The Macro-Ecological Corridors of KZN

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Major Climate Change Threats

- Increase temperature: +2^{o}C over the next 50 years
- Increased rainfall but with longer inter-rainfall and greater intensity events
- N deposition changes
- Sea level rise – estuaries
- Change in land use e.g. crop farming
- Loss of biodiversity (impact on tourism)
- Hydrological system and use of scarce water resources
- Etc Etc Etc…

Results of climate change

- Species responses are non-linear.
- Some species will go extinct.
- Novel assemblages of species.
- Many species will move up the altitudinal gradient (cooler).
- Invasion of the grassland biome by savanna species.

But wait, that’s not all!

- Climate change is concomitant with land use transformation.
- 50% of KZN permanently transformed.
- The landscape is fragmented making it difficult for species to persist and adapt to climate change.

CC Mitigation measures

- Leave it be - Autonomous adaptation
- Facilitated adaptation:
  - Translocate species
  - Ex-situ conservation
  - Living collections
  - Matrix management
  - Conservation Planning

Corridor Theory

- According to island biogeography theory and meta-population theory, species *able* to use linkages have a greater capacity to persist in fragmented habitats. (Bowler & Benton 2009; Bennet 2003).
- Corridors are scale dependant and the spatial scale of the species movements is important e.g. home range territory, seasonal migration, nomadic species etc.
- The quality of the matrix is very important.
- Corridors have disadvantages too!

Corridors in KZN

- Aims:
  - Macro-ecological corridors to facilitate ecological processes
  - Coarse filter approach
  - Linkages for assemblages of species, specifically the matrix species
  - Terrestrial corridors

Corridors and conservation planning

Areas important for the maintenance of ecological process:

- Biogeographic
  - Drakensberg Escarpment Corridor
  - Lebombo Corridor
  - Coastal Fore Dune Corridor
- Altitudinal Corridors (climate change)
  - Fluvial (river) corridors
  - Interfluve (watershed) corridors

How wide should corridors be?

Concepts:

- Reduce edge effects
- Greater diversity of habitats, abundance and diversity of species in larger areas (spp-area relationships) e.g. 10-15 birds in 15m width versus 25-30 species in corridors > 150m wide (Stauffer and Best 1980).
- Provide for species with large space requirements or specialised feeding or habitat requirements.

How wide should corridors be?

- The width must be 2x that over which edge disturbances influence ecological processes.
- Linkage is wide enough when it effectively maintains connectivity for the assemblage of species for which it is intended

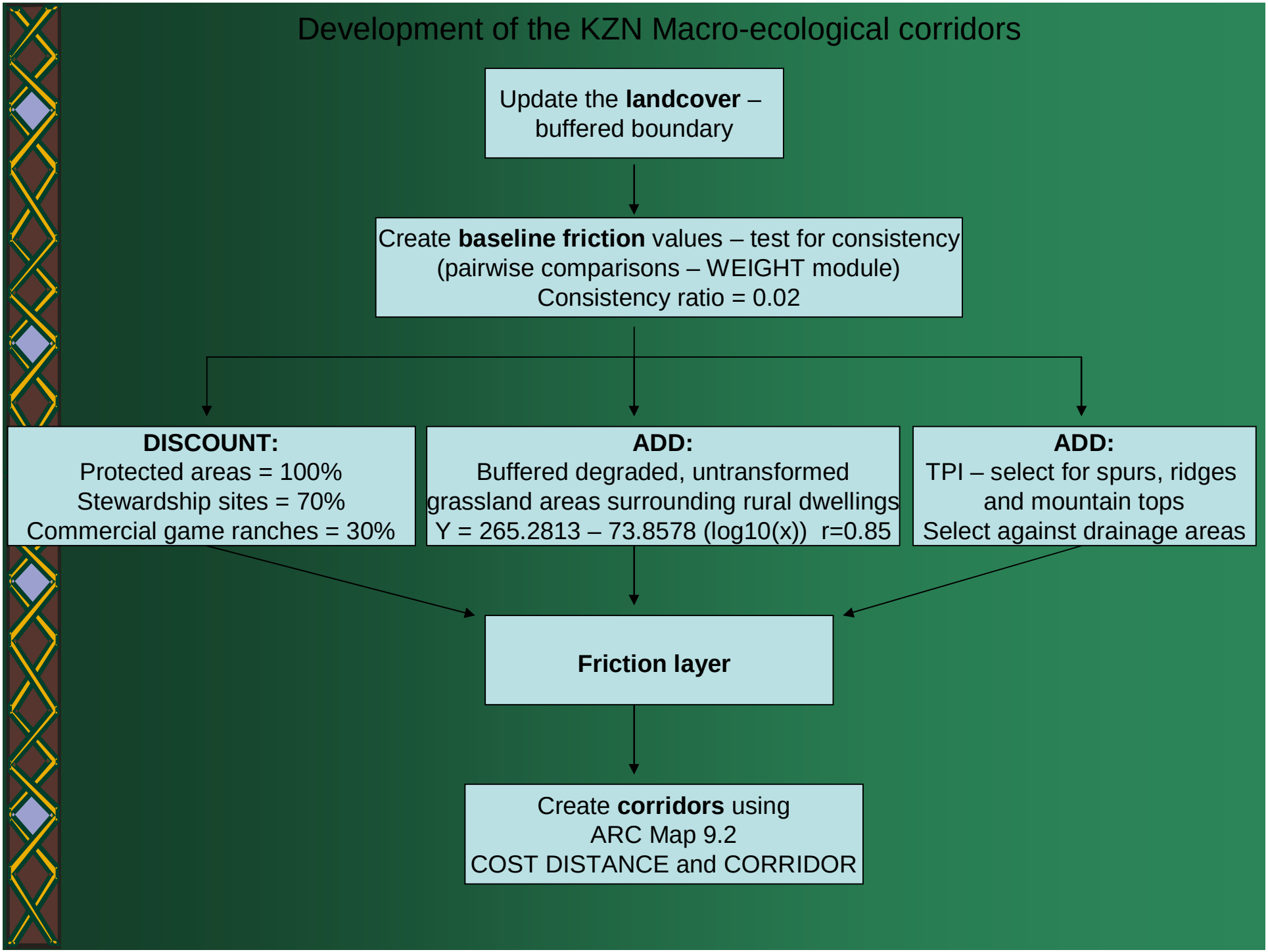
How wide should corridors be?

