

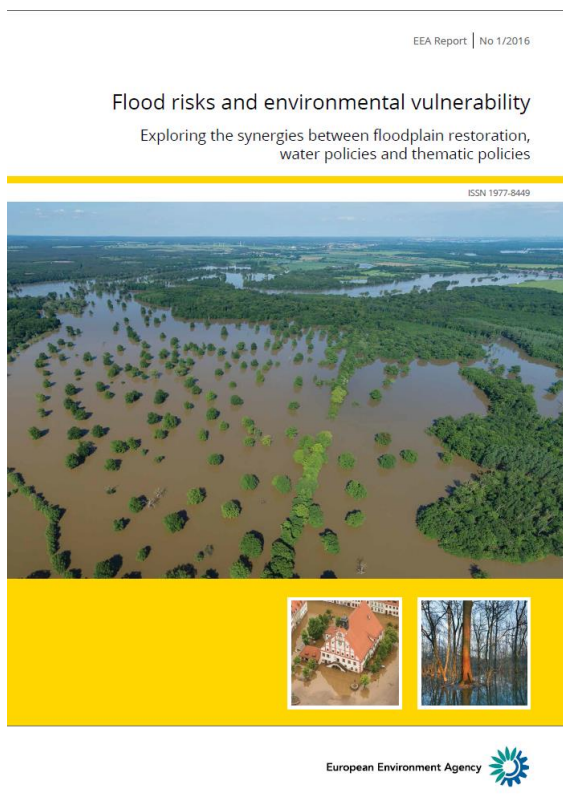
# Flood risks and environmental vulnerability

**Wouter Vanneuville**  
**Flanders Hydraulics Research**



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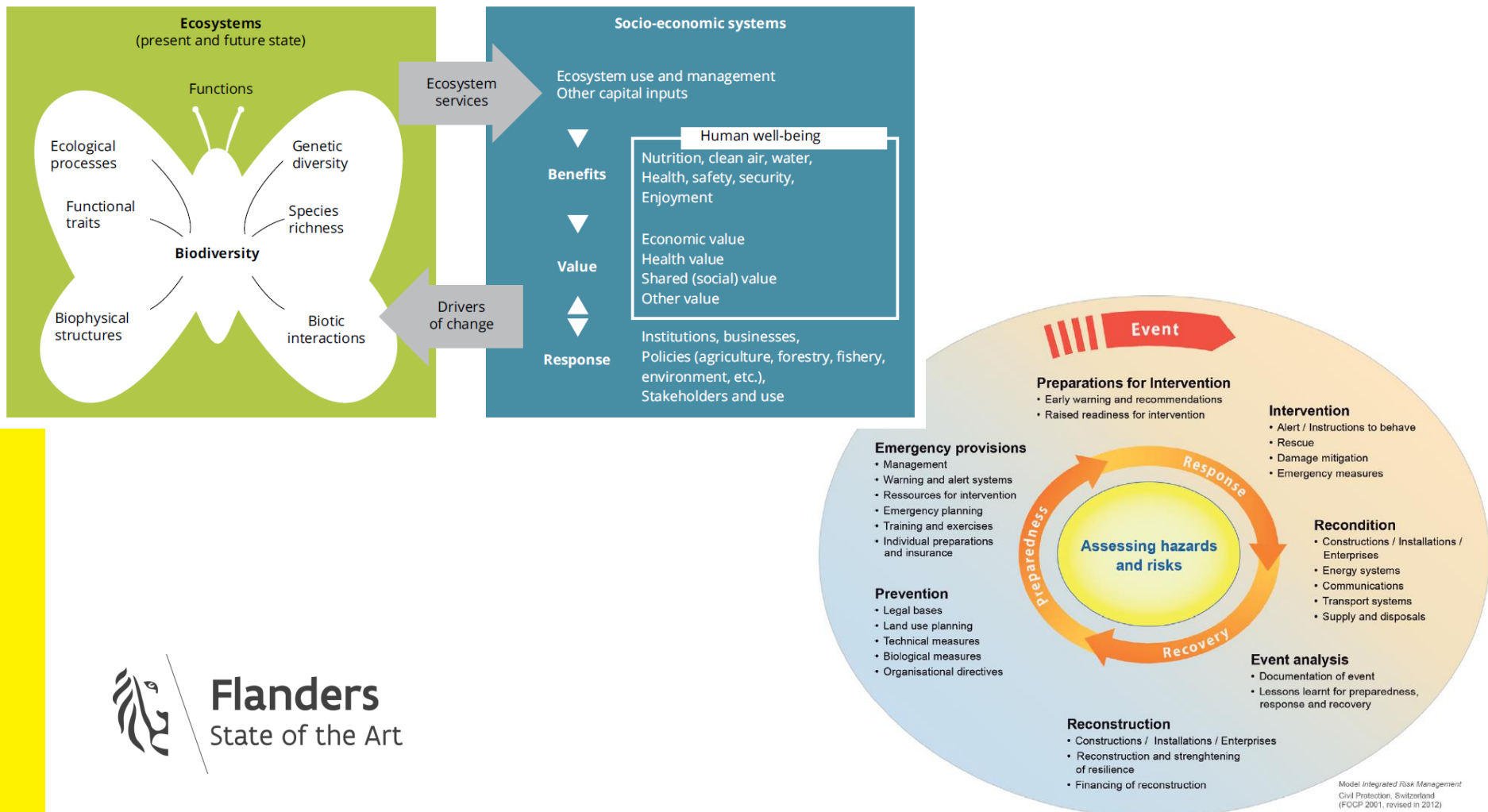
# Exploring synergies between floodplain restoration, water policies and thematic policies



