

# Natural Sponges

Wetland solutions to protect against droughts and floods



Paul Brotherton  
Wetlands International Europe

# Lost Sponge Capacity & Natural Water Retention



- 35% of Europe's wetlands lost since 1970
- 70-90% of Europe's floodplain area ecologically degraded
- Wetlands, including mires, bogs and fens among most threatened ecosystems in Europe

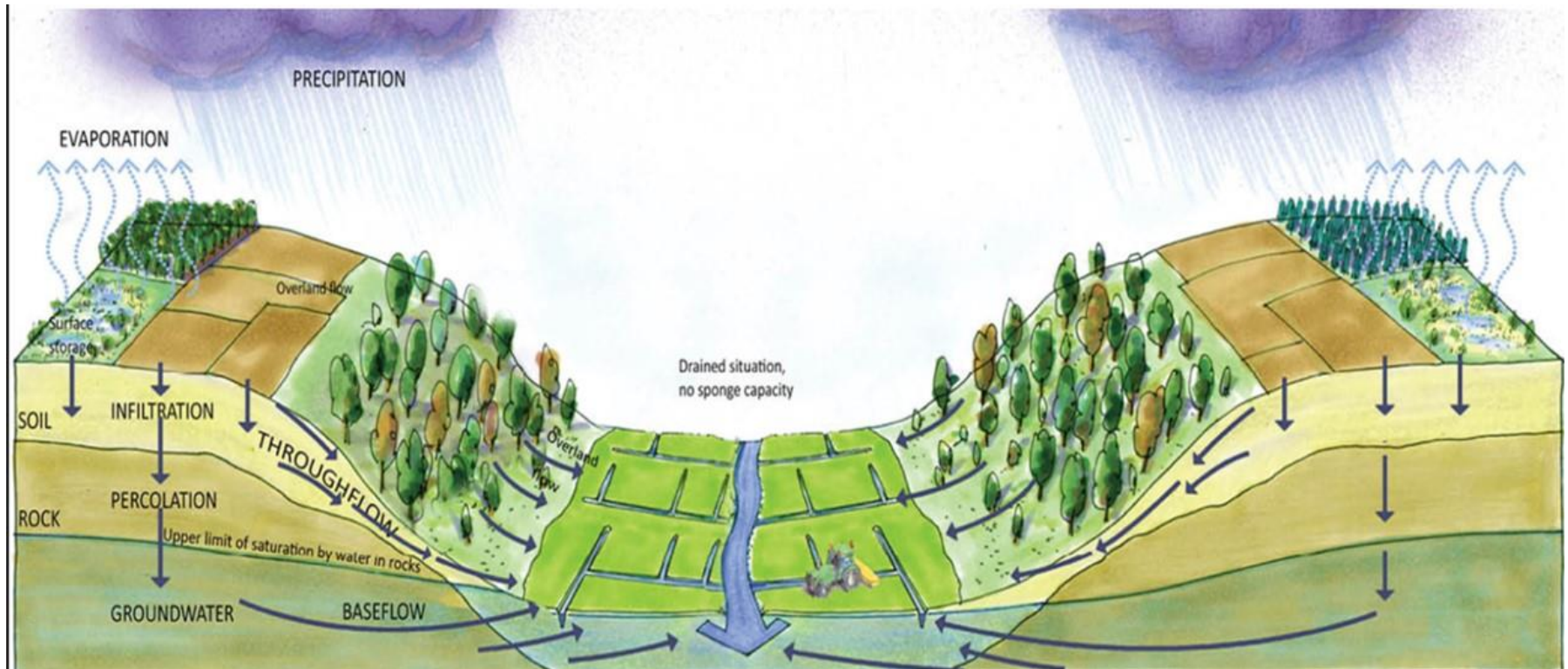


# Germany – Belgium Floods July 2021

- Deadliest flood in decades - 10<sup>th</sup> deadliest in the past 100 years
- +220 people died in Germany and Belgium
- Most expensive natural disaster in Germany estimated at €35 billion
- Worst devastation upper catchments
- Main Rhine river “hardly affected”



