





# Single and joint effects of recurring heat waves, increased temperature and a fungicide on zooplankton-dominated freshwater microcosms

## Hermann, M.<sup>1</sup> (markus.hermann@wur.nl); Peeters, E.T.H.M.<sup>1</sup>; Van den Brink, P. J.<sup>1,2</sup>

<sup>1</sup>Aquatic Ecology and Water Quality Management group, Wageningen University, P.O. Box 47, 6700 AA Wageningen, The Netherlands <sup>2</sup>Wageningen Environmental Research, P.O. Box 47, 6700 AA Wageningen, The Netherlands

Background

idual to population







Global climate change (GCC) may affect distinct environmental variables of freshwater ecosystems (e.g. temperature, pH)

- Increased severity and frequency of extreme events, such as heat waves<sup>1</sup>, and higher mean temperatures are predicted until 2050<sup>2</sup>
- Interaction effects of temperature and chemicals are expected to modify the environmental fate and toxicity of compounds<sup>3</sup>

<sup>to</sup> community

- Joint effects of non-chemical GCC-related stressors and chemicals on population, community or ecosystem-level continue to be understudied<sup>4</sup>
- Temperature variability instead of elevated means is crucial in future GCC studies due to more severe effects on species under chemical stress<sup>5</sup>

#### **Materials and Methods**





### **Questions and objectives**

- How affects temperature the structure and functioning of a chemically stressed community?
- To what extend does temperature alter the adverse effects of the fungicide carbendazim?
- How does temperature modify ecosystem's characteristics?
- Disentangle the joint effects of future, GCC-related temperature scenarios in chemically stressed freshwater systems
- New experimental approach to study the effects of a chemical under GCC with high environmental realism (TENTACLE machinery)

#### **First results**

Chlorophyll-a concentration of green algae



**Figure 2.** Chlorophyll-a concentration over the experimental time (day -1) to day 47) with ambient (Amb), elevated (E) and heat wave (HW), carbendazim (Carb) and no carbendazim (No) treatment combinations.

Dissolved oxygen concentration



**Figure 1.** The **T**ransportable Temperature and Heat Wave **C**ontrol Engine (TENTACLE) in the experimental microcosm set-up. 3 distinct temperature treatments: ambient (blue), elevated (yellow) and heat wave (red), graph above.

#### **Conclusions and outlook**

- Heat waves plus carbendazim have larger detrimental effects on Chlorophyll-a concentration and DO compared to ambient and elevated temperature conditions
- Chemical fate and zooplankton analyses will follow
- Apply the TENTACLE in indoor- and outdoor micro- and mesocosm experiments



Measuring day during the experiment

**Figure 3.** Dissolved oxygen concentration over the experimental time (day-1 to day 47) with ambient (Amb), elevated (E) and heat wave (HW), carbendazim (Carb) and no carbendazim (No) treatment combinations.

#### References

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Wageningen University & Research P.O. Box 47, 6708 PB Wageningen **Contact: Markus Hermann** markus.hermann@wur.nl Г: +31 317 481 740 www.wur.nl





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