Free-flowing rivers and restoration of river connectivity: from theory to operational approaches

Summary of ECRR workshop in I.S. Rivers 2022 Conference, Lyon

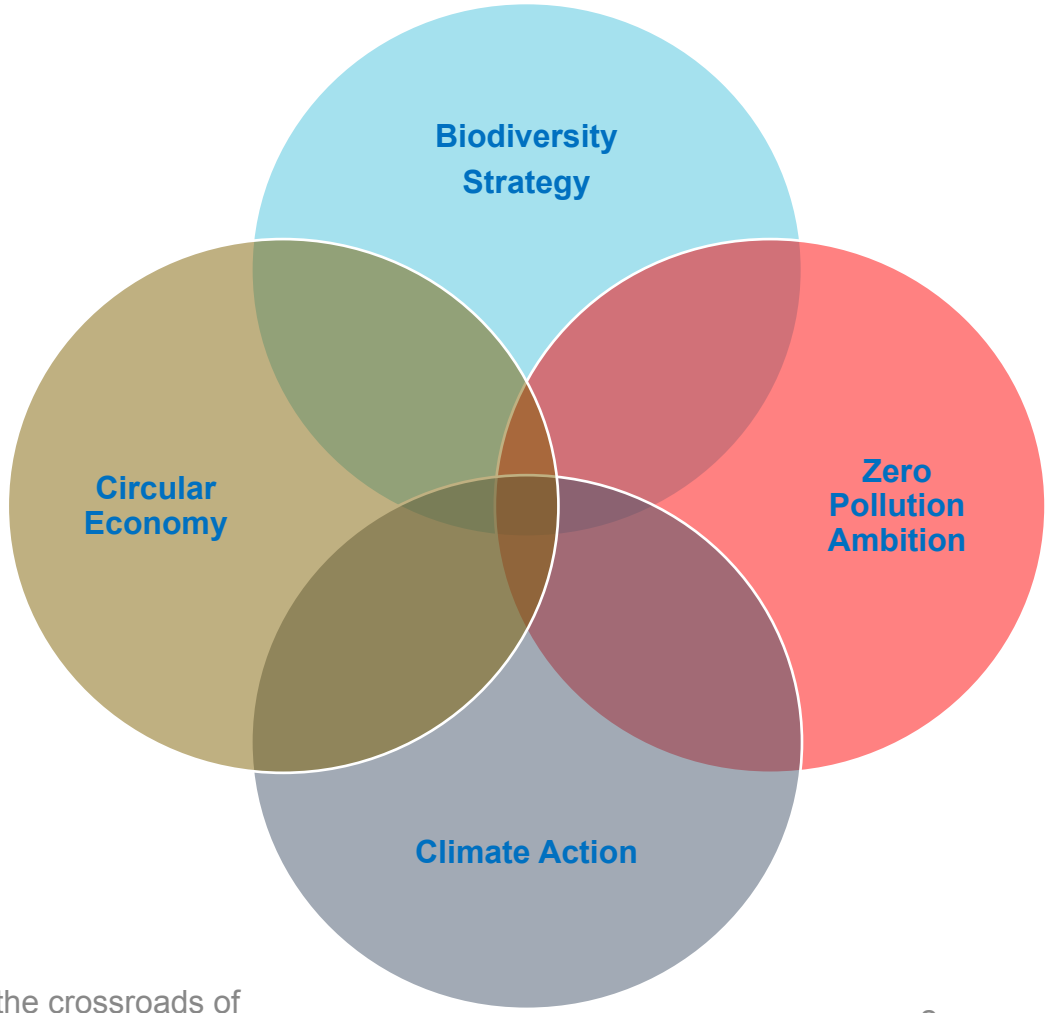
River Restoration Workshop Europe – INBO 2022

September 26, 2022 | Annecy, France

EU ACTING THROUGH INTERRELATED SOLUTIONS

4 ecological crises

- Climate
- Biodiversity
- Resources
- Pollution



BIODIVERSITY KEY TARGETS WATER

30% of EU land and sea protected; 1/3 strict protected	Freshwater ecosystems are included
Freshwater ecosystems restoration	Emphasize on WFD objectives to be met by 2027
Restore at least 25.000 km free flowing rivers	Removal of primarily obsolete barriers Restoration of floodplains and wetlands
Restore and preserve ecological flows	

EU policies call for greater nature/river restoration efforts

Calls for restoring **25 000 km** of EU rivers to a free-flowing state

- **remove (primarily obsolete) barriers to longitudinal and lateral connectivity,**
- Inventerize barriers, conduct necessary research and quantify the area that needs to be restored,
- prepare and submit national restoration plans.

