

EU legislation mainstreaming river and wetland restoration?!

- ✓ European River fragmentation inventory
 - Amber Project

- ✓ Pan-European river continuity survey
 - European River Symposium 2021

- ✓ Free-flowing rivers from theory to practice
 - ✓ I.S. Rivers 2022 workshop

- ✓ River restoration: a European goal at the crossroads of several legislations
 - ✓ River Restoration Workshop Europe – INBO 2022

BIODIVERSITY KEY TARGETS WATER

supported by the Nature Restoration Law



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

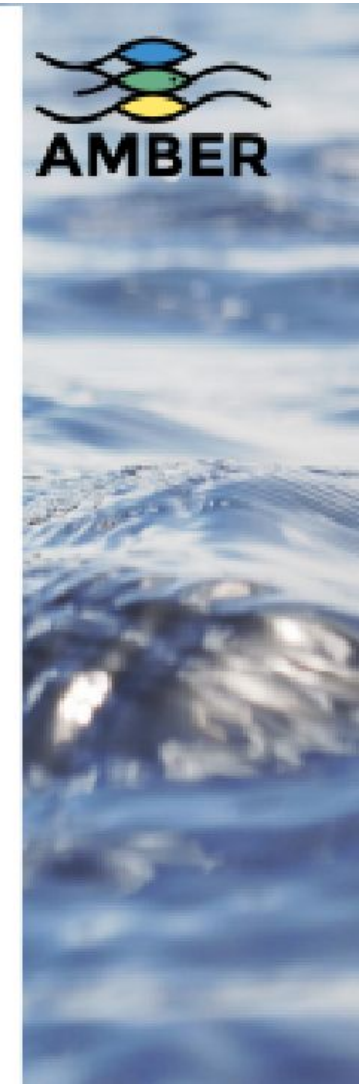
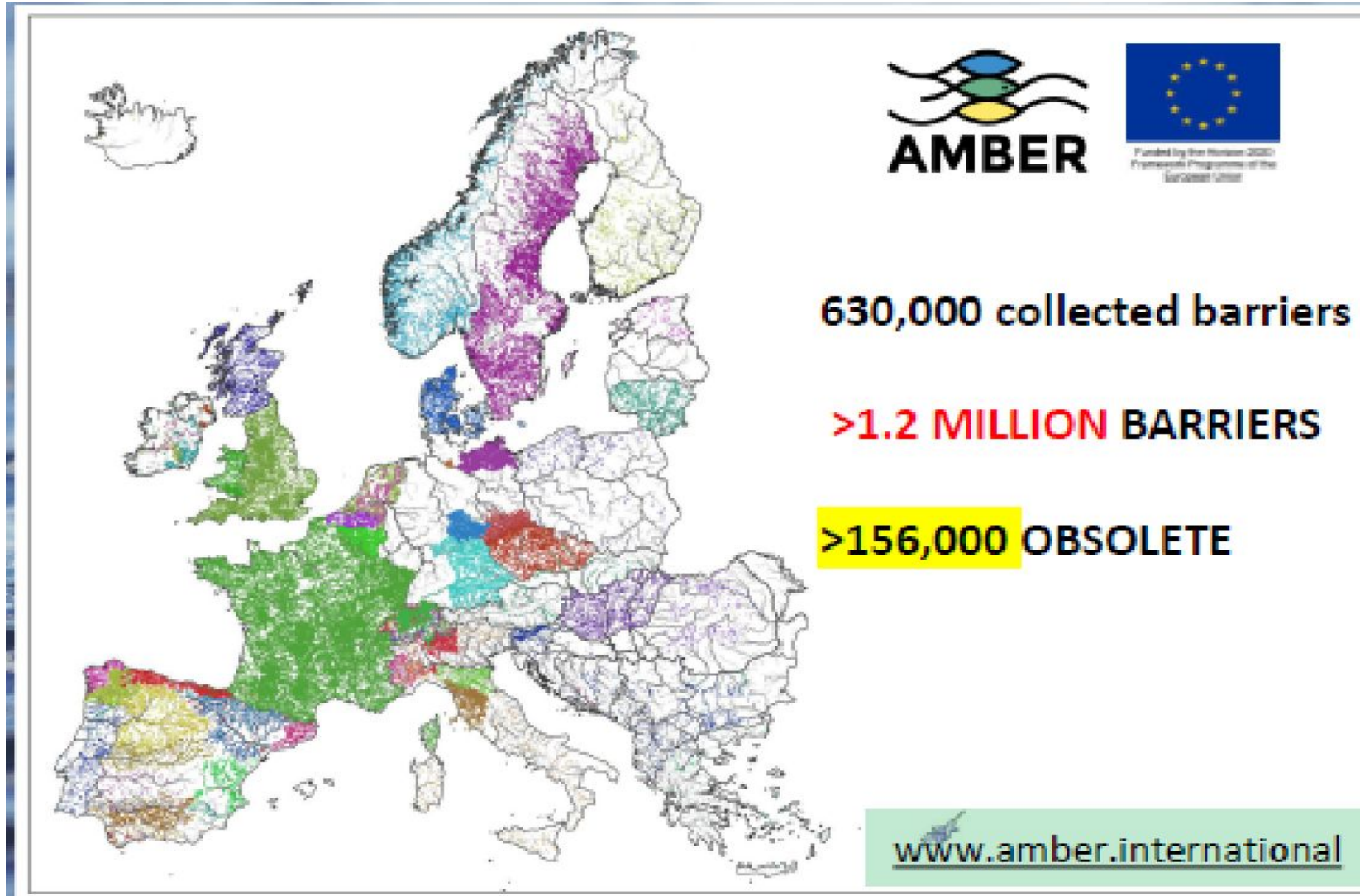
Removal of primarily obsolete barriers
Restoration of floodplains and wetlands



