

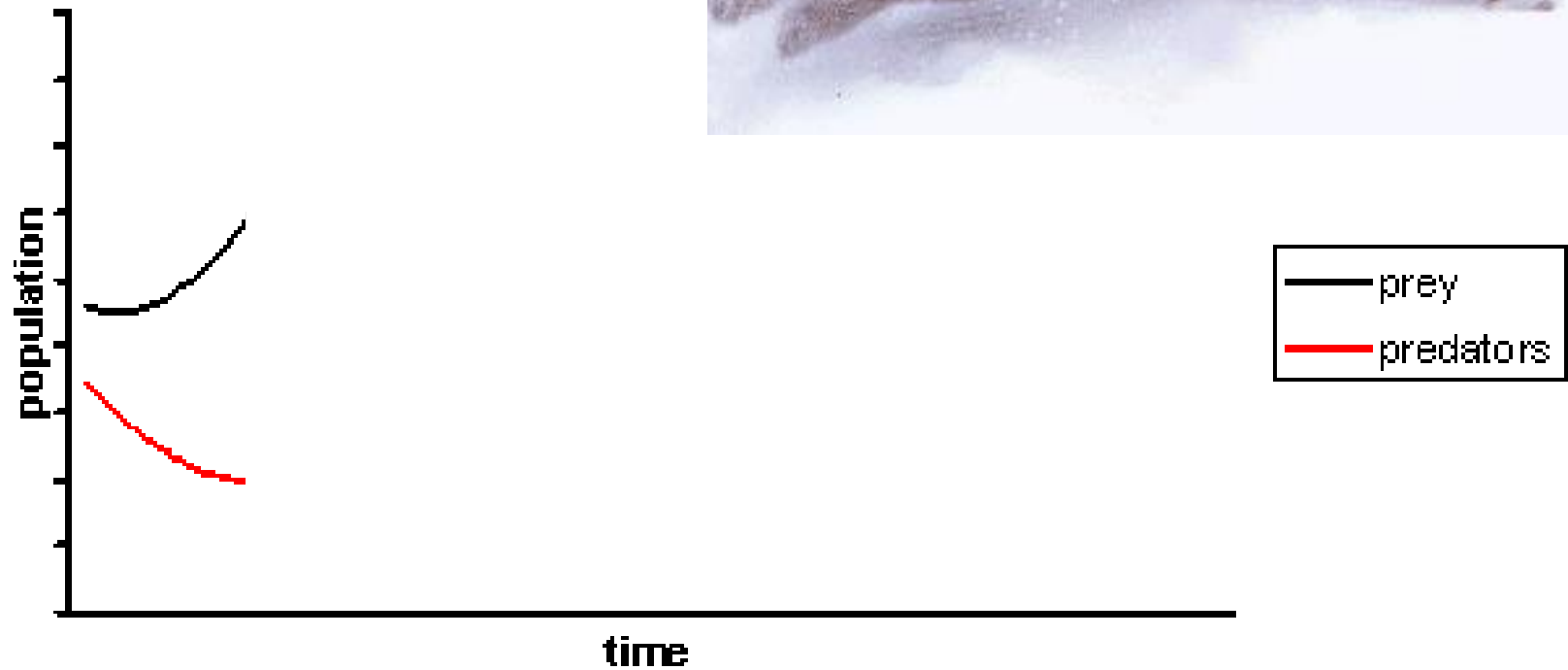
‘Het ecosysteemmodel PCLake:
een multitool voor de wetenschap en het beheer’

