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Claire Vos

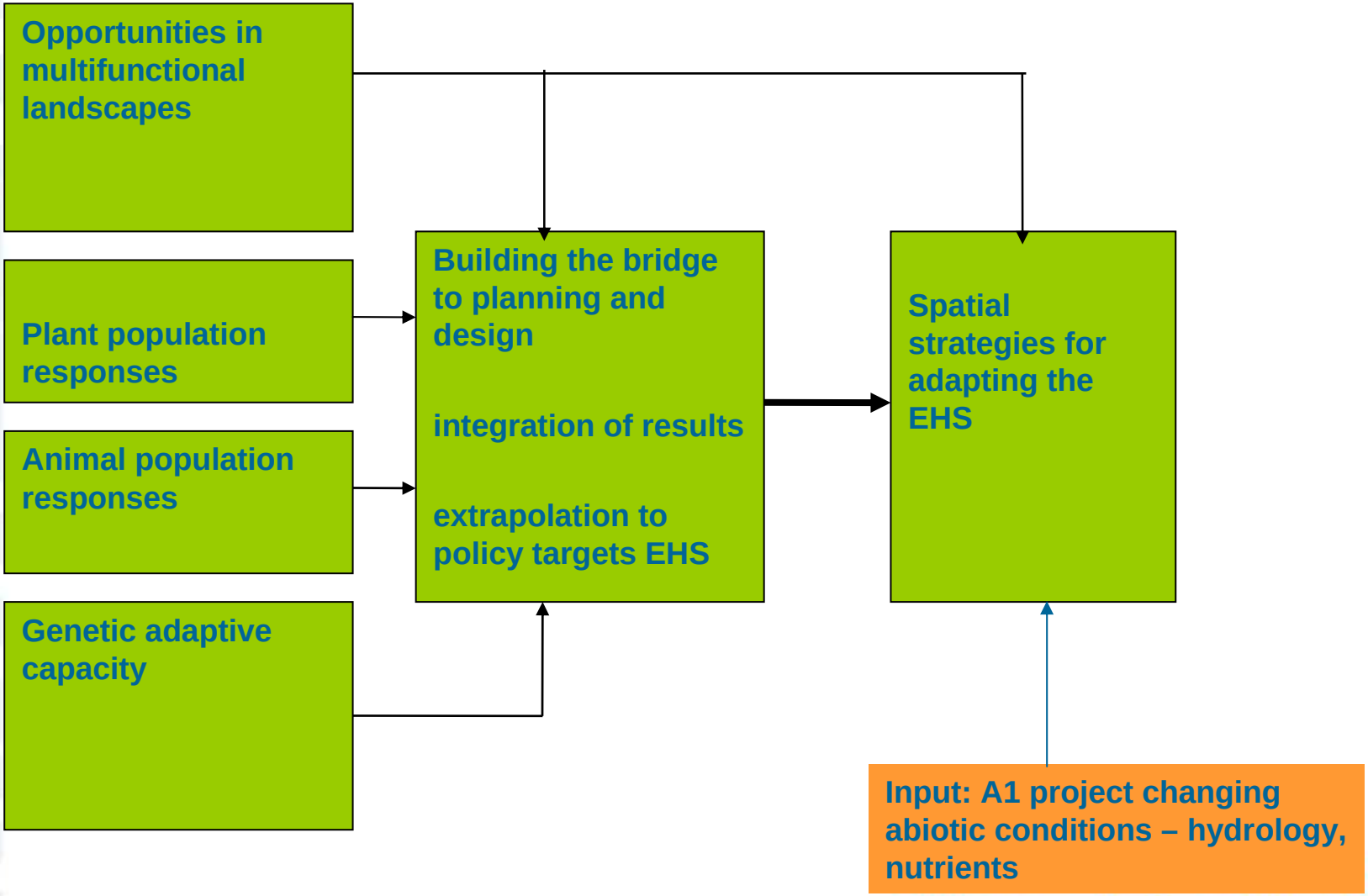
Adaptation A2

Adapting the National Ecological Network to Climate Change

Partners: Wageningen University and Research, Leiden University, SOVON Birds, Dutch Butterfly Conservation,

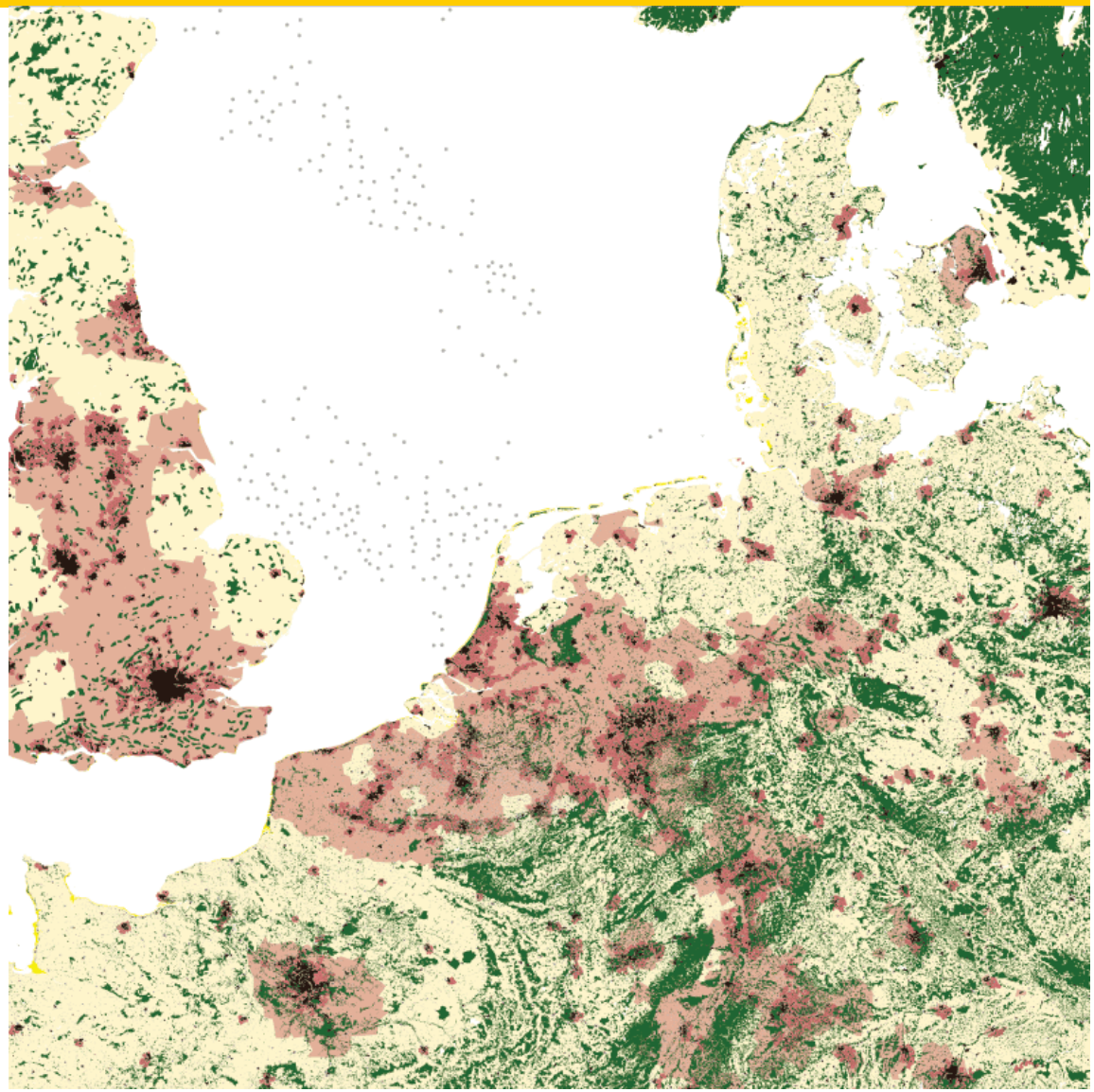
EU Interreg IIIB: (among others) Natural England, Change Institute, Oxford University

