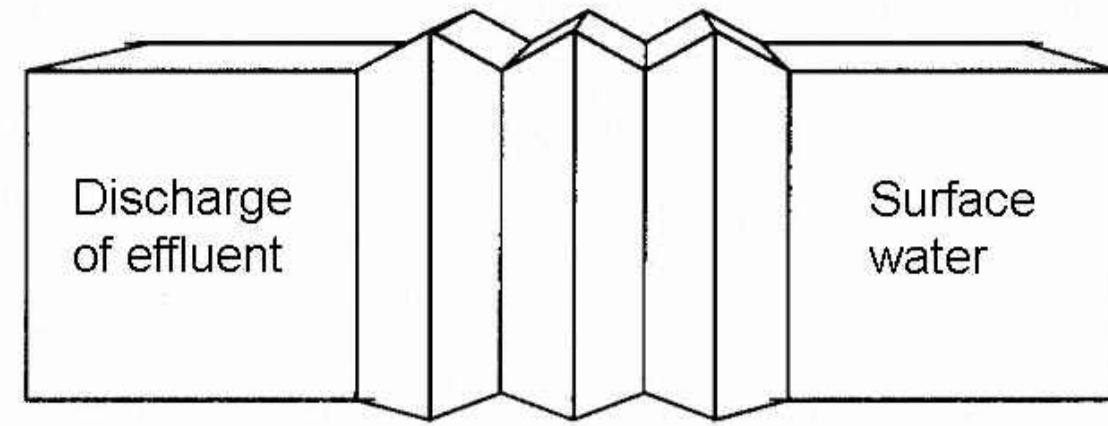


# Biological filtration of treated wastewater by Daphnia: An alternative for technical filtration, or an addition?

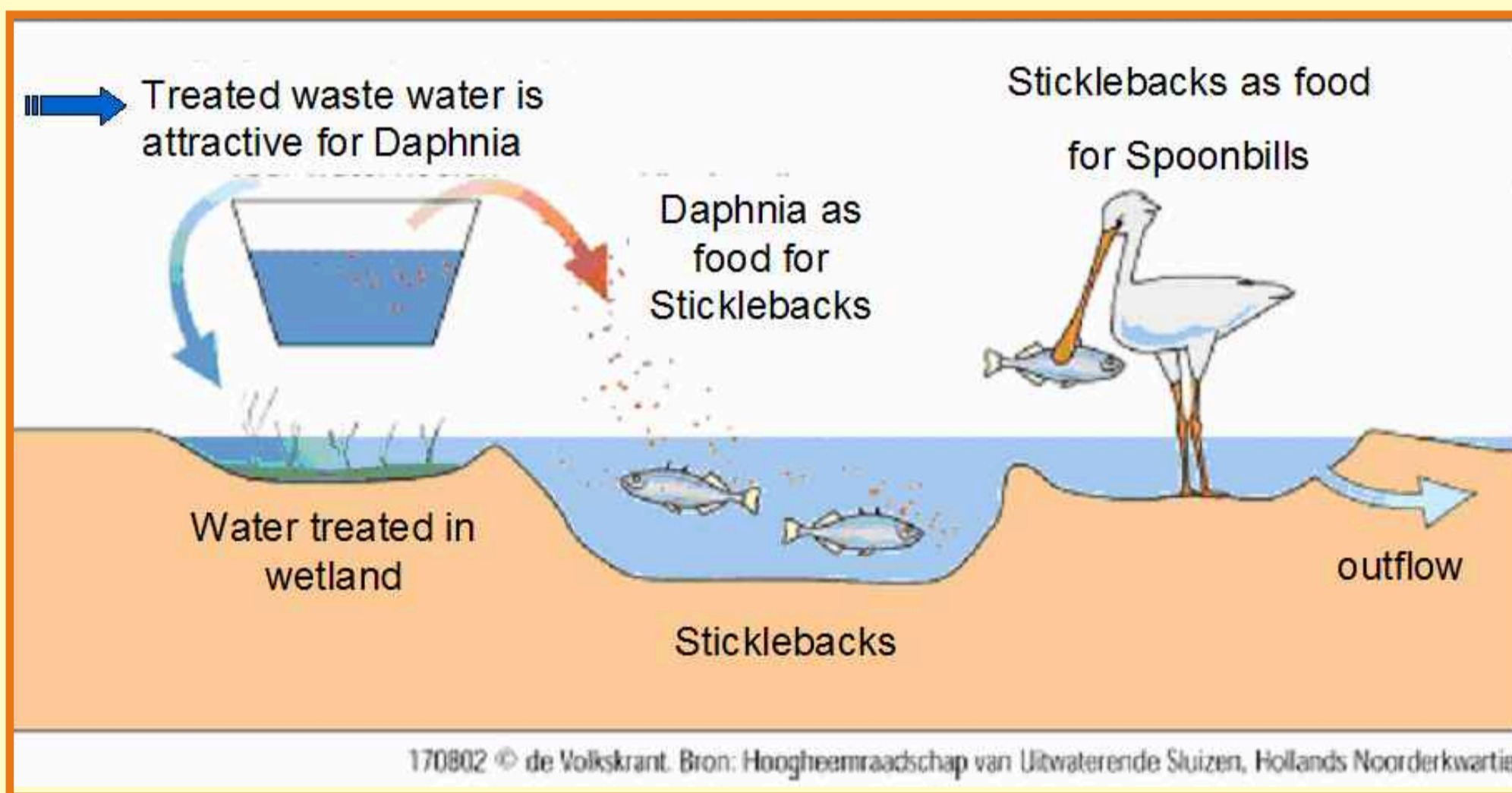
Ruud Kampf Vrije Universiteit Amsterdam, Waterboard Hollands Noorderkwartier, contact: r.kampf@falw.vu.nl , +31(0)6-49450214E

