

# Modelling consumer-resource interactions to derive nutrient thresholds for a sustainable Anthropocene

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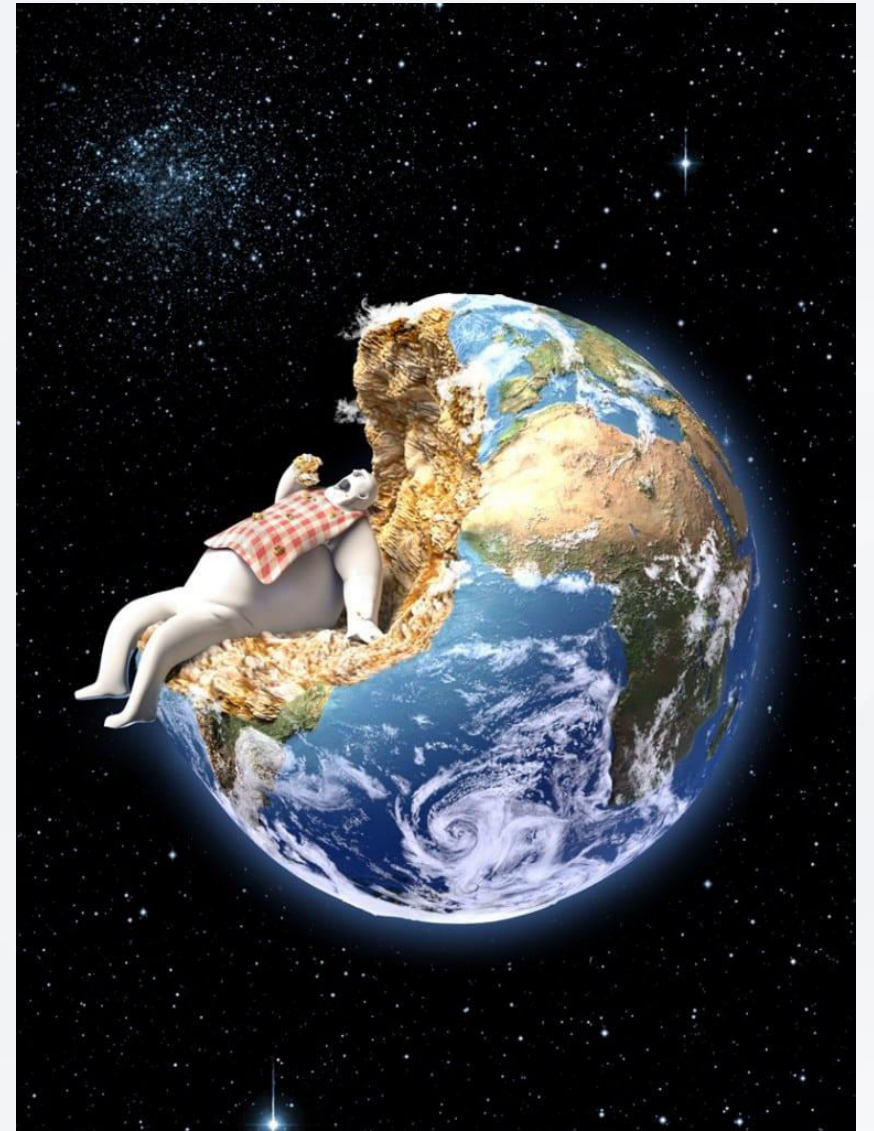


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WORLD WATER  
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第18届  
世界水资源大会  
水与万物：  
人与自然和谐共生

# Anthropocene





# Unsustainable Anthropocene



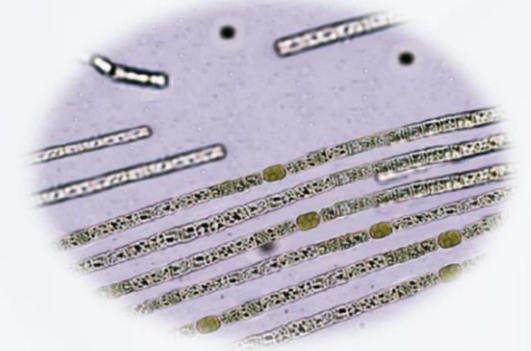
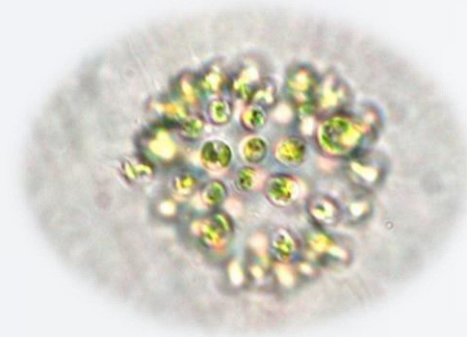
# Sustainable Anthropocene



