

**IGB** Leibniz-Institute of Freshwater Ecology and Inland Fisheries  
Research for the future of our freshwaters

**LOSS of the NIGHT**

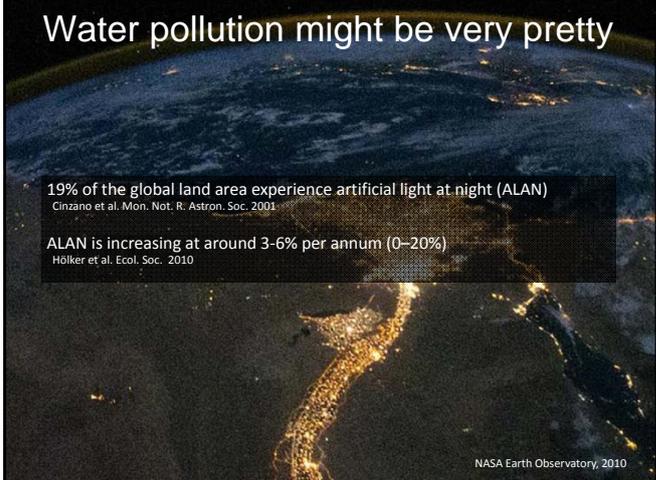
## The influence of artificial light at night on terrestrial-aquatic interactions

Franz Hölker  
Leibniz Institute of Freshwater Ecology and Inland Fisheries,  
Berlin, Germany  
<http://www.verlustdernacht.de>



Foto: M. Oehlert

## Water pollution might be very pretty



19% of the global land area experience artificial light at night (ALAN)  
Cinzano et al. Mon. Not. R. Astron. Soc. 2001

ALAN is increasing at around 3-6% per annum (0-20%)  
Hölker et al. Ecol. Soc. 2010

NASA Earth Observatory, 2010

## Light is where humans are, and humans are where freshwater is

50% of the world's population lives closer than 3 km to a freshwater body  
(Kummu et al. PLoS ONE 2011)

Freshwaters cover ~ 1% of Earth's surface, home to ~ 10% of all animal species, and 1/3 of all vertebrates  
(Dudgeon et al. Biol. Rev. 2006, Ballan et al. Hydrobiologia 2008)

Freshwaters are experiencing declines in biodiversity far greater than most affected terrestrial ecosystems  
(Dudgeon et al. Biol. Rev. 2006)

Freshwaters are hot spots for carbon cycling  
(Tranvik et al. Limnol. Oceanogr. 2009)

Light pollution as a biodiversity threat  
(Rich & Longcore 2006, Hölker et al. Trends Ecol. Evol. 2010)

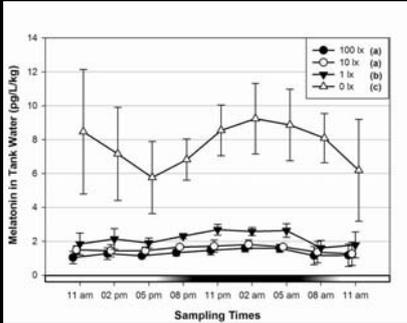
Freshwater systems are particularly susceptible to ALAN  
(Perkin et al. Ecosphere 2011)

NASA Earth Observatory, 2010

## Circadian rhythm perch

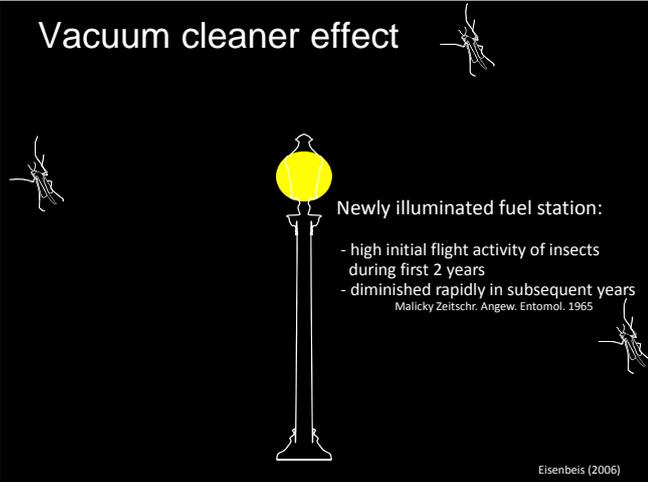
*Perca fluviatilis*

Melatonin



Brüning et al. Sci. Tot. Environm. (2015)

