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***Emerging Pollutants: Protecting Water Quality for the Health of People and the Environment***

**Bio-based and circular solutions for Harmful Algal Blooms (HABs) in lakes and climate change challenges in Berlin**

**Kei Namba**

*15:35 (CET), 18 January 2023*

*A Circular Economy Approach: A Life Cycle Management of Emerging Pollutants*



# Background

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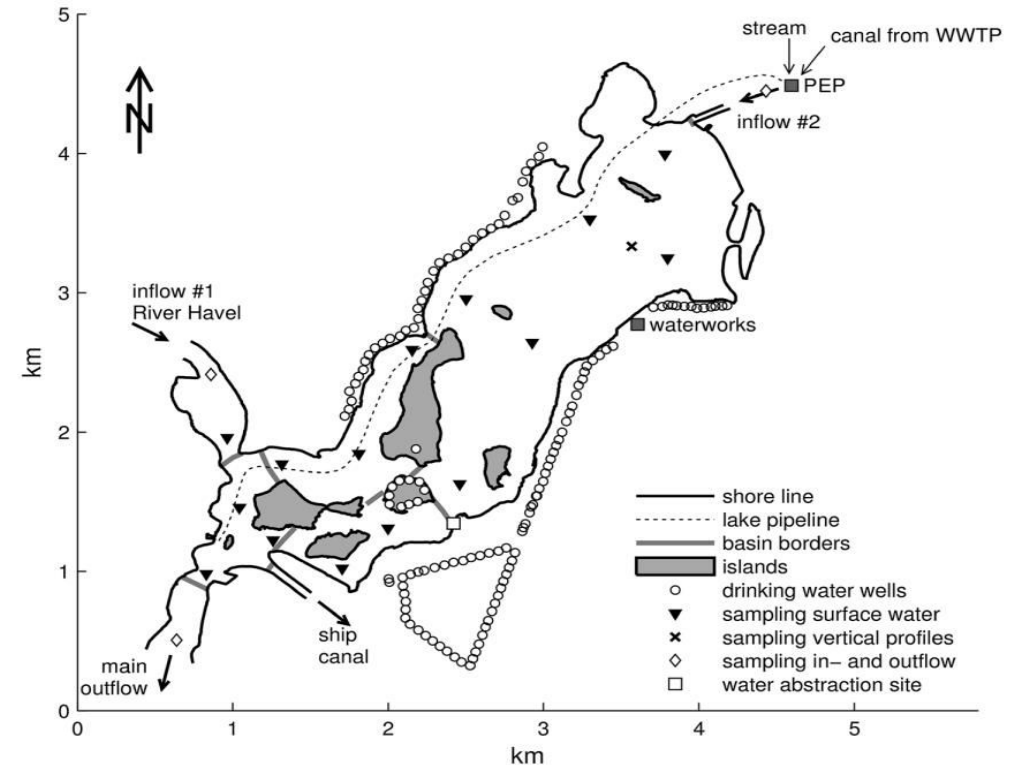


Imago/Schöning

Blue algae in Wannsee, Source: Berliner Zeitung

# Case study: Lake Tegel in Northwest Berlin

- Has not reached „good“ ecological status of the EU's Water Framework Directive (WFD)
- Serves as reservoir for drinking water through bank filtration and artificial groundwater recharge
- Stable control of algal biomass particularly of cyanobacteria remains a management priority (Chorus et al. 2004)
- Risks of pollutants on human health and environment-  
Early-warning by local authority (LAGeSo) –public awareness and communication issue



Map of lake Tegel Source : Schimmelpfennig et al. 2016

## Possible causes

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### Occurrence of genus *Tychonema* producing anatoxin-a

- The need for further investigation of potentially toxic, non-bloom forming cyanobacteria in less eutrophic water bodies (Fastner et al., 2018)

### Wastewater residue in surface and groundwater

- Capacity to remove contaminants through bank filtration in Berlin (Massman et al., 2004), overflows from the combined sewer system

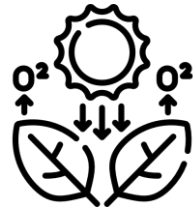
### Pharmaceutical micro-pollutants

- The importance of lake specific mechanisms- inflow and outflow balances and seasonal density stratification for the transport of the micro-pollutants (Schimmelpfennig et al., 2016)

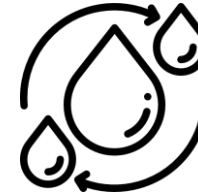
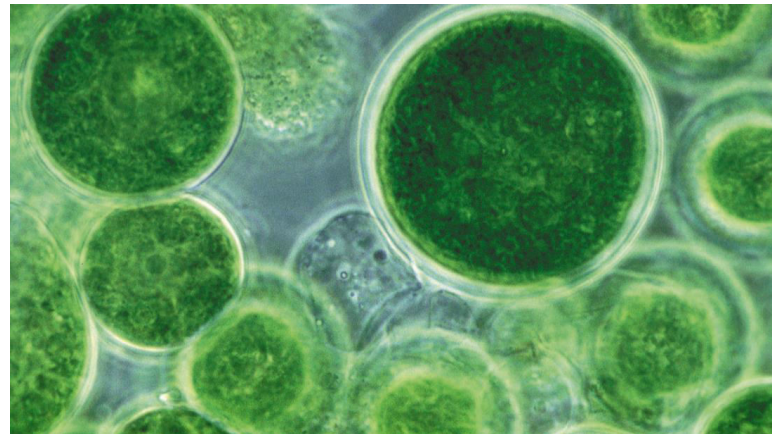
### Climate change