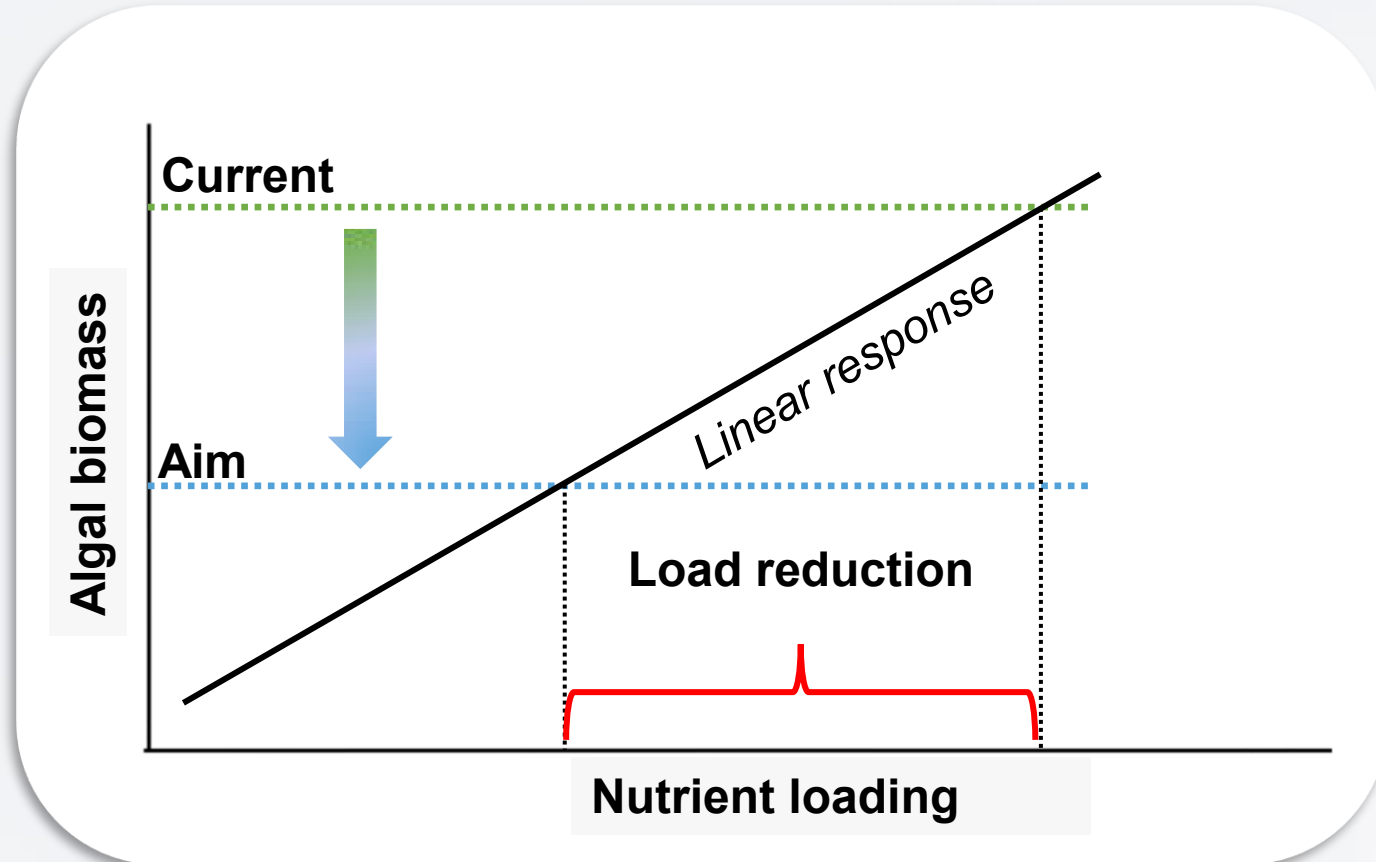
# Eutrophication in the Anthropocene



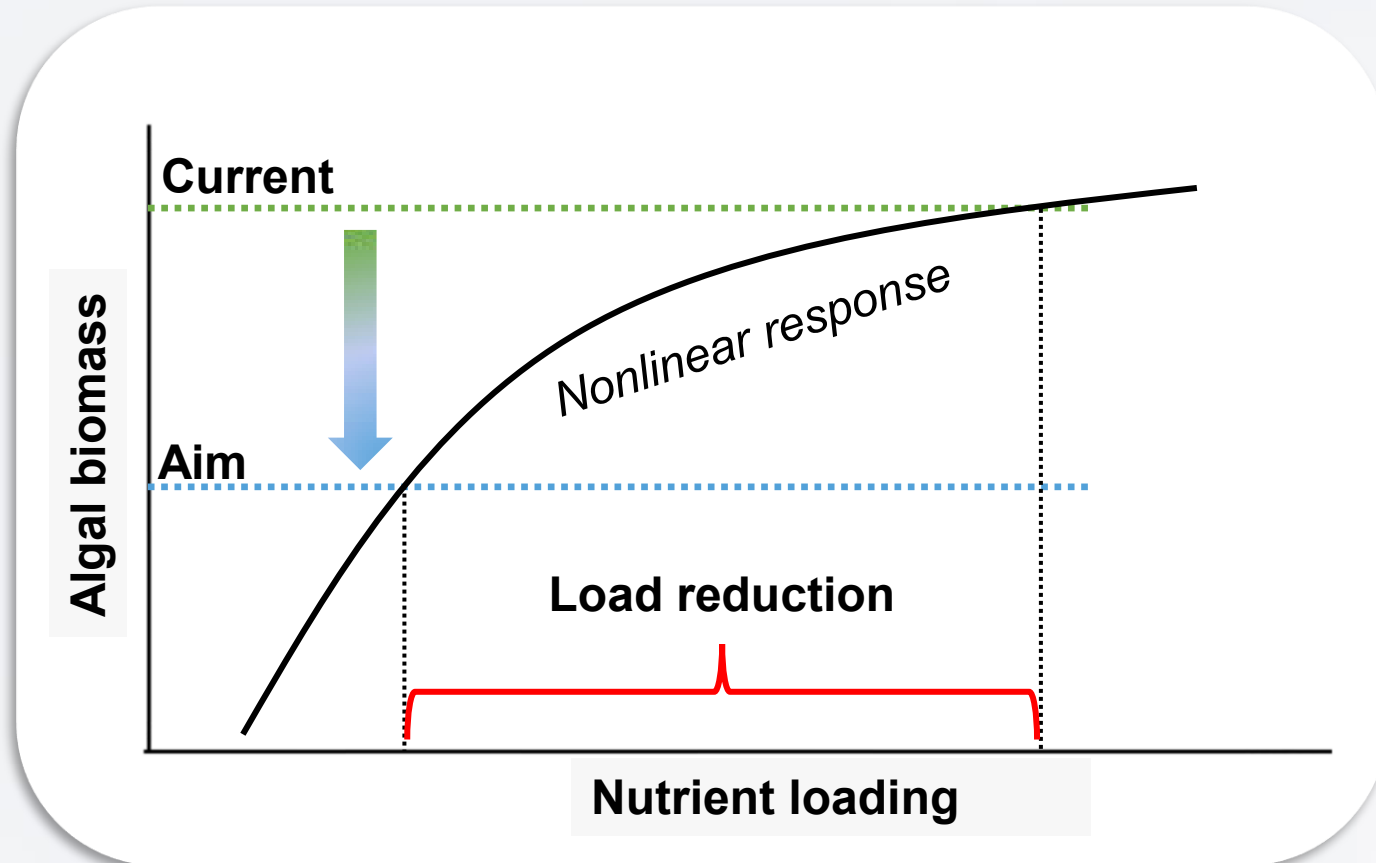
*Cyanobacteria*



# Water quality management through nutrient load reduction

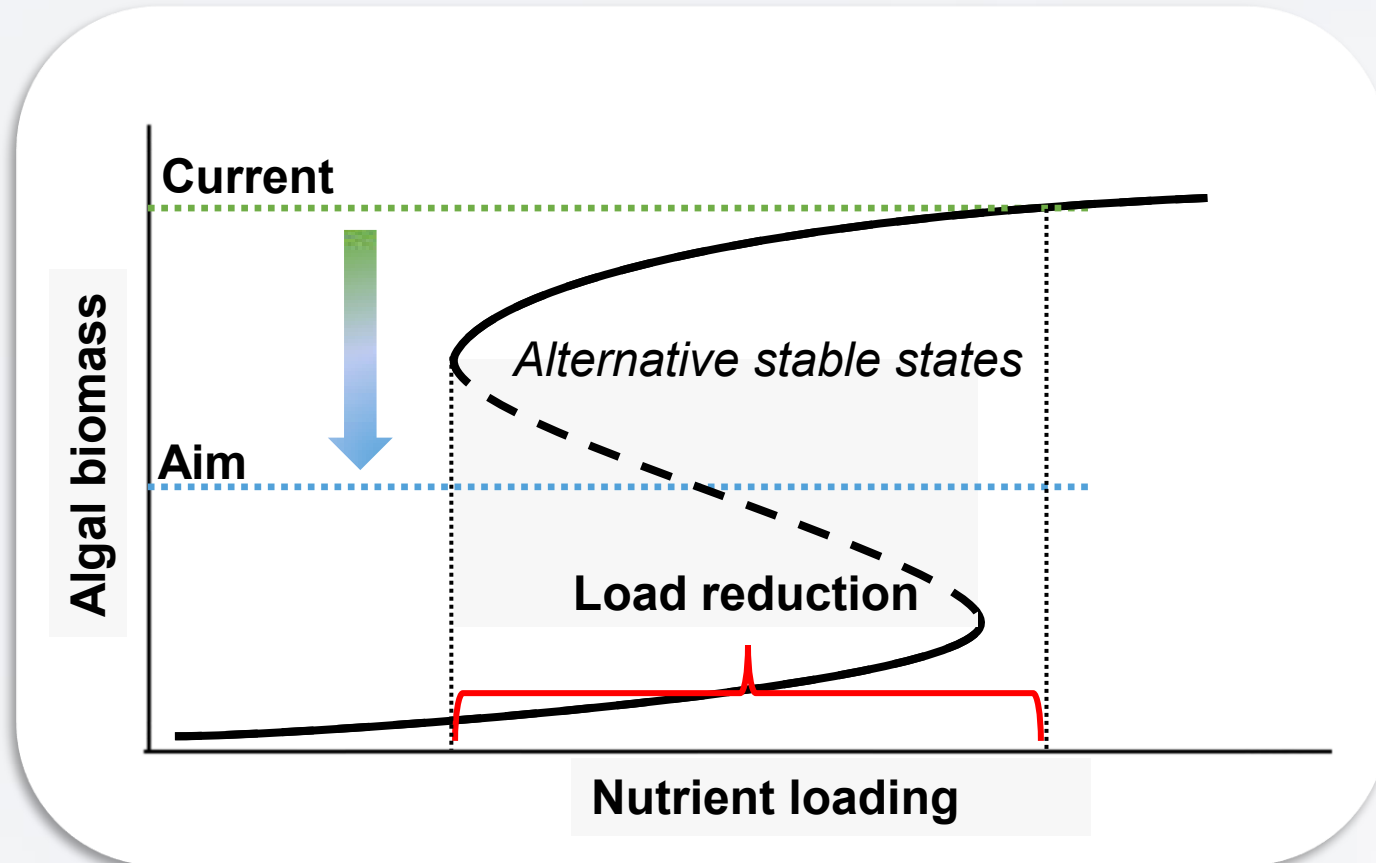


