Restoration of the Danube River Basin for ecosystems and people from mountains to coast

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Four dimensions of river continuity and the first ECOSTAT assessment on the Danube River Basin

Free-flowing Rivers Restoration Conference

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Bratislava, 08.10.2025

Strategy for connectivity assessment

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Connectivity types

Dimensions

- **Longitudinal**
- **Lateral**
- **Vertical**
- **Temporal**

Aspects

- **Flow**
- **Sediment**
- **Biota**
- **Physicochemical**
- **Nutrient**

AI-generated image

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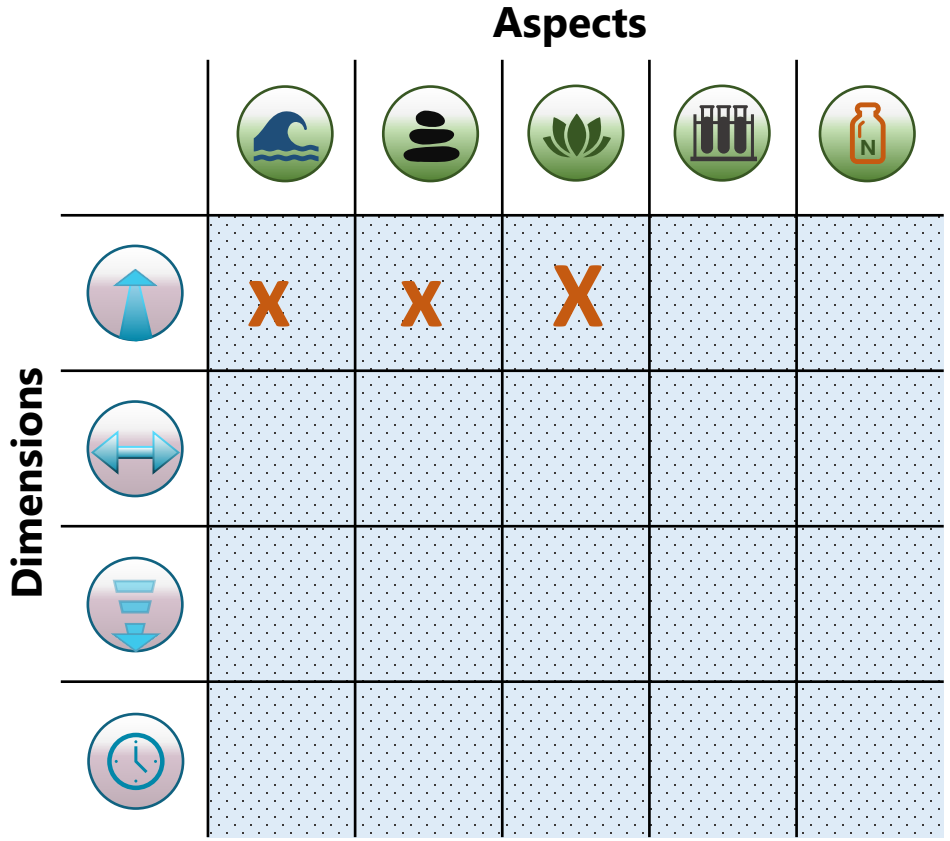
Connectivity assessment matrix

Complex picture, yet to be understood.

X – the commonly investigated perspectives



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FREE-FLOWING RIVER METHODOLOGY

Connectivity assessment by ECOSTAT developed methodology

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ECOSTAT – FFR method

It follows the next four steps, not necessarily in the following order:

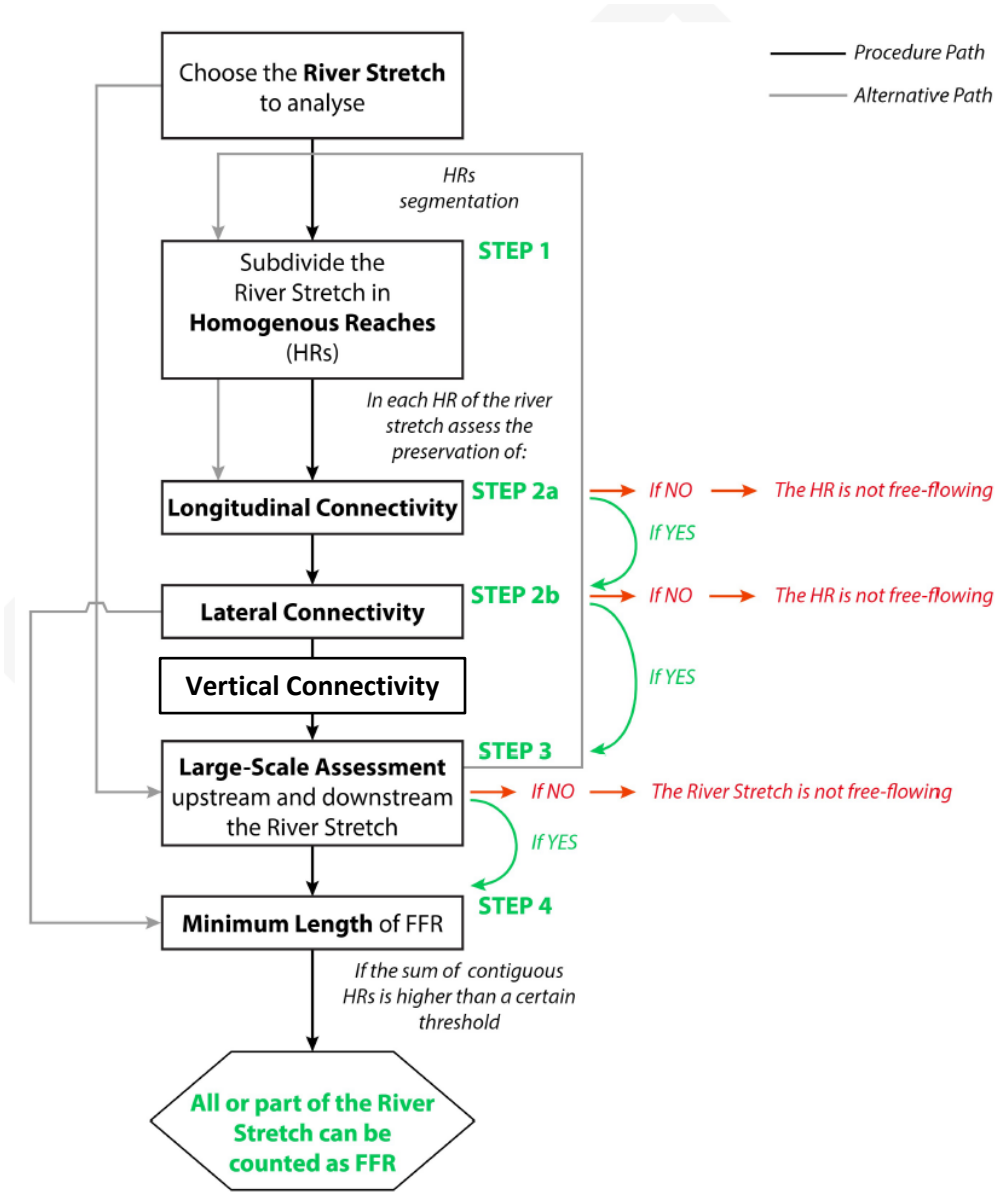
Step 1 – Identification of **homogenous river reaches** within the potential FFR stretch

Step 2 – Homogeneous reach assessment

- Addressing longitudinal connectivity
- Addressing lateral connectivity
- Addressing vertical connectivity

Step 3 – Large-scale assessment of upstream and downstream pressures

Step 4 – Minimum length of FFR stretch



European Commission, Joint Research Centre, van de Bund, W., Bartkova, T., Belka, K., Bussettini, M., Calleja, B., Chris-tiansen, T., Goltara, A., Magdaleno, G., Mühlmann, H., Ofenböck, G., Parasiewicz, P., Peruzzi, C., Schmitt, K., Schultze, A., Reckendorfer, W. and Bastino, V., *Criteria for identifying free-flowing river stretches for the EU Biodiversity Strategy for 2030*, Publications Office of the European Union, Luxembourg, 2024, https://data.europa.eu/doi/10.2760/402517, JRC137919.