Rule of thumb:

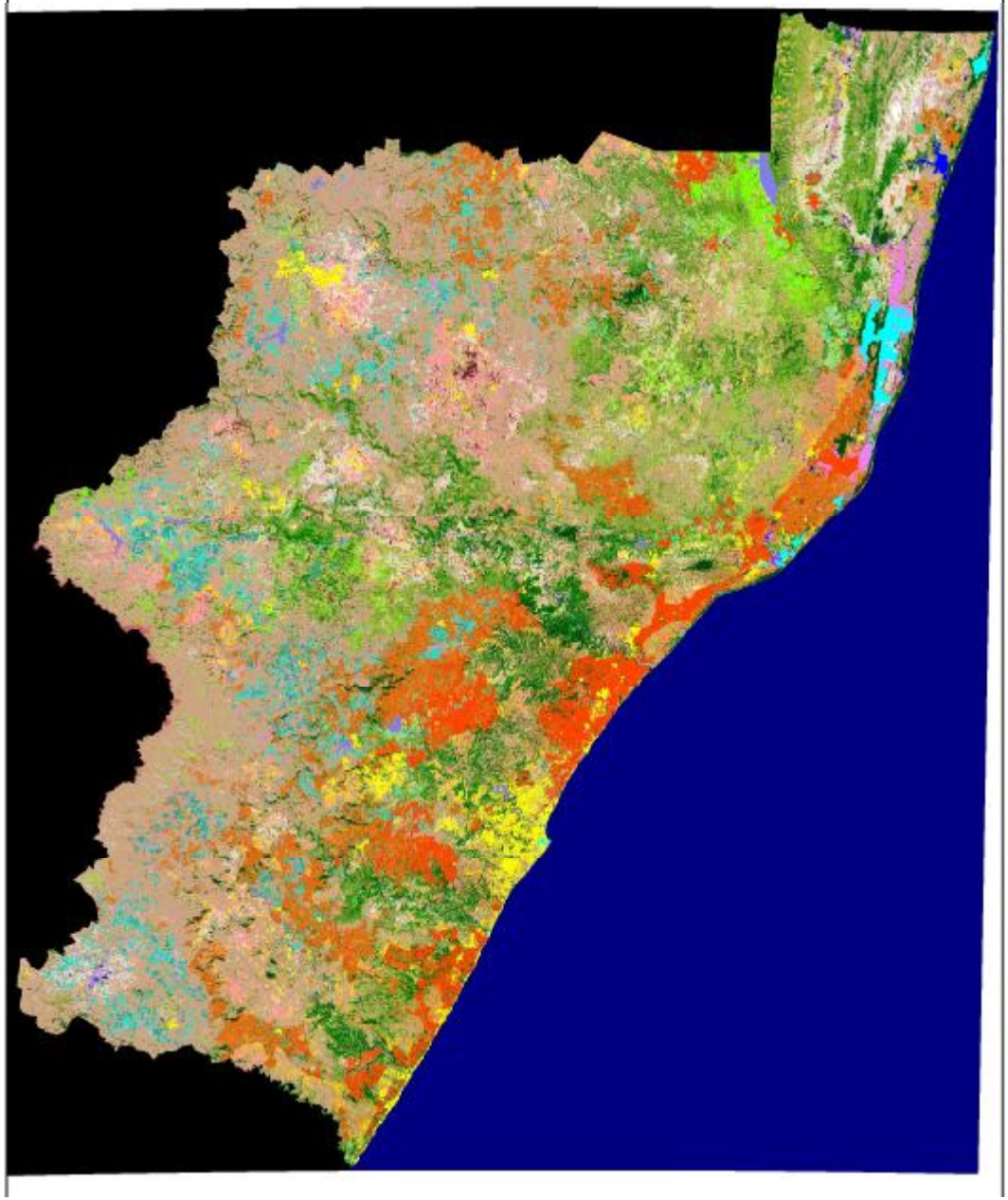
- For the movement of a species with known biology and the corridor is expected to function over years, the width should be 100's metres.
- When the movement of entire assemblages is considered and/or little is known of the biology of the species, and the corridor should function over decades, the width should be in kilometres.