# Water quality management through nutrient load reduction

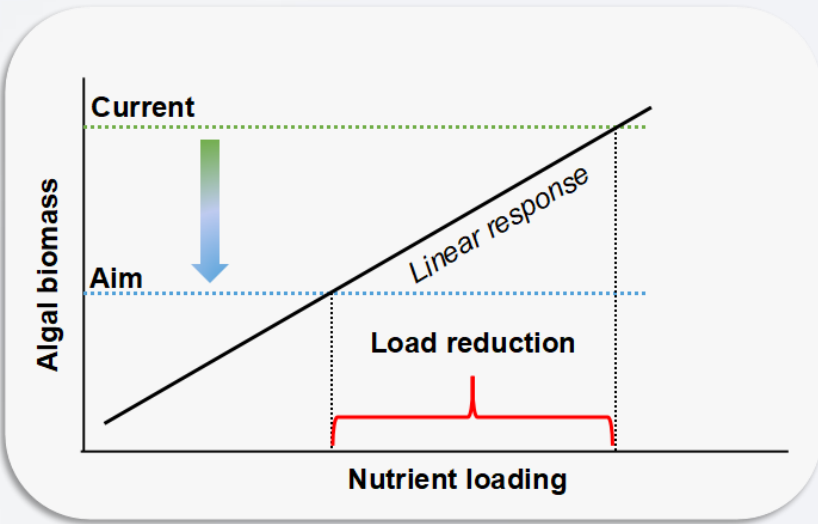




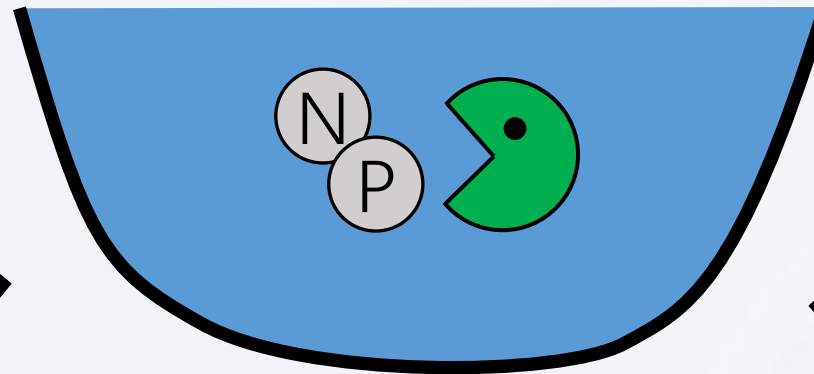
# Water quality management through nutrient load reduction



