



Research Group
Ecosystem Management
University of Antwerp



Applying the ecosystem services concept in marine and estuarine environments

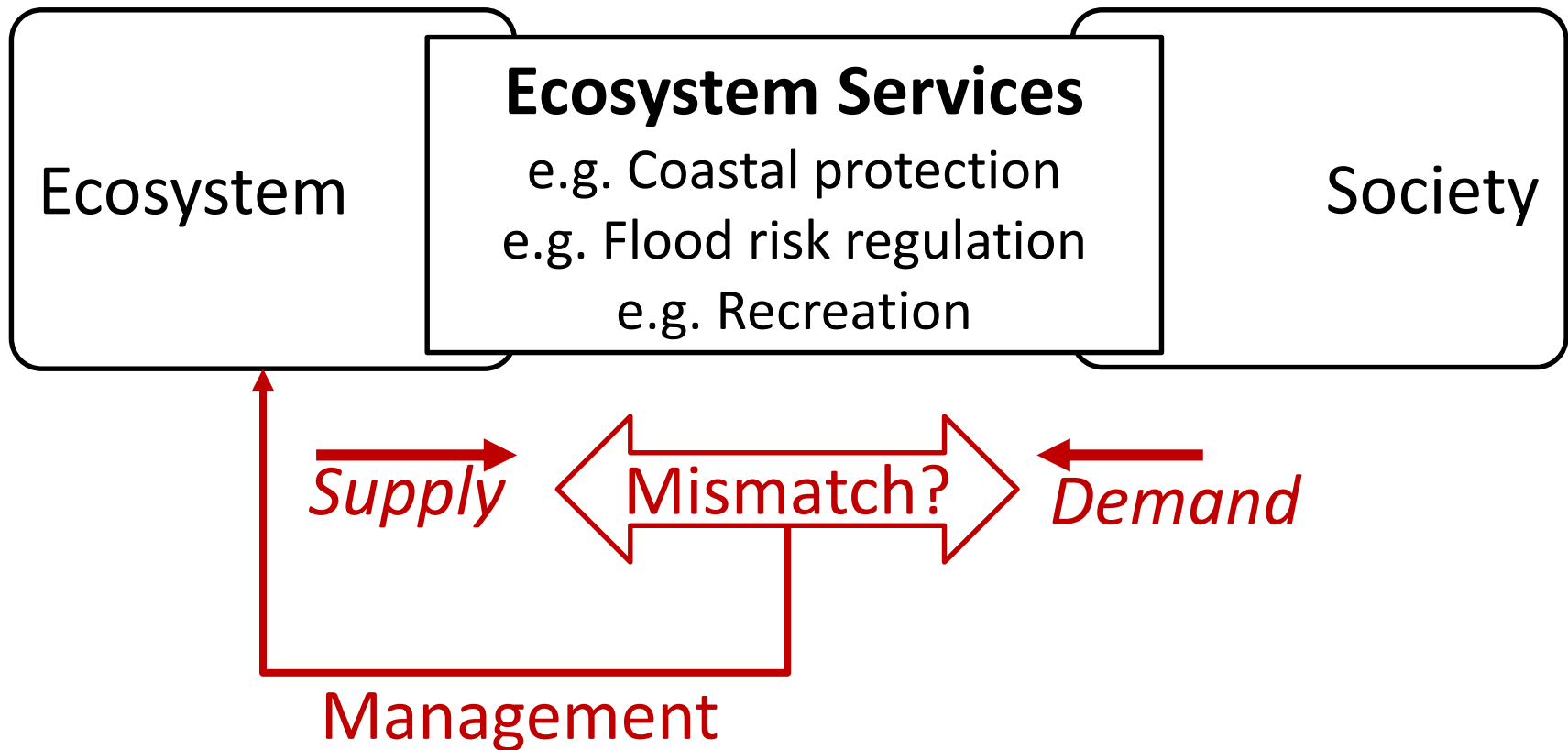
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Prof. Dr. Patrick Meire