Restore and preserve ecological flows

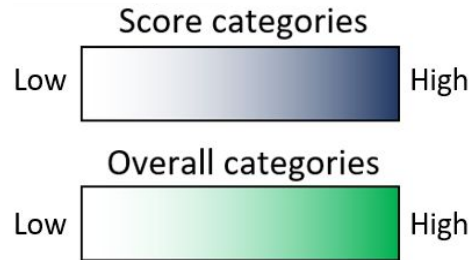
RIVER FRAGMENTATION

Enormous restoration challenge!



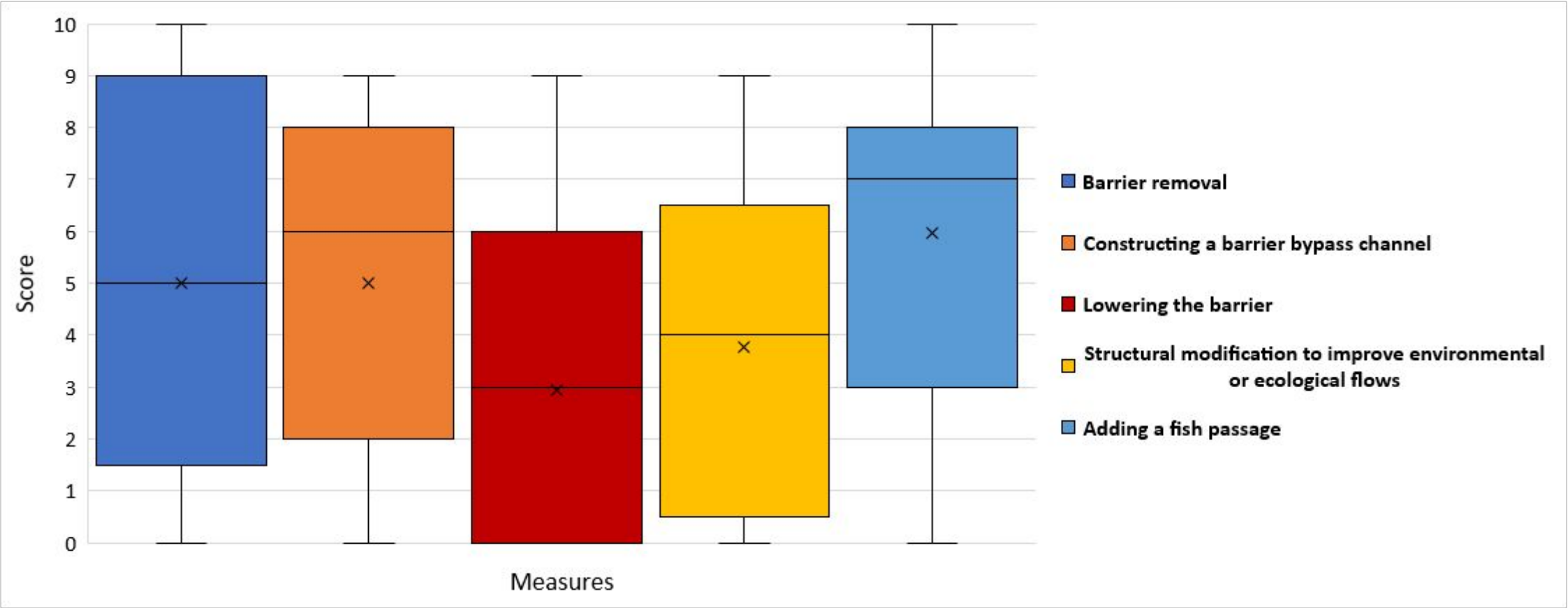
Pan – European River continuity restoration survey

