

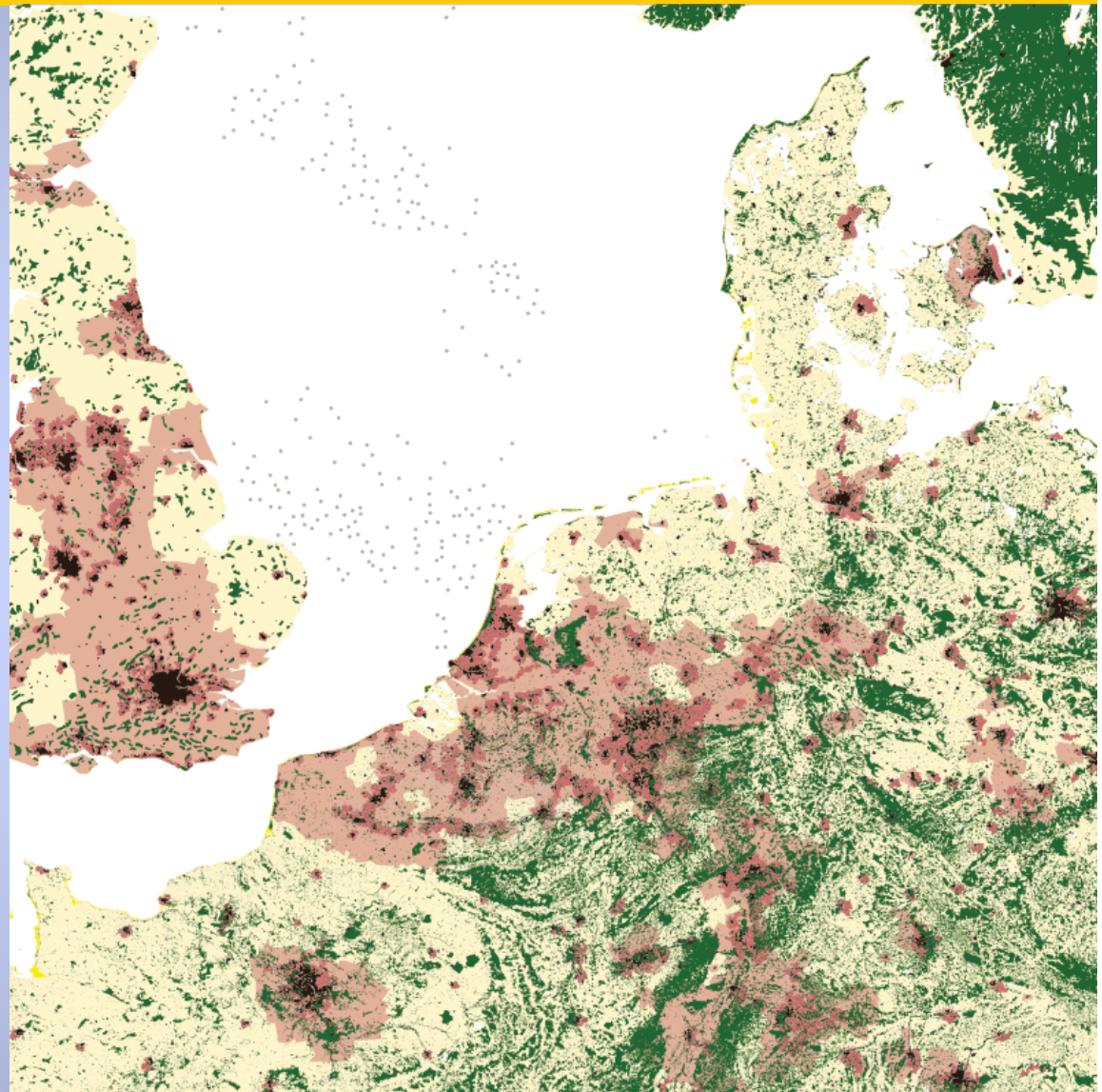
Adapting the landscape to climate change



Claire Vos & Jana Verboom

Content

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



Do we know enough?

- Modelling still in full development
 - climate envelopes
 - include spatially explicit landscapes
 - include population dynamics
 - include genetic variation within pops.
- We need adaptation
 - adaptation takes a long time, so we have to act now
 - ‘no regret’ strategies
 - improve when new knowledge is available

Habitat fragmentation enhances effects climate change

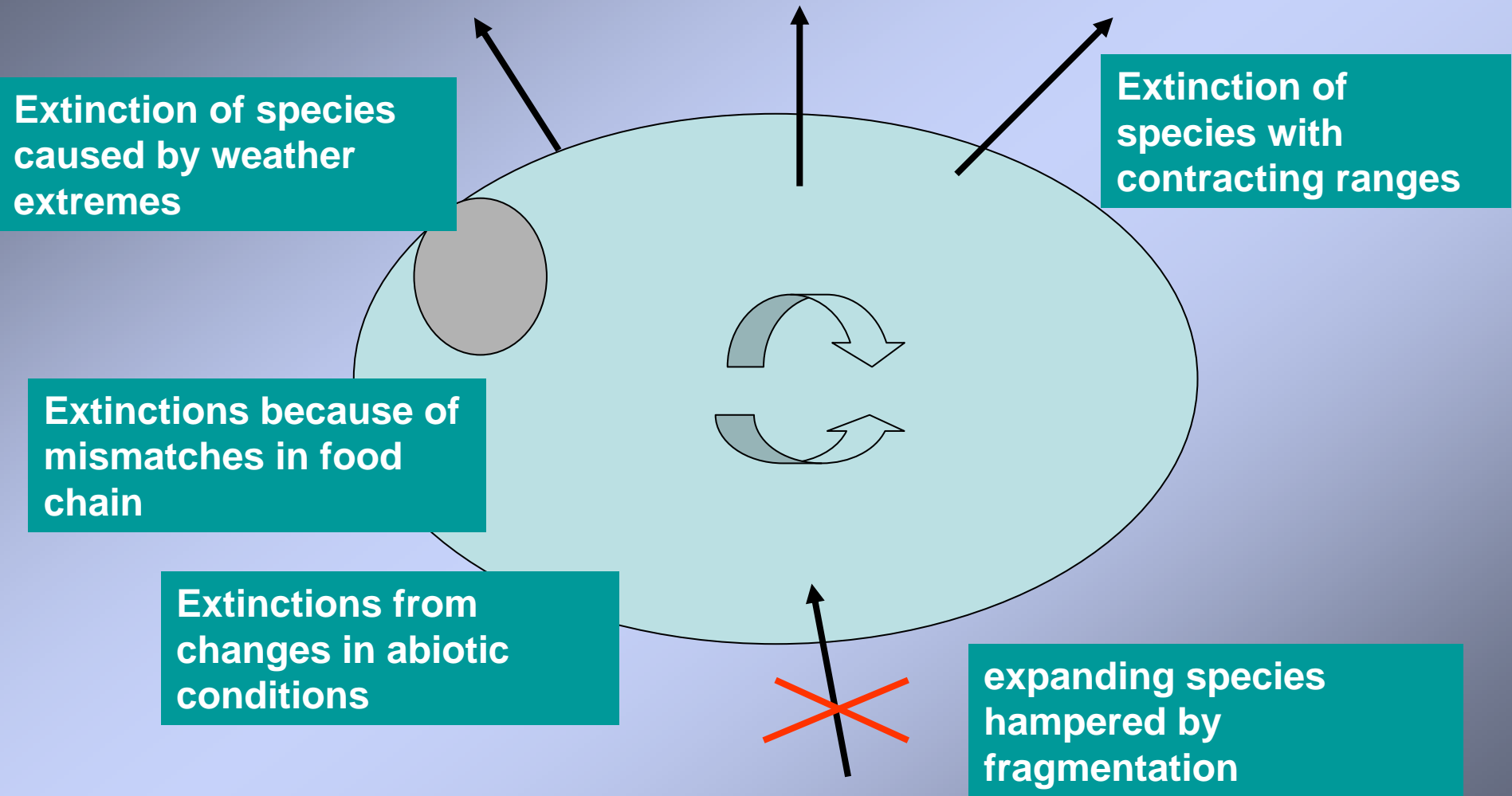
1. Temperature rise:

Species are not able to follow shifting suitable climate zones

2. Weather extremes:

Species recover more slowly from disturbances

Expected loss of biodiversity in ecosystems caused by climate change



Adapting the landscape to climate change: defining a strategy

Go for conditions for **ecosystem resilience** in stead of trying to control a steady state

