

5^e eutrofiëringsenquête

wat is er gaande in het water?

Roelf Pot



Roelf Pot onderzoek- en adviesbureau

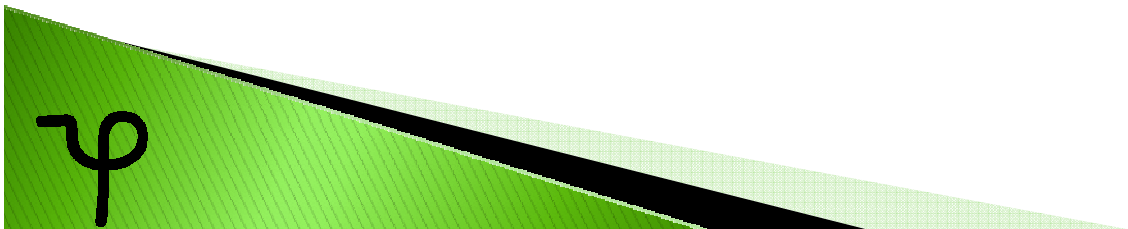
Eutrofiëringsenquête

- ▶ Onderzoek naar de Toestand en de Trends in de waterkwaliteit van de Nederlandse meren.
- ▶ Trofie-parameters:
 - Chlorofyl
 - Doorzicht
 - Totaal-P
 - Totaal-N
- ▶ Biologische kwaliteitselementen (sinds KRW mogelijk):
 - Fytoplankton (bloeien en chlorofyl)
 - Macrofyten (soortensamenstelling, abundantie groeivormen)
 - ~~Fytobenthos (diatomeeën-index)~~
 - Macrofauna (verhouding DomPos, DomNeg, Karak)
 - Vissen (verhouding gilden)



Eerdere versies

- ▶ 1976: Schets van de eutrofiëringssituatie van het Nederlandse oppervlaktewater en overzicht van de onderzoeksactiviteiten van de verschillende waterkwaliteitsbeheerders (CUWVO)
- ▶ 1980: Ontwikkeling van grenswaarden voor doorzicht, chlorophyl, fosfaat en stikstof (CUWVO)
- ▶ 1988: Vergelijkend onderzoek naar de eutrofiering in Nederlandse meren en plassen (CUWVO)
- ▶ 1997: Trendanalyse eutrofiëringstoestand van de Nederlandse meren en plassen (Portielje & Van der Molen)
- ▶ 2007: Heldere meren in Nederland in 2015: droom of werkelijkheid? (Hosper, Portielje & Lammens in H₂O)



Aan het werk



Foto: Harry Hosper

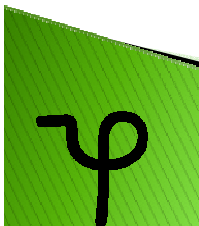
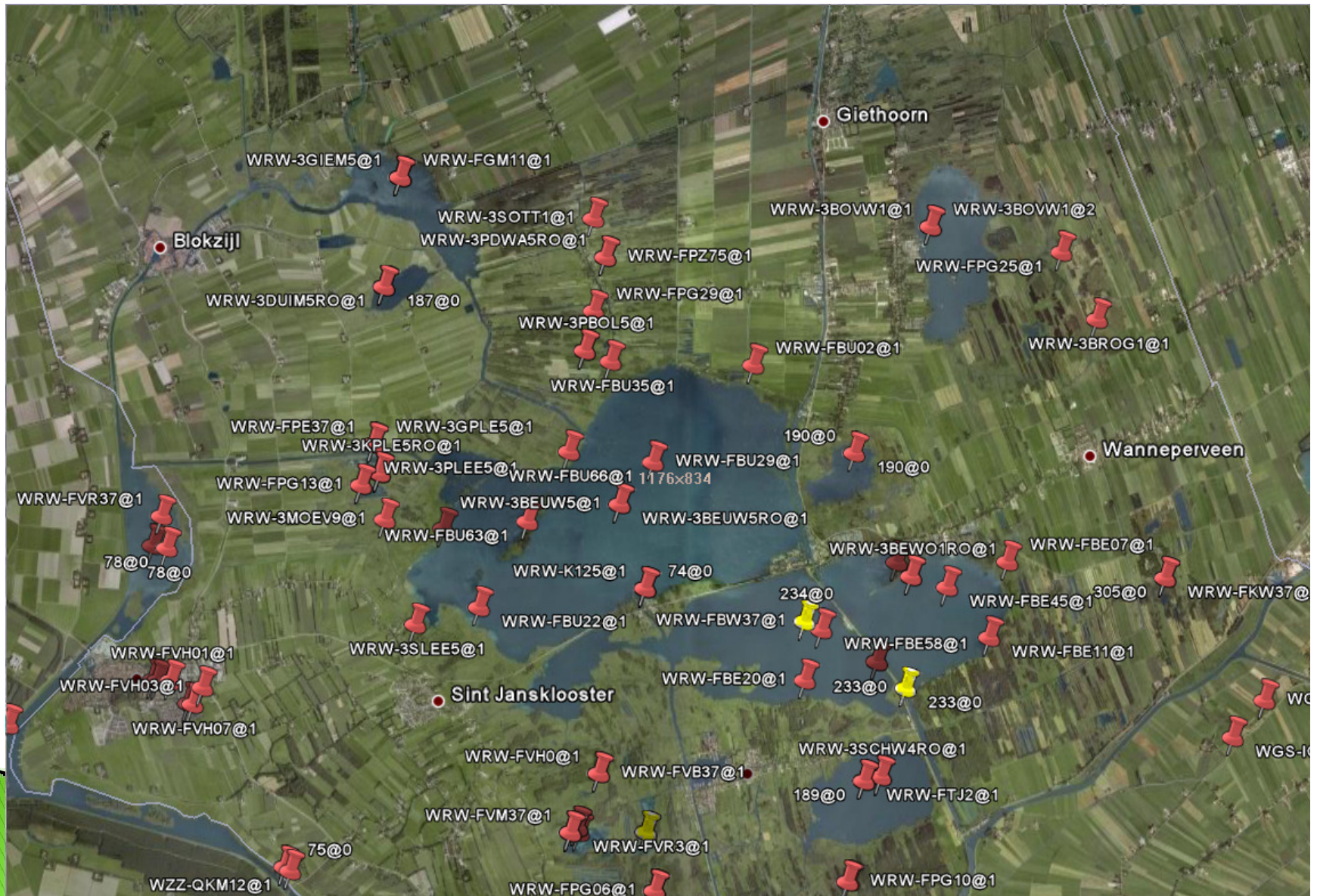
ψ

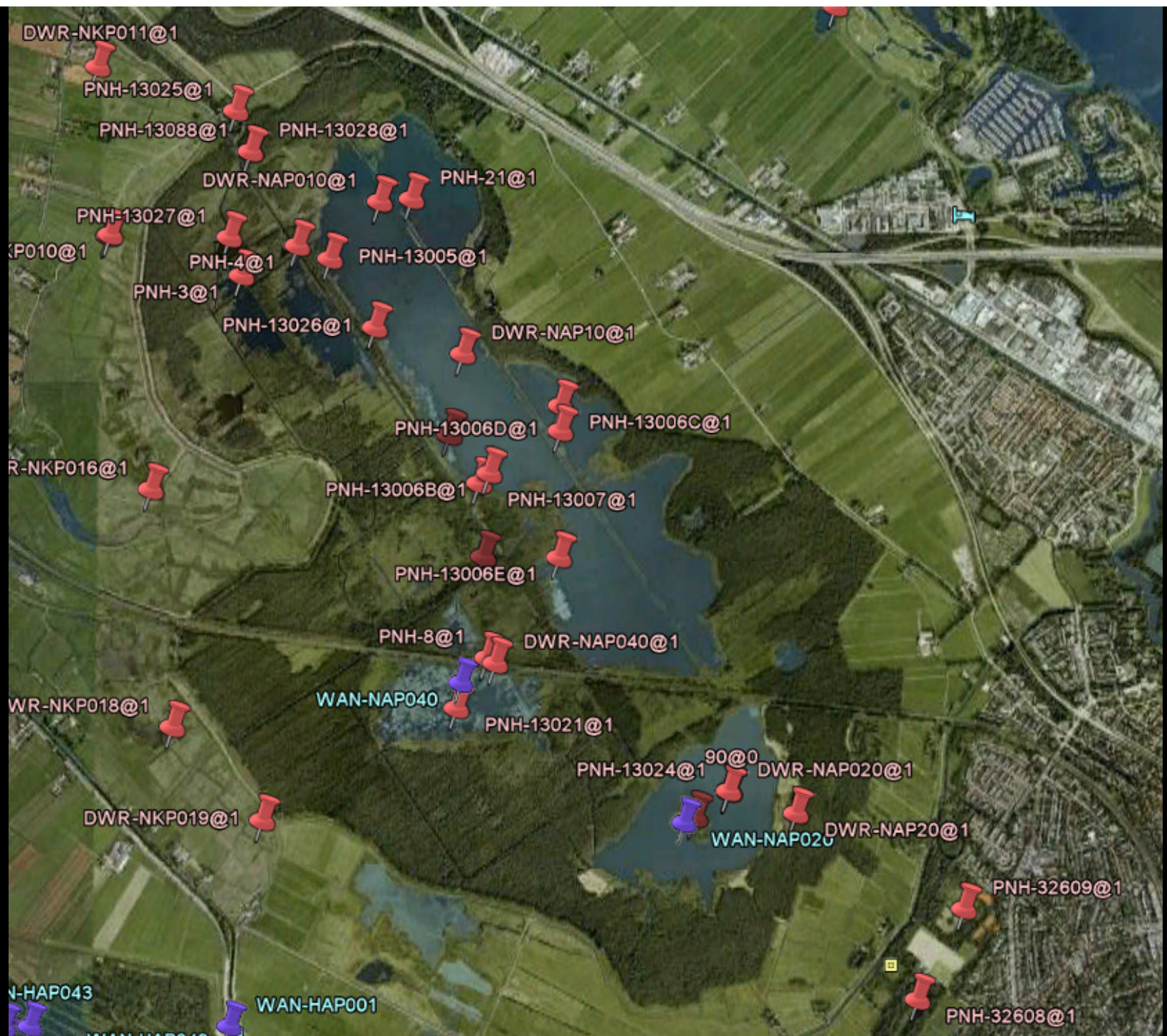
Meren



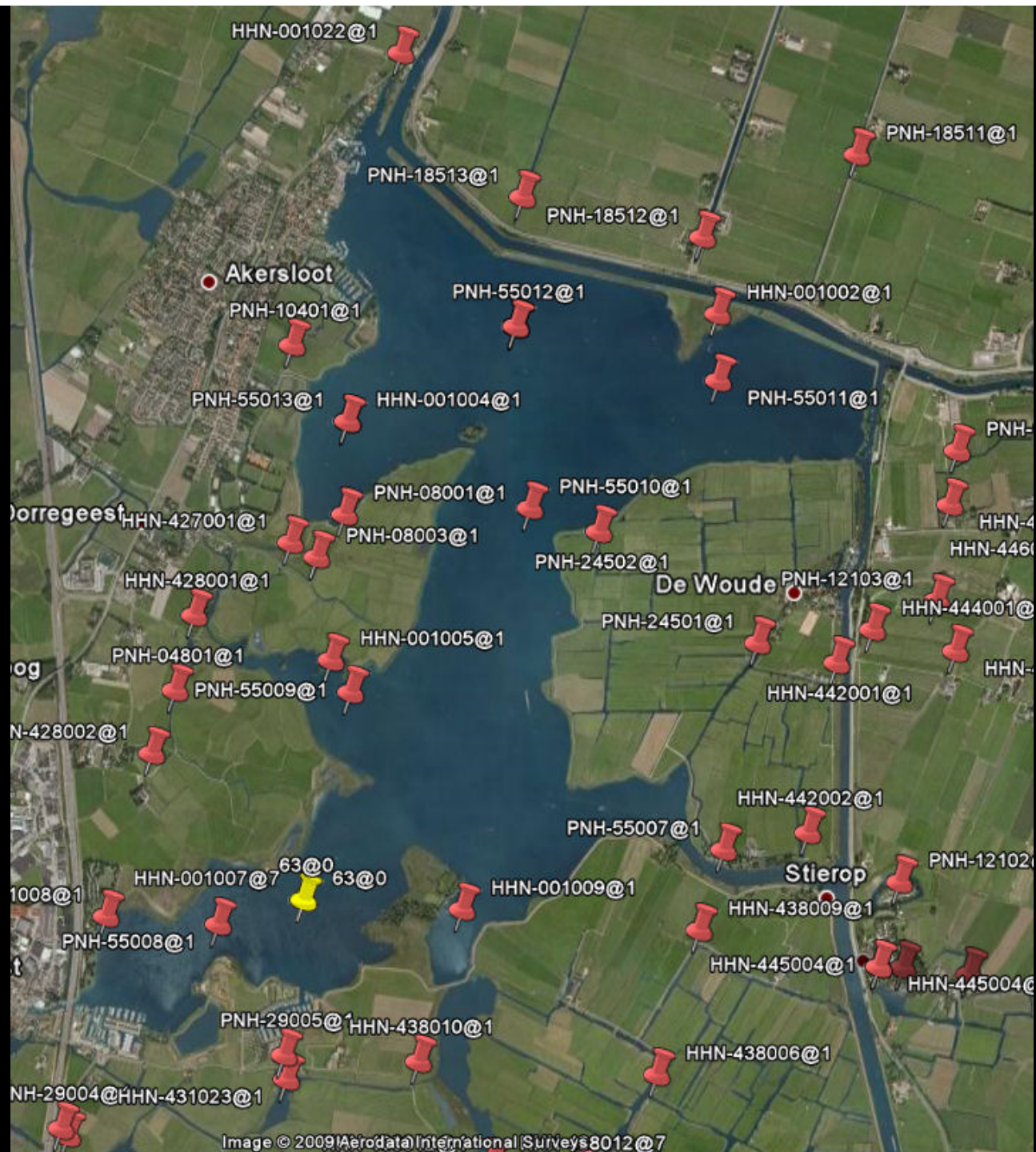
?

