

Potential contribution of commercial fish production to aquatic biodiversity conservation in large pond areas



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Departement
Aquatische
Ecologie

History

Intensification of farming practices:

- Increased farming of carp
- Higher fish biomass standing stocks
- Addition of feeds and fertilisers
- Protection against cormorant predation

Potential threat for :

- Quality of the environment
- Biodiversity
- Various ecosystem services



Vijvergebied Midden-Limburg (België)

- “The Lake area of Belgium” (Hermy, 1993) (>1000 ponds)
- Origins:
 - Peat harvests (1851 -1900)
 - Construction of fish ponds (20 century)
- Hotspot for biodiversity
 - Natura 2000 (Habitat type 3110, 3130 en 3150)
 - Unique aquatic flora
 - Rare amphibians, birds...



Solution for the problems?

A ban on fish farming:

- Expensive
- Loss of an economic sector in the region
- Without management
 - Degradation of ponds
 - Los of valuable ecosystems

Management aims

- Maximizing the potential for biodiversity
- while safeguarding viability of farming companies



Aims of this study



Pieter Lemmens

Develop a strategy improving the

- ecological** sustainability of fish farming
- economic** sustainability of nature conservation

Conservation of nature value,

- Not only at the level of individual ponds
- but on the regional scale, i.e. the entire pond area
- for multiple organism groups simultaneously

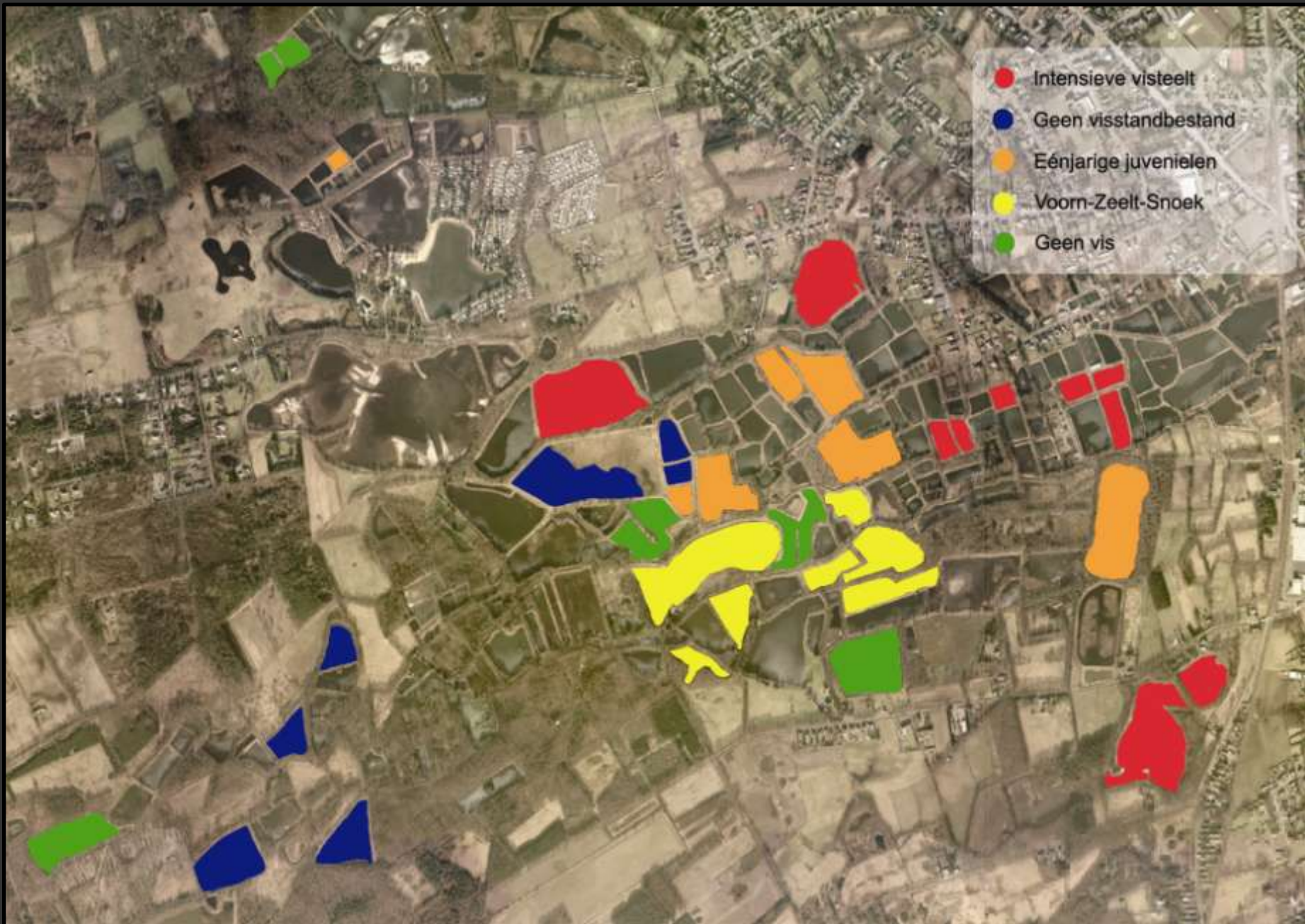


Field study

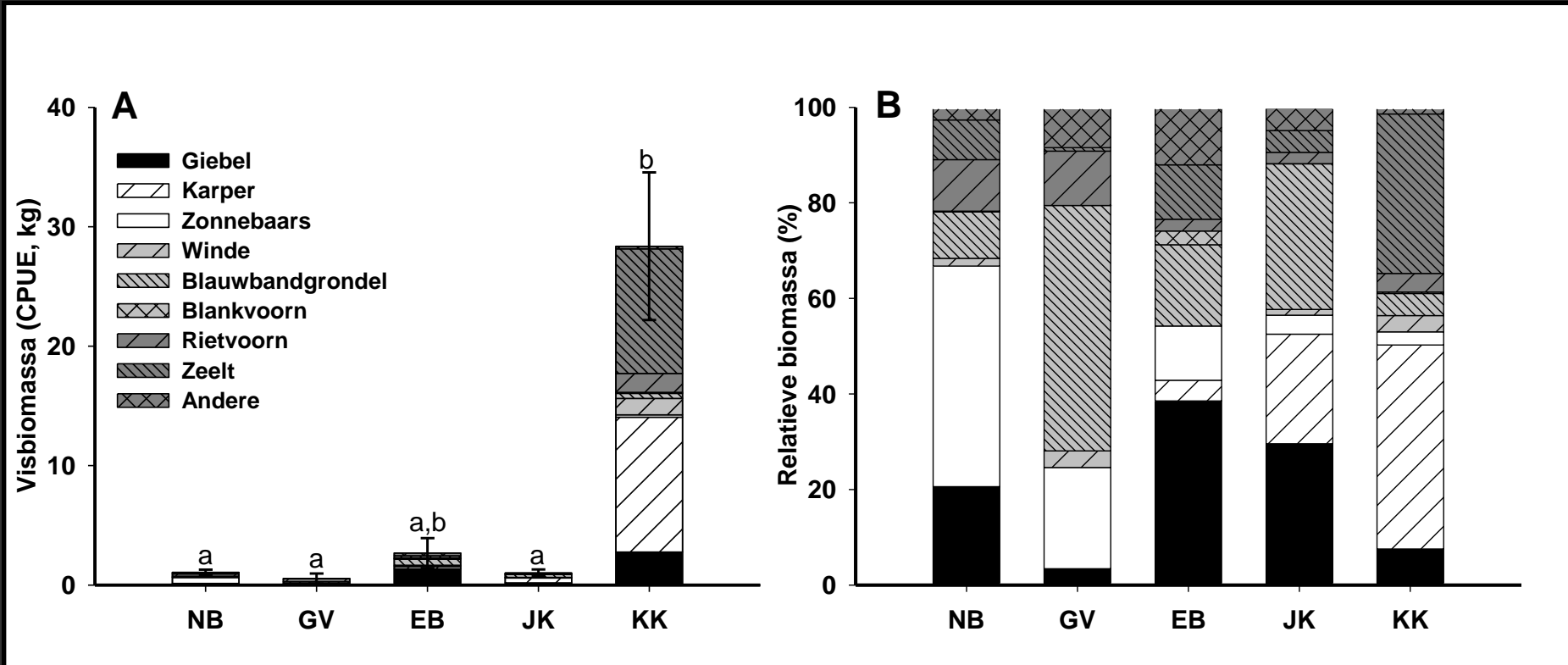
Relationship between management practices and nature values