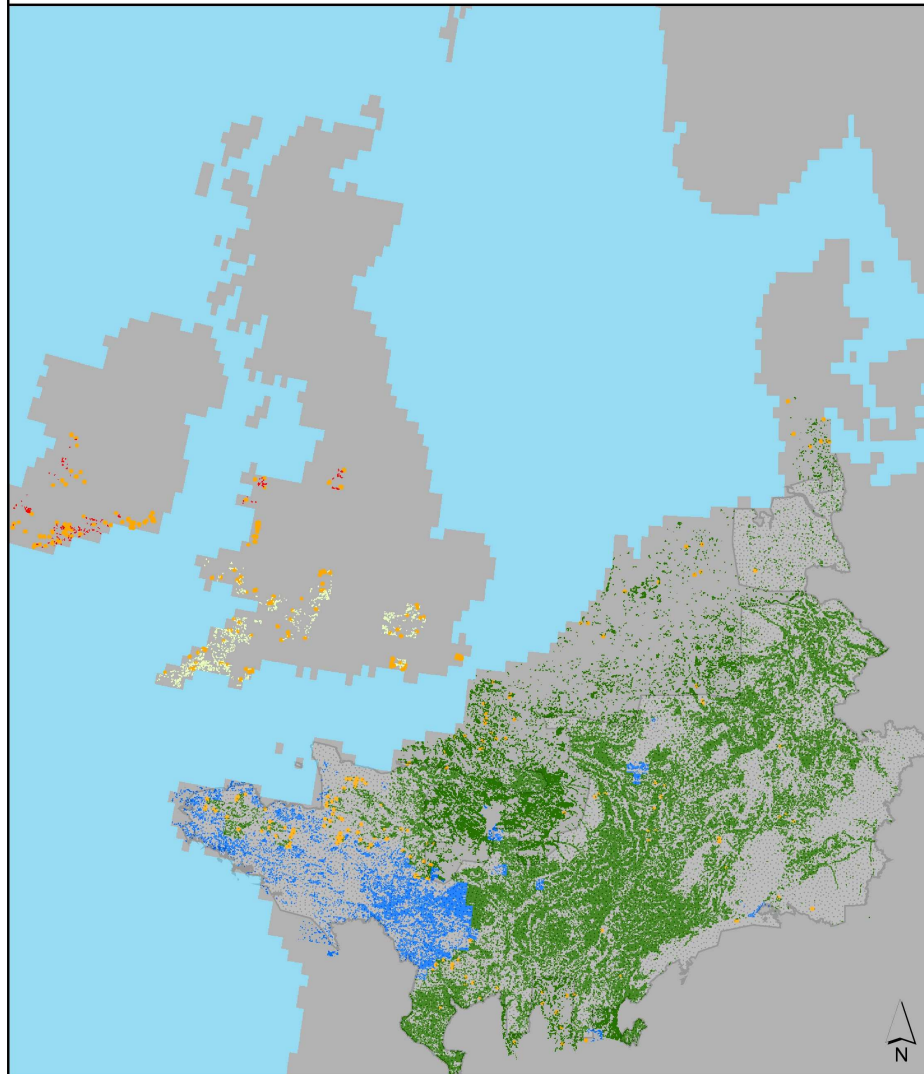
1. Spreading of risk in ecosystems with high level of biodiversity
 - more alternatives in food chain species interactions
- 2 Spreading of risk by creating spatial cohesion on a large spatial scale
 - facilitate range expansion
 - speed up population recovery time after disturbances

BRANCH study Northwest Europe

Recommended adaptations

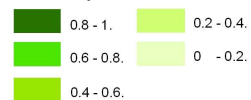
- Develop more forests
 - strong decline from South-East to North-West
 - large development time
- Wetlands too small and too isolated (even in present situation)
 - integrated adaptation - flooding retention
 - river valleys Rhine, Donau, Elbe, Meuse
- Mitigate barriers in the landscapes
 - infrastructure, urbanization, agriculture

Adaptation measures Middle spotted woodpecker 2020.

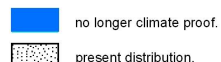
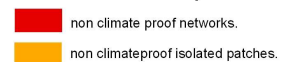


Legend

Climate proof networks.



Areas that need adaptation measures.



SCENARIO:Def barr thr 2.

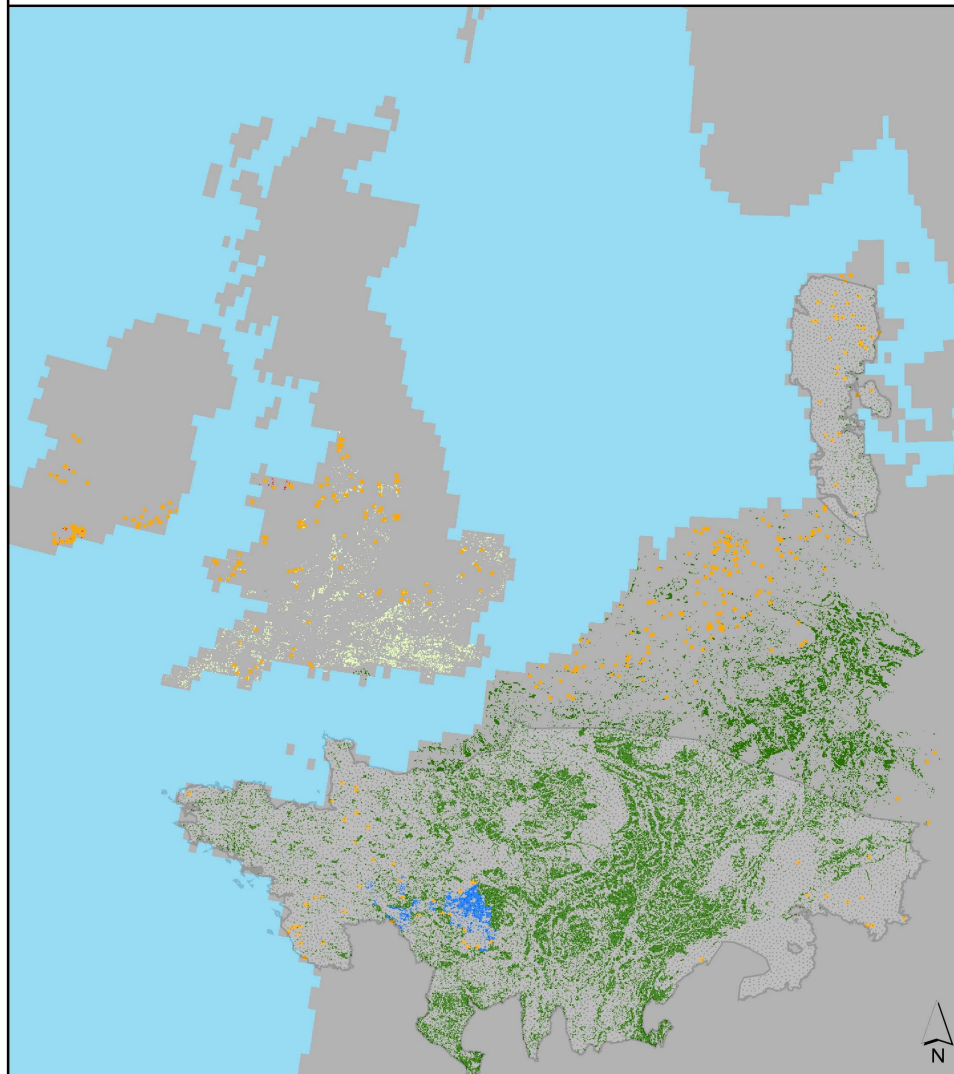
1. Climate change proof networks

2. Areas that need adaptation 2020



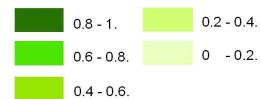
Branch
BIODIVERSITY
SPATIAL PLANNING
CLIMATE CHANGE

Adaptation measures Agile frog 2020.

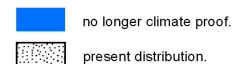
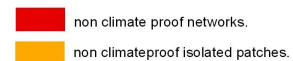


Legend

Climate proof networks.



Areas that need adaptation measures.



SCENARIO: Def barr thr 2.