Meetpunten (Wieden)







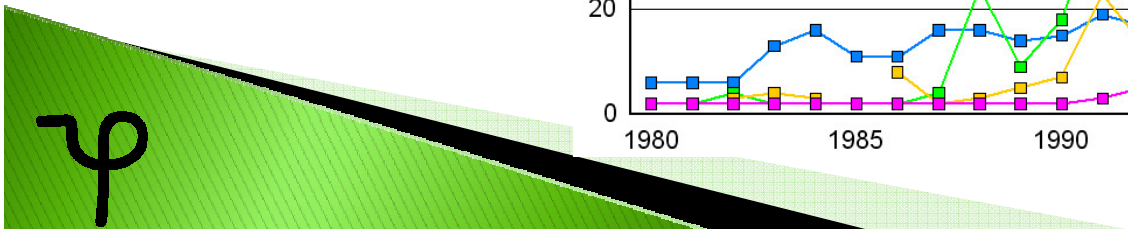
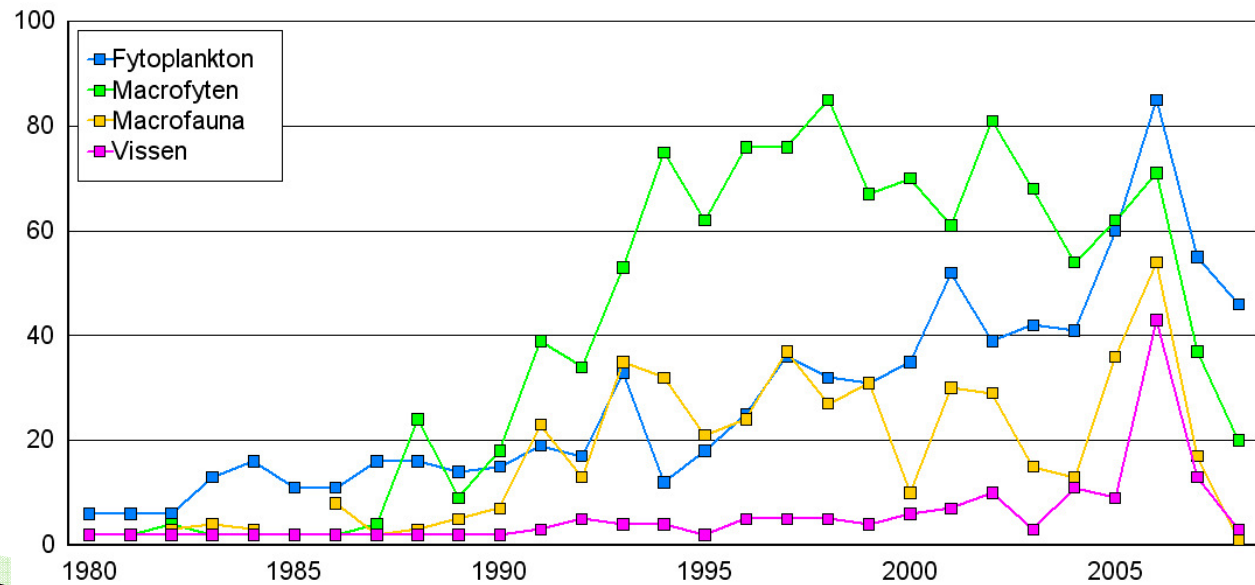
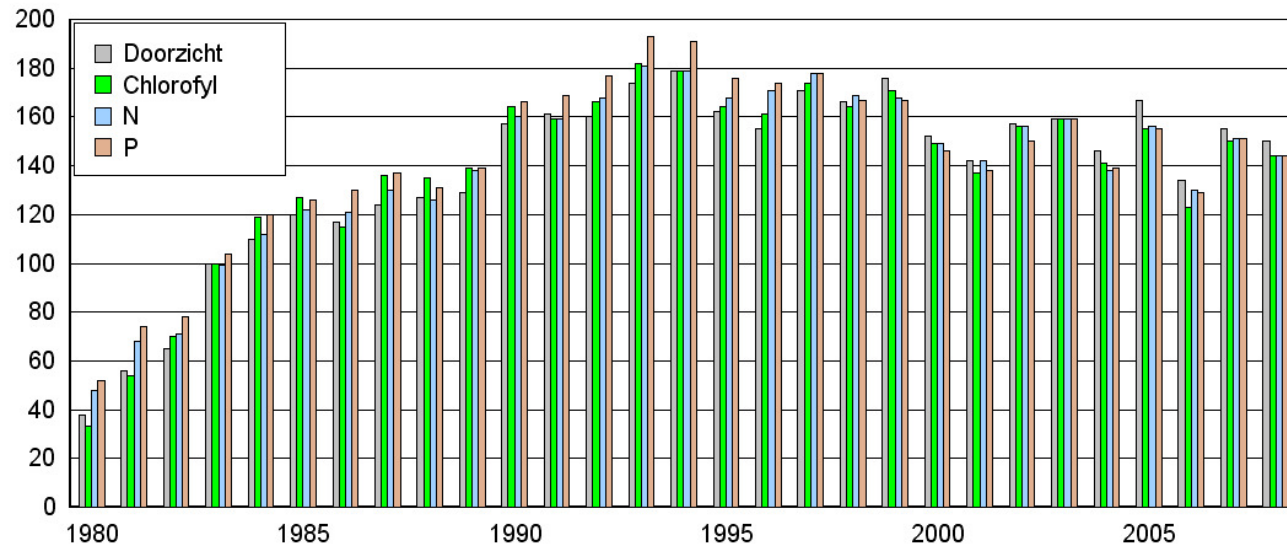




Datadichtheid

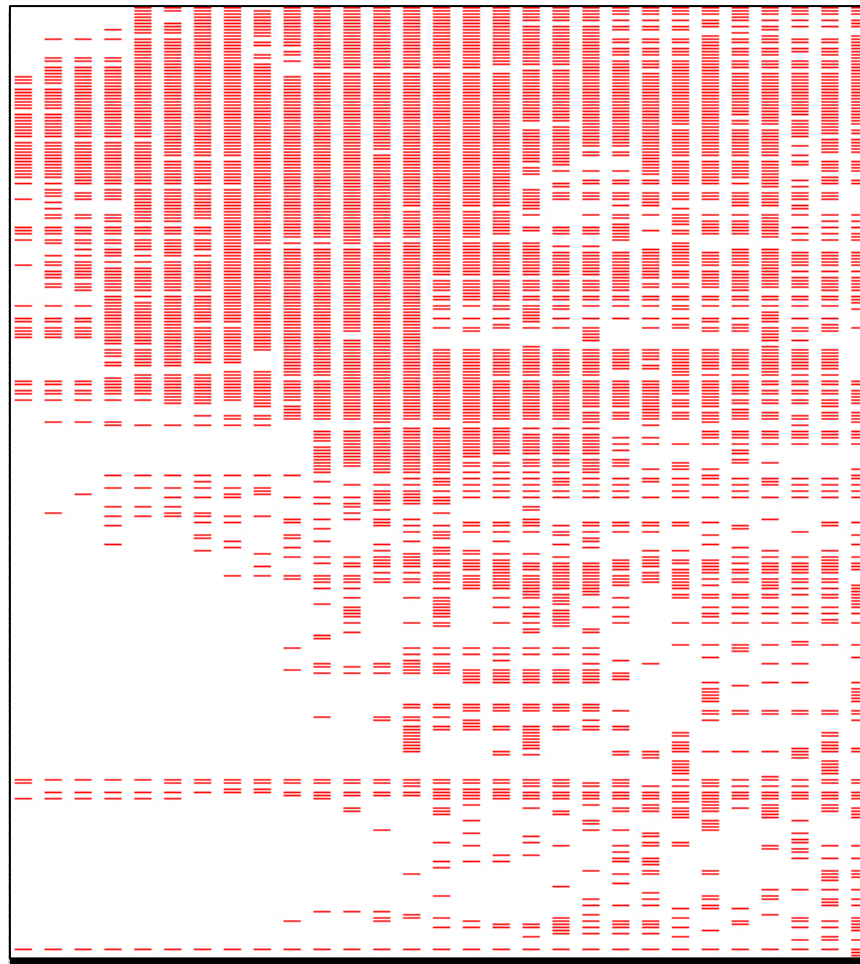
- ▶ 188 meren die ook eerder waren onderzocht
- ▶ 125 extra meren
- ▶ 795 meetpunten
- ▶ Enkele her-begrenzings (Vinkeveense plassen → 3 meren)
- ▶ Chlorofyl, Doorzicht, P en N : 4277 oordelen in 296 meren
- ▶ Fytoplankton: 808 oordelen in 222 meren (301 x geen bloei)
- ▶ Macrofyten: 1156 oordelen in 251 meren
- ▶ Macrofauna: 483 oordelen in 183 meren
- ▶ Vissen: 162 oordelen in 86 meren
 - (waarvan 56 in IJsselmeer en Markermeer, type M21)

Datadichtheid



Datadichtheid (Chlorofyl)

313 meren

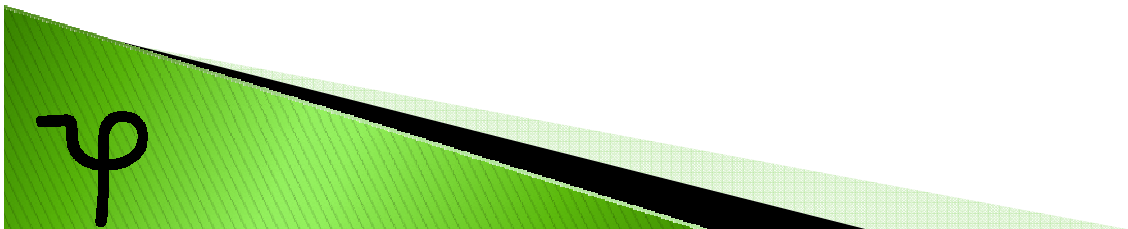


1980 – 2008

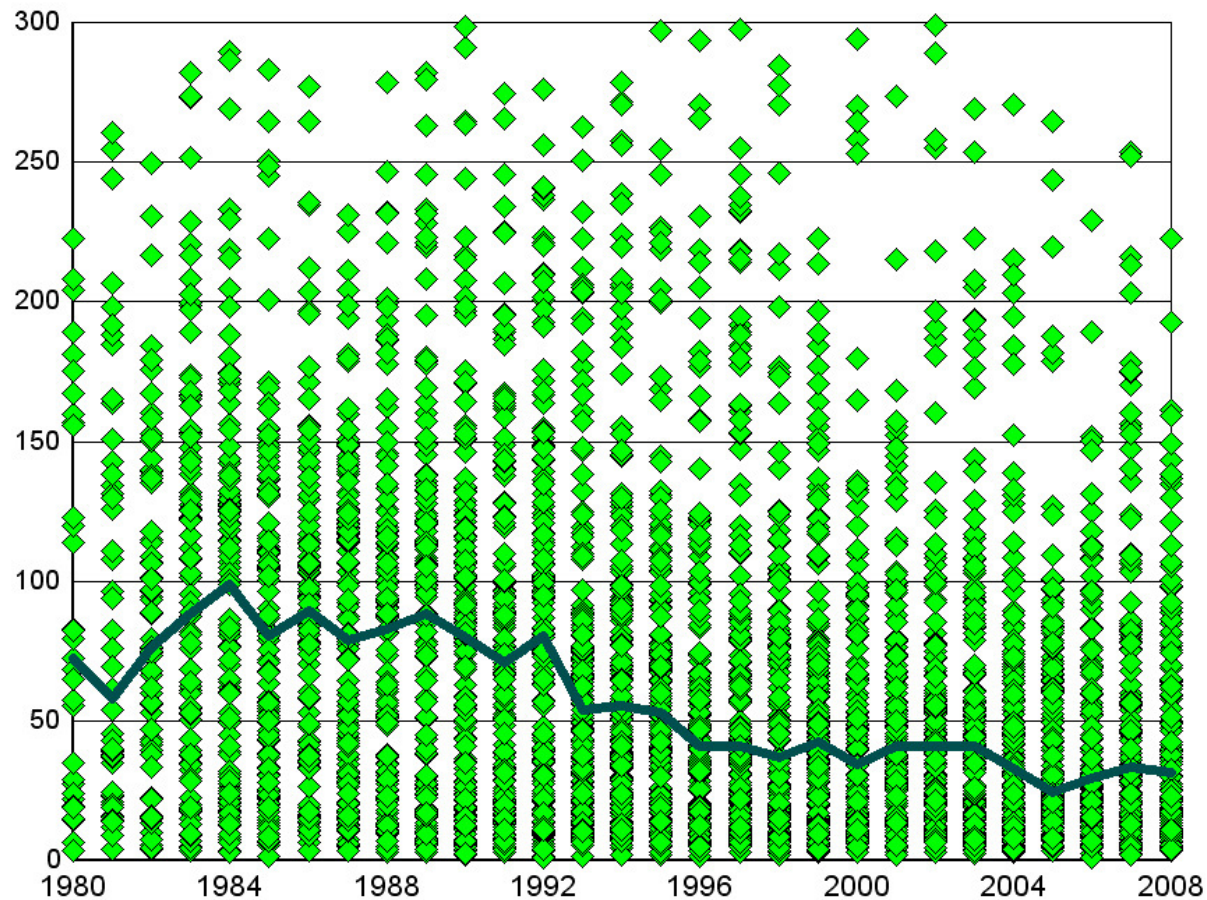


Van metingen naar oordeel per meer

- ▶ Chloride, Doorzicht, P en N
 - Zomergemiddelden op basis van dagwaarden tussen 1 april en 30 september.
 - Alle dagwaarden door interpolatie tussen metingen vast te stellen
 - In de praktijk: gemiddelde van steeds twee opeenvolgende metingen, gewogen naar interval in dagen
 - Dagwaarden voor 1 april en 30 september door interpolatie óf gelijk aan dichtbij zijnde meting indien interpolatie niet mogelijk is
 - Aggregatie van meetpunten: na beoordeling
- ▶ Biologische kwaliteitselementen
 - Volgens KRW-maatlatten
 - Aggregatie van meetpunten en data maatlat-specifiek

