Operational Area of the BenthoFluor: measurement of pelagic and benthic algae

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The “Integrated River Engineering Project”
on the Danube to the East of Vienna

Content:

- Integrated River Engineering Project

- Monitoring programme and operational area of the Fluoroprobe (pelagic and benthic measurements)

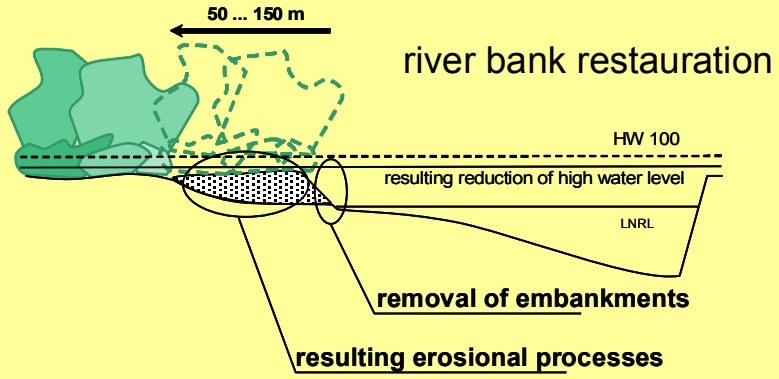
The “Integrated River Engineering Project”
on the Danube to the East of Vienna

Main Aims:

- stop constant soil erosion
  (granulometric bed improvement)

- improve ecological quality of riverine and riparian habitats,
  reduce high water levels at flood periods
  (river bank restoration and side arm reconnection)

- inprove shipping conditions
  (low river regulation)



The “Integrated River Engineering Project” on the Danube to the East of Vienna

- process-(ecosystem-)oriented project
  foster the hydrological and geomorphological functions of the river

- ecological target: approach of the current situation
  to the reference conditions in the 19th century

The “Integrated River Engineering Project”
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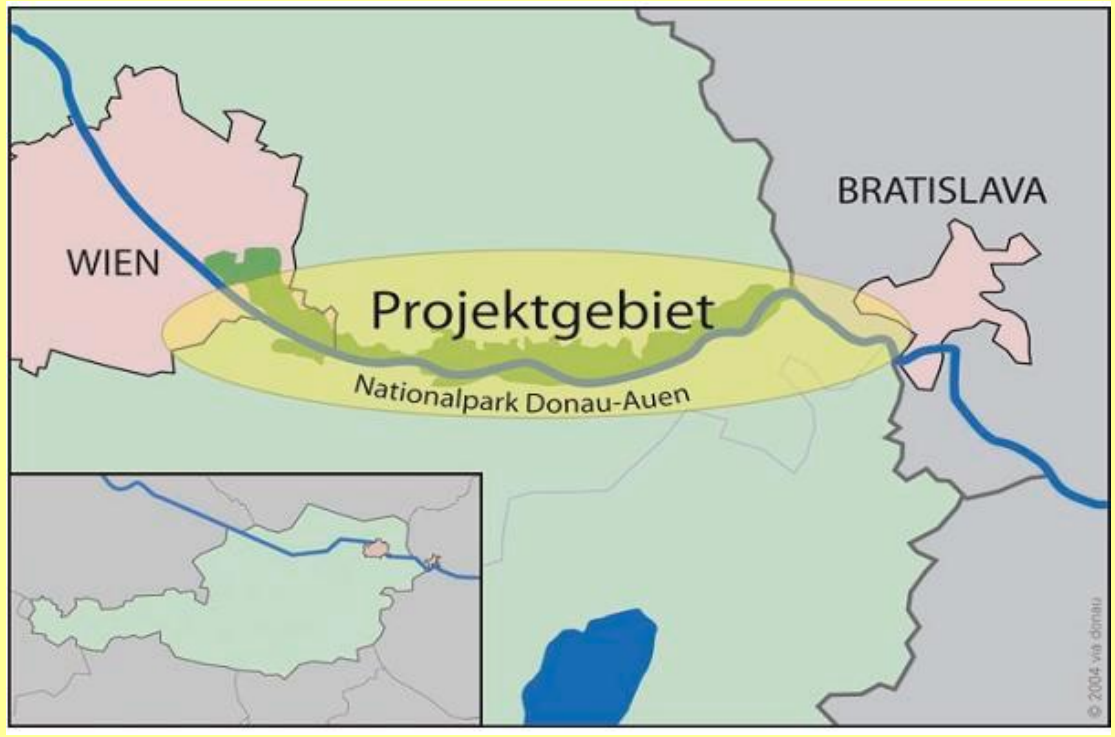
Project Area:

Danube River between Vienna (Freudenau hydrologic power station) and the Austrian–Slovak border



The “Integrated River Engineering Project”
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Monitoring Programme:

abiotic monitoring

- A1 Hydrology and Hydraulics
- A2 Hydrology and Hydraulics of Groundwater
- A3 Sediment Budget and Transport
- A4 Changes in Morphology
- A5 Navigation

biotic monitoring

- B1 Ecological Functions and Processes
- B2 Landscape Dynamics & - Structure
- B3 Habitat Diversity
- B4 Biodiversity/Bio-indication

The “Integrated River Engineering Project” on the Danube to the East of Vienna

Time Schedule:

- construction process over entire project reach carried out in 5 successive steps

- 3 km test reach next to Hainburg

- results of the monitoring project will be considered in the following engineering measures

Operational Area of the BenthoFluor:

B1 Team: Ecological Functions and Processes

- pelagic part

- benthic part

Operational area of the BenthoFluor:
measurement of pelagic algae

Objectives:

- show impact of shoreline morphology on the phytoplankton community

- describe the spacial distribution of the algal community in selected shoreline zones (gravelbanks, groynes, side arm systems) in connection with water level fluctuations and retention time




Operational area of the BenthoFluor: measurement of pelagic algae

Measurements:

- focussed on the development of the pelagic phytoplankton community in a selected groyne in the test reach at different water levels

- determination of biomass with pigment extraction and fluorescence probe (Benthofluor, bbe Moldaenke Corp. Germany)