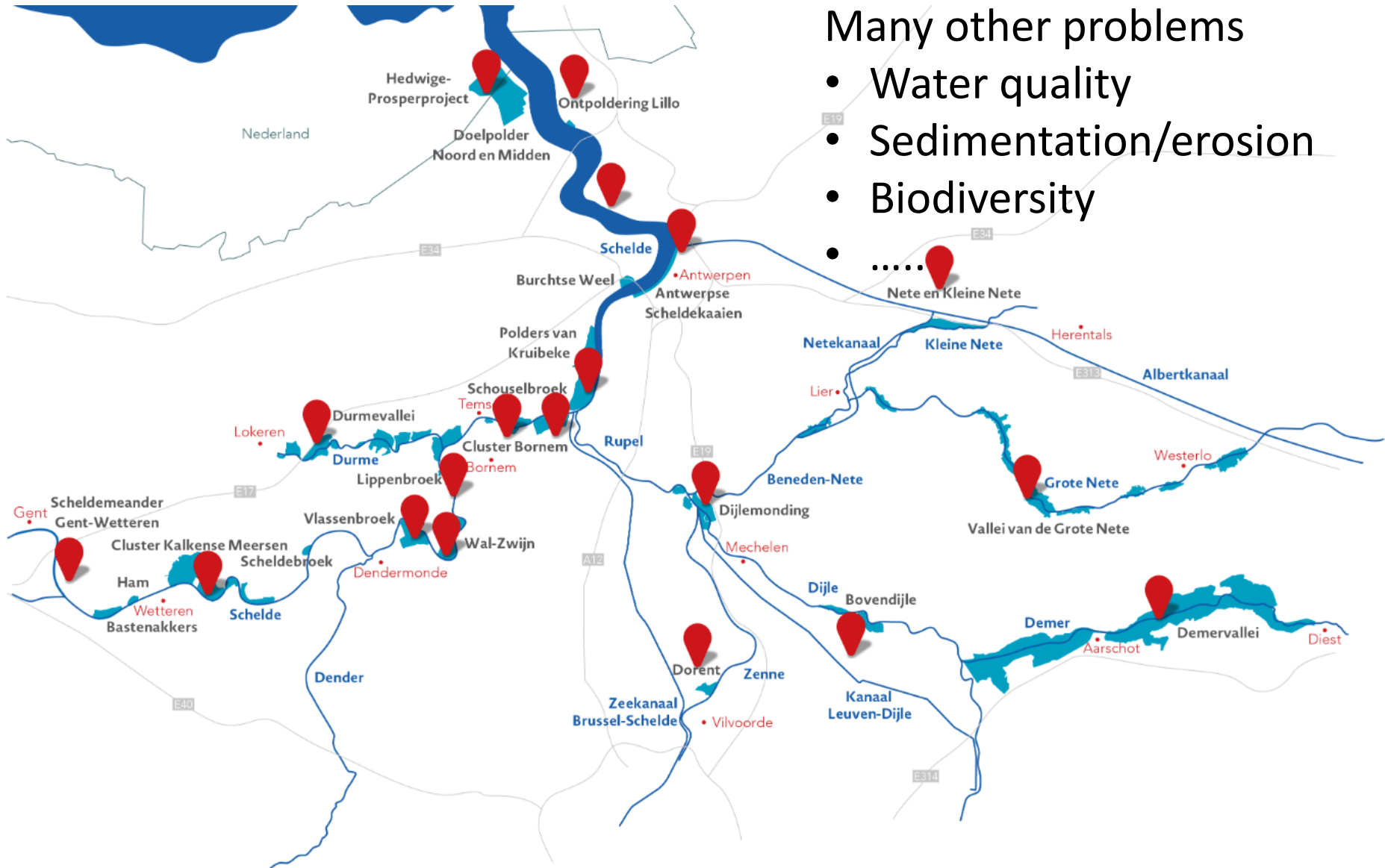
Biologist by formation and we used the ecosystem service concept as a key concept in developing an integrated management plan for the Schelde estuary and parts of the coastal zone with emphasis on quantification of ES.