- Written together with ETC/ICM colleagues (Henk, Mathias, Lidija, Luka), ETC/CCA, expert workshop participants, EEA colleagues etc.
- Looking for synergies, seen from a water perspective (focus on floods)



# Synergies between ecosystem services and disaster risk reduction





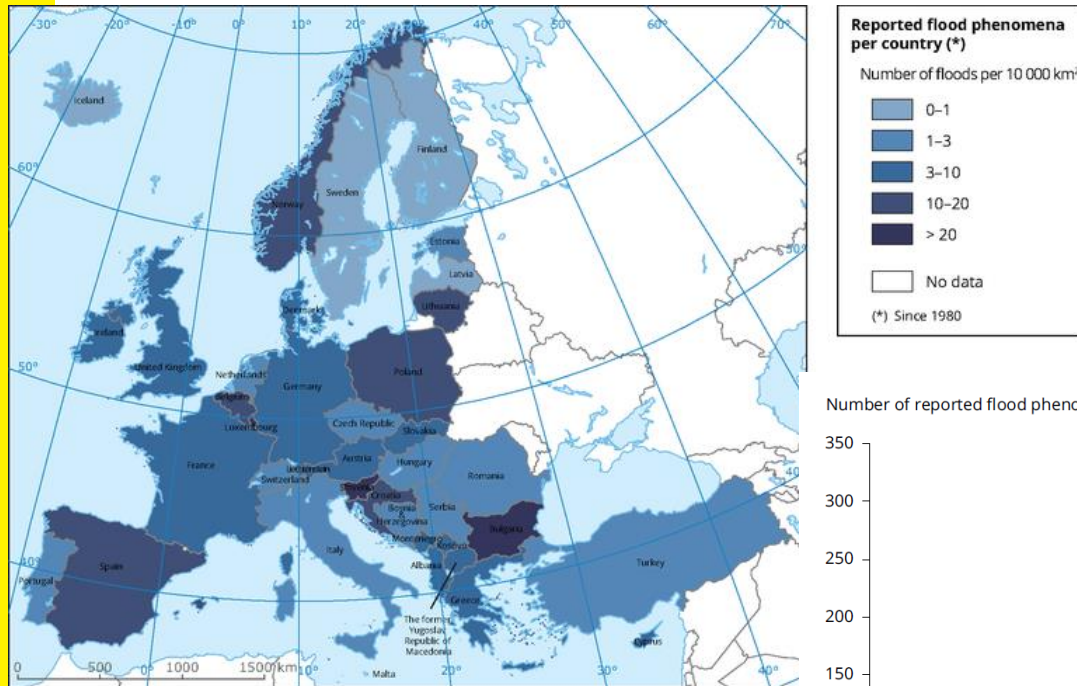


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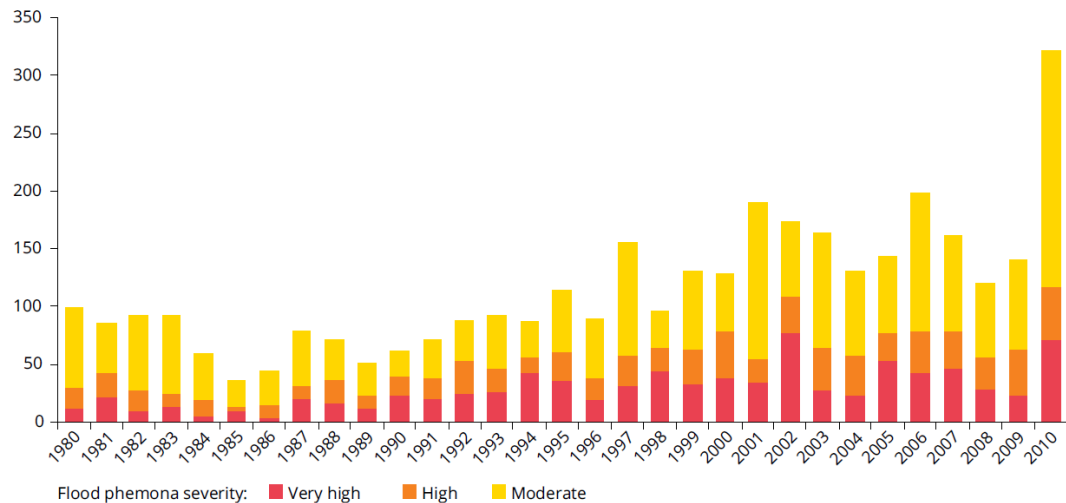
# Floods in Europe