Which measures are applied to restore river continuity?



| | <i>Adding a fish passage</i> | <i>Constructing a barrier bypass channel</i> | <i>Barrier removal</i> | <i>Structural modification to improve environmental or ecological flows</i> | <i>Lowering the barrier</i> | <i>Overall</i> |
|------------------------------------|------------------------------|--|------------------------|---|-----------------------------|----------------|
| Wales (UK) | Dark Blue | Dark Blue | Dark Blue | Dark Blue | Dark Blue | Dark Green |
| Poland | Dark Blue | Dark Blue | Dark Blue | Dark Blue | Dark Blue | Dark Green |
| Scotland (UK) | Dark Blue | Dark Blue | Dark Blue | Dark Blue | Dark Blue | Dark Green |
| Spain | Dark Blue | Dark Blue | Dark Blue | Dark Blue | Dark Blue | Dark Green |
| Ireland | Light Blue | Dark Blue | Dark Blue | Dark Blue | Dark Blue | Dark Green |
| Estonia | Dark Blue | Dark Blue | Dark Blue | Light Blue | Dark Blue | Dark Green |
| France | Dark Blue | Dark Blue | Dark Blue | Dark Blue | Dark Blue | Dark Green |
| Finland | Dark Blue | Dark Blue | Dark Blue | Light Blue | Light Blue | Dark Green |
| England (UK) | Light Blue | Light Blue | Light Blue | Dark Blue | Dark Blue | Dark Green |
| Denmark | Light Blue | Dark Blue | Dark Blue | Light Blue | Light Blue | Dark Green |
| Cyprus | Dark Blue | Light Blue | Dark Blue | Light Blue | Light Blue | Dark Green |
| Sweden | Dark Blue | Dark Blue | Dark Blue | Dark Blue | Dark Blue | Dark Green |
| Germany | Dark Blue | Dark Blue | Dark Blue | Dark Blue | Dark Blue | Dark Green |
| Austria | Dark Blue | Dark Blue | Light Blue | Dark Blue | Light Blue | Dark Green |
| Portugal | Dark Blue | Light Blue | Dark Blue | Dark Blue | Light Blue | Dark Green |
| Lithuania | Dark Blue | Dark Blue | Dark Blue | Light Blue | Light Blue | Dark Green |
| Northern Ireland (UK) | Dark Blue | Light Blue | Light Blue | Dark Blue | Dark Blue | Dark Green |
| Republic of North Macedonia | Dark Blue | Light Blue | Light Blue | Dark Blue | Dark Blue | Dark Green |
| Romania | Light Blue | Dark Blue | Light Blue | Dark Blue | Light Blue | Dark Green |
| Switzerland | Dark Blue | Dark Blue | Dark Blue | Light Blue | Light Blue | Dark Green |
| Slovakia | Dark Blue | Dark Blue | Light Blue | Light Blue | Light Blue | Dark Green |
| Netherlands | Dark Blue | Dark Blue | Dark Blue | Light Blue | Light Blue | Dark Green |
| Norway | Dark Blue | Light Blue | Light Blue | Light Blue | Light Blue | Dark Green |
| Hungary | Light Blue | Light Blue | Light Blue | Light Blue | Light Blue | Dark Green |
| Latvia | Light Blue | Light Blue | Light Blue | Light Blue | Light Blue | Dark Green |
| Bosnia and Herzegovina | Light Blue | Light Blue | Light Blue | Light Blue | Dark Blue | Dark Green |
| Russia | Light Blue | Light Blue | Light Blue | Light Blue | Light Blue | Dark Green |
| Malta | Light Blue | Light Blue | Light Blue | Light Blue | Light Blue | Dark Green |
| Overall | Dark Green | Dark Green | Dark Green | Dark Green | Dark Green | Dark Green |

Which measures are applied to restore river continuity? Scale: 0 (not considered) to 10 (highest priority)





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) From habitats and species to ecosystems!