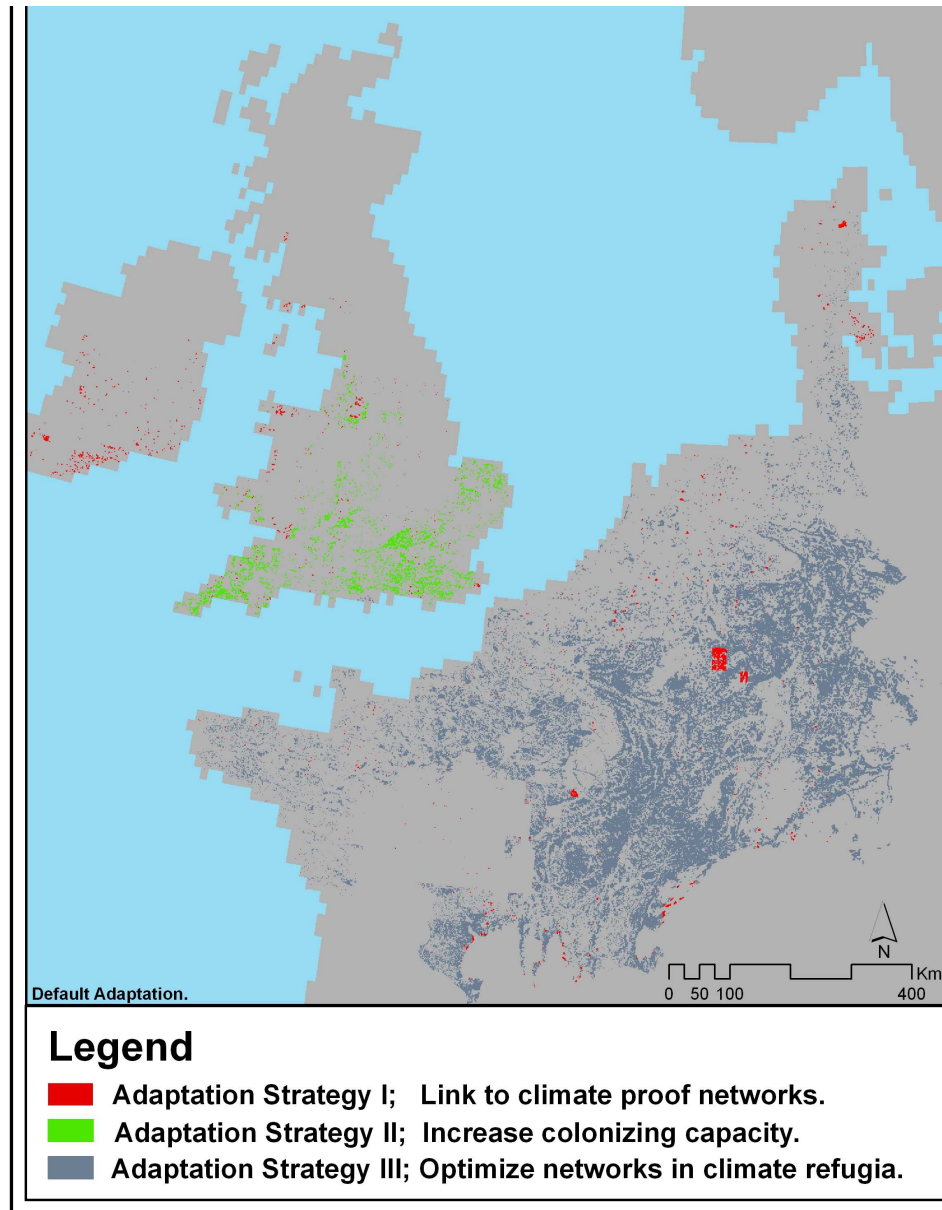
1. Climate change proof networks

2. Areas that need adaptation 2020



Branch
BIODIVERSITY
SPATIAL PLANNING
CLIMATE CHANGE

Adaptation task forest species NW Europe

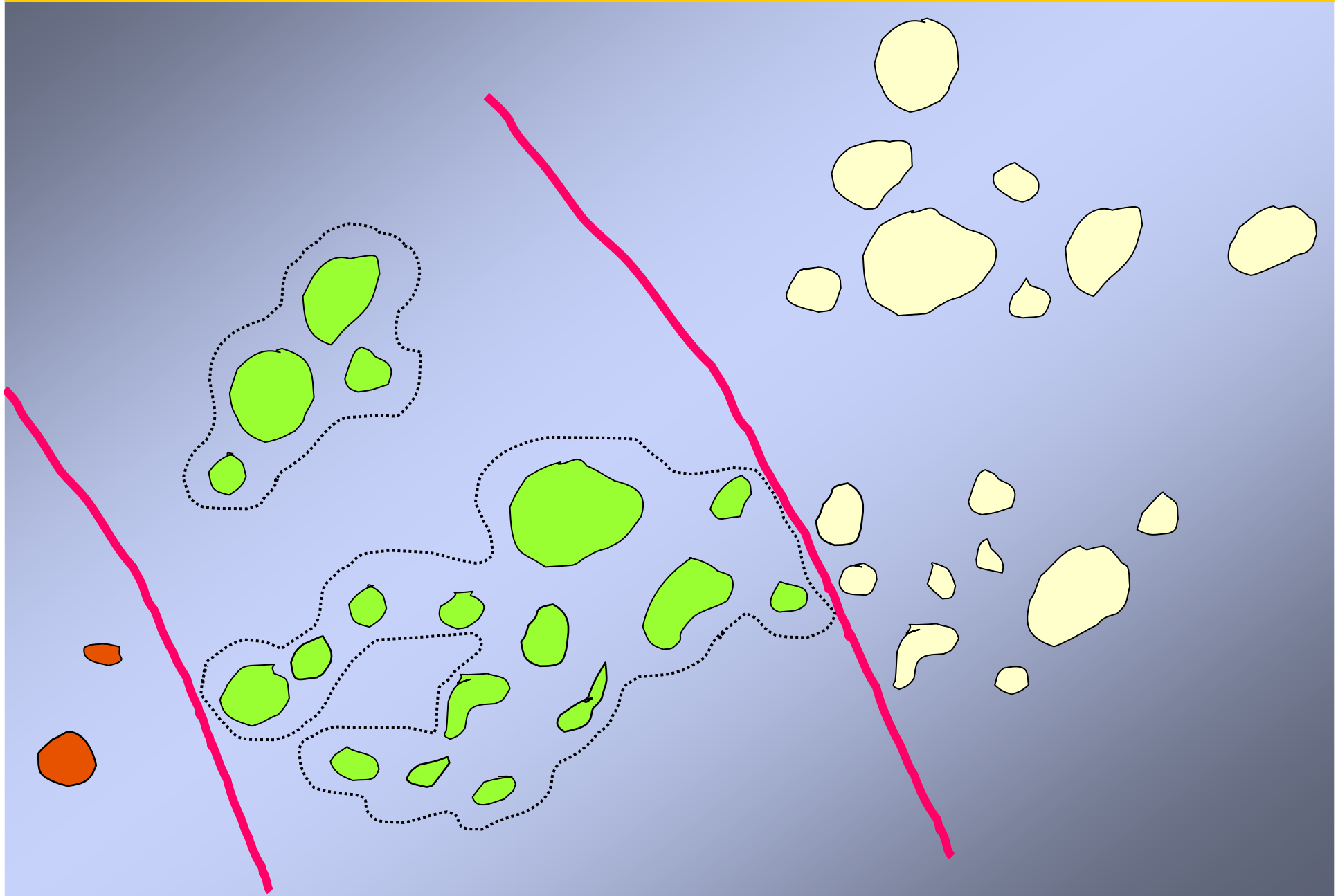


Adaptation strategies

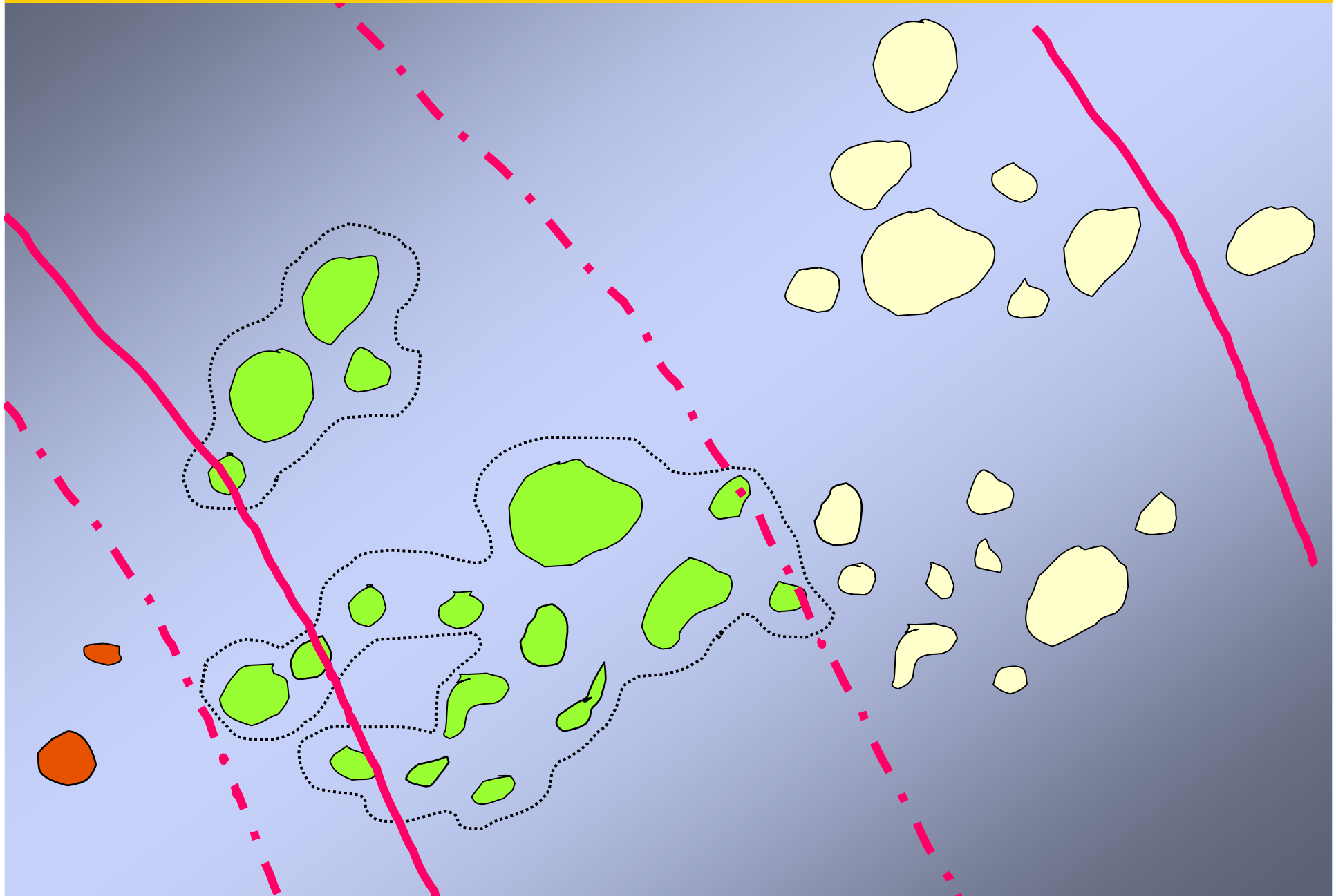
1. Link to nearest climate proof network
2. Increase colonizing capacity
3. Optimize networks in climate refugia