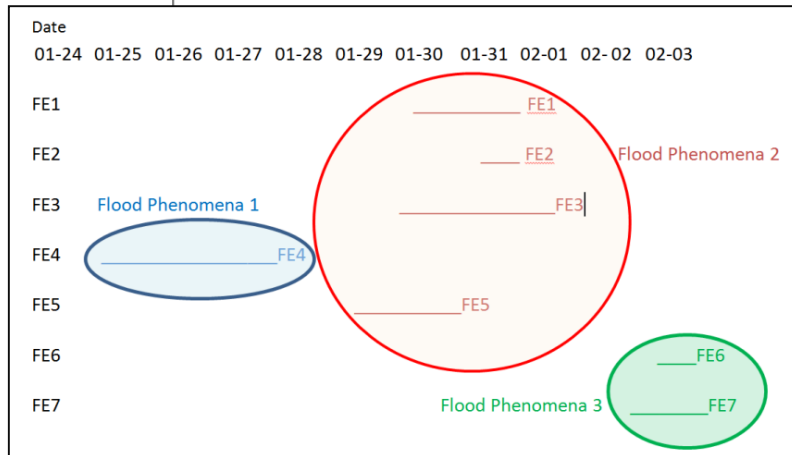
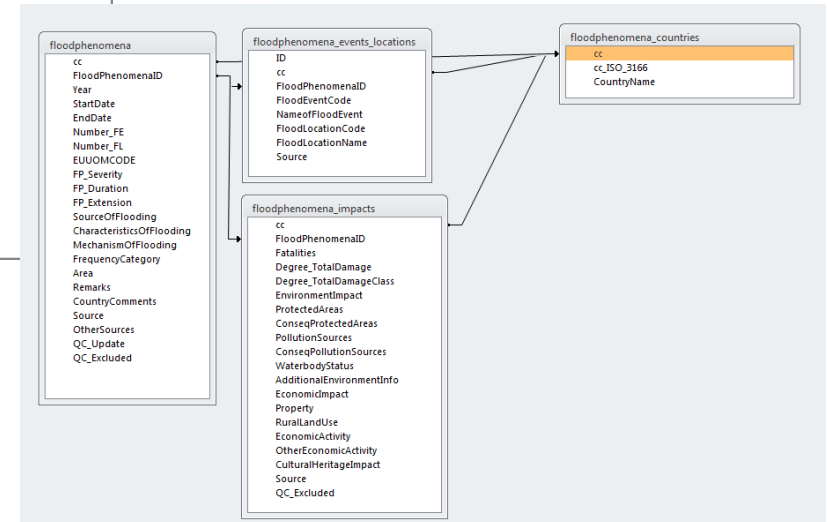
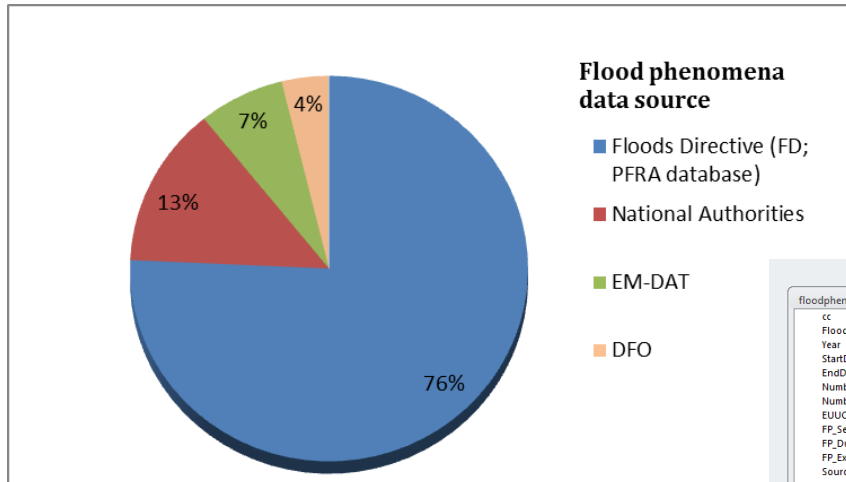
# Floods in Europe



Number of reported flood phenomena between 1980 and 2010 (EEA-39)



# European floods database





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# Status of Europe's floodplains



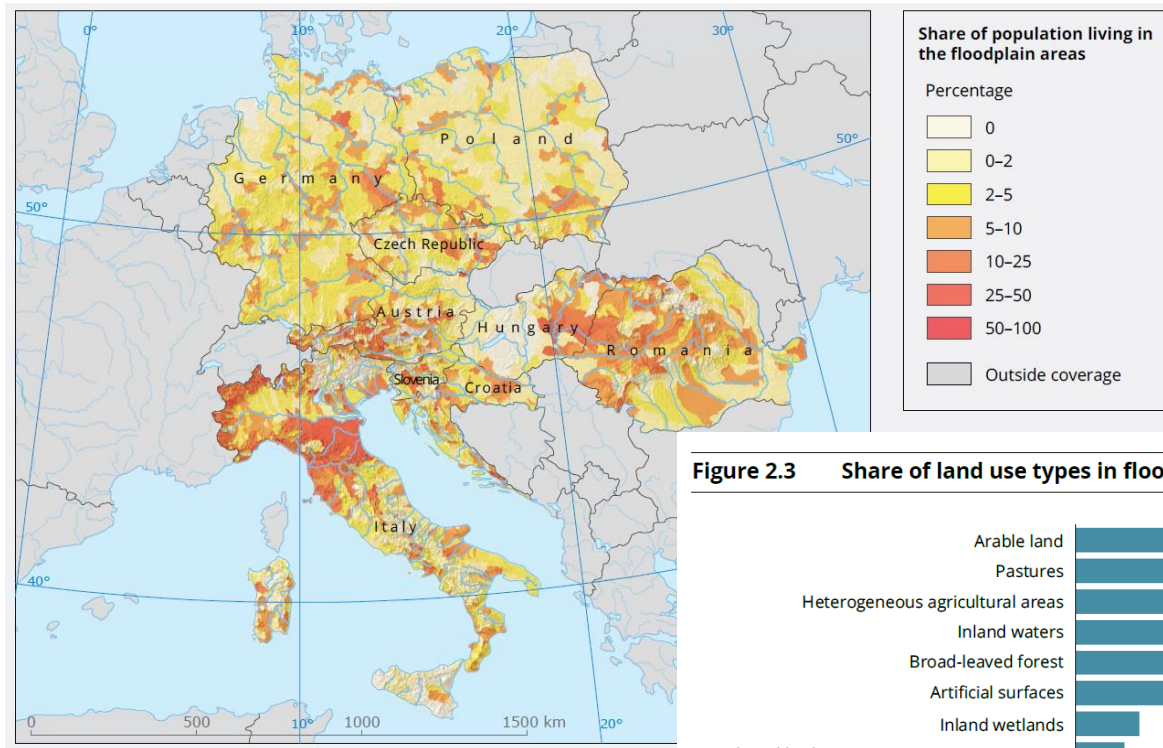
# Floodplains?