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Connectivity assessment in Danube4ALL

Basis: application of **ECOSTAT - FFR method**

Specific: project extension of **ECOSTAT – FFR** focusing on sediments

- **Improved longitudinal assessment**
- **Improved vertical assessment**

Specific: demonstration of **Earth Observation (EO) products** to for connectivity assessment

Specific: conceptualization of temporal connectivity assessment

	X+	X+	X	X	
	X+	X	X	X	
	X+	X+			
	X	X	X	X	X

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ECOSTAT – FFR method

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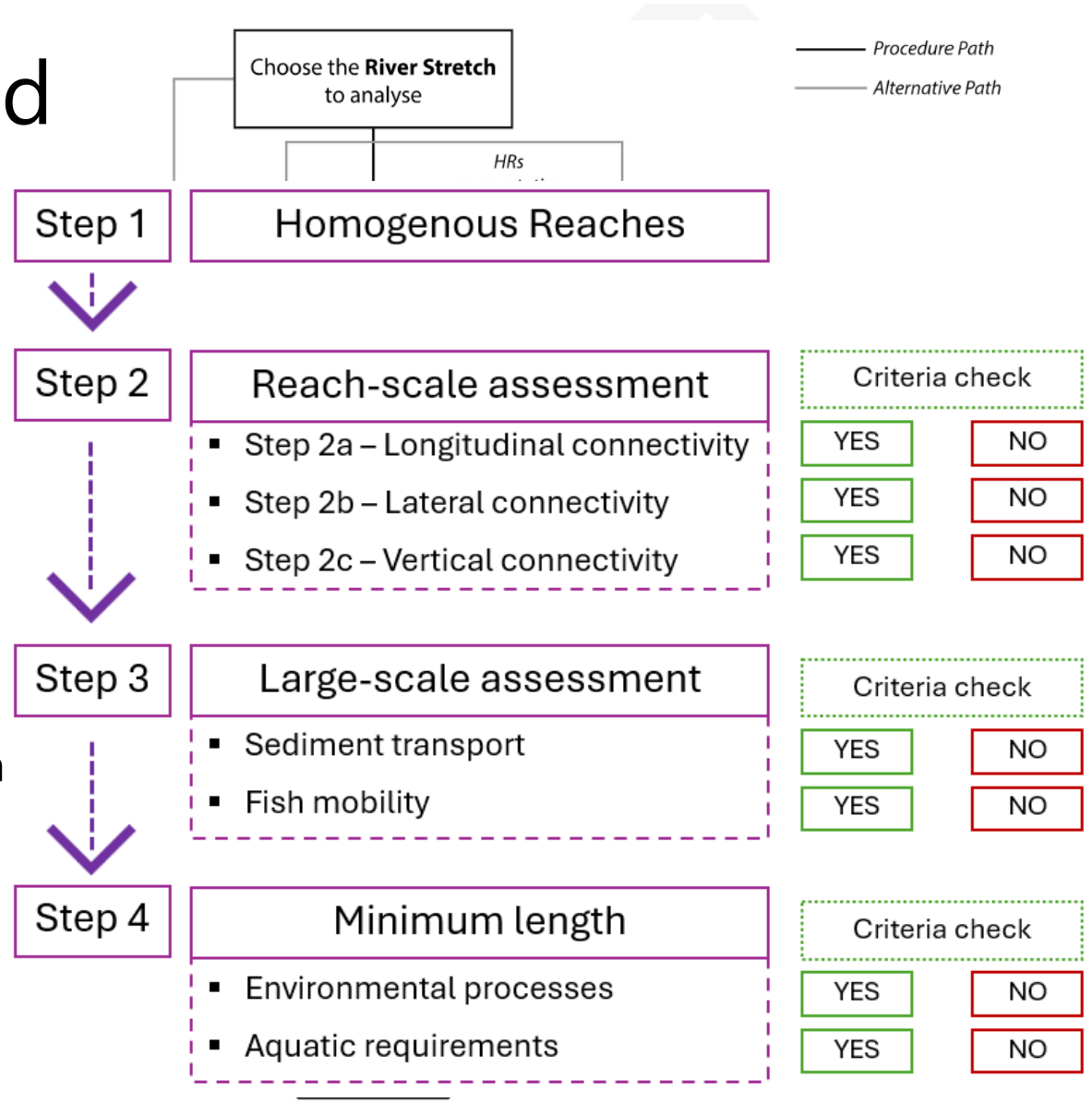