Management based on ecosystem services



Sigma plan

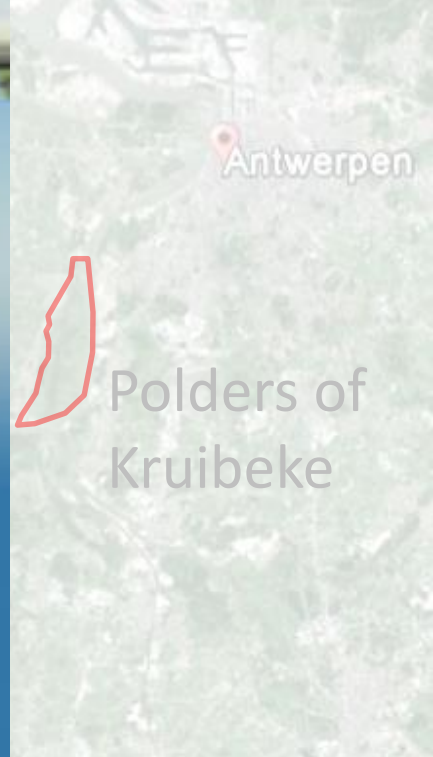


Flood protection

Many other problems

- Water quality
- Sedimentation/erosion
- Biodiversity
-

Sigmaplan e.g. Polders of Kruibeke



Step 1: What are the effects of the project

FLOOD PROTECTION



100 M€ (600 ha)
(until 2100)

FOOD PRODUCTION: LIVESTOCK



237 ha

FOOD PRODUCTION: CROPS



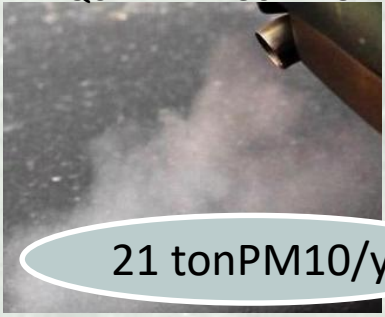
- 600 ha

WOOD PRODUCTION



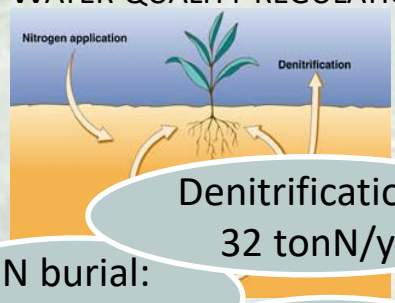
640 m³/y
(annual productivity)

AIR QUALITY REGULATION: FINE DUST CAPTURE



21 tonPM10/y

WATER QUALITY REGULATION

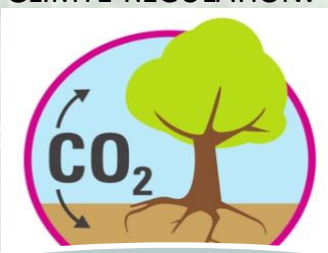


Denitrification:
32 tonN/y

N burial:
7.8 tonN/y

P burial:
0.5 tonP/y

CLIMATE REGULATION: CO₂ SEQ.