- **Guiding questions for mitigating or reducing flood risk:**
  - How is the area used? What are the potential consequences of flooding?
  - What is the hydrological regime?
  - What is the connectivity of the water body (river) and the floodplain?
  - What is the water-quality?
- **No comprehensive classification**
  - Alluvial areas
  - Riparian zones
  - Wetlands
  - Hydraulic floodplain

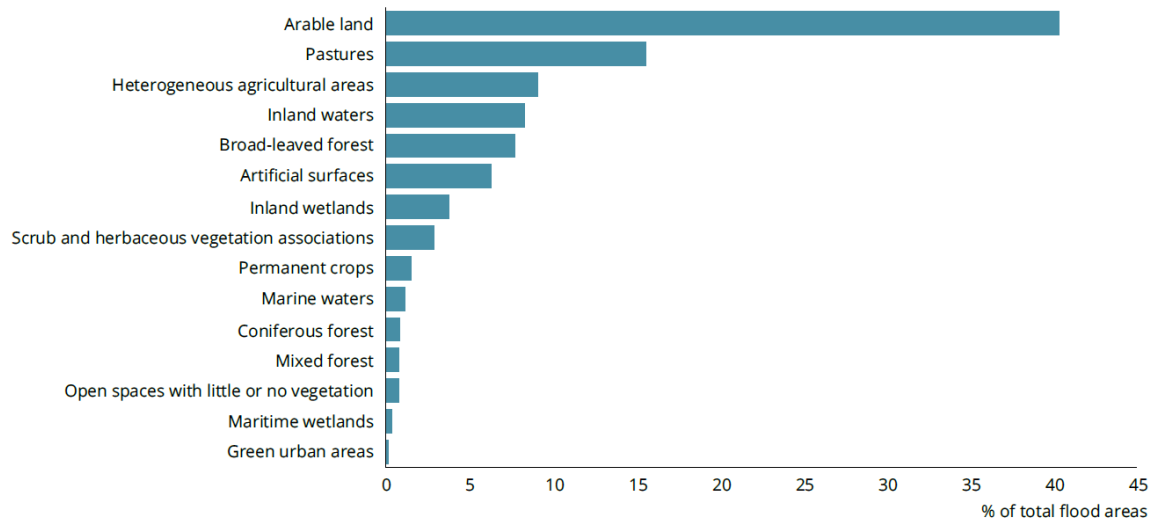
Working definition for the report:  
“intermittently inundated lands  
next to river beds and channels”



# Socio-economic developments and land use change

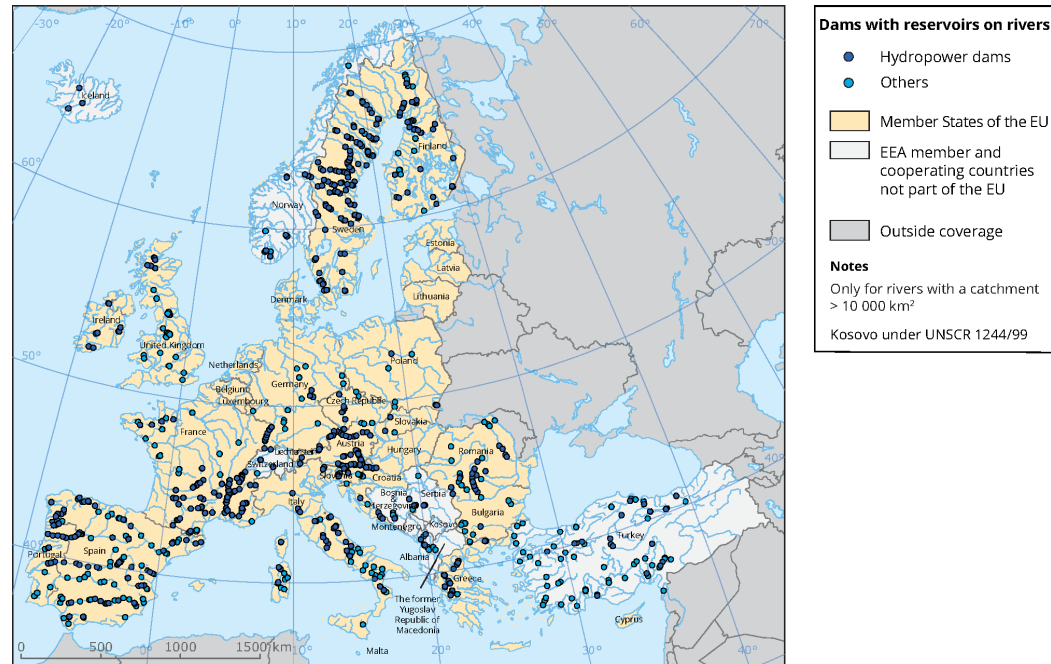


**Figure 2.3** Share of land use types in floodplains

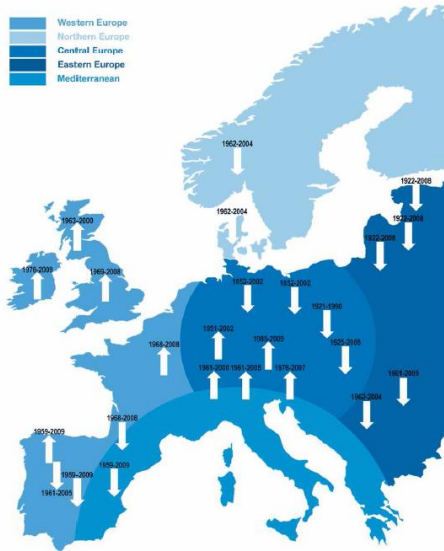


# Hydromorphological changes and pollution

- Hydrological regime
- Connectivity
- Morphology
- Pollution and historic contamination