Lluís Sala, Consorci de la Costa Brava, Girona  
 Harm van der Geest, Universiteit van Amsterdam  
 Anna Romani, Universitat de Girona  
 Joaquim Comas, Universitat de Girona



Theo Claassen, Wetterskip Fryslân, Leeuwarden  
 Sybren Gerbens, Wetterskip Fryslân, Leeuwarden  
 Remmie Neef, Waternet, Amsterdam  
 Wilbert Menkveld, Witteveen+Bos, Deventer

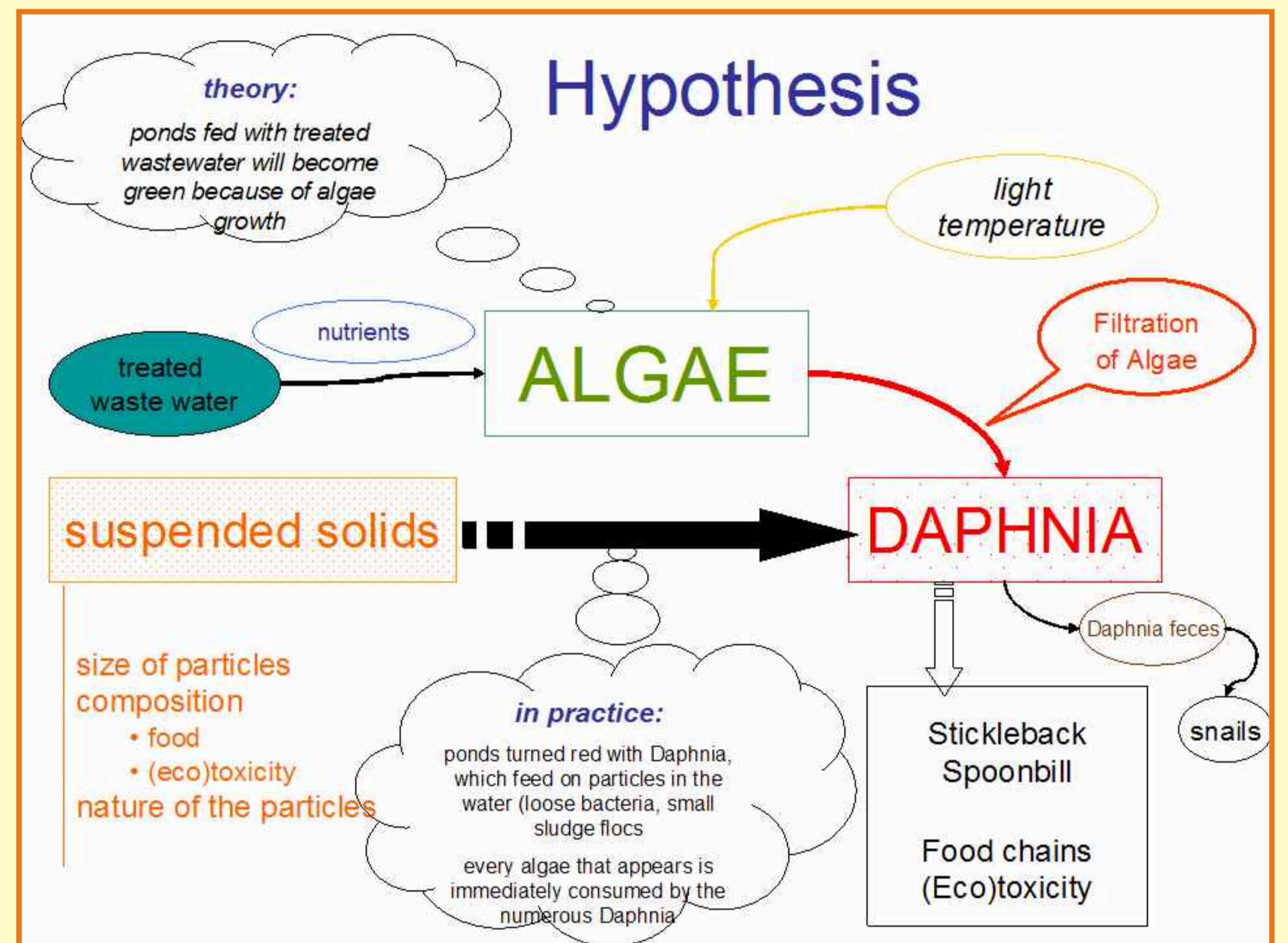
Constructed wetlands convert treated wastewater into usable surface water with abundance of "natural life"



Right →  
**Hypothesis PhD**  
 biological filtration of treated waste water

**Theory:**  
 "green ponds"

**Reality"**  
 Particles in treated waste water are good feed for Daphnia.  
 These Daphnia not only filter these loose bacteria and sludge particles but also remove algae effectively



## The "Grickleback" process:

- A combined system to reuse treated wastewater for nature enhancement
- Daphnia keep the Daphnia pond clear and remove faecal coli bacteria effectively
- No fish in the Daphnia ponds: optimum for growth of Daphnia
- The constructed wetland transfers the waste water in " fish water" it is about Growing Sticklebacks or other fish in a food chain approach
- Finally a "natural" pond. Suitable feeding area for birds, spawning area for fish

## Three Mesocosms: Horstermeer, Grou and Empuriabrava



**STP Horstermeer, The Netherlands**  
 Rather high loaded activated sludge process  
 Ongoing research project Technical filtration  
 Feed also filtered waste water  
 Food web studies, harvesting of Daphnia



**STP Grou, The Netherlands**  
 Very low loaded activated sludge (oxidation ditch)  
 Full-scale Daphnia ponds  
 "Understanding the full scale process"  
 Disinfection



**STP Empuriabrava, Costa Brava, Spain**  
 Very low loaded activated sludge (oxidation ditch)  
 Full-scale Daphnia ponds  
 "Understanding the full scale process"  
 Food web studies, harvesting of Daphnia

This research project is part of PhD study of Ruud Kampf: experiments 2007 - 2008