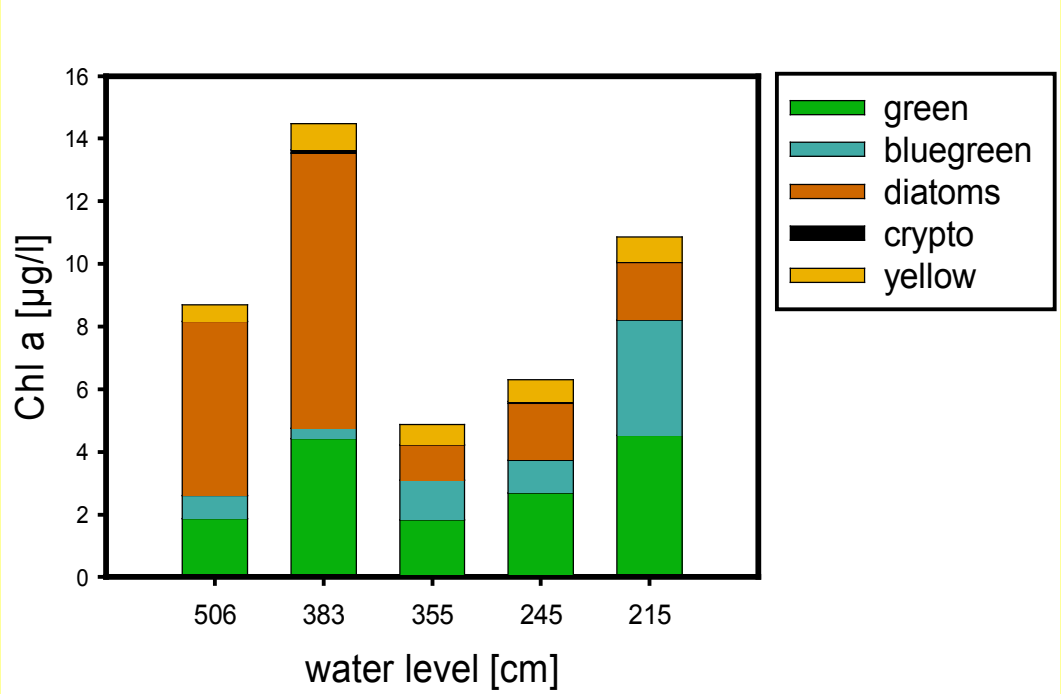
water level [cm]: 245

water level [cm]: 215

Operational area of the BenthoFluor: measurement of pelagic algae

First Results:

- time scale starts with high water level after a flood event
- after that, continuously sinkage of water level
- peak after the flood event
- following reduction of phytoplankton biomass
- rise of green and blue-green algae

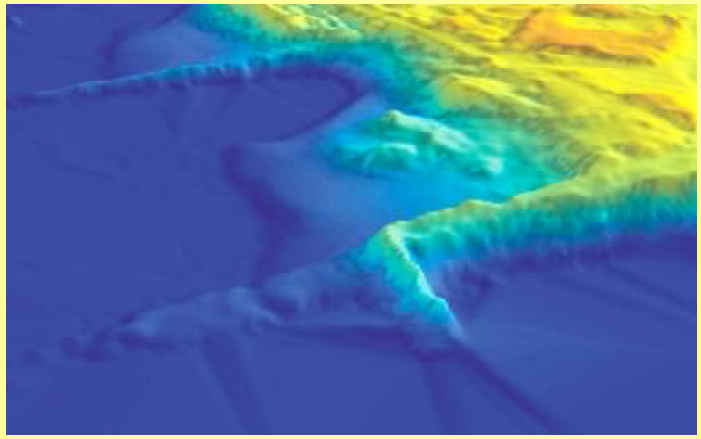


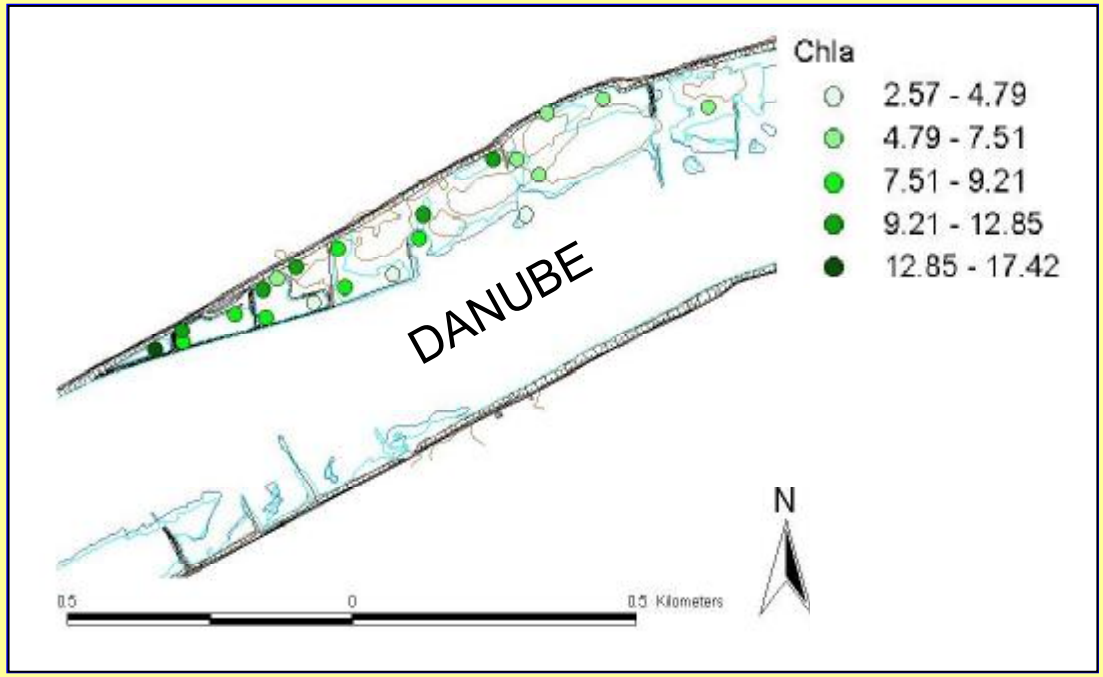
Operational Area of the BenthoFluor:
measurement of pelagic algae