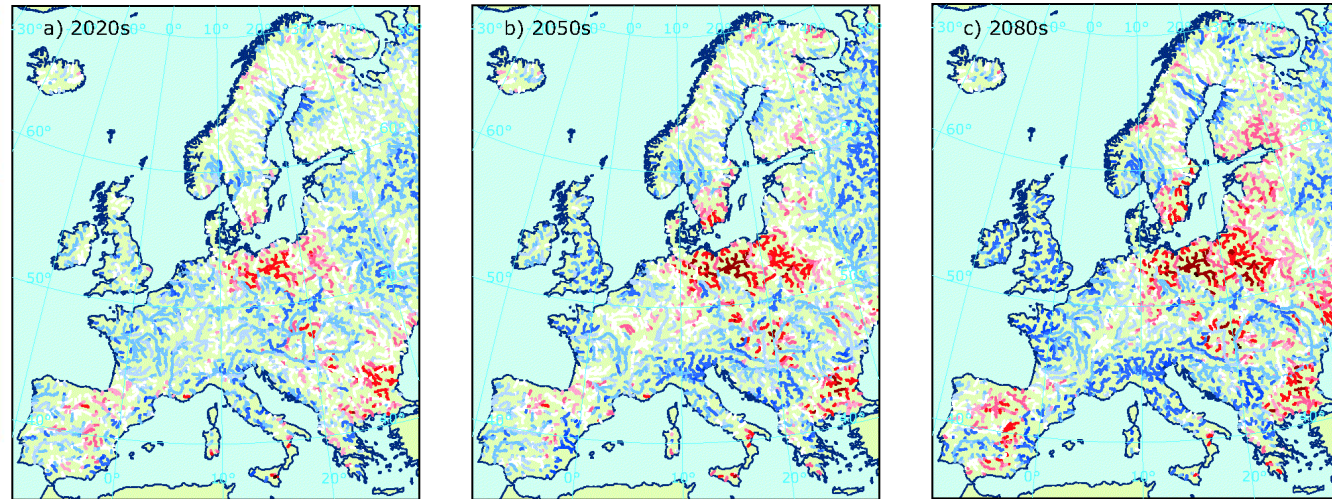


# Climate change

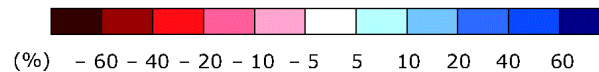


**Note:** The schematic summarises the outcomes of many different studies, which used different and not directly comparable change analysis methods and time periods. The arrows in the schematic indicate the majority of trends, including regions with weak and/or mixed change patterns. Areas with no or inconclusive studies owing to insufficient data (e.g. Italy) and inconclusive change signal (e.g. Sweden) are not shown.

**Source:** Hall et al., 2014.



**Relative change in river floods with a return period of 100 years between future period and 1961–1990 (SRES A1B)**



© 2012 JRC, European Commission

# Remaining areas as status

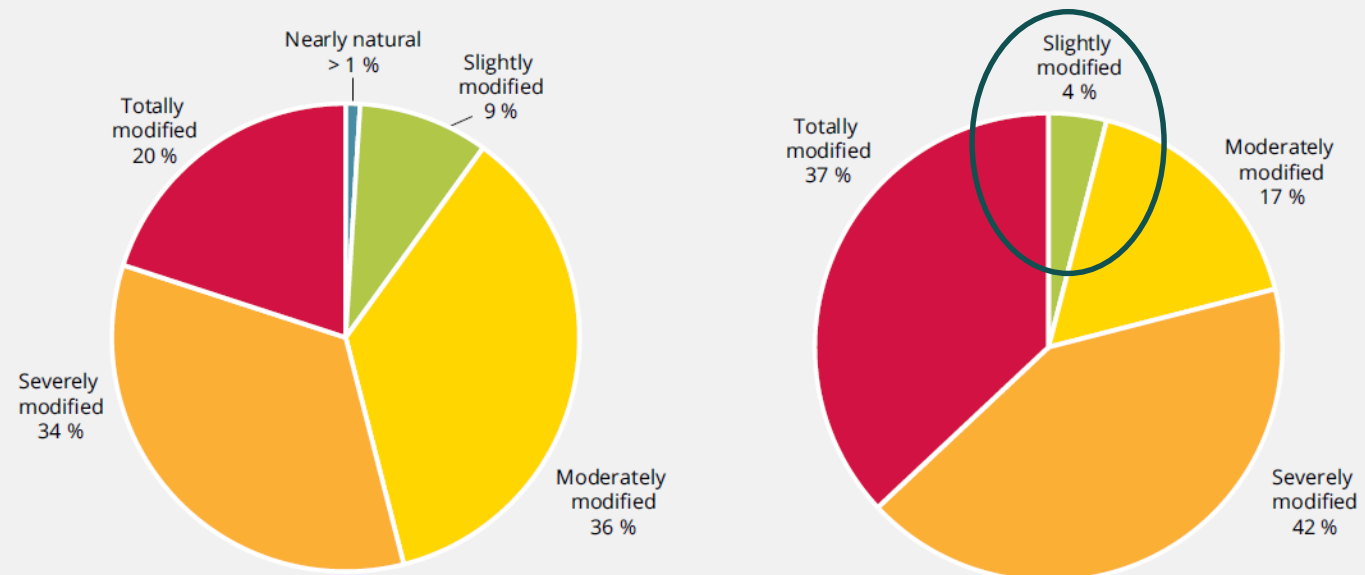
River section	Morphological floodplain area (km <sup>2</sup> )	Remaining floodplain area (km <sup>2</sup> )	Loss of floodplain area (%)
Upper Danube (Austria, Germany) <sup>(a,b)</sup>	1 762	95	95
Central Danube (Croatia, Hungary, Serbia, Slovakia) <sup>(c)</sup>	8 161	2 002	75
Lower Danube (Bulgaria, Republic of Moldova, Romania, Serbia) <sup>(c)</sup>	8 173	2 193	73
Danube Delta (Romania, Ukraine) <sup>(c)</sup>	5 402	3 799	30
Tisza (Hungary, Romania, Ukraine) <sup>(c)</sup>	36 000	1 800	95
Upper Rhine (France, Germany) <sup>(d)</sup>			93
River Rhine (Austria, Switzerland, France, Germany, Netherlands) <sup>(d)</sup>	8 000	1 200	85
River Rhine (Germany) <sup>(b)</sup>	2 064	454	80
Rhine and Meuse (Netherlands) <sup>(e)</sup>			90-100
Seine (France) <sup>(f)</sup>			99
Oder (Germany, Poland) <sup>(g)</sup>	3 593	970	73
Oder (only Germany) <sup>(b)</sup>	941	94	90
Middle Ebro River (Spain) <sup>(h)</sup>			58

