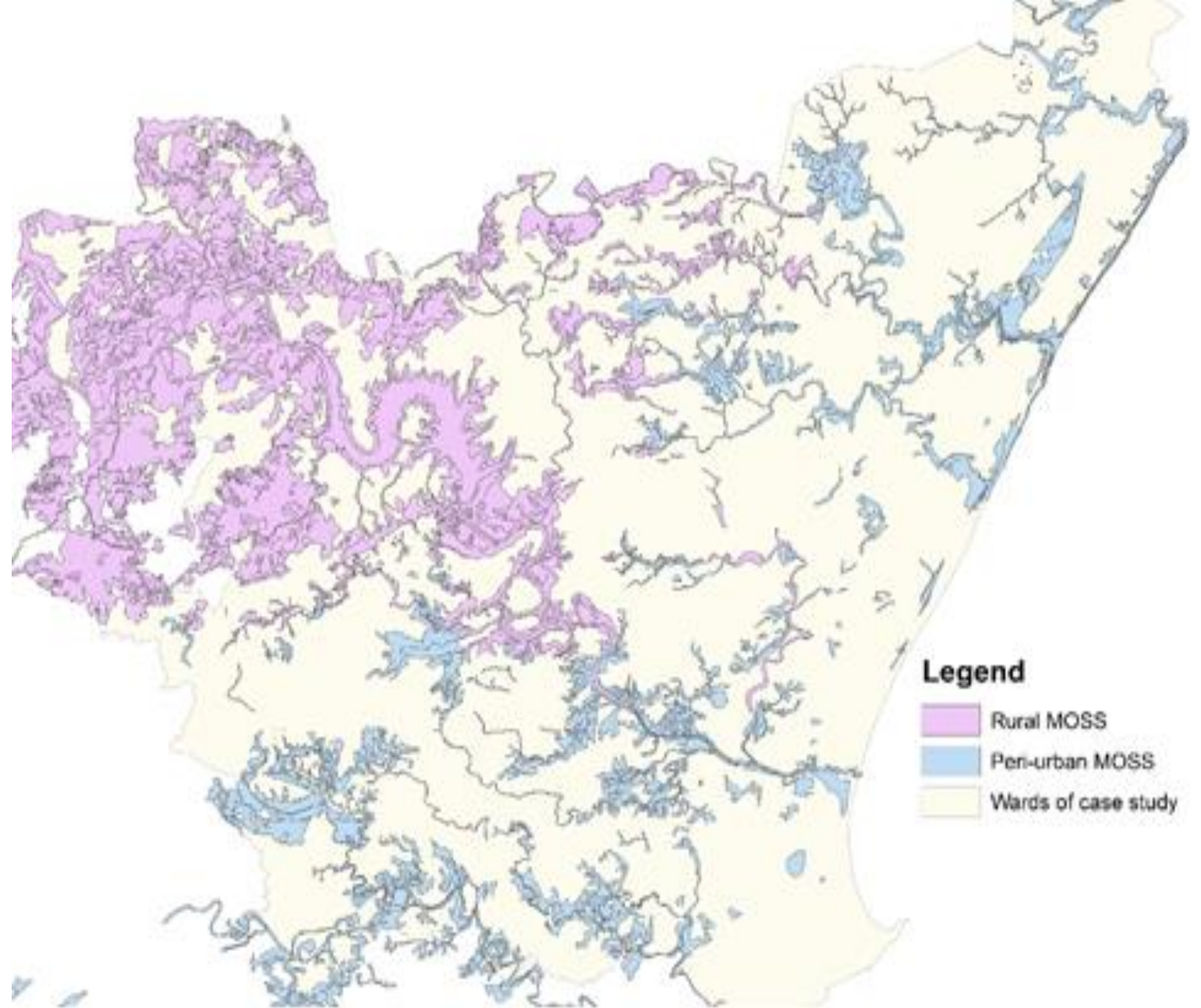
- ▶ With identified GI planning potential from the influence of RPU informal settlements (this is not the capacity)
- ▶ This GI planning potential is the puzzle picture for strategic spatial planning from specific influences
- ▶ Further strategic spatial planning from this potential benefit not only GI but other spatial planning land use activities



