

Towards a climate change proof National Ecological Network: the use of (mechanistic) models

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PKB - kaart 5: Ecologische Hoofdstructuur

- begrensd Ecologische Hoofdstructuur
- begrensd Ecologische Hoofdstructuur grote wateren
- zoekgebied Ecologische Hoofdstructuur
- intensief gebruikte militaire terreinen (buiten de EHS)

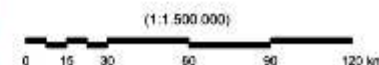


■ begrensd Ecologische Hoofdstructuur Noordzee

- robuuste verbinding
- > indicatieve robuuste verbinding (poort)
- > nader uit te werken en bestuurlijk af te stemmen robuuste verbinding

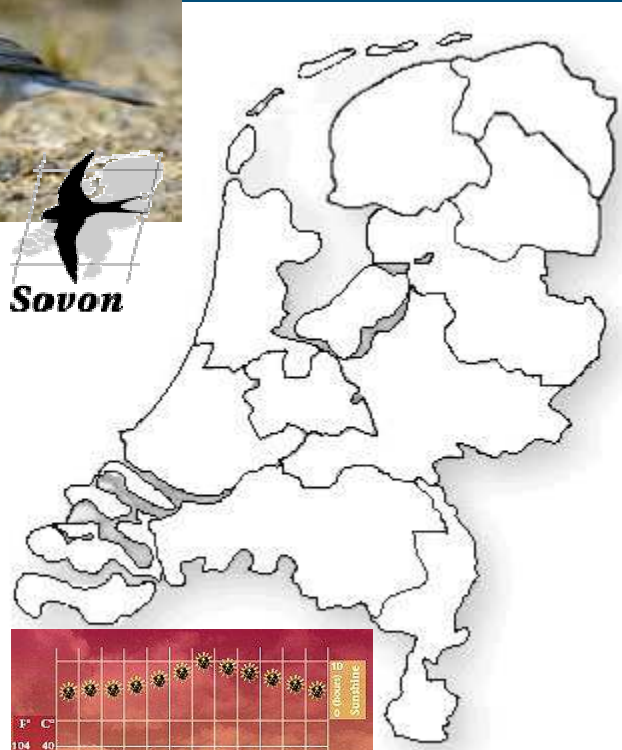
ondergrond

- vereenvoudigde topografie (exclusief hoofdinfrastructuur)
- grens Exclusieve Economische Zone (EEZ) en 12-mijlszone



Het kaartbeeld betreft een indicatieve weergave van de in de legenda vermelde eenheden

Databases



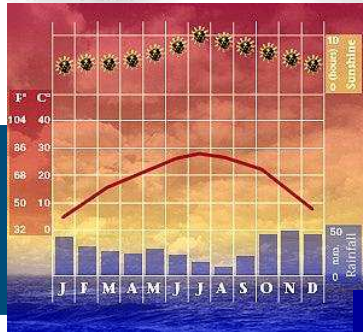
pattern of abundance

correlate timeseries

weather data

extremes

mean trends



2 modeling tracks

■ Incidence Function Models

- incidence -> abundance
- black box model

■ Mechanistic models

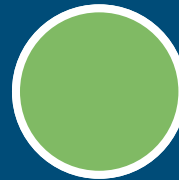
- population-dynamic processes
- grey box model

Incidence Function Model

immigration
to patch i
colonization

patch i

emigration/
mortality
in patch i
extinction



patch i empty



Incidence Function Model

immigration
to patch i

colonization

patch i

emigration/
mortality
in patch i

extinction



occupation chance patch i :

$$J_i = \frac{C_i}{C_i + E_i}$$



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Incidence Function Model

immigration
to patch i

colonization

patch i

emigration/
mortality
in patch i

extinction



$$C_{i,j} = \sum p_j A_j e^{-\alpha d_{i,j}}$$

landscape pattern



$$E_i = e / A_i^x$$

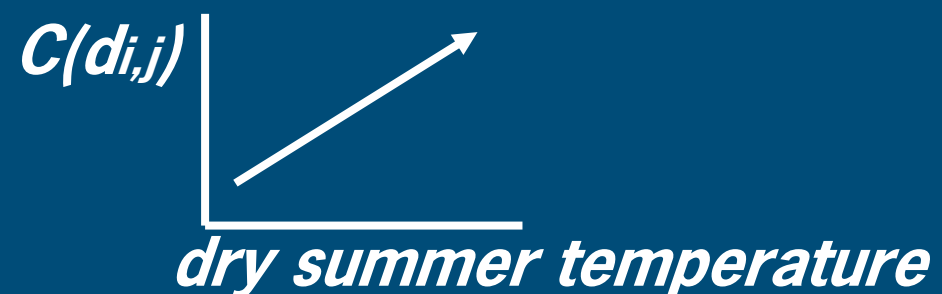
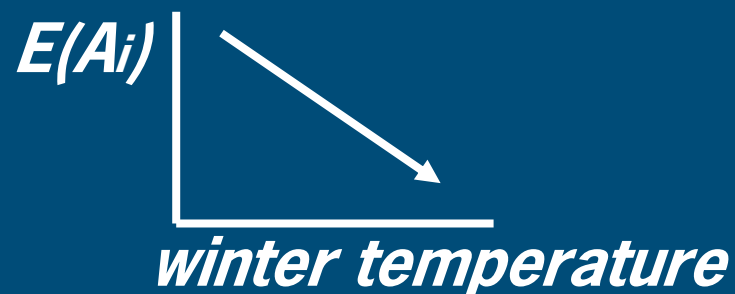
Incidence Function Model