- No fish (GV)
- No management (NB)
- Low intensity management (EB)
- Farming of juvenile cyprinids (JK)
- Carp farming (KK)

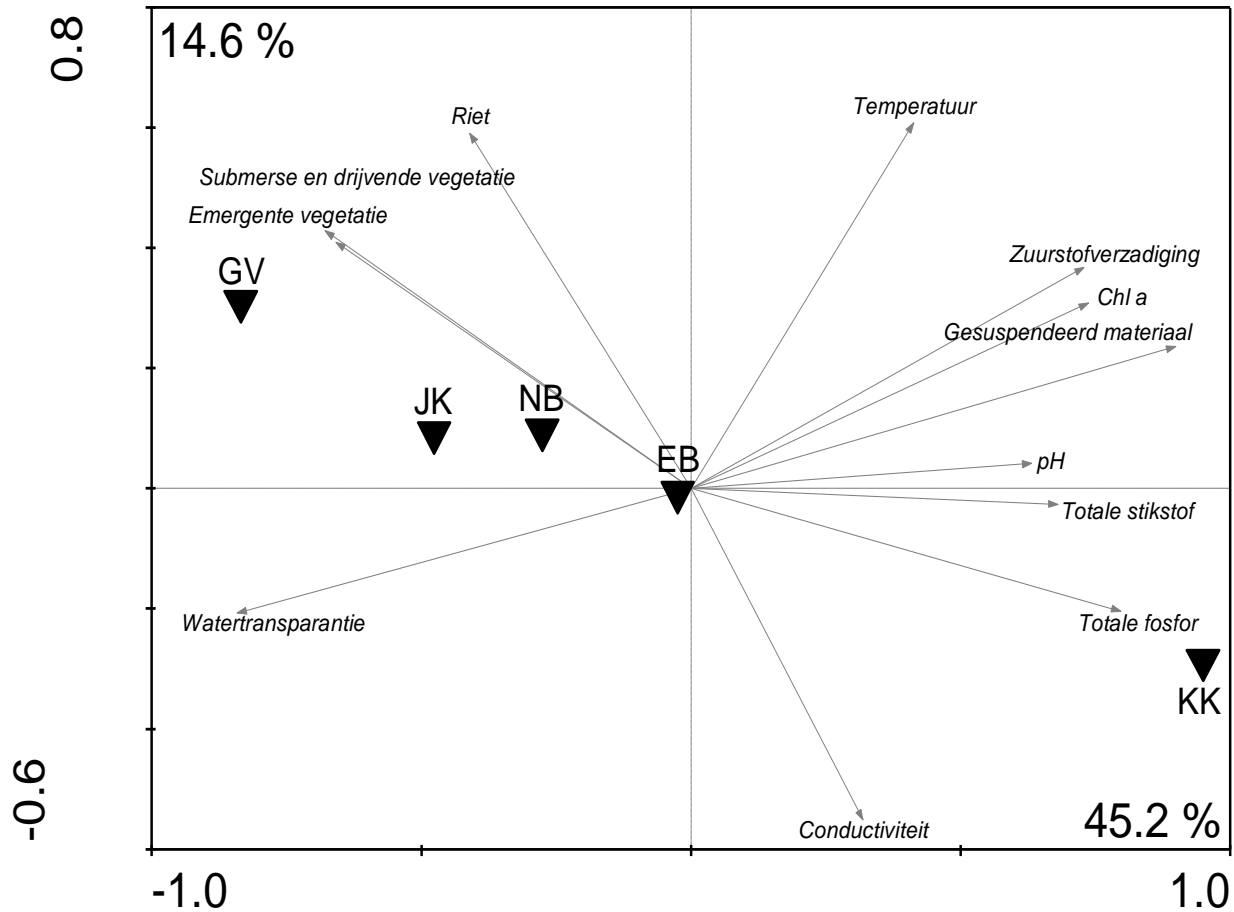




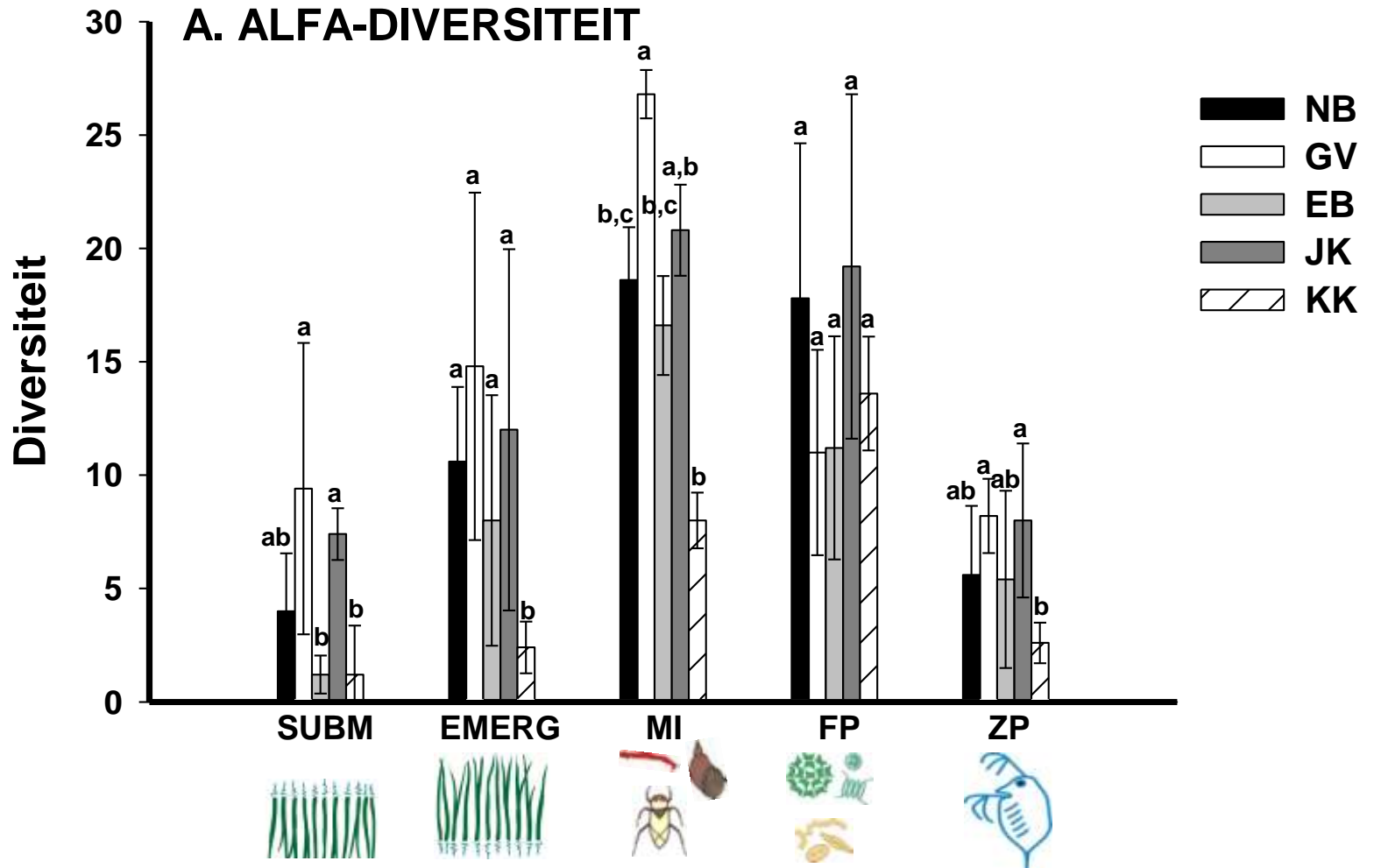
Field study: fish communities