Informal settlement of eThekweni municipality rural and peri-urban areas



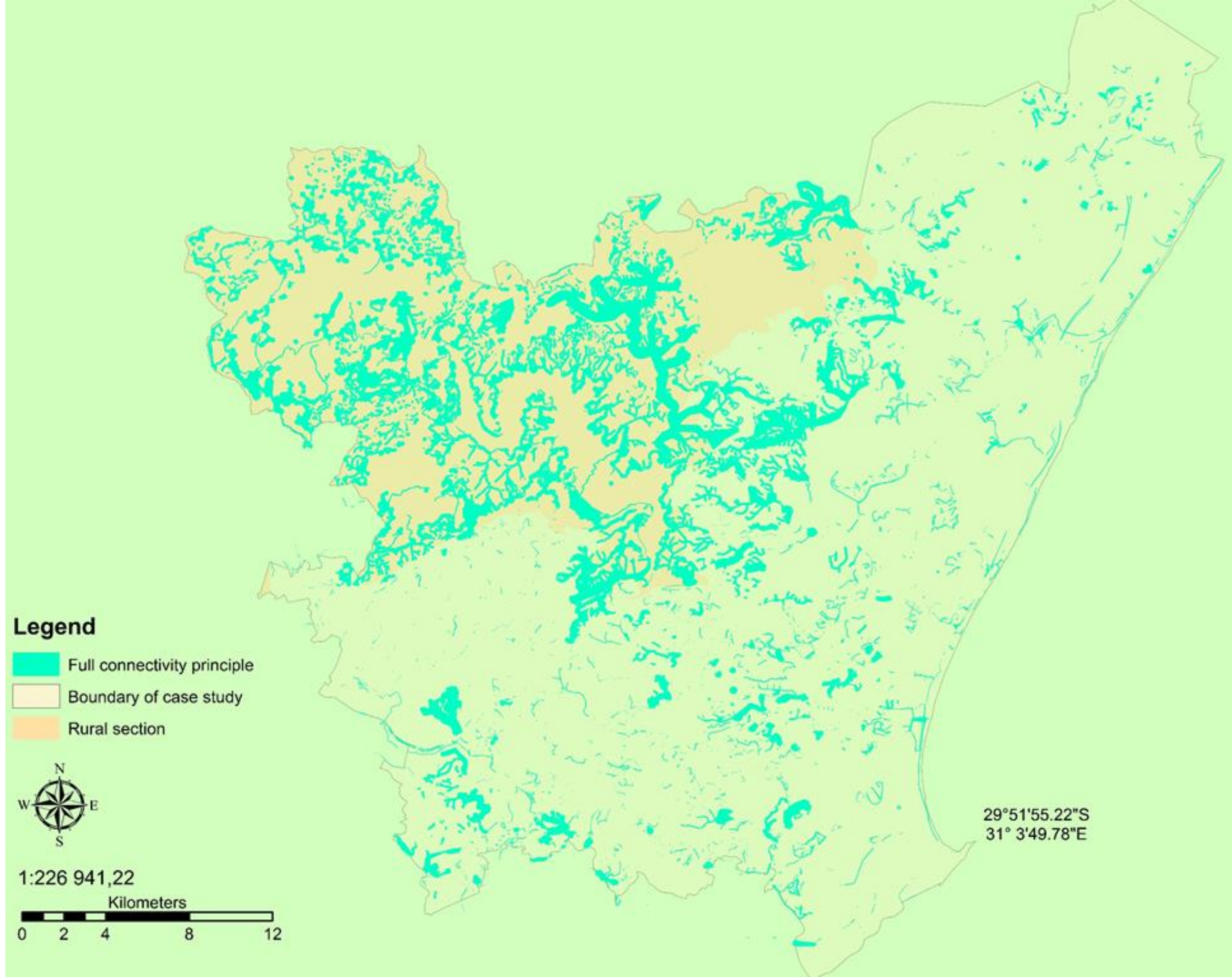
Established MOSS of the case study



Case study: River networks