# Upper Rhine River Catchment Land Use



Large-scale drainage on sloping hills and valleys for agriculture and forestry

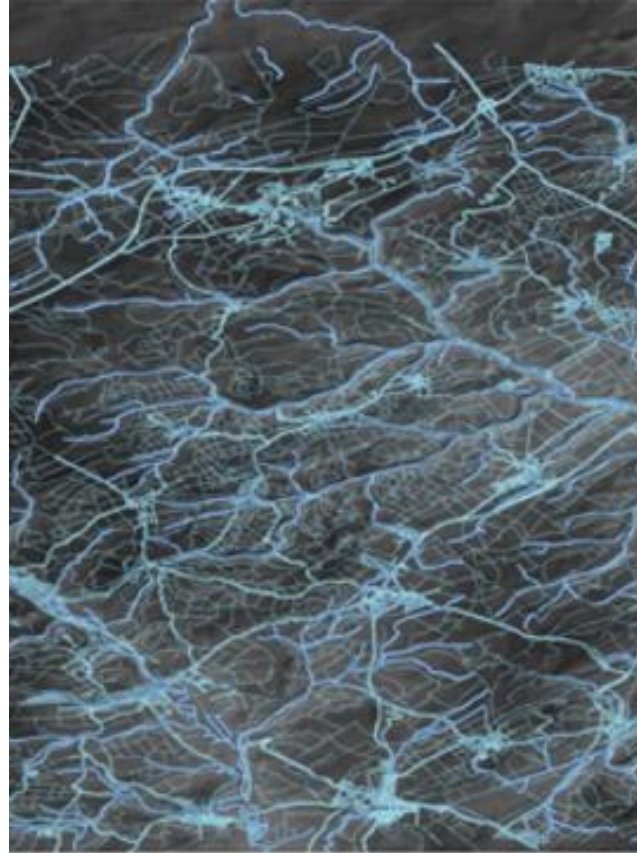


# Landscape Factors July 2021 Floods Rhine River Upper Catchments

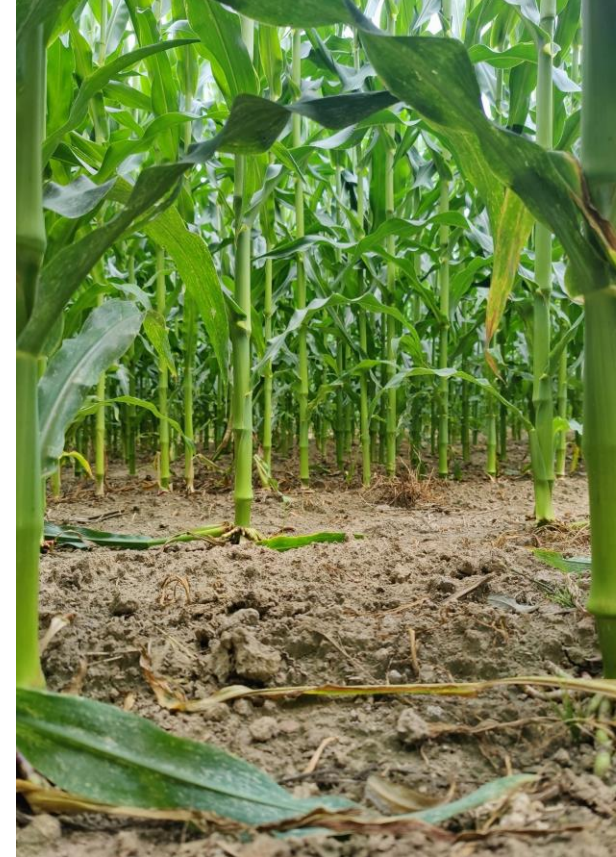
58% of the upstream land area contributed 89% of the peak discharge downstream