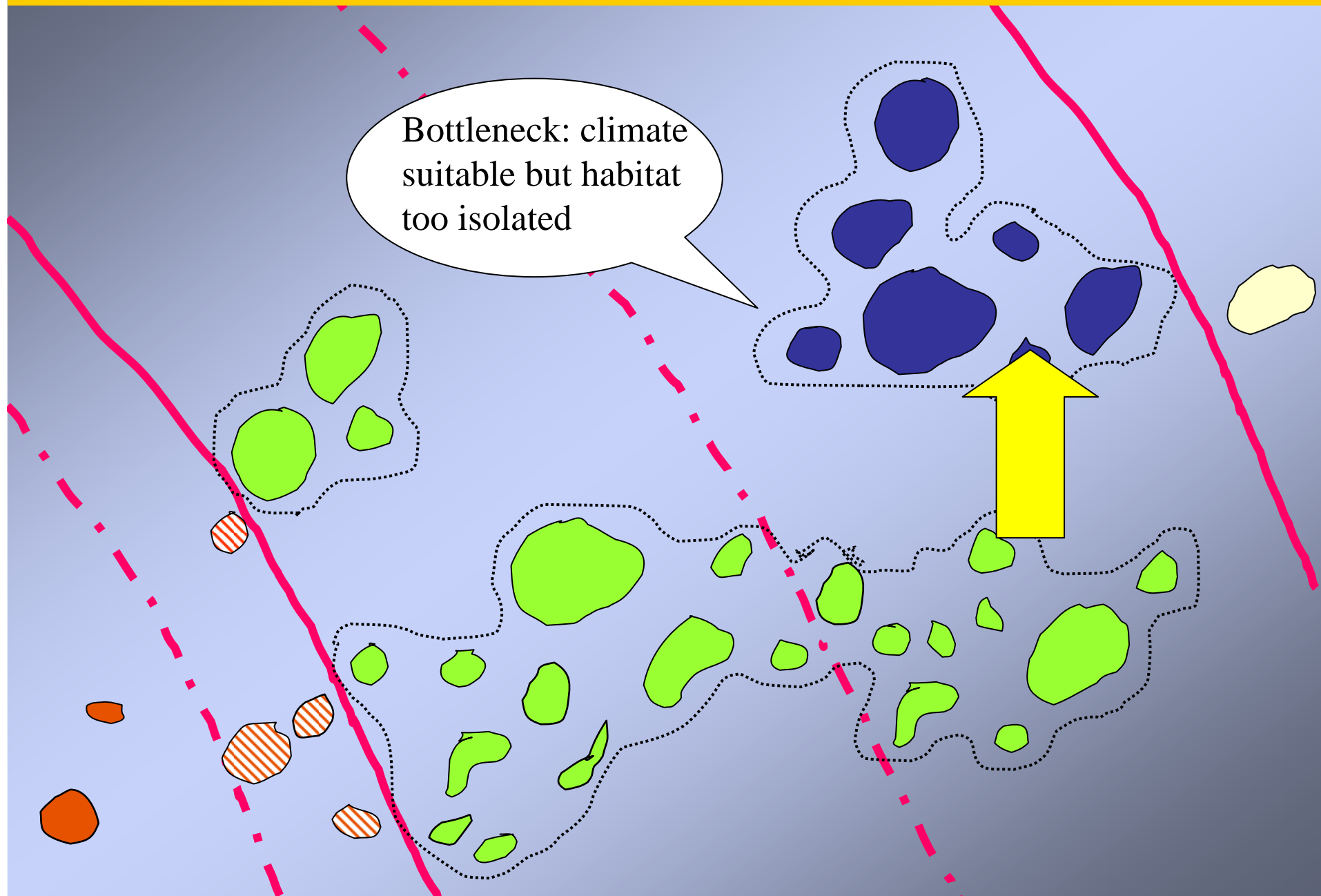
Shifting suitable climate zone



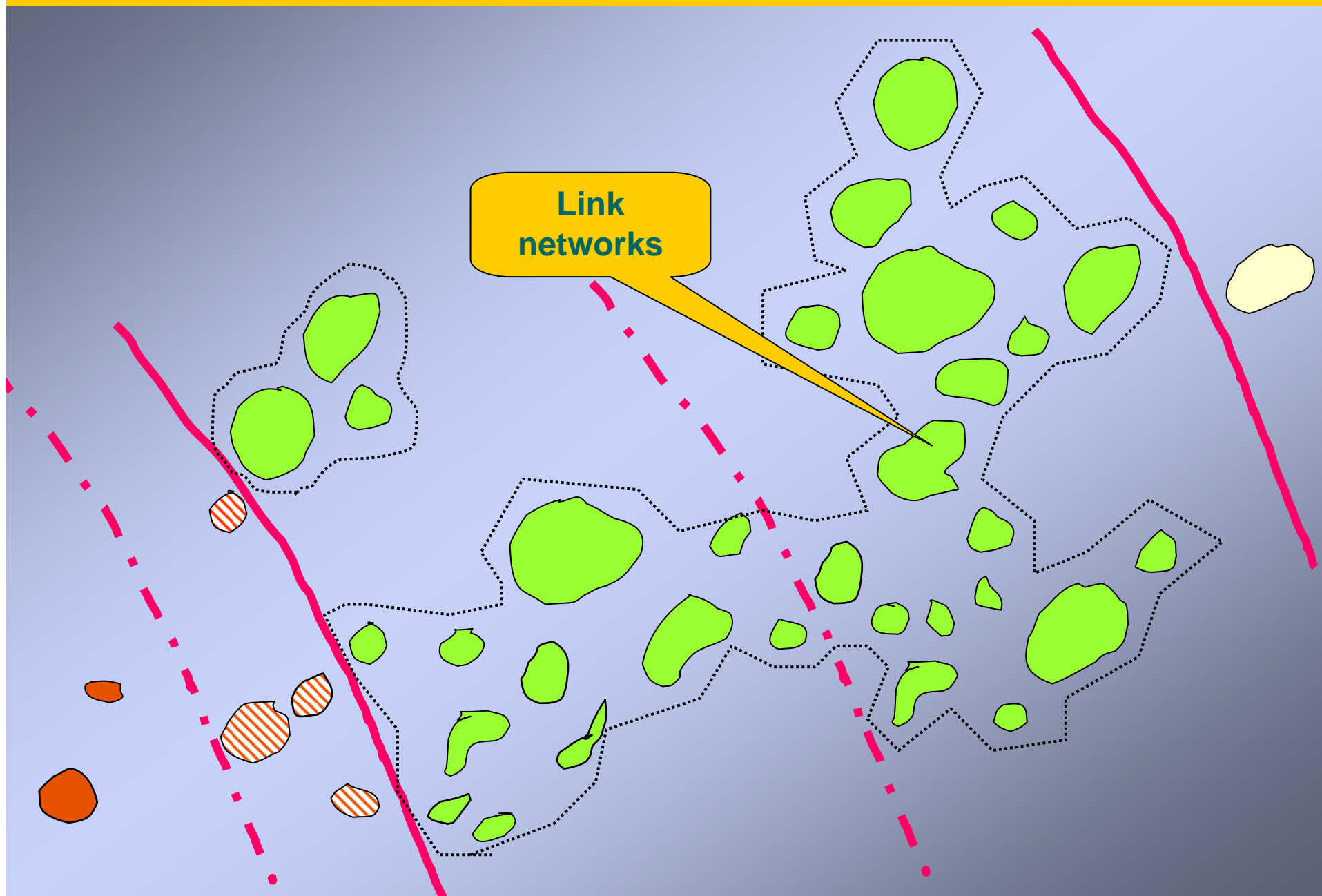
Shifting suitable climate zone



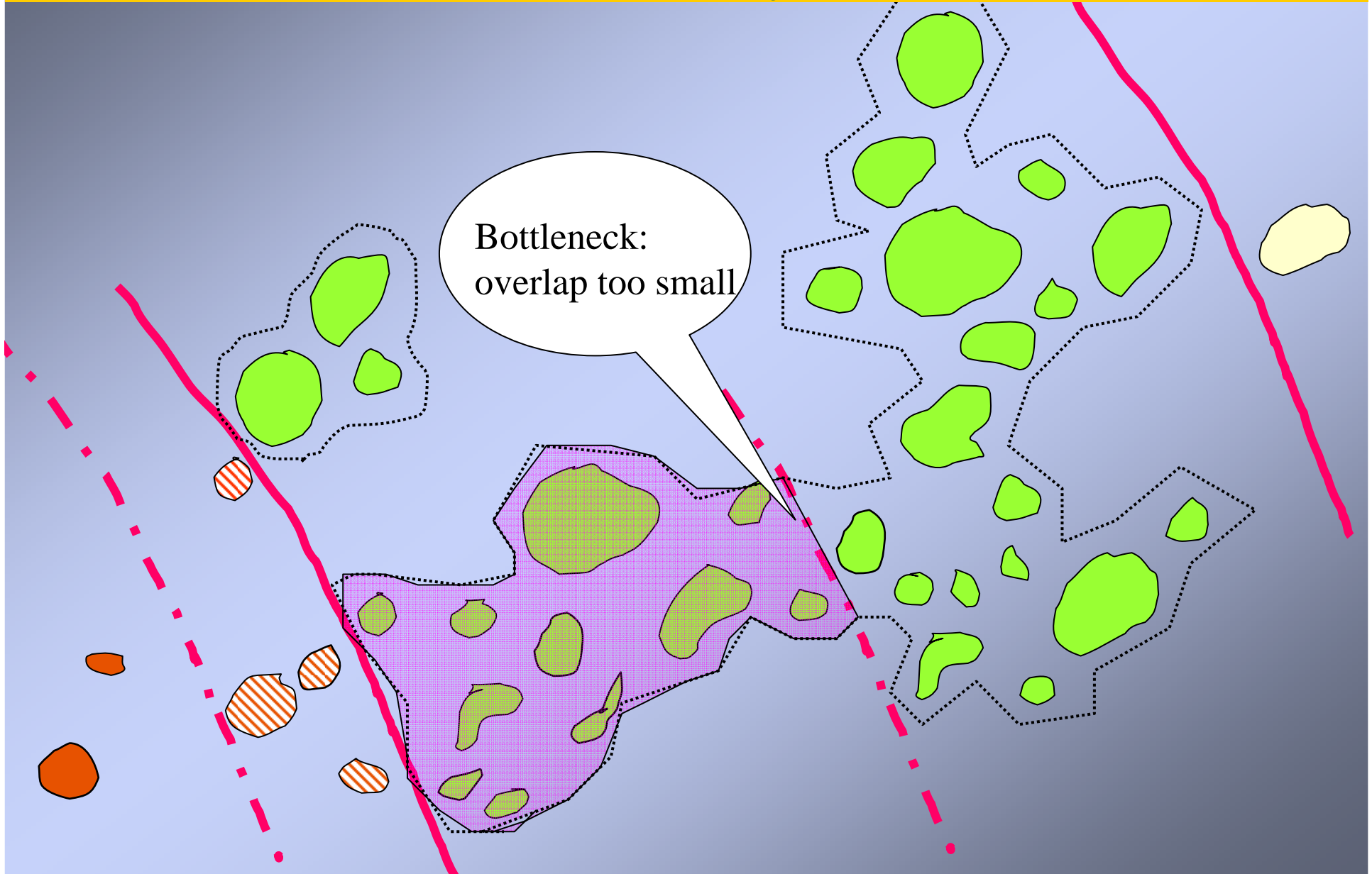
Adaptation strategy I: Link networks