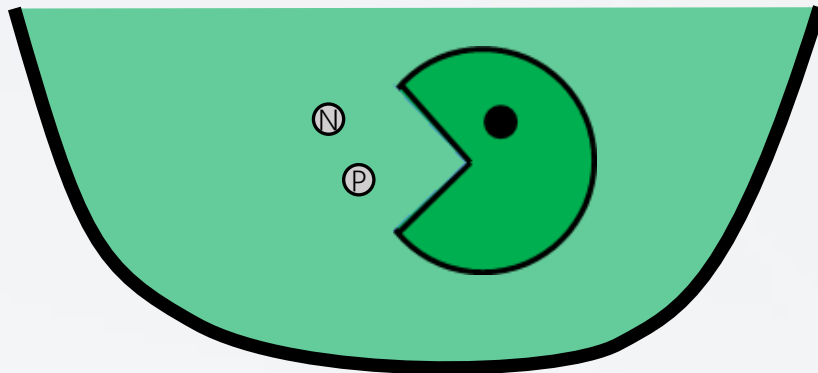
# Consumer-resource interactions in lakes



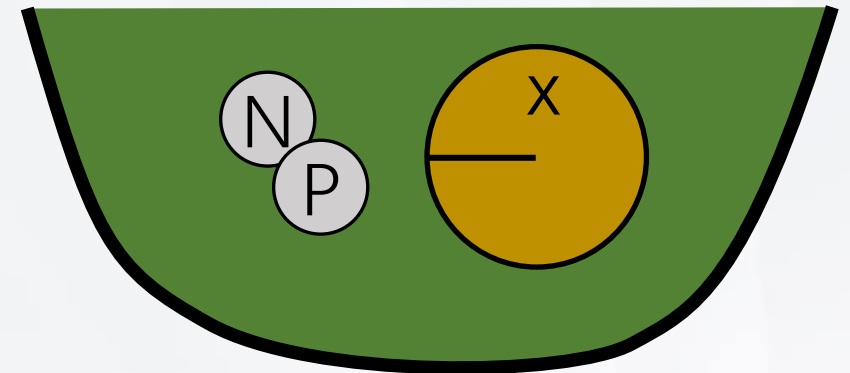
Pristine ecosystem



Nutrient limited ecosystem



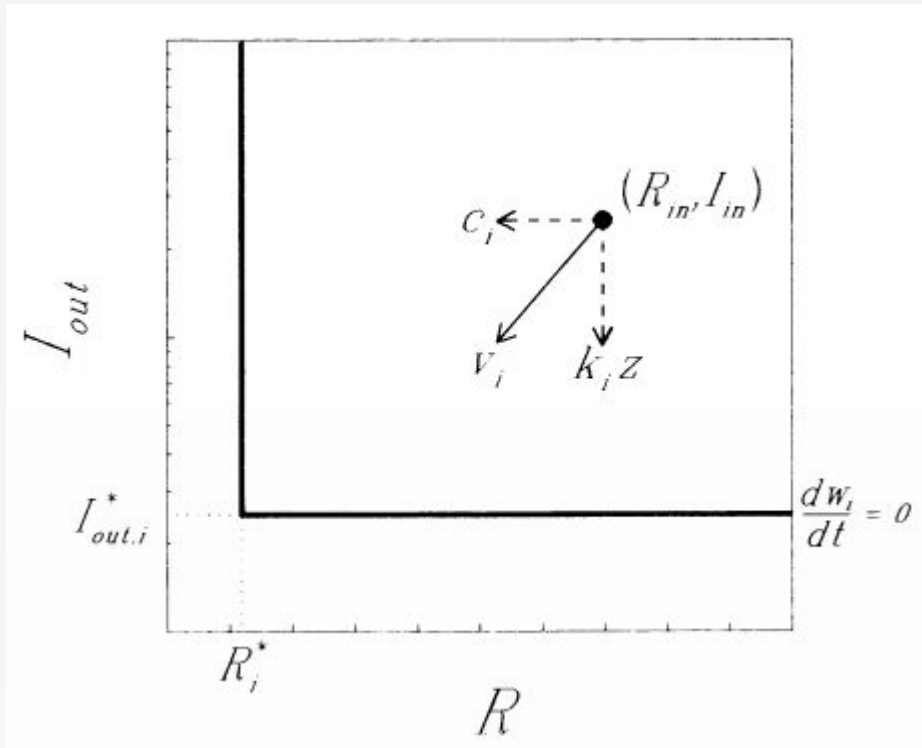
Light limited ecosystem





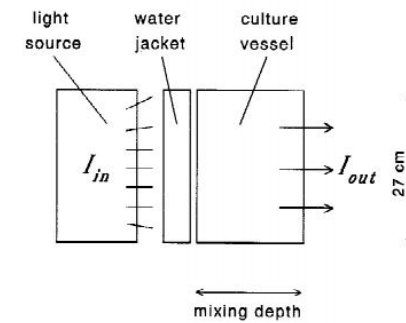
# Consumer-resource interactions

## Nutrient & light limited ecosystem

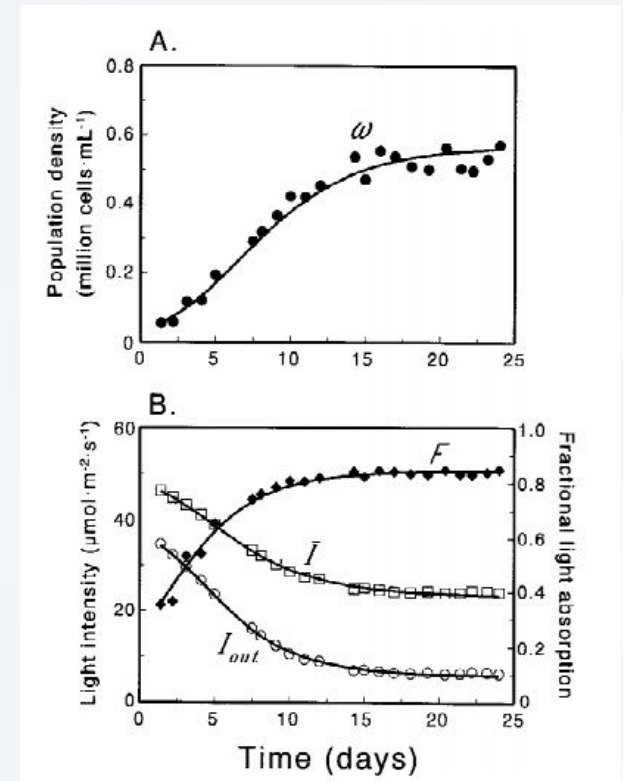
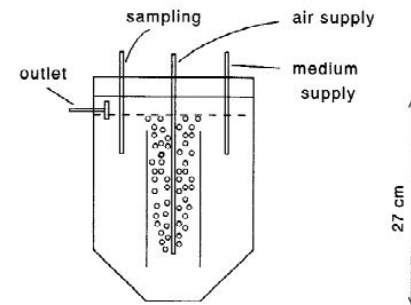