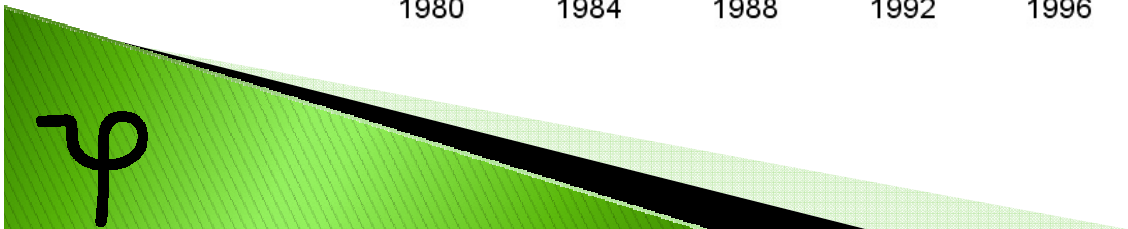
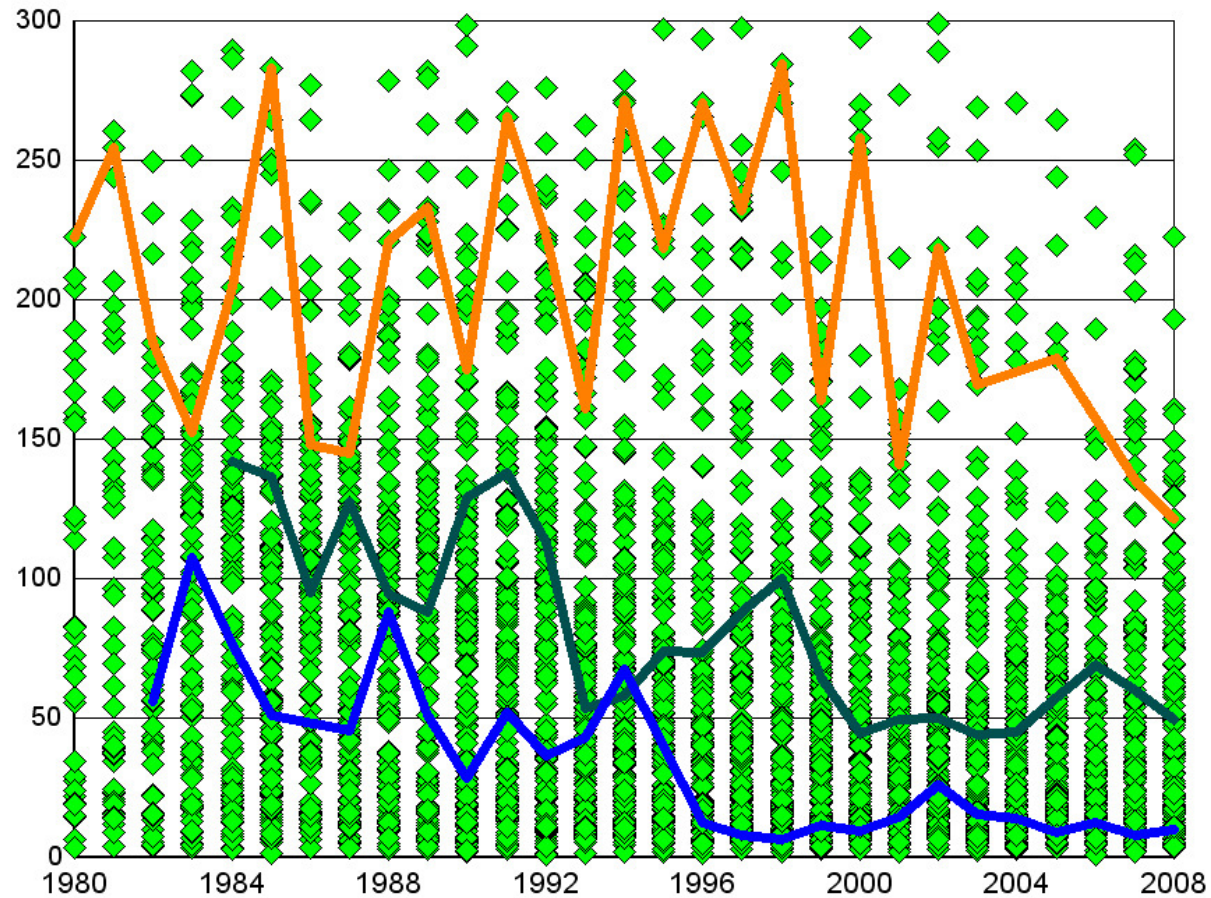


Trendberekening (Chlorofyl, mediaan)

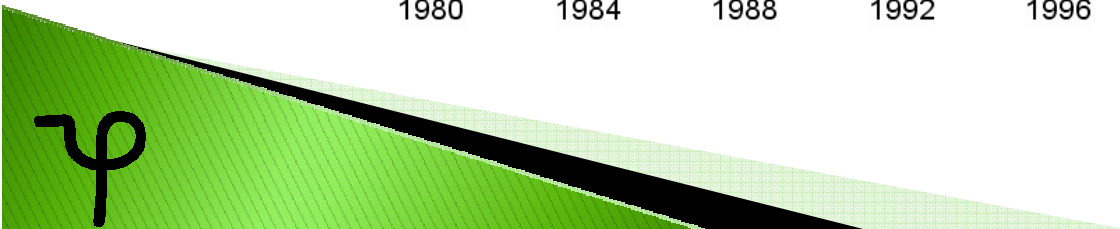
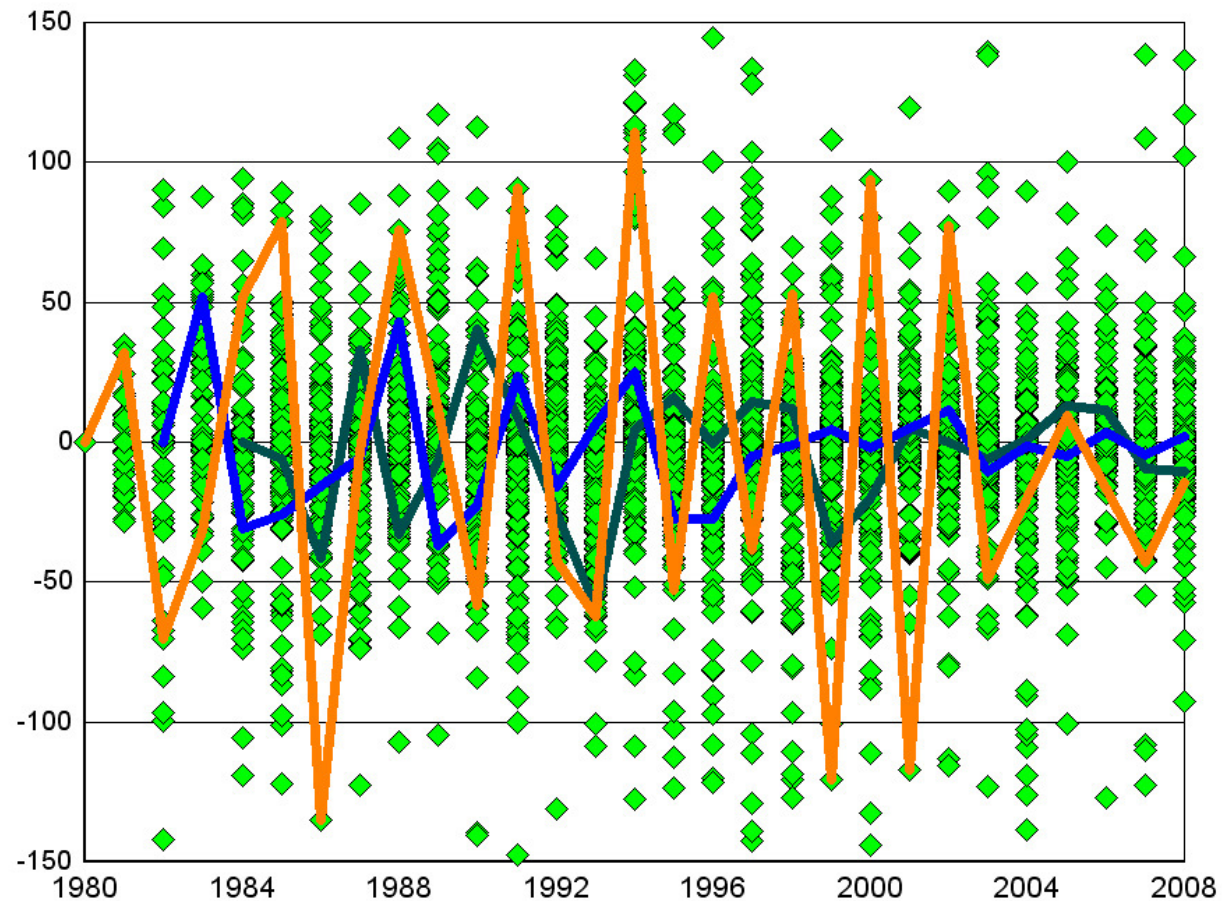


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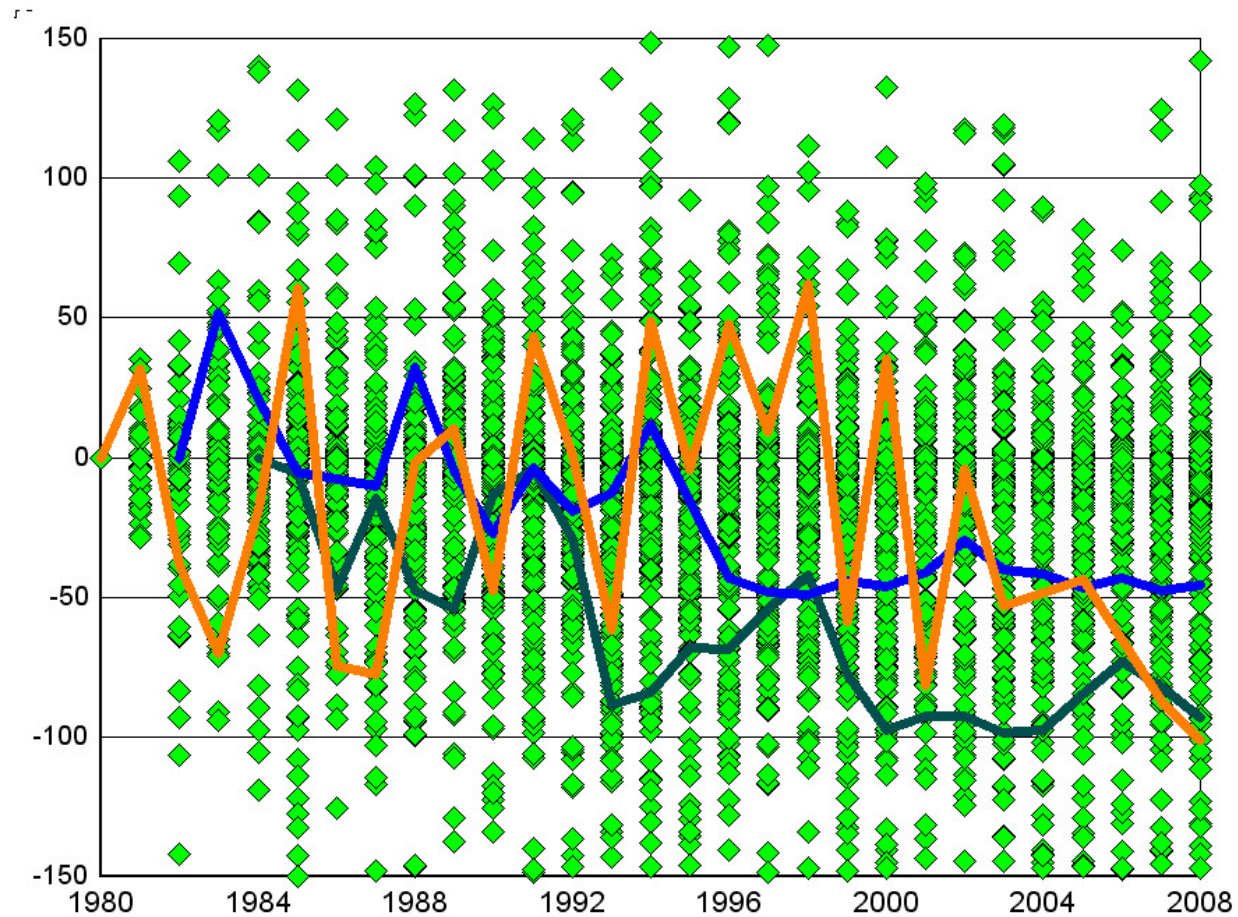
Trendberekening (aparte meren)



Trendberekening (∂j = verschil /jaar)