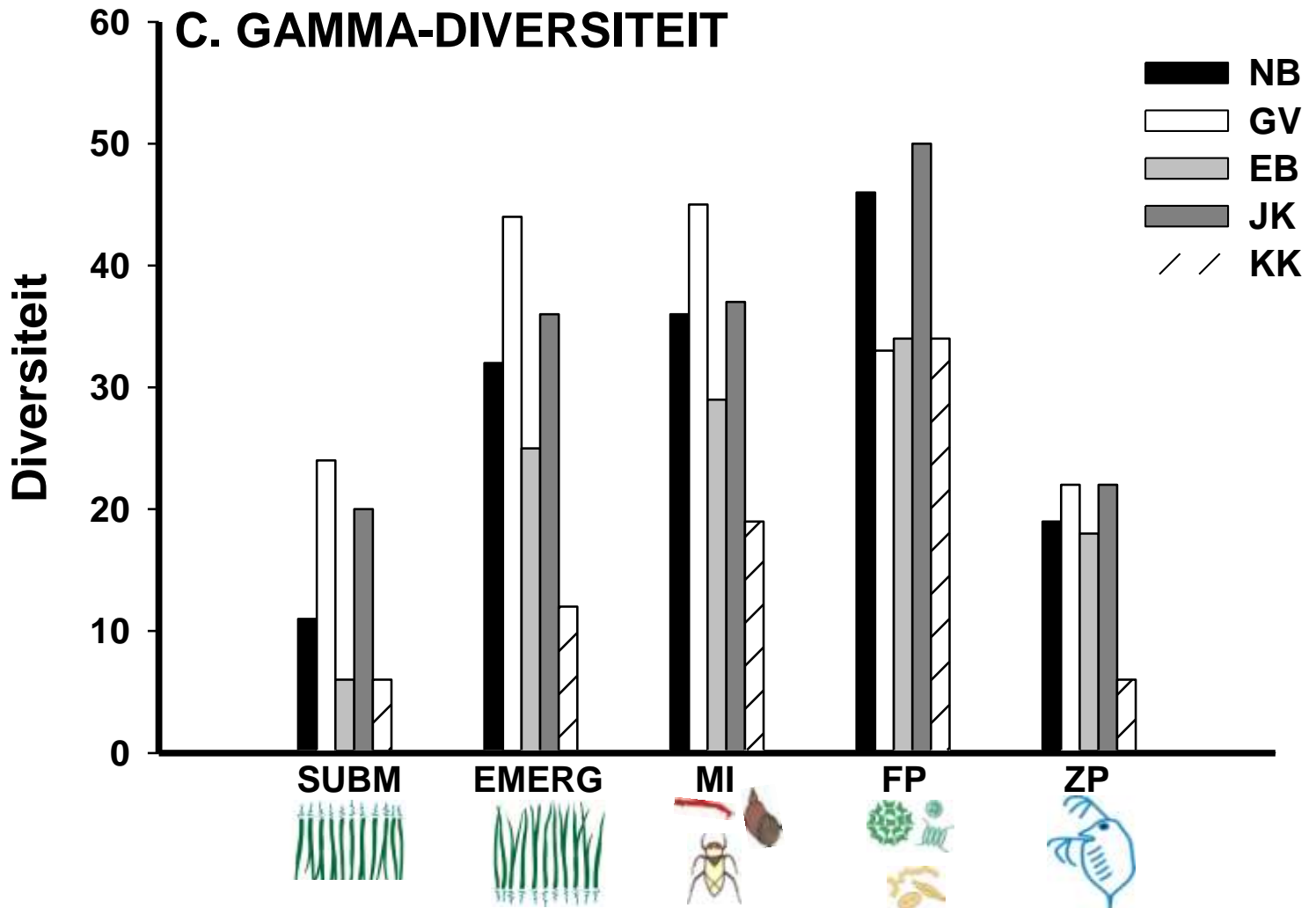
Field study: environmental variables



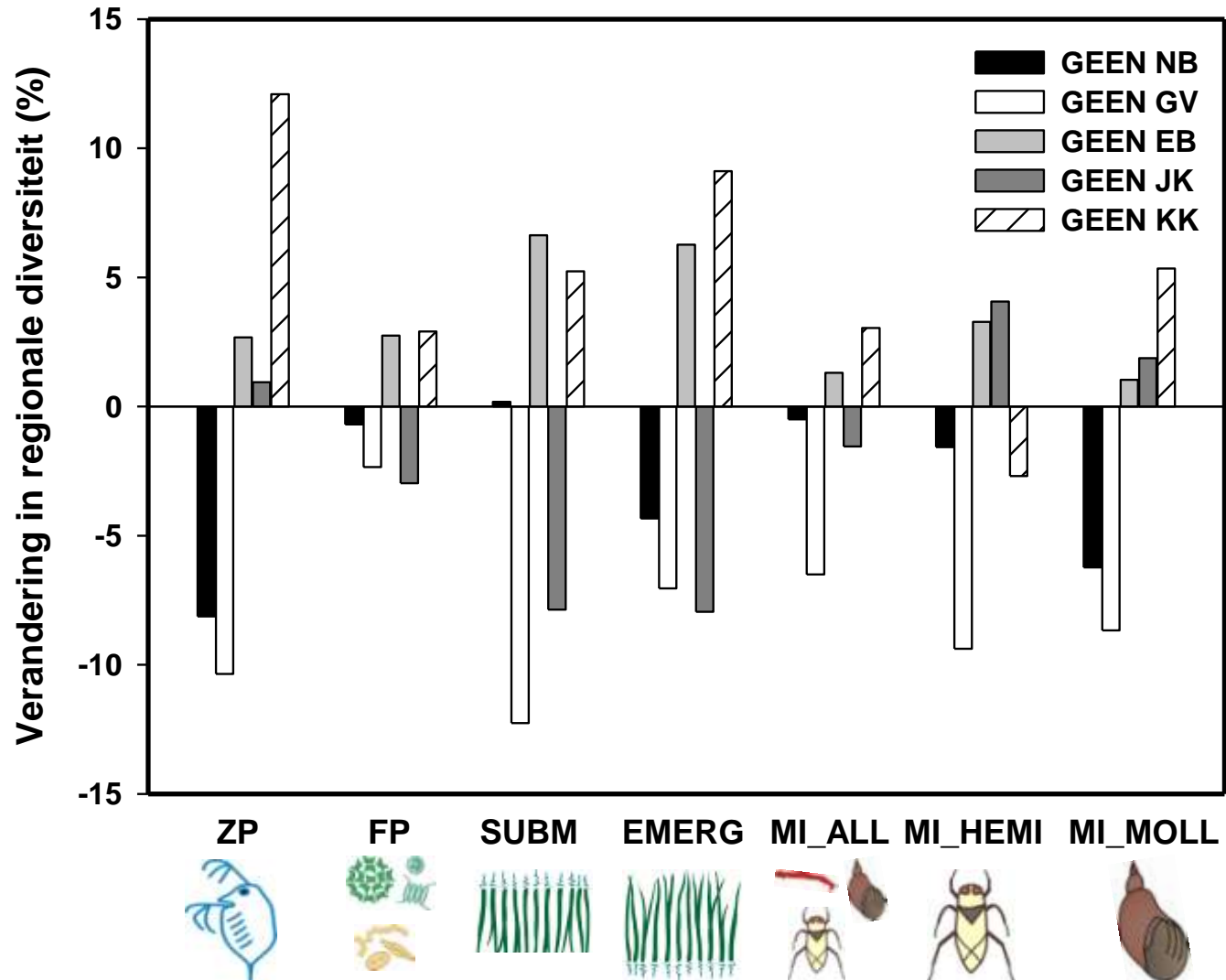
Field study: diversity



Field study: diversity



Contribution of management types to regional diversity



CONCLUSIONS

No management (NB)