Project A2 - overview

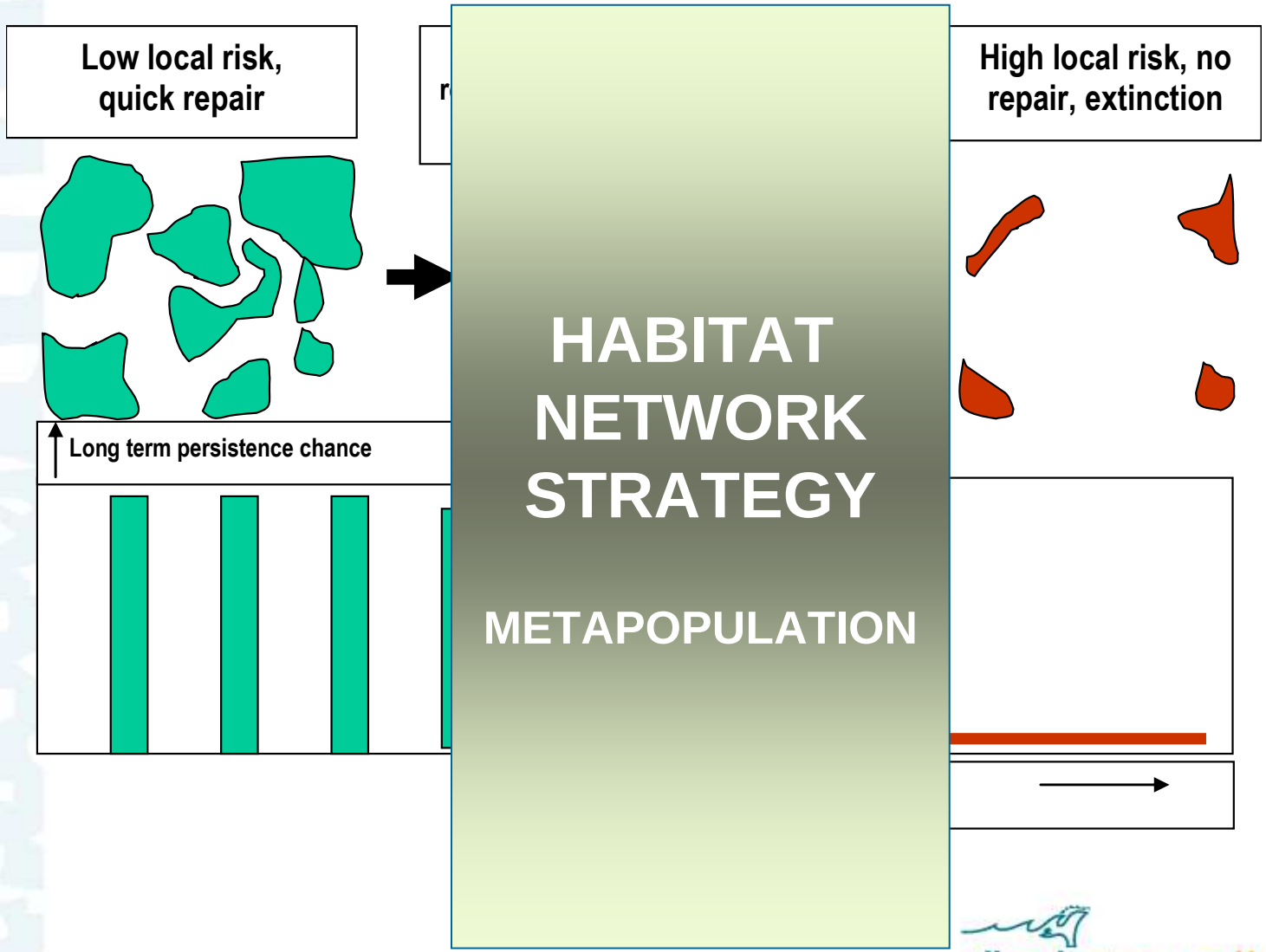


Content

- Impacts climate change stronger because of habitat fragmentation
- Adaptation strategies ask for spatial planning



Habitat fragmentation: a conservation strategy



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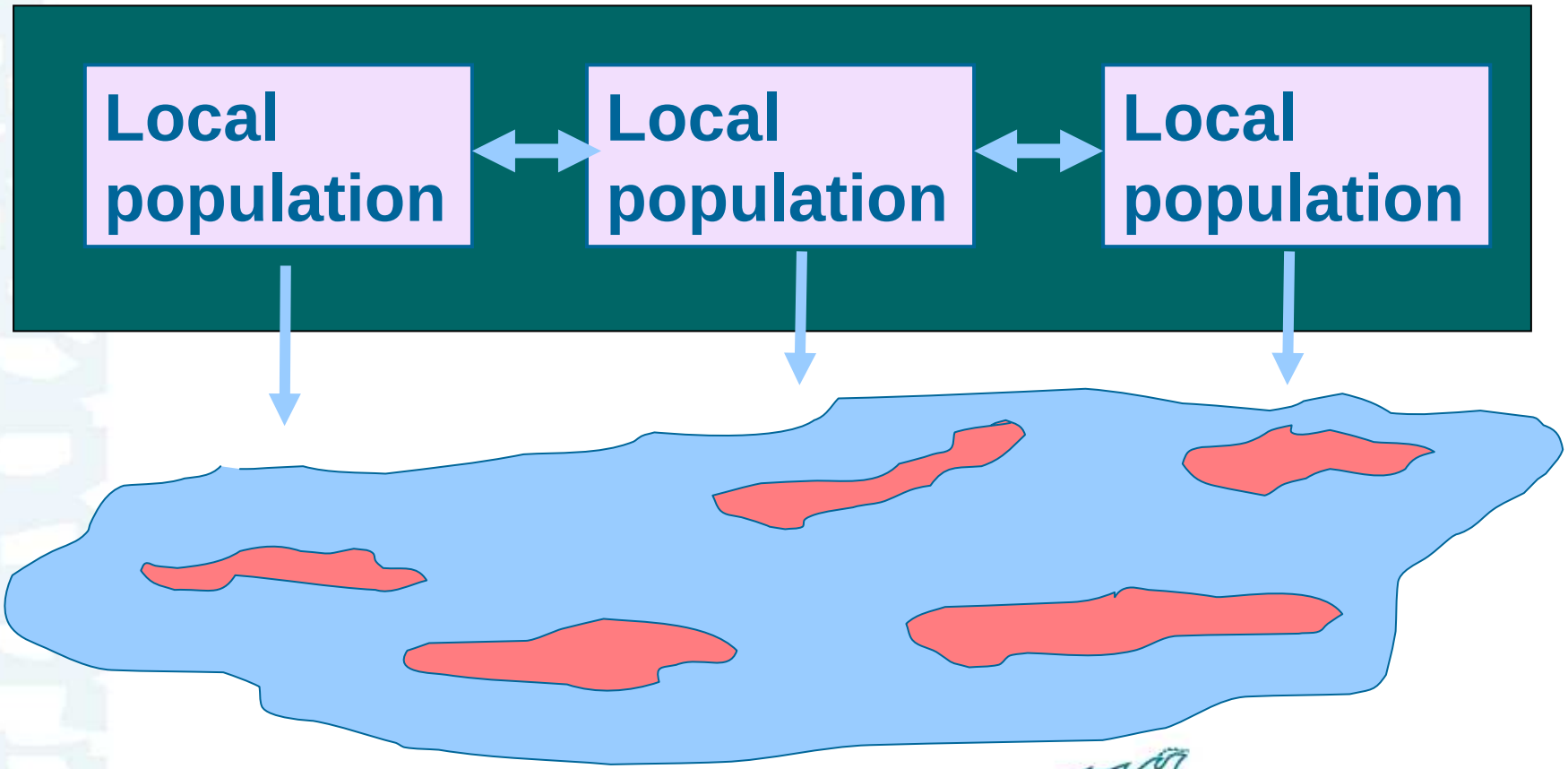
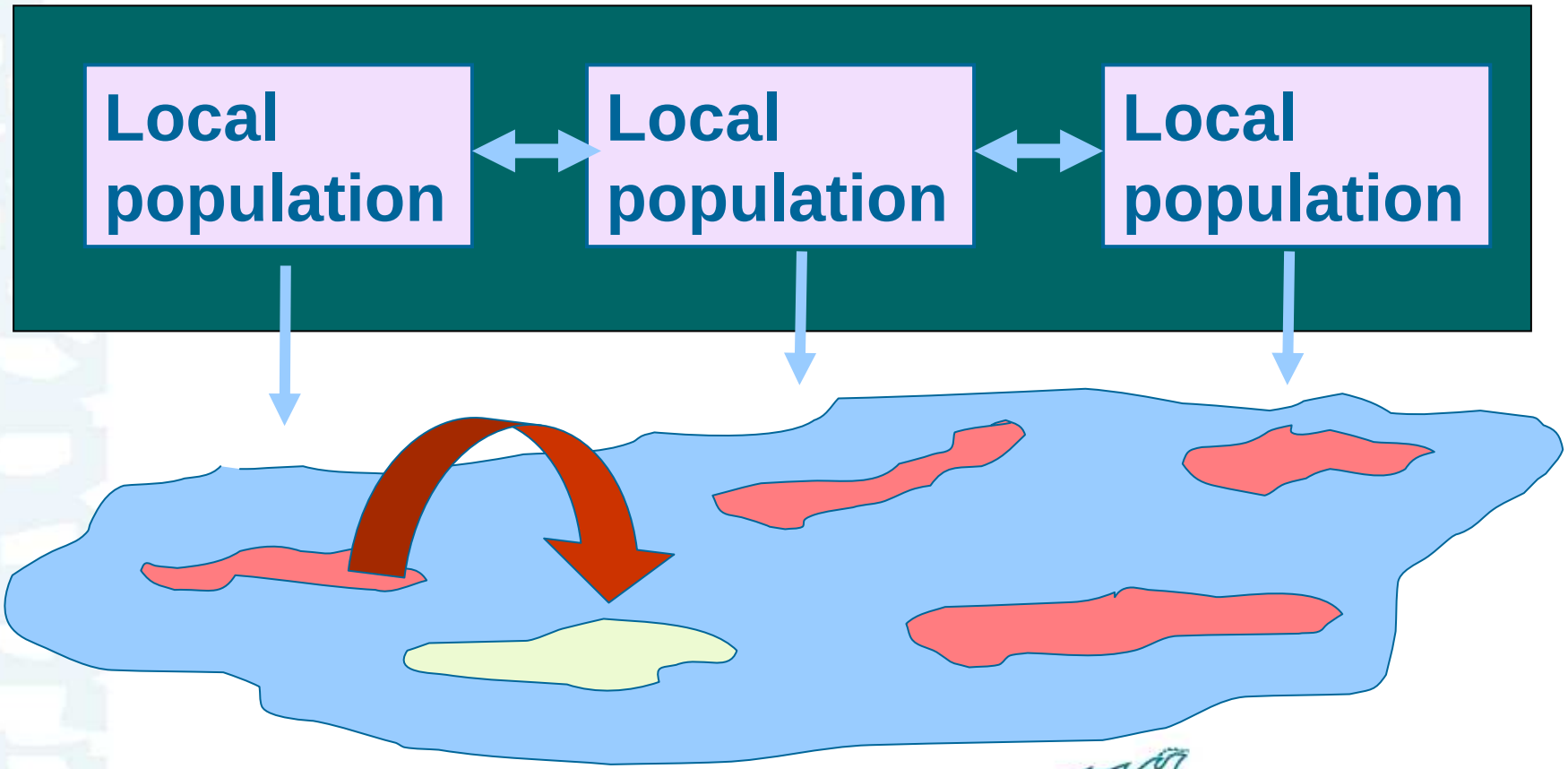
Habitat network strategy: in metapopulations the local risk is spread over the network