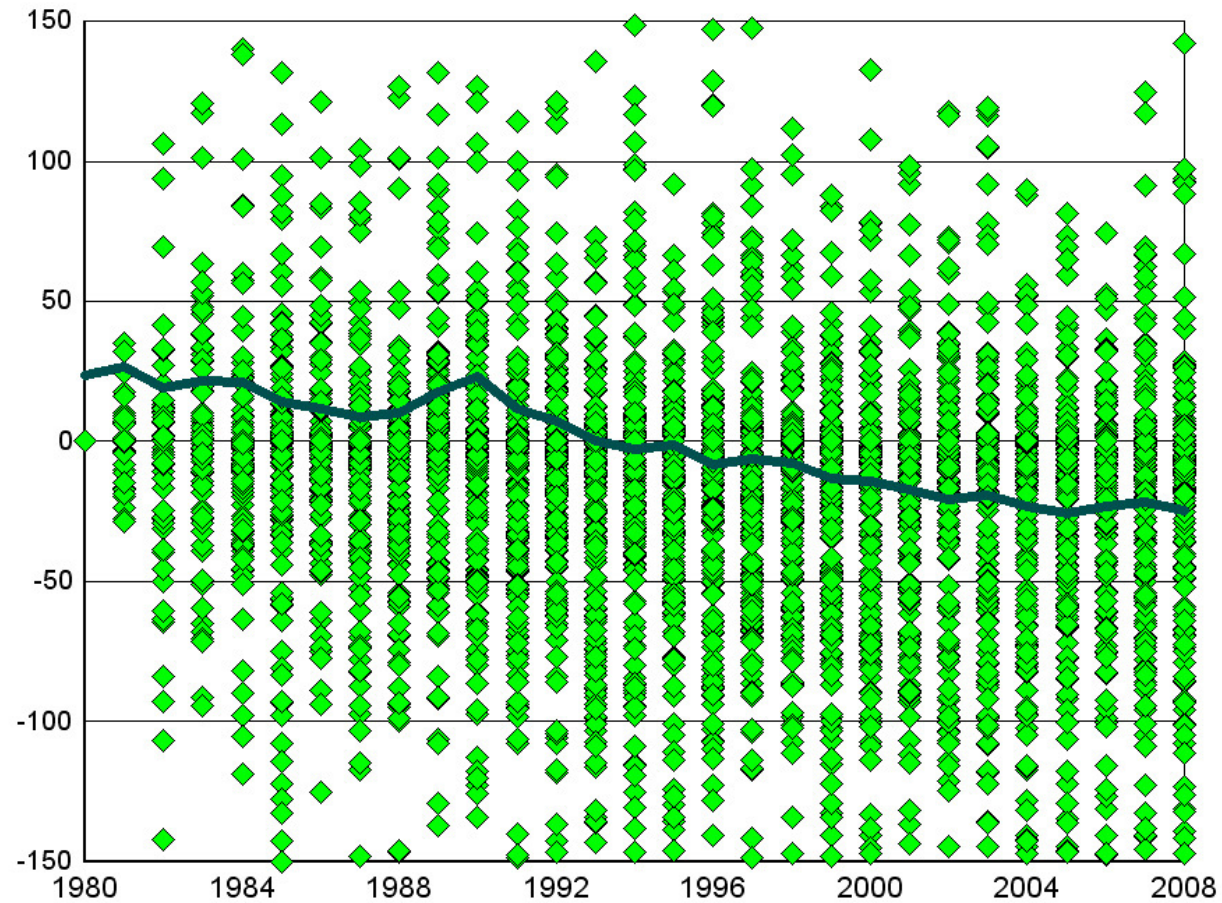


Trendberekening (cummulatie ∂j)



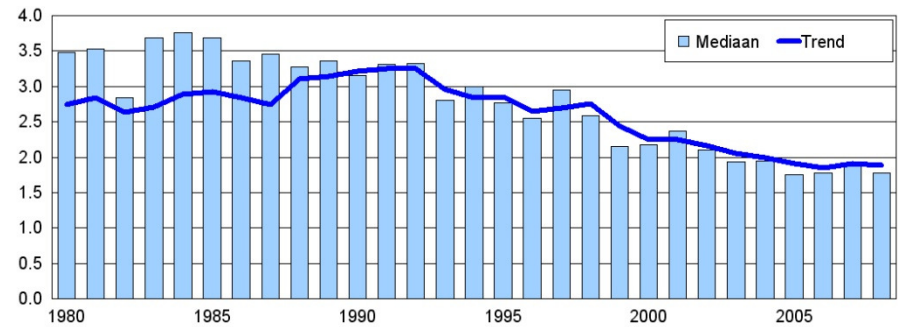
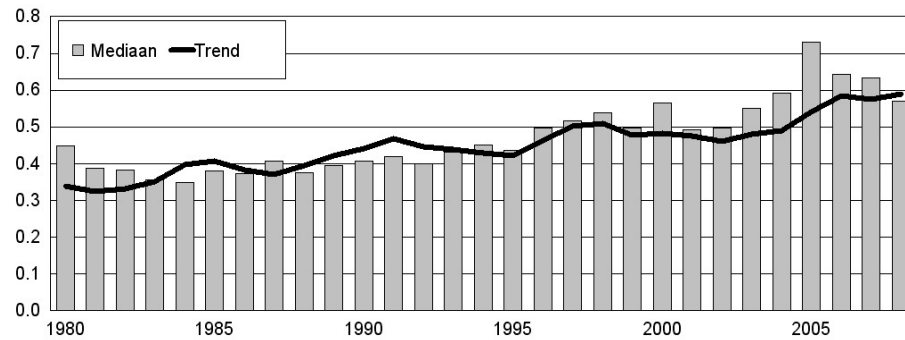
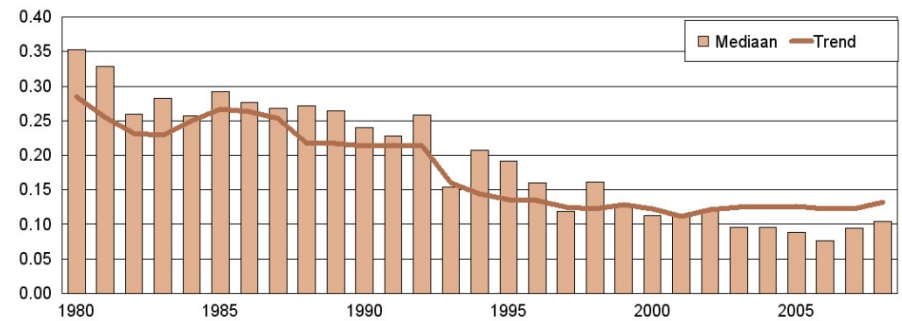
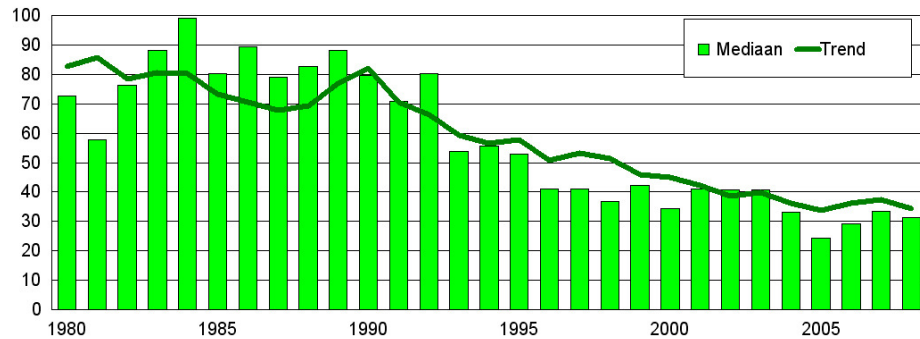
φ

Trendberekening (cumm. gemidd. ∂j)

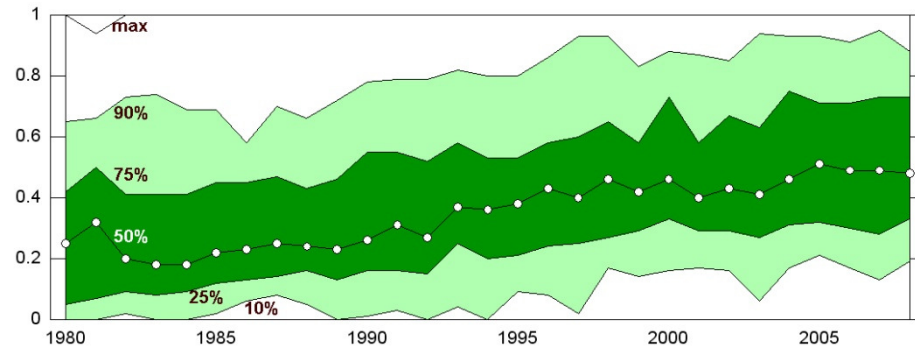


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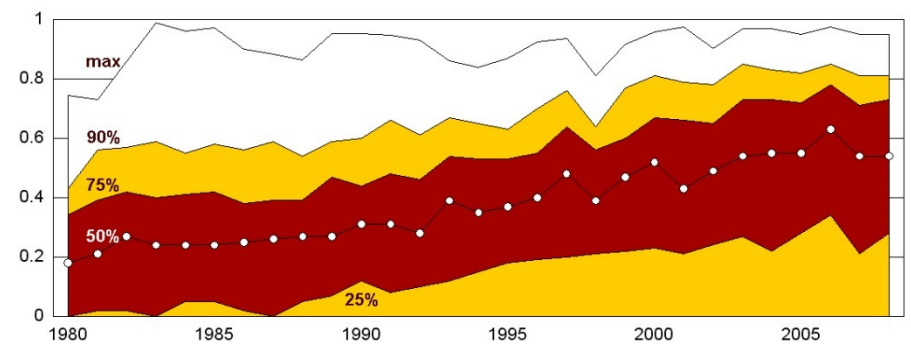
Mediaan en cumm. gem. verandering