*Huisman and Weissing (1994,1995)*

A. side-view:

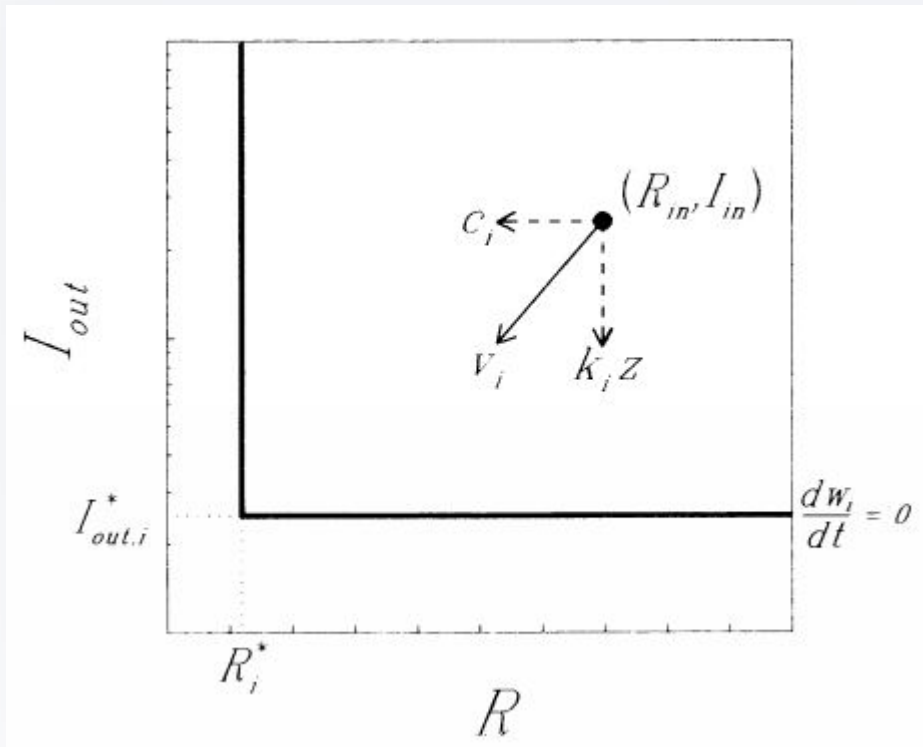


B. front view:

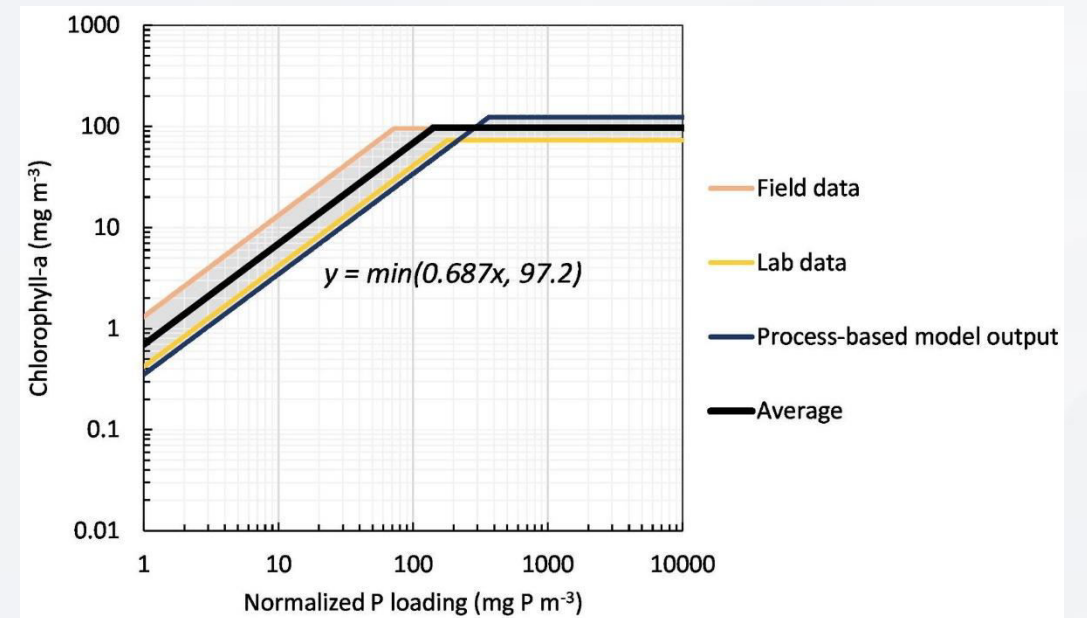


*Huisman et al. (2002)*

# GPLake model



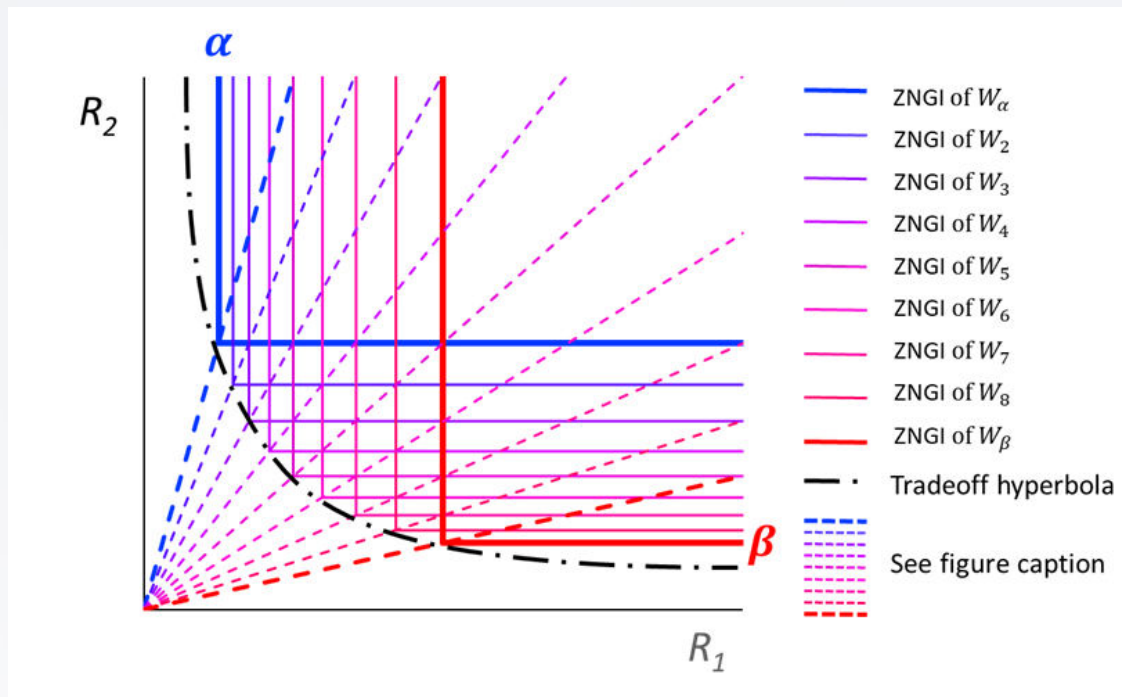
## Load-biomass response: **Type I**



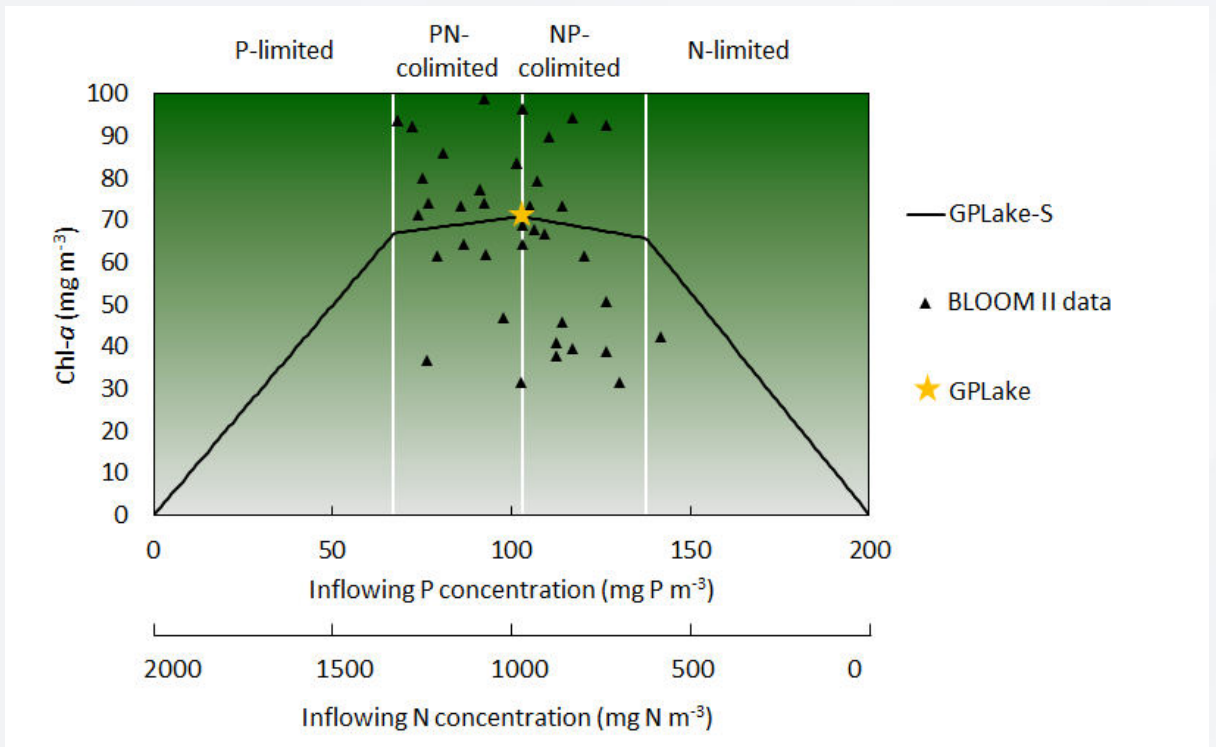
*Chang et al. (2019) STOTEN*

# GPLake-S model

Load-biomass response: **Type II**