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

FFR metrics should all river functions:

- 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

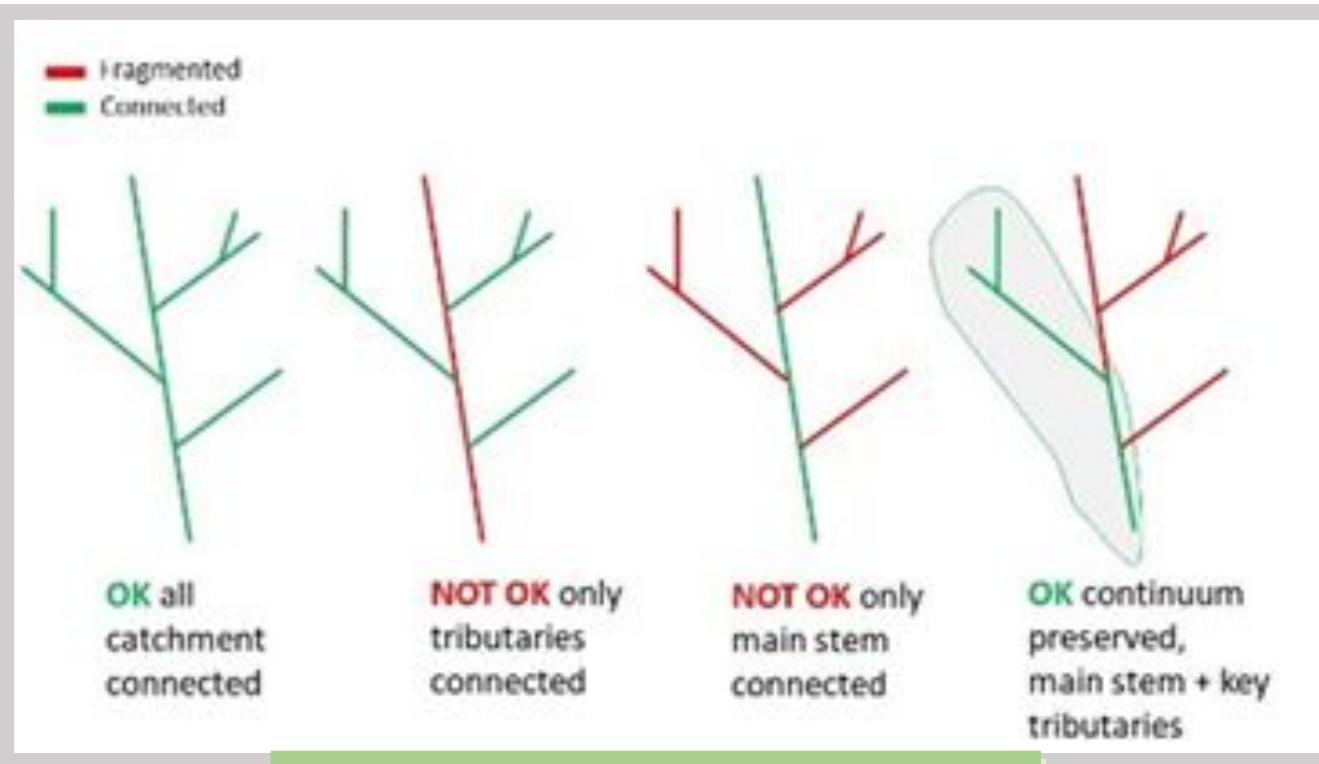
Longitudinal connectivity

based on presence/absence of barriers

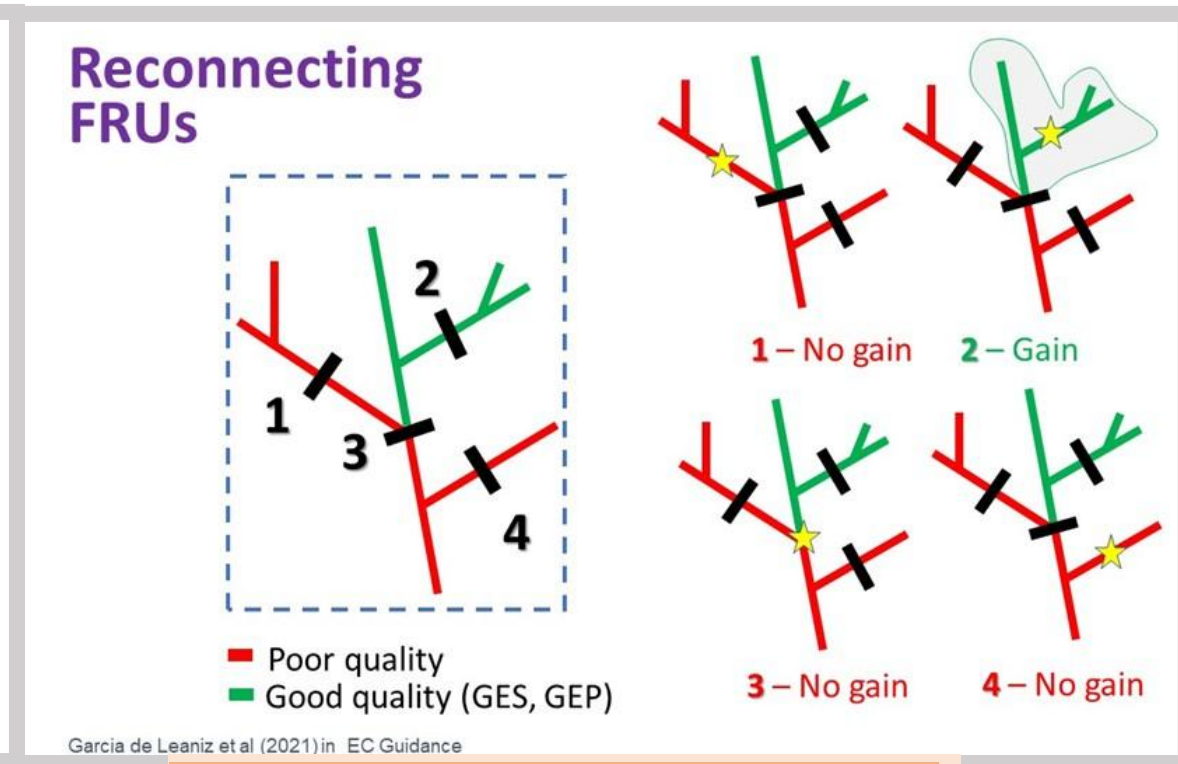
Lateral connectivity

river type/size-specific meeting minimum lateral space available for flooding/erosion

Functional River Unit (FRU) concept to restore Free-flowing Rivers (FFR)



Theoretical principles formulated



Pragmatic approaches and practical metrics still to be defined!

Prioritisation of barriers & rivers for restoration

Several methods, most 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

ranks barriers for removal based on the highest ecological outcome (high ecological gains, but high costs and risk);

vs.

Optimisation

selects specific barriers for highest ecological gains with given resources (lower ecological gains, but more realistic).



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River restoration: a European goal at the crossroads of several legislations!?

No Red Flag!



