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Dublin

Multi-scale integrated approach of hydro-morphology in France

This presentation was originally prepared and **presented** in Oslo (13th oct. 2015) by :

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22nd september 2017



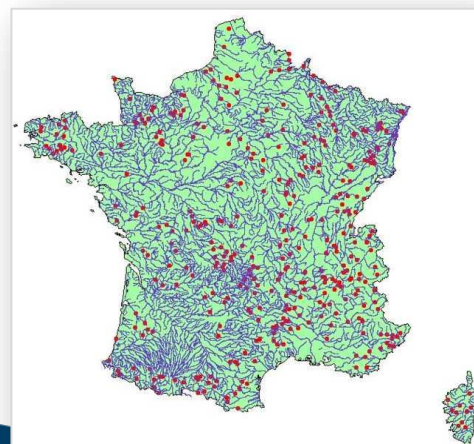
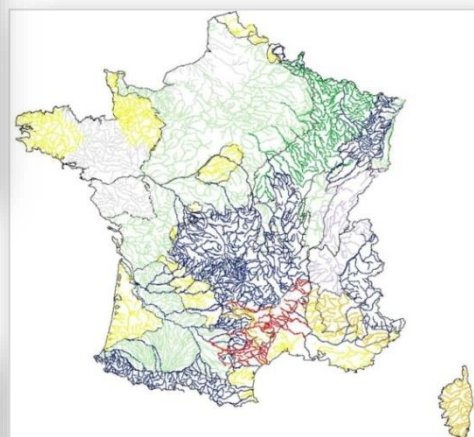
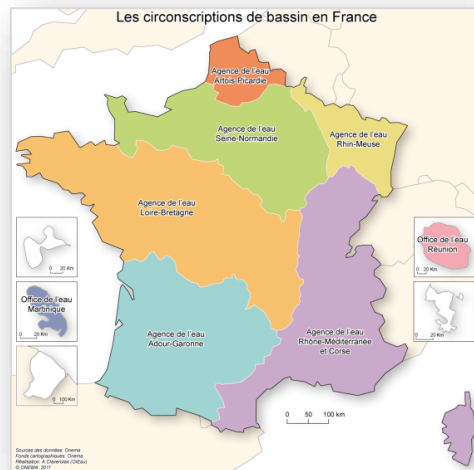
Geographical features of the national territory



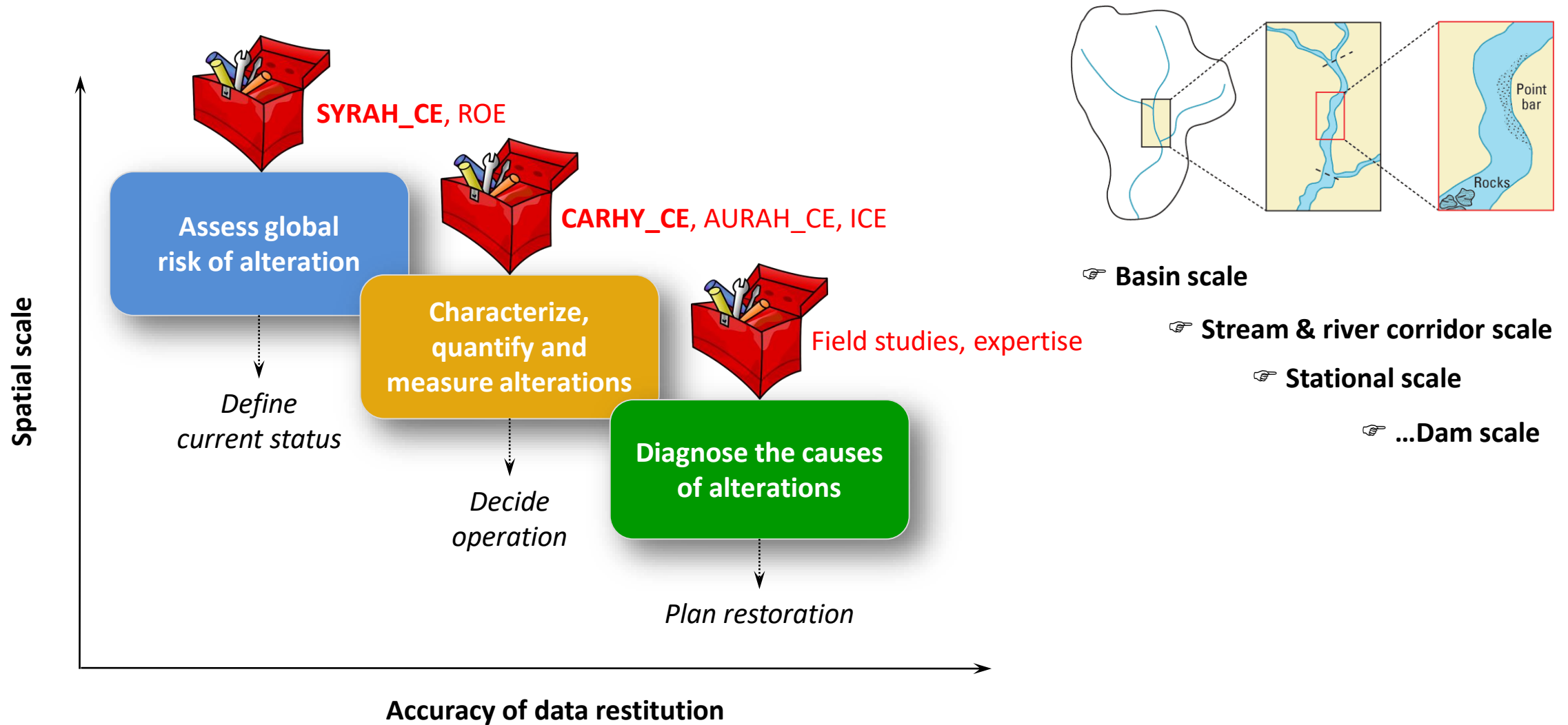
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- 6 river basins & 5 overseas territories
- 22 hydro-ecological regions = 50 types of rivers
- $\approx 250\ 000$ km & $\approx 10\ 800$ water bodies
- Surveillance monitoring network ≈ 1700 stations