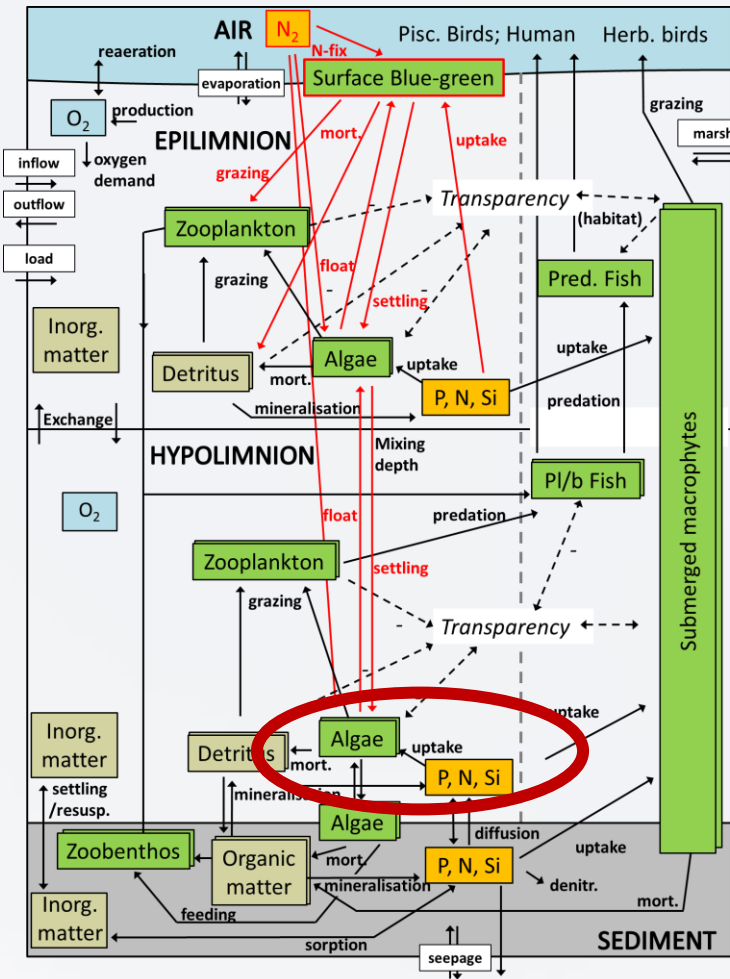


Biomass response along different N:P ratio

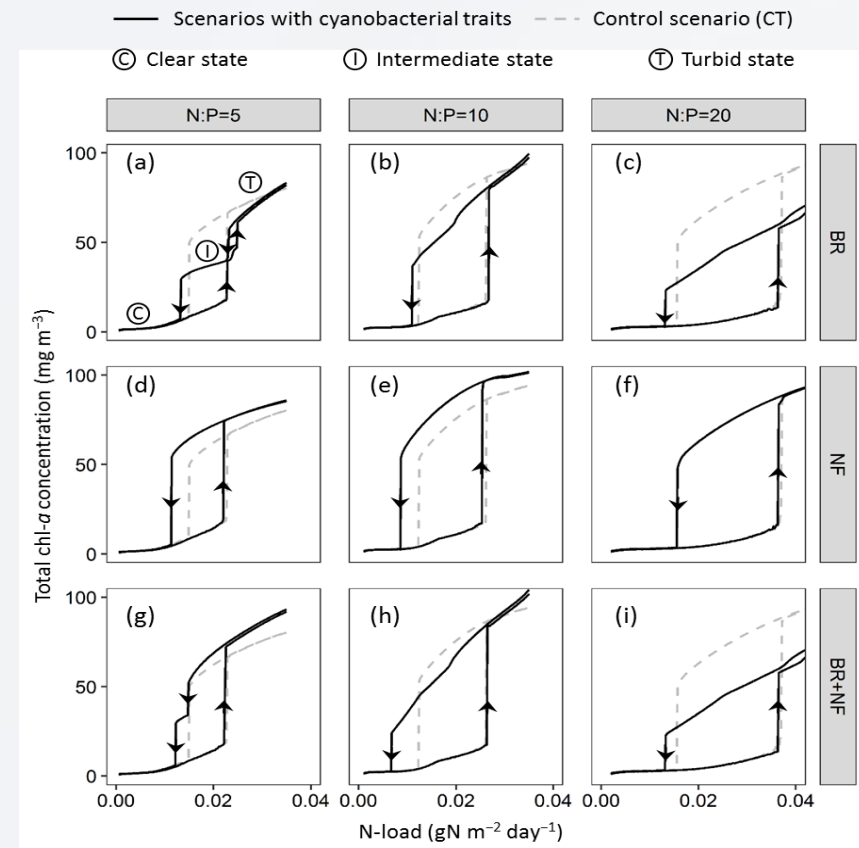


*Chang et al. (2022) Ecological Modelling*

# PCLake+ model with cyanobacterial traits



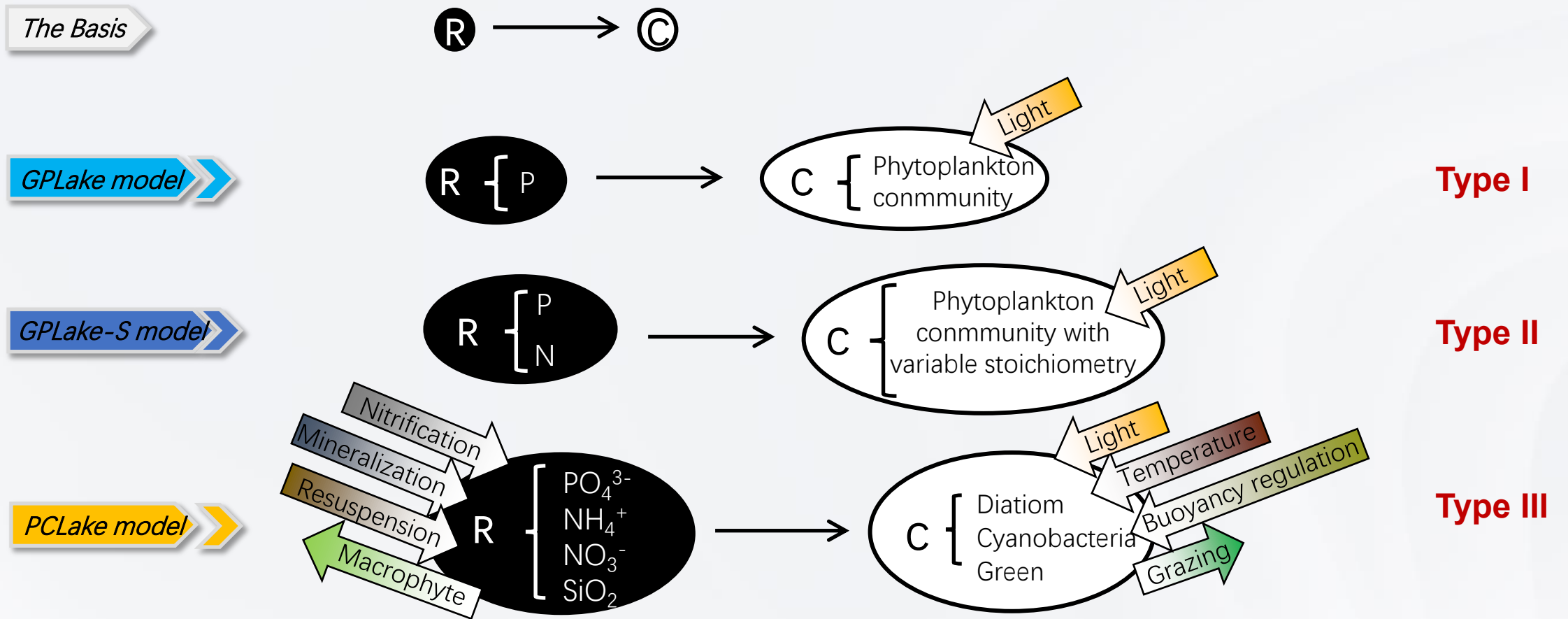
## Load-biomass response: Type III



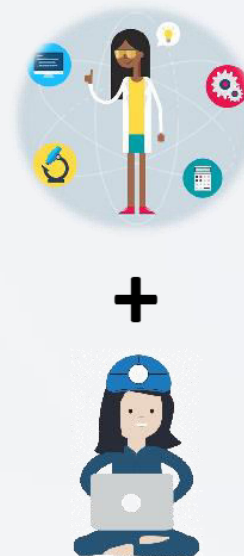
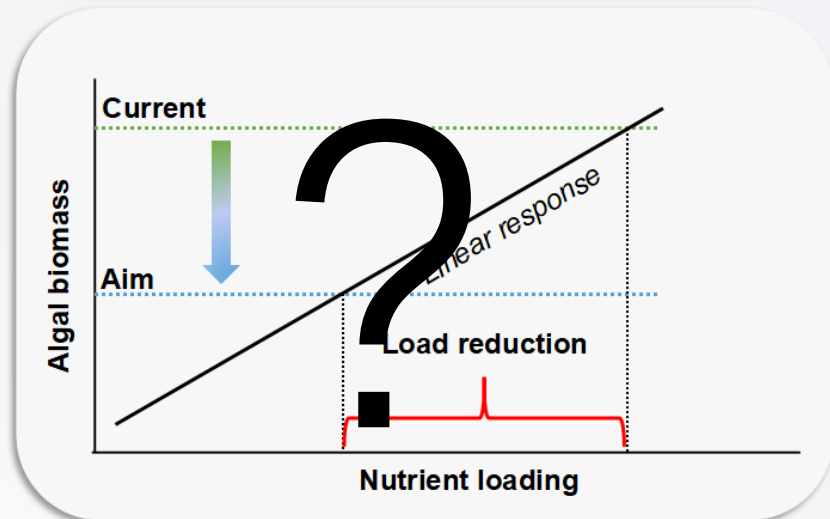
Chang et al. (2020) Water



