

Towards Sustainable Management of River-Sea Systems: Enhancing Process & System Understanding in the Elbe-North Sea System



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Why are we doing it?

- Elbe is more than 1000 km long, its catchment comprises about 150,000 km² and harbours about 25 Mio. people in Czech Republic and Germany
- for a **sustainable management**, interdisciplinary knowledge about process dynamics along the **River-Sea Continuum**, as well as the interacting effects of different human activities (e.g. agriculture, shipping, energy generation), climate change and extreme events is needed
- Elbe and North Sea are a case study (Supersite, Fig.1) within the European research infrastructure initiative **DANUBIUS-RI (International Centre for Advanced Studies on River-Sea Systems)**

What are we offering?

- providing **access to research infrastructure** enabling research along River-Sea Continuum
- integrating existing knowledge** and providing new interdisciplinary knowledge and methods
- using **standardised methods** and providing access to comparable data
- strengthening regional, national and international **collaborations**
- combining research with **technology development** and its application
- training early career scientists** (e.g. by establishing a graduate school)

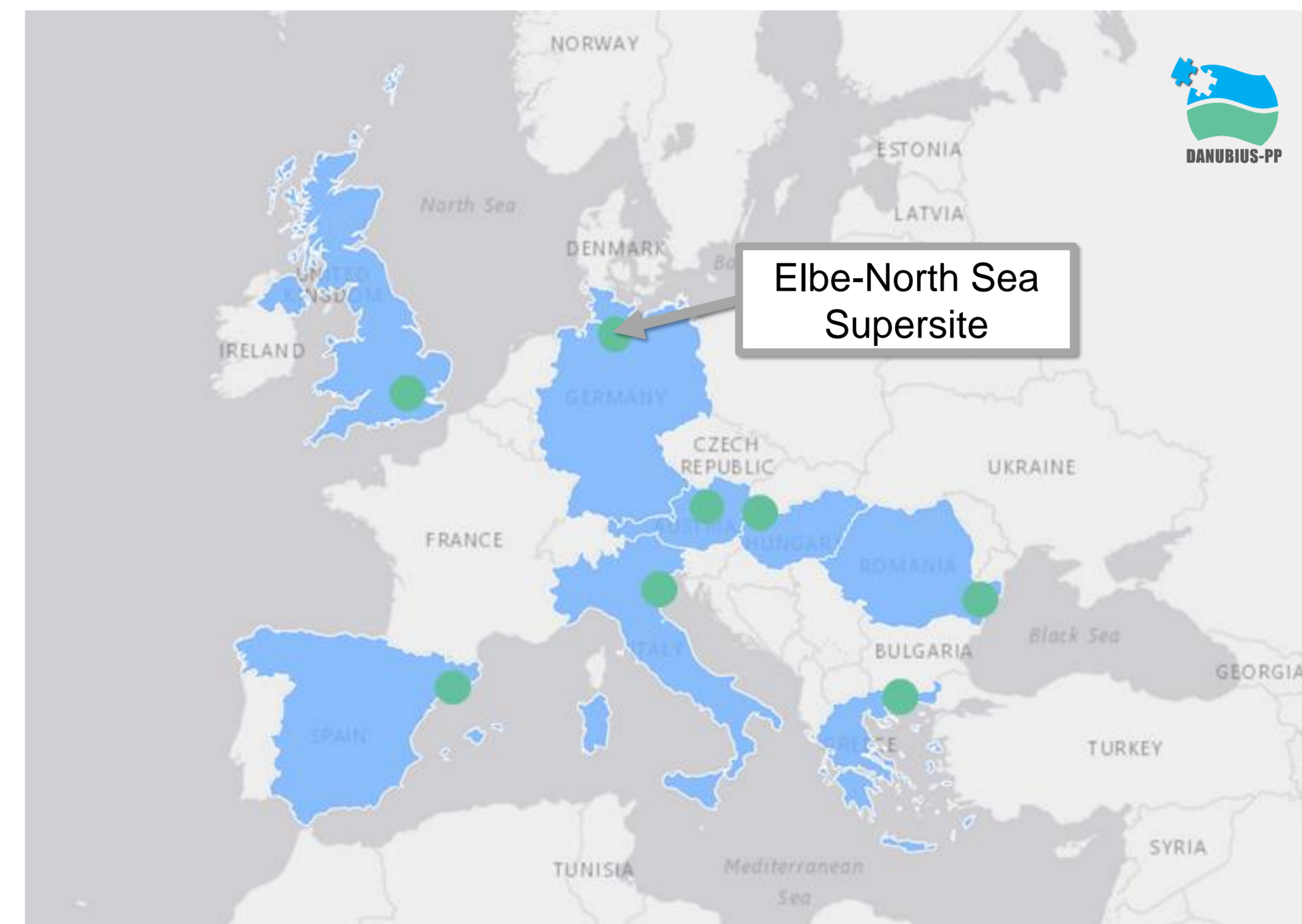


Figure 1 Currently, research infrastructures are being developed at eight **Supersites** along six River-Sea Systems (Elbe, Thames, Danube, Po, Ebro, Nestos and their respective adjacent seas; Map: ESRI-HZG).