Drainage contributed disproportionately to peak floodwaters downstream



Paved surfaces were the main rivers channelling floodwaters downstream



Bare soils were a major contributor to floodwaters



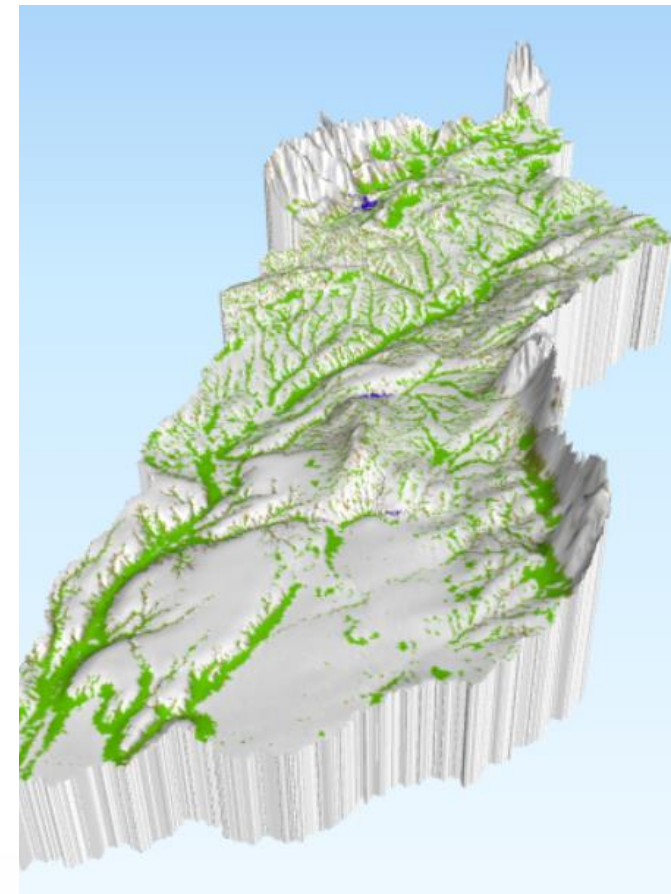
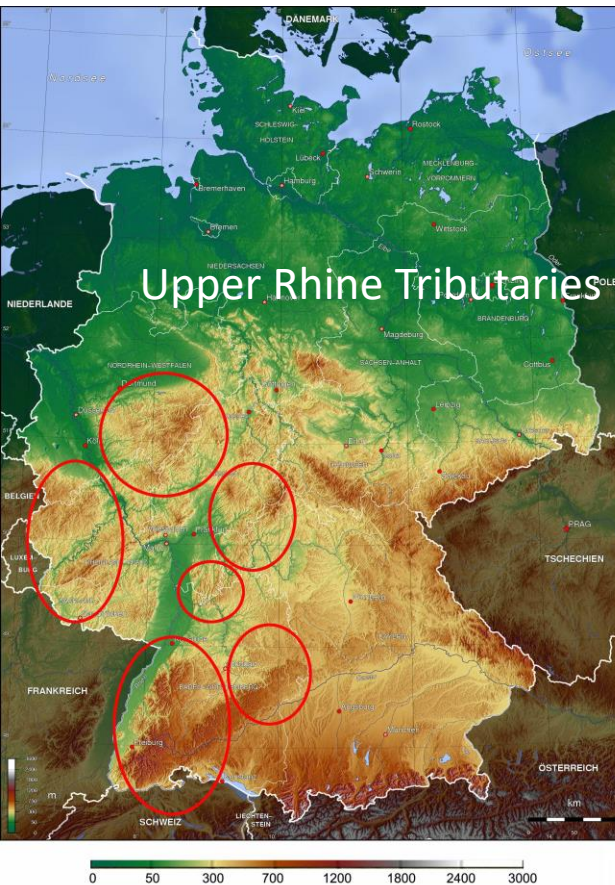
# Natural Sponge Potential

Upper Catchment Headwaters & Small Tributaries “Just Right”