Outlook:

- create a basis for interdisciplinary modelling approach

- 3D hydrodynamic models habitat models for biological indicator groups.





results of measurements with the fluorescence probe last year in a guide dyke

Operational Area of the BenthoFluor:
measurement of benthic algae

Objectives:

- show the impact of water level fluctuations on phytobenthos development and describe the spatial distribution of phytobenthos along a shoreline zone.

- description of the impact of shoreline morphology on phytobenthos communities.

- effect of flow exposition on phytobenthos development and the influence of changing flow velocities.

Operational Area of the BenthoFluor: measurement of benthic algae

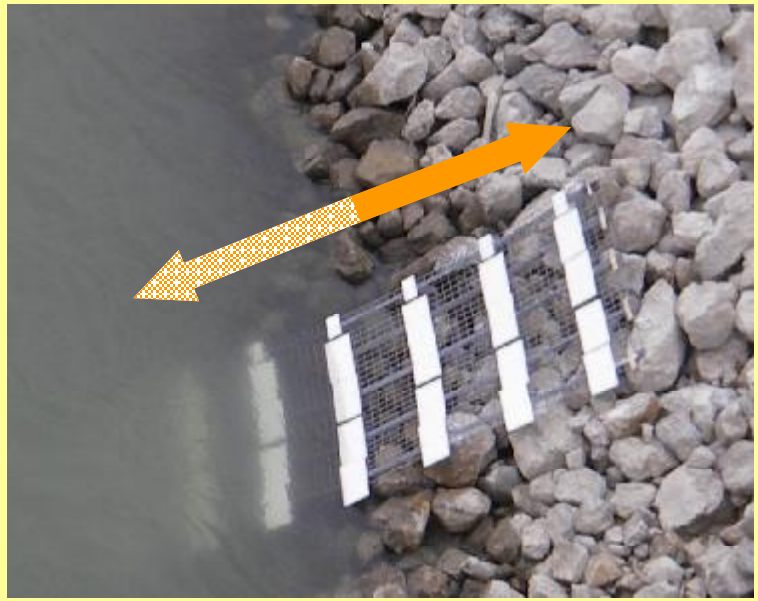
In-situ Experiment:

- focussed on the development of the benthic phytoplankton community and the effect of water level fluctuations

- rack with etched glass slides as artificial substrata

- exposed along a water level gradient (MW ± 1.5m)

- determination of biomass with pigment extraction and fluorescence probe (Benthofluor, bbe Moldaenke, Germany)