5,000 tonCO₂/y

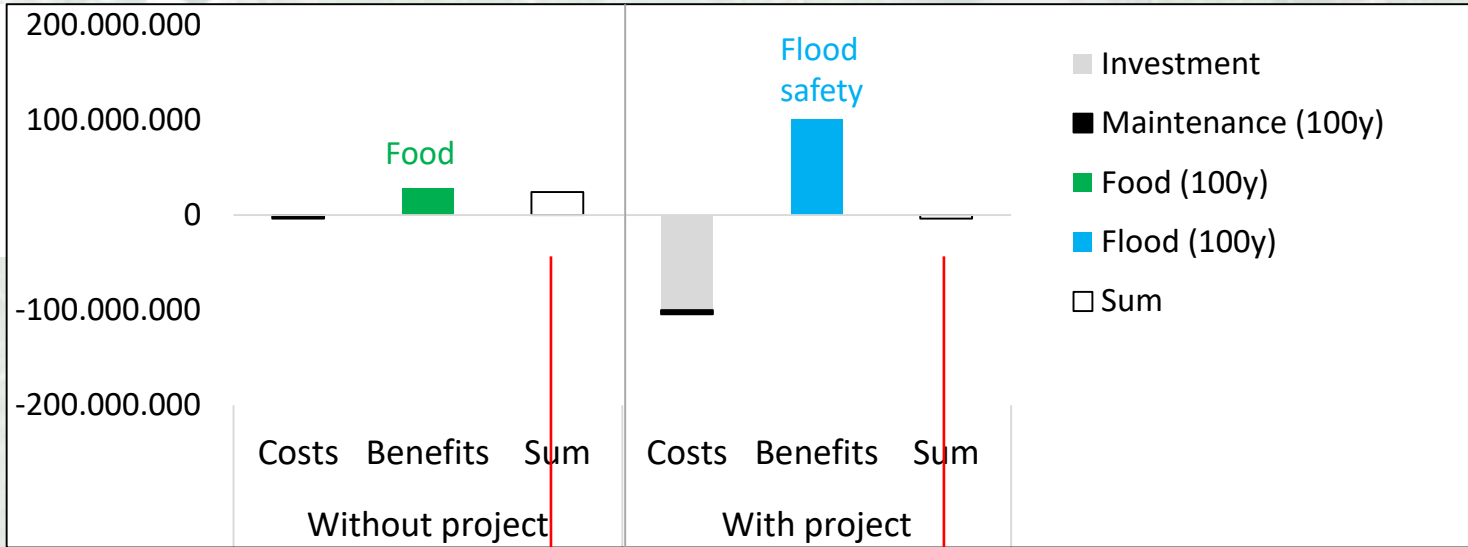


Boerema et al. 2015, Terra et Aqua nr. 41

Step 2: Cost-efficient project (benefits > costs)?