What do we want to do?

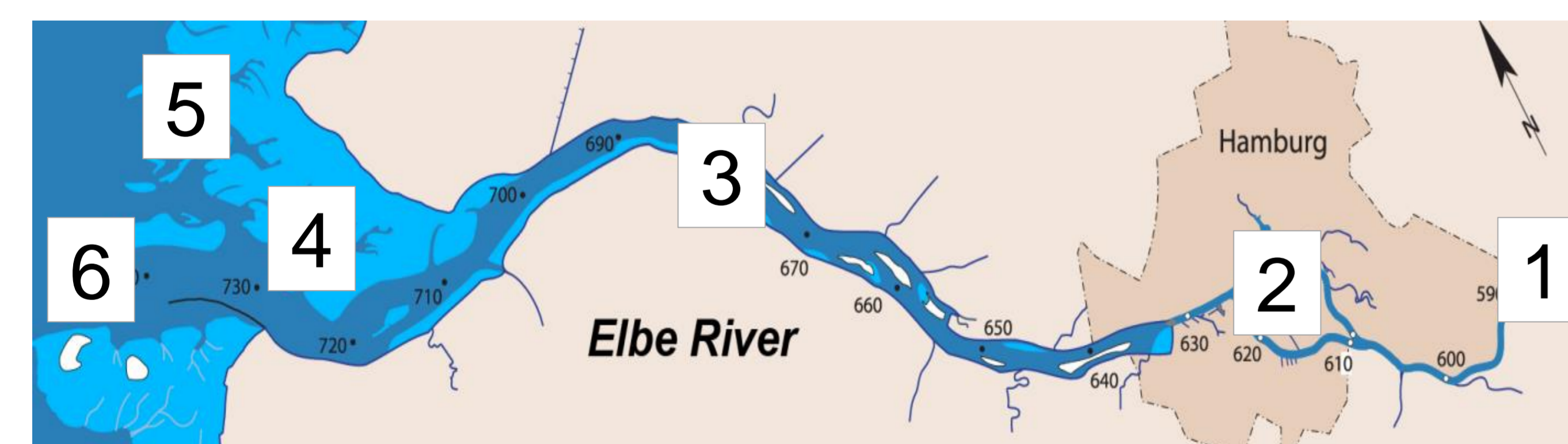
- How are **climate change** and **extreme events** influencing nutrient, suspended particulate matter and pollutant dynamics?
- How are **agricultural measures** (e.g. fertilizer use, livestock production) affecting nutrient thresholds and eutrophication?
- What is the **effect of diking, deepening, dredging and disposal of dredged material** on hydro- and morphodynamics, and on the cycling of organic matter, nutrients and pollutants?
- What are **cumulative impacts** of natural and human drivers? How can we distinguish between natural variability and anthropogenic changes?

How do we want to do it?

- establishing an integrated **observation, experimentation** and **modelling** research infrastructure along River-Sea Continuum
- researching **hydro- and morphodynamics, biogeochemistry** (suspended particulate matter, nutrients, oxygen, greenhouse gases), **pollutant** and **phytoplankton dynamics**
- using automated measuring systems (e.g. FerryBox, Underwater Node), in-situ observations, remote sensing, ship campaigns, laboratory analytics and high-performance computing

Where are we planning to do it?

- Elbe-North Sea Supersite: tidal part of Elbe and German Bight (Map: ARGE Elbe), an extension upstream is planned
- research infrastructure components are planned to be implemented at the following **points of particular interest**:



- Import of Matter over Weir Geesthacht
- Turnover of Matter in Hamburg Port Area
- Turnover of Matter in Freshwater-Seawater Mixing Zone
- Export/Import of Matter to/from North Sea
- Turnover of Matter in Wadden Sea
- Turnover of Matter in North Sea

Who are we?

Coordination	Partners	
 Helmholtz-Zentrum Geesthacht Centre for Materials and Coastal Research	 Bundesanstalt für Gewässerkunde	 Federal Waterways Engineering and Research Institute
Collaborations		
 Coastal Observing System for Northern and Arctic Seas	 Modular Observation Solutions for Earth Systems	 Marine Geoportal

- bringing together different stakeholders**, research infrastructures and respective data along River-Sea Continuum
- complementing existing infrastructures** and activities in order to enhance process and system understanding in Elbe and North Sea

When do we want to do it?