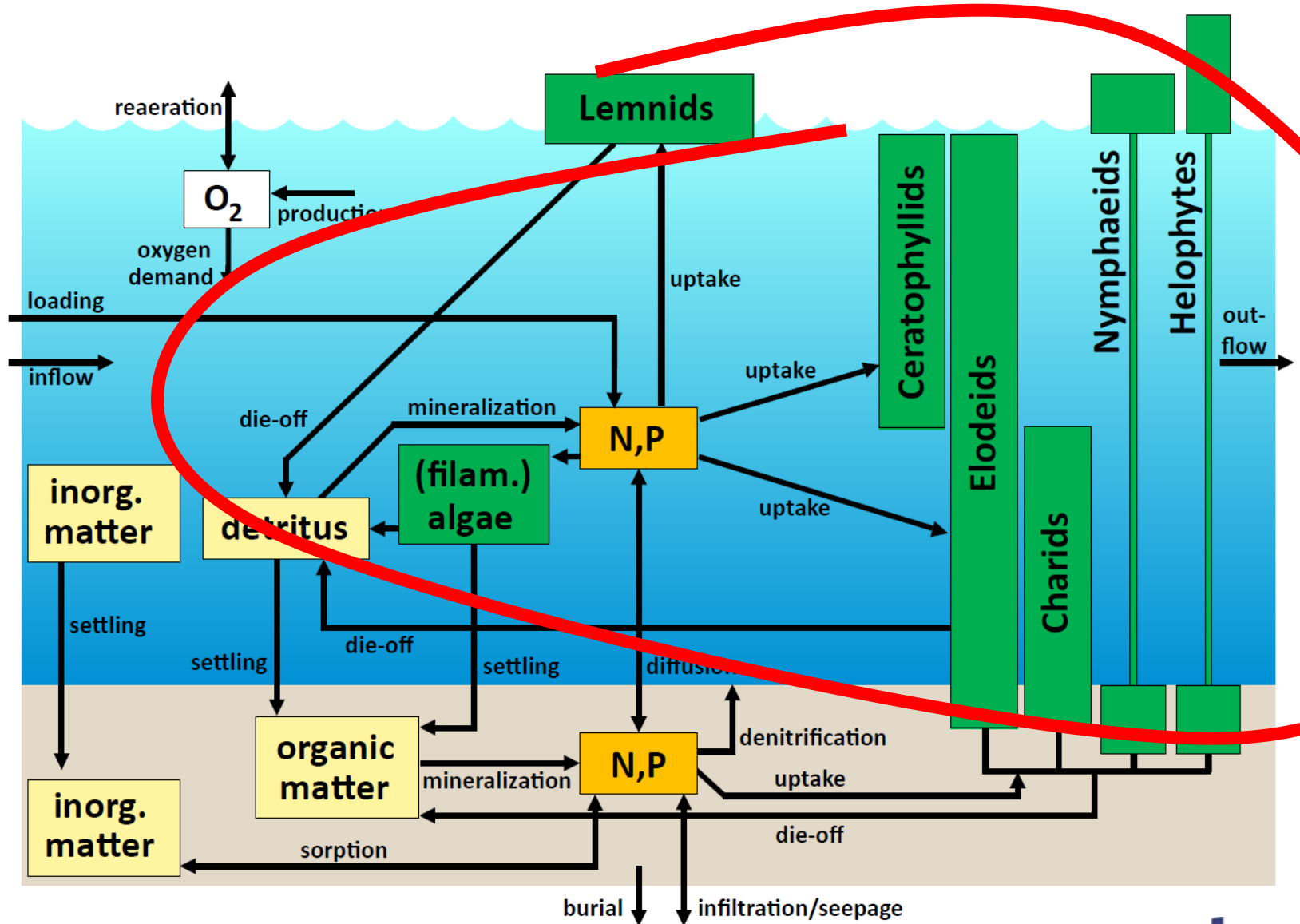


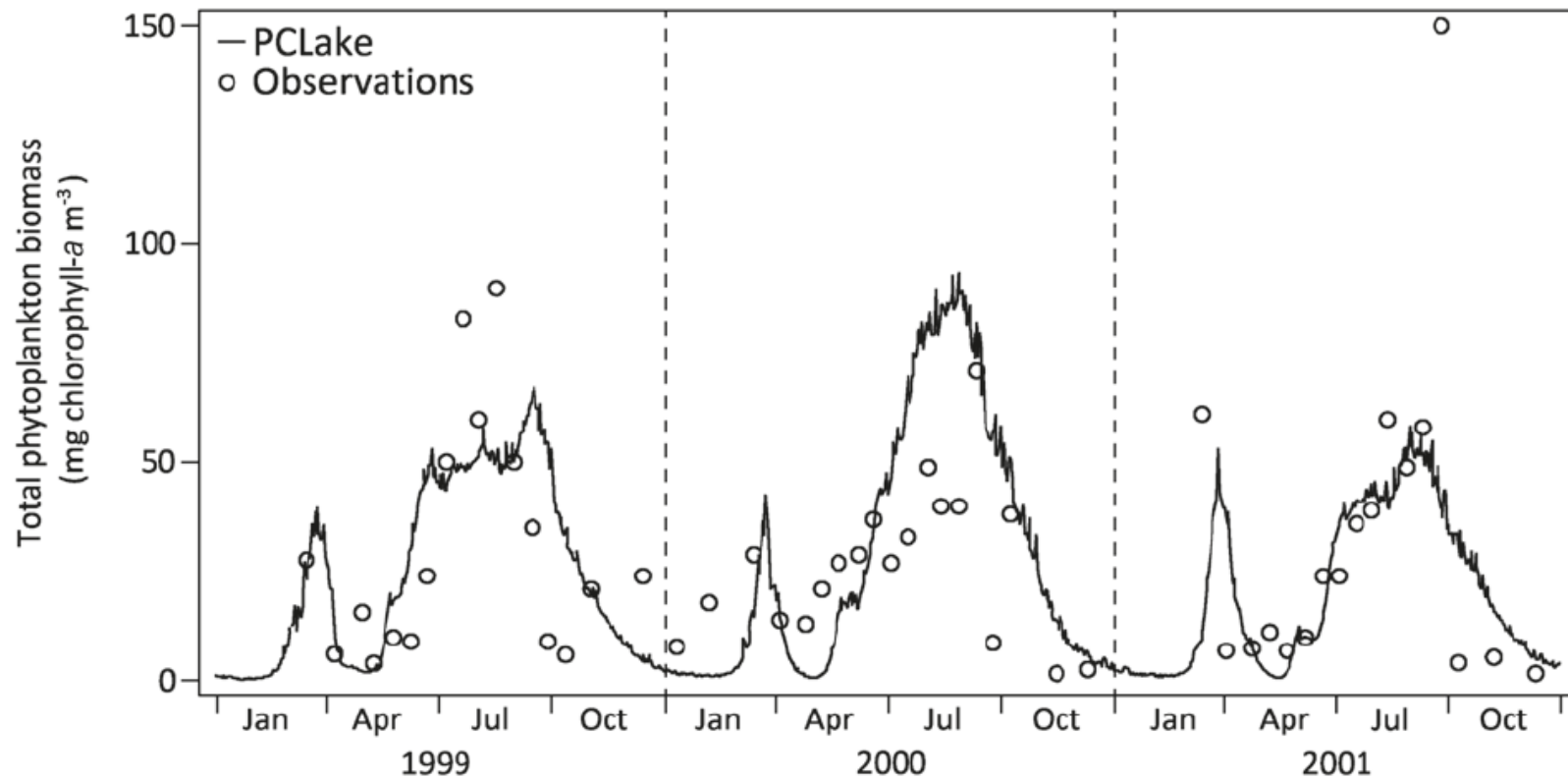
$$dV/dt = r V - a V P$$

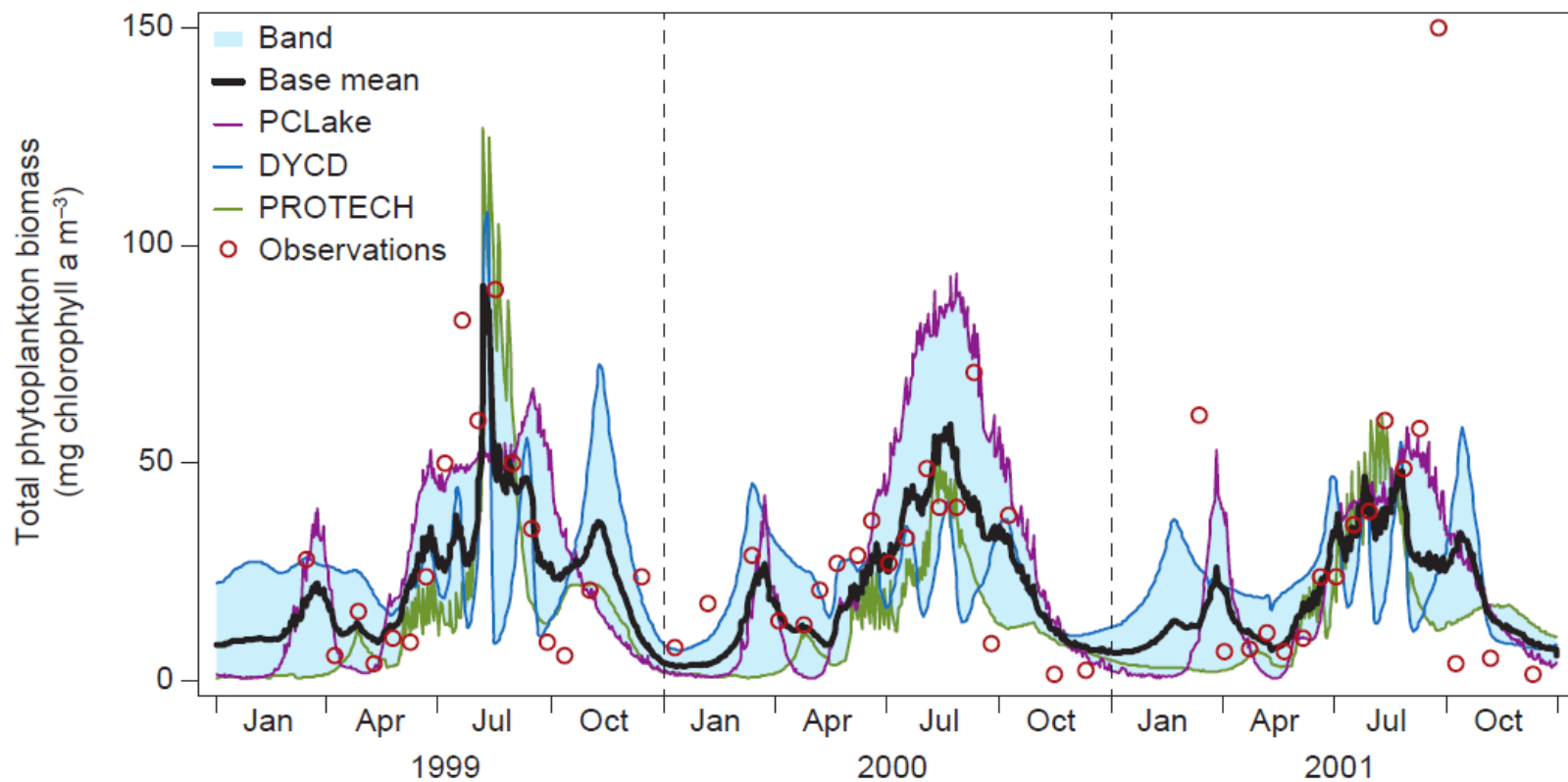
$$dP/dt = a e V P - d P$$

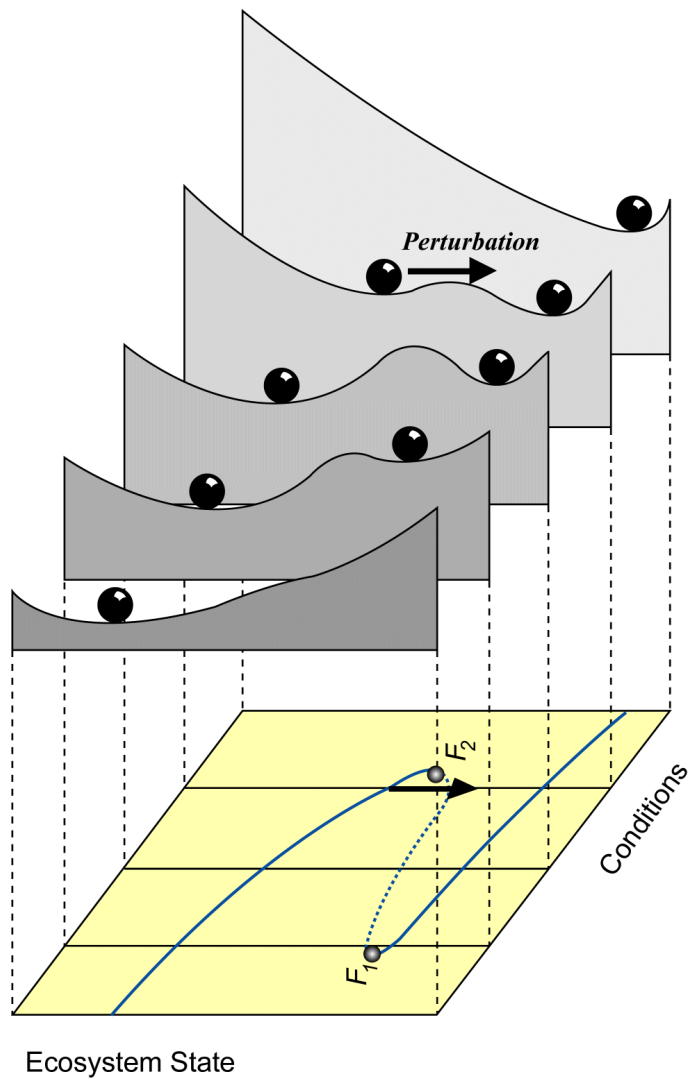
Example: Lotka-Volterra





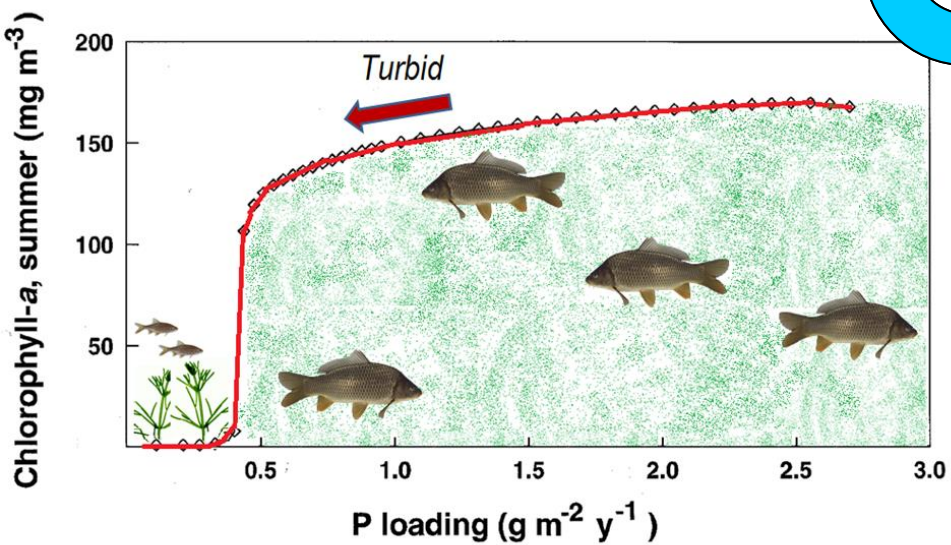
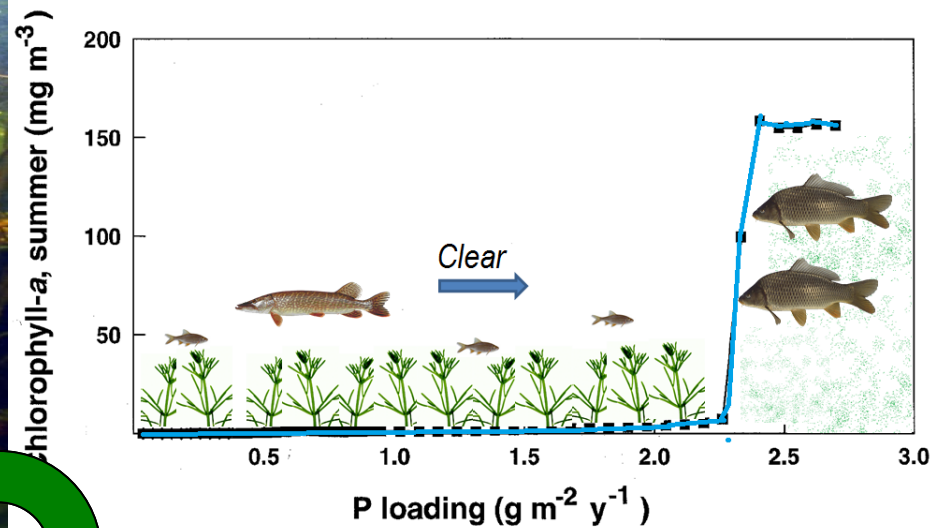