# Eutrophication models using consumer-resource interactions



- Aquatic ecosystem have different types of response to nutrient loading due to its complexity
- Understanding ecological processes is crucial in water quality management
- Models considering consumer resource interactions provide tools in estimating nutrient thresholds as benchmark for management



# Collaboration is required in the Anthropocene

Sven Teurlincx Don DeAngelis



Manqi Chang



Tineke Troost



Jeroen de Klein



Wolf Mooij



Lilith Kramer



Bob Brederveld



Dianneke van Wijk



Annette Janssen



Andrea Downing



Jan Kuiper



Jan Janse

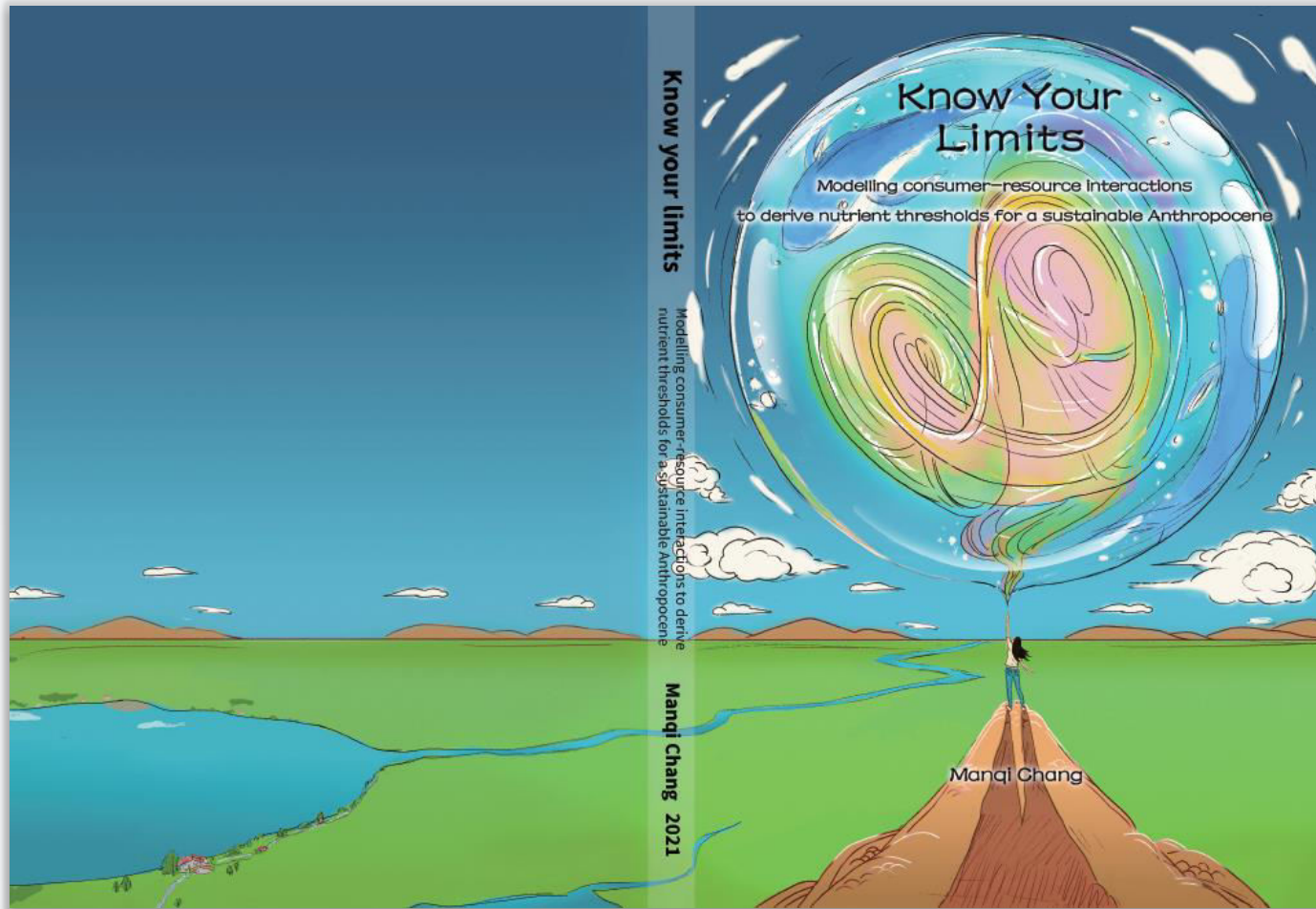


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# Thanks for your attention!



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