Case study: Connectivity principle



Case study: Multifunctionality principle

Legend

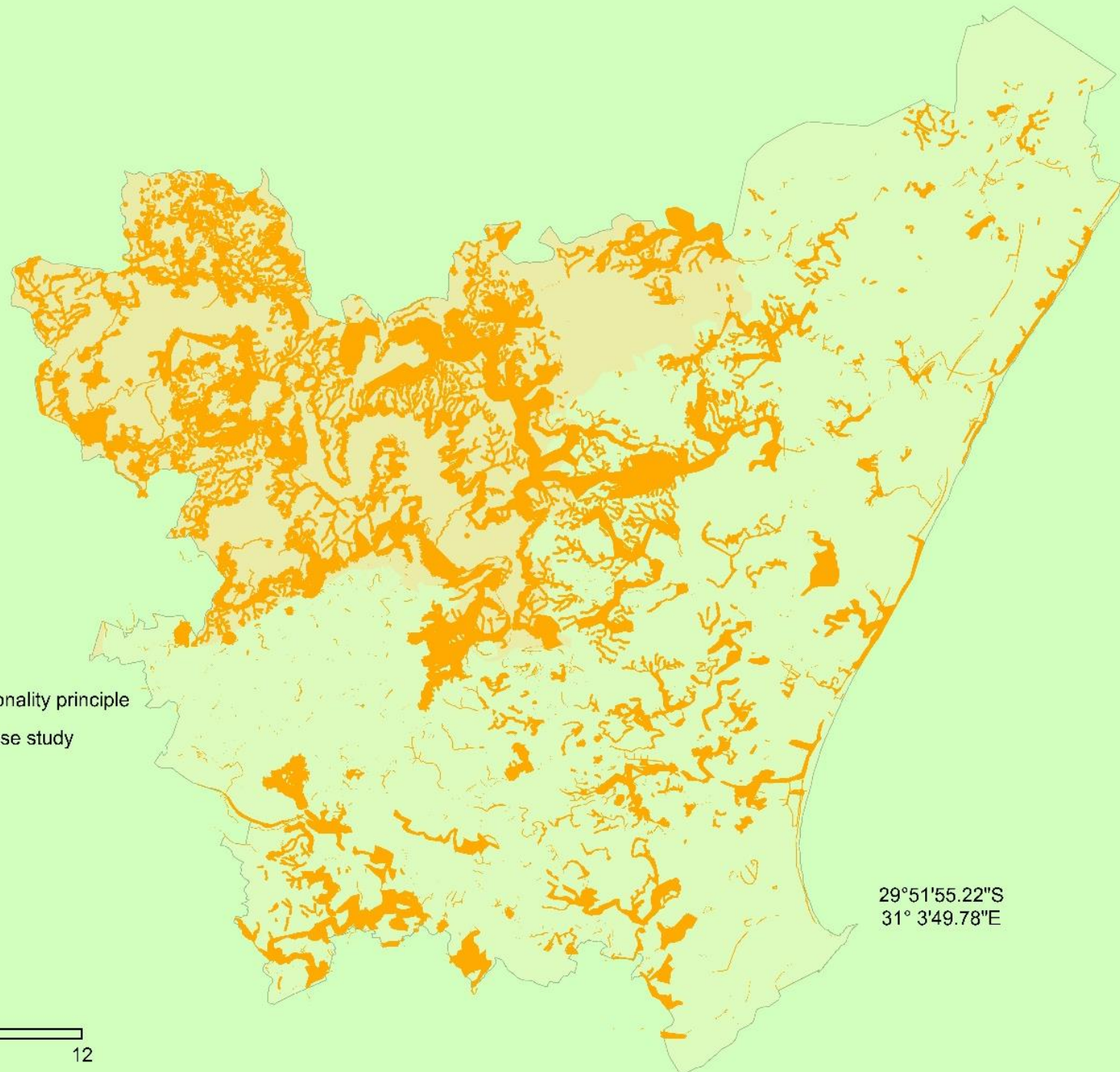
-  Full multifunctionality principle
-  Boundary of case study
-  Rural section