## Vacuum cleaner effect



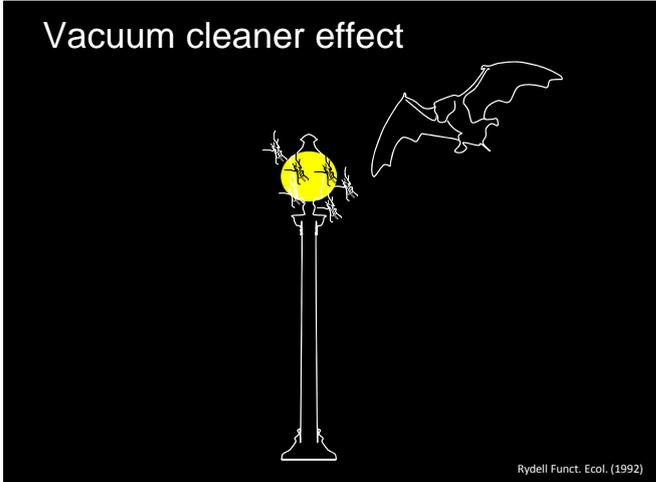
Newly illuminated fuel station:

- high initial flight activity of insects during first 2 years
- diminished rapidly in subsequent years

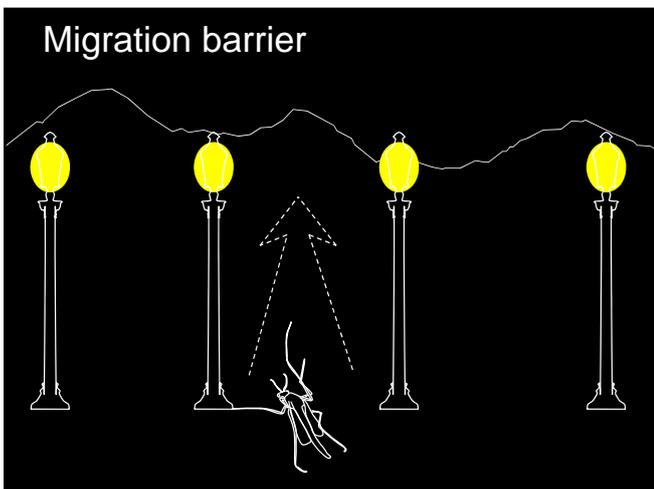
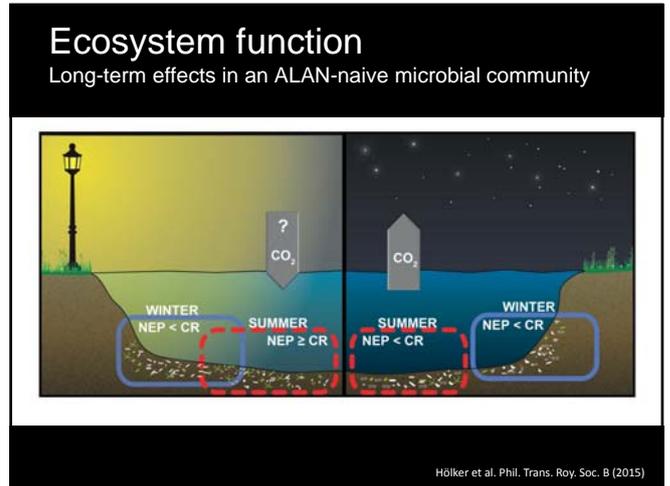
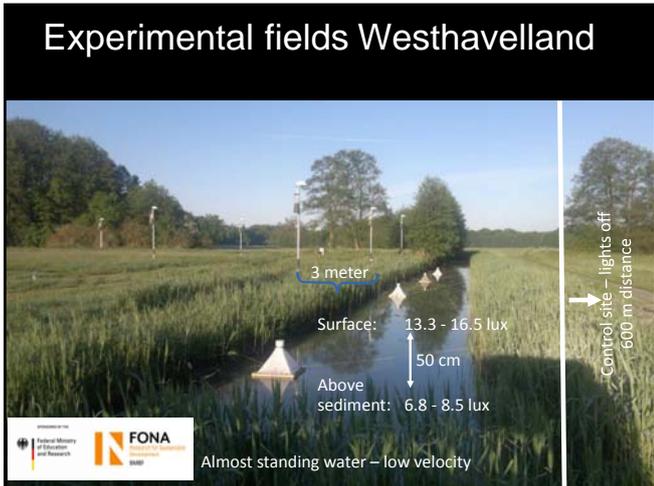
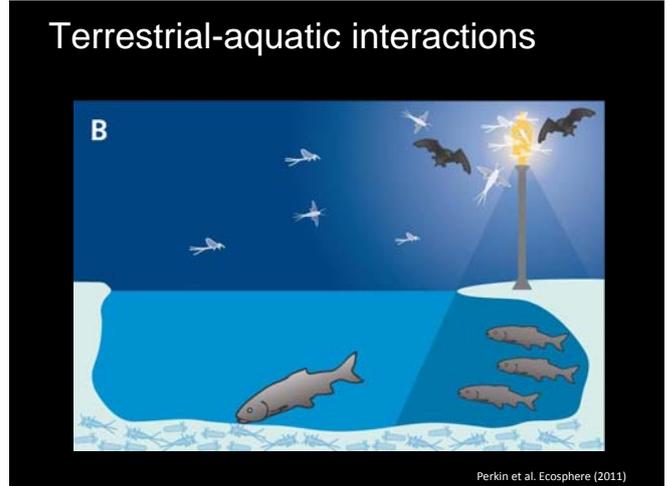
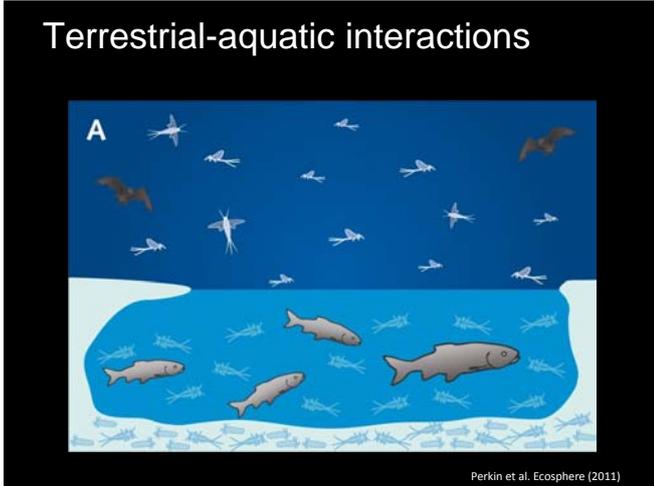
Malicky Zeitschr. Angew. Entomol. 1965

Eisenbeis (2006)

## Vacuum cleaner effect



Rydell Funct. Ecol. (1992)



## Now it is the best time to think about sustainable ALAN



The UN has recognized the importance of raising global awareness about how light-based technologies promote sustainable development and provide solutions to global challenges in energy, education, agriculture and health.

## Europe is in a dynamic phase



2015 International Year of Light and Light-Based Technologies

Understanding the genuine severity is both **challenging and timely!**

Hölker et al. Ecol. Soc. 2010,  
Kyba, Hänel, Hölker Energ. Environm. Sci. 2014










Co-funded by:





# Thank You!