(Harris and Scheck 1991)

Development of the KZN Macro-ecological corridors



KZN Landcover 2005

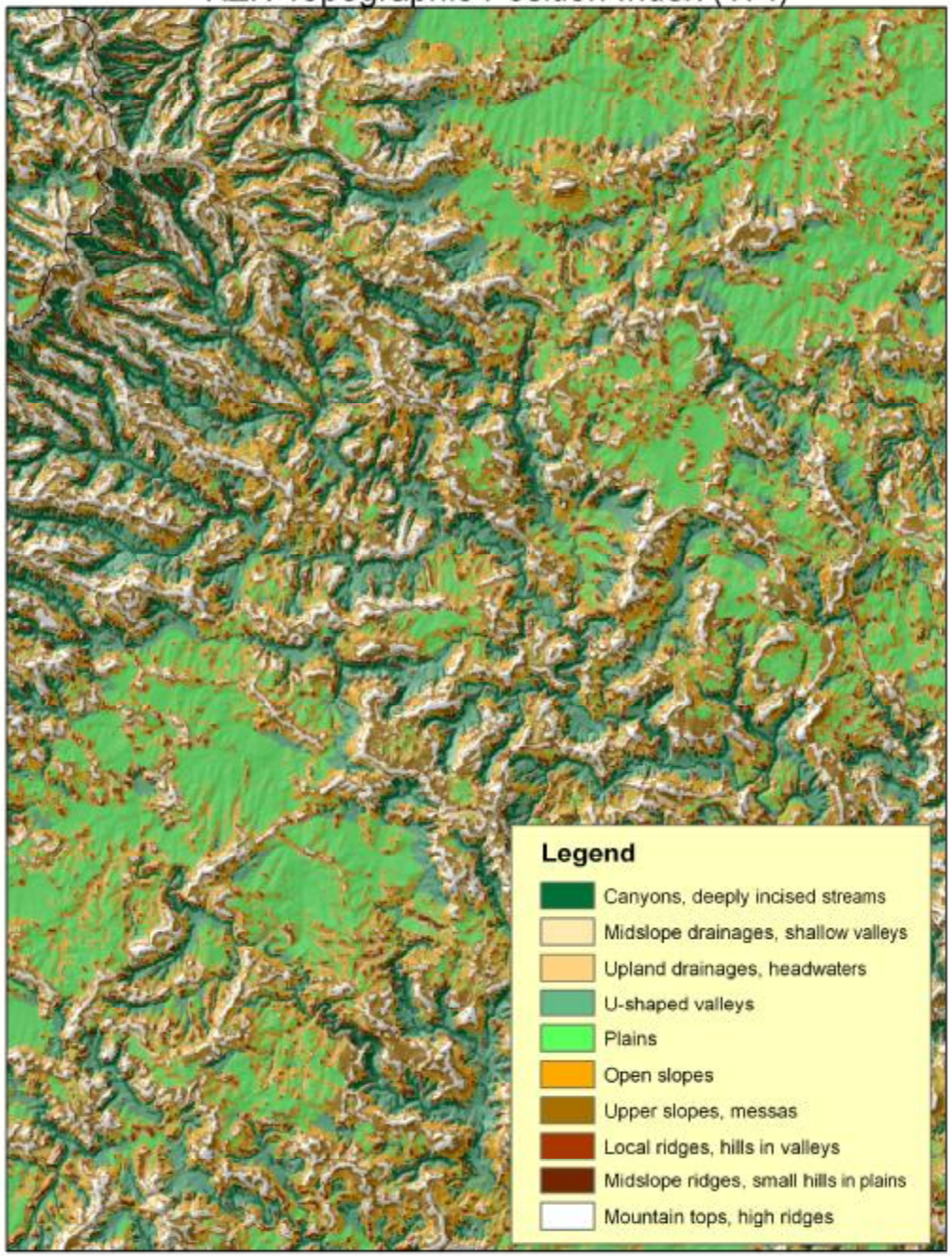


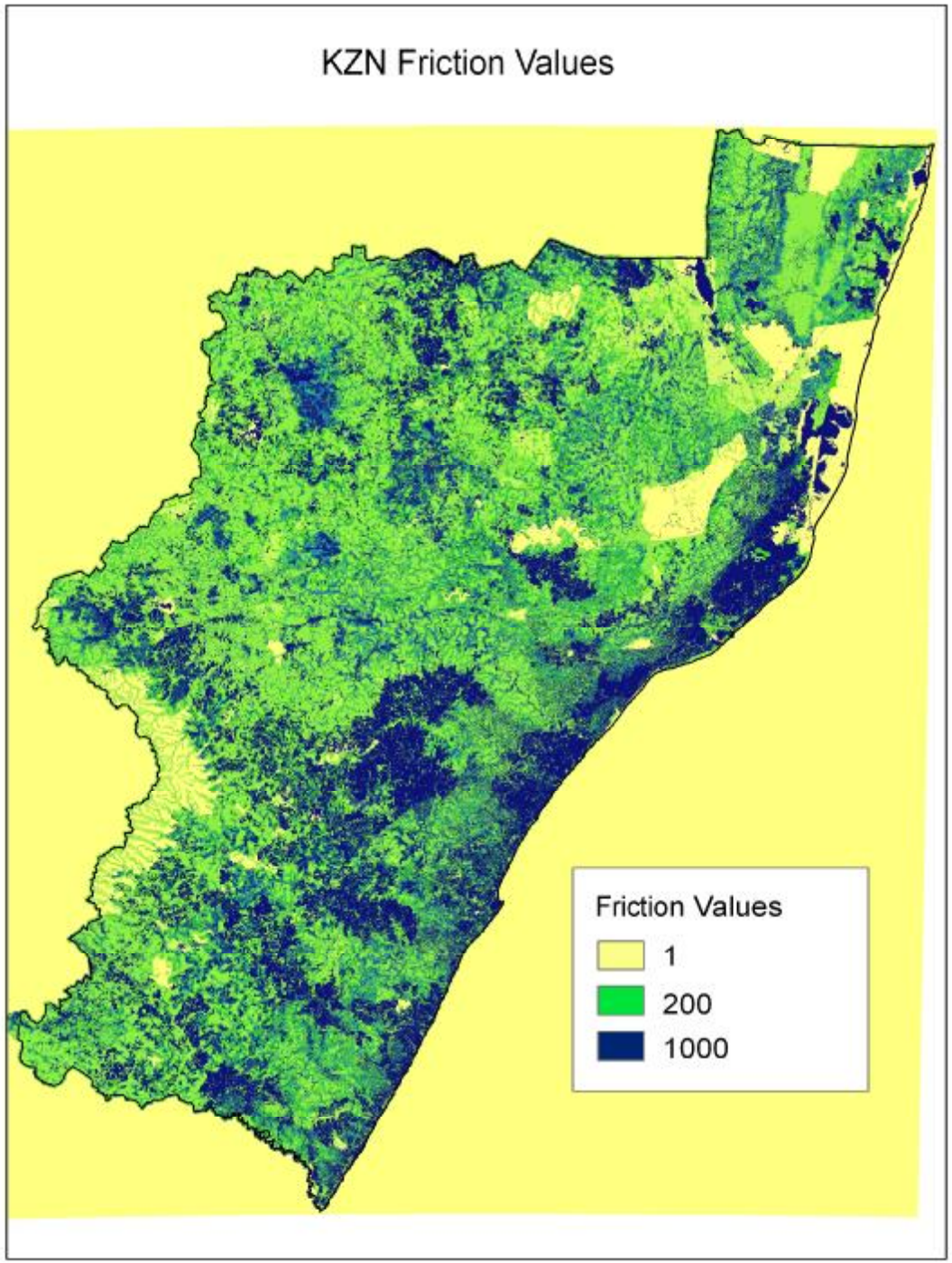
Baseline Friction Values

Value	Class_Name	Friction Value
0	Outside KZN	-1
1	Natural Fresh Water	1000
2	Plantation	900
3	Plantation clearfelled	900
4	Wetlands	150
5	Wetlands-mangrove	500
6	Permanent orchards (banana, citrus) irrigated	800
7	Permanent orchards (cashew) dryland	800
8	Permanent pineapples dryland	800
9	Sugarcane - commercial	800
10	Sugarcane - emerging farmer	800
11	Mines and quarries	1000
12	Urban	1000
13	Golf courses	700
14	Rural dwellings	700
15	Susbsistence (rural)	700
16	Annual commercial crops dryland	800
17	Annual commercial crops irrigated	800
18	Forest	100
19	Dense bush (70-100 cc)	100