- Very cheap
- Relatively high diversity for several organism groups

BUT... on longer term

- Not sustainable, cf. filling in



CONCLUSIONS

No Fish (GV)

- Very good ecological quality
- Highest score for local as well as regional diversity

Farming of juvenile cyprinids (JK)

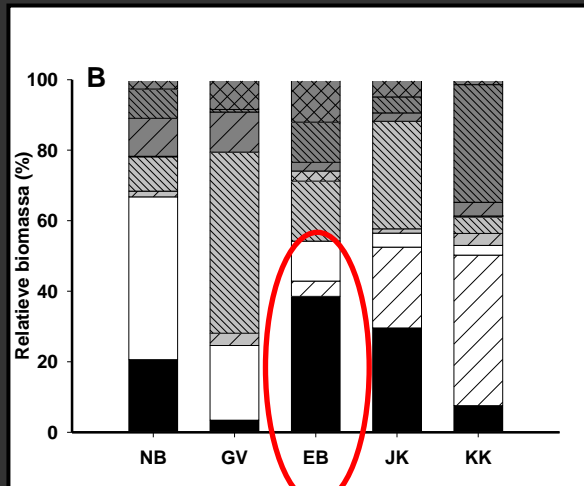
- High ecological quality with clear water and high macrophyte coverage
- Good score for local and regional diversity



CONCLUSIES

Low intensity management (EB)

- Surprisingly low ecological quality and biodiversity
- Probably does not reflect initial stocking
- Most probably result of insufficient draining, leading to dominance of Prussian carp (*Carassius gibelio*)



CONCLUSIONS

Implications for management:

- Draining of ponds has to be complete
- Let ponds stand completely dry for a while
- Avoid immigration of unwanted fish from rivulets



CONCLUSIES

Intensive carp farming (KK)

- Unfavourable state (blooms of cyanobacteria,...)
- Very low nature values (local and regional)
as result of :
 - Bottom resuspension by carp
 - Internal eutrophication
 - Loss of macrophytes
 - Eutrophication as result of feeding



EXPERIMENT: design

- 24 former farm ponds
- 4 fish communities with different functional composition (100 kg/ha)

A) Planktivores (PL)



B) Benthivores (B)



C) Planktivores + Benthivores (PL+B)

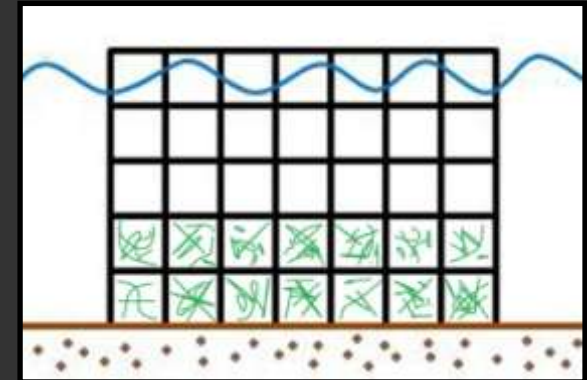


D) Planktivores + Benthivores + Piscivores (PL+B+Pi)