**Sources:** <sup>(a)</sup> Schneider et al. (2009); <sup>(b)</sup> Brunotte et al. (2009); <sup>(c)</sup> Haraszthy (2001); <sup>(d)</sup> Schmid-Breton (2015); <sup>(e)</sup> Rijkswaterstaat Waterdienst (2008); <sup>(f)</sup> Tockner et al. (2009); <sup>(g)</sup> WWF Germany (2000); <sup>(h)</sup> Ollero (2010).



# Distance to reference conditions as status

Figure 2.2 Comparison of the distribution of the active and former floodplain status classes in Germany



**Note:** Comparison of all assessed sections of active floodplains (left) with former floodplain areas (right).

**Source:** Based on Brunotte et al., 2009 and BMU and BfN, 2009.




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# Floodplain management and restoration



# Natural water retention measures

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## Natural Water Retention Measures


Home | Implementing NWRM | Catalogue of NWRM | Case studies | Glossary | About NWRM project

### WELCOME TO THE EUROPEAN NWRM PLATFORM

This platform gathers information on NWRM at EU level. From this page you can browse NWRM related concepts, access the [practical guide](#) that will help you find your way to implement NWRM, or directly access the different products: [synthesis documents](#), [catalogue of measures](#), [case studies](#).

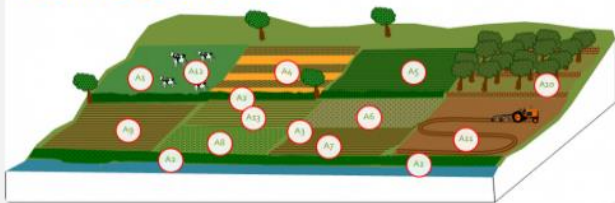
You can also join us on LinkedIn and access the NWRM community of practice gathered on our discussion forum.

[JOIN OUR FORUM](#) 

#### MEASURES BY SECTOR

##### AGRICULTURE



To see all measures: [CATALOGUE OF NWRM](#)

#### DEFINITION

*Natural Water Retention Measures are multi-functional measures that aim to protect water resources and address water-related challenges by restoring or maintaining ecosystems as well as natural features and characteristics of water bodies using natural means and processes. [...]*


*Source: "EU policy document on Natural Water Retention Measures", WG PoM, 2014)*

[FIND OUT MORE](#)

#### CASE STUDIES MAP

Measures have been implemented in the field.  
To see examples of implementation see the catalogue of case studies or click directly on the map below.

[CATALOGUE OF CASE STUDIES](#)



<http://www.nwrn.eu>

- Explicitly mentioned in the Floods Directive
- Evidence of being effective and cost-beneficial: low regret measures
- However:
  - large spatial scale
  - financing

# River Mur recognised for effective river basin management

- Second European River Prize (2014)
- Restoring old structures and recovering natural habitats by reconnecting them with the dynamic river-system
- Environmental benefits, passive flood protection, natural recreation areas, ...
- Policy integration and stakeholder dialogue