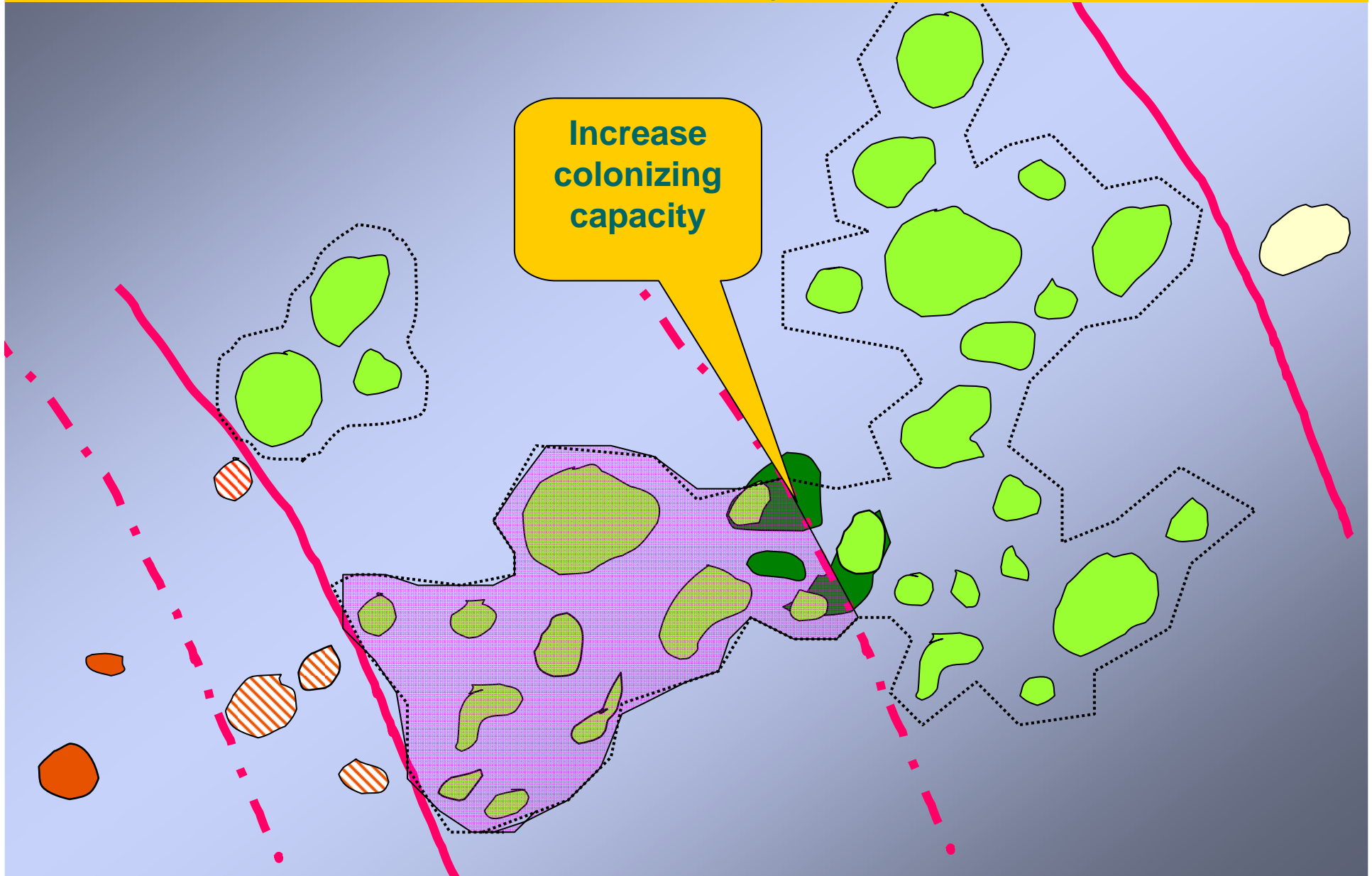
Adaptation strategy I: Link networks



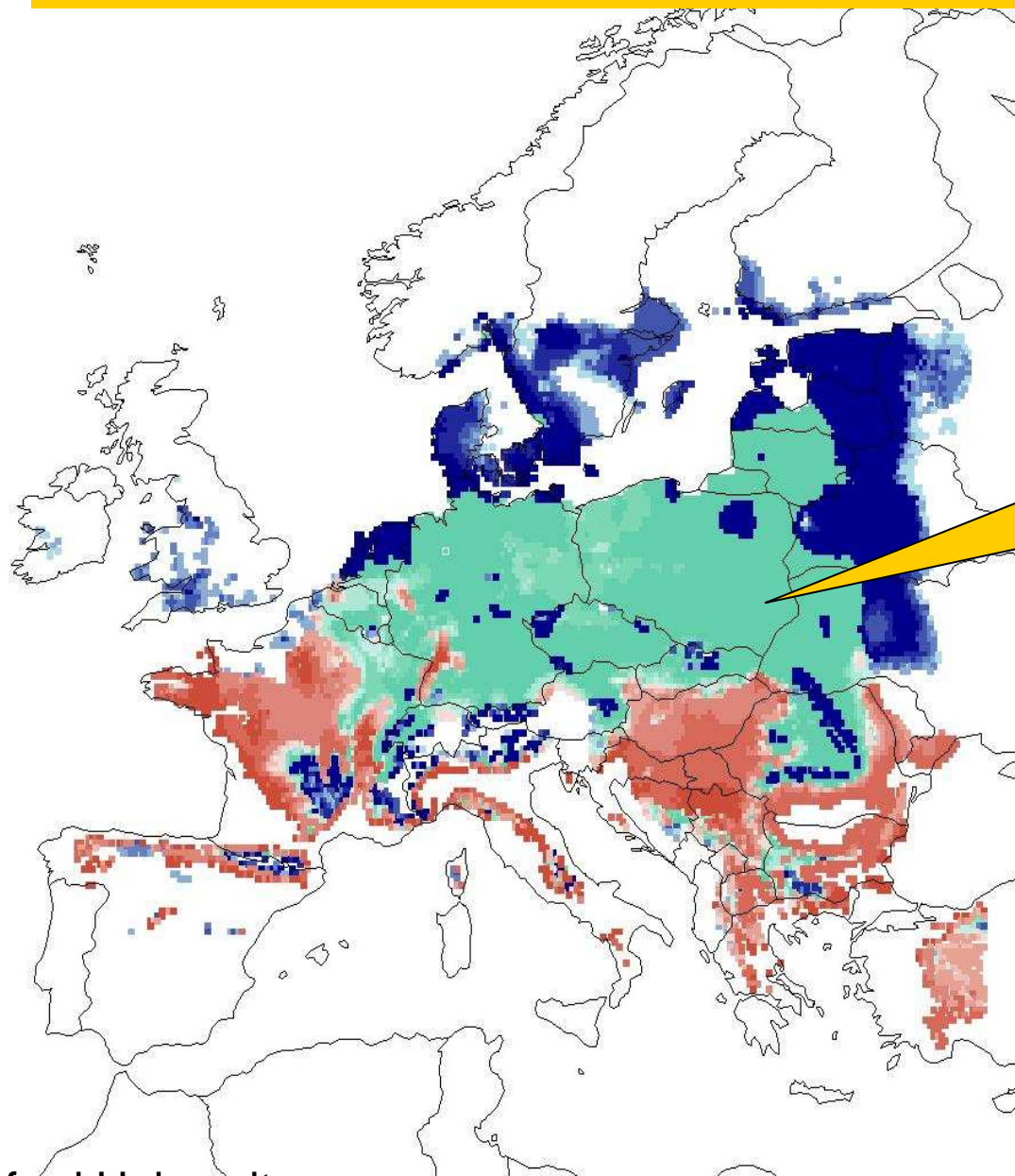
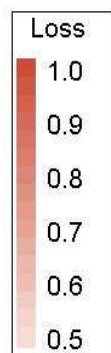
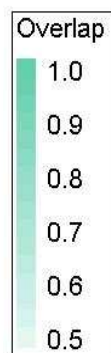
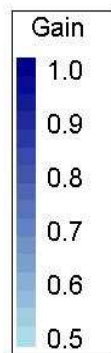