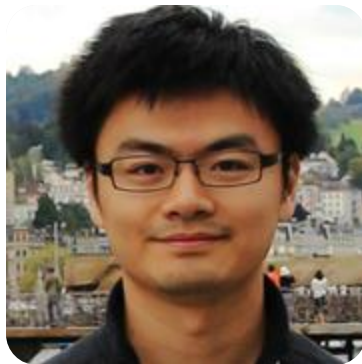
Scheffer et al. (2001) Nature

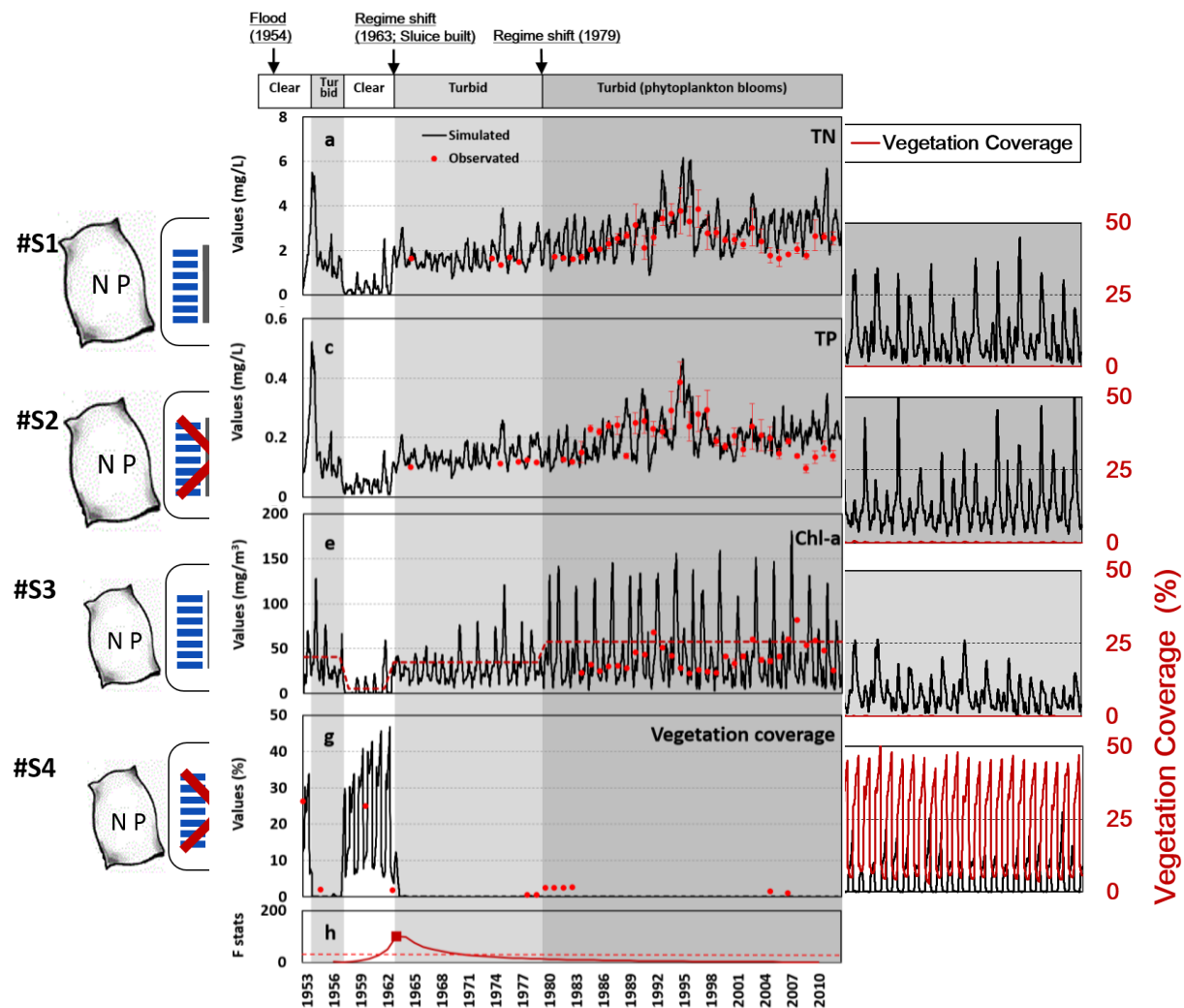


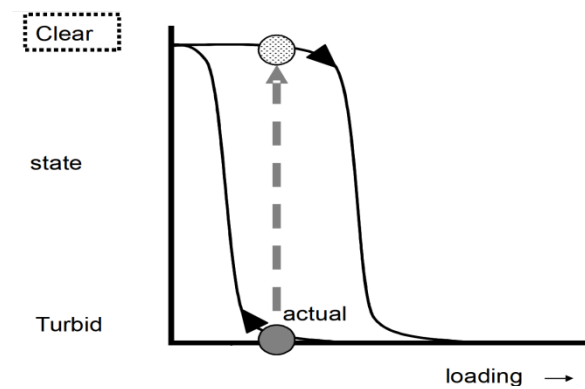
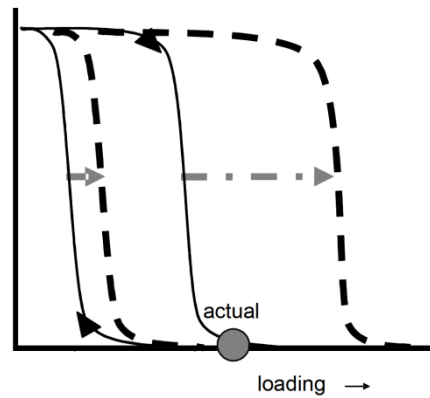
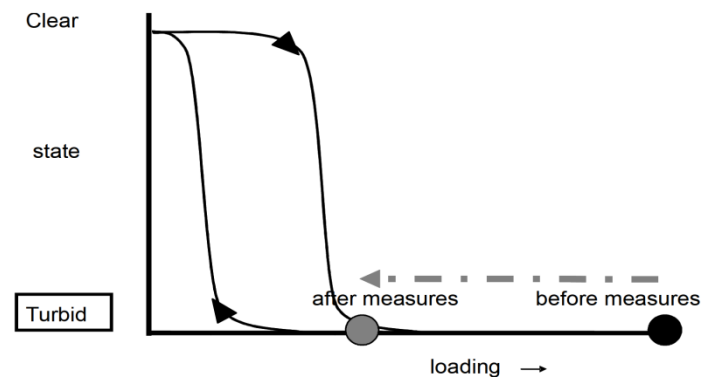





Hydrological regulation drives regime shifts: evidence from paleolimnology and ecosystem modeling of a large shallow Chinese lake