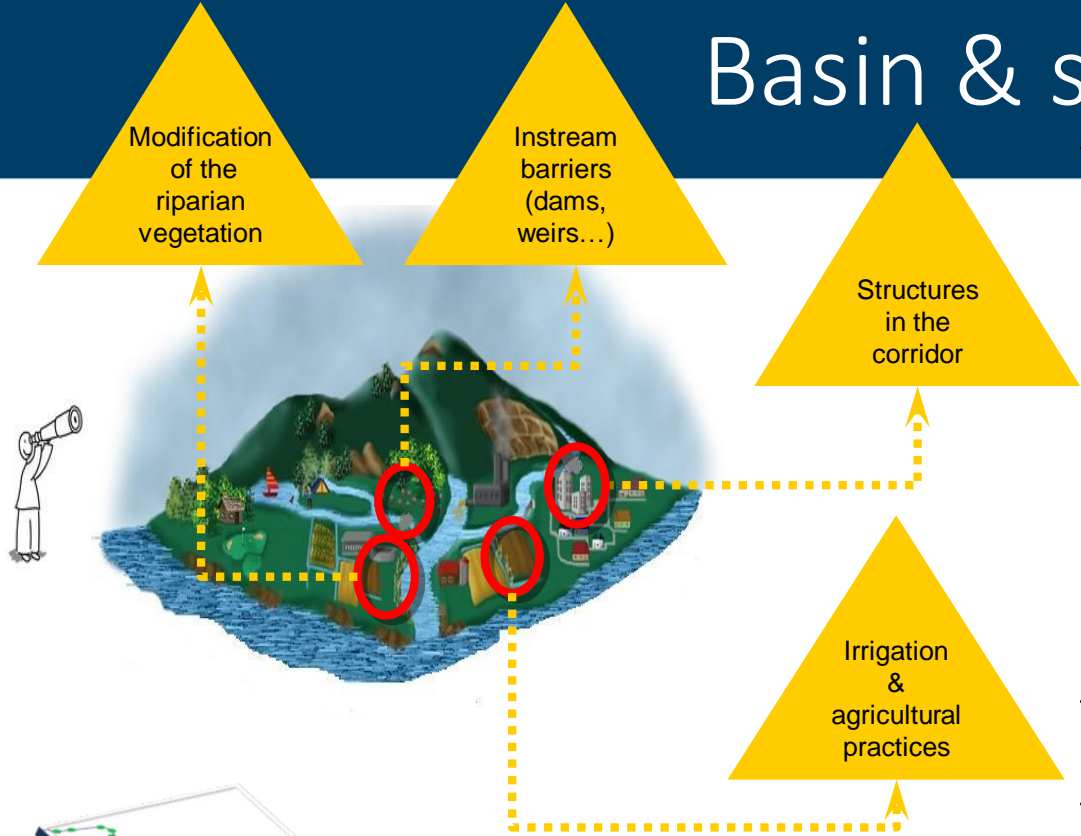
Which approach for assessment of hydro-morphology in France?