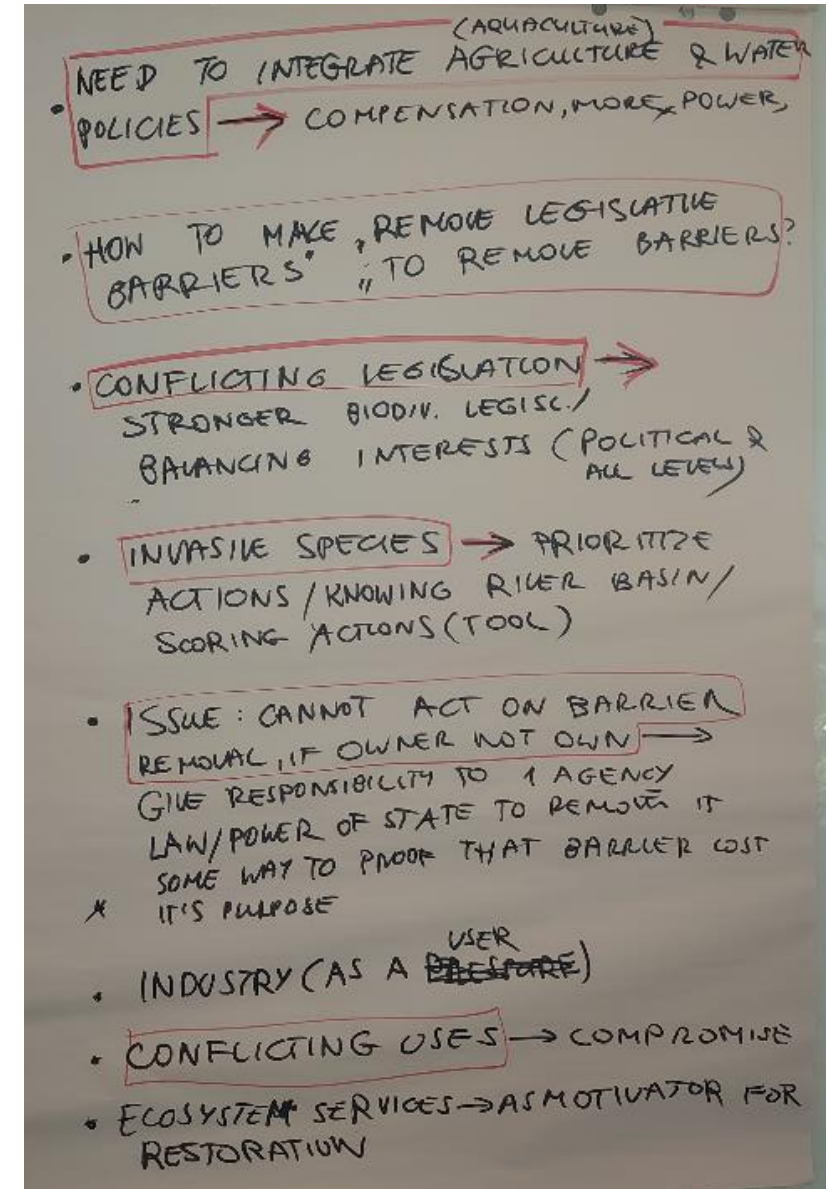
Some take-away messages

• Technical aspects

- Definition FFR/FRU ?
- Continuity AND Connectivity !
- Metrics to be developed, Monitoring (pre-post implementation)
- Let the rivers do their way! (Less is more ?)

• Knowledge

- Data acquisition and management
- Innovation but experience feedback!
- All compartments of the ecosystems (not only hydrology and sediment)



Some take-away messages

- **Prioritization and design**

- Upstream/downstream
- Whole Basin approach
- Multi-objectives (Floods, Biodiv, Quantity, CC...) in a multisectoral context (Agriculture, Energy, Industry...)
- The WB is not the unit
- Priority to NBS

- **Funding, financing**

- Payment for Ecosystem Services
- Basin solidarity
- Cross-funding
- Socio-economical benefits not only costs !