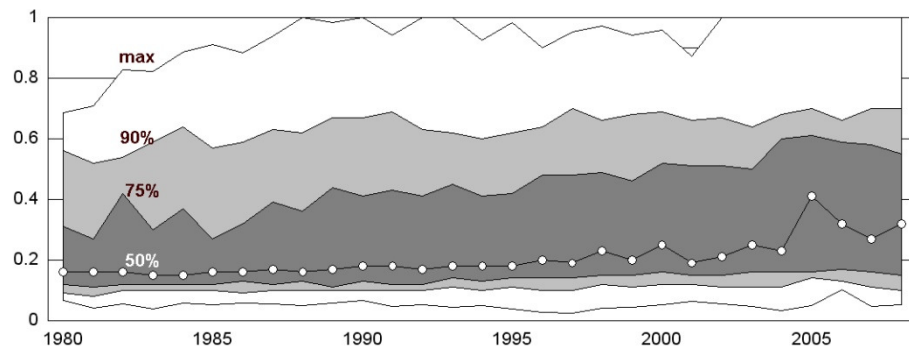
Mediaan en percentielen, als EKR



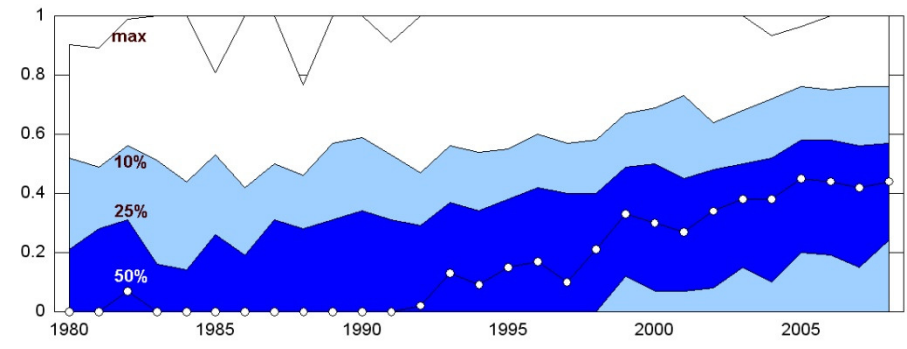
Chlorofyl



Totaal P



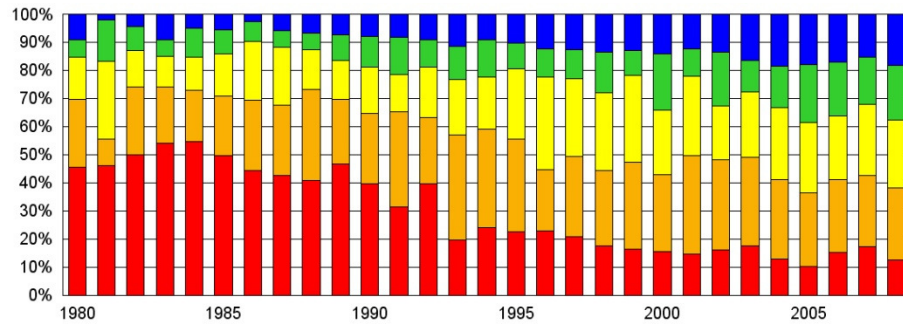
Doorzicht



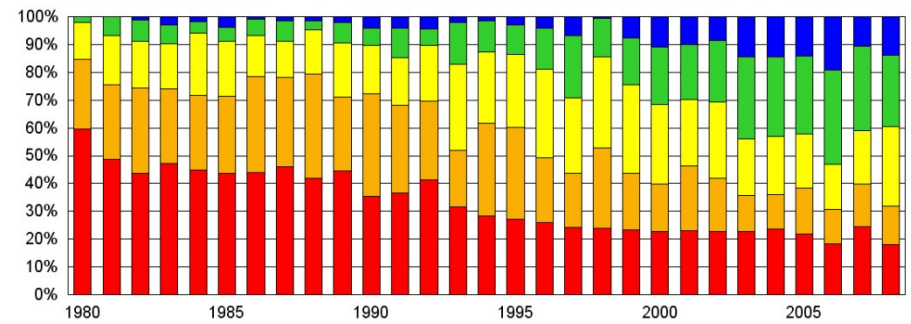
Totaal N



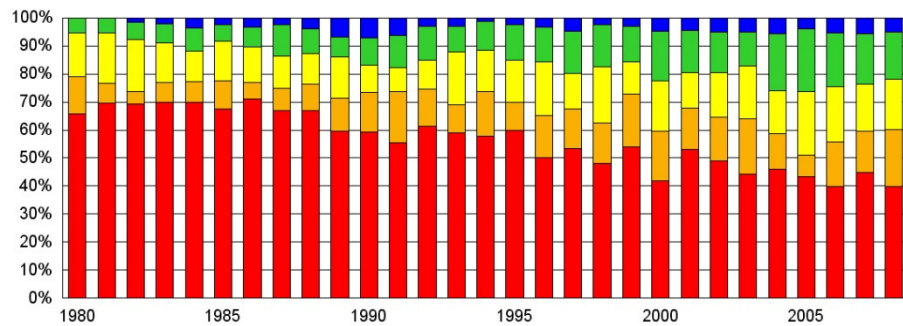
Klassenverdeling



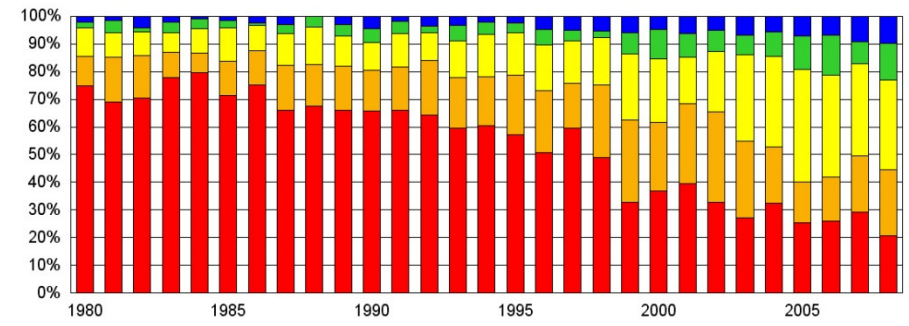
Chlorofyl



Totaal P



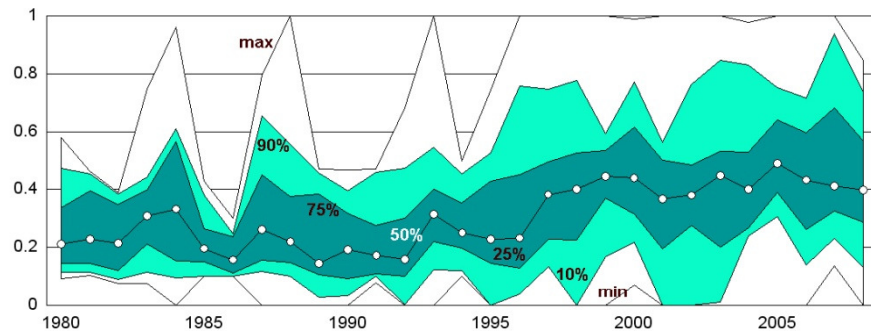
Doorzicht



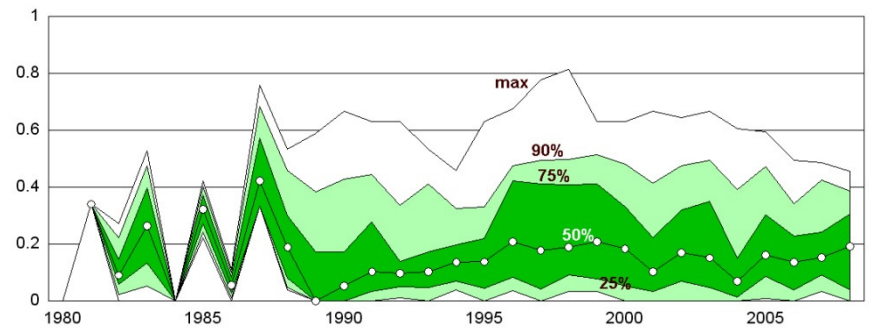
Totaal N



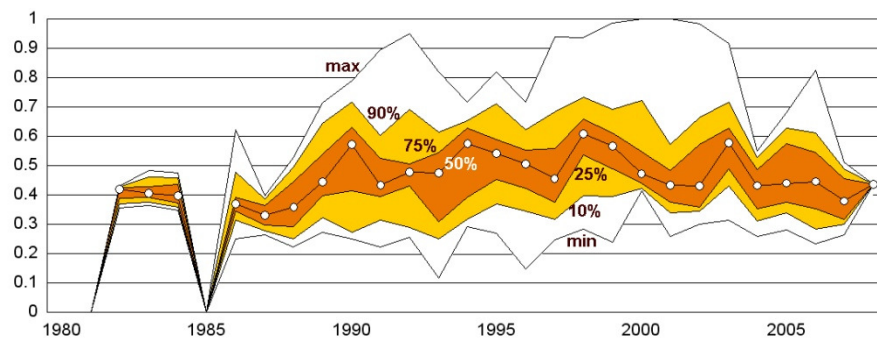
Mediaan en percentielen



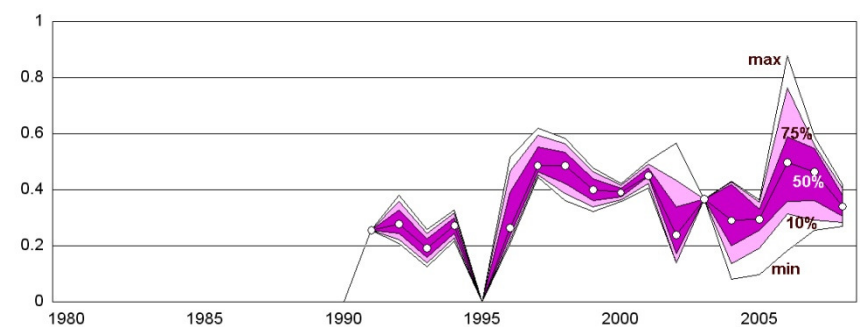
Fytoplankton



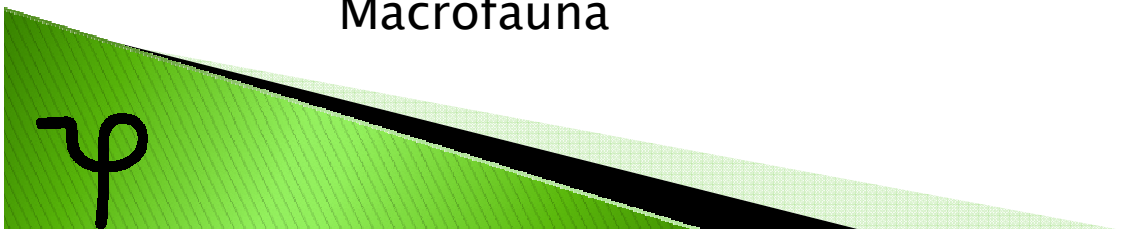
Macrofyten



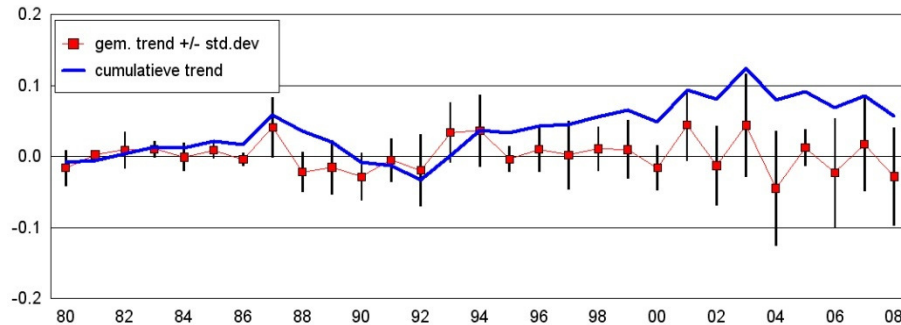
Macrofauna



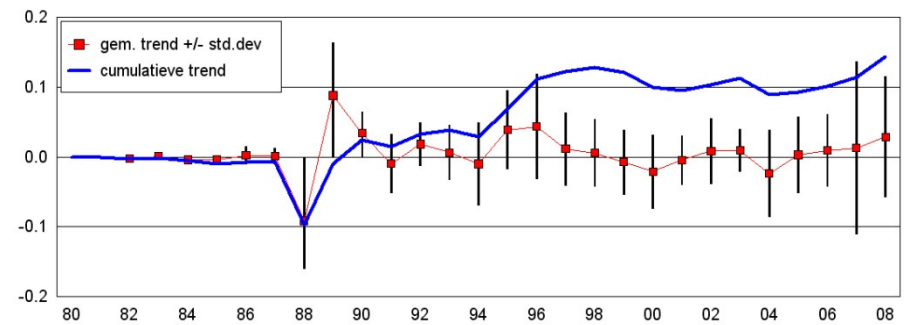
Vis (zonder M21)



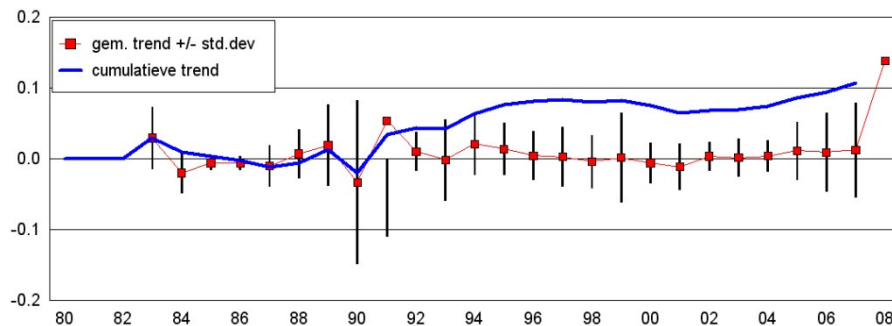
Cummulatief gemiddelde verandering



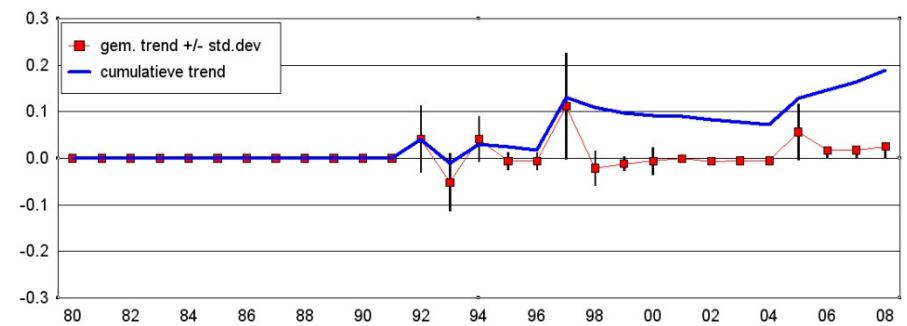
Fytoplankton



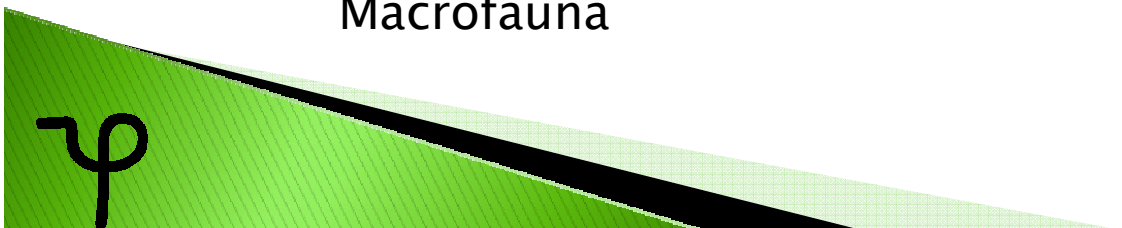
Macrofyten



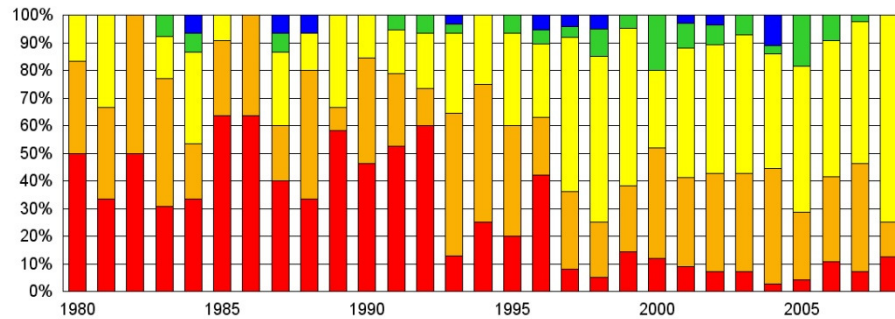
Macrofauna



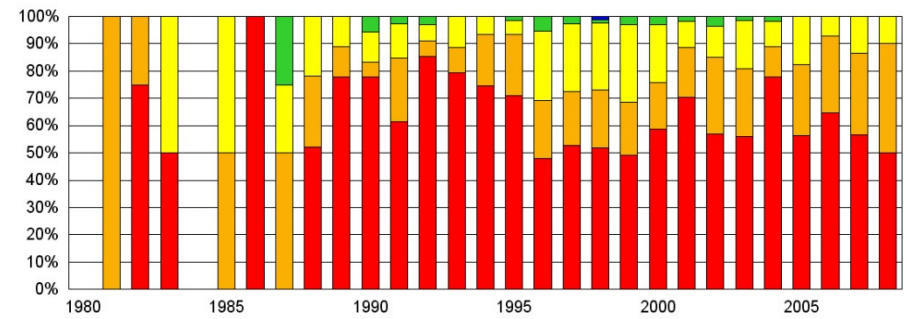
Vis (zonder M21)