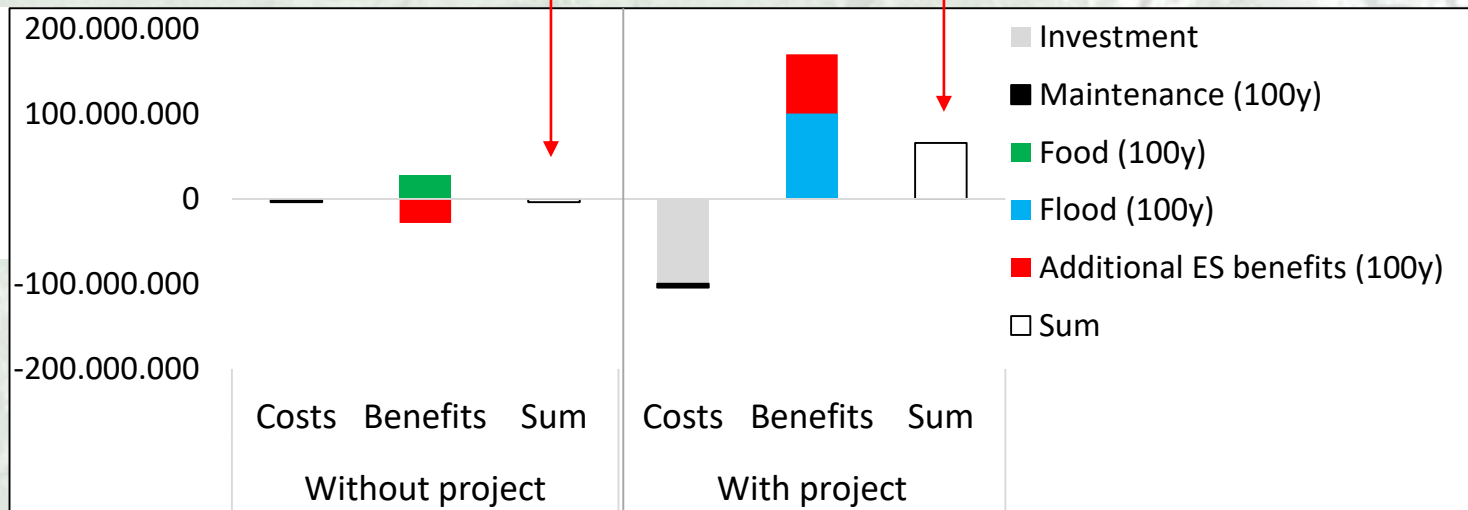
Without ES benefits

€



+additional ES benefits

€





Total cost:
±100 million euro

BEFORE

Polder

Positive effects

= Costs

But, also negative effects
(e.g. emissions)

= Benefits

After

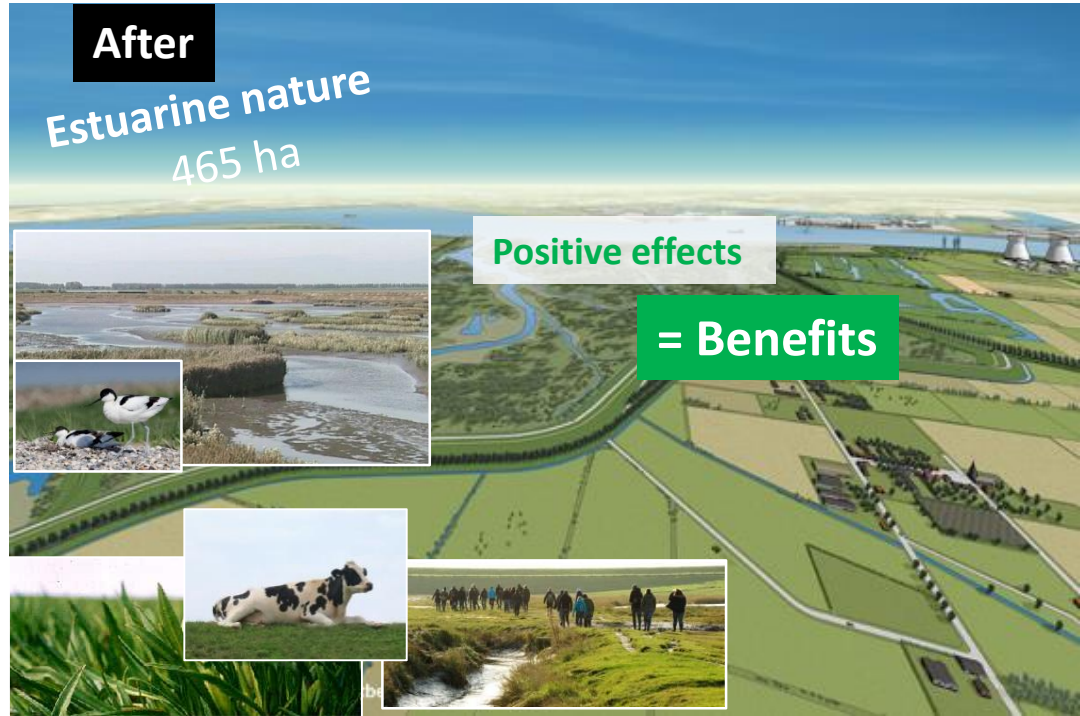
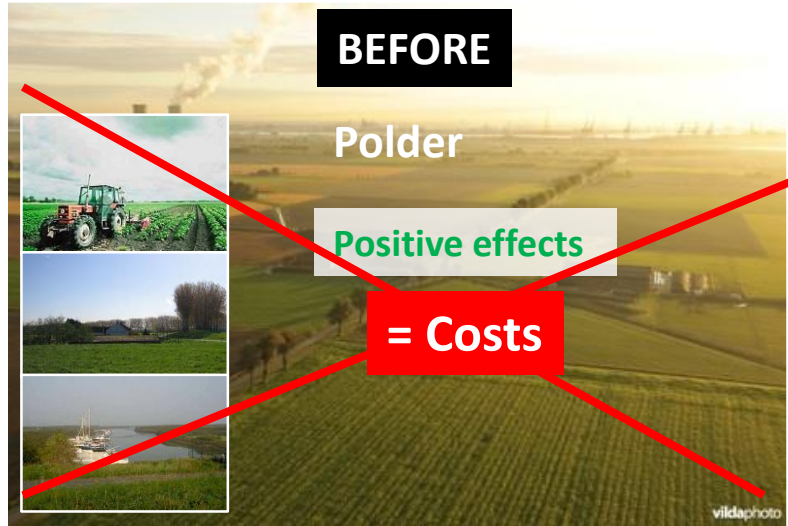
Estuarine nature
465 ha