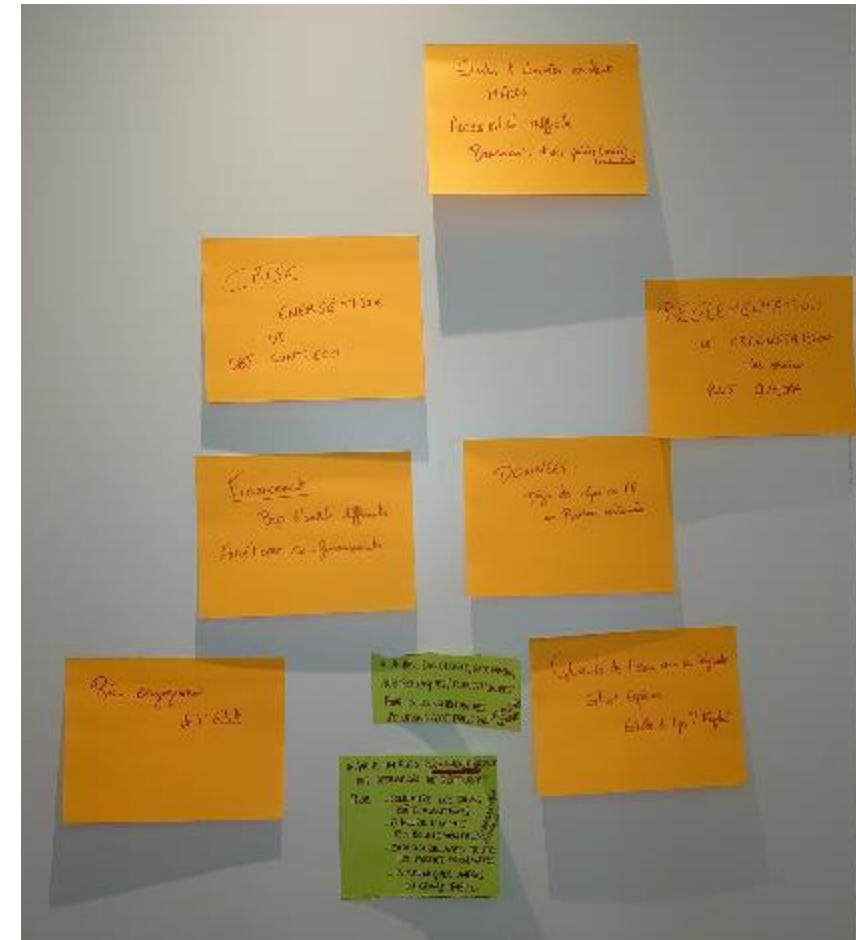
Some take-away messages

- **Regulation**

- Complement the regulations (national, local...)
- Simplify the administrative burden to foster implementation
- Still conflicting legislations (Energy, agriculture)
- Ownership
- Land planning, Land use

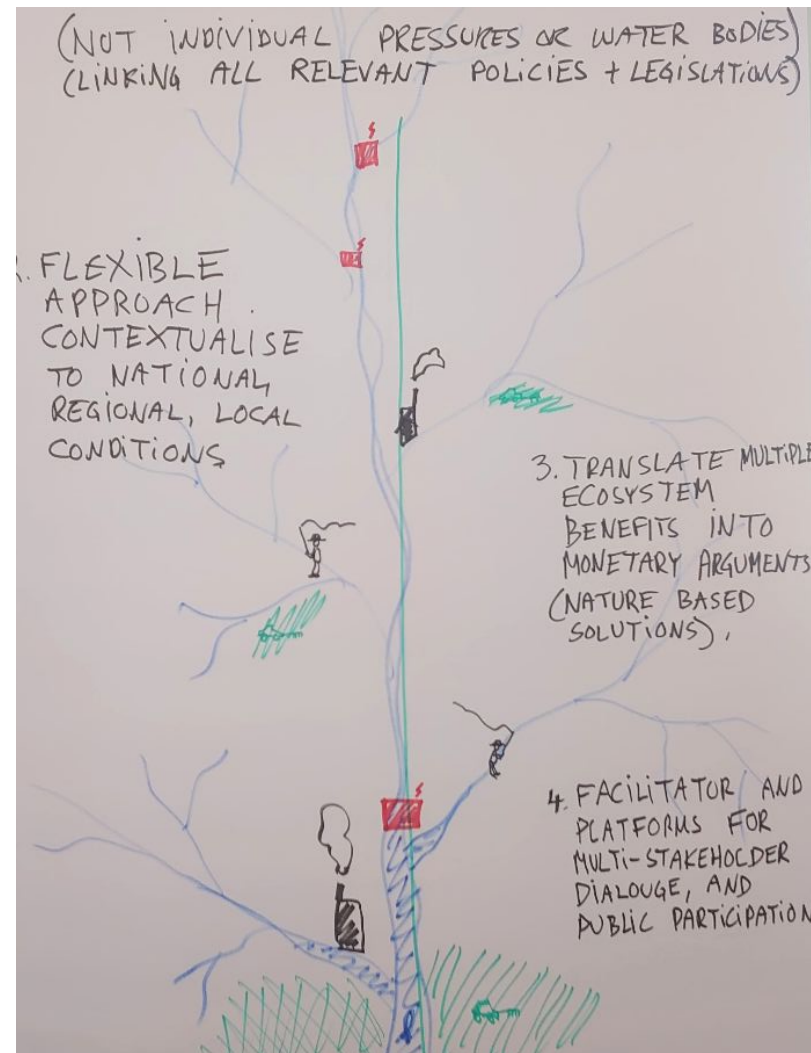
- **Governance**

- Stakeholders involvement
- Win-win strategies
- Ownerships of projects
- Role of the State and public authorities
- Citizen awareness
- Training and capacity building !



Catchment scale - Integrative River Restoration

Approaches: Want to work on this new paradigm ?!



Let's keep working together on the subject!

- Workshop report
- INBO website
- Basins and Members involvement
- Participation to Working groups
- ...