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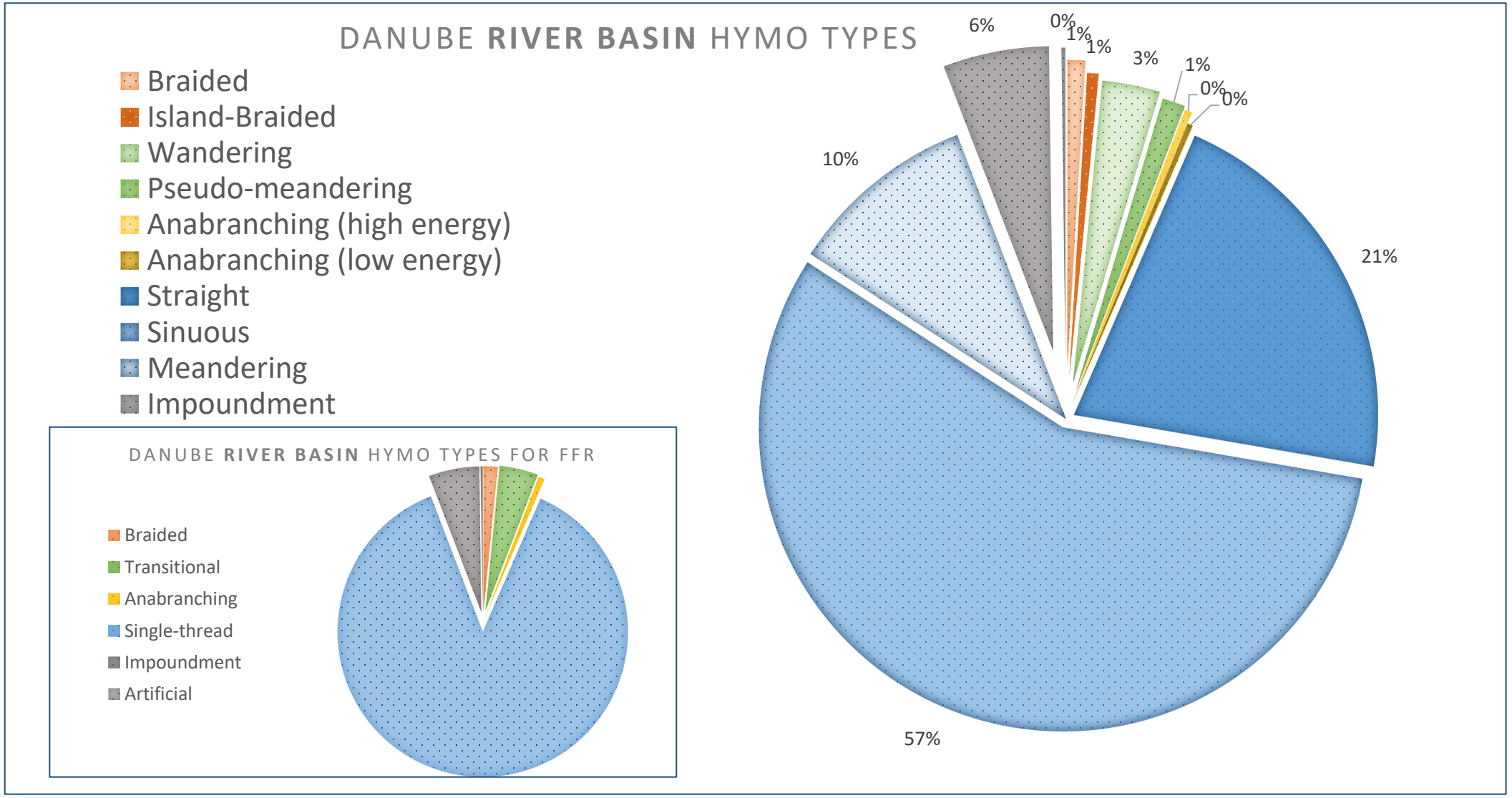
ECOSTAT FFR – Preparatory work

