

## Motivation and main purposes

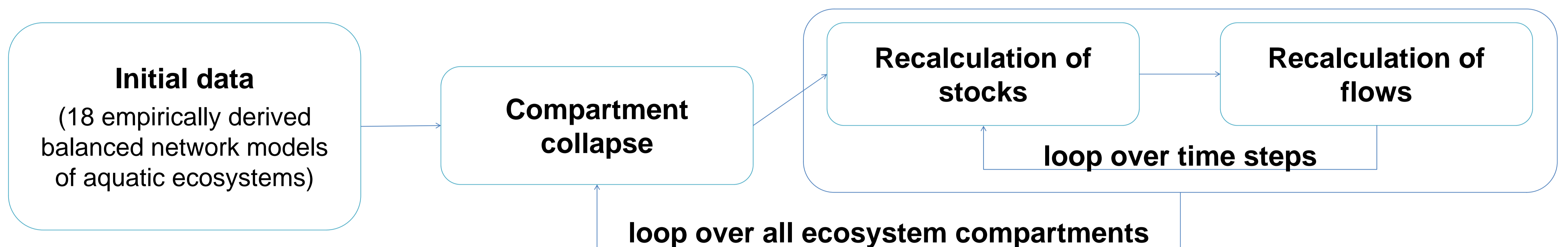
Species losses have always occurred as a natural phenomenon, but the pace at which species are going extinct has recently accelerated dramatically as a result of human activities. The disappearance of a species can have far-reaching and often unexpected consequences for other species, since changes can propagate throughout ecosystems. Hence, the following questions arise:

- How does the collapse of one ecosystem compartment (species or functional groups) influence the remaining ecosystem compartments?
- How is an ecosystem's structure related to its vulnerability to compartment collapses?

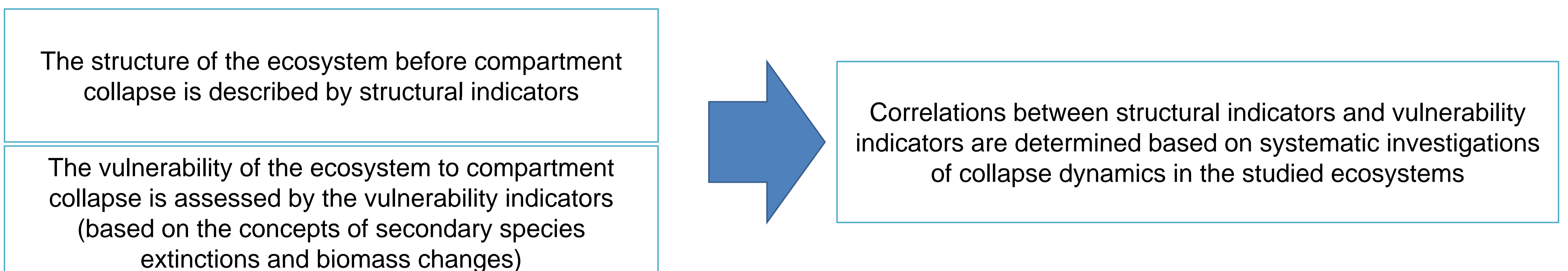
## Modelling concepts

- Ecosystems are represented by directed network models.
- Starting with an ecosystem at equilibrium, a selected compartment collapses (is removed).
- The changes propagate through the ecosystem over time due to the following rules:
  - The magnitude of the flows within the system and the flows to the external environment depends on the donor species' biomass.
  - Incoming flows from the external environment are recipient-controlled.

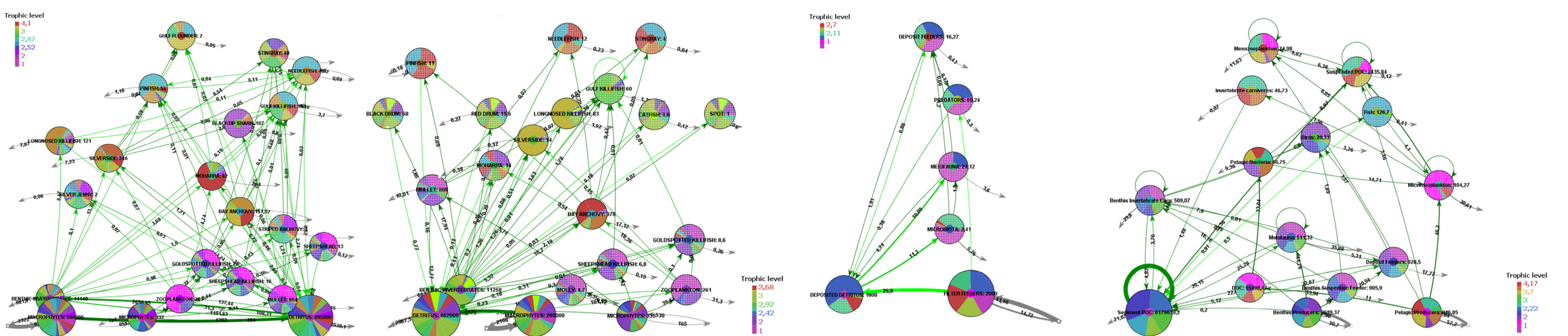
## Simulations



## Statistical analysis



## Examples of ecosystems



## Results

- Ecosystems with less connectance and richer trophic structure tend to have the dominated compartment (collapse of this element exerts significant influence on the other compartments' biomasses).
- Ecosystems with more compartments are more vulnerable.
- More connected ecosystems with lower number of compartments suffer less extinctions.
- The results show no effect of cycling flows and ecosystem's total biomass on vulnerability indices.