Positive effects

= Benefits

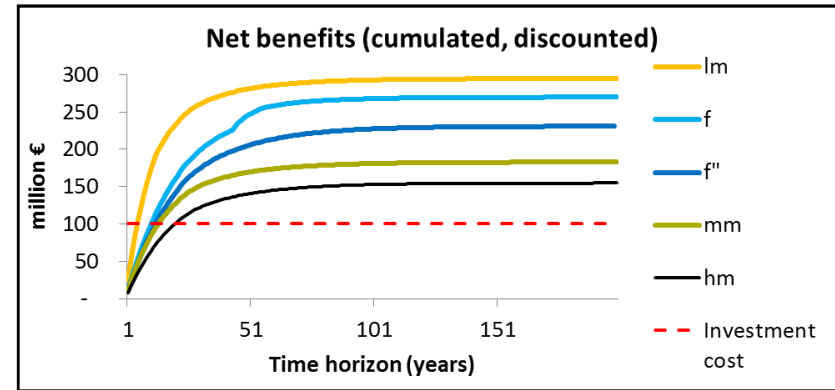
But, also negative effects
(e.g. emissions)

= Costs

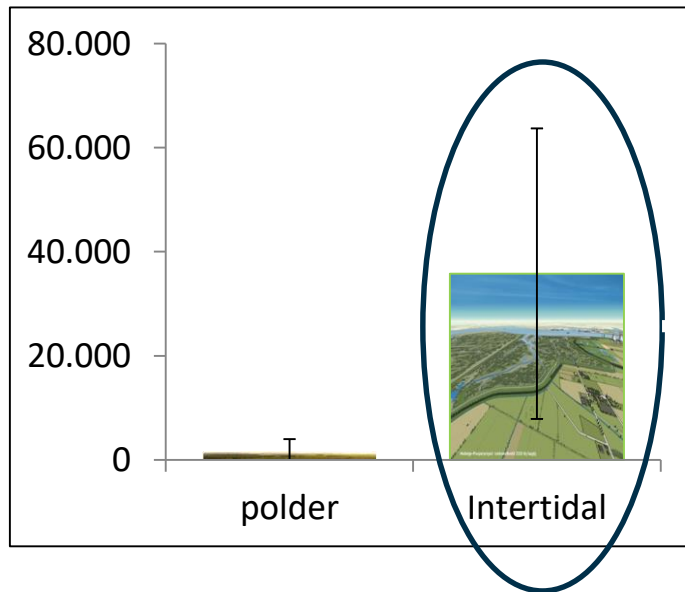




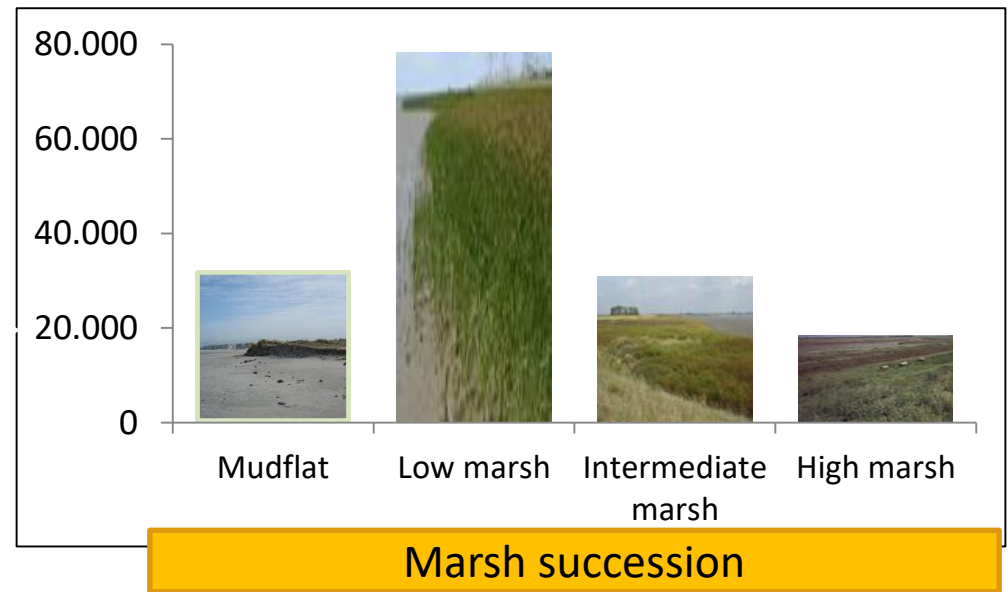
Impact on net benefits of different marsh succession trajectories



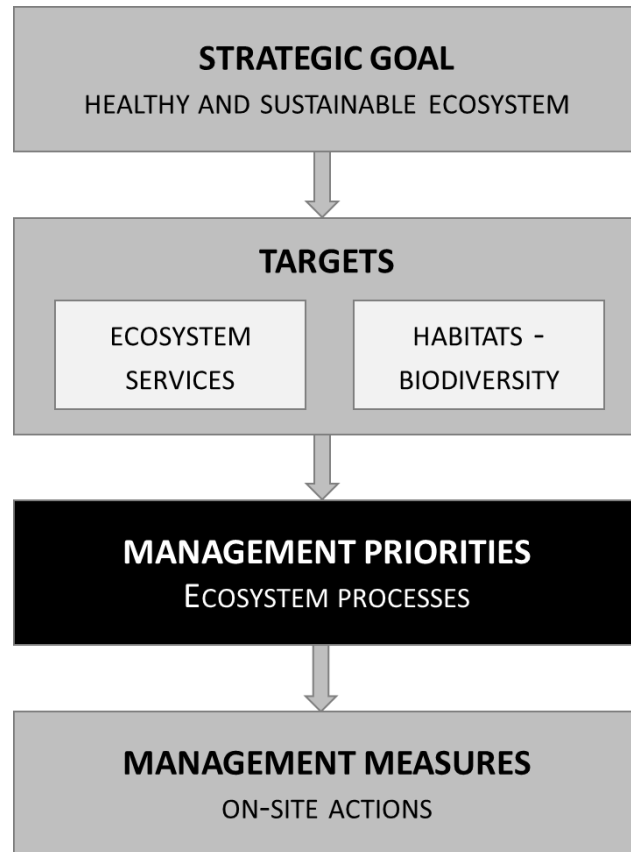
Annual benefit (€/ha/y)



€/ha/y



Matrix tool vision coast



Conclusions

1. What is needed?

Development of sustainable management should start from a mismatch between demand and supply of ES

Define objectives for ES

2. What processes and habitats deliver the ES?

Impact of sustainable management on ES through changes in habitats and ecosystem processes

3. Benefits for society?

Cost-benefit analysis to compare between management alternatives and incorporate ES benefits





Thanks for your attention