Adaptation strategy II: Increase colonizing capacity



Adaptation strategy II: Increase colonizing capacity



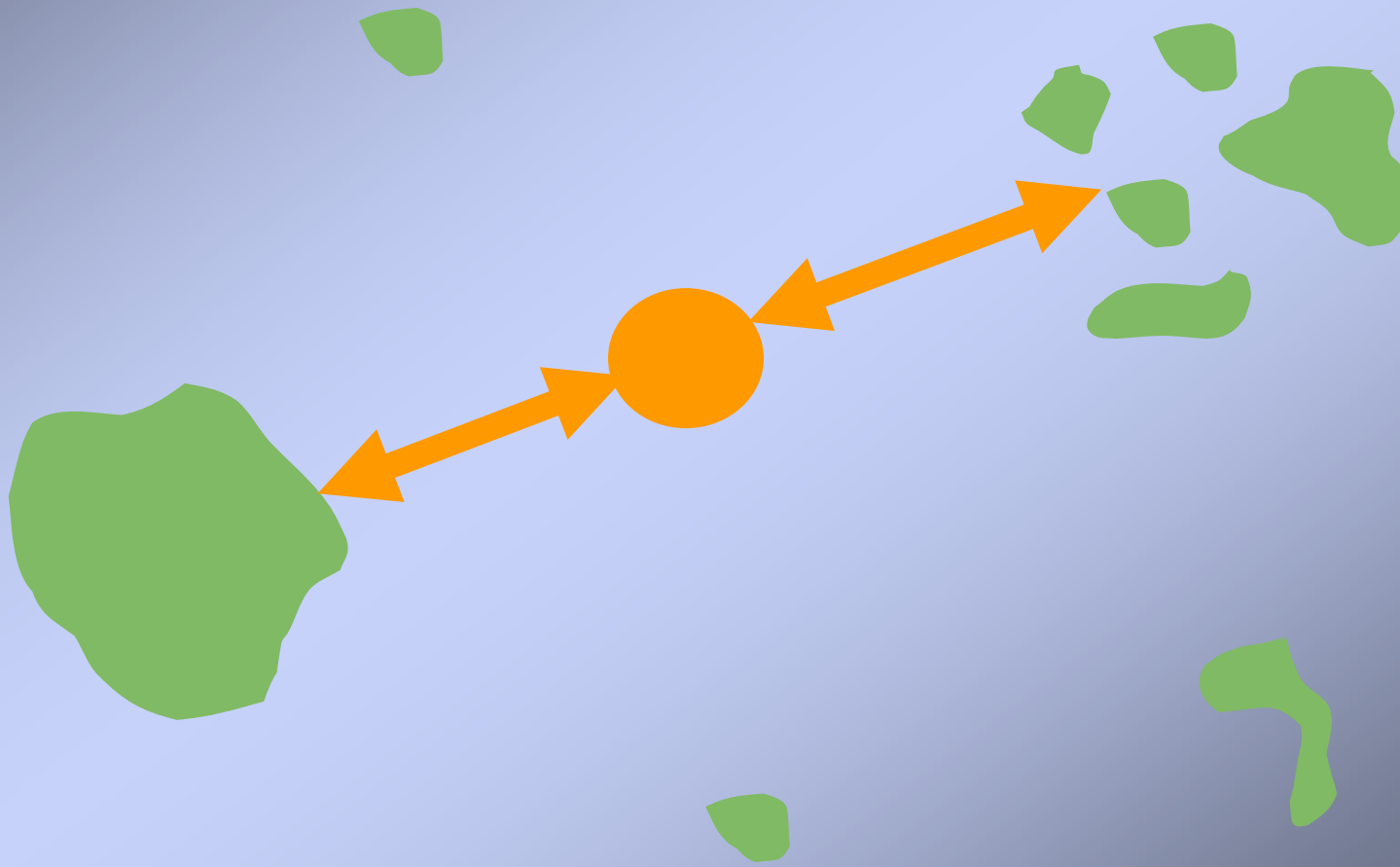
Adaptation strategy III



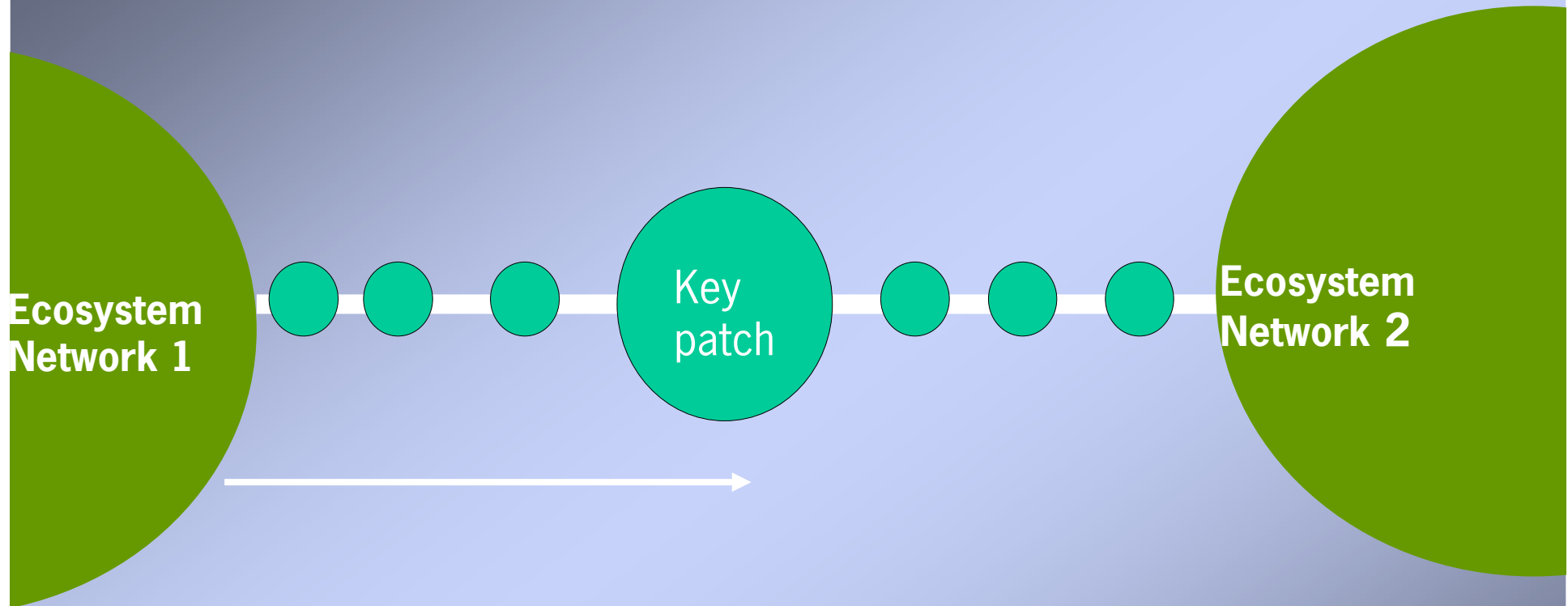
Optimize
sustainable
networks in
'climate
refugia'