Hydro-morphological classification of river reaches



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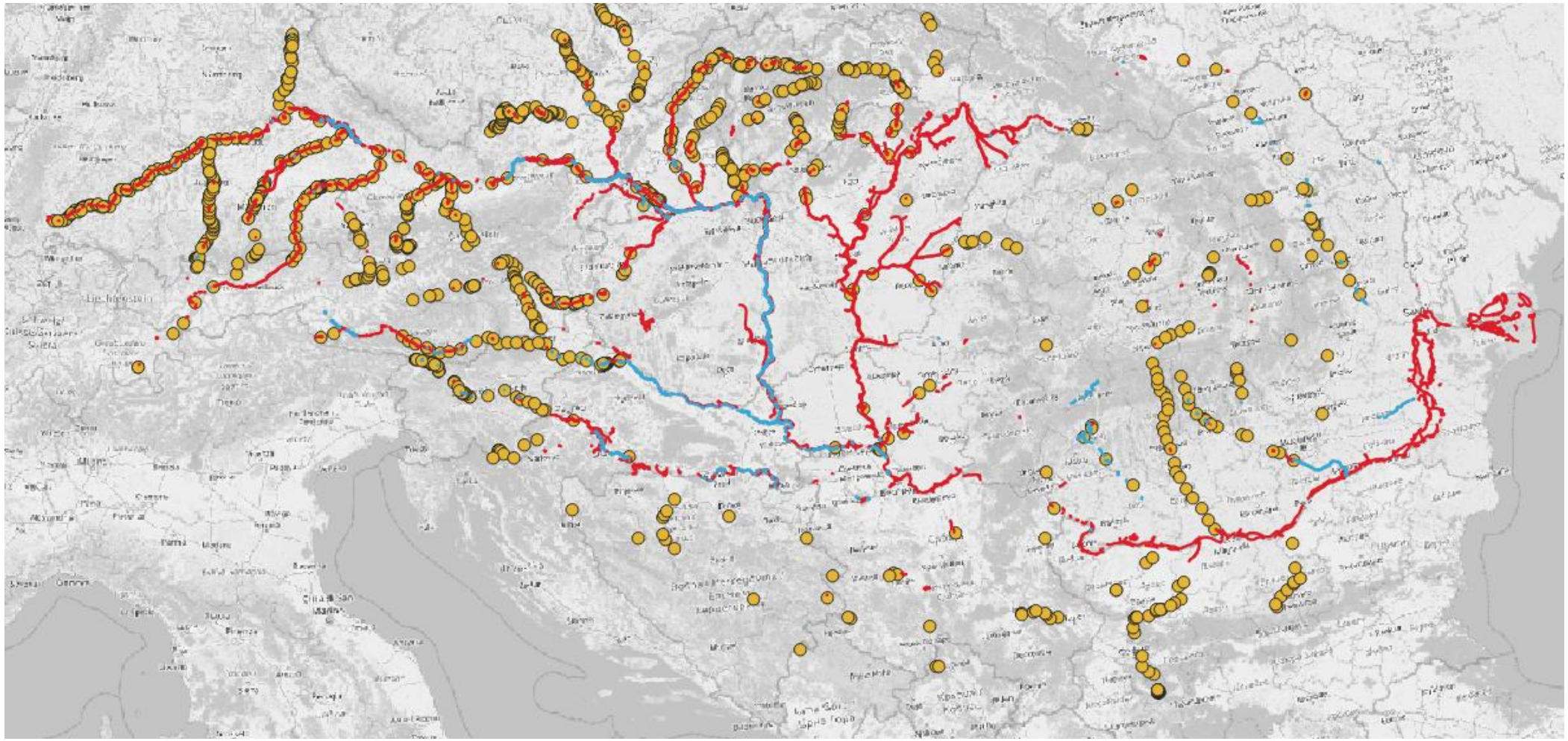
ECOSTAT FFR – Preparatory work

Assembling barrier dataset

- Danube Sediment dataset,
- Danube GIS (ICPDR),
- Global Dam Watch,
- Electronic Navigational Charts, …