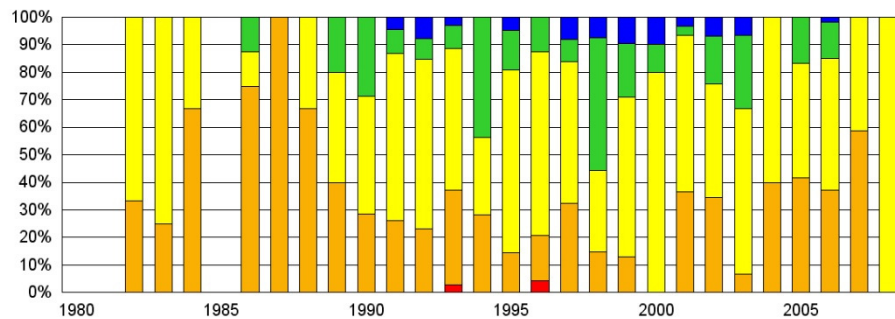
Klassenverdeling



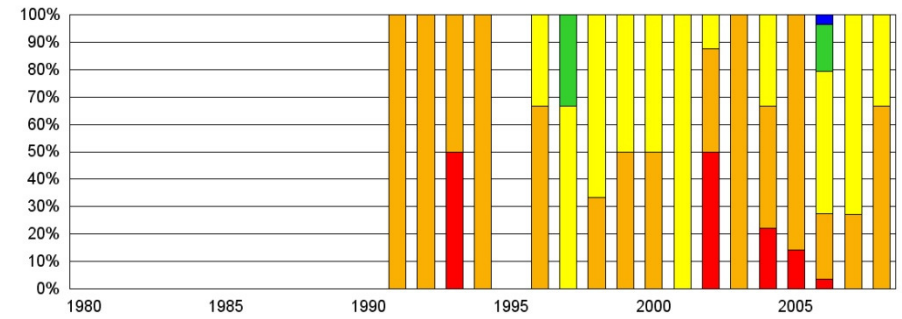
Fytoplankton



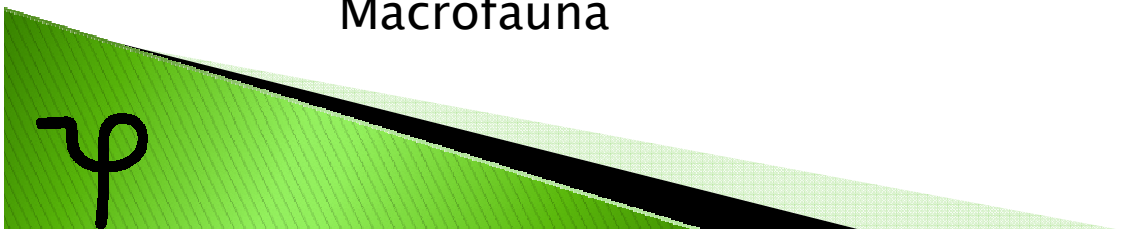
Macrofyten



Macrofauna

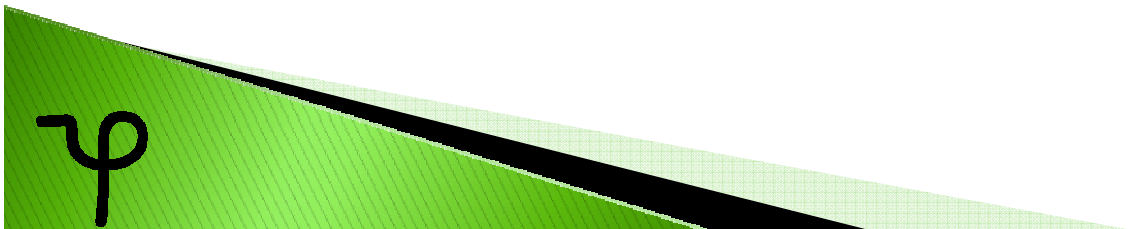


Vis (zonder M21)

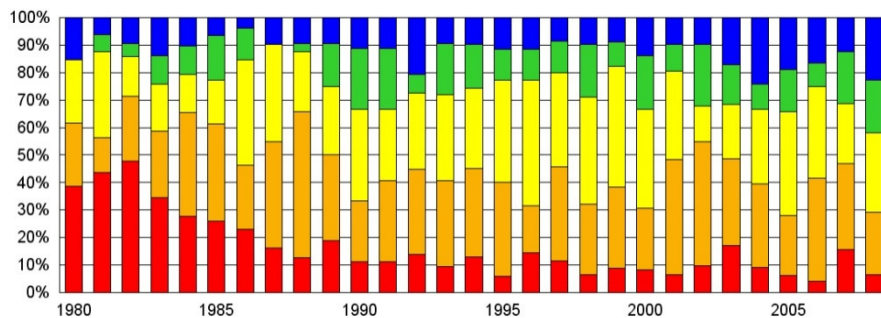
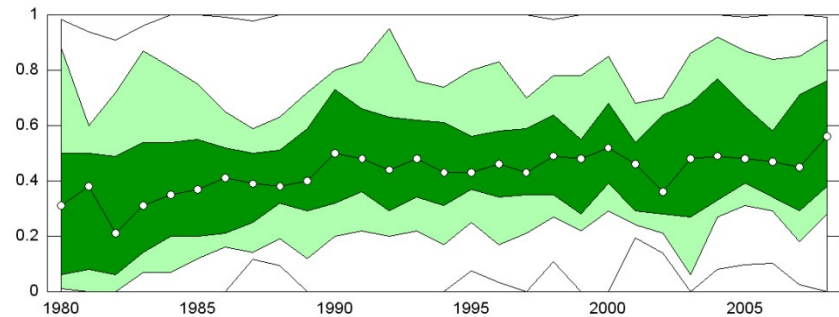
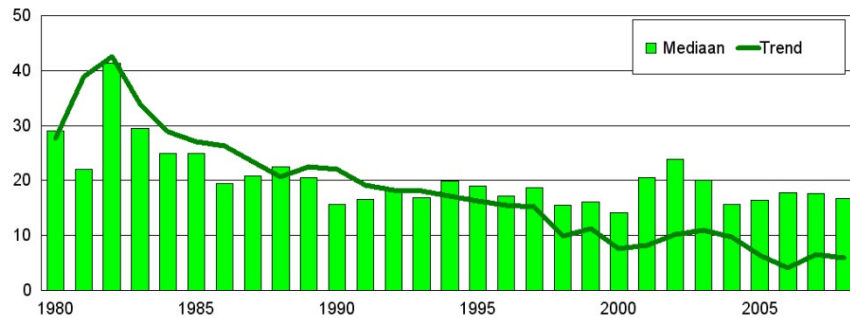


Inzoomen

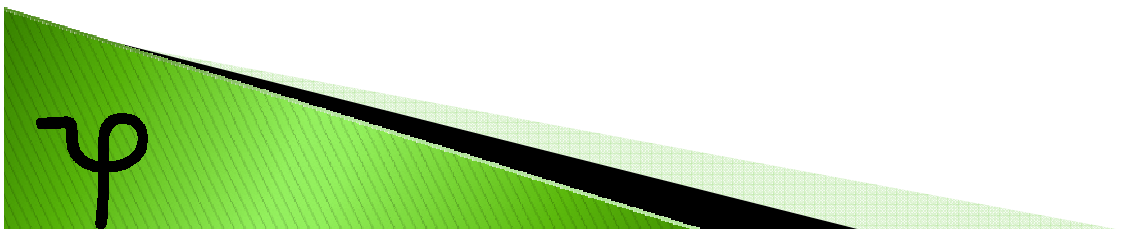
- ▶ Opsplitsen van alle analyses naar meer-type:
 - Diep / ondiep
 - Groot / klein
 - Brak apart beoordelen
- ▶ Opsplitsen naar waterbeheerder
- ▶ Analyse van individuele meren
 - Vergelijken met de eigenschappen en historie van het meer
- ▶ Correlatieanalyse van kwaliteitselementen



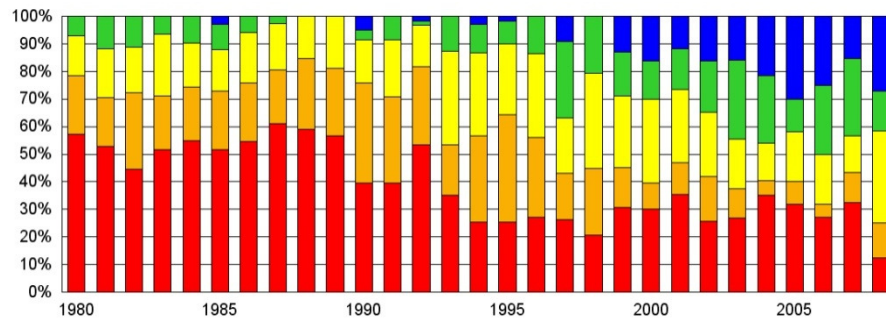
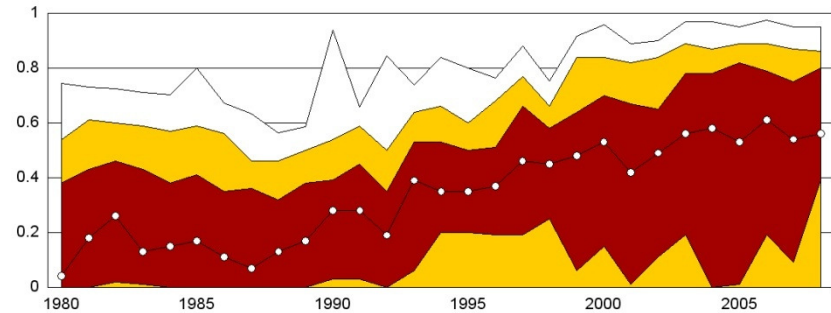
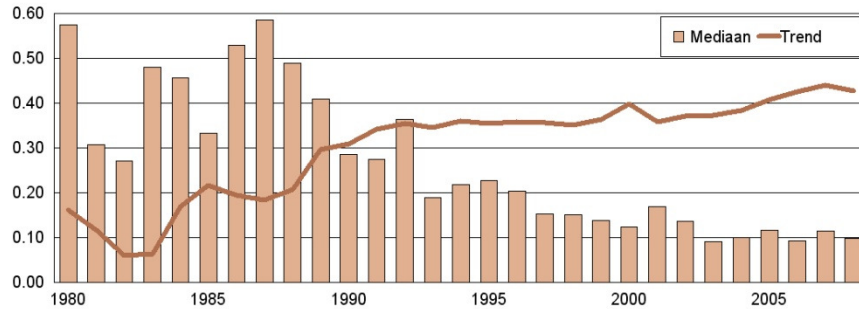
Diepe meren chlorofyl



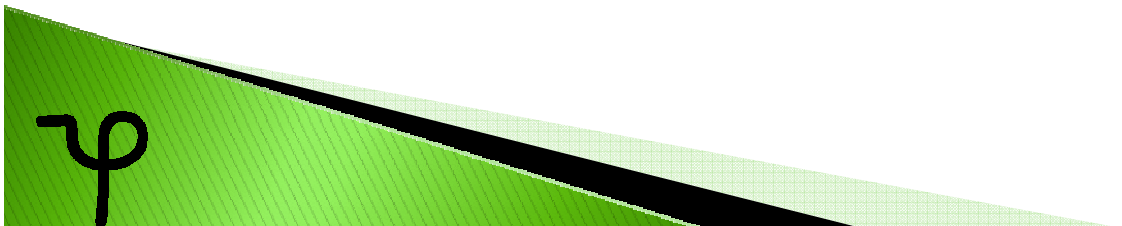
- Mediaan 1995 – 2008 gelijk
- Slechtste 10% verbetert licht
- Beste verbeteren: aantal zeer goed neemt toe