- Colonization and extinction through time

(Ter Braak & Etienne 2004):

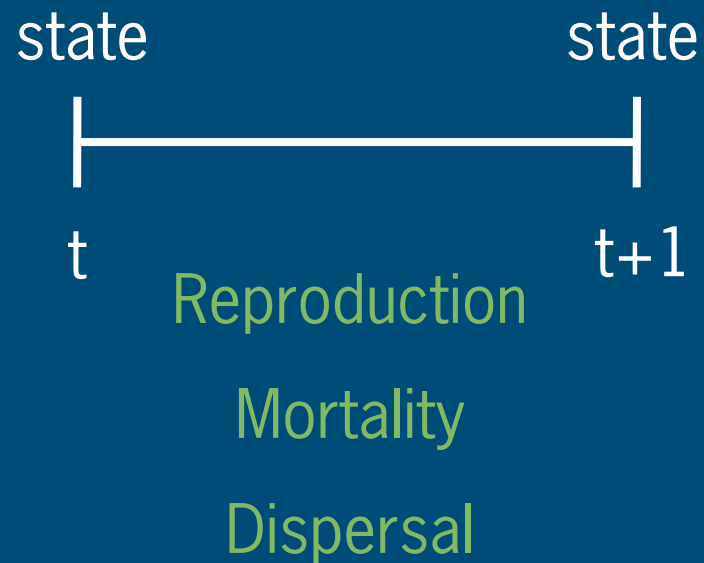
$$E_i(t); C_{i,j}(t)$$

- can depend on climate
 - e.g. look for weather in most vulnerable phase



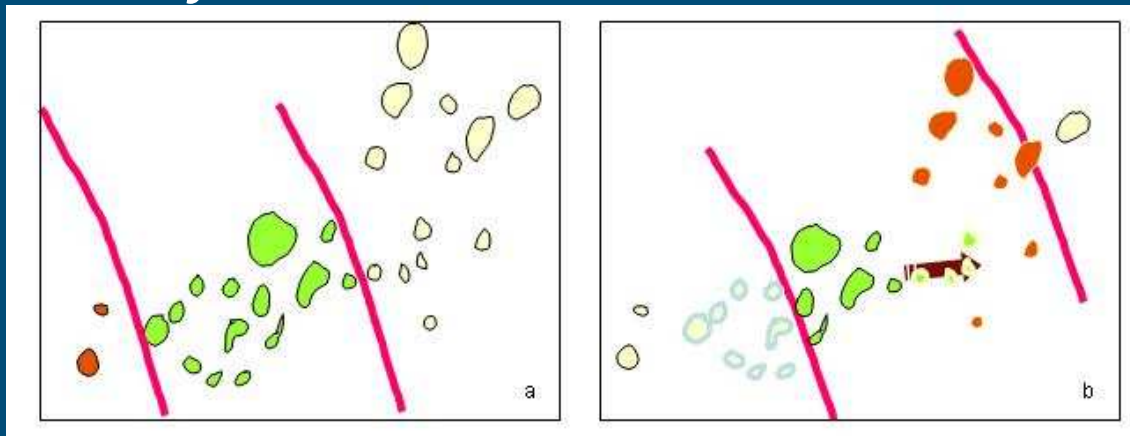
Mechanistic model

- Individually based, population based (METAPHOR)



Mechanistic model

- Climate into METAPHOR:
 - Take into account patches that evolve in area that has recently become suitable