Middle Mountains  
200 - 1200m elevation

Precipitation: High

Slope: < 10%



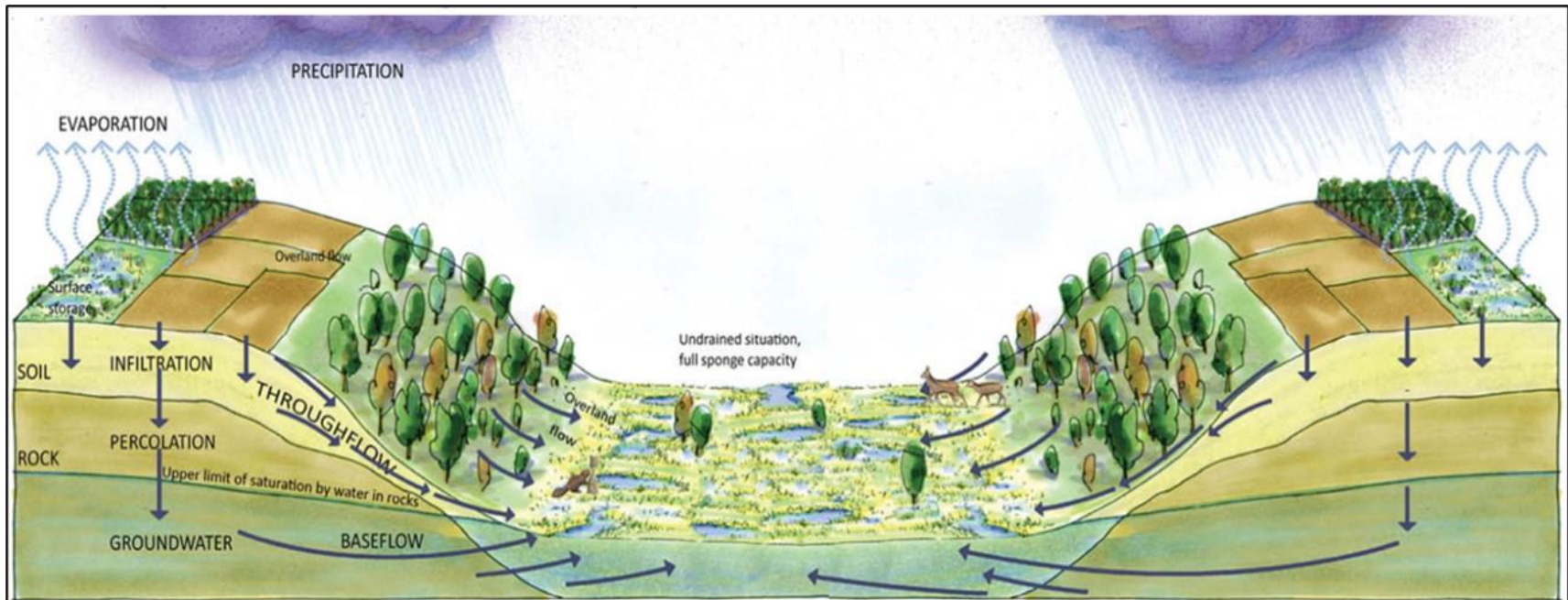
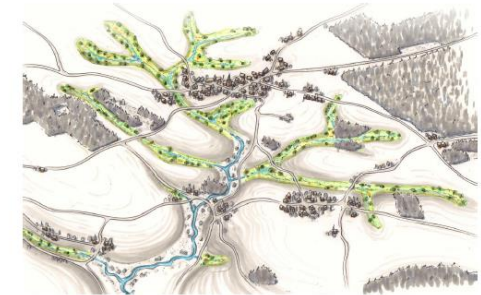
# Micro Catchments, Macro Effects

When restoring 6% of upstream areas

- **Peak flow reduction:** up to 35% at local scale (2% international)
- **Dry periods:** 10 - 30% higher baseflow
- **Water quality:** Retention of nutrients
- **Carbon Farming:** CO2 storage
- **Biodiversity:** improves status species and habitats

## Micro Catchments, Macro Effects

*Natural retention in the Rhine catchment as a nature-based solution for flood risks, drought control, biodiversity restoration and climate challenges.*