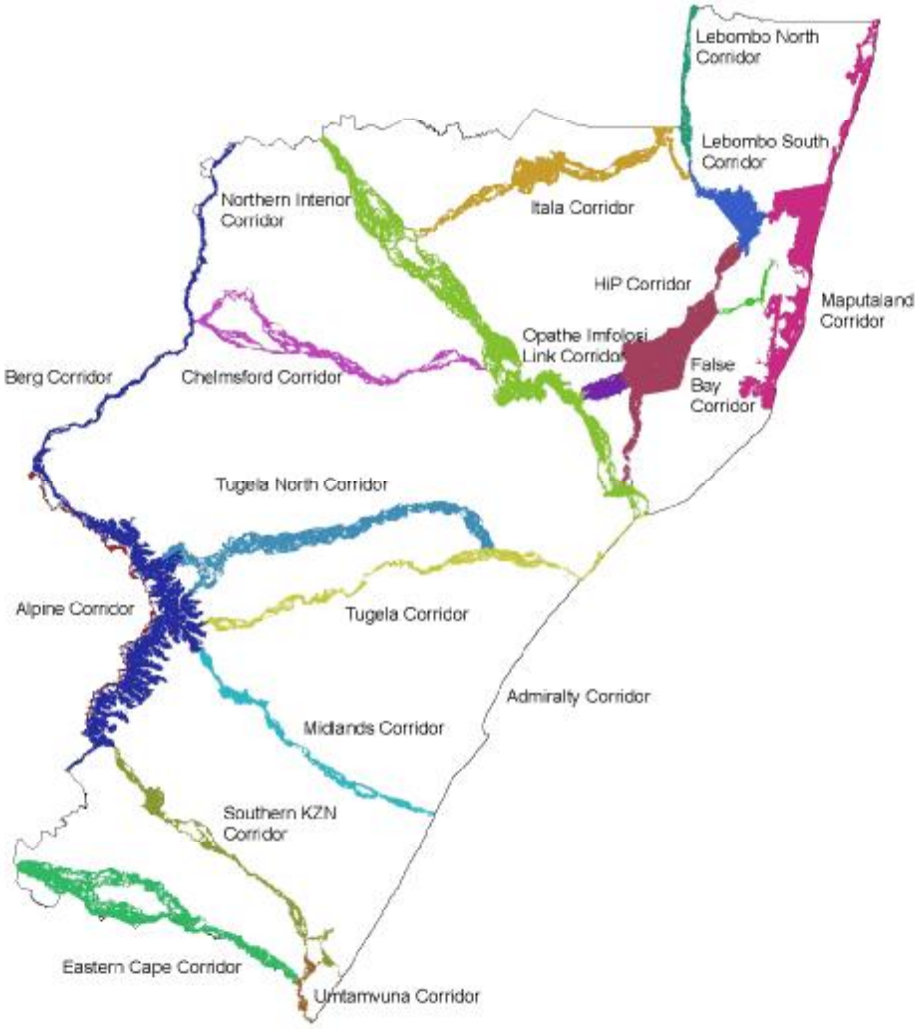
Etc…

KZN Topographic Position Index (TPI)