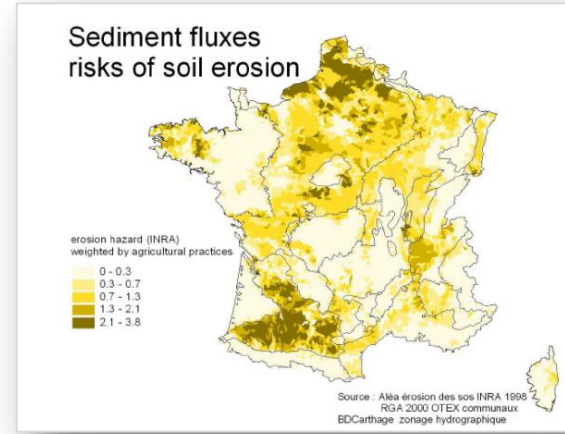
A multi-scale integrated approach in hydro-morphology objectives



Basin & stream scales: SYRAH_CÉ

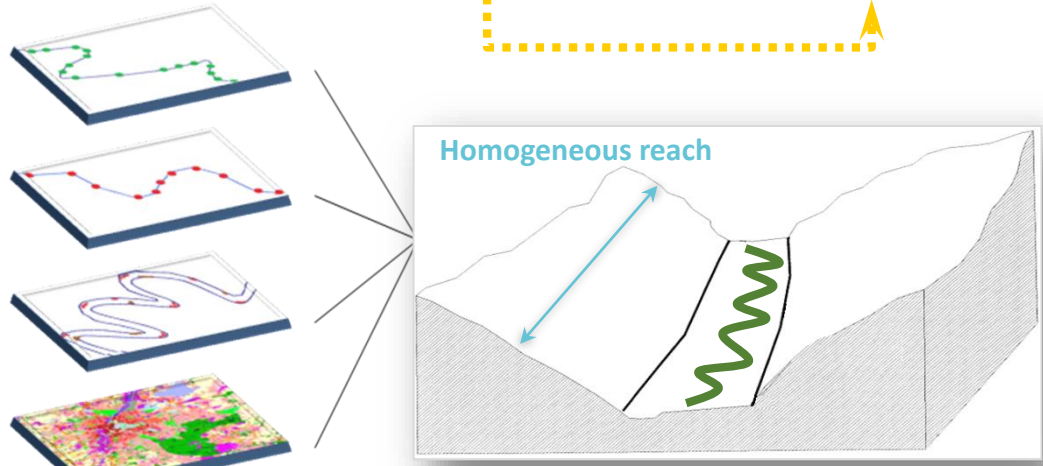


**CATCHMENT
SCALE ANALYSIS**



Pressure database → 15 thematic maps

**STREAM SCALE
ANALYSIS**

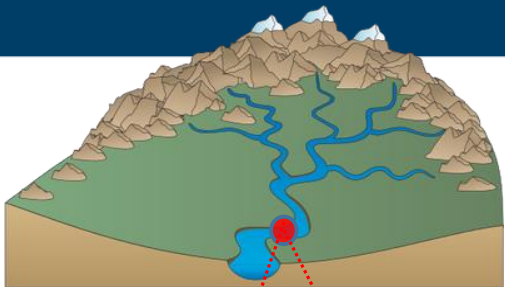


- Land use, roads, levees, riparian area...
- Dams, bridge
- Width, slope...