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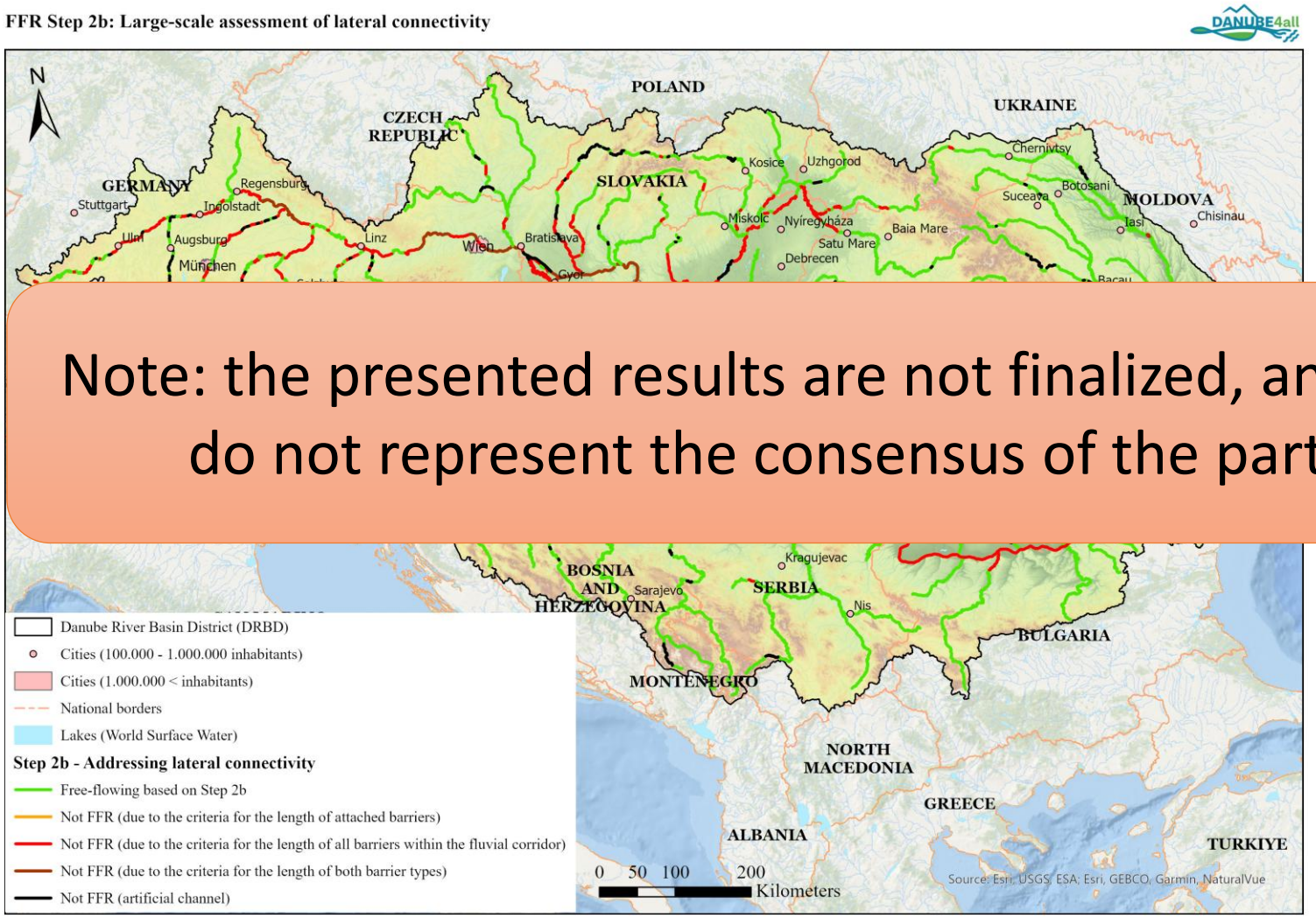
ECOSTAT – FFR: preliminary results

Reach-scale assessment on fish mobility

Note: the presented results are not finalized, and as such they do not represent the consensus of the partners, yet!

ECOSTAT – FFR: preliminary results

Reach-scale assessment on lateral connectivity



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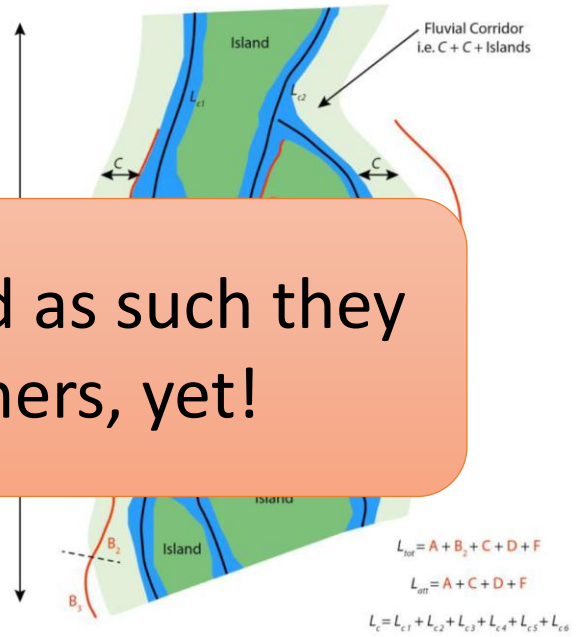