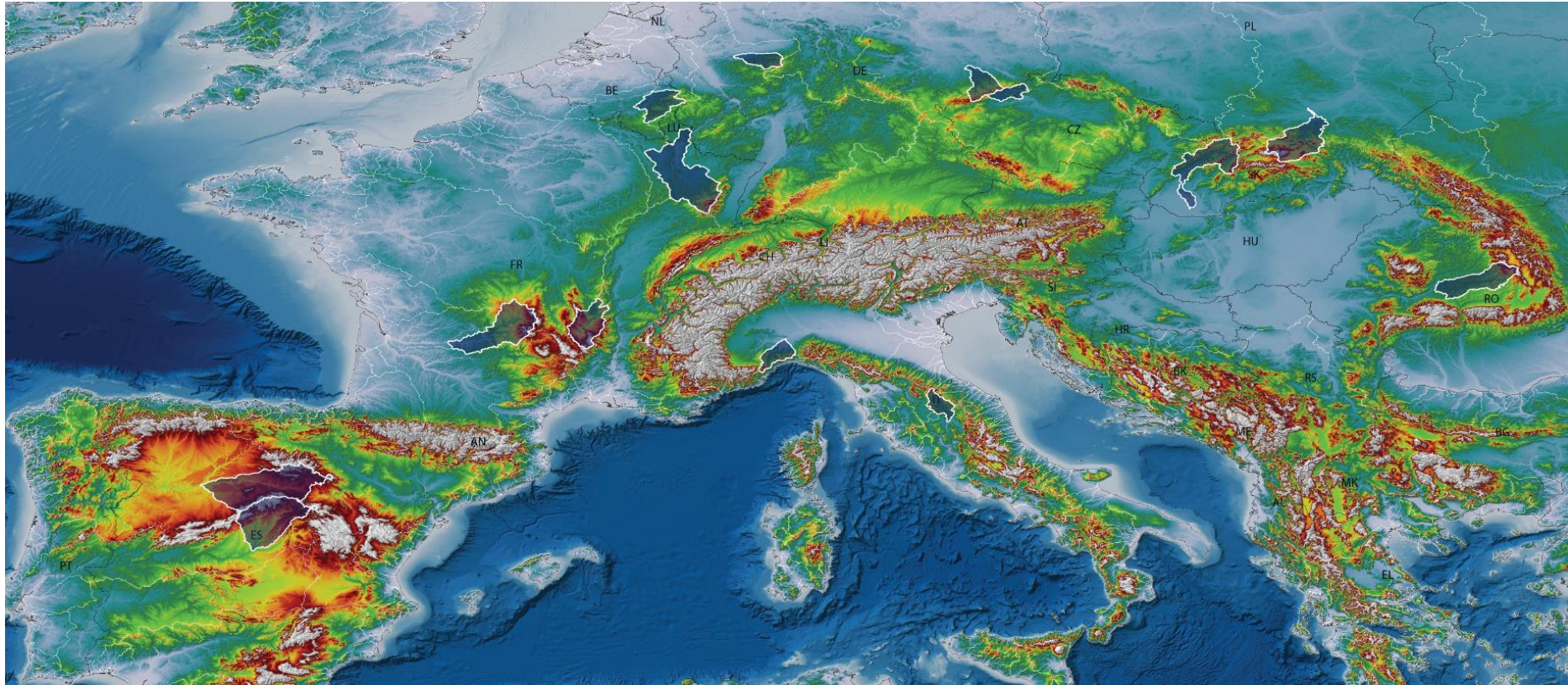


Measures could benefit 125,000 km<sup>2</sup> in Germany, France, Belgium and Luxembourg



# High Sponge Restoration Potential

## Middle Mountain regions



<https://media.stroming.nl/sponges/>

Source: land.Copernicus.eu





# Natural Sponge Concept in Upstream Catchments

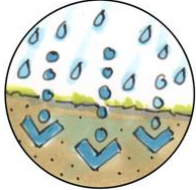
Maximise potential of soils for absorption & infiltration



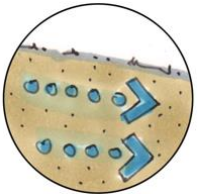
1. Block drainage channels that speed up surface water



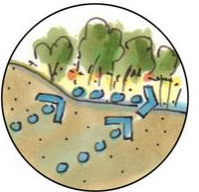
2. Intercept rain with rough vegetation



3. Ensure water that reaches the ground can infiltrate



4. Hold water in soil & wetlands as long as possible, otherwise re-infiltrate from paved surfaces, fields and slopes



5. Slow water that comes to the surface in valley floors with vegetation

# Multi-Benefits Wetland Solutions

EU Policies	Contribution
<b>Birds &amp; Habitats Directives</b>	Improves the status of species and habitats
<b>European Green Deal</b>	Climate change adaptation and mitigation, restore ground and surface waters and biodiversity
<b>Biodiversity Strategy Nature Restoration Law Soil Health Law</b>	Protecting and restoring wetlands, grasslands and agricultural soils
<b>Water Framework Directive</b>	Improves freshwater ecosystems through natural flow regulation
<b>Floods Directive</b>	Reduce flood risk and reduce peak flows
<b>Farm to Fork Strategy Common Agricultural Policy</b>	Improve environmental and climate performance
<b>Trans-European Network for Green Infrastructure</b>	Maintain and enhance healthy ecosystems.
<b>Strategy on Adaptation to Climate Change</b>	Essential nature-based solution sustaining healthy water and soils
<b>Drinking Water Directive</b>	Natural filtration of pollutants