Spreading the risk: a local mishap is repaired



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Different approaches

Experimental studies	Plants: influence CC on competition Butterflies influence weather on dispersal behaviour
Empirical studies	Time series on distribution/abundance (plants, butterflies, birds) and influence weather conditions and habitat fragmentation
Models	Combining climate change and metapopulation models, statistical models, mechanistic models
Integration Spatial Planning Tools	Quantify adaptation strategies Spatial cohesion national ecological network Case studies: Multifunctional adaptation buffer zones surrounding nature areas

Different approaches

Experimental studies

Plants influence CC on competition

Butterflies influence weather on dispersal behaviour

Empirical studies

Time series on distribution/abundance (plants, butterflies, birds) and influence weather (extremes) and habitat fragmentation

Models

Combining climate change and metapopulation models, statistical models, mechanistic models

Integration Spatial Planning Tools

Quantify adaptation strategies

Spatial cohesion national ecological network

Case studies: Multifunctional adaptation buffer zones surrounding nature areas

Different approaches

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Empirical studies

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Models

Combining climate change and metapopulation models, statistical models, mechanistic models

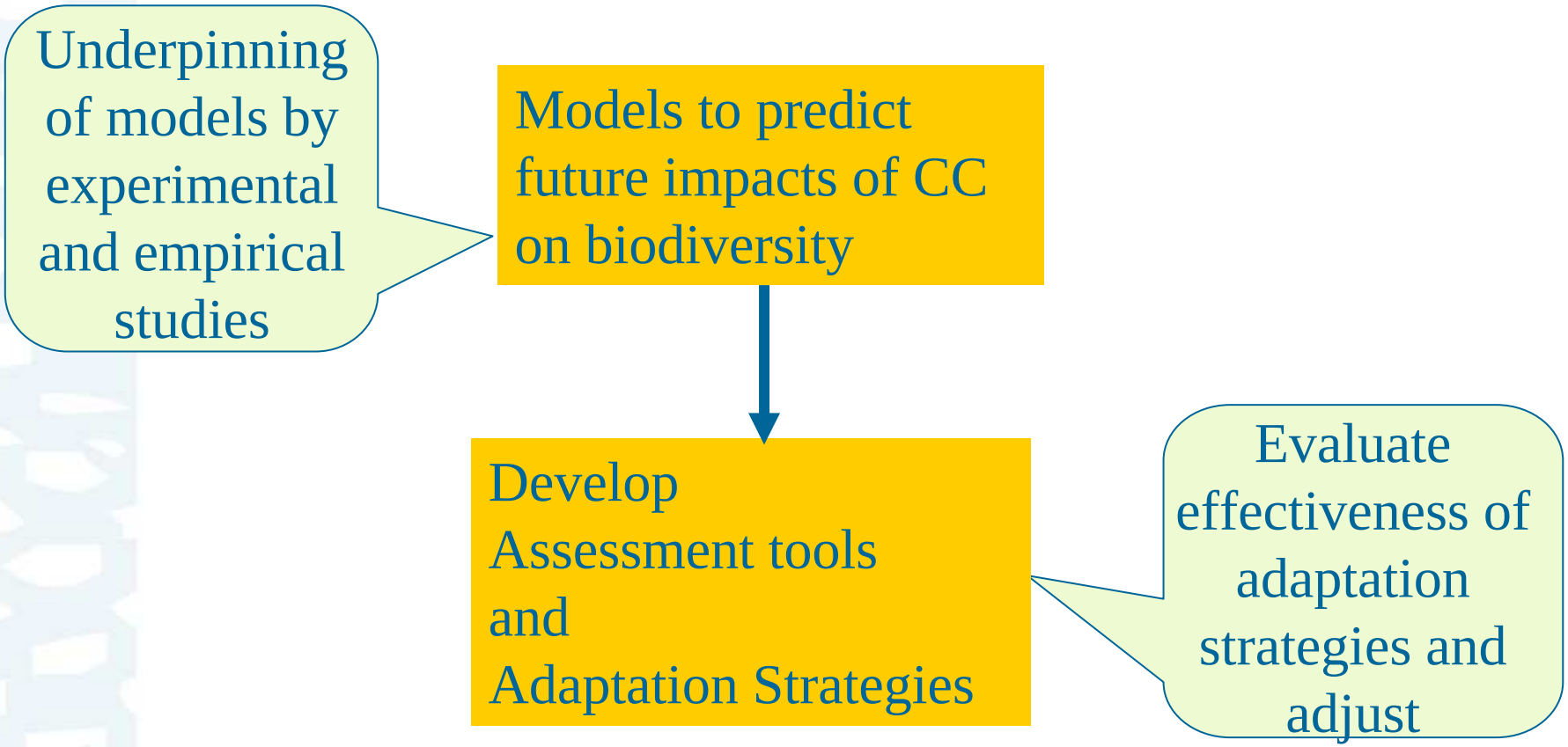
Integration Spatial Planning Tools

Quantify adaptation strategies

Spatial cohesion national ecological network

Case studies: Multifunctional adaptation buffer zones surrounding nature areas

How to cope with uncertainty?



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Branch Project –Questions

- If species tend to adapt their ranges to new climatic conditions
- where does the landscape inhibit responding?
- and how can these bottlenecks areas be adapted to contribute to a climate proof network?

www.branchproject.org

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Results BRANCH project Analysis NW Europe 2020 2050

- SPECIES bio climate envelope model: predict shifting ranges
- GRIDWALK dispersal model identify climate proof and non climate proof networks
- Adaptation strategies

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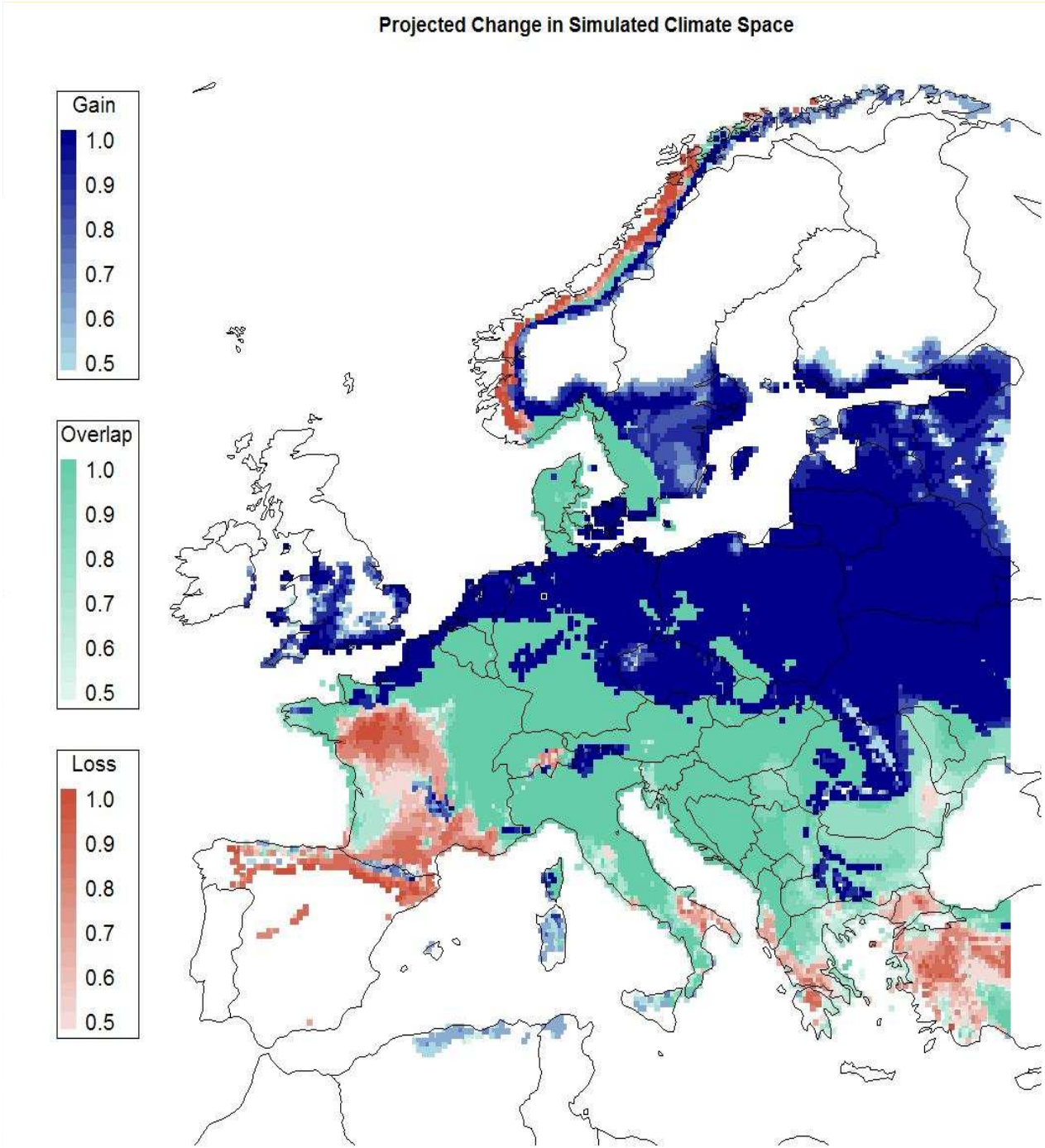
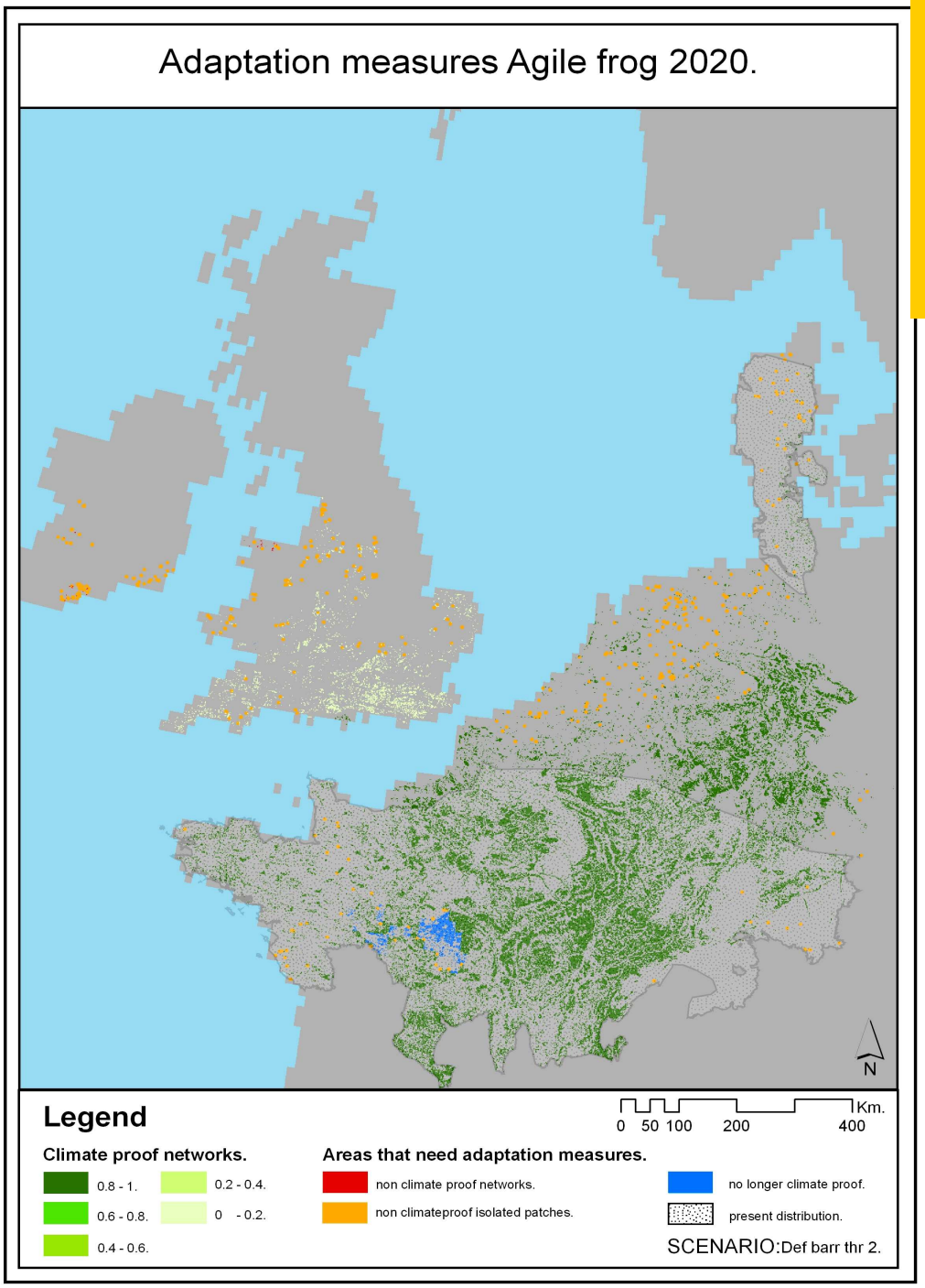