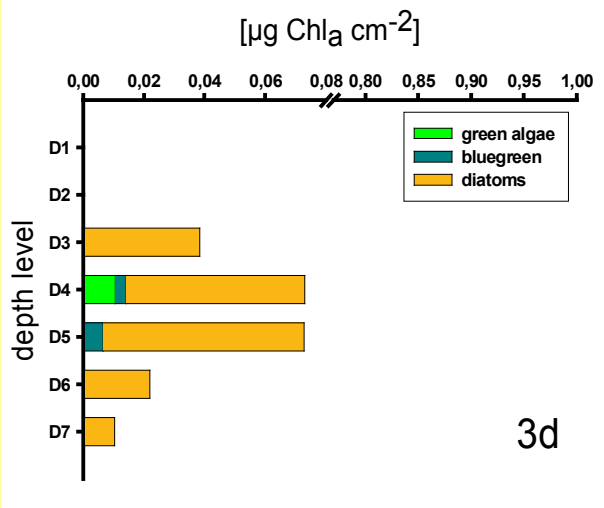


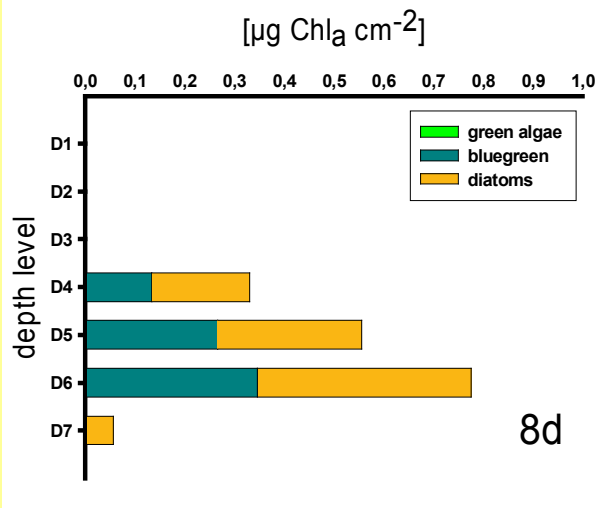
Operational Area of the BenthoFluor: measurement of benthic algae

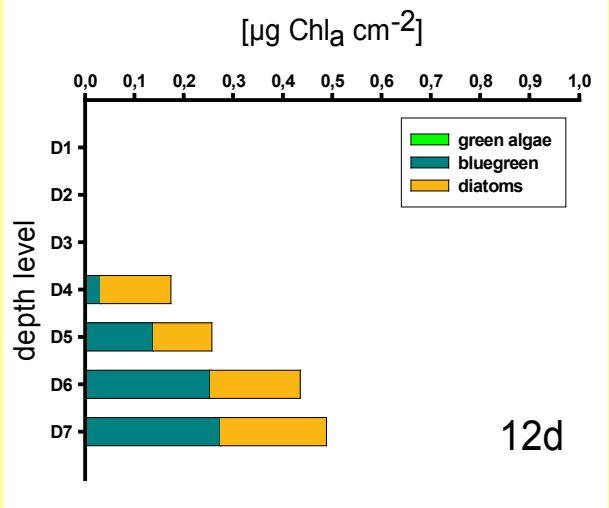
First Results:

Biomass development 3, 8 and 12 days after exposition

dominant algal classes were diatoms and blue-green algae,
whereas the diatoms first colonize the glass slides.







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Conclusion:

- good correlation between standard ISO method and Fluoroprobe (the fluorescence probe provides lower values than ISO)

- open questions concerning differentiation of the algal groups and fingerprints no problems with cyanobacteria but Fluoroprobe seems to underestimate green algae and cryptophyta problems with the differentiation of diatoms and blue algae

- database for information exchange ?

- technical problem: handheld for switching between benthic and pelagic measurments

- but all in all great potential for our monitoring programme as a great amout of data can be obtained directly in the field

Operational area of the BenthoFluor: measurement of pelagic algae

Financed by:

Monitoring partners:

- Institute of Hydrobiology and Aquatic Ecosystem Management, University of Natural Resources and Applied Life Sciences, Vienna
- Institute for Hydraulic and Water Resources Engineering, University of Technology, Vienna
- Department of Conservation Biology, Vegetation Ecology, Landscape Ecology, University of Vienna
- Department of Population Ecology, University of Vienna
- WasserCluster Lunz, University Cluster For Water Research

Engineering design:

In cooperation with:

Thanks for your attention!

Maria Maschek, Department of Freshwater Ecology, University of Vienna

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Pelagic pure culture tests