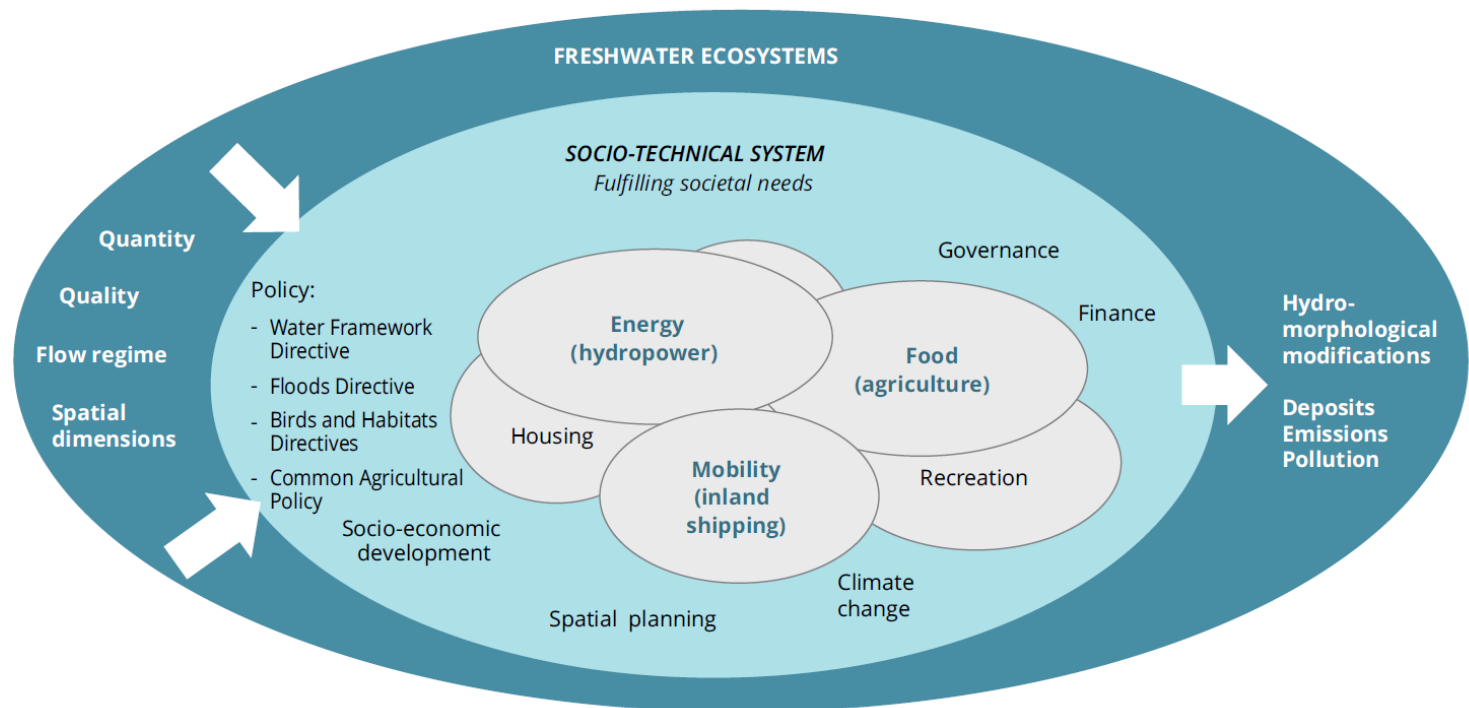


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# Policy developments and implementation



# Water and nature policies, thematic policies



# European policies influencing the management of floods and floodplains

- **FLOODS DIRECTIVE**
- **Water framework directive**
- **Birds and Habitats Directives**
- ....
- **CAP (!)**
- **Regional and urban policies (!)**
- ...

**Lack of integration and coherence**

## **Links between the Floods Directive, Water Framework Directive and Birds and Habitats Directives**

- **They don't change each others requirements**
- **Successes in flood, water, nature and marine policies invariably depend on the progress in all other areas**
- **Coordinated implementation is rewarding, notwithstanding the different context, aim and instruments**
- **Mismatches to be solved by early cooperation , negotiation and using the flexibilities the directives provide**



# Comparison of management aspects

Directive(s)	Floods Directive	Water Framework Directive	Birds and Habitats Directives
Objectives	Assessment and management of flood risk  Reduce adverse consequences (human health, the environment, cultural heritage and economic activity)	Good status (ecological and chemical status for surface water, chemical and quantitative status for groundwater)  No deterioration  Exemptions	Favourable conservation Status of protected habitats and species  No deterioration
Scale	River Basin District (Unit of Management)  Areas of Potential Significant Flood Risk  Country	River Basin District (and sub-units)  Water body and water body types specified at biogeographical scale  Country	Biogeographical region, country, site  Habitat type  Species
Instruments	Preliminary Flood Risk Assessment  Flood Hazard and Risk Maps  Flood Risk Management Plan	River Basin Management Plan  Programmes of Measures  Normative definitions (type, reference, intercalibration)	Network of Protected Areas for Habitats/Species (Natura 2000)  Habitats and wild fauna and flora Appropriate Assessment  Management Plans
Schedule	6-year management cycle ending 2015, 2021, etc.	6-year management cycle ending 2015, 2021, etc.	6-year reporting cycle ending 2012, 2018, etc.

**Source:** Based on Workshop preparatory committee (2014) for Birds and Habitats Directives and Water Framework Directive objectives and scale.

# Links and potential synergies

Column A	Column B	Column C	Column D	Column E
Scale	Hydrological processes of interest for the Floods Directive	Physical processes which are of interest for the Water Framework Directive and which have a relation to the hydrological processes in Column B	Physical processes which are of interest for the Birds and Habitats Directives and which have a relation to the hydrological processes in Column B	Potential synergetic measures between Columns B, C and D
Catchment	Infiltration Retention Storage	Nutrient control Natural hydromorphology of small water bodies (*)	Groundwater in- and out-flow Natural groundwater level fluctuations Temporal pluvial and groundwater floods in low-lying areas	Restoration of buffering capacity of agricultural land and forests Natural Water Retention Measures Land use planning, securing functions and ecosystem services
Floodplain/ Areas of Potential Significant Flood Risk	Storage Attenuation of flood waves (upstream stretches) Increase of discharge capacity (downstream stretches)	Nutrient-retention Natural hydromorphology of water bodies in floodplains (*)	Connectivity in natural degrees Continuity Inundation depths at natural levels Natural erosion and sedimentation processes	Increasing or reactivating floodplains Land use planning, excluding certain developments, keeping storage / discharge capacities intact Increase floodplain area Protection of Natura 2000 from adverse effects of flood risk management Green infrastructure to support multifunctionality
River bed	Fast discharge of flood water	Natural hydro-morphology (*)	Continuity Environmental flow	Sediment management

**Note:** (\*) Hydromorphological elements supporting the biological elements: hydrological regime, quantity and dynamics of water flow, connection to groundwater bodies, river continuity, morphological conditions, river depth and width variation, structure and substrate of the river bed and structure of the riparian zone.