Shift suitable climate space



1. Climate change proof networks

2. Areas that need adaptation 2020

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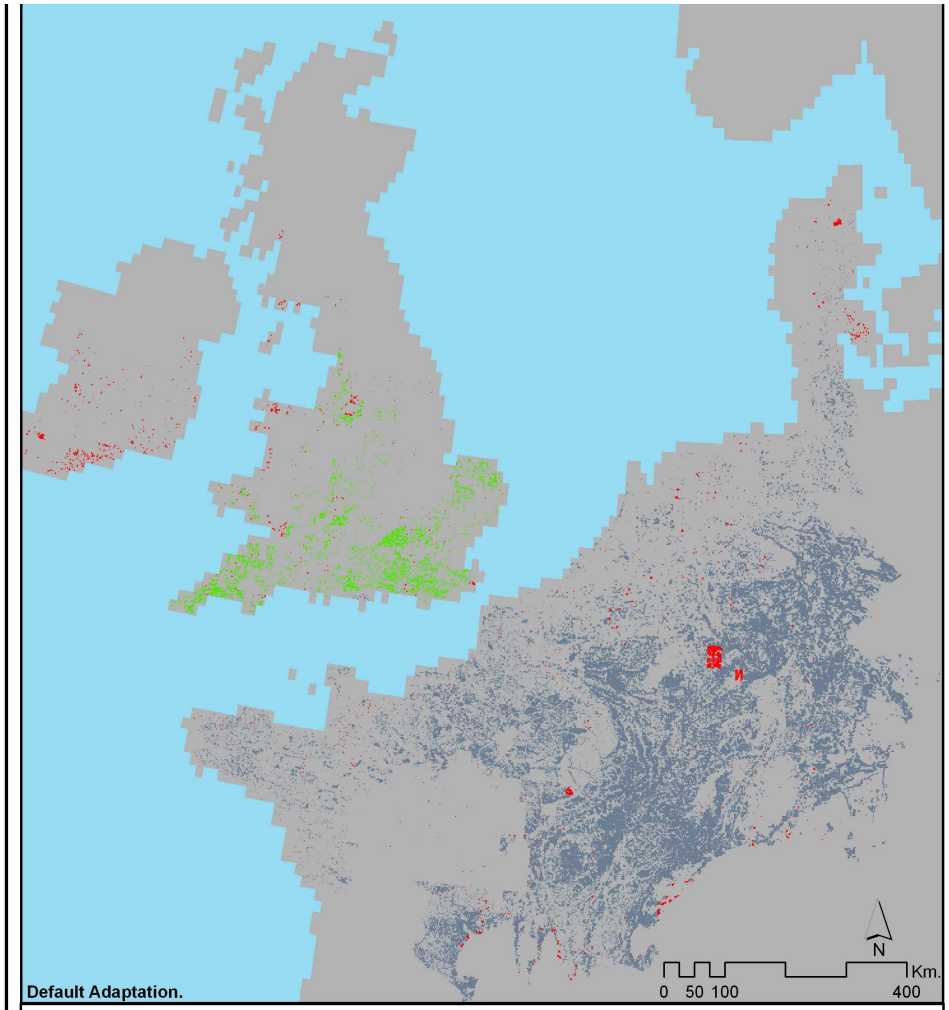
Branch
BIODIVERSITY
SPATIAL PLANNING
CLIMATE CHANGE

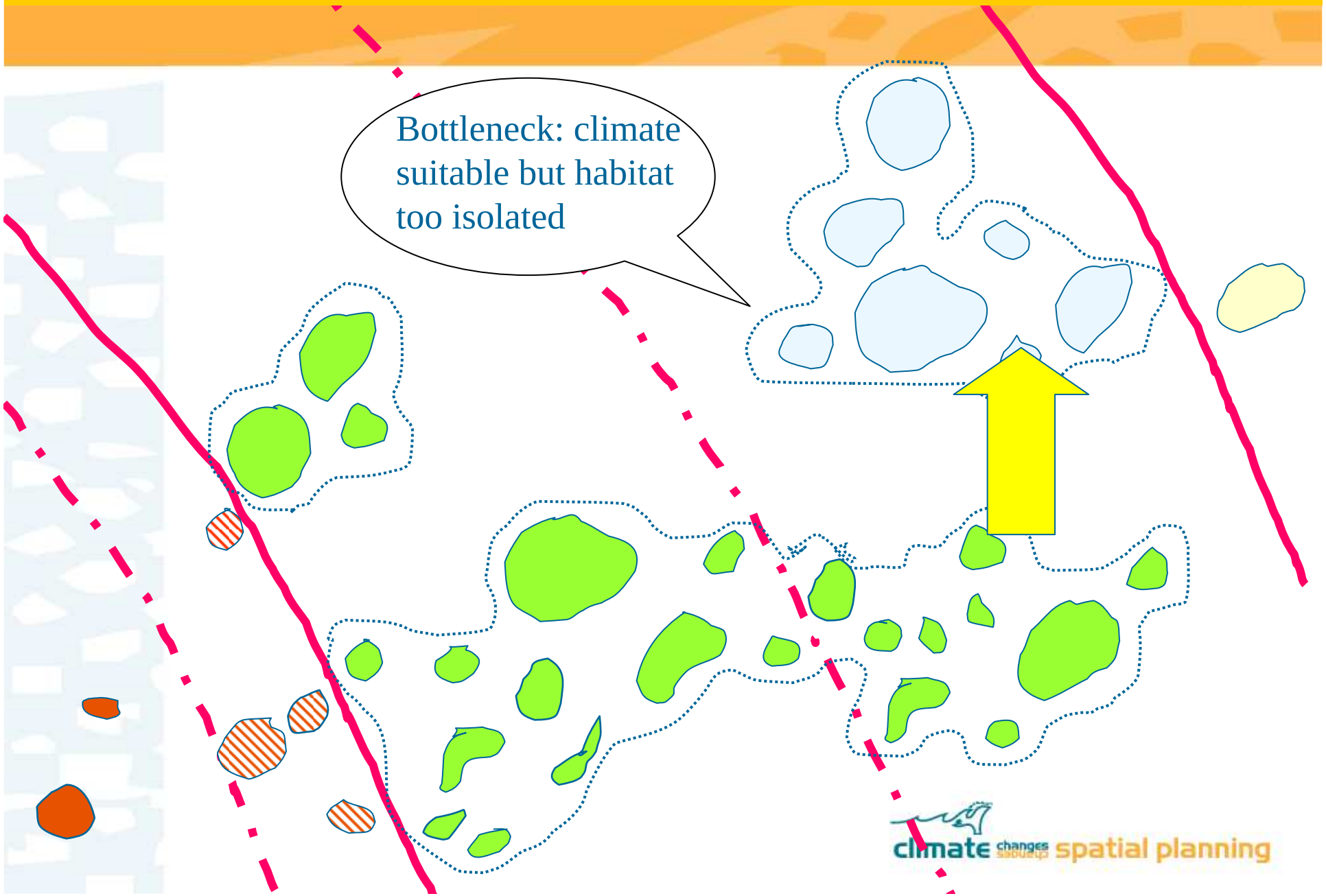
Adaptation task forest species NW Europe



