




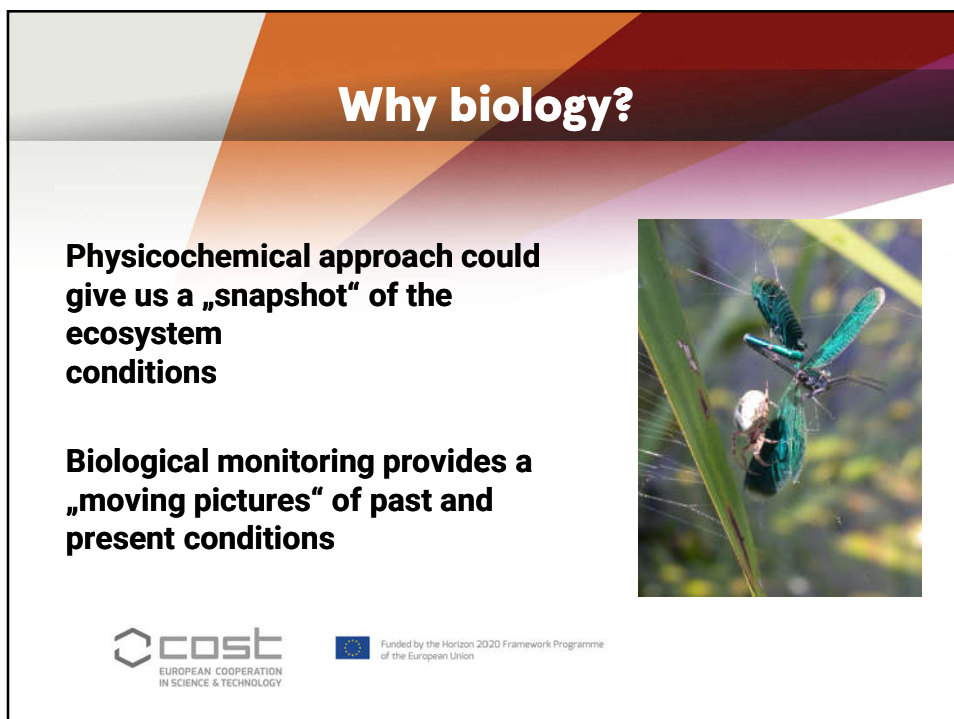
Growing
ideas
through
networks

**Detecting disturbance of
riparian ecosystems using
macroinvertebrate communities
as surrogates
for ecosystem attributes**

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Rennes, France
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Why biology?

**Physicochemical approach could
give us a „snapshot“ of the
ecosystem
conditions**

**Biological monitoring provides a
„moving pictures“ of past and
present conditions**




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Why biology?

We can:

- **Reconstruct previous state of ecosystem based on number of species, specimens, their diversity...**
- **Predict future state of ecosystem based on their stadium of development, health condition of population...**



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Why macroinvertebrates?

Of all freshwater organisms, benthic invertebrates are the most often recommended

Macroinvertebrates have been used to evaluate the effects of antropogenic stresors at all the levels of biological organization, from the molecular to the ecosystem




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Biological assessments

Aa ape	Nn newt
Bb bear	Oo octopus
Cc cat	Pp penguin
Dd dog	Qq quail
Eelephant	Rr rabbit
Ff fish	Ss seal
Gg giraffe	Tt tadpole
Hh horse	Uu unicorn
Ii iguana	Vv vulture
Jj jellyfish	Ww walrus
Kk kangaroo	Xx xanthocephalus (yellow-headed black bird)
Ll lion	Yy yak
Mm monkey	Zz zebra

Taxonomic approach:
„What is it?“

Functional approach:
„What does it do?“

I will here present a functional approach

Why functional approach?

Wrongfully neglected; especially when we have in mind to compare community structures, their degradation degree etc. from different parts of the world.

PROS:

- Possible to compare communities from different parts of the world (not able to do with taxonomic approach)
- Able to overcome the geographical limitations of species to specific regions (as it is based on functional groups)



How do we conclude about ecosystem attributes from FFG?