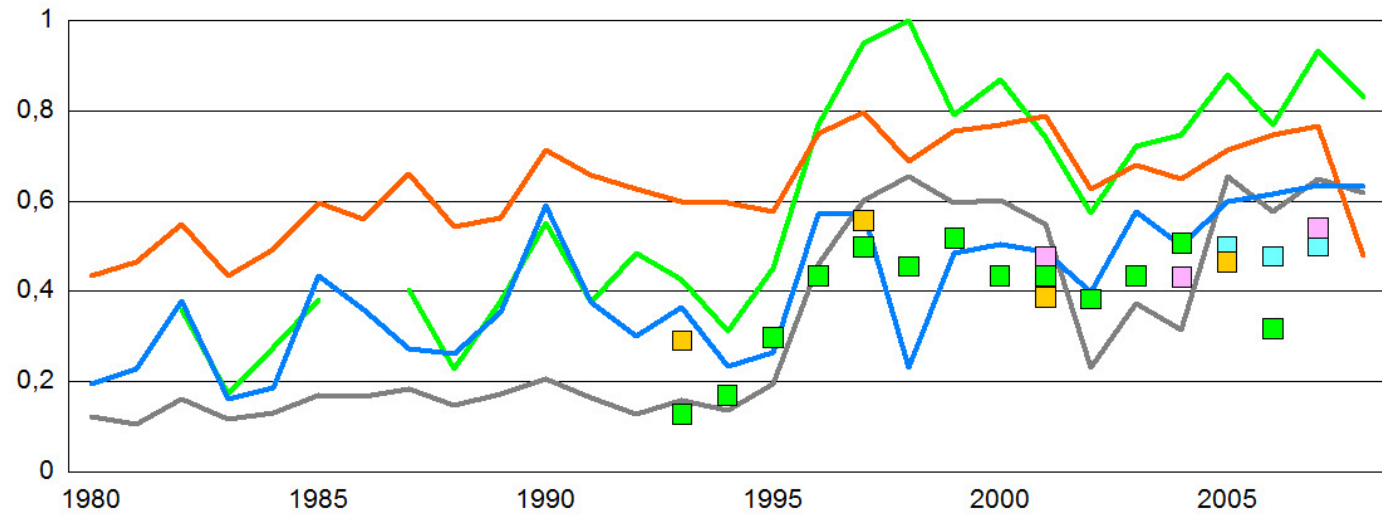
Kleine meren totaal P



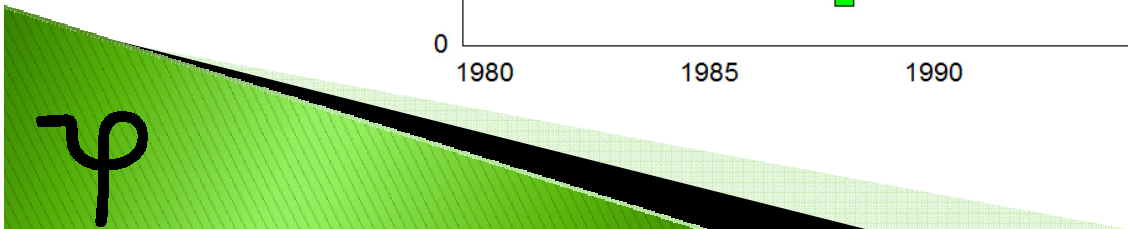
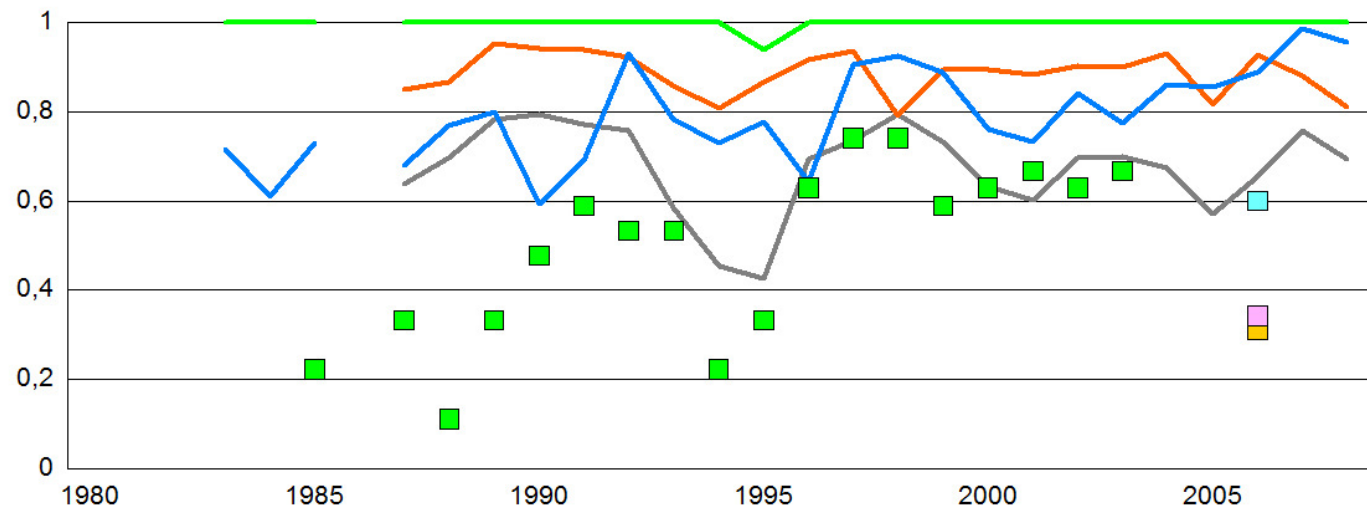
- Mediaan daalt, trend stijgt
- Beste verbeteren: aantal zeer goed neemt toe
- Slechtste meren verslechteren



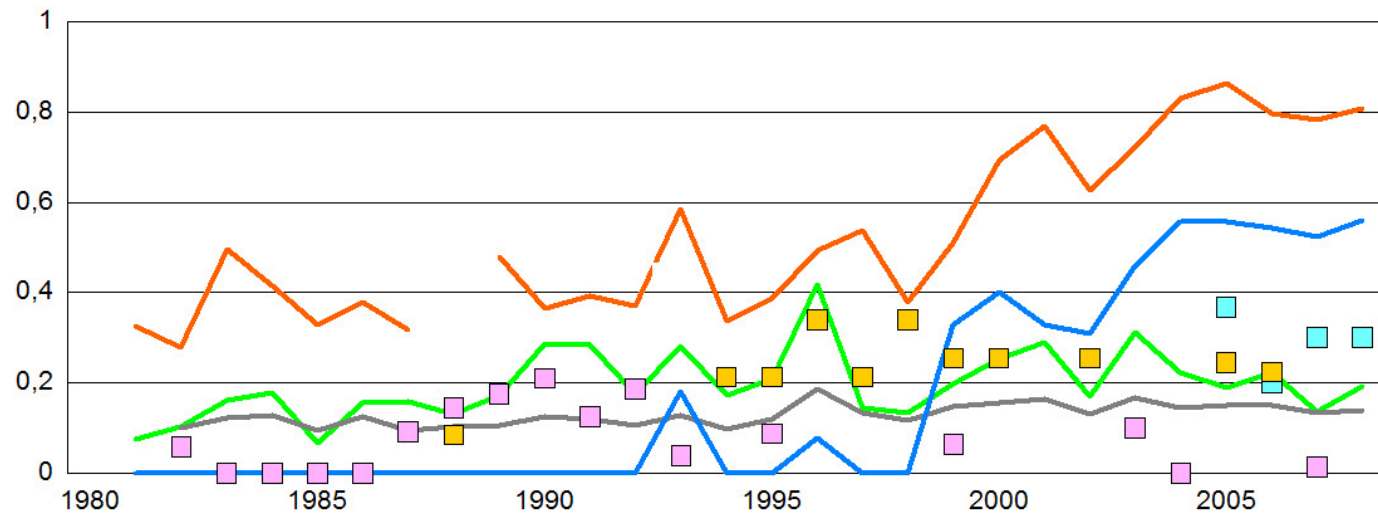
Veluwemeer



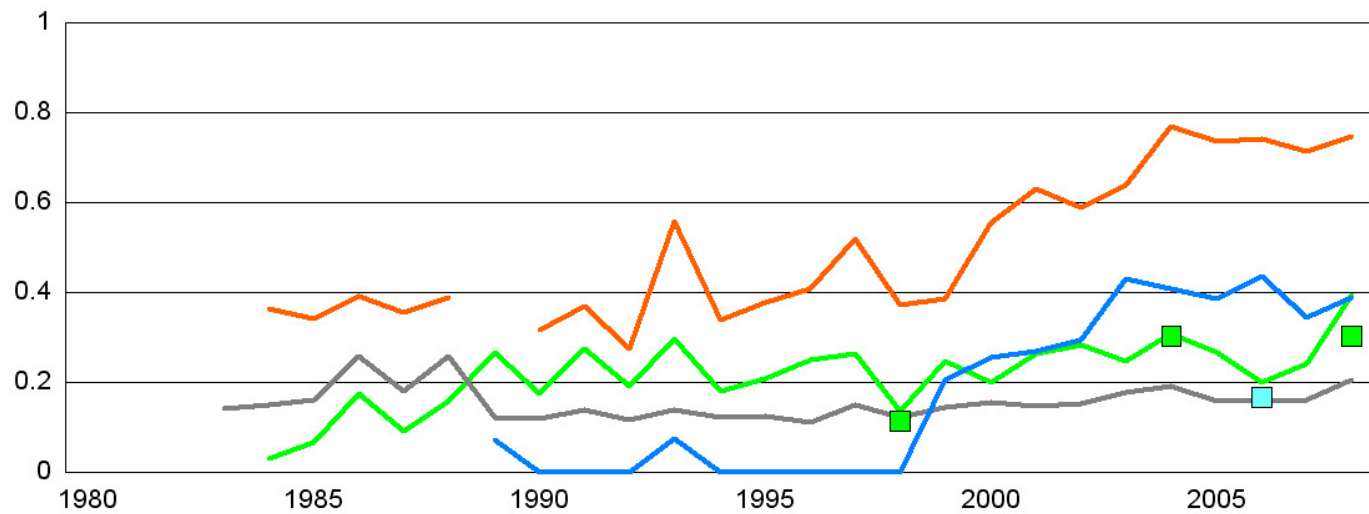
Botshol



Slotermeer

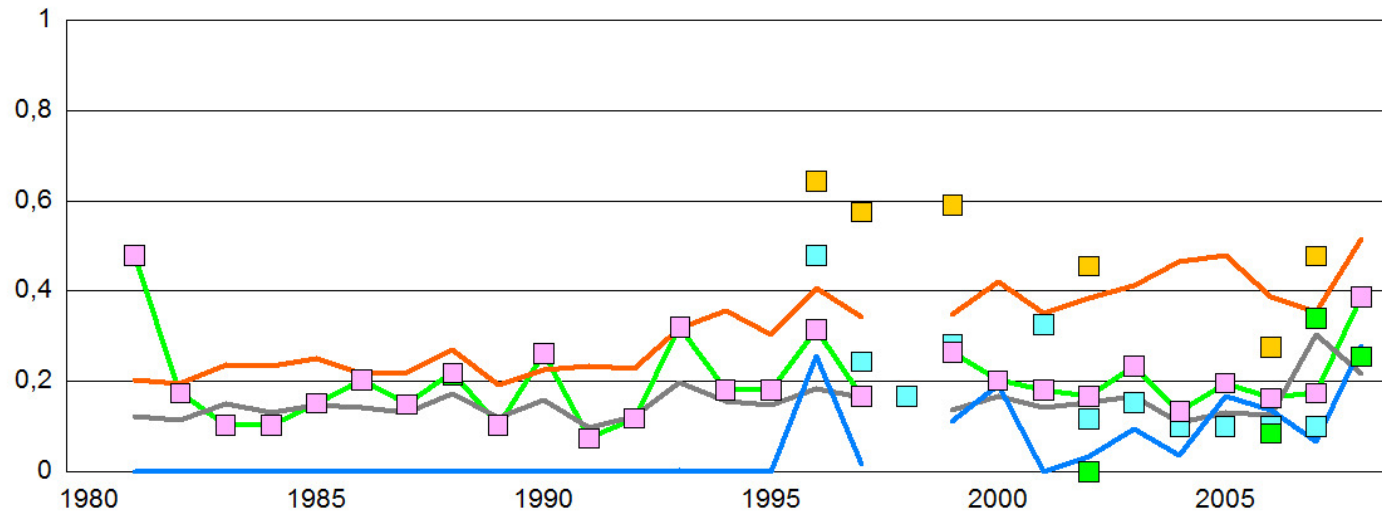


Tjeukermeer

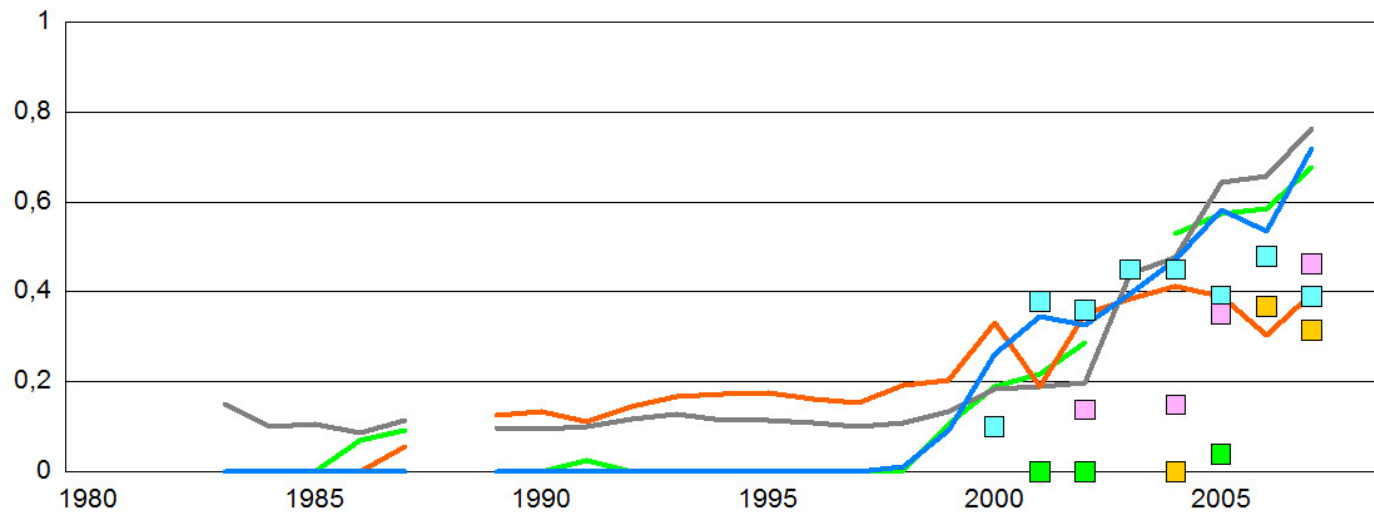


ψ

Zuidlaarder-
meer



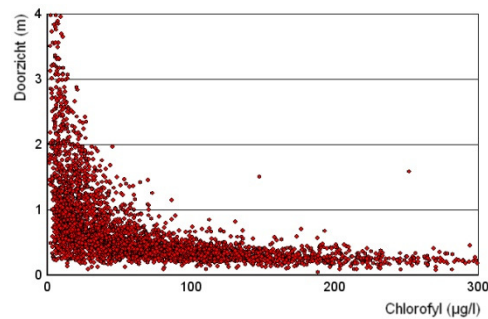
Bergse
Achterplas



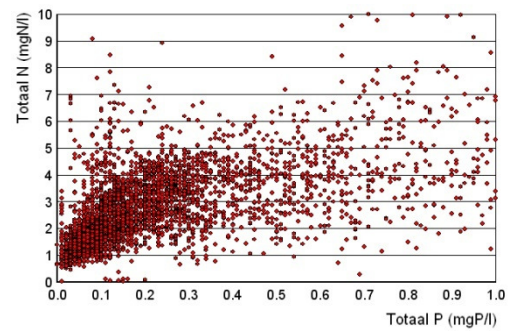
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Correlaties