≈ 250 000 km
≈ 70 000 sections

Risk of hydromorphological alteration





☞ **Monitoring network: \approx 1250 stations**

Good status = slight deviation from reference conditions

☞ **Reference network (for model): \approx 400 stations**

Hydrology

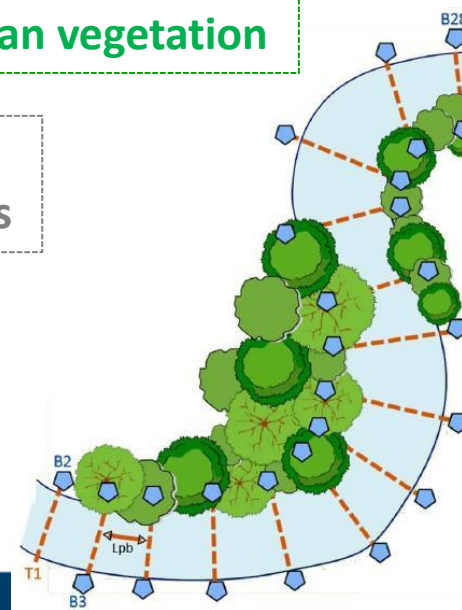
Channel geometry & slope

Riparian vegetation

Sediment size characteristics

Bed clogging

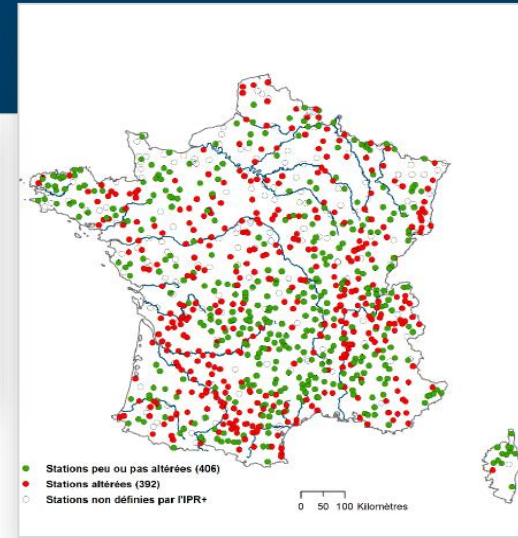
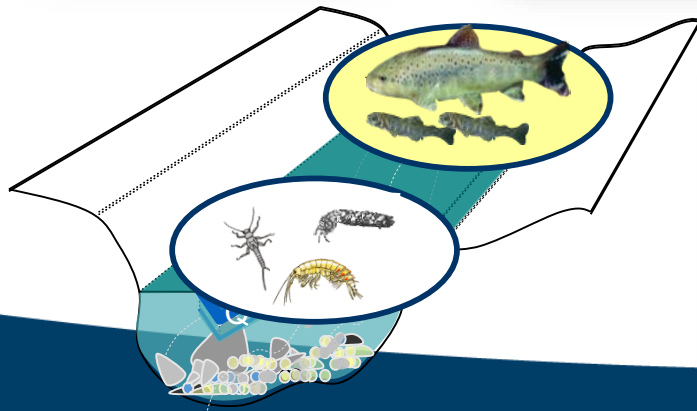
Station scale (\approx 12W)



CARHY_CE aims and perspectives

Objective 1:

- Define a spatial, dynamic, regional reference
- Evaluate the deviation from this reference
- ...Then define a level of alteration



Altered station

Non altered station

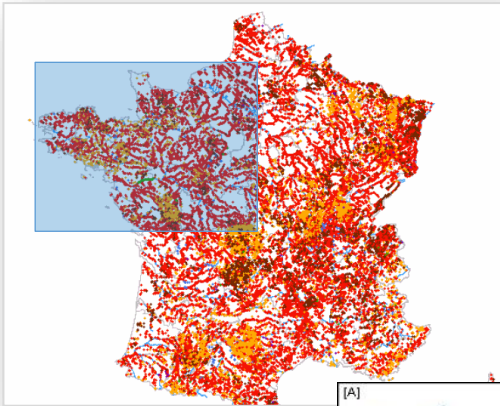


Objective 2:

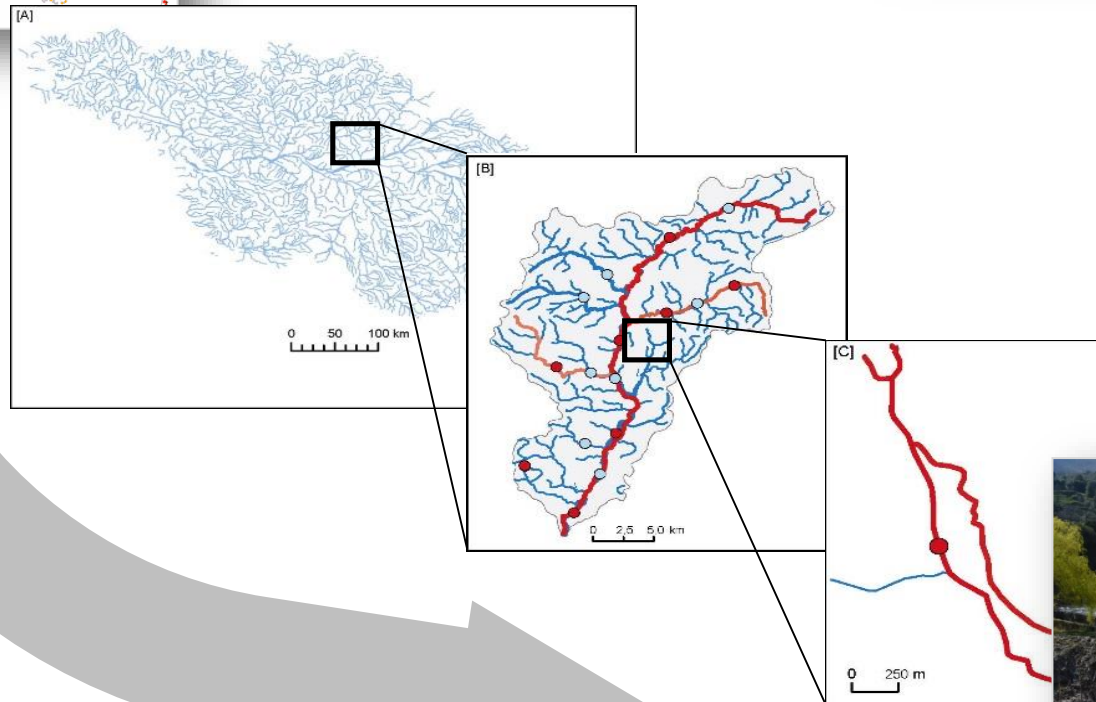
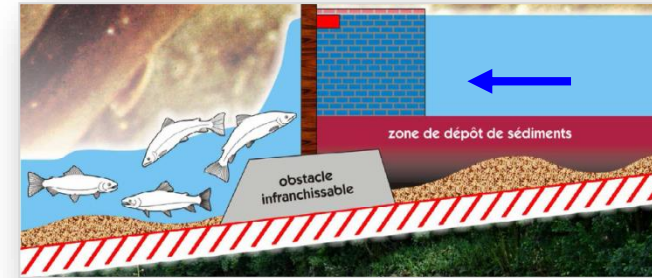
- Links between hydromorphological stations & biological surveillance stations (compare hydromorphological conditions, river habitats & species diversity)



