HUMI PROJECT

LAKE BROWNING INDICATORS

HUMI-PROJECT
= HUMIC LOAD INDICATORS

- ✓ 10-year research project (2018-2027), University of Helsinki
- ✓ Funded by R. Erik and Bror Serlachius Foundation

→What (biological) variables reflect lake browning?

→How to develop current monitoring?

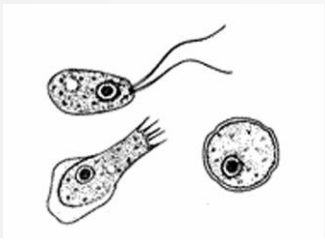
Kuva: Stefan Löfgren

MAIN OBJECTIVES FOR THE DEVELOPMENT OF INDICATORS

WFD: The biological quality elements include

- Phytoplankton
- Phytobenthos
- Macrophytes
- Benthic invertebrate fauna
- Fish fauna

- ✓ Application of current monitoring methods?
- ✓ Applicability in practice (e.g. simple, easy, inexpensive)

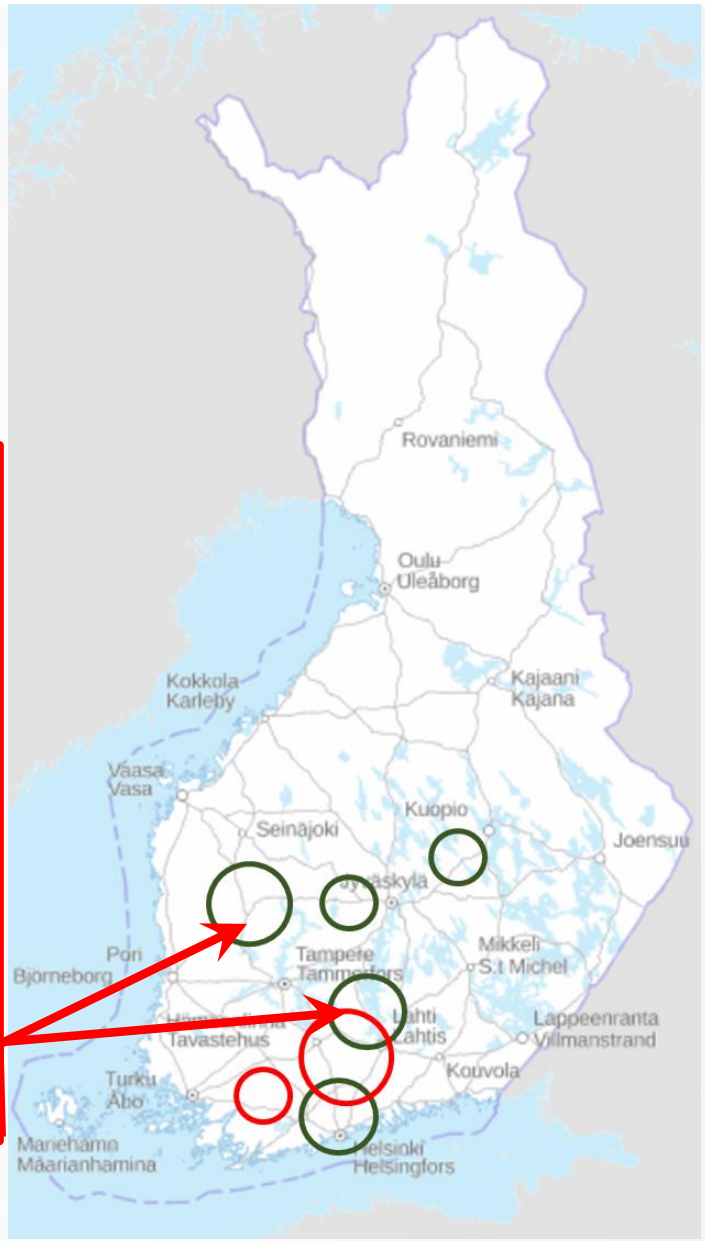



2021-2022: Intensive monitoring in 6 lakes

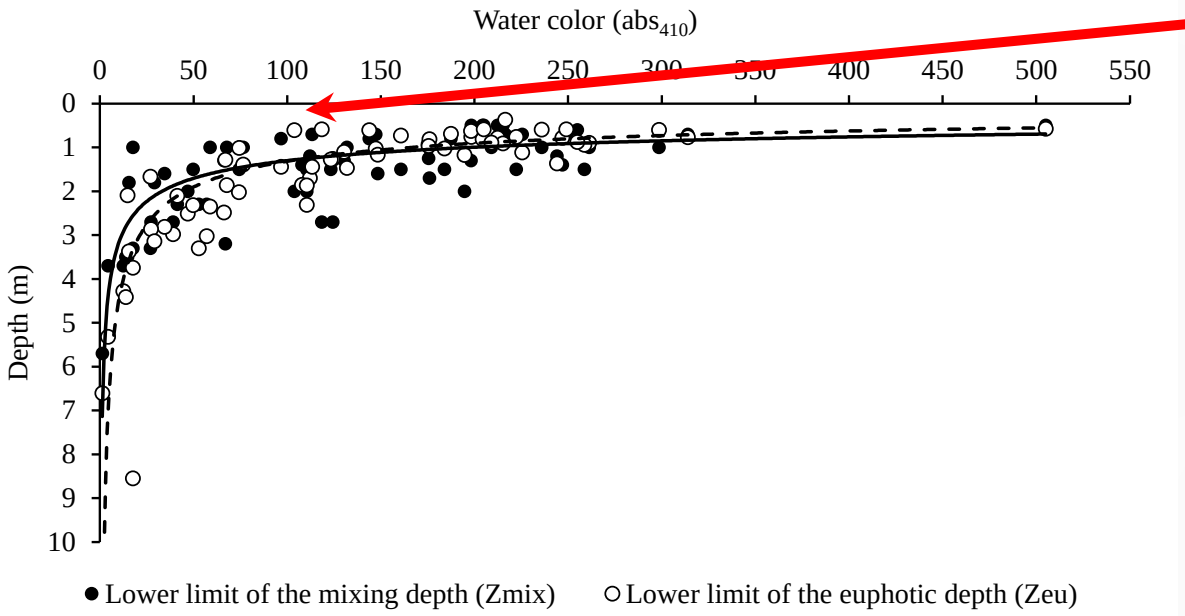
- 2 x eutrophic
- 2 x dystrophic (with high humic load)
- 2 x oligotrophic (with minor humic load)