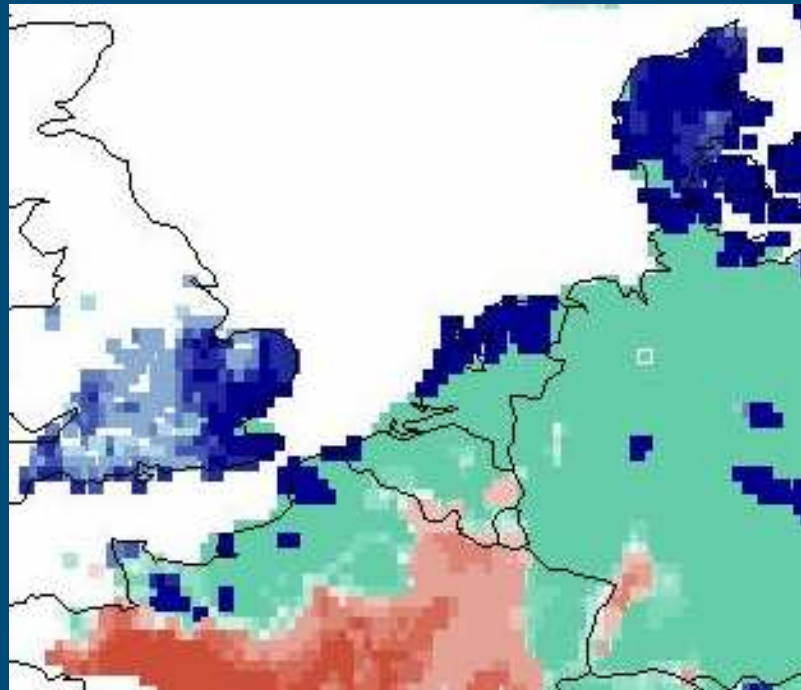
- Bring in environmental stochasticity (*Sæther et al.*)
- Not just one model, explore possibilities

Mechanistic model

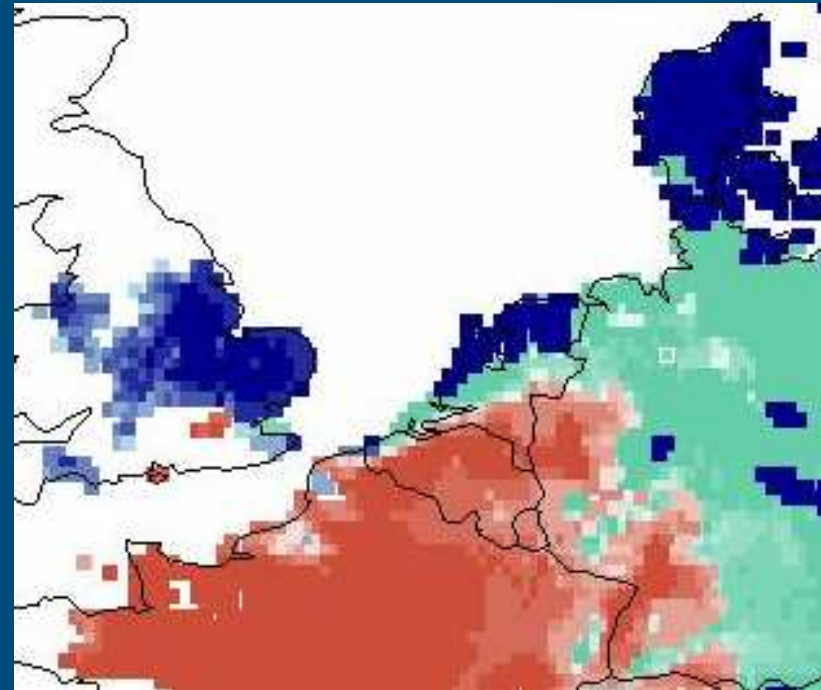
- Input:
 - BRANCH envelopes
 - GIS landuse/landcover maps

BRANCH envelopes

2020



2050



■ = gain ■ = overlap ■ = loss

Carterocephalus palaemon (Chequered skipper)



Mechanistic model

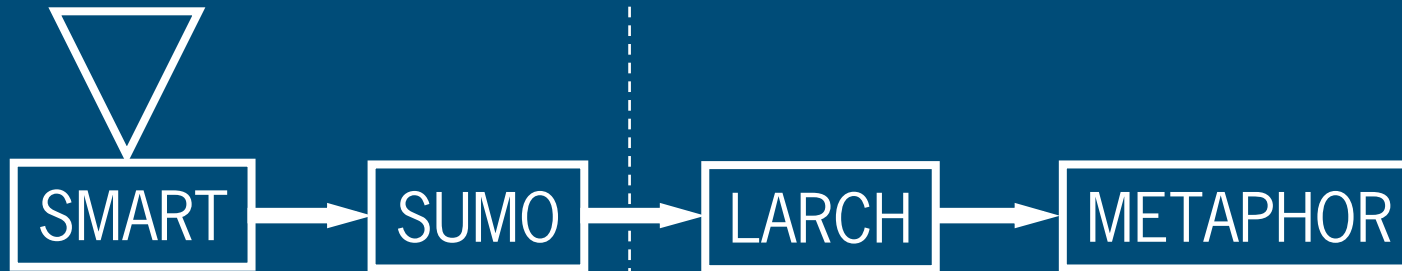
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Combine models

- Option: couple databases; link both models
- What defines colonization and extinction chance?
 - Assess correlations in IFM
 - Assess parameters in mechanistic models
- -> *Do both lead to comparable results?*

On the list of wishes:

weather scenarios



vegetation

suitability

End

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