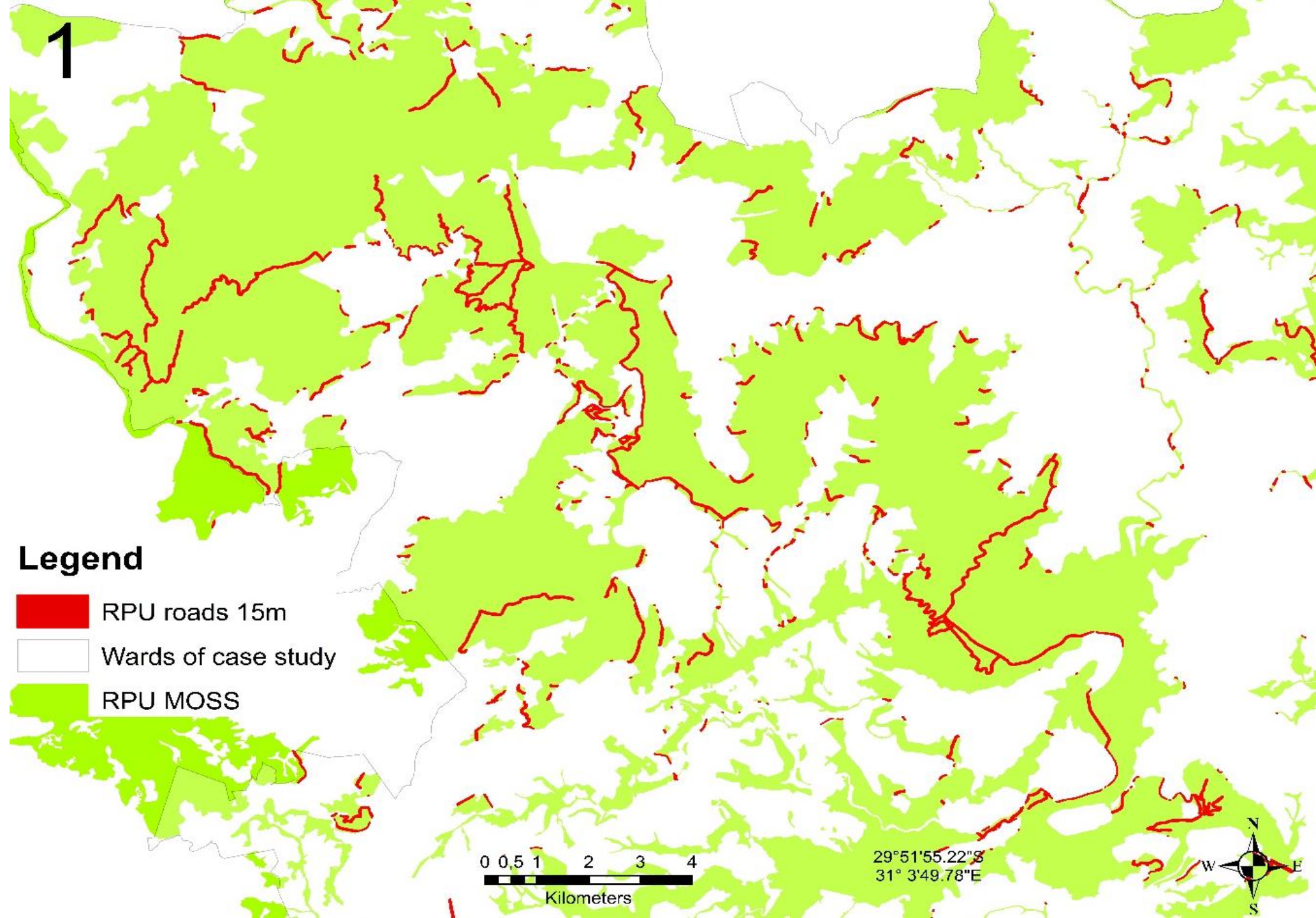
1:250 000



29°51'55.22"S
31° 3'49.78"E



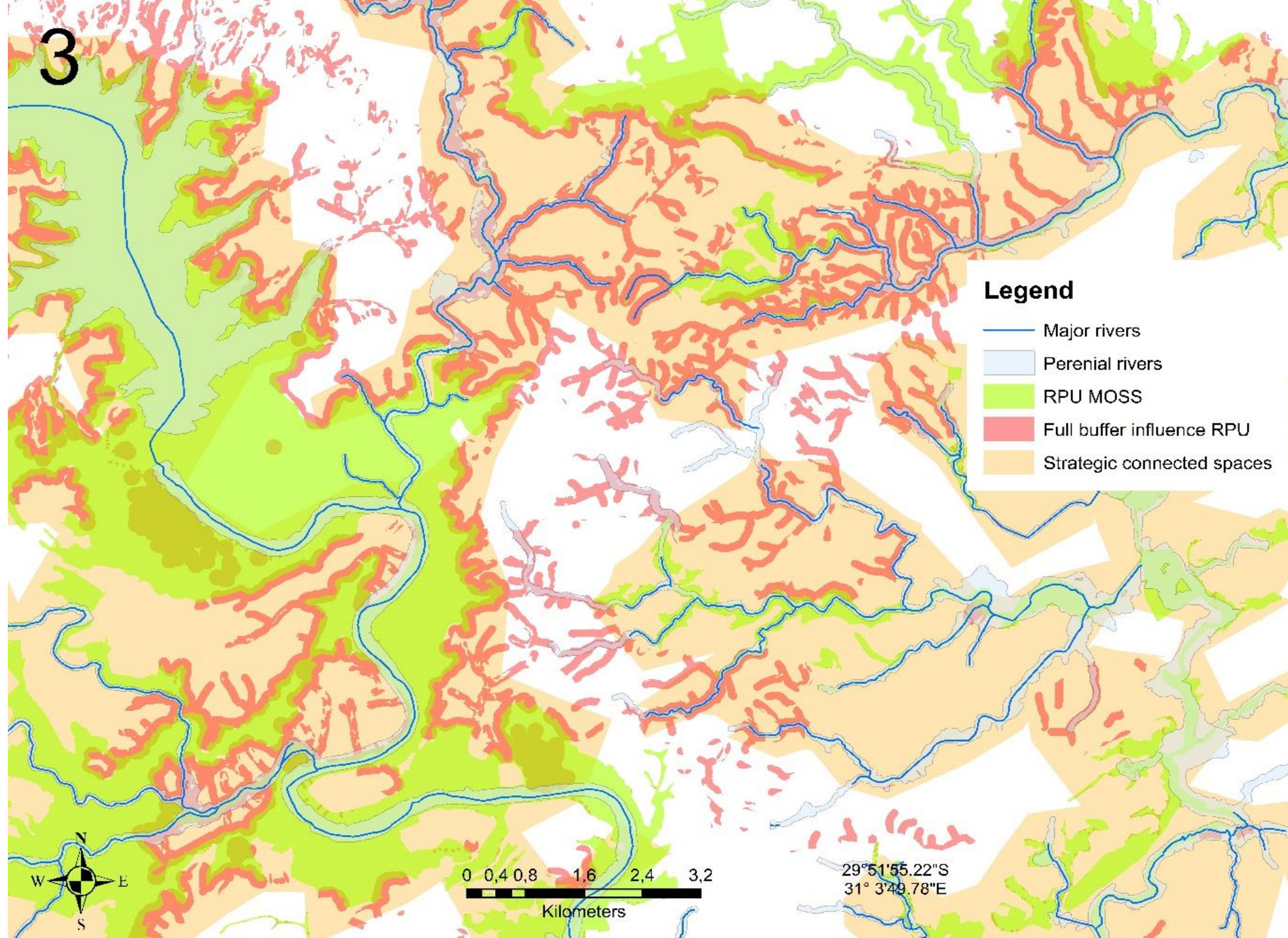
Roads



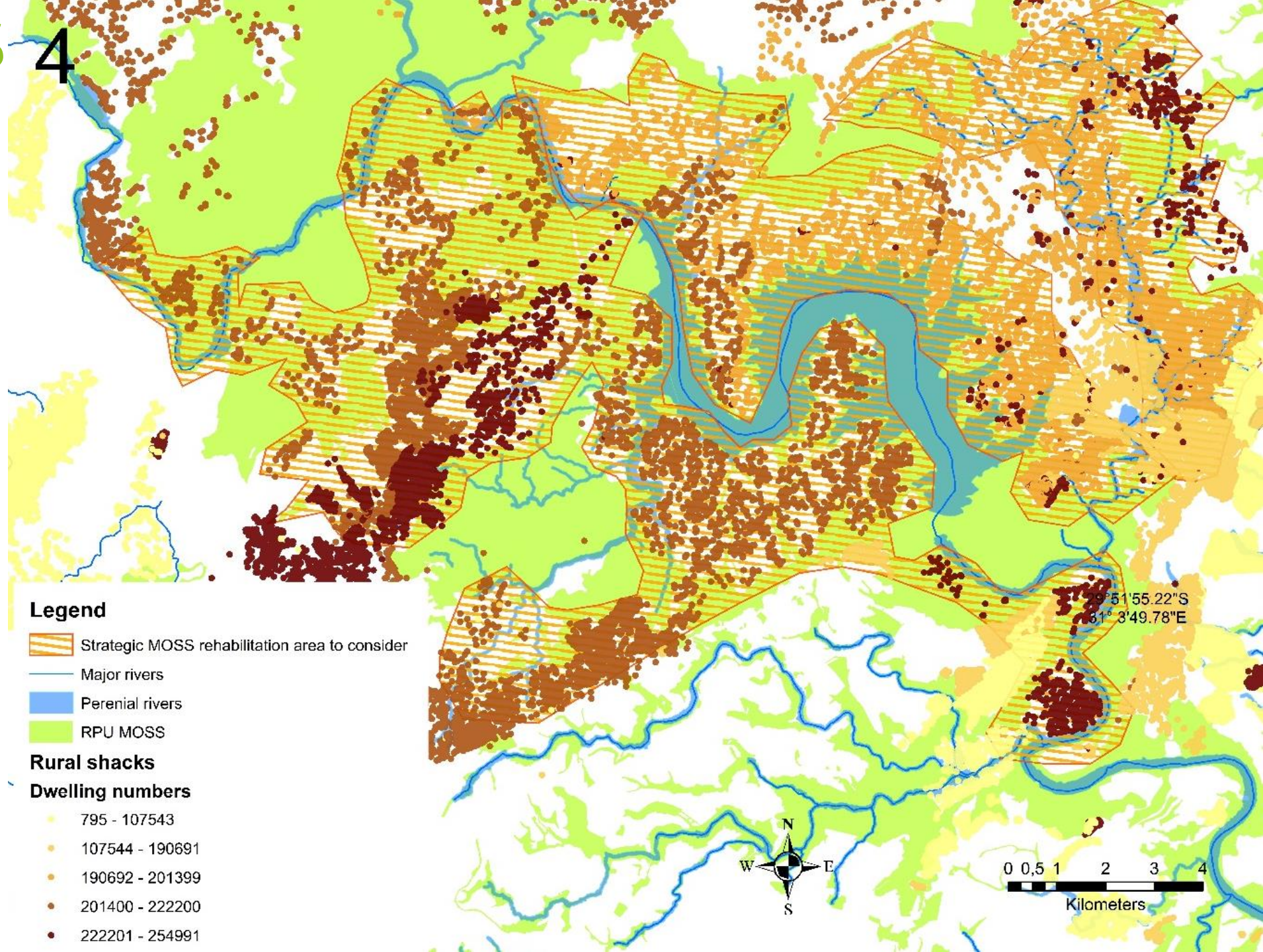