What is a **free-flowing river**, how is it defined?

How to **prioritize barriers for removals**, when there are so many barriers?

Metrics for “free-flowing rivers” (FFR)

EC defines FFRs as surface WBs, not impaired by barriers & not disconnected from floodplains.

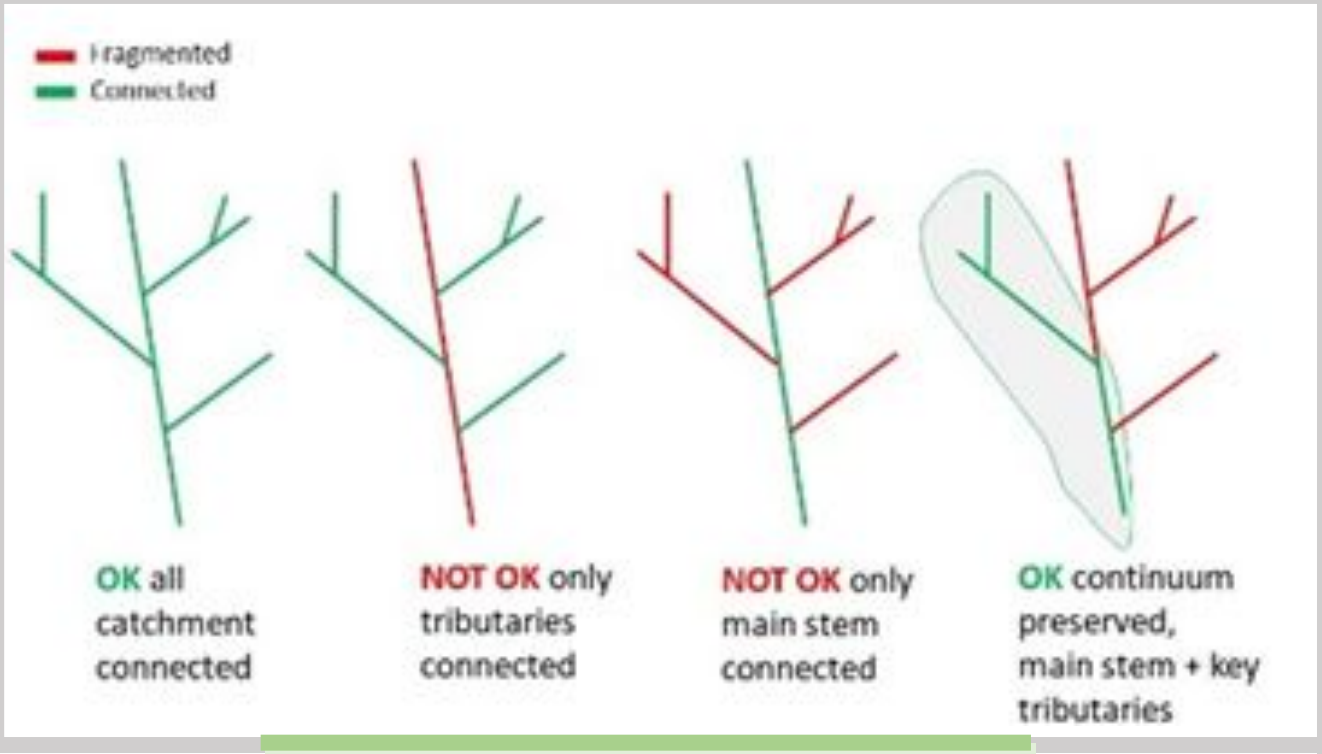
WB is not the right scale for FFR assessment, because does not consider river functions!