Seasonal sampling

-Physicochemical and biological

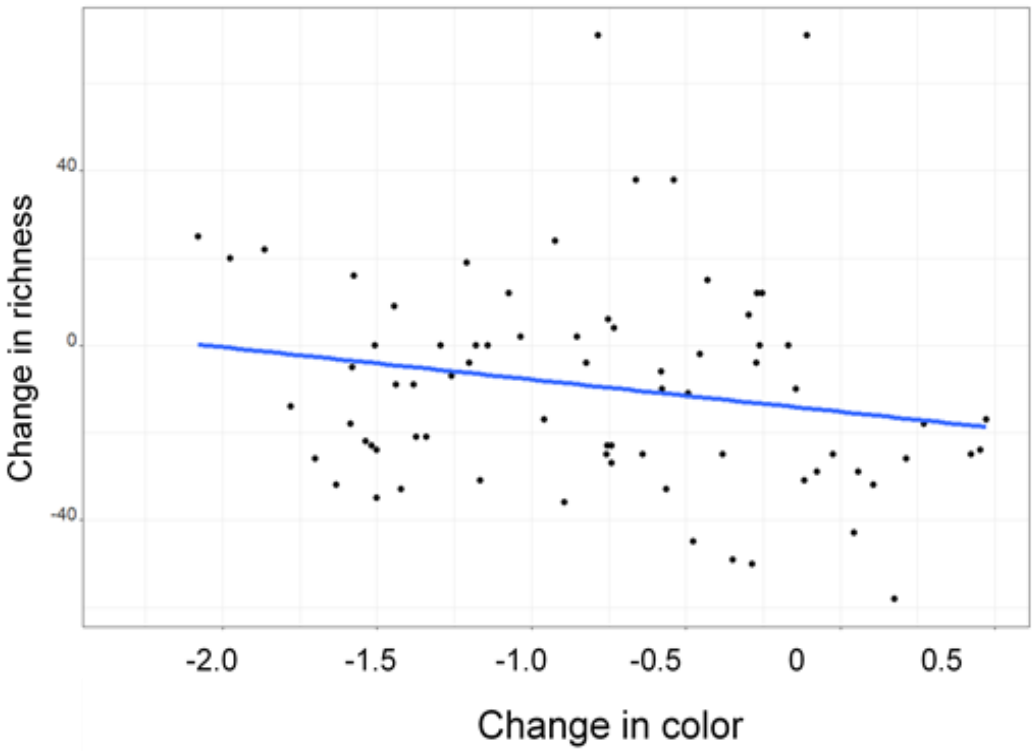


RESULTS



- Mixing layer getting thicker than the euphotic zone (DOC ~13 mg l^{-1})
- Consequences for primary production?

2) Primary production I (Phytoplankton)

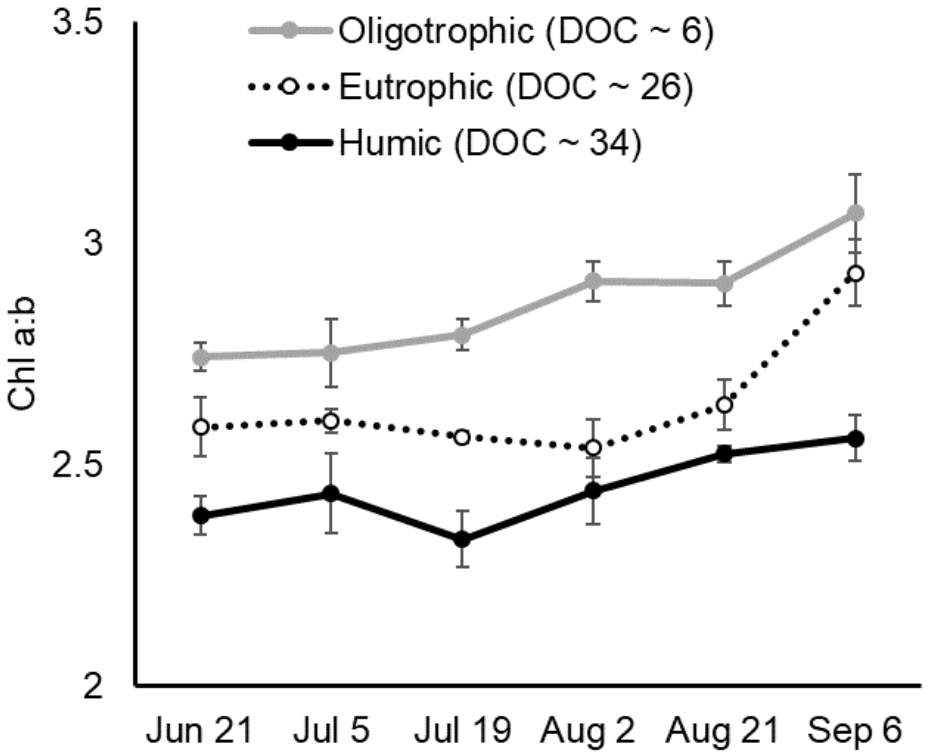


- Huovinen, L. (2020) Master thesis: The effect of brownification on lake phytoplankton communities in the last decades:
- Flagellated species increased with colour
- Increasing water colour reduced species richness

2) Primary production II

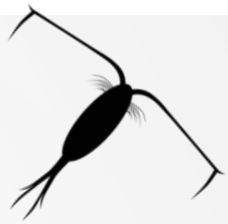
(Macrophytes)