For example: link networks by creating robust corridors



Link networks by creating robust corridors



Incorporate different spatial requirements



Dutch Nature Policy Plan 1990

National Ecological Network

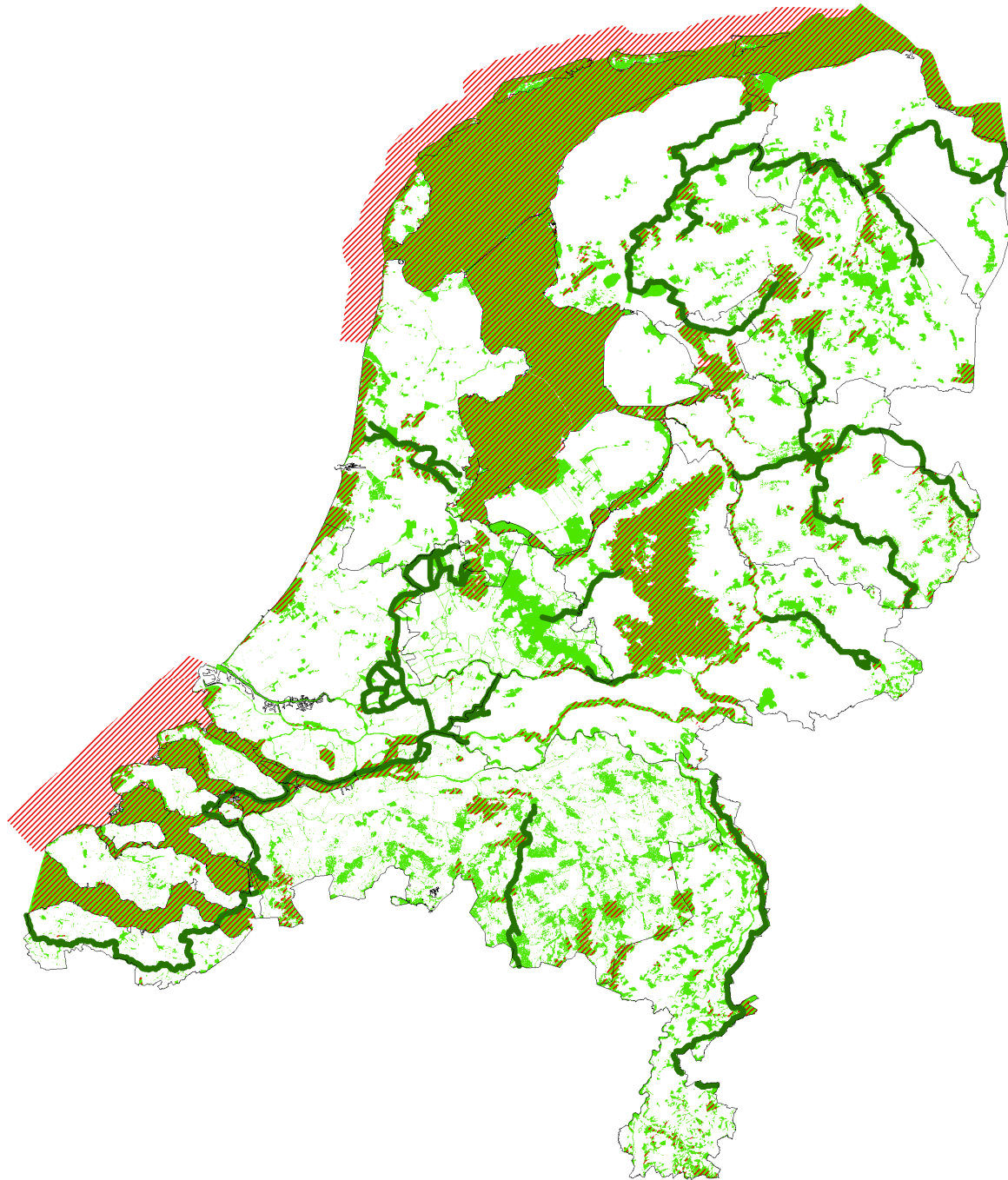


Nature Policy
Plan 2000

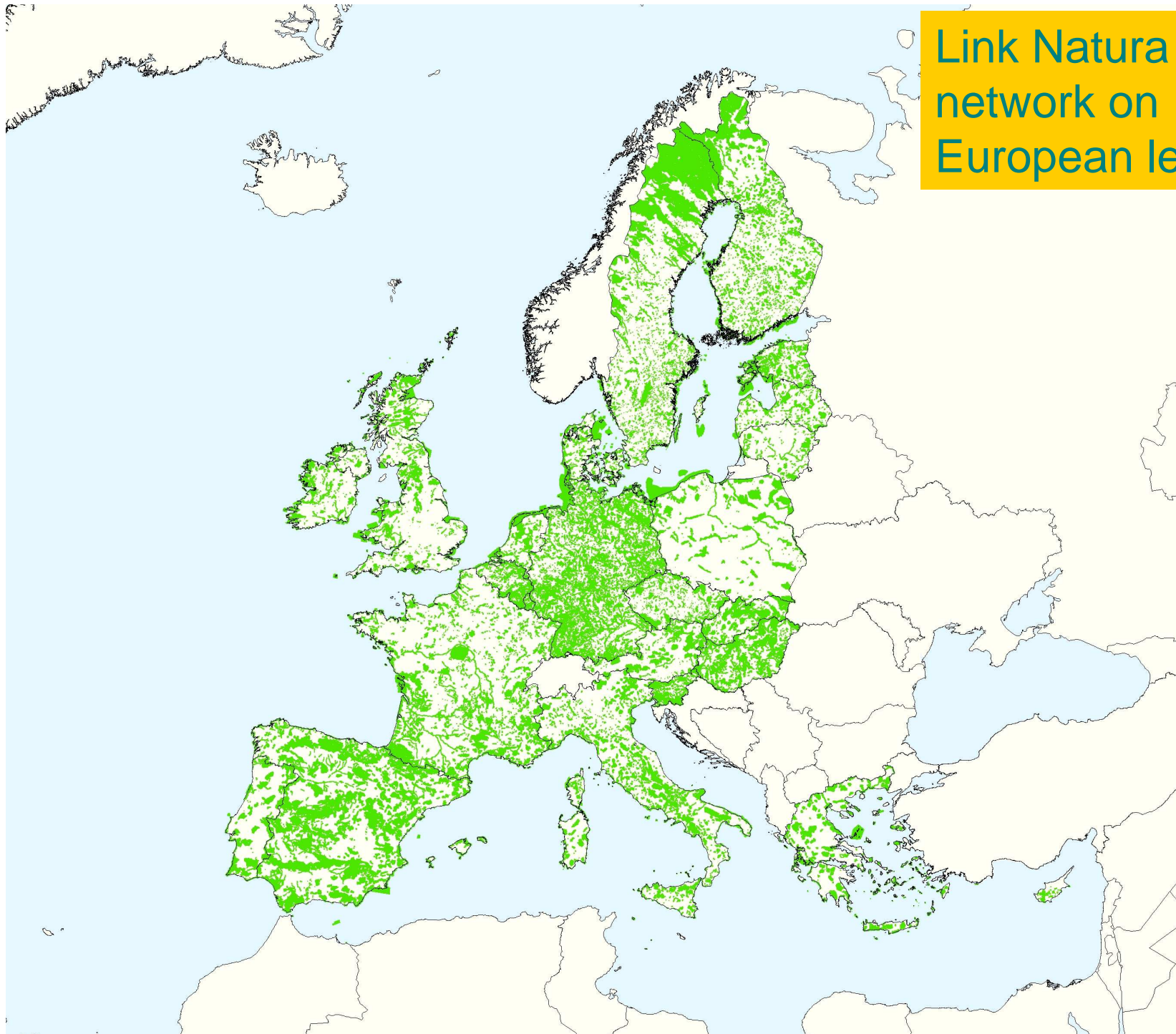
Large scale
spatial Cohesion

Robust
Ecological
Corridors

These strategies
are only effective
when
implemented on
an international
level



Link Natura 2000
network on
European level



A map of Europe showing green patches representing various ecosystem types. A dashed brown line with square markers traces a path across the continent, starting from the Iberian Peninsula, moving north through France, Germany, and Poland, then east through Scandinavia, and finally north through the British Isles and Ireland.