- Relationships between climate change and Harmful Algal Blooms (HAB) (Gobler 2020; Glibert 2020; Neerugatti et al., 2022)

# Possible benefits of microalgae



Biofertilizer  
Soil stabilizer



Animal feed  
Food additives



Cosmetics  
Pharmaceuticals  
Food Supplement

Bioplastics



# Product: Biofertilizer

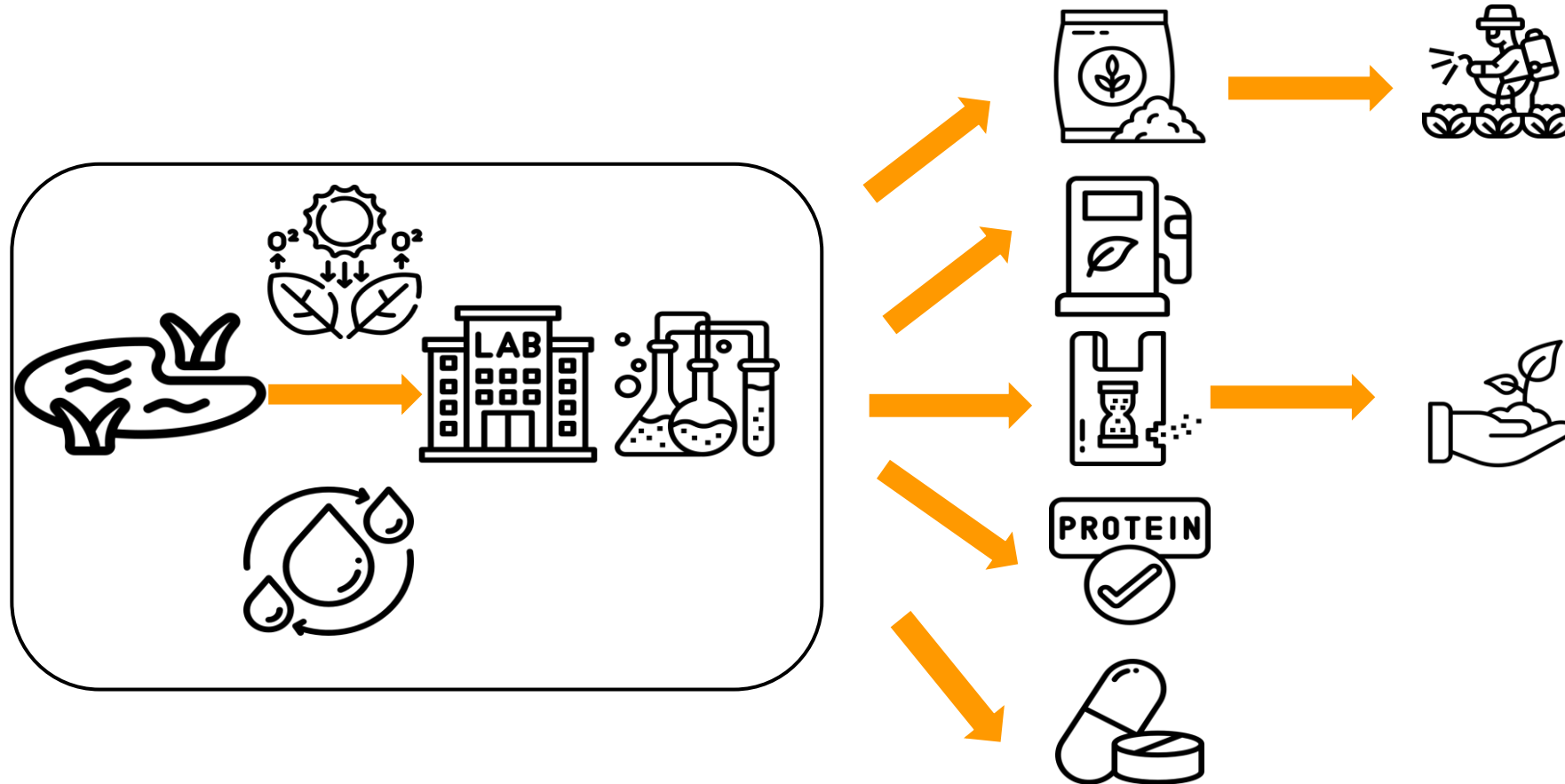
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*“We are currently using fertilizer pallets made from pig hair imported somewhere from Asia... We have enough stock for the next few months but we will have to see if the price goes up afterward”*

Organic farmer from Vierlinden, Brandenburg



# The solution



## Where we stand now

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Partnerships for technical assessment with (Armin Dolatimehr, German Environmental Agency)


Challenges:

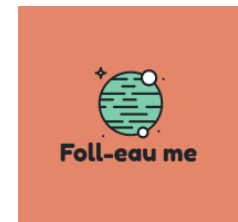
- Assessment of regulatory conditions for sampling and installing decentralized treatment system
- Increased energy costs for treatment



Thank you!  
Any questions?

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# Bibliography

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