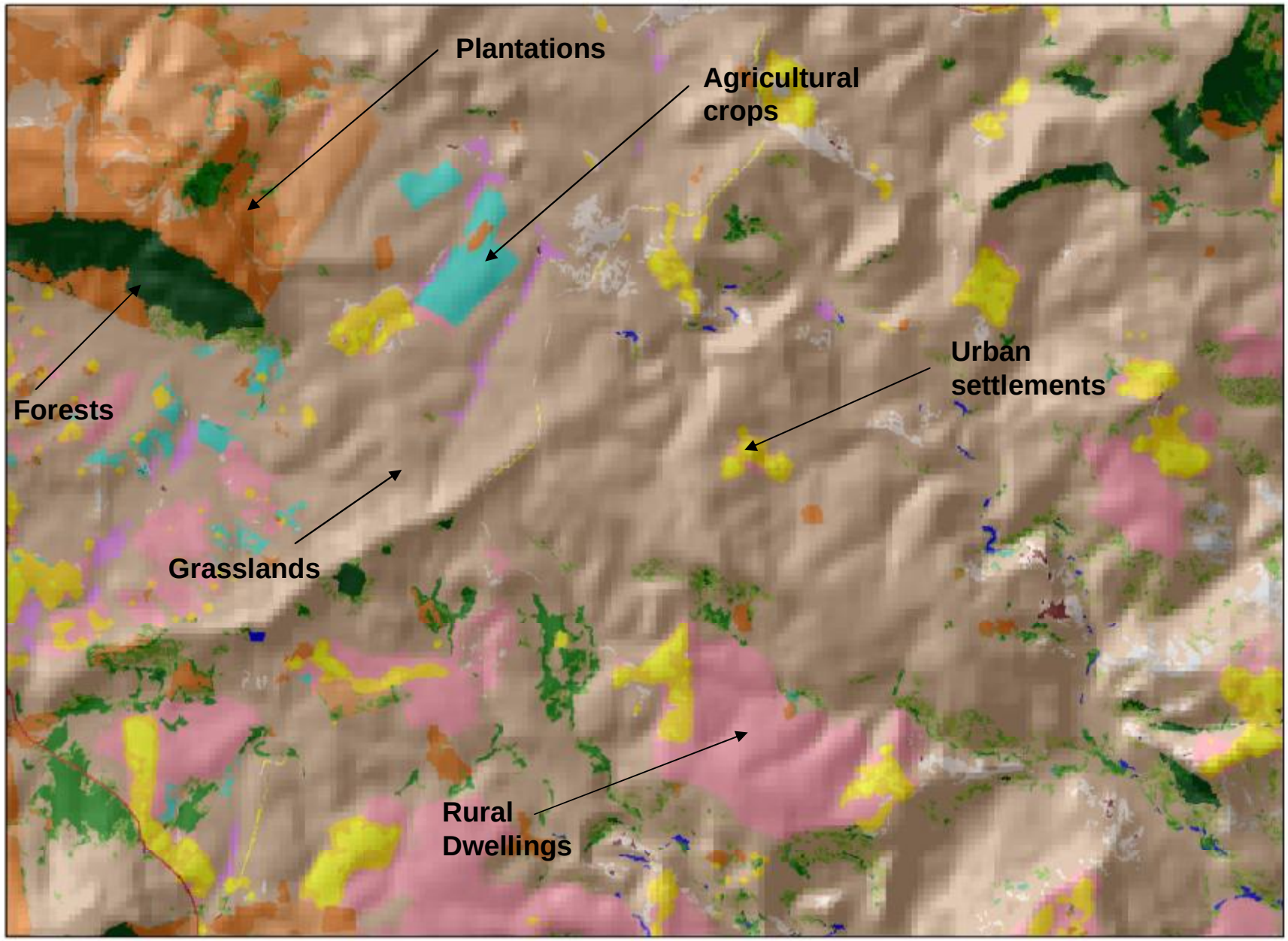



KZN Friction Values
Friction Values
1
200
1000

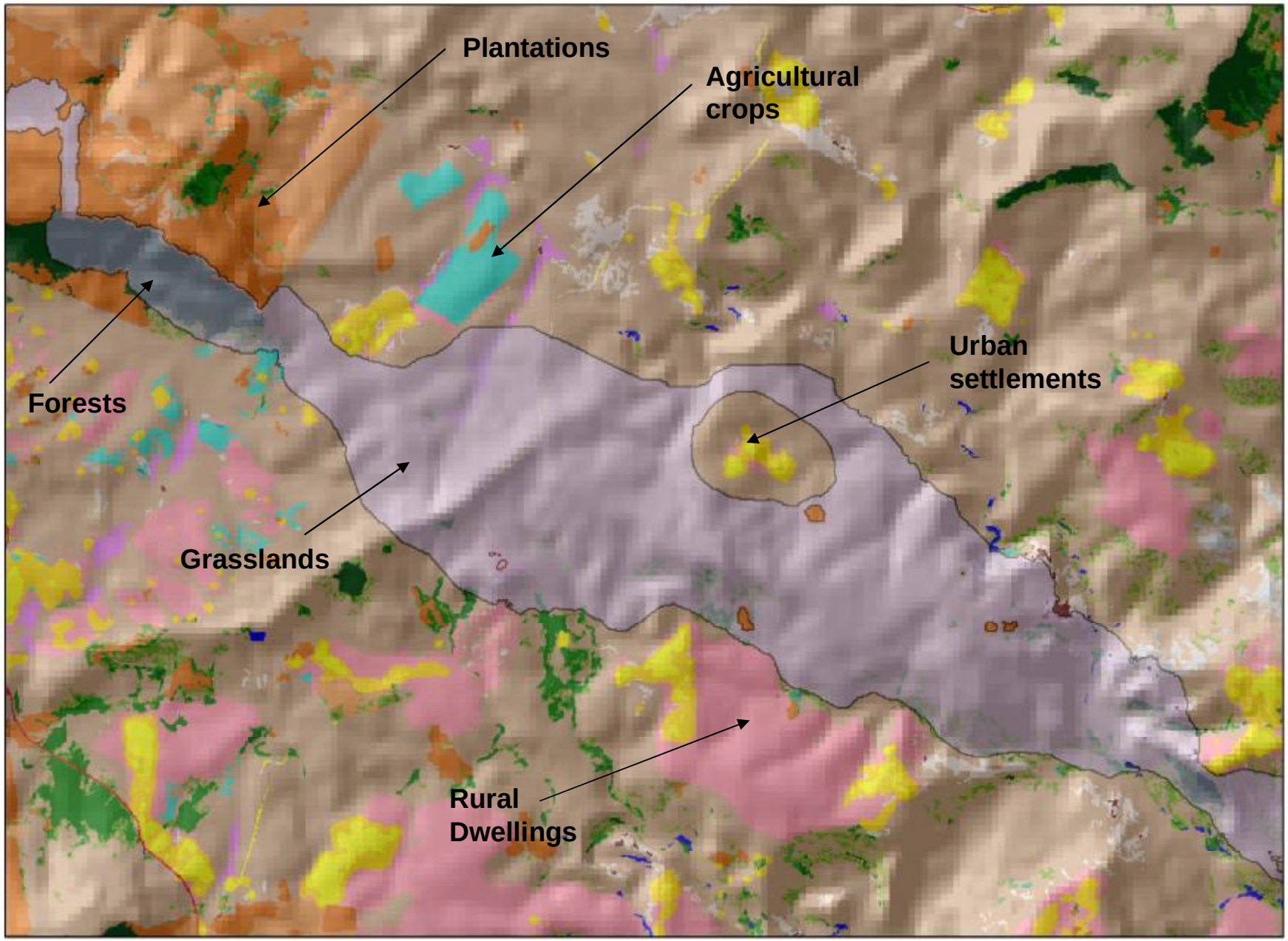
Macro Ecological Corridors of KZN

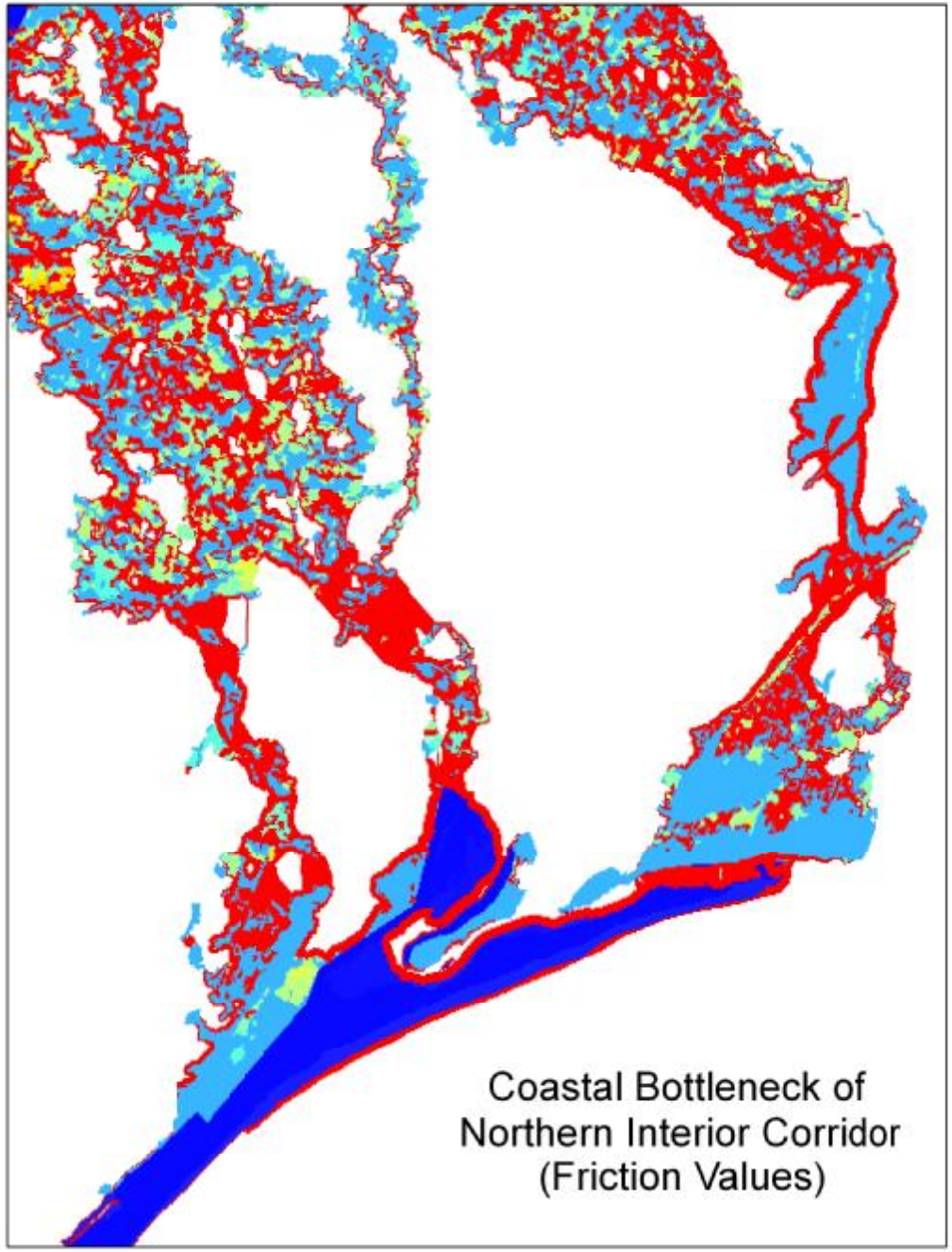


Corridor braiding effect



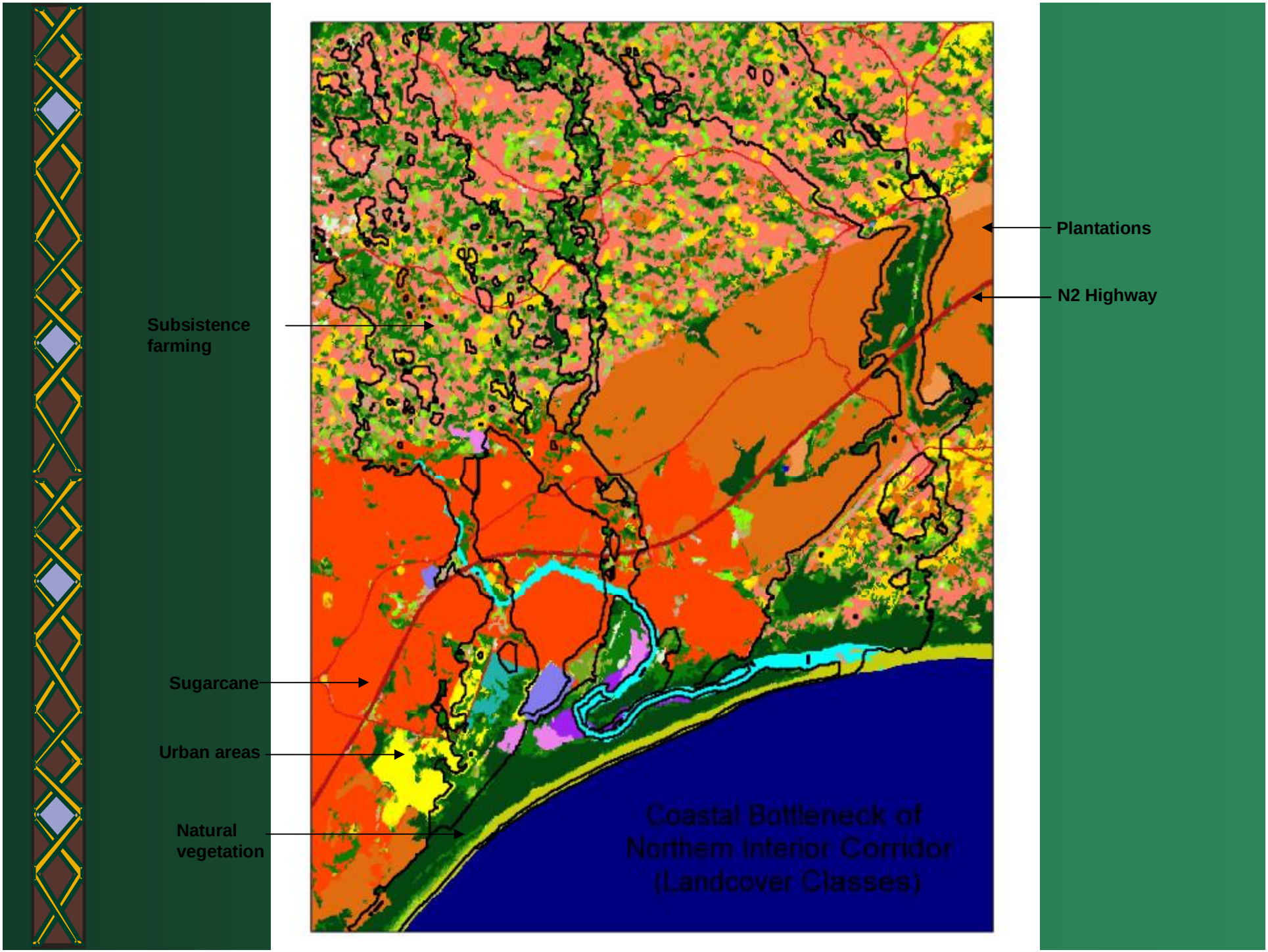
Corridor braiding effect





High friction (1000)

Low friction (1)


Subsistence farming
Sugarcane
Urban areas
Natural vegetation
Plantations
N2 Highway
Coastal Bottleneck of Northern Interior Corridor (Landcover Classes)

How to use the corridors in conservation planning

- Used as a resource in C-Plan:

  if two areas have the same irreplaceability value then the area in the corridor would be selected first in minset.

Recommendations

- Corridors need to be set up at finer scales e.g within municipalities.
- Create specific corridors for species with limited distribution or specialised habitats.
- The spatial distribution of PA's, between lowlands and uplands, is an important determinant of the likely conservation consequences of climate change (Hannah *et al*, 2005).
- The management of reserve networks needs to consider the requirements of species with different life history characteristics (McInerny 2007).

Recommendations

- Manage the matrix.
- Plan protected area networks that accommodate migrational shifts;
  - protected area networks which maximise altitudinal range
  - preserving the range of micro-climates
  - consider the effects of disturbance and variability (Gilson, 2009).

Thank you!