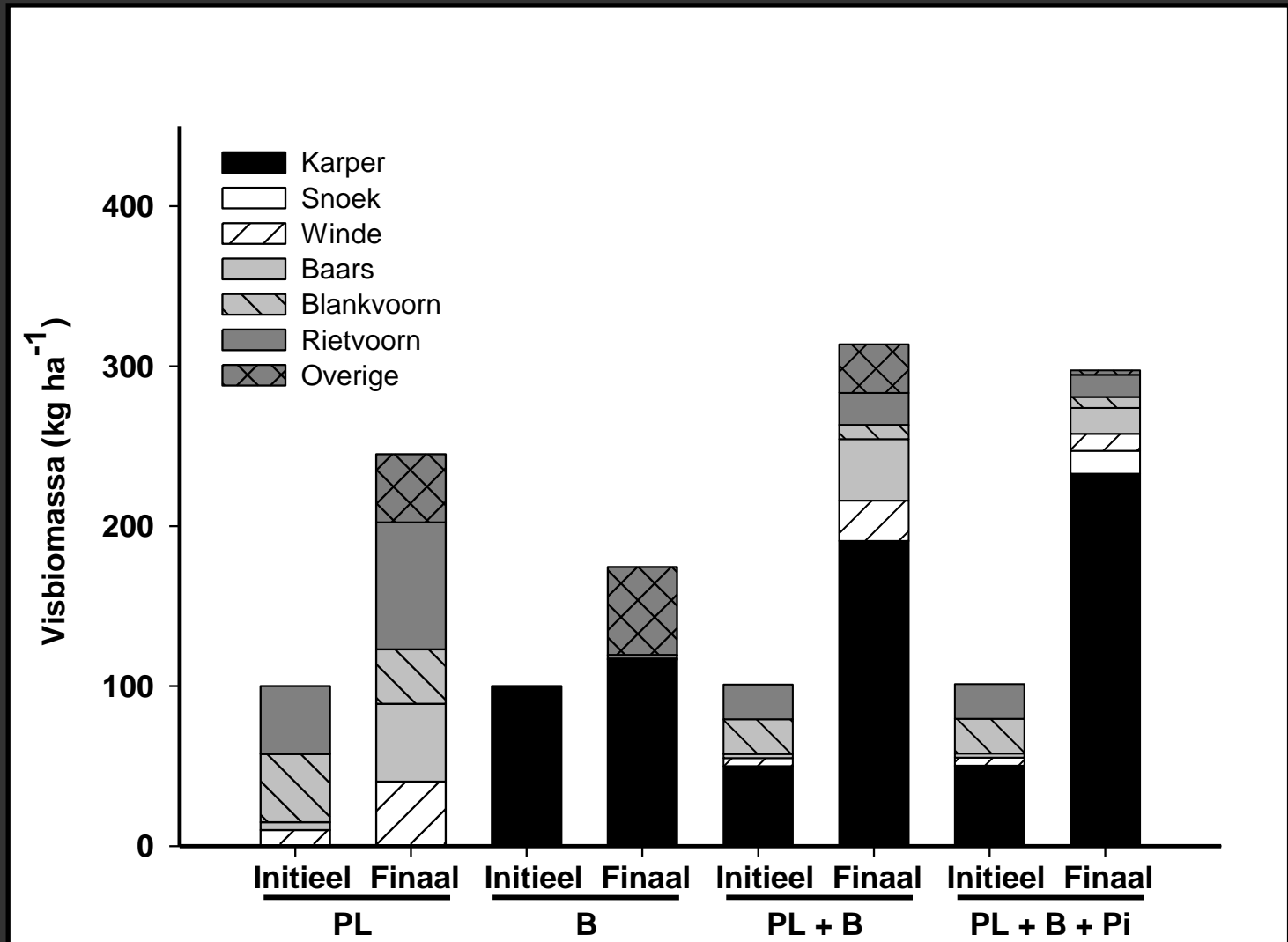


EXPERIMENT: design

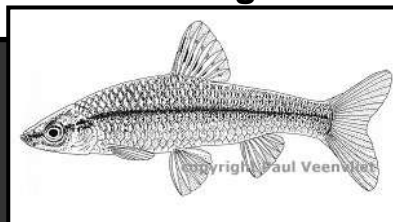
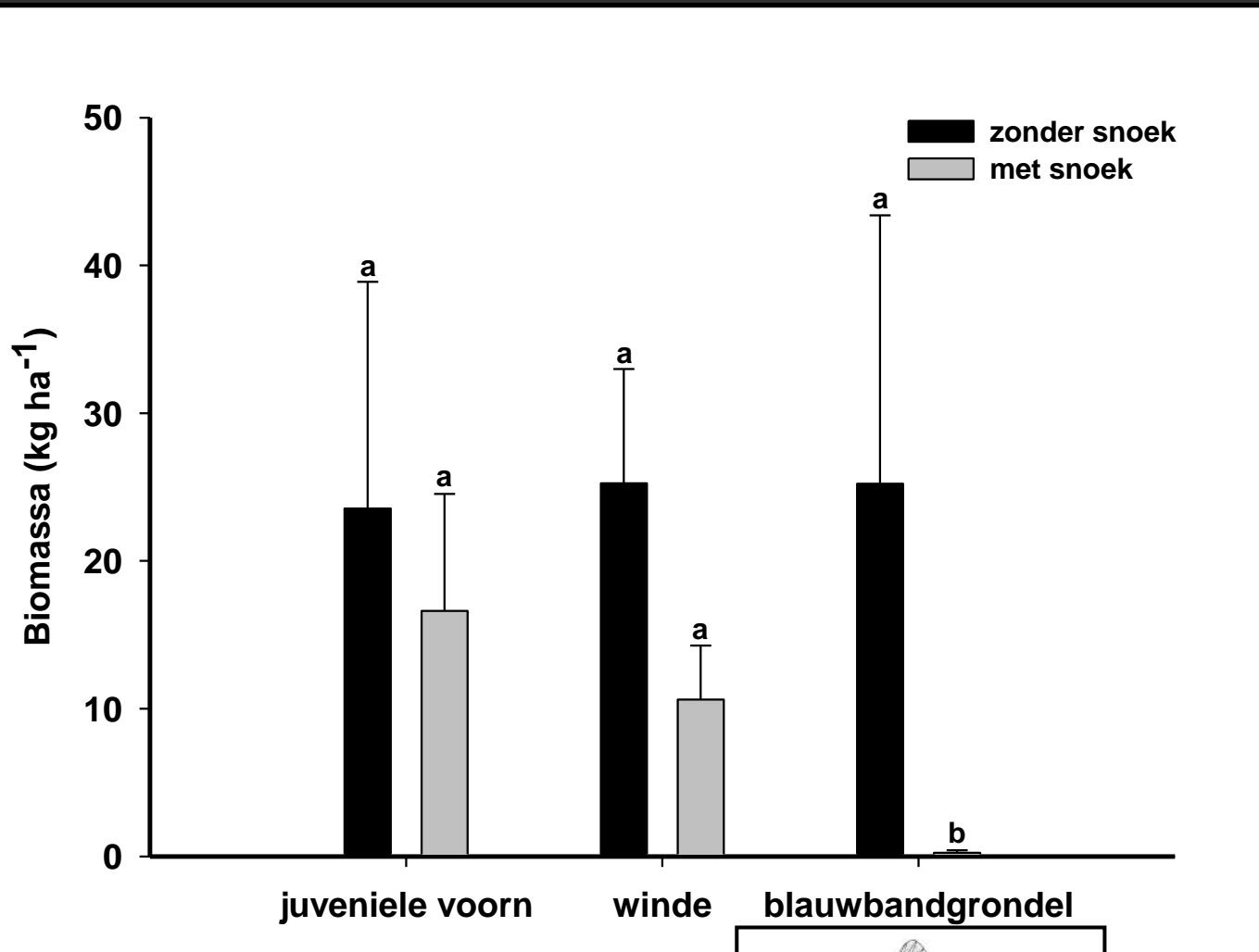
- Half of the ponds covered with refuges against cormorants (5% of total surface)



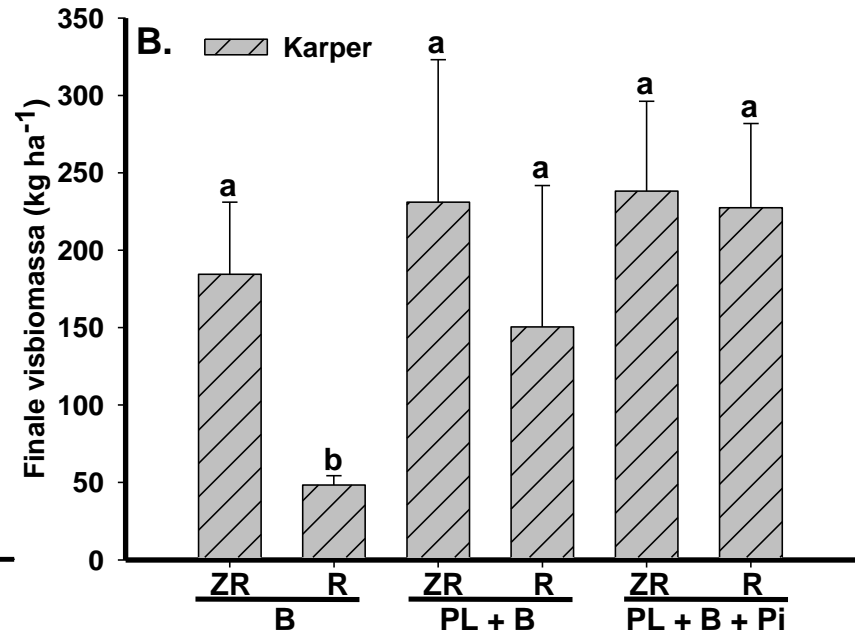
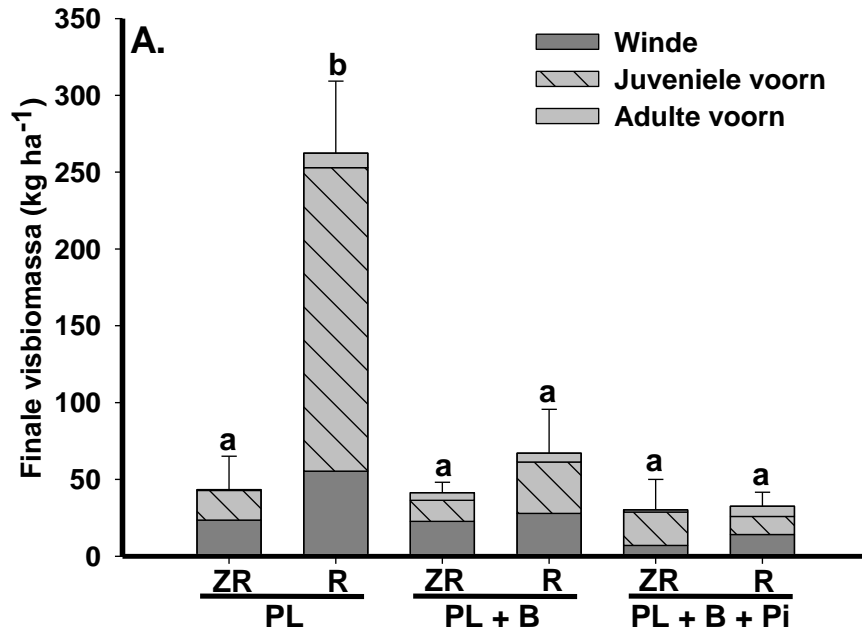
RESULTS: fish community composition