Identify main zones
to facilitate species
movements

For all main ecosystem
types

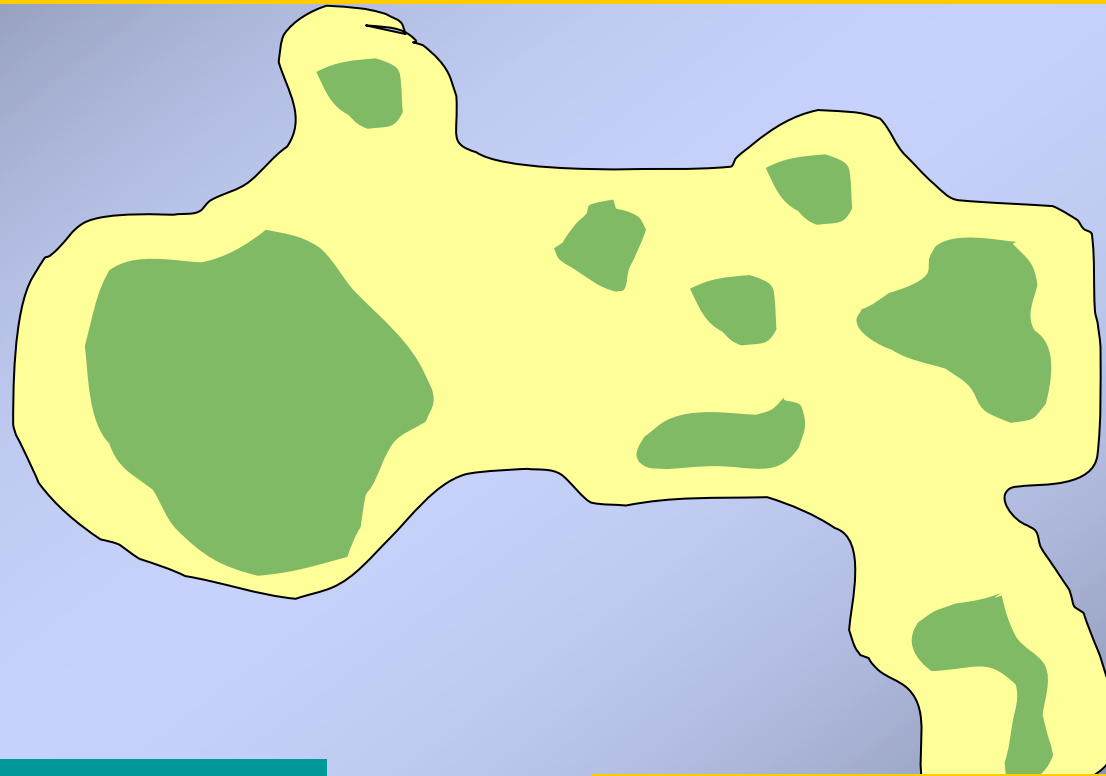
Incorporate different
habitat fragmentation
responses

- dispersal capacity
- area requirements

Incorporate different
climate change
responses

- northwards
- eastwards

Adaptation strategies outside nature areas



**Multifunctional
adaptation zones
surrounding nature
areas**

**Feasability will increase
when adaptation is
integrated and
multifunctional**

Green veining - natural elements in the agricultural landscape



Improving matrix permeability:

Link networks

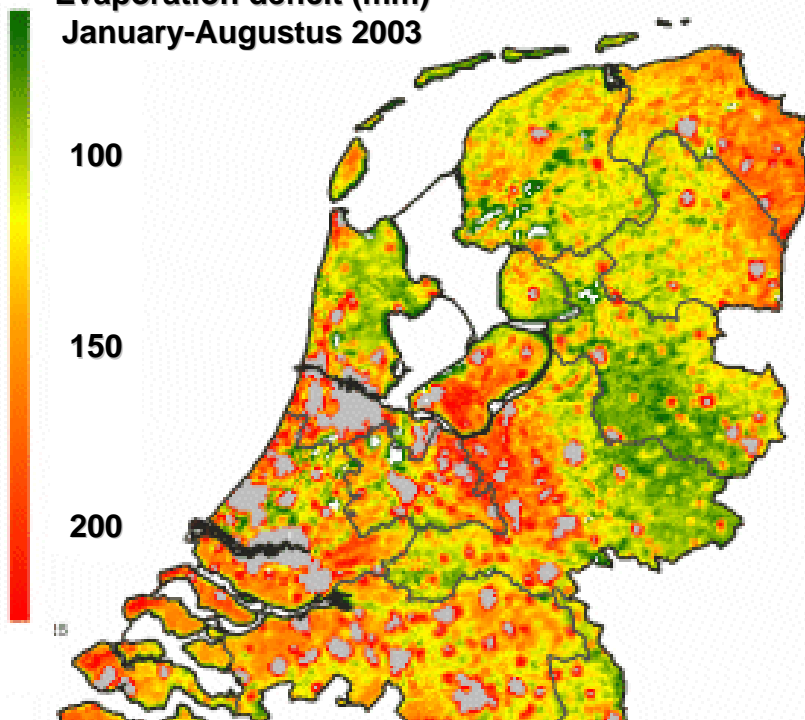
Improve colonizing capacity

Multifunctional benefits

- Recreation quality
- Economic value pest control

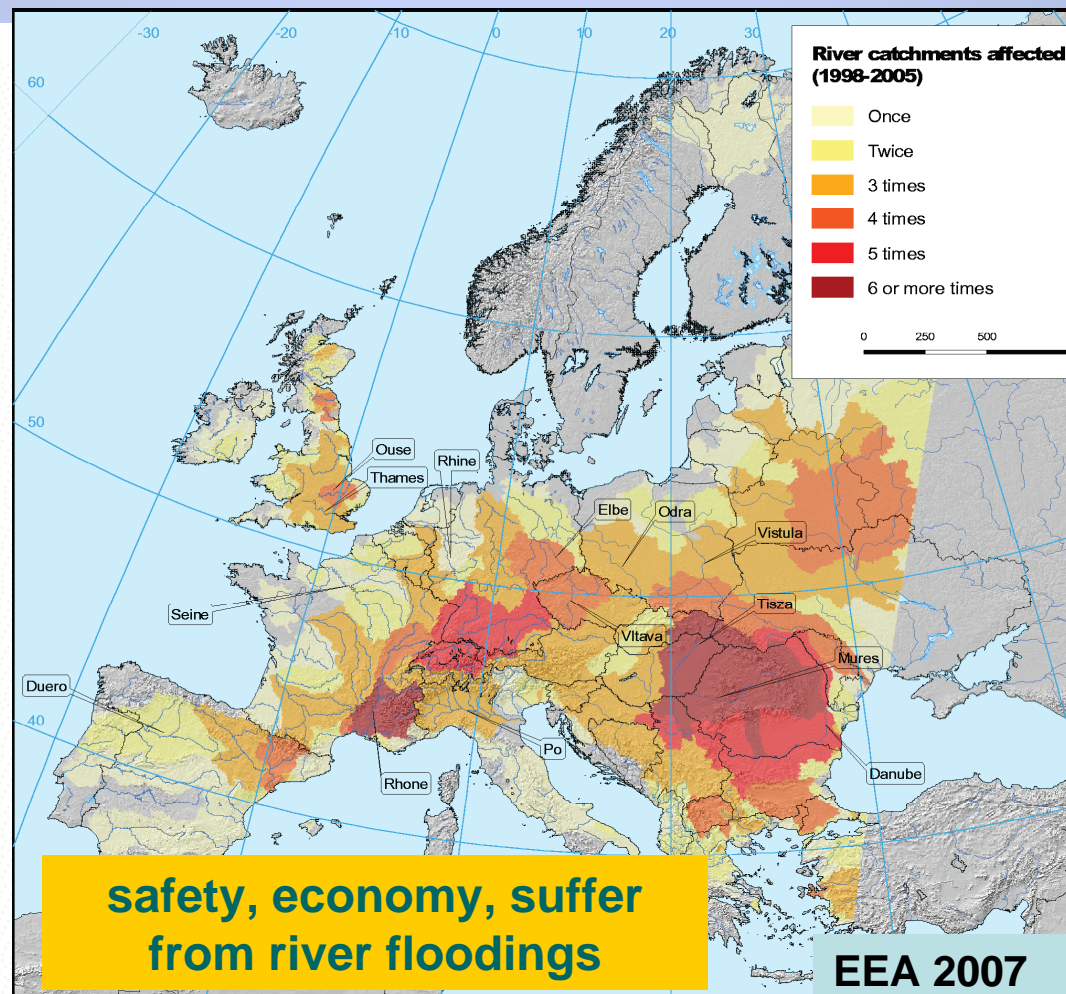
Water management: sometimes not enough sometimes too much

Evaporation deficit (mm)
January-Augustus 2003



Agriculture and wet lands
both suffer from warm dry
periods in summer

© WaterWatch



safety, economy, suffer
from river floodings

EEA 2007

Increase regional water retention by creating new wetlands

Link networks

- Optimize spatial cohesion in existing networks
- Improve colonizing capacity

Current Policy

Room for the river
project: Rhine river

>100 Regional
retention projects

Multifunctional benefits

- Safety – reduce flooding
- Agriculture- flooding, retention



Summarising Adaptation strategies

- Link networks
- Improve colonizing capacity
- Optimize network sustainability in 'climate refugia'
- Create large scale international connectivity between Natura 2000 sites
- Feasability will increase when adaptation is integrated and multifunctional
- Outside nature areas: multifunctional adaptation zones

Thank you