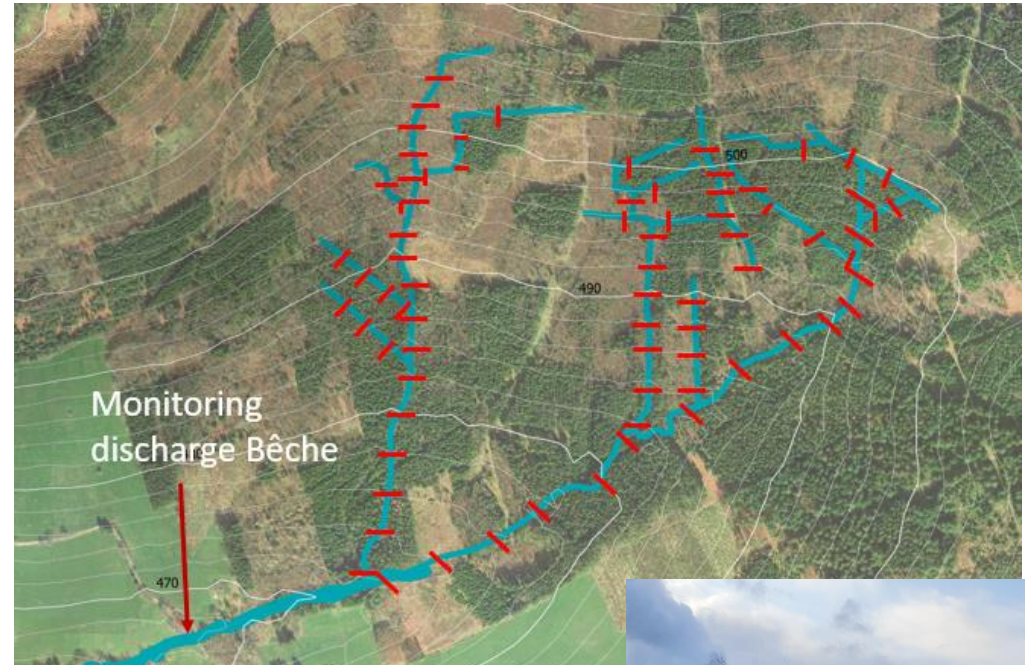


# Enhancing EU Water Resilience

- Adopt ambitious EU Nature Restoration Law
  - National Restoration Plans enhance nature-based climate change adaptation
- EU Water and Climate Resilience Law
  - Better protect water at the source
  - Funding mechanisms/incentives to rapidly upscale wetlands restoration, incl. public/private finance
  - Climate proofing legislative + non legislative acts

## Characteristics Stream Bêche

- Amblève catchment, Meuse River
- Drainage channels to support plantation forestry
- slope of  $< 10\%$
- watershed of  $2 \text{ km}^2$
- elevation 470 and 530 metre altitude



## Measures

- Blocking drainage channels with wood debris and soil to slow flows & raise riverbed



# Horizon SpongeBoost

- **OBJECTIVE** collect, test and advance, widely disseminate **innovative solutions to improve the sponge functioning of landscapes** from local, regional and national to the European scale to **maximize climate adaptation, disaster risk reduction, biodiversity and other societal benefits from nature-based solutions**

## Pilots

- |          |                         |                                                       |
|----------|-------------------------|-------------------------------------------------------|
| <b>1</b> | <b>Azores</b>           | San Miguel Island                                     |
| <b>2</b> | <b>Spain</b>            | <b>a</b> Xistral mountains of Galicia   <b>b</b> Ebro |
| <b>3</b> | <b>Belgium/Germany</b>  | Eifel - High Fens                                     |
| <b>4</b> | <b>Germany/Czech R.</b> | Weißer Elster catchment                               |
| <b>5</b> | <b>Estonia</b>          | <b>a</b> Pärnu catchment   <b>b</b> Alam-Pedja        |

## Partners

- |                                                            |                                                      |
|------------------------------------------------------------|------------------------------------------------------|
| • UFZ Helmholtz Center for Environmental Research, Germany | • University of Tartu, Estonia                       |
| • RWTH Aachen University, Germany                          | • Jan Evangelista Purkyně University, Czechia        |
| • Deutsche Umwelthilfe (Environmental Action Germany)      | • CIREF, Iberian Center for River Restoration, Spain |
| • Bureau Stoming, Netherlands                              | • Portuguese Society for the Study of Birds          |



# Thank You!

 @WetlandsEurope  
 Restoring Europe's Rivers  
<https://europe.wetlands.org/>

[Paul.Brotherton@wetlands.org](mailto:Paul.Brotherton@wetlands.org)