SOURCE: ECOSTAT EC, 2024

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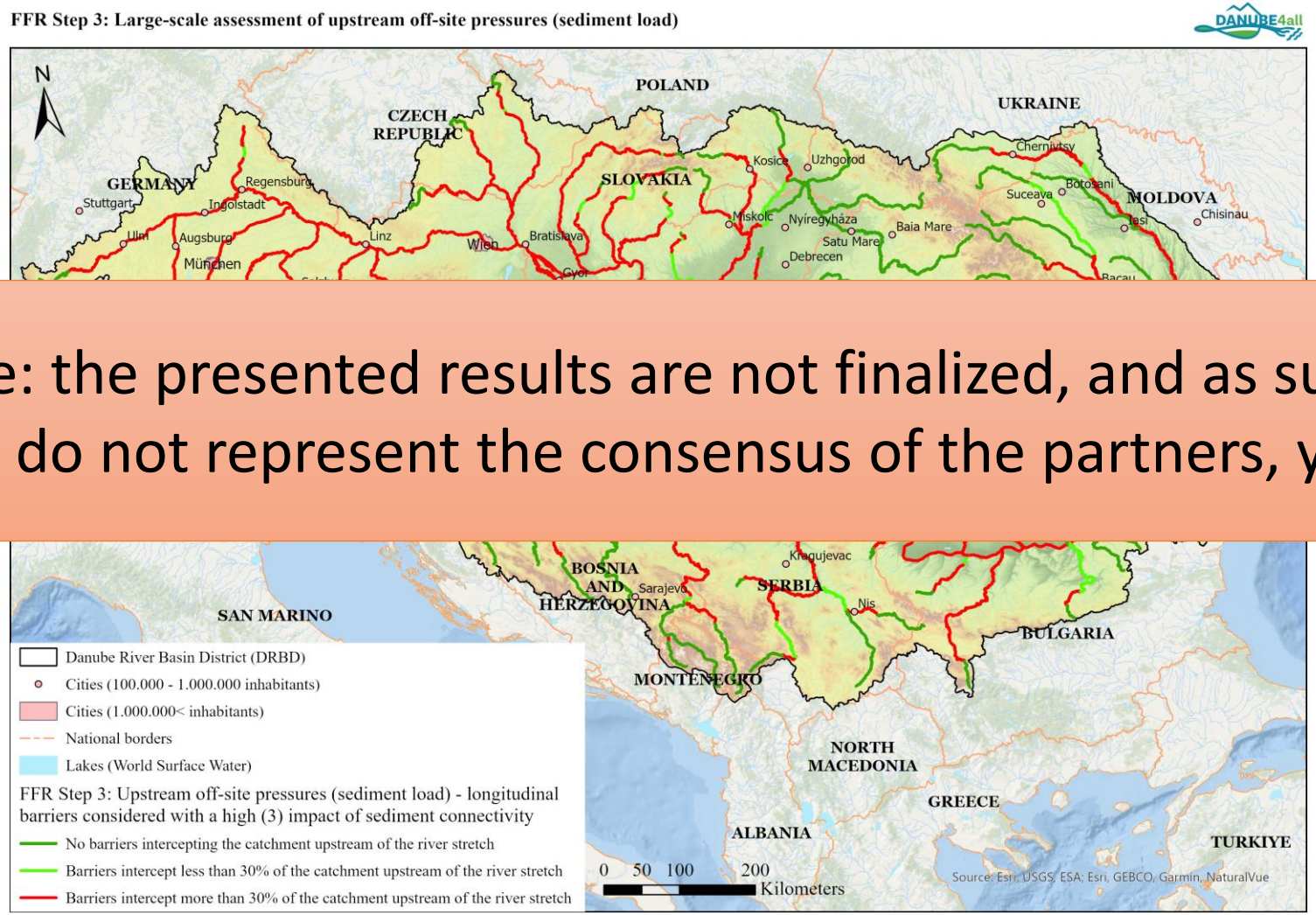
ECOSTAT – FFR: preliminary results

Large-scale assessment of sediment transport



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ECOSTAT – FFR: preliminary results

Overall assessment

Across the assessed river network, there are:

Impounded: ca. 6%

FFR: ca. 9%

Not FFR: ca. 85%

Note: the presented results are not finalized, and as such they do not represent the consensus of the partners, yet!

TAKE HOME MESSAGES

- River connectivity is a multi-dimensional topic
- ECOSTAT FFR method provides a novel basis for connectivity assessment
  - still under development
- Applications across riverbasins are challenging but they are able to provide exceptional insights on current status

Thank you!

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