Adaptation strategies

1. Link to nearest climate proof network
2. Increase colonizing capacity
3. Optimize networks in climate refugia

Adaptation strategy I: Link networks



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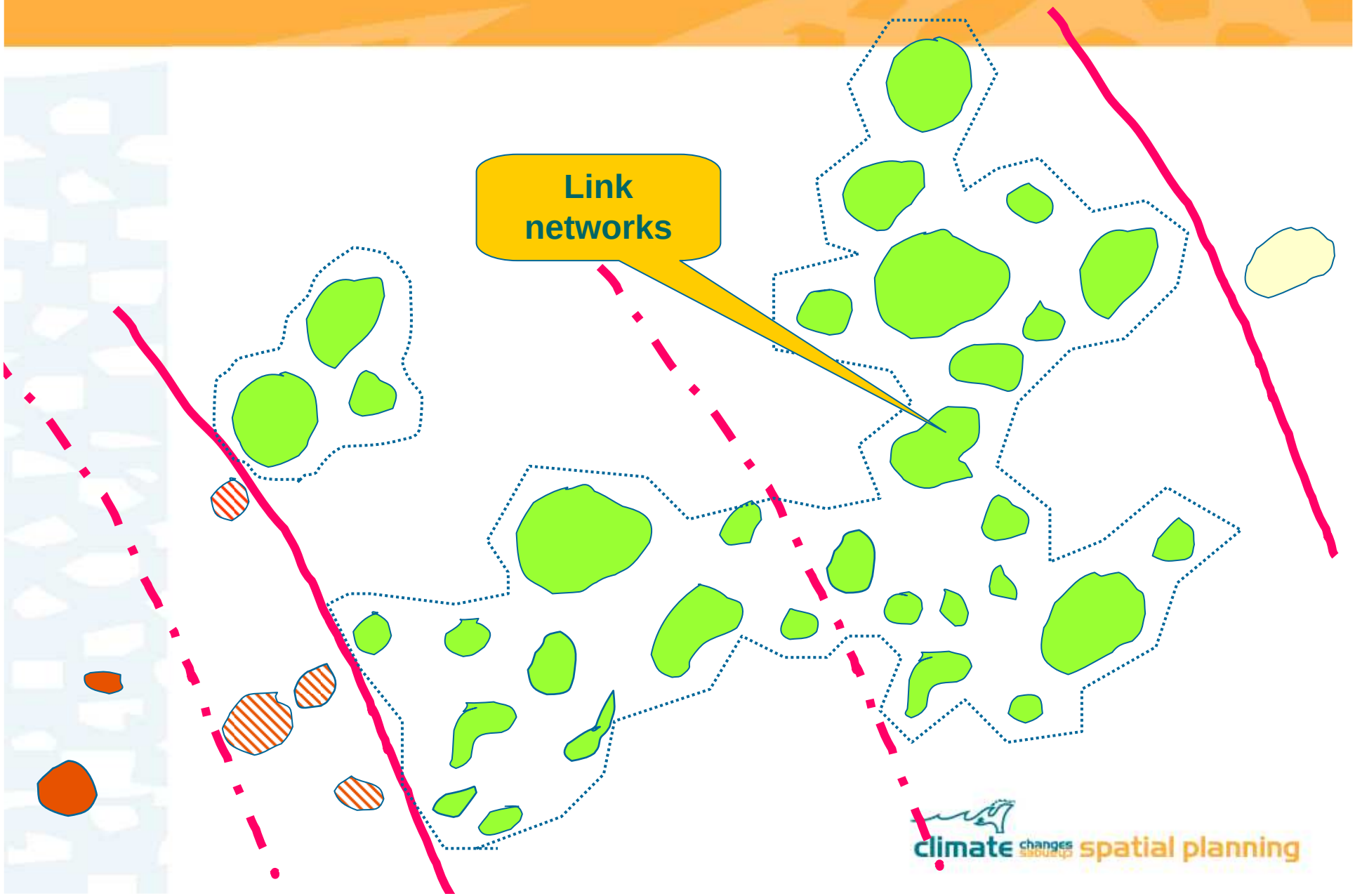
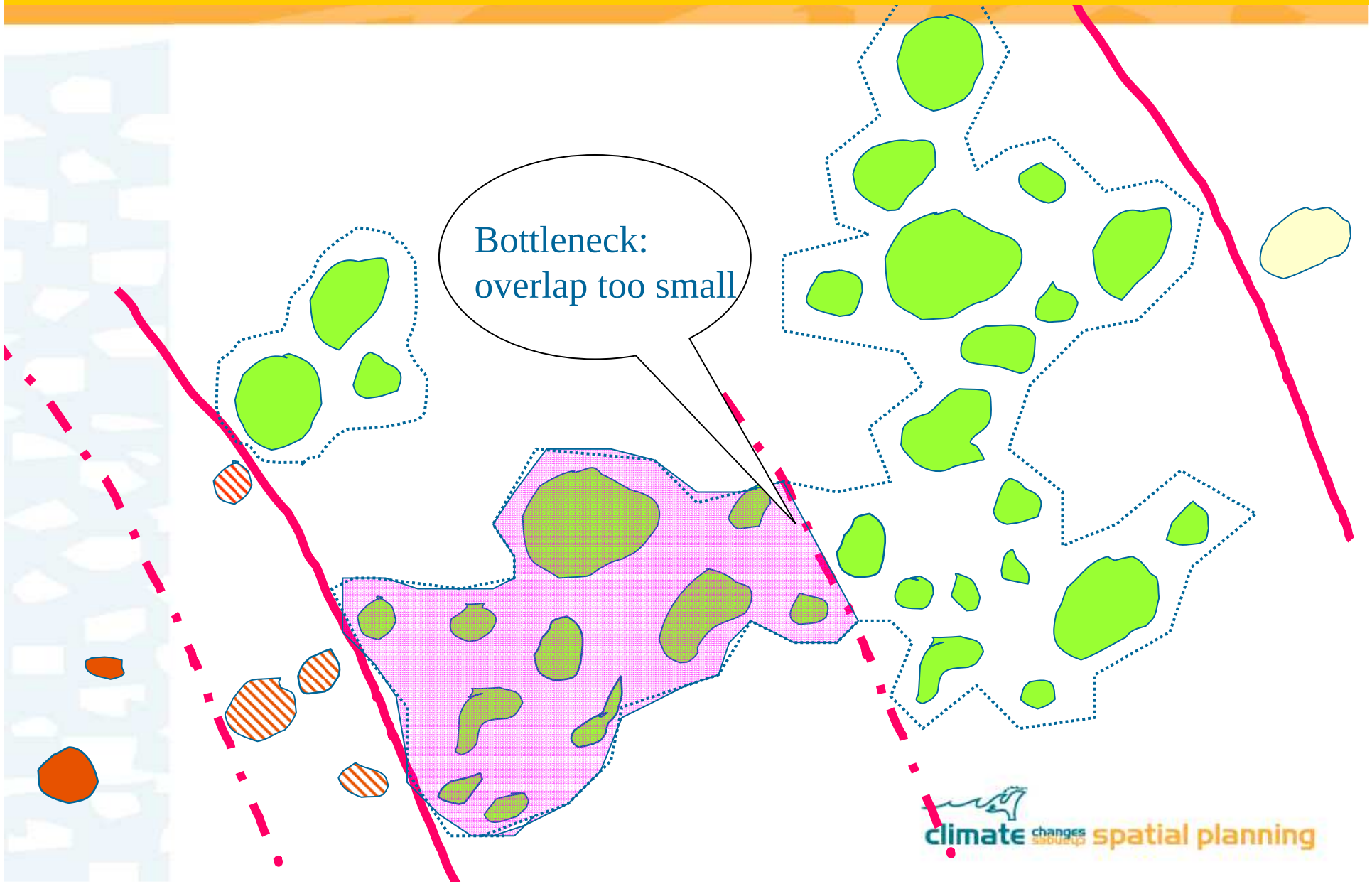
Adaptation strategy I: Link networks