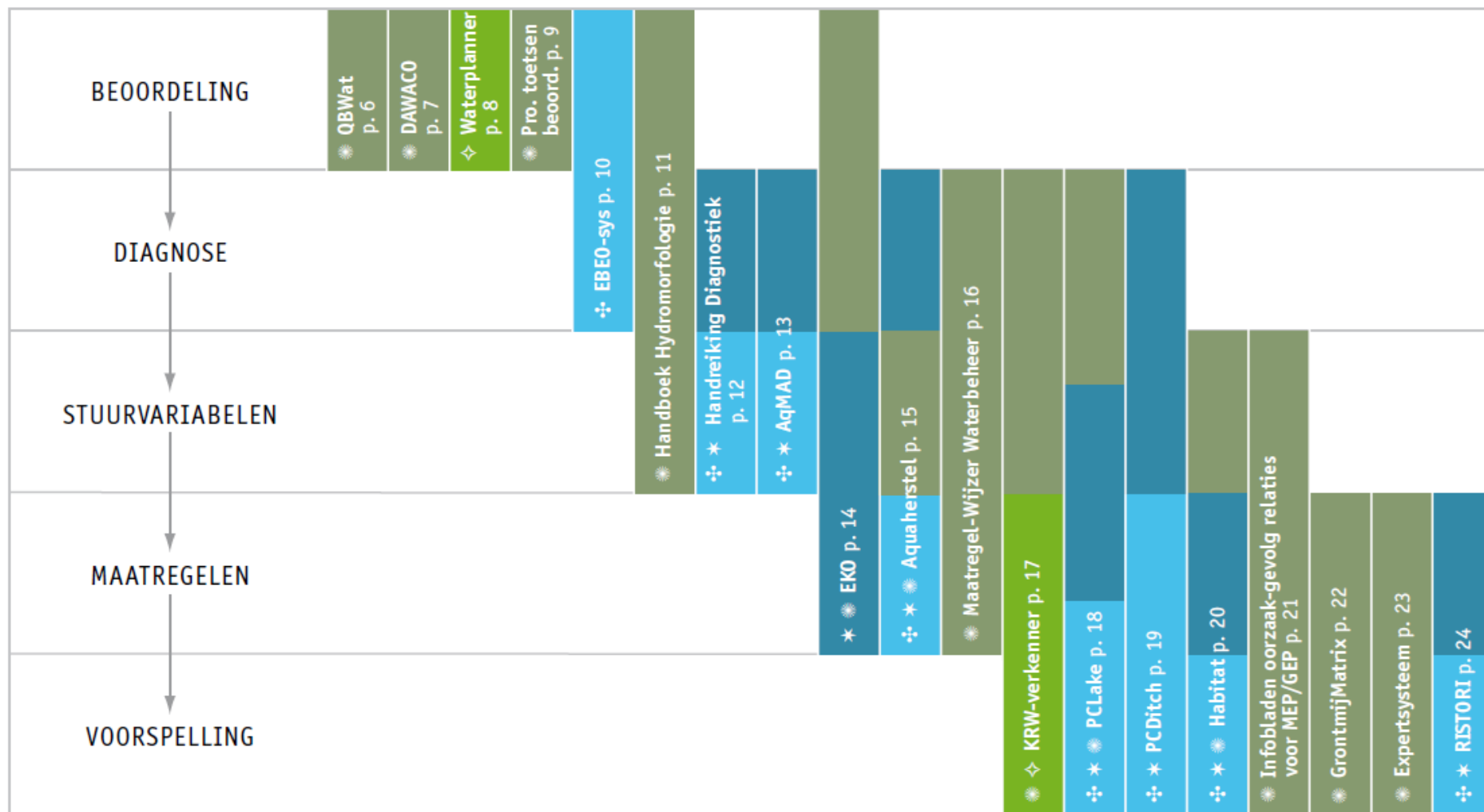
XIANGZHEN KONG^{1,2}, QISHUANG HE¹, BIN YANG¹, WEI HE¹, FULIU XU^{1,3},
ANNETTE B. G. JANSSEN^{2,4}, JAN J. KUIPER^{2,4}, LUUK P. A. VAN GERVEN^{2,4},
NING QIN¹, YUJIAO JIANG¹, WENXIU LIU¹, CHEN YANG¹, ZELIN BAI¹,
MIN ZHANG⁵, FANXIANG KONG⁵, JAN H. JANSE^{2,6} and WOLF M. MOOIJ^{2,4}







-  turbid
-  turbid, but chance of recovery
-  clear

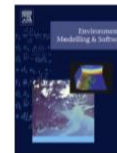


◇ HABITAT * ECOTOOP * WATERLICHAAM ◇ STROOMGEBIED



BEFORE THE FLOOD

stowa



Advancing projections of phytoplankton responses to climate change through ensemble modelling[☆]

Dennis Trolle^{a,b,*}, J. Alex Elliott^c, Wolf M. Mooij^{d,e}, Jan H. Janse^{d,f}, Karsten Bolding^{a,g}, David P. Hamilton^h, Erik Jeppesen^{a,b,i}



Article

Climate Change Will Make Recovery from Eutrophication More Difficult in Shallow Danish Lake Søbygaard

Jonas Rolighed^{1,*}, Erik Jeppesen^{1,2,3,4}, Martin Søndergaard^{1,2}, Rikke Bjerring¹, Jan H. Janse^{5,6}, Wolf M. Mooij^{6,7} and Dennis Trolle^{1,2,*}

Ecological Applications, 24(8), 2014, pp. 1926–1944
© 2014 by the Ecological Society of America

Effects of climate and nutrient load on the water quality of shallow lakes assessed through ensemble runs by PCLake

ANDERS NIELSEN,^{1,2,3,8} DENNIS TROLLE,^{1,2} RIKKE BJERRING,¹ MARTIN SØNDERGAARD,¹ JØRGEN E. OLESEN,^{2,3}
JAN H. JANSE,⁵ WOLF M. MOOIJ,^{6,7} AND ERIK JEPPESEN^{1,2,4}



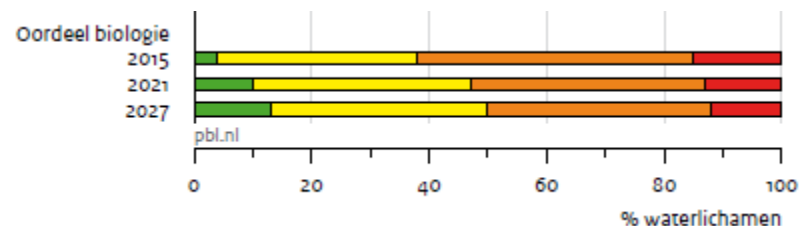


Planbureau voor de Leefomgeving

Waterkwaliteit nu en in de toekomst

Eindrapport ex ante evaluatie
van de Nederlandse plannen
voor de Kaderrichtlijn Water

Beleidsstudie





Witteveen

Bos



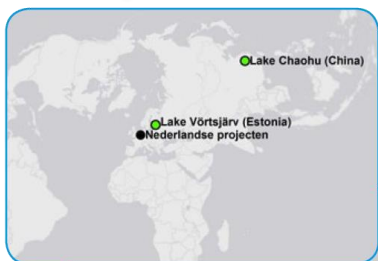
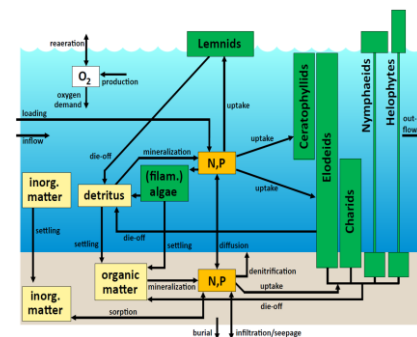
WAGENINGEN

for quality



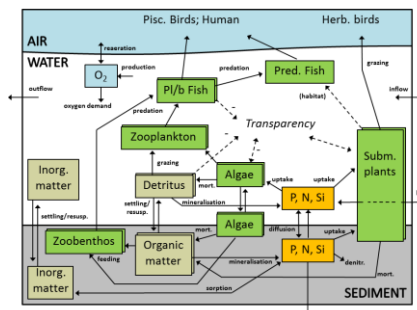
WAGENINGEN

For quality of life



WAGENINGEN

For quality of life

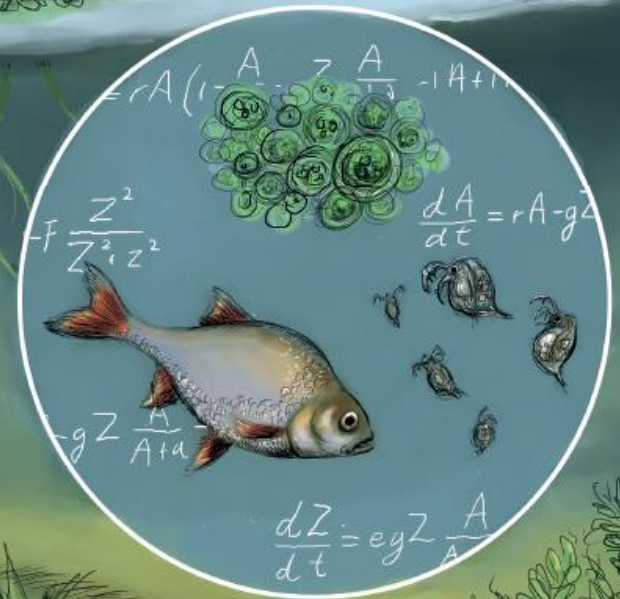


Doelen:

- De modellen toegankelijker maken
- De modellen verbeteren
- Nieuwe toepassingen uitwerken
- Wetenschappelijke theorie ontwikkelen

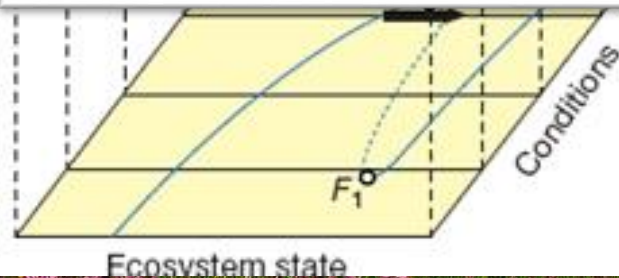
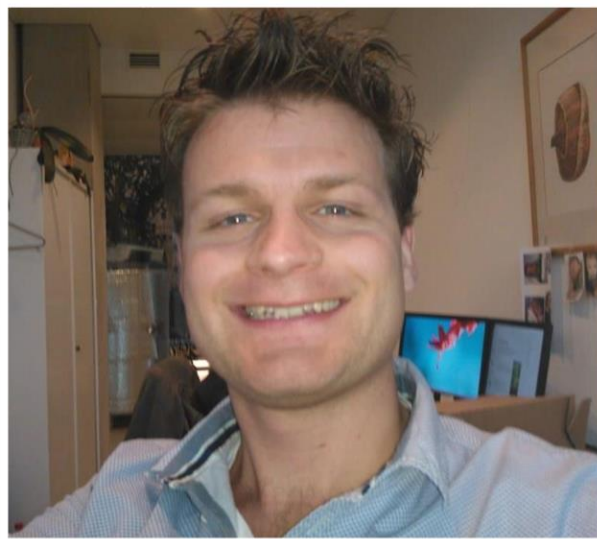
Making eco logic and models work

An integrative approach to lake ecosystem modelling



Doelen:

- De modellen toegankelijker maken (H2)
- De modellen verbeteren
- Nieuwe toepassingen uitwerken
- Wetenschappelijke theorie ontwikkelen