Example 1: Assessing pressures and alterations on river continuity



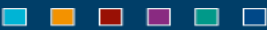
**Large scale assessment
(SYRAH CE + ROE)**



**Local scale
assessment**



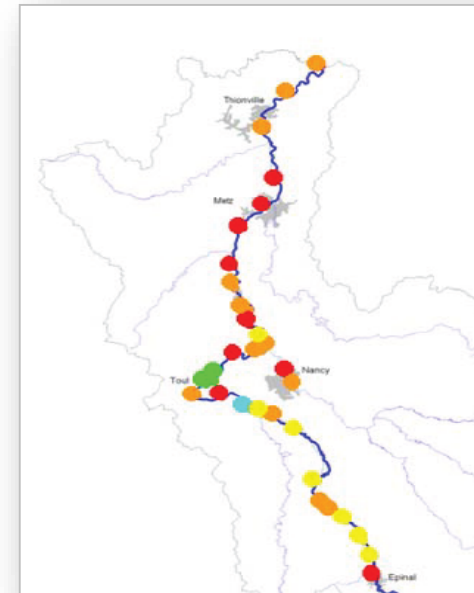
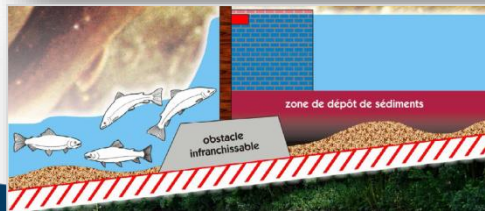
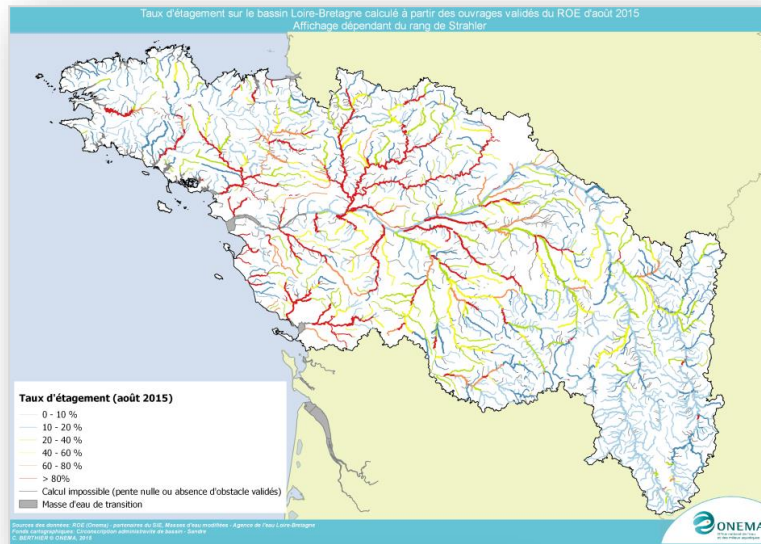
Prospects 1: Linking continuity alterations and impacts on biology



Using indicators and new methods

Watershed scale assessment

Reach scale assessment



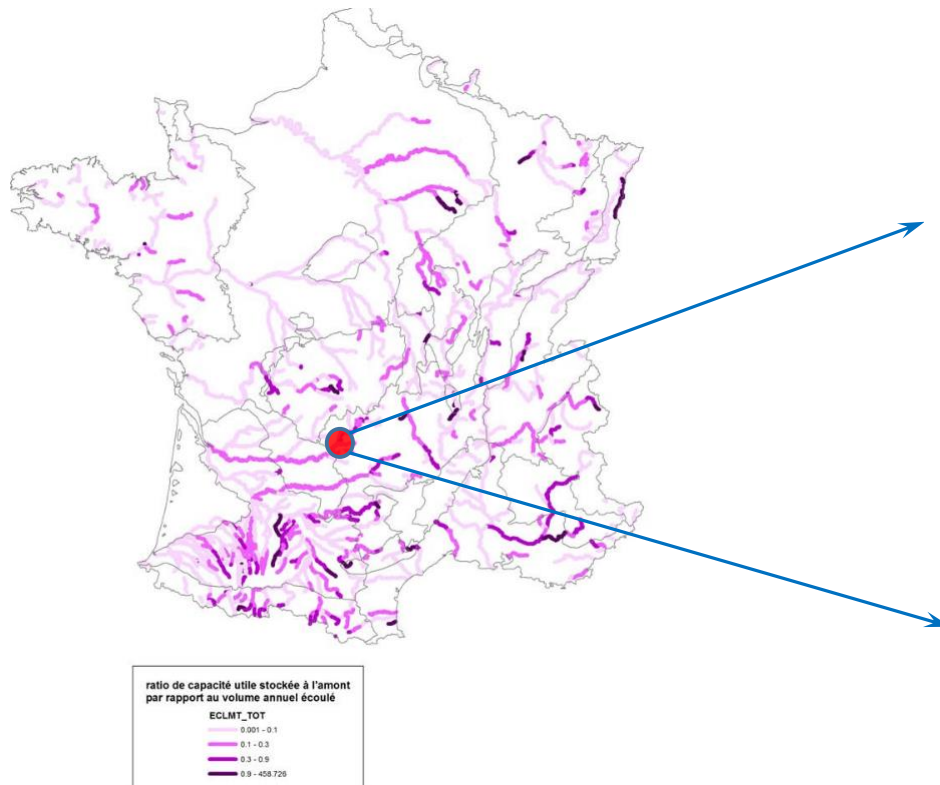
To an indicator of river discontinuity
(biology & sediment dynamic: ICS in progress)