Adaptation strategy II: Increase colonizing capacity



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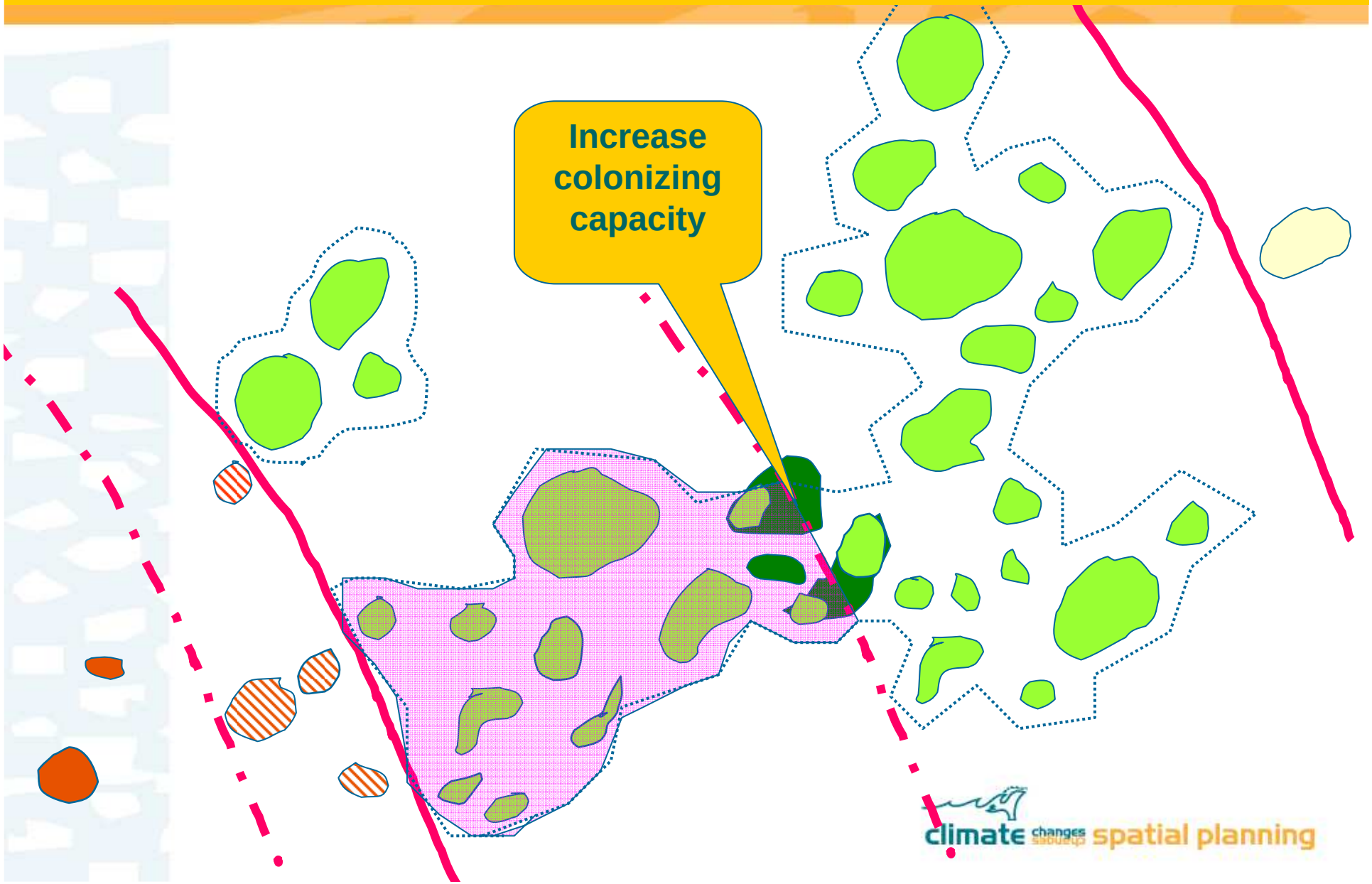
Adaptation strategy II: Increase colonizing capacity



Modelling still in full development

- Climate envelopes BRANCH:
  - identify main adaptation zones for many species
  - given the direction of CC and habitat fragmentation
- include population dynamics METAPHOR shaking windows
  - impact weather extremes
  - are species able to keep up?

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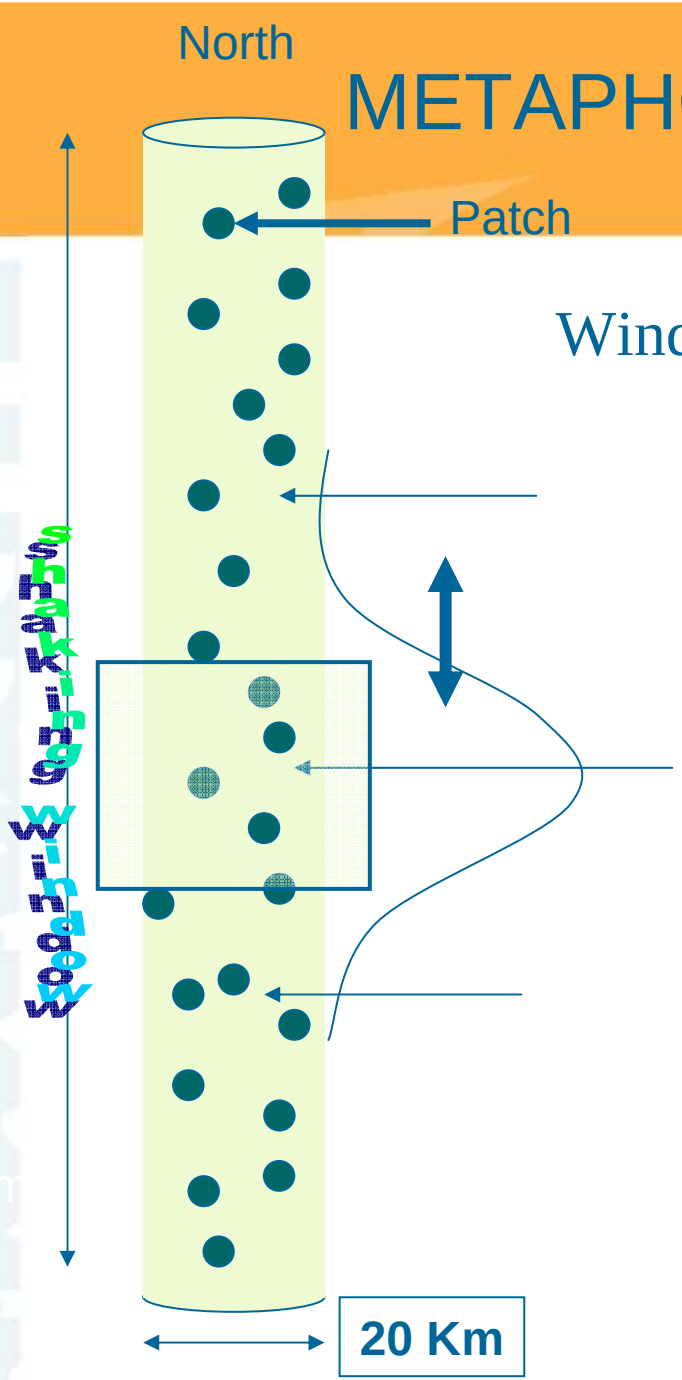
METAPHOR moving/shaking window