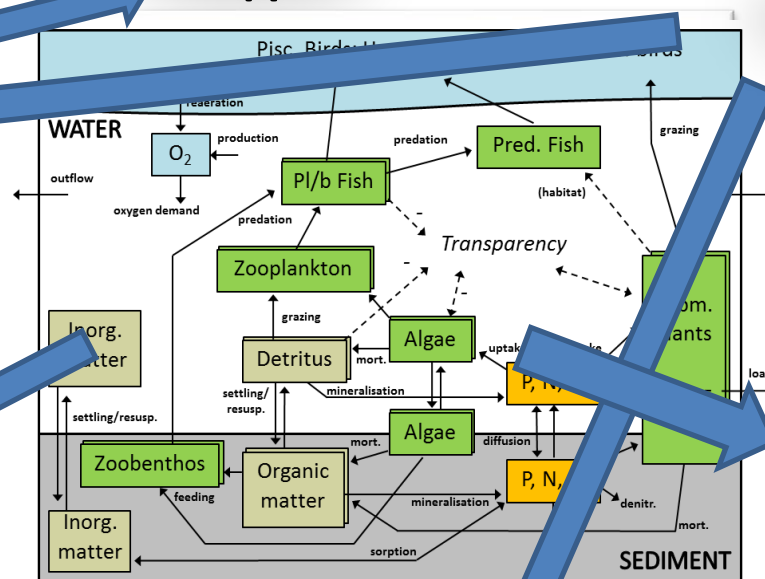
OSIRIS/C++



R



ACSL



DELWAQ/SOBK
FORTRAN



DUPROL



MATLAB

stowa



OSIRIS/C++



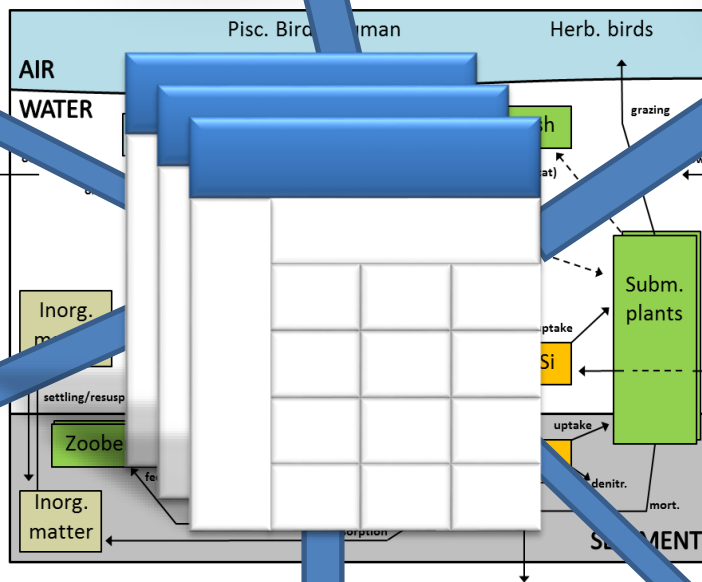
R



ACSL



DELWAQ/SOBK
FORTRAN

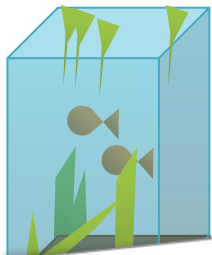


MATLAB



DUPROL

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Environmental Modelling & Software 61 (2014) 266–273

Contents lists available at ScienceDirect



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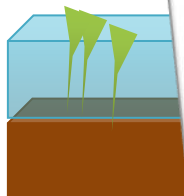
CrossMark

Serving many at once: How a database approach can create unity in dynamical ecosystem modelling[☆]

Wolf M. Mooij^{a,b,*}, Robert J. Brederveld^c, Jeroen J.M. de Klein^b, Don L. DeAngelis^d,
Andrea S. Downing^e, Michiel Faber^c, Daan J. Gerla^{f,p}, Matthew R. Hipsey^g,
Jochem 't Hoen^b, Jan H. Janse^h, Annette B.G. Janssen^{a,b}, Michel Jeukenⁱ, Bob W. Kooij^j,
Betty Lischke^k, Thomas Petzoldt^l, Leo Postma^h, Sebastiaan A. Schep^c, Huub Scholten^m,
Sven Teurlincx^a, Christophe Thiange^h, Dennis Trolleⁿ, Anne A. van Dam^o,
Luuk P.A. van Gerven^{a,b}, Egbert H. van Nes^b, Jan J. Kuiper^{a,b}

^a Department of Aquatic Ecology, Netherlands Institute of Ecology (NIOO-KNAW)
^b Water Quality Management Group, Delft University of Technology

PC



PCDitch



SOBEK



stowa

Doelen:

- De modellen toegankelijker maken
- De modellen verbeteren (H3)
- Nieuwe toepassingen uitwerken
- Wetenschappelijke theorie ontwikkelen

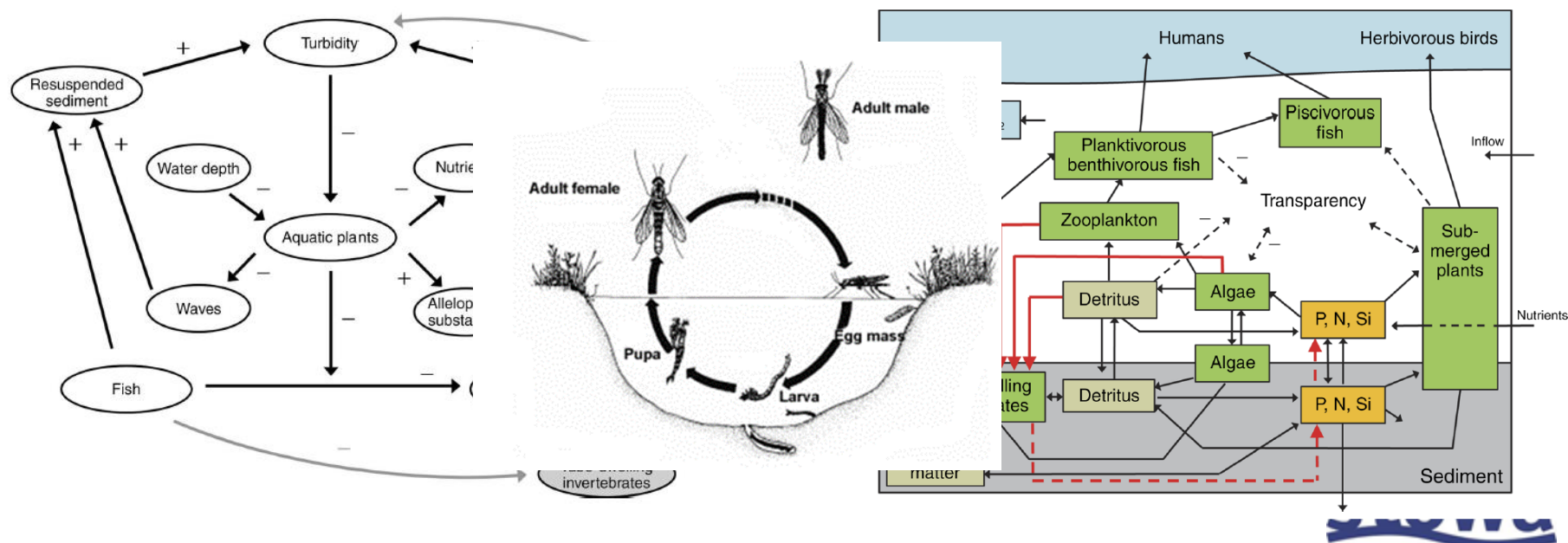
CONCEPTS & SYNTHESIS

EMPHASIZING NEW IDEAS TO STIMULATE RESEARCH IN ECOLOGY

Ecological Monographs, 85(3), 2015, pp. 333–351
© 2015 by the Ecological Society of America

Tube-dwelling invertebrates: tiny ecosystem engineers have large effects in lake ecosystems

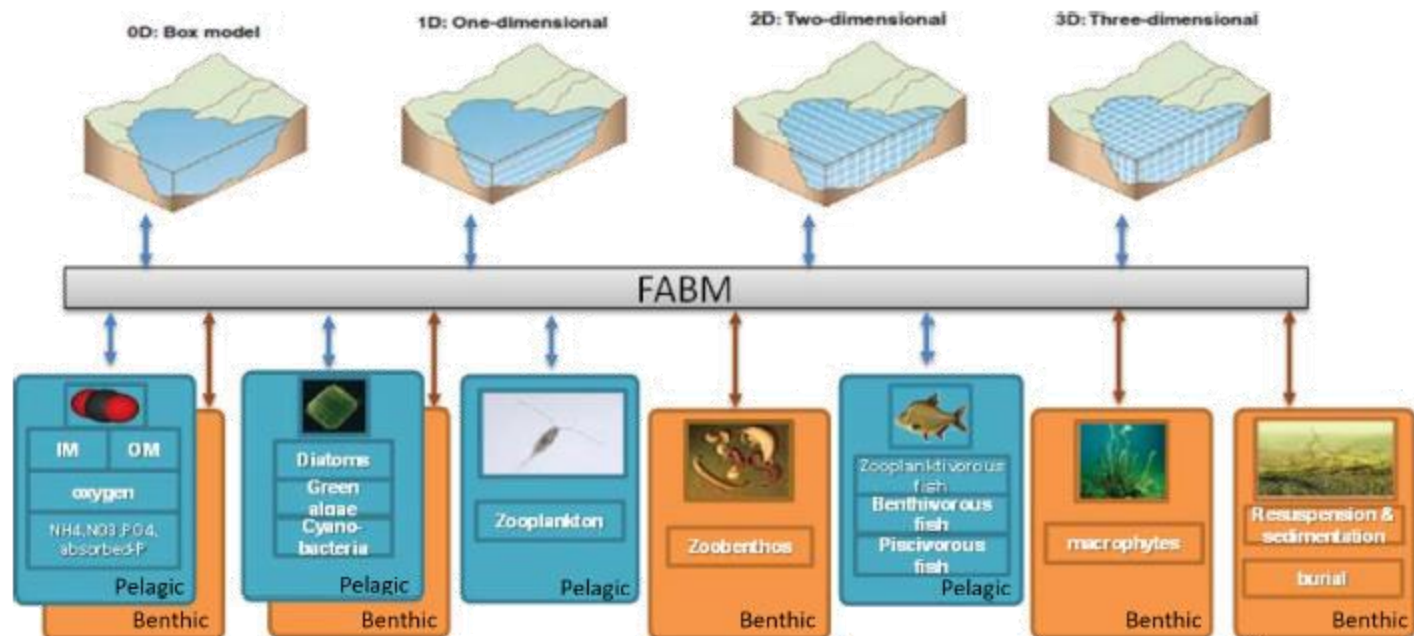
FRANZ HÖLKER,^{1,10} MICHAEL J. VANNI,² JAN J. KUIPER,³ CHRISTOF MEILE,⁴ HANS-PETER GROSSART,¹ PETER STIEF,⁵
RITA ADRIAN,¹ ANDREAS LORKE,⁶ OLAF DELLWIG,⁷ ANDREAS BRAND,⁸ MICHAEL HUPFER,¹ WOLF M. MOOIJ,^{3,9}
GUNNAR NÜTZMANN,¹ AND JÖRG LEWANDOWSKI¹