How do we conclude about ecosystem attributes from FFG?

scrapers – feed on periphyton



How do we conclude about ecosystem attributes from FFG?

shredders – feed on CPOM
(riparian derived plant litter)



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How do we conclude about ecosystem attributes from FFG?

filtering collectors – remove fine particles of
detritus from water column



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How do we conclude about ecosystem attributes from FFG?

gathering collectors – feed on FPOM
where it is deposited on surfaces or
in crevices in the sediments



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How do we conclude about ecosystem attributes from FFG?

predators – capture live prey



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How FFG ratios could be used as surrogates for aquatic ecosystem attributes?



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Balance autotrophy/heterotrophy

Ecosystem parameter	Functional feeding group ratios	General criteria ratio levels
AUTO/HETERO or P/R	scrapers/ shredders+ total collectors	Autotrophic >0,75

Autotrophy – ecosystem in which the dominant base of food chains is algae or aquatic plants

Heterotrophy - ecosystem in which the major base of the food chain is leaf litter derived from the riparian zone

Assumption:
smaller ratio indicates undisturbed riparian area



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Ratio CPOM to FPOM

Ecosystem parameter	Functional feeding group ratios	General criteria ratio levels
CPOM/FPOM	Shredders/ Total collectors	Normal shredder association linked to functioning riparian system in winter >0,5 and in summer >0,25

Ratio is an indicator of the availability of a food resource for shredders, and therefore the linkage between the riparian zone and stream/river ecosystem function

shredder – riparian linkage

Assumption:

higher ratio – stronger shredder link with riparian area



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Ratio TFPOM to BFPOM

Ecosystem parameter	Functional feeding group ratios	General criteria ratio levels
TFPOM/BFPOM	Filtering collectors/ Gathering collectors	FPOM u transport (in suspension) enriched usual particulate loading >0,50

Ratio is a measure of the availability of organic particle resource to support a community of filtering taxa

more filtering taxa – if there is more TFPOM

more gathering taxa - if there is more BFPOM

Assumption:

higher ratio indicates undisturbed riparian area



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Stability of channel

Ecosystem parameter	Functional feeding group ratios	General criteria ratio levels
STABLE CHANNEL	Scrapers+filtering collectors/ shredders+gathering collectors	Stable substrates (bedrock, boulders, cobbles, large woody debris) plentiful >0,50

If the bottom is more stable, invertebrates that cling to surfaces of stones or climb on vegetation while feeding on attached algae would be more abundant

Assumption:
higher stability indicates undisturbed riparian area



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What are we trying?

- To quantify measure of riparian degradation regarding to mentioned sets of ratios
- To find correlation between measure of degradation of riparian area and measure of changes in sets of ratios



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What are we asking you for?

- **Samples with high level of degradation of riparian area – with mark 1**
- **Samples with slightly lower level of degradation of riparian area – with mark 2**
- ...
- **samples without degradation of riparian area – with mark 7**
- **All localities need to be within the same stream order**



Why do we need those surrogates?

- **Because in many countries around the world monitoring of macroinvertebrate communities already exist**
- **We could use existing data for calculation degradation degree of riparian area**



What are the advantages?

SAVING MONEY AND TIME
by using existing data

PROTECTING RIPARIAN AREA
from new sampling procedure



Additional advantages

Using FFG like surrogates we can determine the level of water pollution

Because this approach is based on functional group it would be possible to compare level of water pollution from localities all around the world





Who are we?

Miodrag

Statistics

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Who are we?



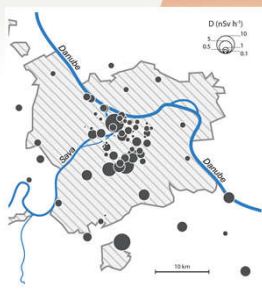
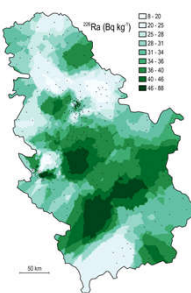
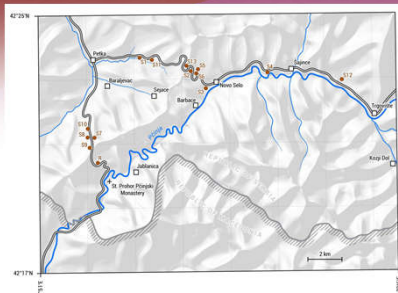
Milan

**GIS
Cartography**

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Who are we?






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Thanks!



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