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# CAP

- **23/05/2016: all 118 RDPs covered by 28 partnerships agreements**
- **Rural development plans – in general – missed opportunity to strengthen the links between CAP and water policies**
- **Trend of greater land and water use**
  - Revised CAP includes measures to reduce water use
  - Cross-compliance of WFD discussion postponed

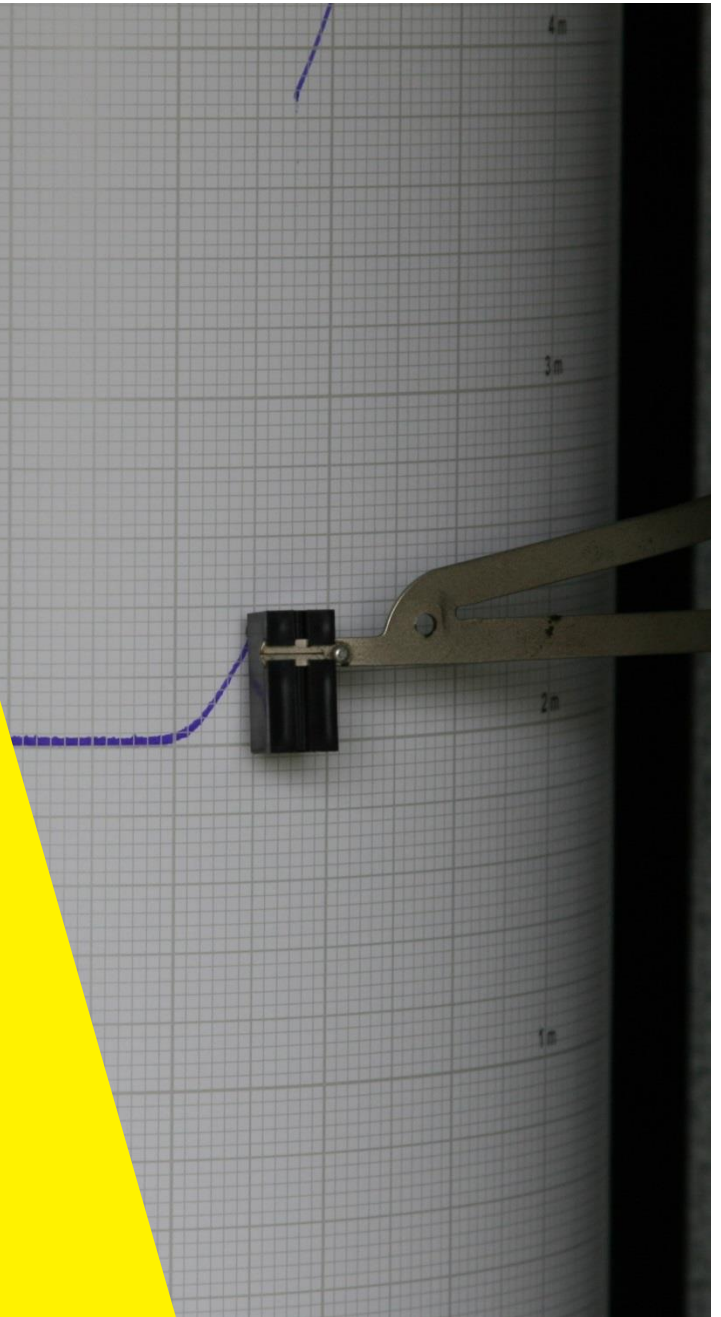
# Inland navigation

- **Focus on droughts and low flows**
- **Adaptation of infrastructure, vessels and operations**
- **Improved fairway conditions**
  - Technically possible
  - Structural modifications (WFD)
  - Sediment balance and behaviour
  - Impact on floods
- **Role of international river commissions (?)**



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# Conclusions





# Knowledge and policy integration

**Gaps remain, but we are making progress**

- **Data**
  - Past floods
  - Land use in floodplains
  - Flood-protection infrastructure
- **Methodology**
  - Quantify (monetarise) costs and benefits of measures
  - Environmental flood impacts

**Bring together communities: ecosystem services, disaster risk reduction, climate change adaptation!**

# **Coordination of flood risk management with adjacent policy fields**

**More than any other environmental hazard, floods bring benefits as well as losses**

- **Floods serve as ecological ‘refueling’ or in extreme cases ‘reset’ buttons**
- **WFD, BHDs: measures have a primary focus on improving the environment**
- **FD: hard/grey measures have a negative impact on the quality and amount of ecosystem services**
- **There no binary switch between green and grey measures: ‘greening the grey’**

# Guiding principles for the next steps in flood risk management

- **An inclusive approach**
  - More than maintaining the integrity of flood control structures:  
Efficiency and fairness, resilience and adaptive capacity, safeguarding ecosystem services
- **Economic assessments supporting an inclusive approach**
  - Socio-environmental cost-benefit approaches, and adaptive management approaches
- **An appropriate role for inherent uncertainties**
  - Difficult to distinguish the effect of the different drivers (and pressures)



Thank you for your attention



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