FABM-PCLake – linking aquatic ecology with hydrodynamics

Fenjuan Hu^{1,2}, Karsten Bolding^{1,3}, Jorn Bruggeman^{3,4}, Erik Jeppesen^{1,5}, Mogens R. Flindt², Luuk van Gerven^{6,7}, Jan H. Janse^{6,8}, Annette B. G. Janssen^{6,7}, Jan J. Kuiper^{6,7}, Wolf M. Mooij^{6,7}, and Dennis Trolle^{1,5}

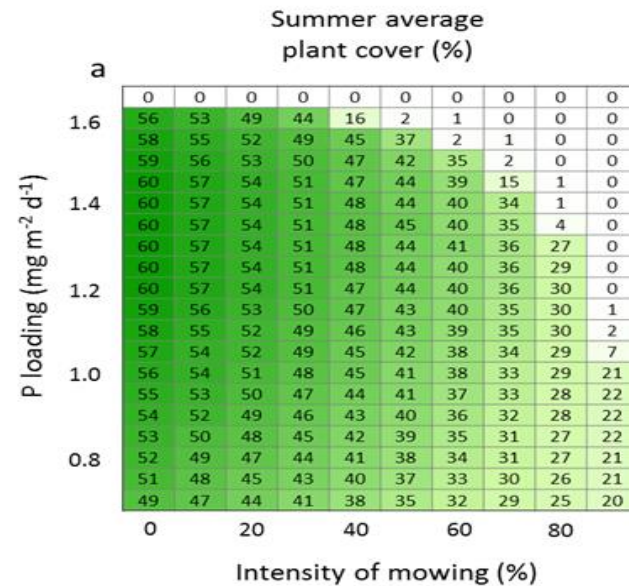
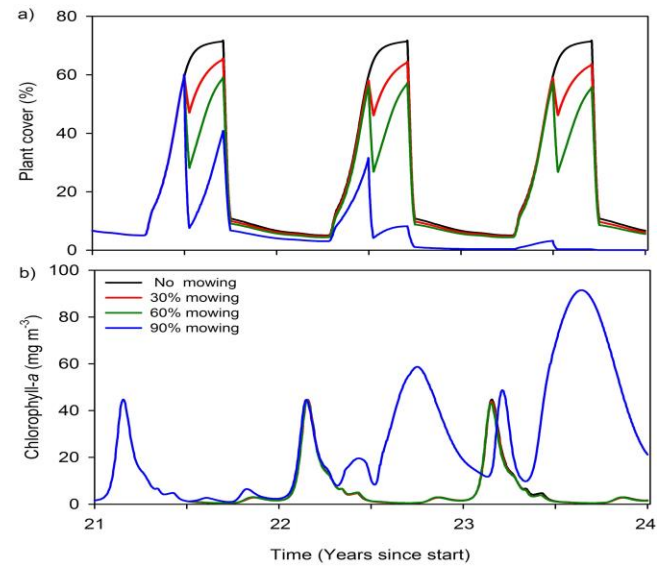


Doelen:

- De modellen toegankelijker maken
- De modellen verbeteren
- Nieuwe toepassingen uitwerken (H6)
- Wetenschappelijke theorie ontwikkelen

Maaien van waterplanten in ondiepe meren
met alternatieve stabiele toestanden:
Battling the good guys?

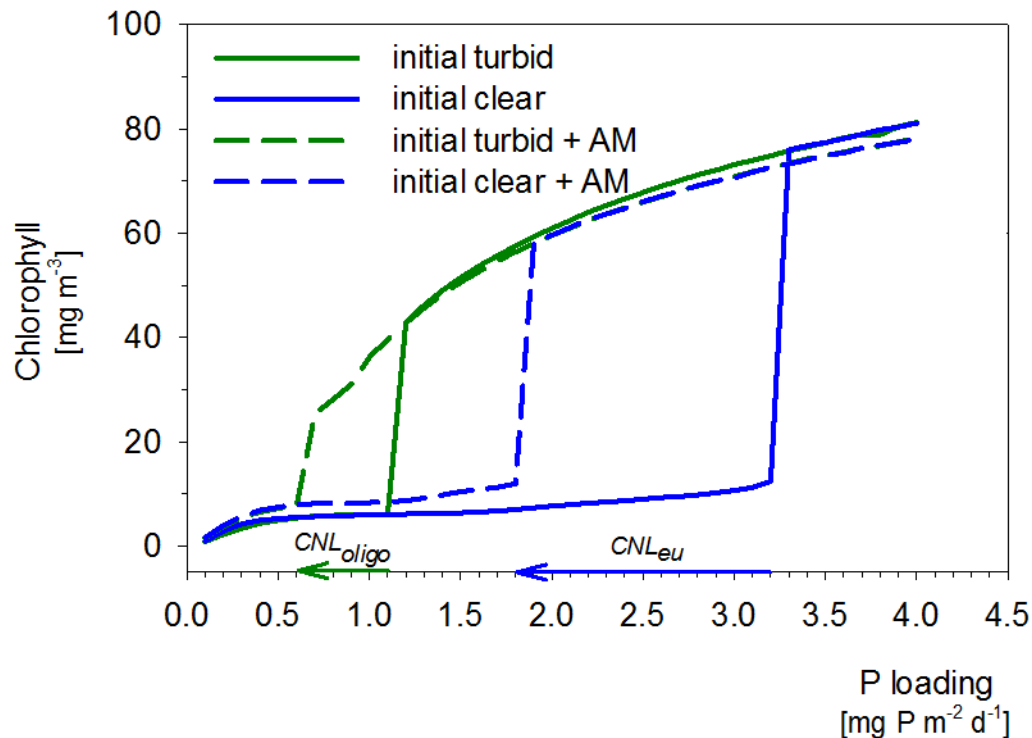






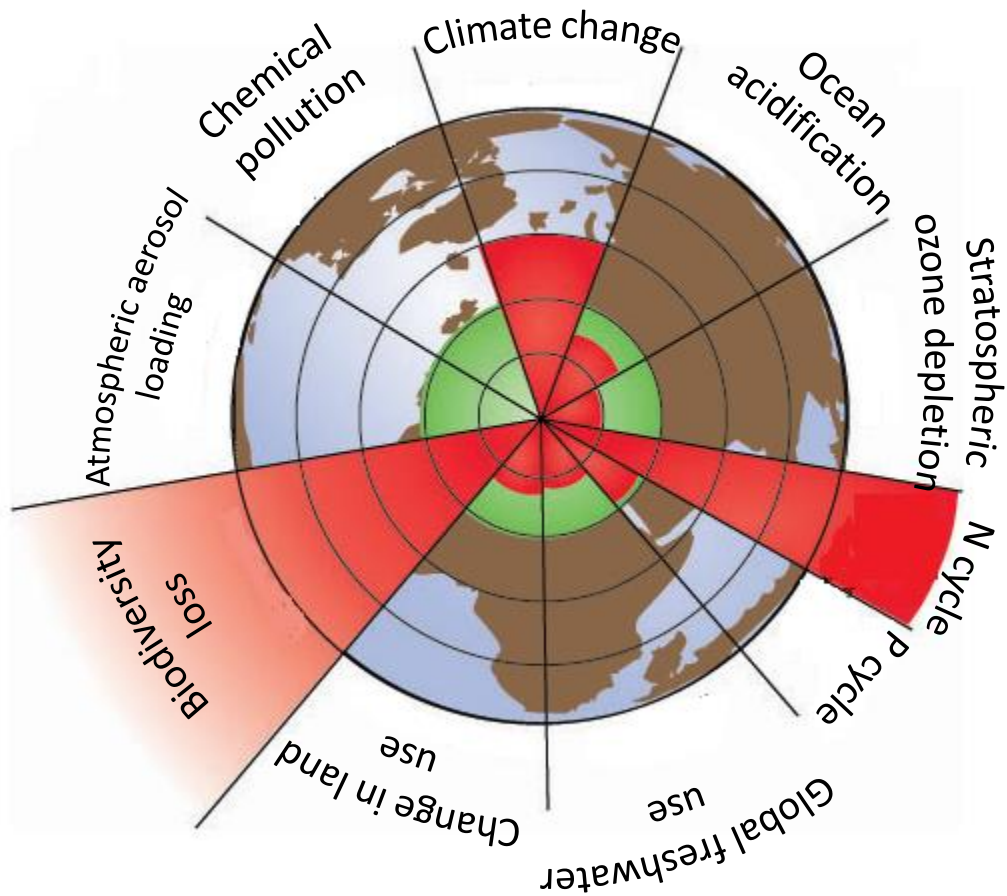
Enhanced Input of Terrestrial Particulate Organic Matter Reduces the Resilience of the Clear-Water State of Shallow Lakes: A Model Study