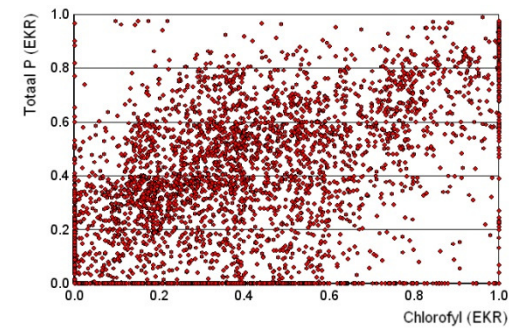
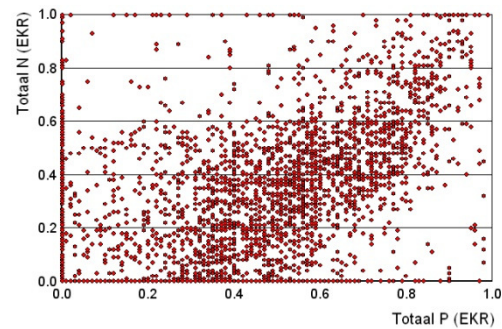
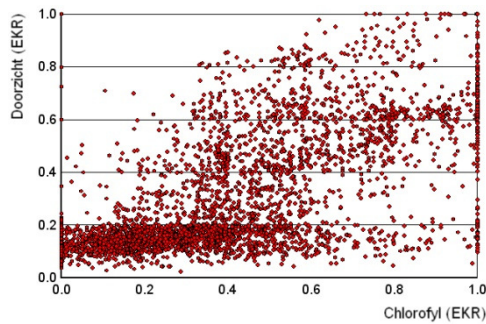
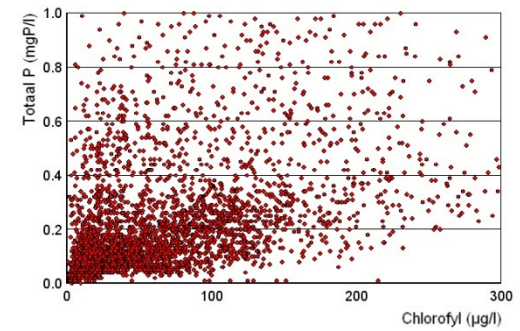
Doorzicht / Chlorofyl



N / P



P / Chlorofyl

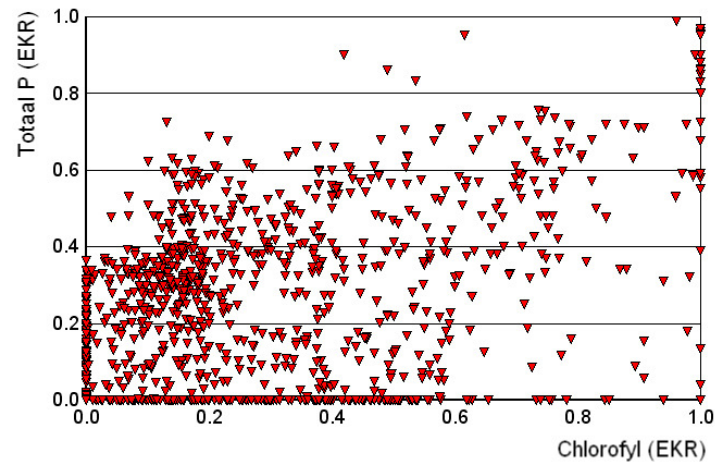


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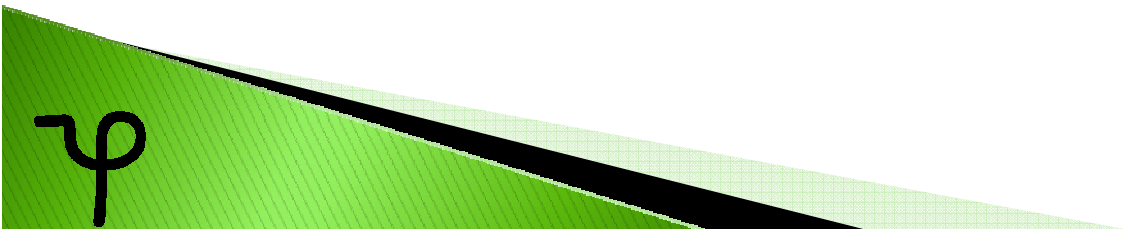
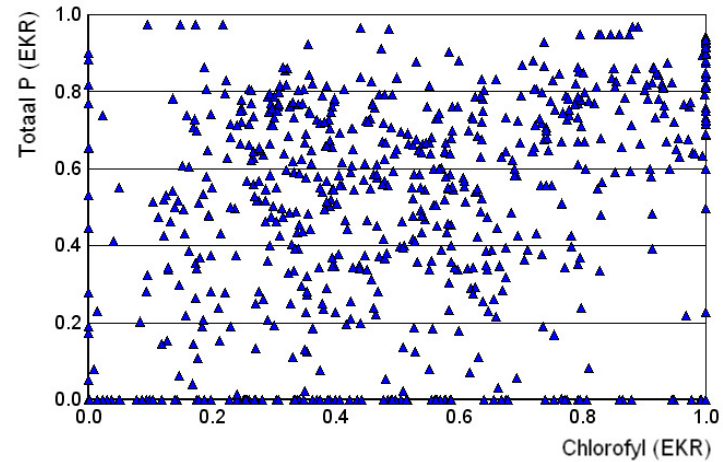
Boven: toetswaarden
Onder: EKR

P / Chlorofyl in de loop van tijd

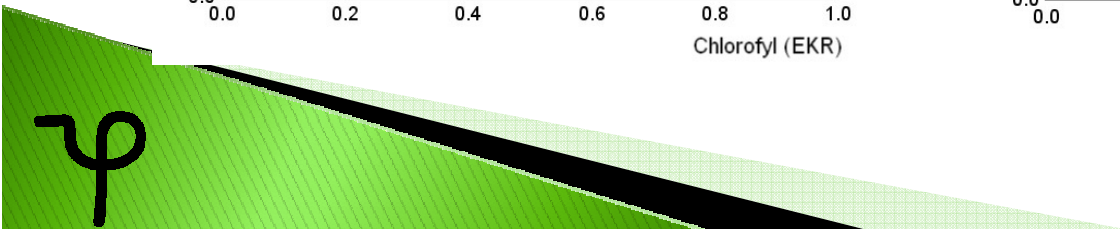
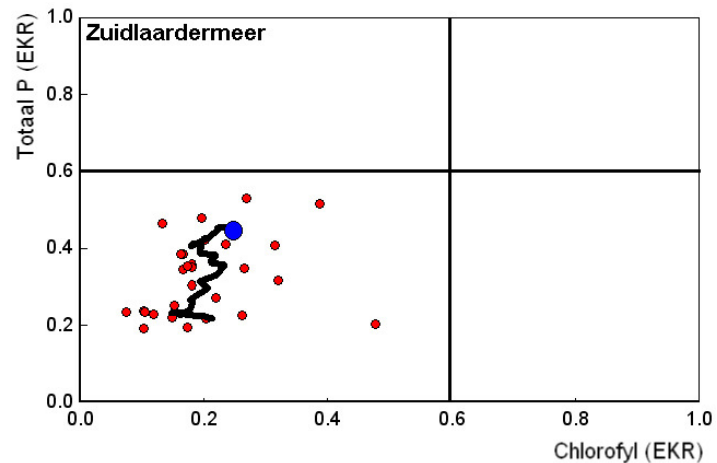
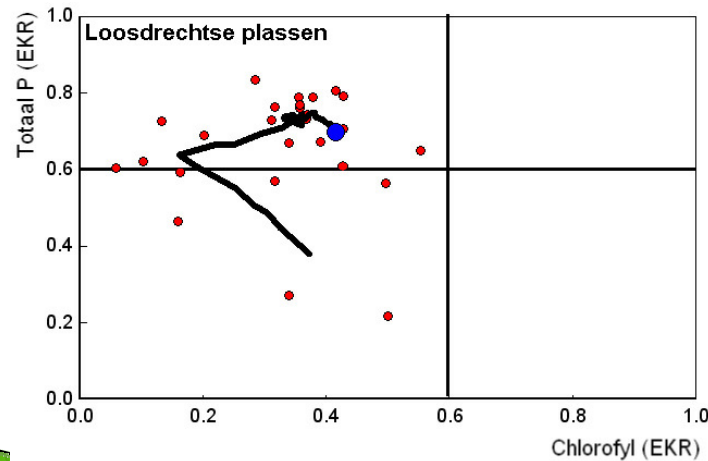
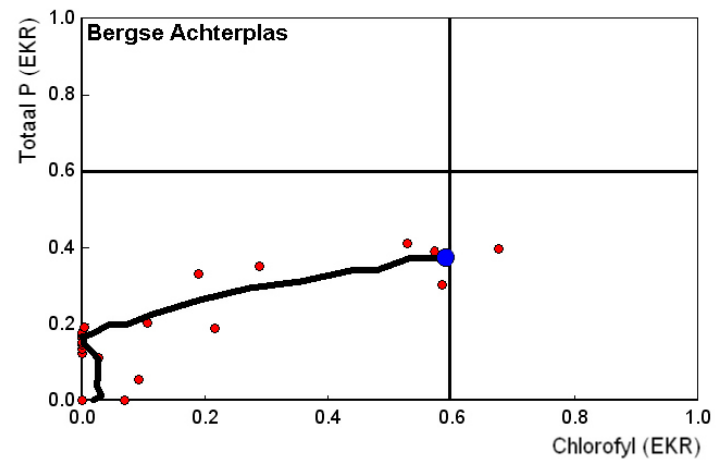
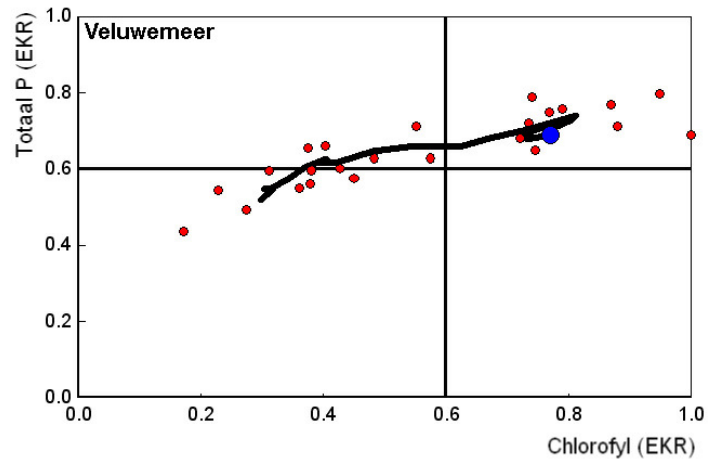
1980-1998



2004-2008

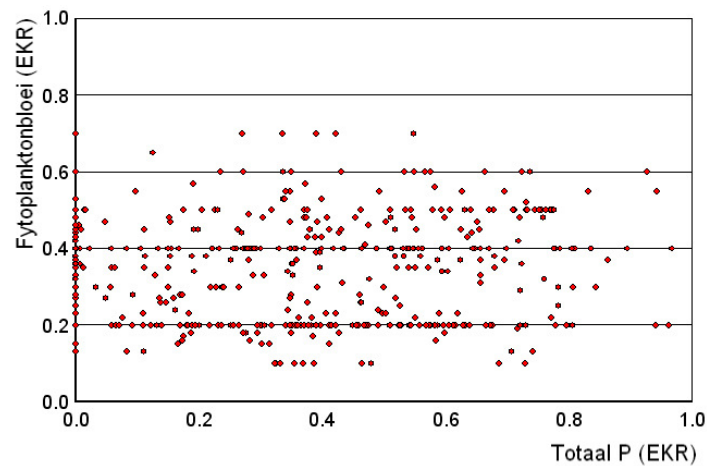


P / Chlorofyl in de loop van tijd

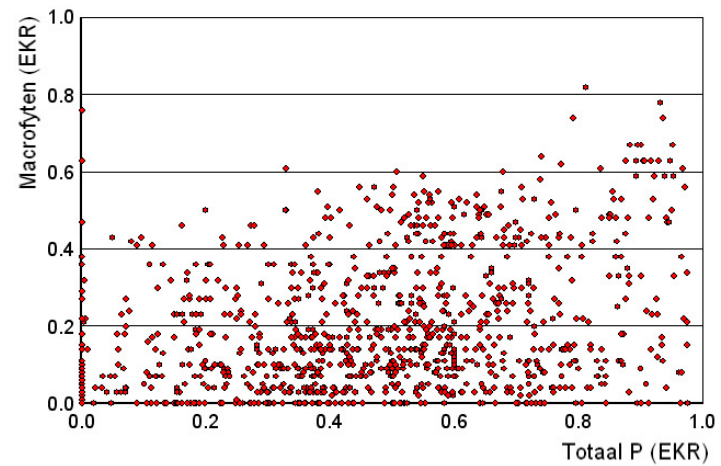


Totaal P met biologische oordelen

Fytoplankton-bloei



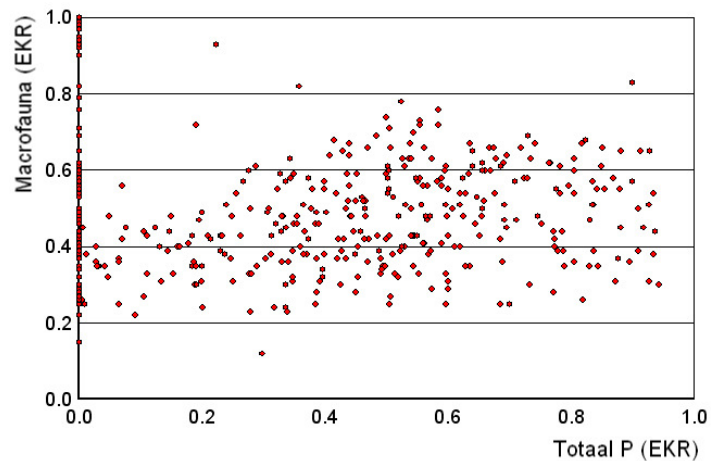
Macrofyten



ψ

Totaal P met biologische oordelen

Macrofauna



Vis