Example 2: Assessing hydrological alterations

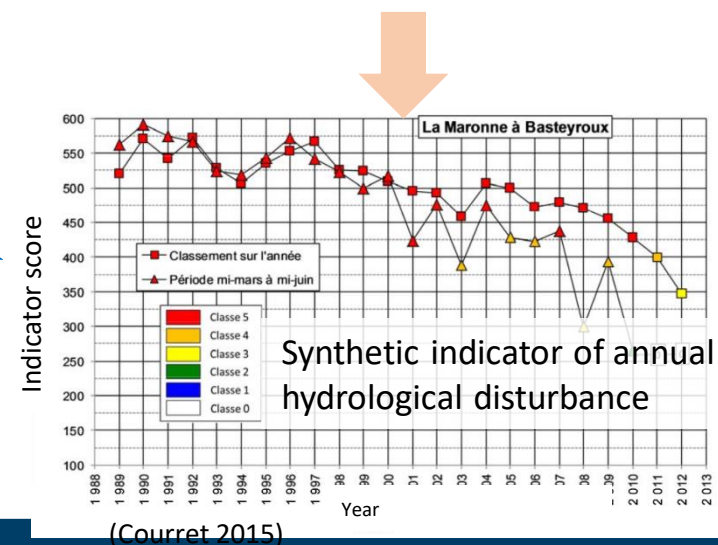
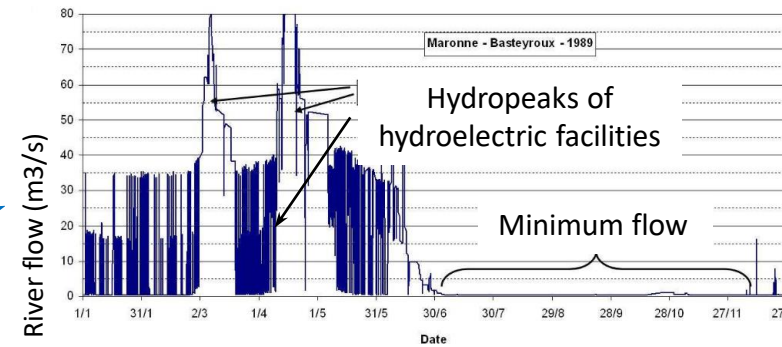
Large scale assessment (SYRAH_CE)