Betty Lischke,^{1*} Sabine Hilt,² Jan H. Janse,³ Jan J. Kuiper,⁴
Thomas Mehner,² Wolf M. Mooij,^{4,5} and Ursula Gaedke¹

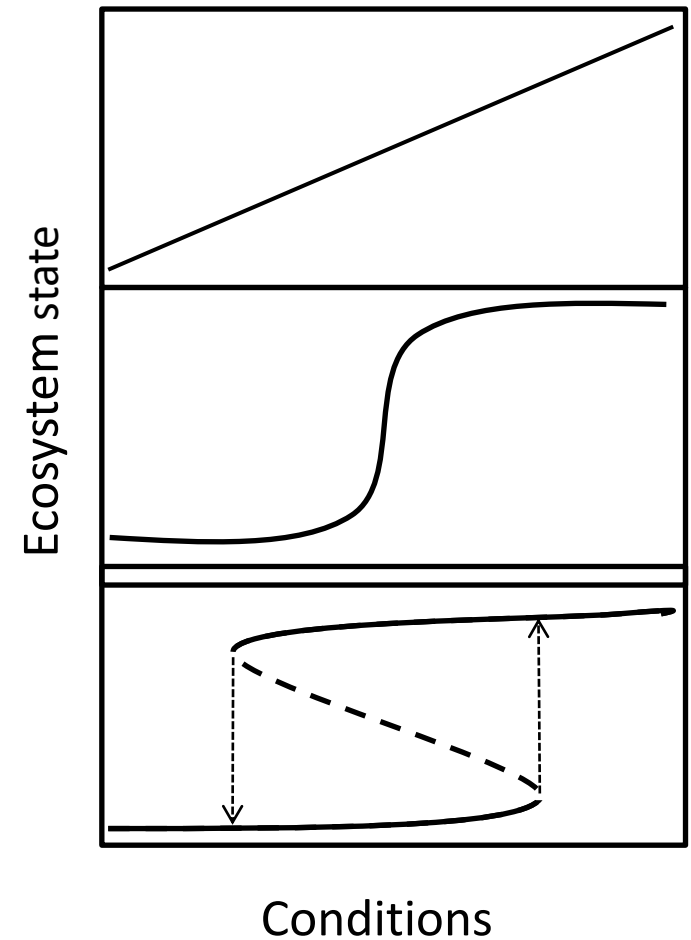


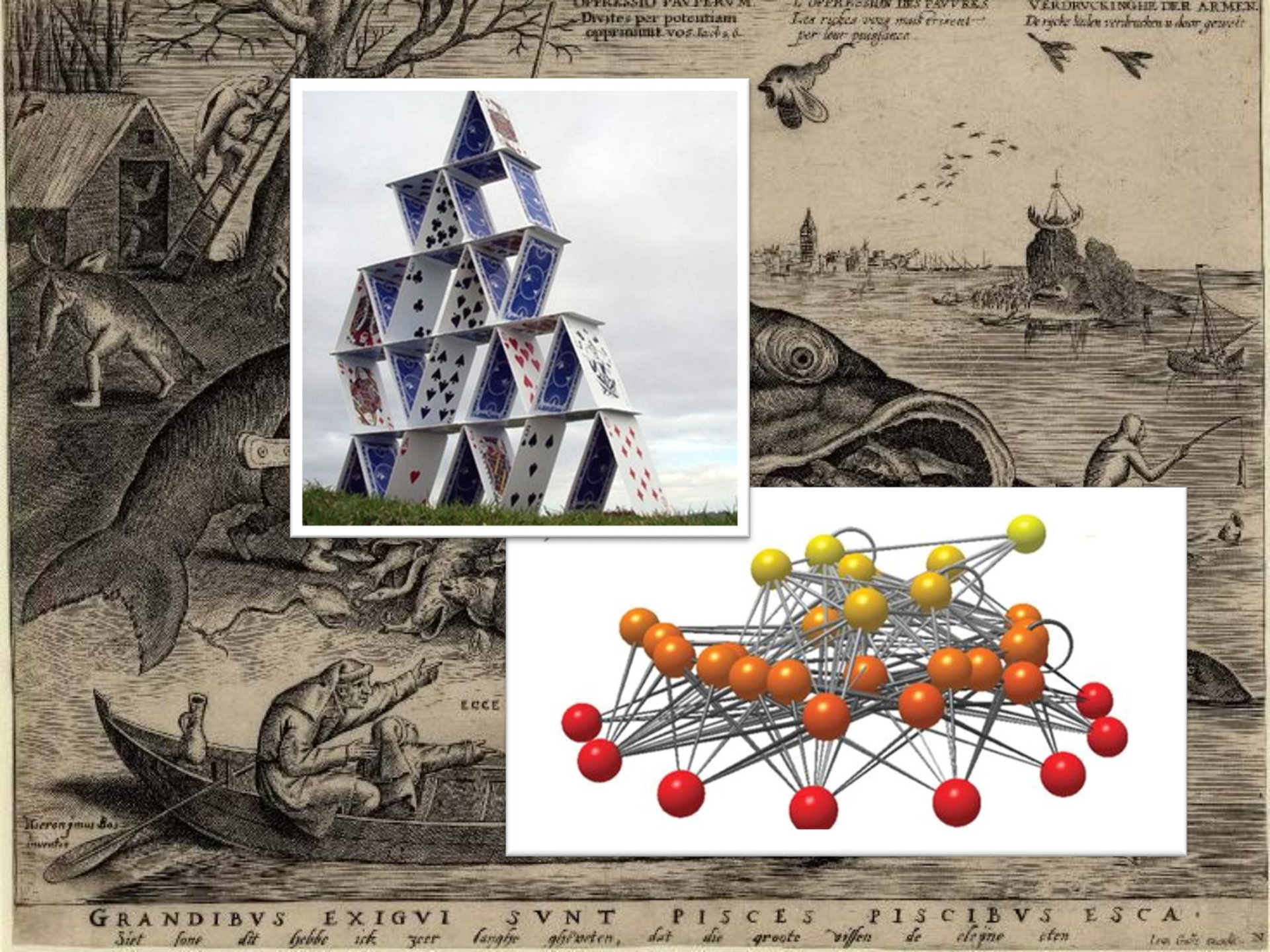
Doelen:

- De modellen toegankelijker maken
- De modellen verbeteren
- Nieuwe toepassingen uitwerken
- Wetenschappelijke theorie ontwikkelen (H4,H5)



Rockström et al. 2009, Nature
A safe operating space for humanity

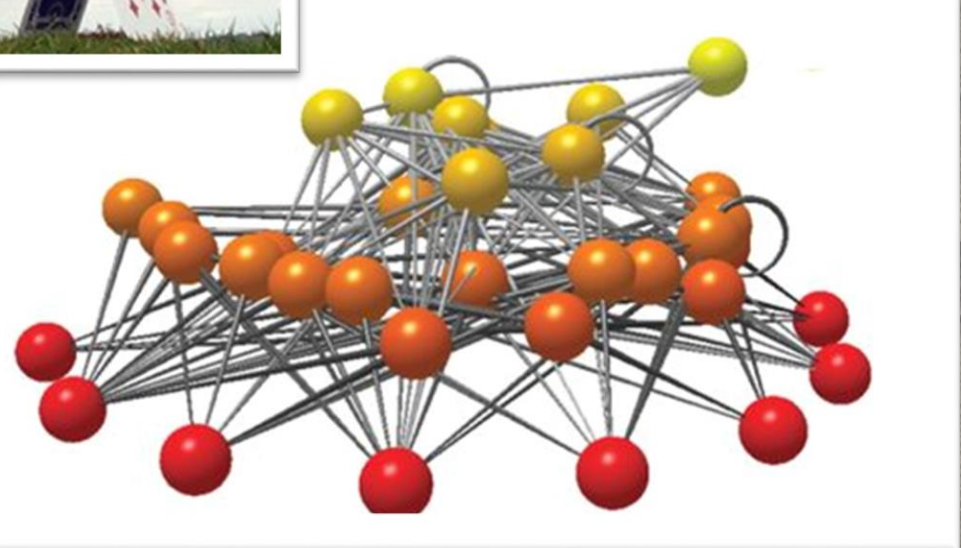




OPPRESSIO PAUPERVM
Divites per potentiam
opprimunt vos. Luc. 1. 1.