Drainage lines



Strategic connected spaces



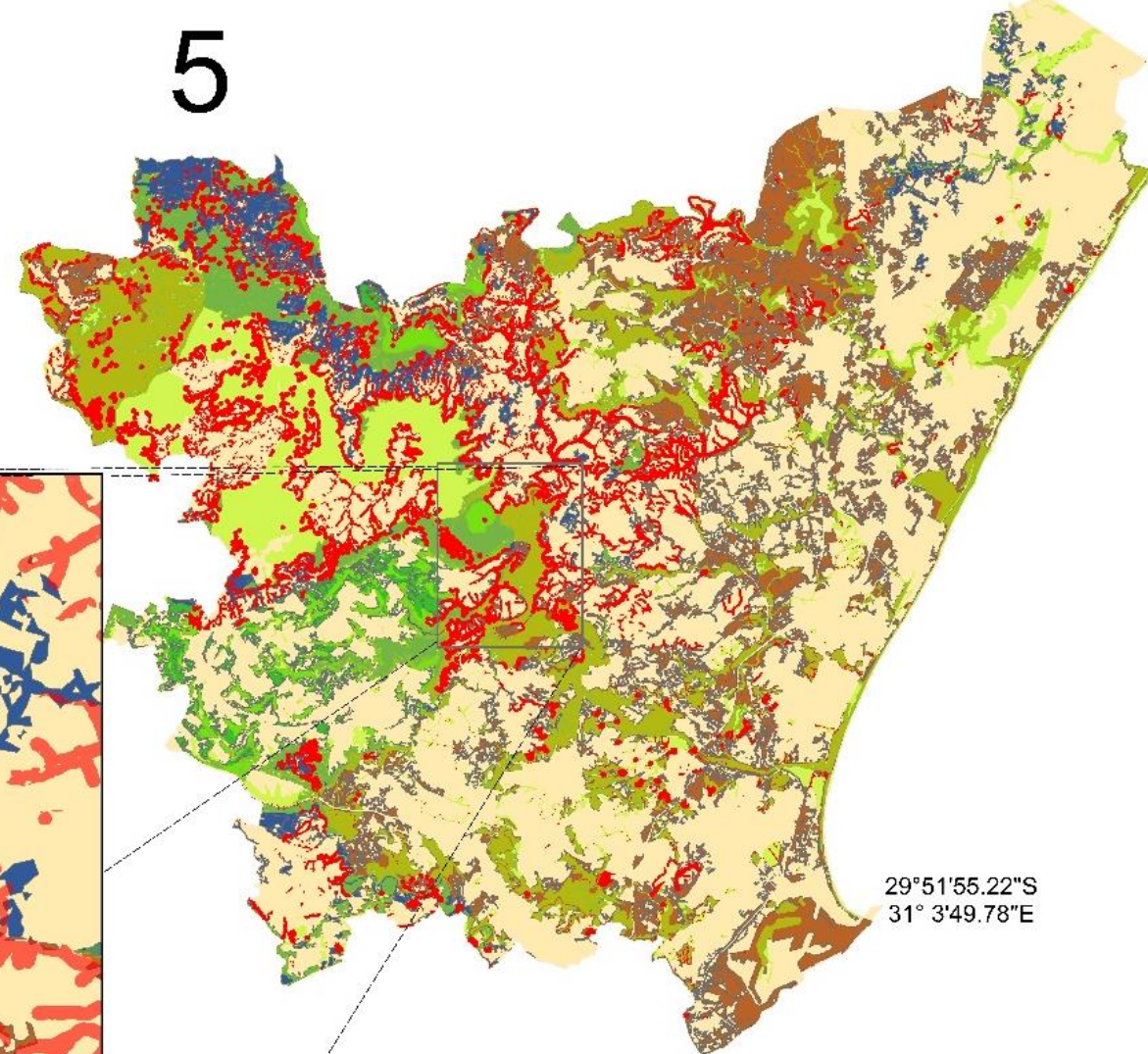
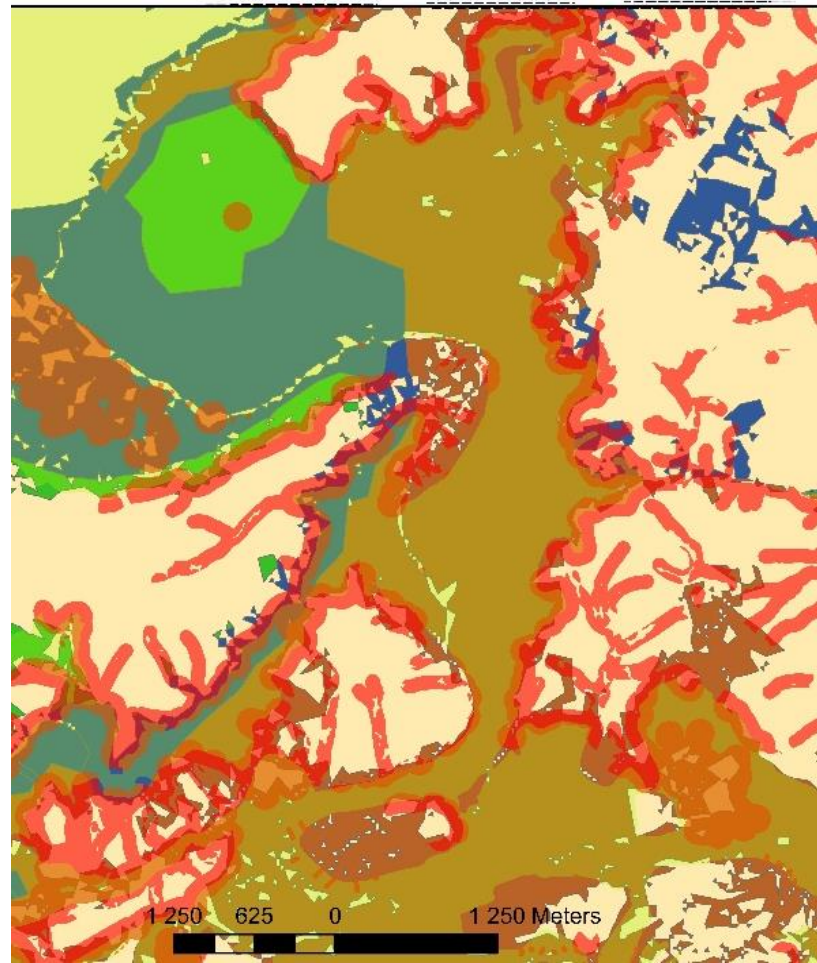
Strategic MOSS 4 areas to consider rehabilitation



Identifying critical planning zones from identified GI planning potential

Legend

- Full buffer influence RPU
- RPU MOSS
- Wards of case study
- Critically endangered ecosystems
- Endangered ecosystems
- Vulnerable ecosystems



Acknowledgements

- ▶ Sarel Cilliers
- ▶ Juaneé Cilliers



NORTH-WEST UNIVERSITY
YUNIBESITI YA BOKONE-BOPHIRIMA
NOORDWES-UNIVERSITEIT

- ▶ NRF financial acceptance



**National
Research
Foundation**