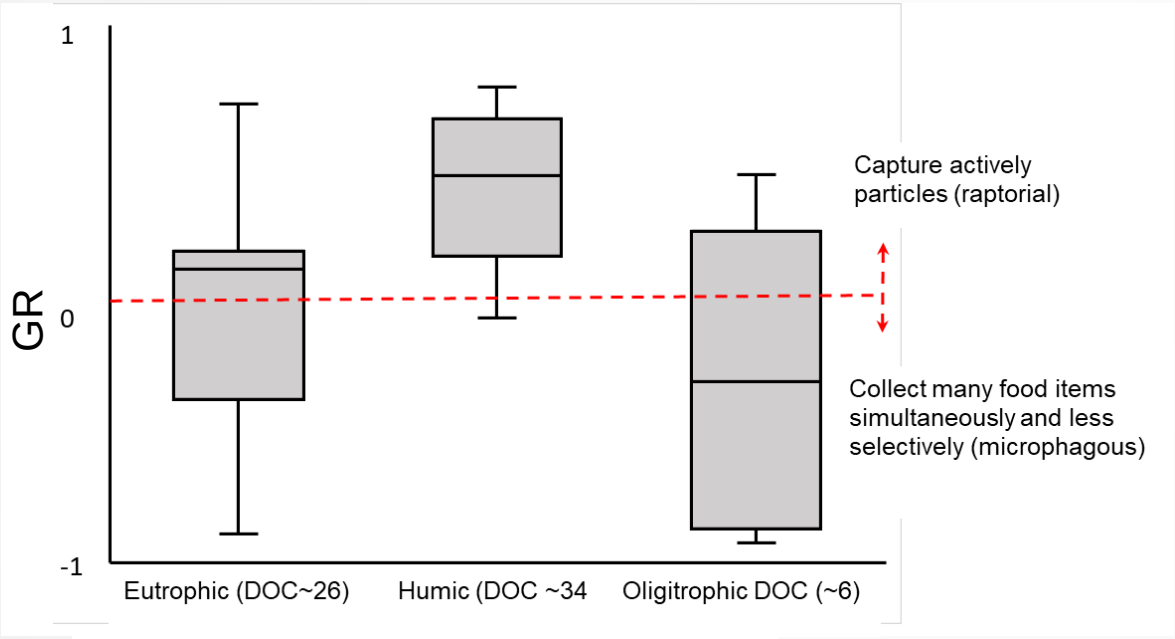
How the photosynthetic pigment content of the floating-leaved macrophyte *Nuphar lutea* respond to increasing water colour?



- Increase in water colour shifts the photosynthetic pigment maximum towards the surface
- Chlorophyll a:b ratio decreases with increasing water colour
- Significant difference in the a:b ratio throughout the summer

3) Consumers I (zooplankton)





- Diversity of zooplankton decrease with browning
- Changes occur mainly in the rotifer community
- Browning may change functionality of zooplankton
- Species that feed *Gonyostomum semen* become more common

Field work 2022 still under analysis…

1) Water quality
   - Temporal and spatial variation within lakes (DOC, colour, TP)
   - Light quality (spectrum in the water column)

2) Primary producers
   - Photosynthetic pigments of phytoplankton
   - Spatial variation (within lake) of macrophyte pigments
   - Response rate of macrophyte pigments (experimental + field)

3) Consumers
   - Functionality of rotifers
   - Epibionts and parasites of zooplankton
   - Benthic macroinvertebrates

LITTERATURE

Estlander, S. & Horppila, J. (2022). DOC gives and takes away
Effects of dissolved organic carbon gradient on epilimnetic zooplankton communities in lakes (under review)

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Horppila, J., Pippingsköld, E., & Estlander, S. (2022). Effects of water colour on the pigment content of a floating-leaved macrophyte—Implications of lake brownification. Aquatic Botany, 181, 103540.

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Rajala, S. (2022). Seasonal variation of macrophyte chlorophyll content in lakes with variable water quality. Master thesis, University of Helsinki.

Instagram

humi_hanke

Helsingin yliopiston HUMI

HUMI -humuskuormituksen mittarit on Helsingin yliopiston 10 vuotinen tutkimushanke, jota rahoittaa R.Erik ja Bror Serlachiuksen säätiö.

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HUMI - Humuskuormituksen mittarit

HUMI on Helsingin yliopiston tutkimushanke, joka tutkii järvien humuskuormitusta