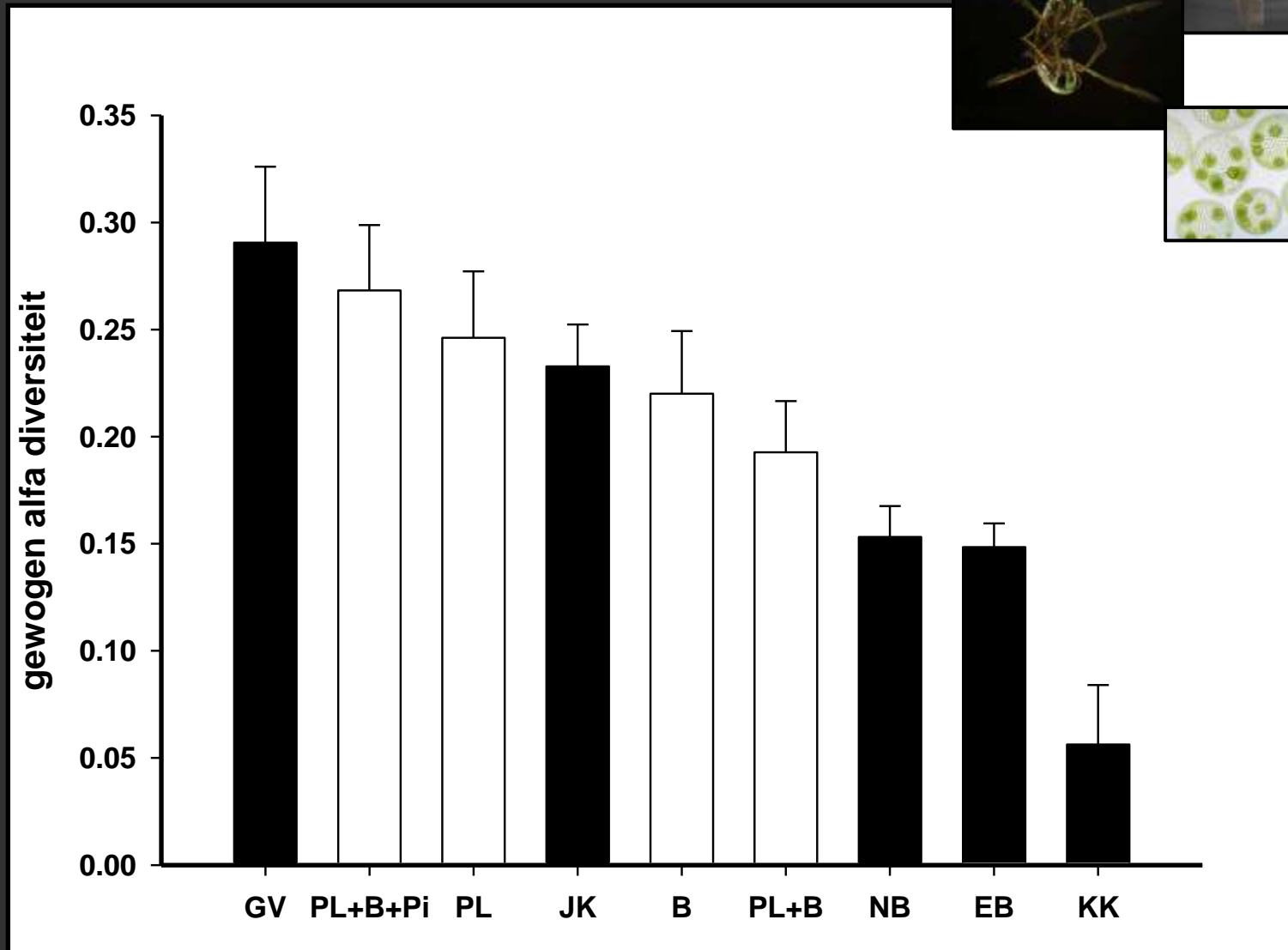
RESULTS: effect of pike



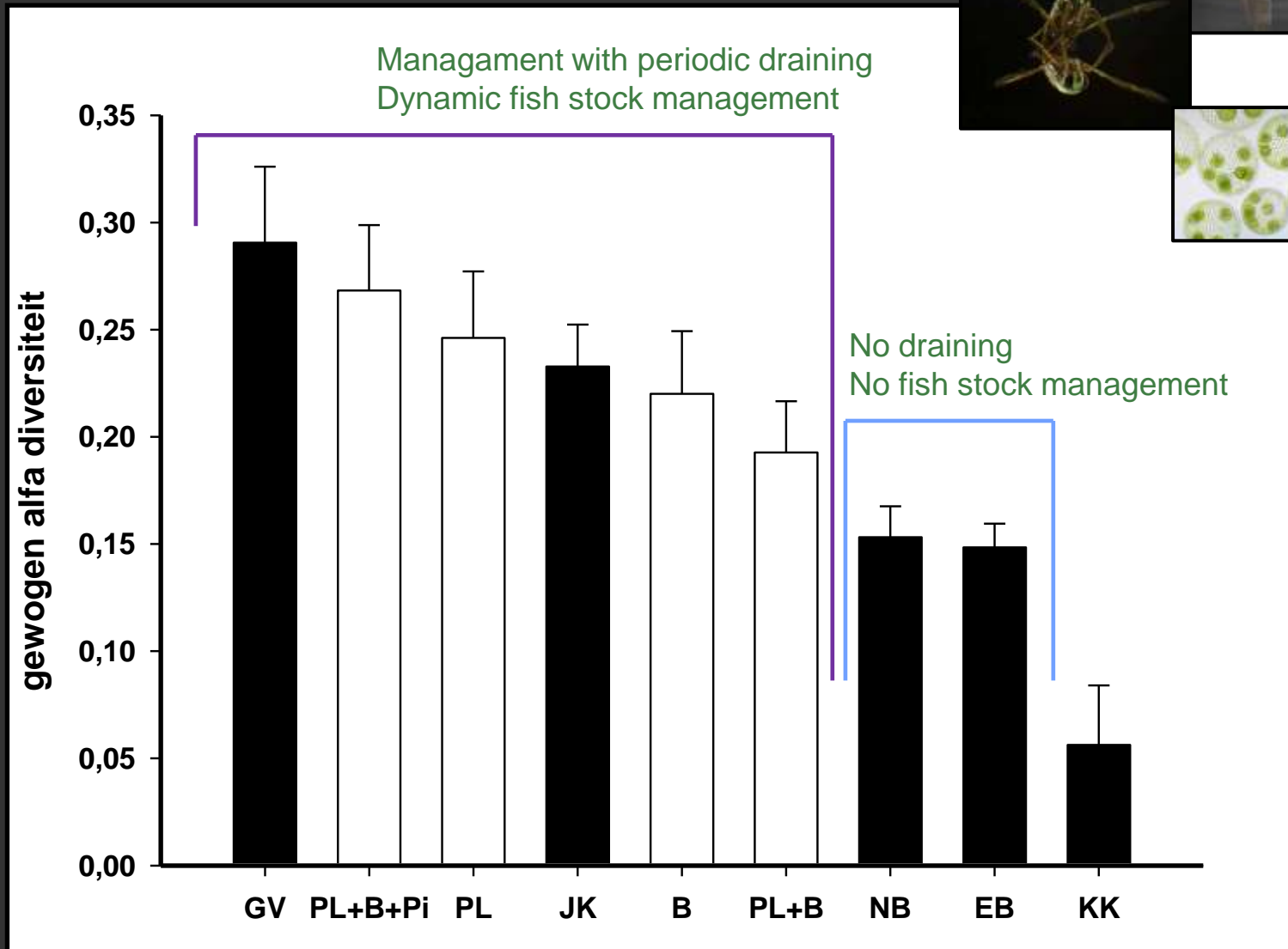
RESULTS: effect of refuges



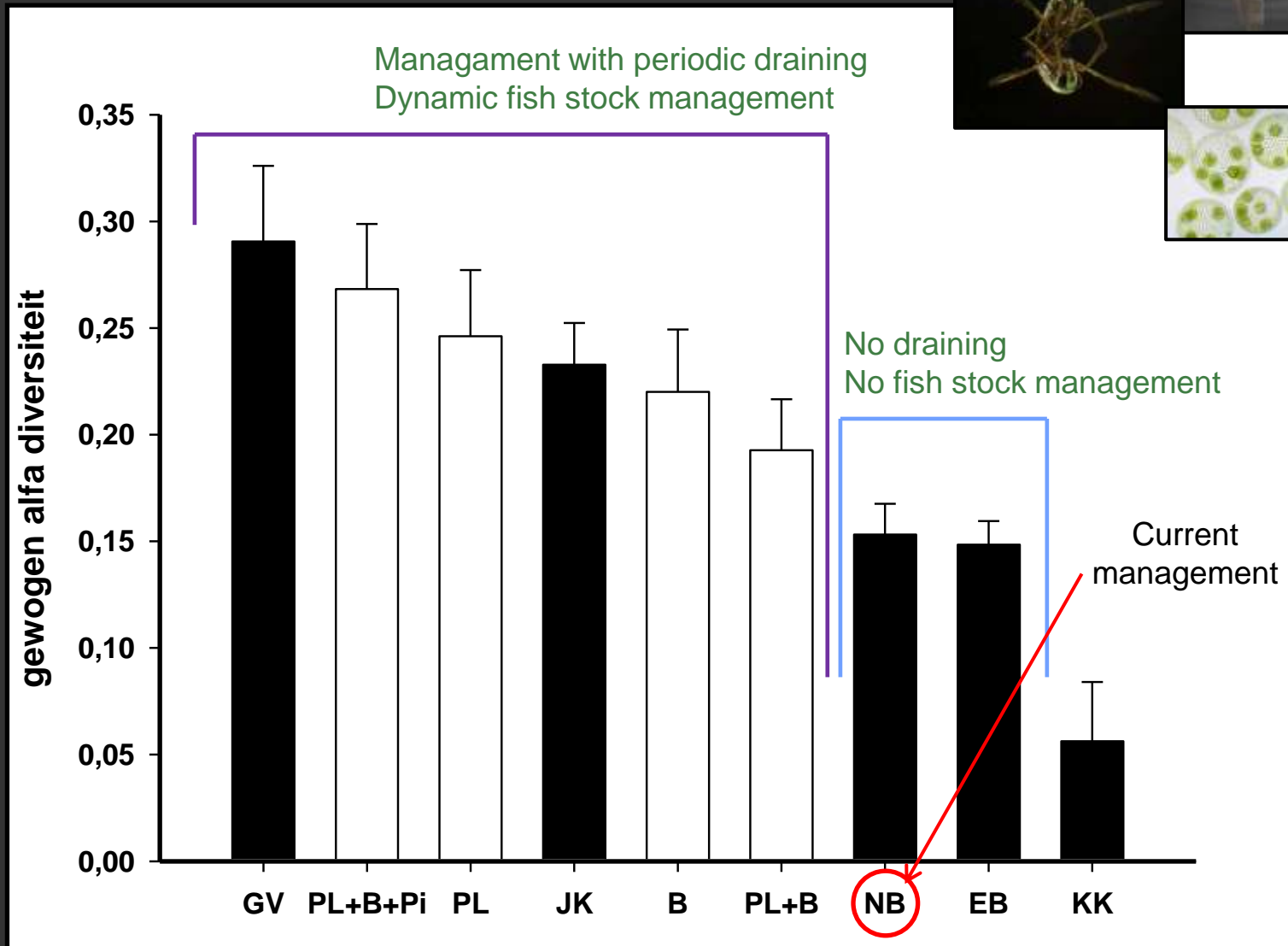
Evaluation of management types



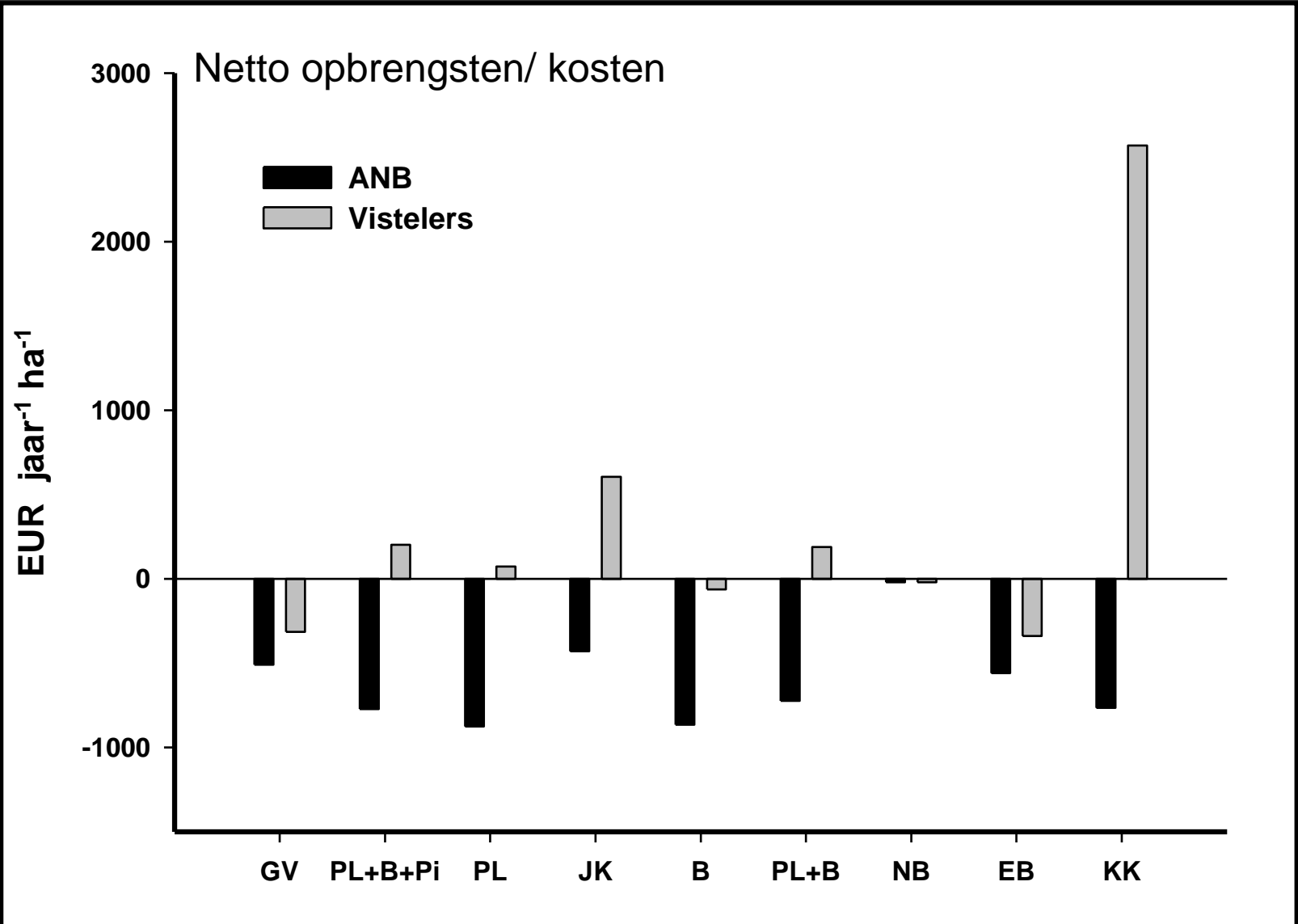
Evaluation management types



Evaluation management types



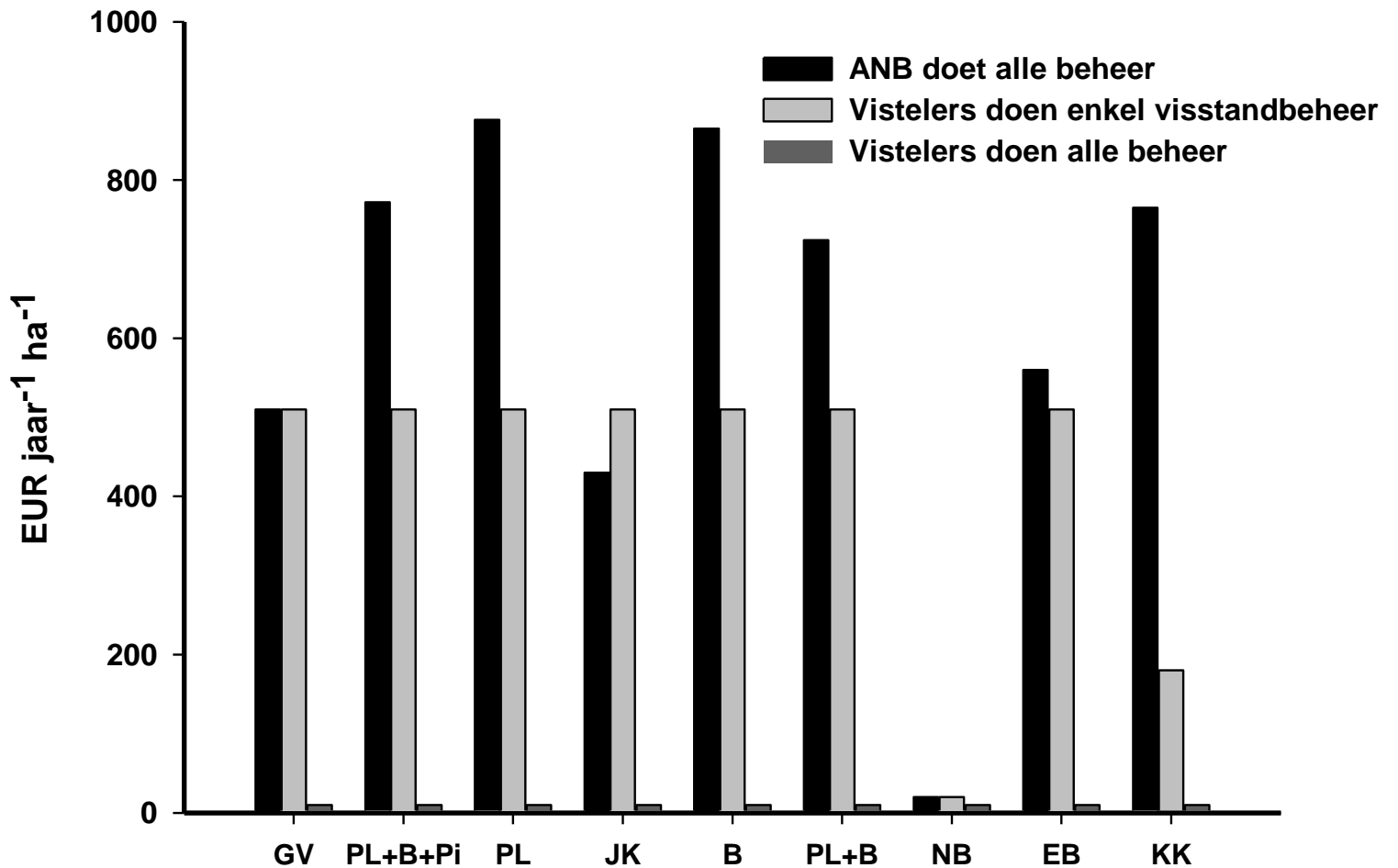