L'OPPRESSION DES PAUVRES
Les riches vous oppriment
par leur puissance

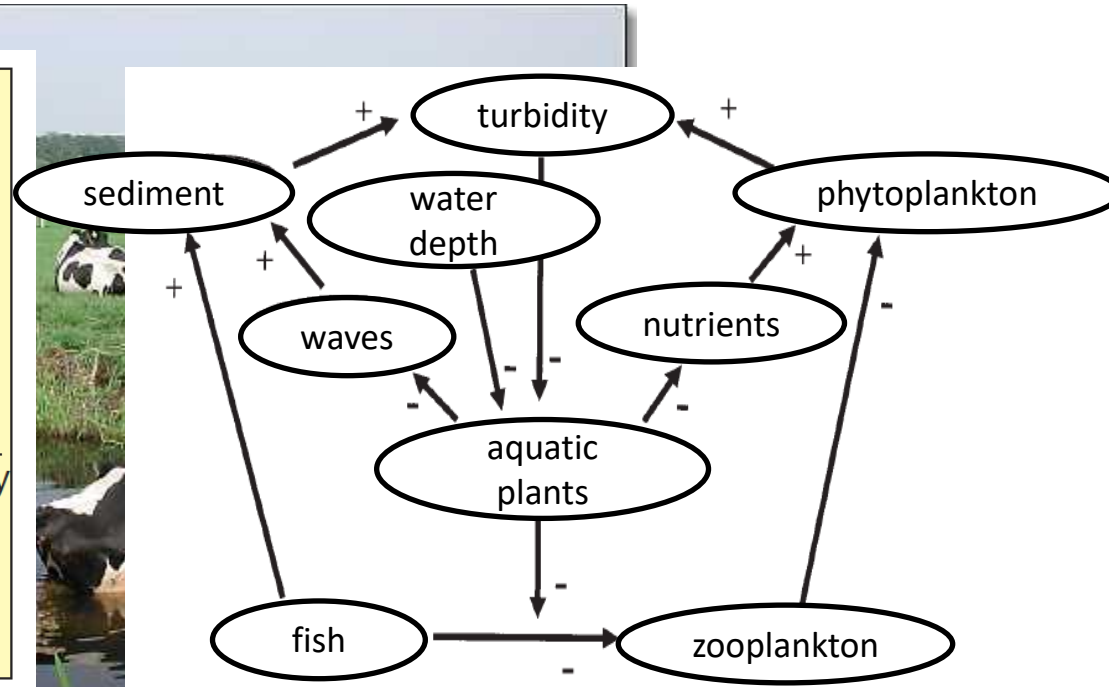
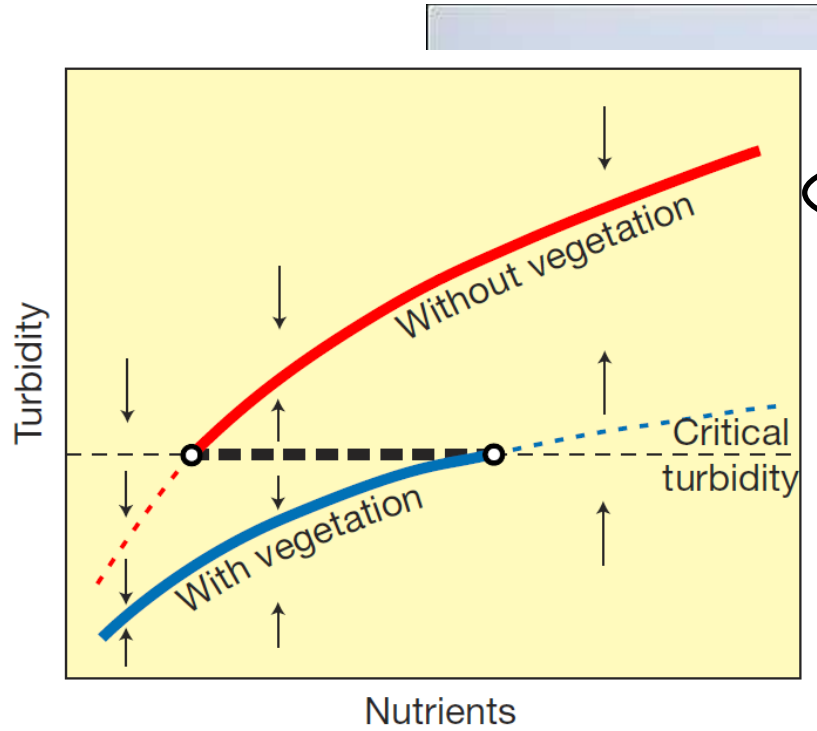
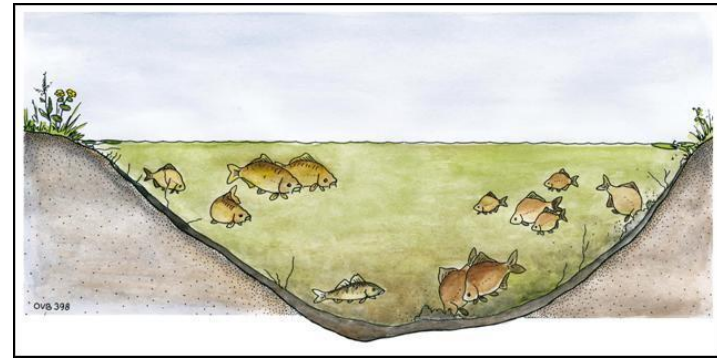
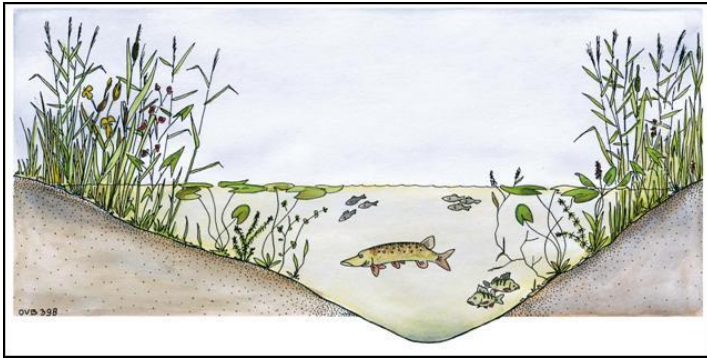
VERDRUCKINGHE DER ARMEN.
De rycke lieden verdrucken u door geweld



GRANDIBVS EXIGVI SVNT PISCES PISCIBVS ESCA.

Siet lene dit hebbe ick zeer langhe gheweten, dat die groote vissen de eyghe eten

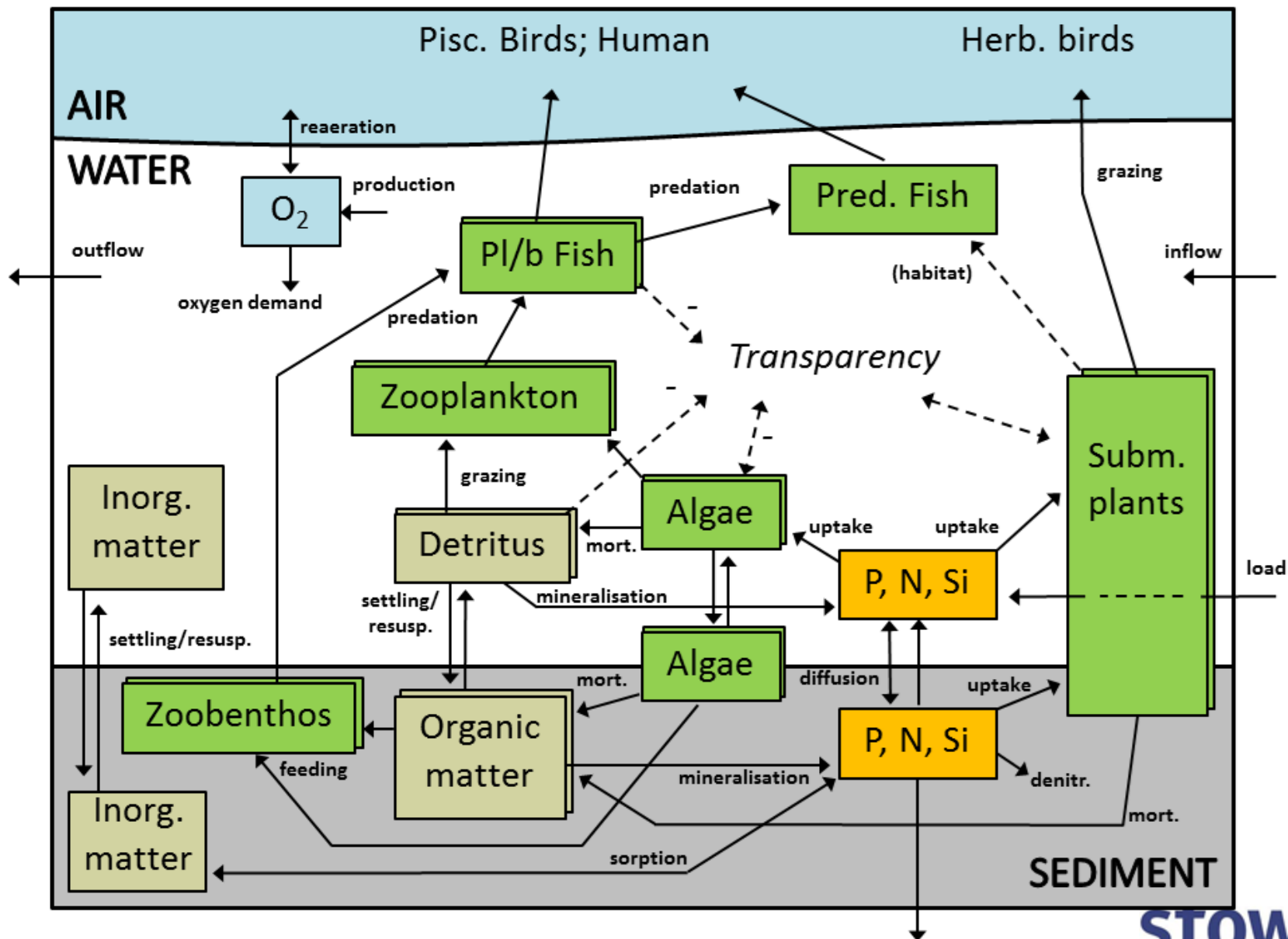
Van Goye maect. 28



Scheffer et al, 2001

Scheffer et al, 1993

Alternative equilibria in shallow lakes. TREE, 8,8



**Hoe verandert de stabiliteit
van het voedselweb
in aanloop naar
een kantelpunt
van helder naar troebel?**



ARTICLE

Received 22 Apr 2015 | Accepted 4 Jun 2015 | Published 15 Jul 2015

DOI: [10.1038/ncomms8727](https://doi.org/10.1038/ncomms8727)

OPEN

Food-web stability signals critical transitions in temperate shallow lakes

Jan J. Kuiper^{1,2}, Cassandra van Altena³, Peter C. de Ruiter^{3,4}, Luuk P.A. van Gerven^{1,2}, Jan H. Janse^{1,5}
& Wolf M. Mooij^{1,2}

**We zijn al een heel eind,
maar we zijn er nog niet!**

**Het project is afgelopen,
hoe ziet de toekomst eruit?**