Example of metric used:
Total water storage/annual flow



Local scale assessment

Example of metric used:
Indicator of hydropeak impact

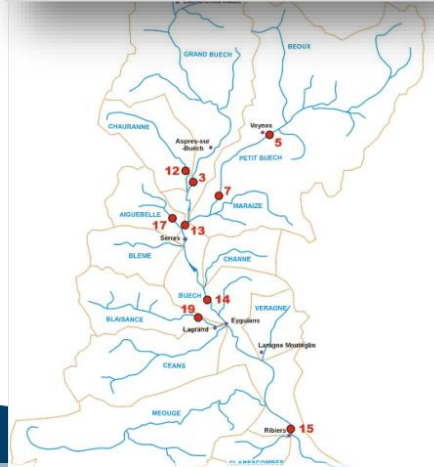


Prospects 2: Linking hydrological alterations and impacts on biology

Using fish habitat to manage

Watershed scale assessment

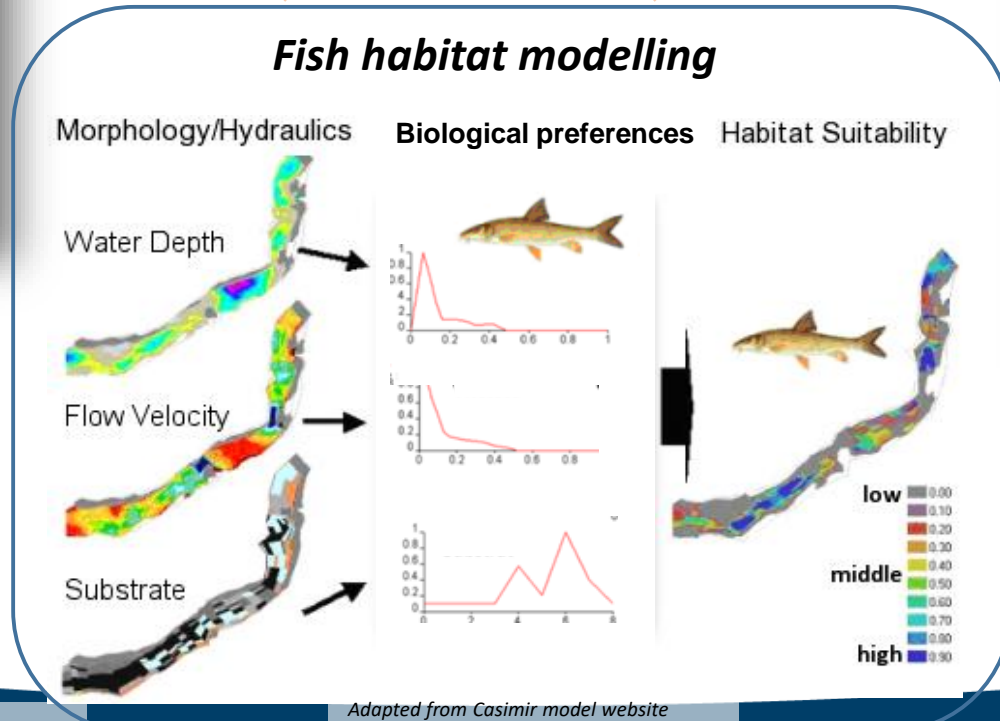
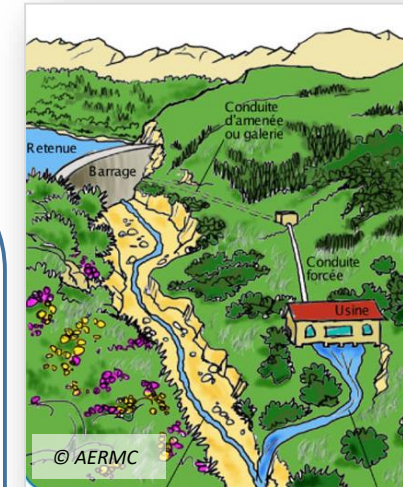
Defining the maximum abstraction allowable using fish habitat modelling at several sub-catchment outlets



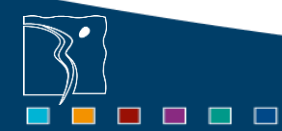
Subcatchment outlets (© EVP Buech)

Reach scale assessment

Defining environmental flows downstream a dam using fish habitat modelling



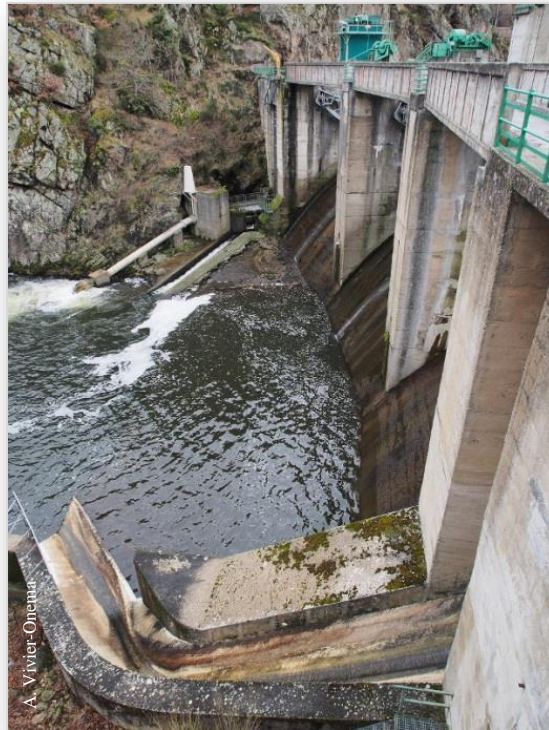
Adapted from Casimir model website



Solution of multi-scale approach: biocenoses/ecological status and hydro-morphological restoration