Economic evaluation



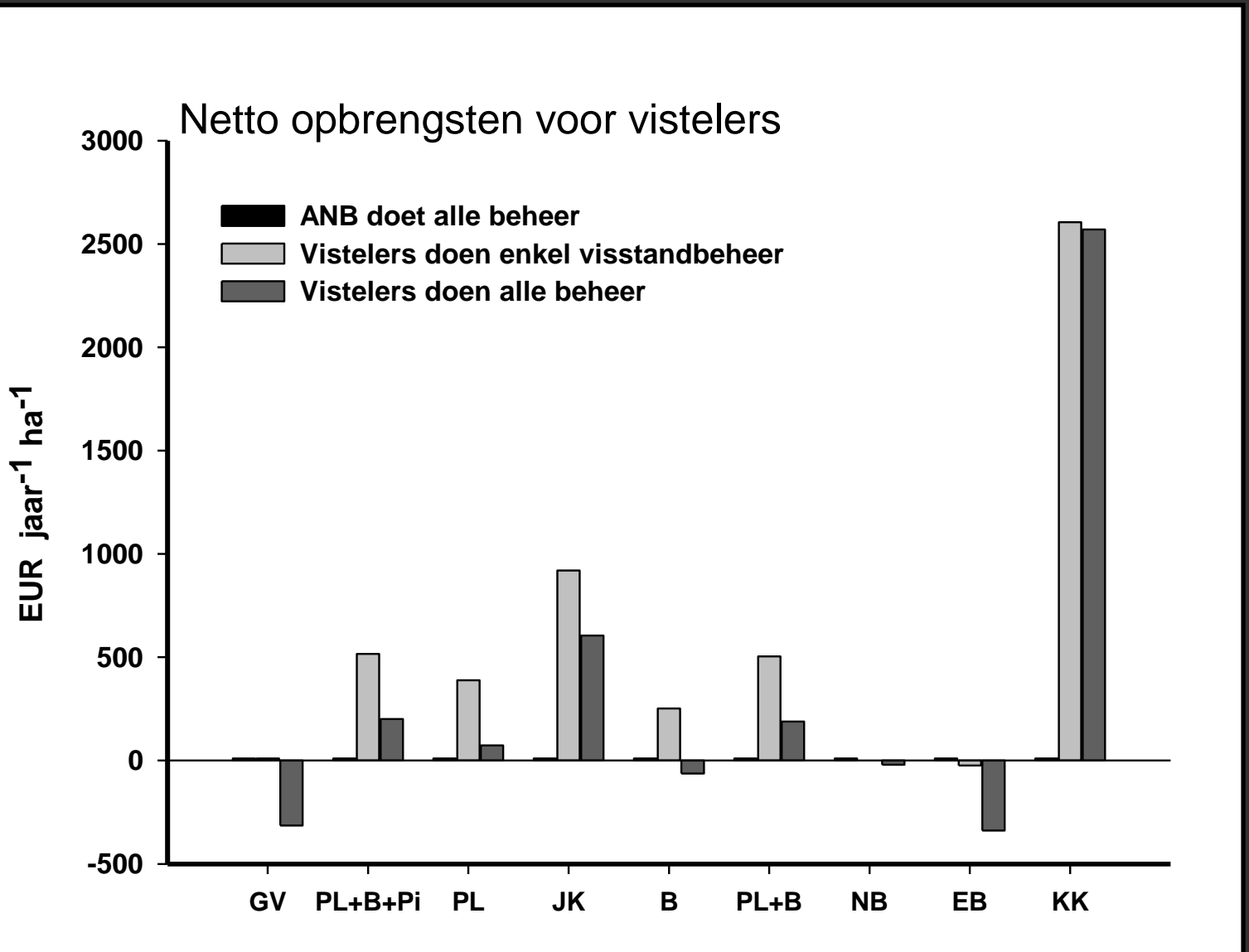
Economic evaluation



Beheerkosten voor ANB



Economic evaluation



Conclusions

Ponds in property of the government (ANB):

- present management is not effective
- Proposed solution: give management of ponds back to fish farmers, under strict conditions:
 - no feeding, no fertilization
 - periodic draining
 - limited stocking in terms of biomass
- This will
 - lower management costs for government
 - lead to more effective conservation of aquatic biodiversity
 - strengthen the companies: lower efficiency but higher total yields



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The fish famers



Sponsors