Window of Suitable Climate Space

* Moves
* Shakes (weather extremes)
* Impact habitat fragmentation

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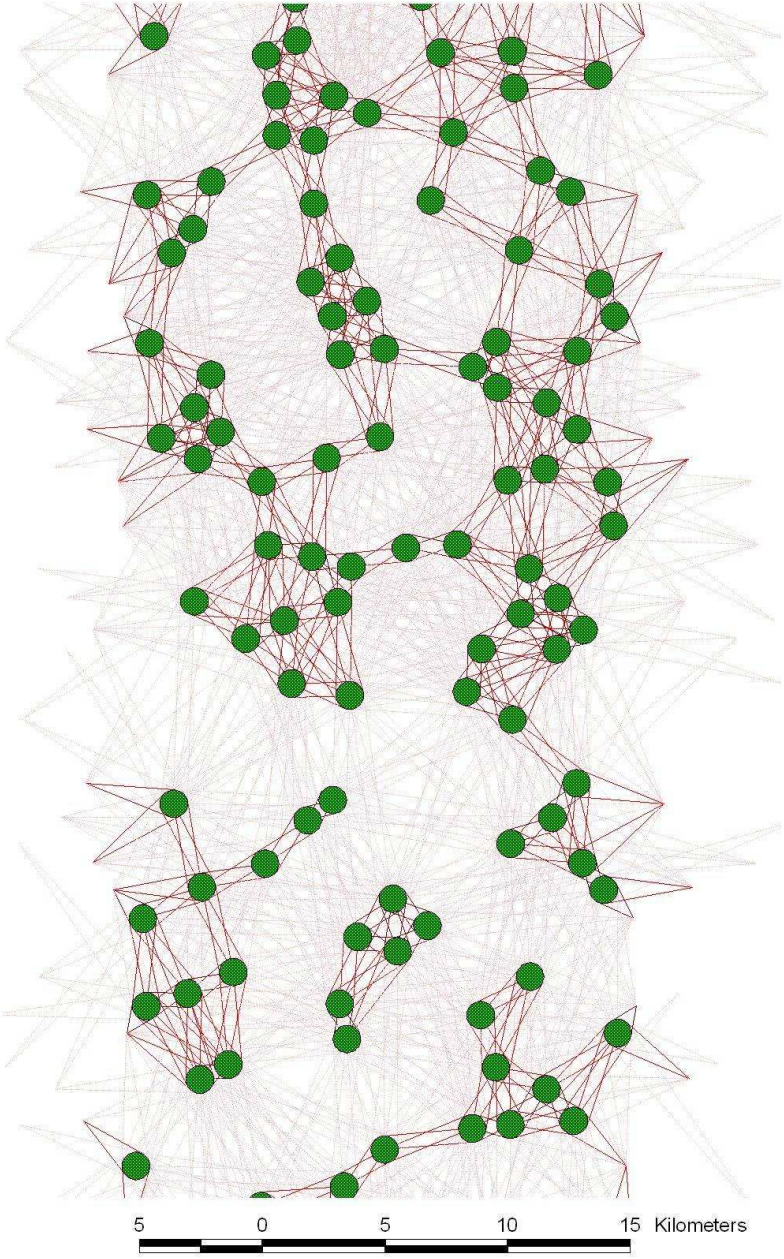
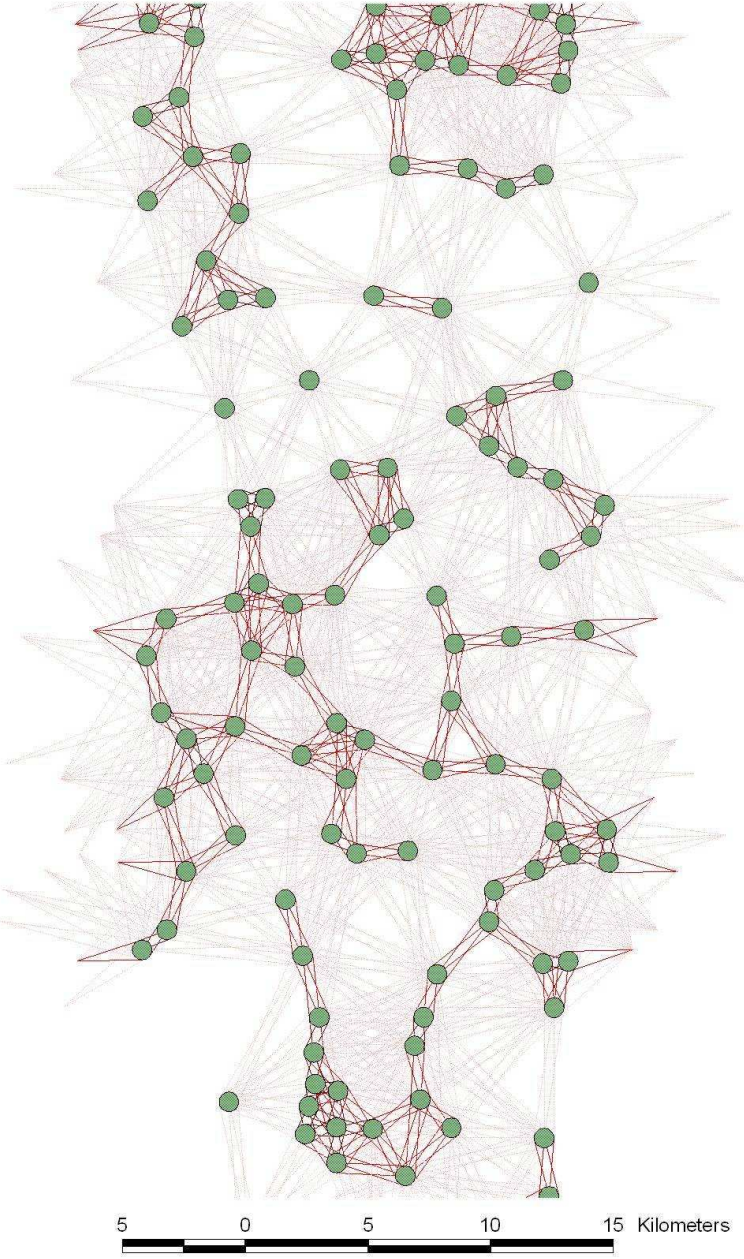
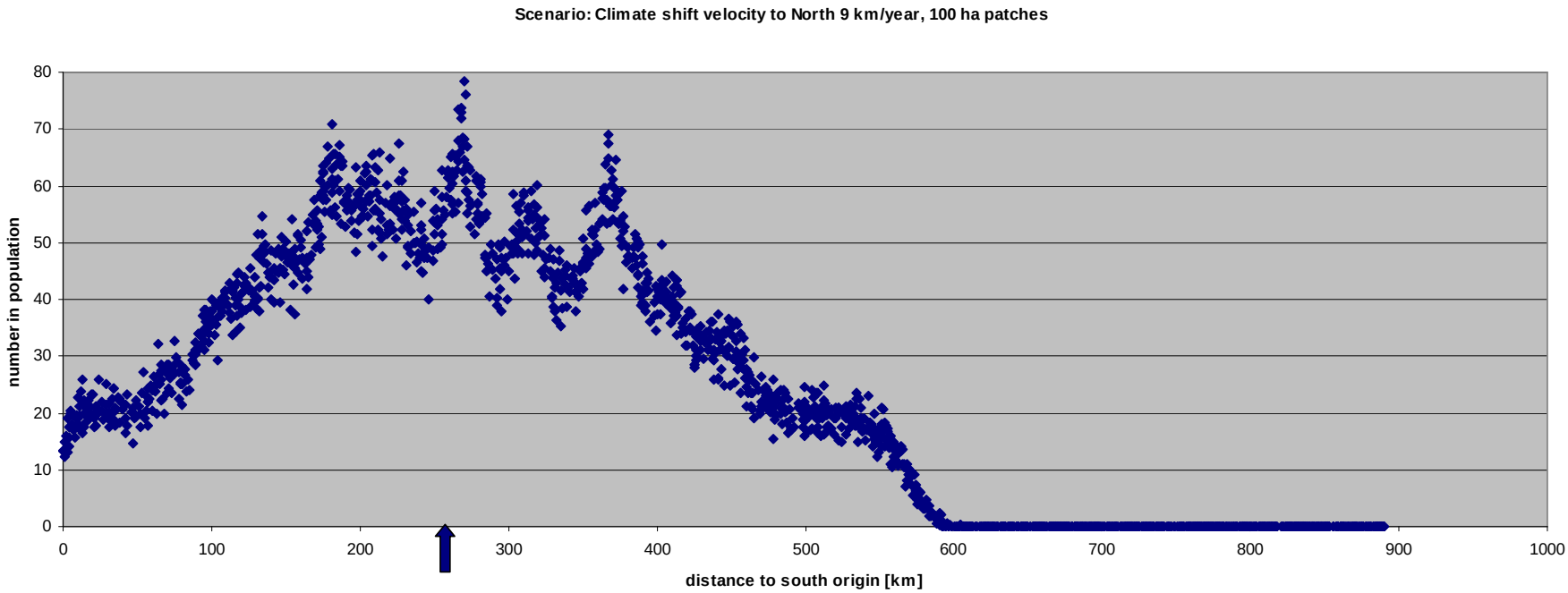
Landscape: random 100 ha patches vs. 50 ha patches (1 p.p.km²)





Location of the population (no climate change: window shaking, not moving)



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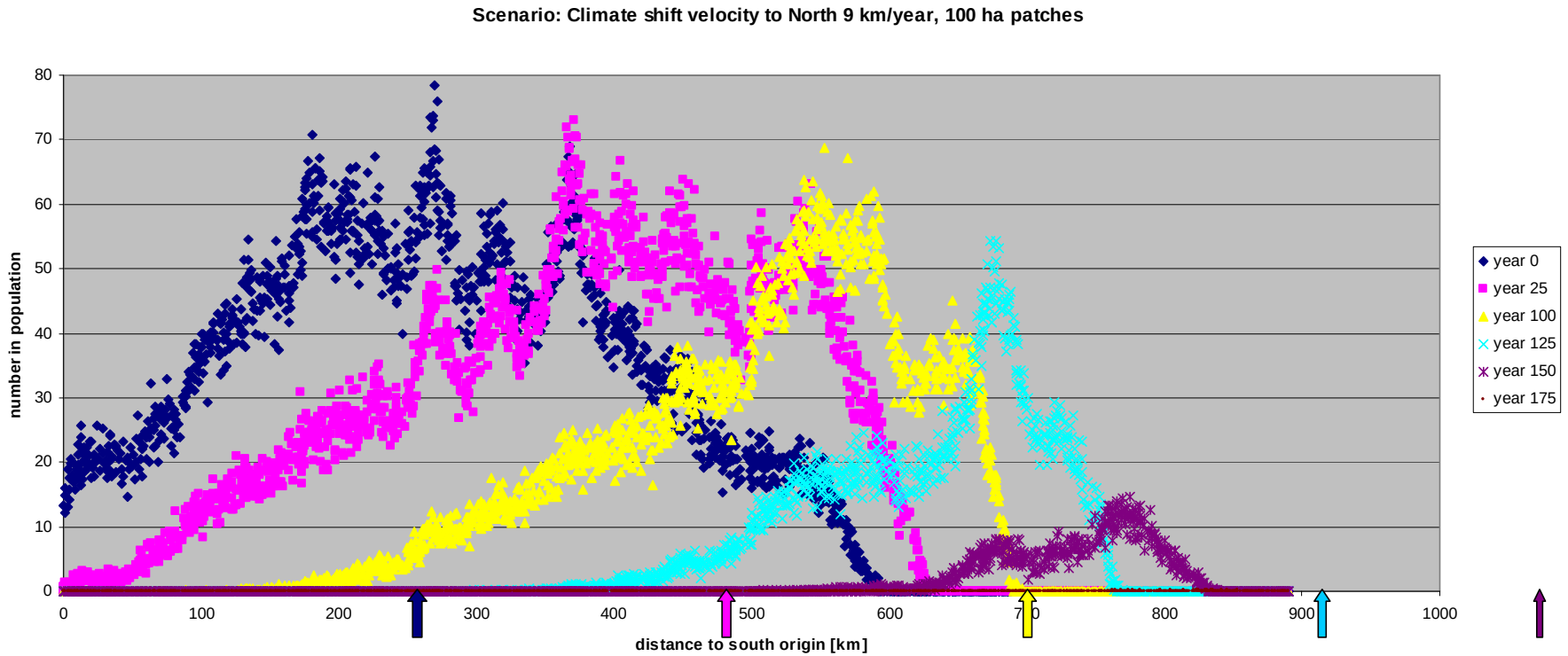
Location of the population (25 year intervals: moving and shaking window)