1. Scientific monitoring programs of **national restoration sites**

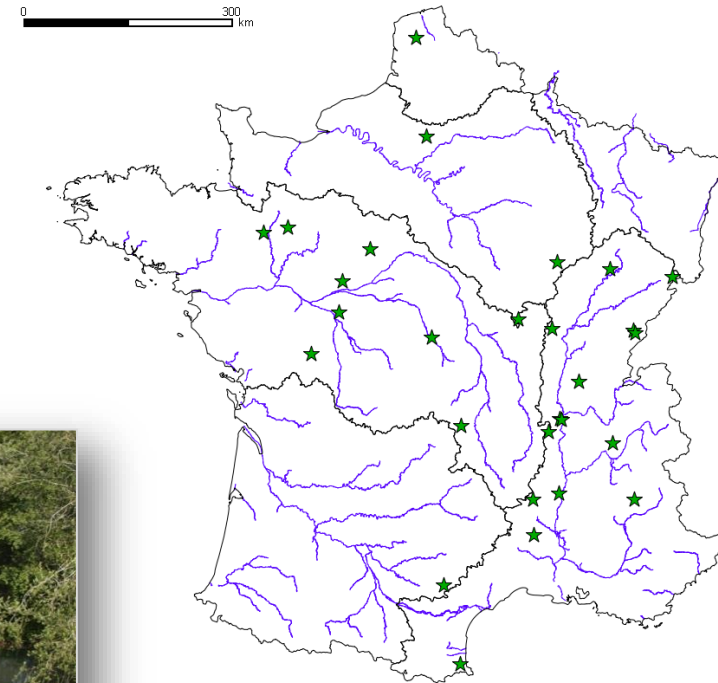


ex.: Poutès dam

- **Biology**
- **Hydromorphology**
- **Physico-chemistry**



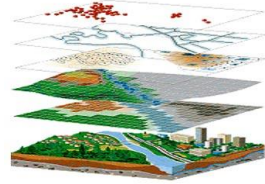
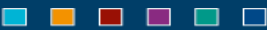
2. **Network of restoration sites** using homogeneous field protocols (WFD compatible) and sampling frequencies



→ **Mid-term perspective**



Lakes and reservoirs - a similar approach



Multi-scale development

Stressors in the catchment area

- Bavela Method (GIS)
- Connectivity (ROE)

Stressors and alterations in the corridor

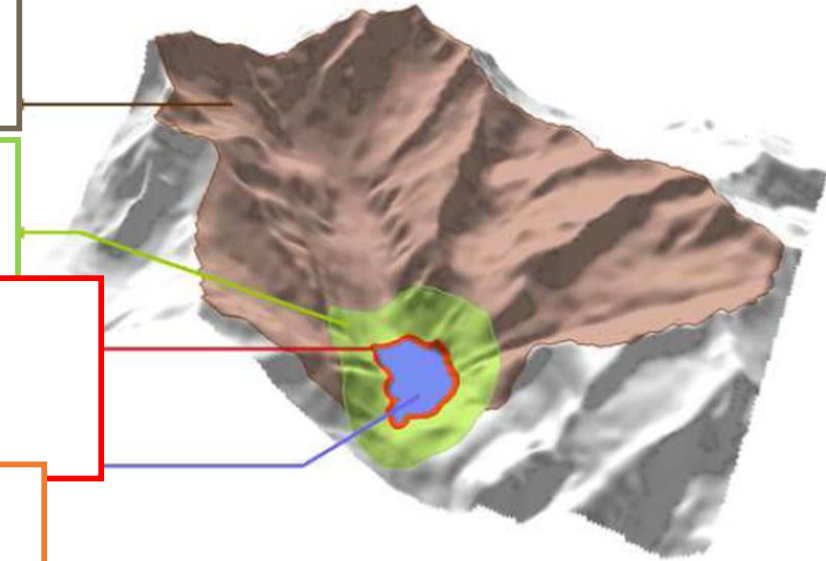
- Corila (GIS - BD Topo®)

Riparian and shore zone characteristics and alterations

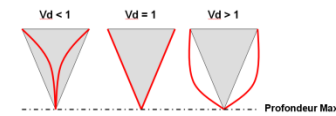
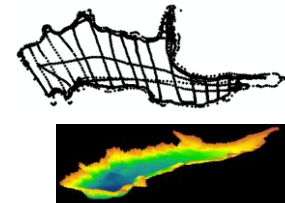
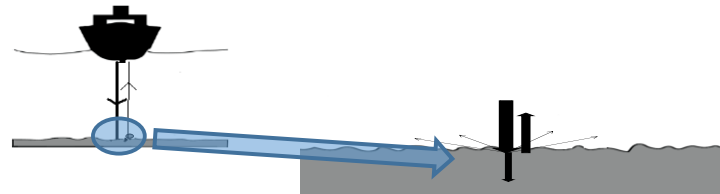
- AlBer (field survey)
- Charli (Field survey)

Depth, shape and bottom

- Bathymetry
- Characterisation of the sediments (Roxann)



Field survey
Acoustic methods



Conclusion

- Substantial progress during the first cycle: inclusion of hydromorphology and implementation management in river basins → To continue for the 3rd cycle WFD
- The multi-scaler integrated approach as an operational key for the hydromorphological restoration (rivers and lakes)
- But many questions remain ! Scientific results to enhance and operationalise
- Need to share experiences / methods / results between Member-States



Time to exchange!

- What kind of networks do you have on your territory to monitor the hydromorphology ? How many sites it represents ?
- For how many river's types is your method applied?
- Does it exist any system able to valorise the data collected on field ?
- Is there any question/probable evolution in the way you monitor the hydromorphology on your territory ?



Thank you for your attention !



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