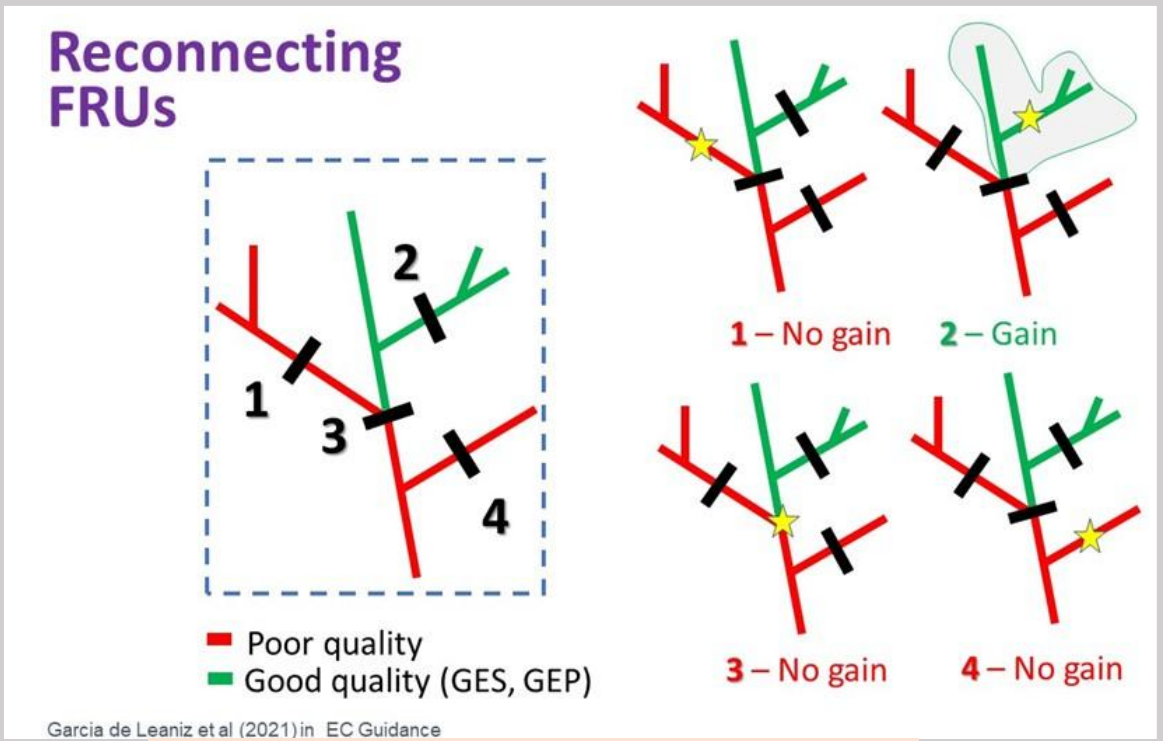
FFR metric includes:

- Longitudinal connectivity for fish
- Longitudinal connectivity for sediments
- Lateral connectivity in relation to ordinary (2-10 years) flooding processes
- Lateral connectivity in relation to riverbed mobility/lateral erosion
- Minimum levels of functionality defined

Longitudinal connectivity	Lateral connectivity
based on presence/absence of barriers	river type/size-specific meeting minimum lateral space available for flooding/erosion

Functional River Unit (FRU) concept





FRU: minimum river length that sustain targeted river functions.

Unclear if FRU covers all relevant processes, i.e. longitudinal connectivity for sediments.

Prioritisation of barriers & rivers for restoration

Most methods focus on:

- longitudinal connectivity (for fish & priority species),
- No. of barriers upstream, downstream, to the sea,
- Km of rivers (ha of habitats) opened,
- financial efficiency of project (km/€).

Additional criteria:

- goals of RBMP,
- protected areas,
- effects of climate change,
- threats brought by invasive species
- etc.

Prioritisation	vs.	**Optimisation**
ranks barriers for removal based on the highest ecological outcome (high ecological gains, but high costs and risk);		selects specific barriers for highest ecological gains with given resources (lower ecological gains, but more realistic).

Discussion & conclusions

Climate change	→ Incorporate CC effects into prioritisation
Ecological needs	→ Assess vulnerability of fish communities to barrier types
Lack of data	→ Develop databases of barriers, habitats, etc.
Sediment discon-tinuity	→ Include metrics on sediment connectivity
Public opposition	→ Better communication, engage communities
Conflicting needs	→ Involve stakeholders, tailor tools to multiple users' needs

Feedback

Free-flowing rivers

- Principles of free-flowing rivers theoretically defined
- Pragmatic approaches to be developed?
- CIS – ECOSTAT to elaborate (practical) metrics

Barrier removal & Restoration of Rivers

- Several prioritisation /optimisation approaches
- How to ‘calculate’ the ecological gains
- Many other factors (can) contribute to the outcome