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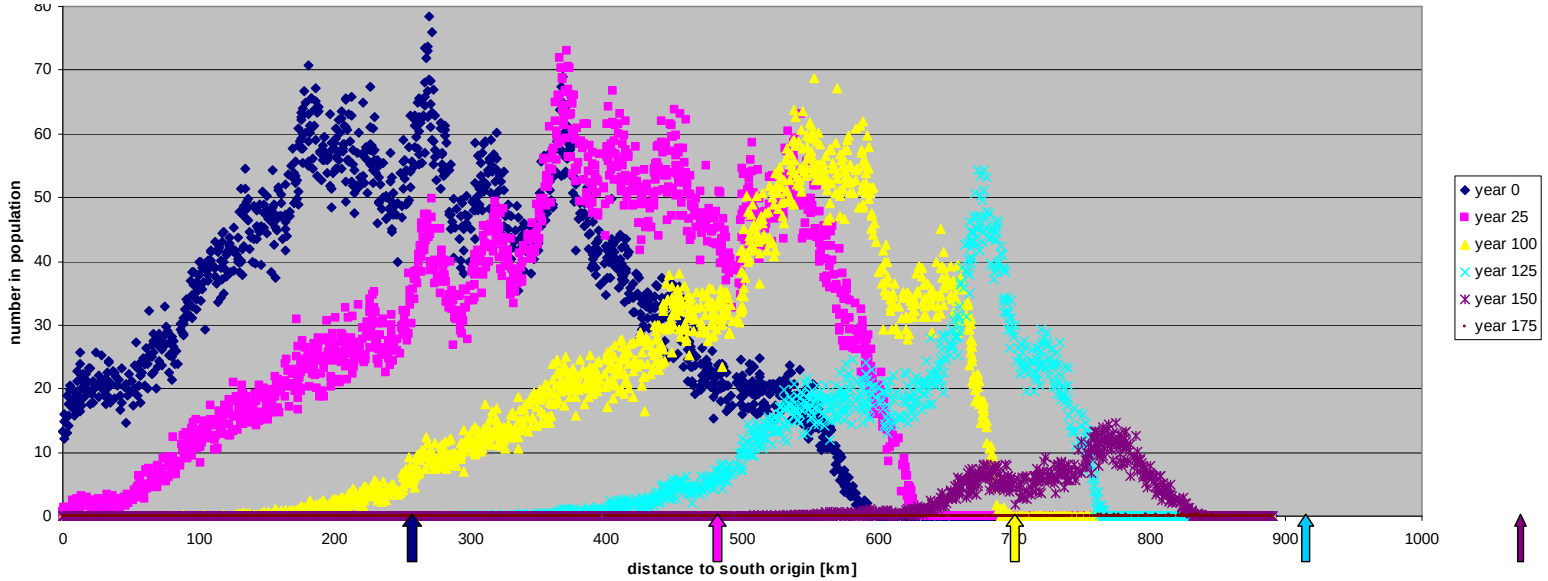
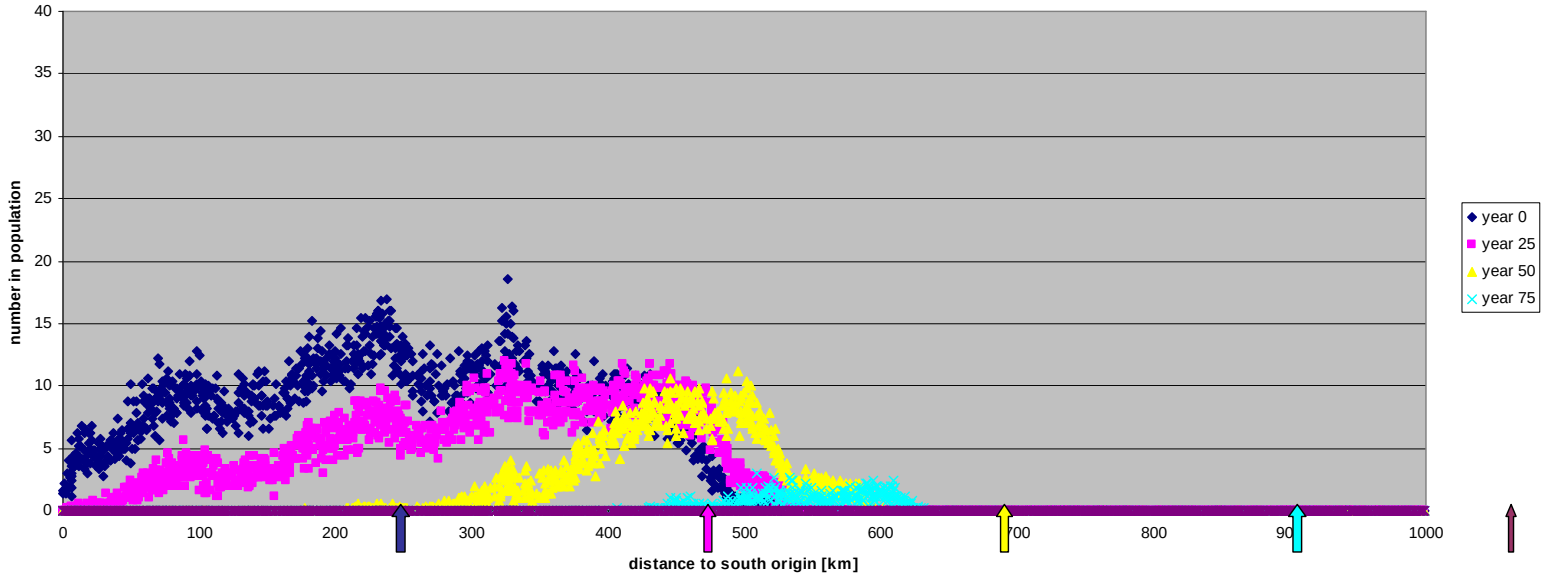
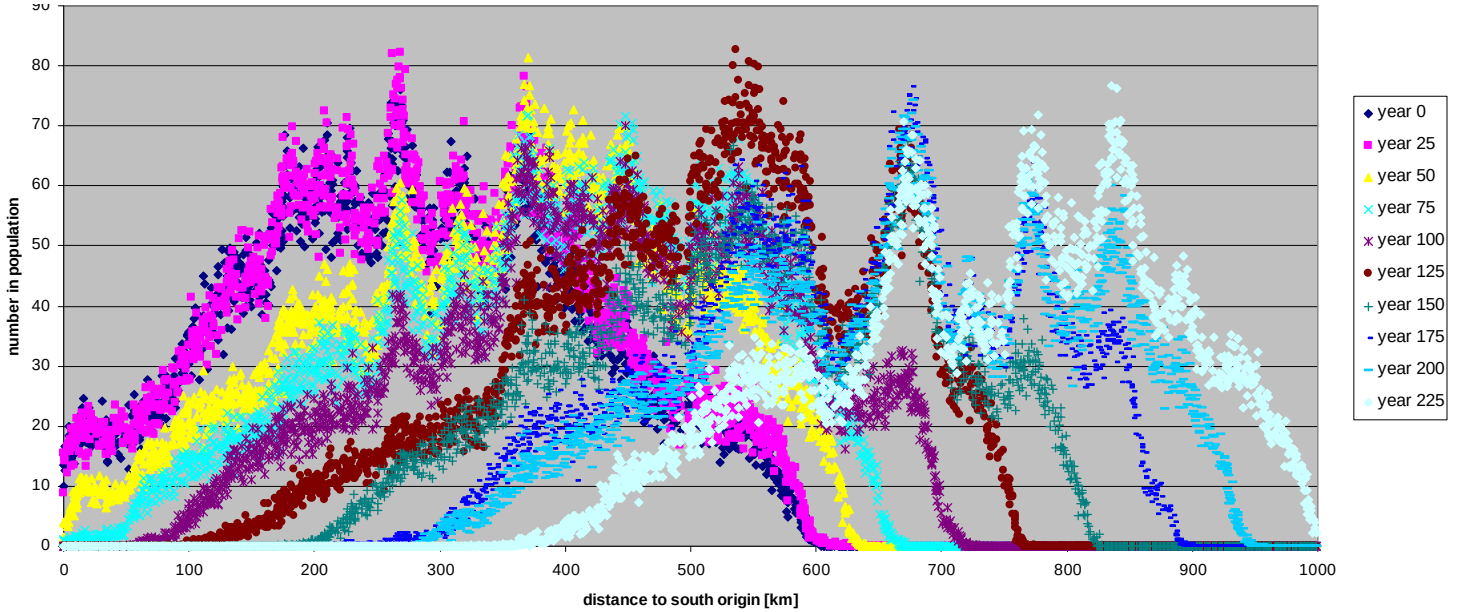
Fast climate change (9 km/y): 10% habitat vs. 5% habitat

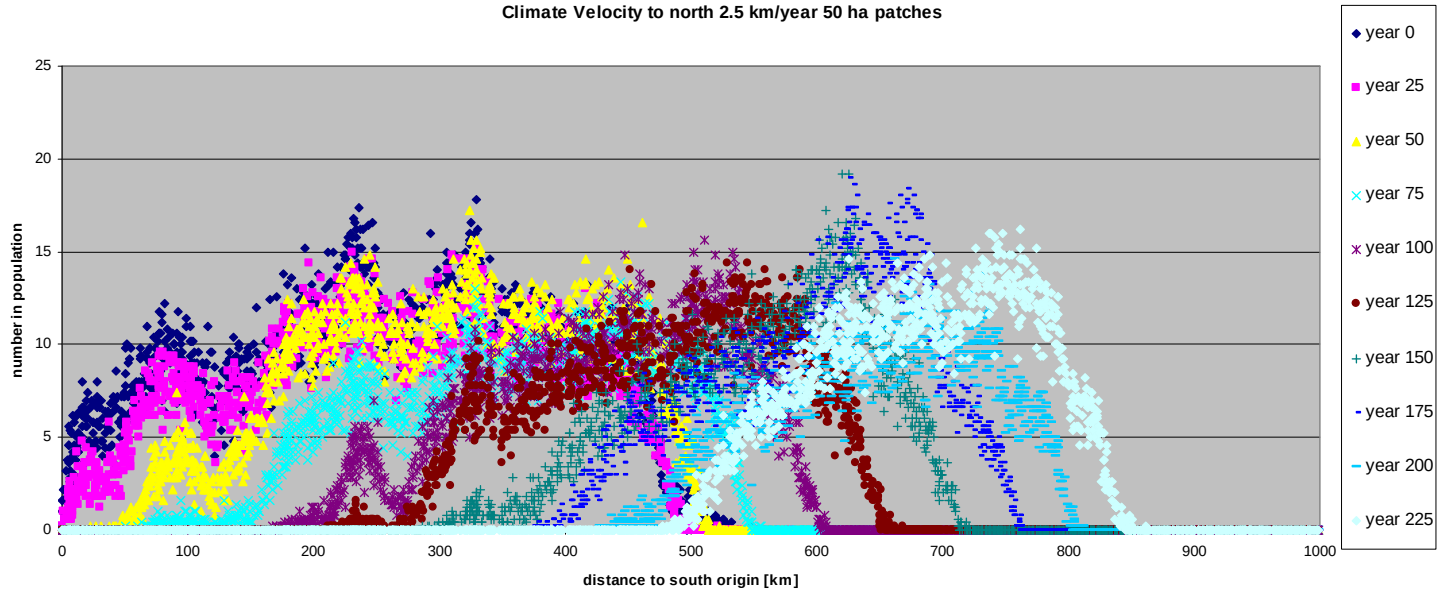


Climate velocity to North 9 km/year, 50 ha patches



Slow climate change (2.5 km/y): 10% habitat vs. 5% habitat





Preliminary results

- actual population movement rate << potential dispersal distance
- stochastic climate change decreases population movement rate
- habitat fragmentation decreases population movement rate
- climate change and fragmentation decrease population viability

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Thank you for your attention

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