

Integrative studies of the River-Sea-Continuum

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This session provides a scientific platform for exchange of findings from research that addresses the entire continuum of river and sea. We invite studies across geographical borders, along the freshwater-marine water continuum, and interdisciplinary studies that integrate physical, chemical, biological, geological observations/experiments, and modelling, and those that span the traditional silos of natural and social sciences.

River-Sea-Systems comprise river catchments, estuaries/deltas, lagoons and the coastal seas. They are dynamic products of interacting environmental and socio-economic processes. River-Sea-Systems provide natural capital and related ecosystem services that are fundamental to societal wellbeing. These systems, however, face compounding pressures from natural forces such as climate change and natural hazards, and from anthropogenic forces like urbanisation, shipping, energy generation, industrial development, water abstraction and damming, operating at local, national and global scales. The resulting pressures contribute to societal challenges such as eutrophication, hypoxia, pollution, change in hydrodynamics and morphodynamics (including disturbed sediment balances), loss of biodiversity, habitat depletion, sea level rise, and ultimately loss of ecosystem services. This impacts not only on the 'planet' but also on 'people' and 'profit'. These pressures are likely to increase in the future with implications throughout the river-sea continuum with uncertain consequences for the resilience of the socio-ecological system.

We need to fully understand how River-Sea-Systems function. How are River-Sea-Systems changing due to human pressures? What is the impact of processes in the catchment on marine systems function, and *vice versa*? How can we discern between human-induced changes or those driven by natural processes from climate-induced variability? What will the tipping points of socio-ecologic system states be and what will they look like? How can we better characterise river-sea systems from the latest generation Earth observation to citizen science based observatories. How can we predict short and long term changes in River-Sea-Systems to manage them sustainably? What is the limit to which it is possible to predict the natural and human-influenced evolution of River-Sea-Systems?

Which policy responses would be desirable from a scientific perspective and how will the gaps between the existing European environmental policies be bridged (e.g. Water Framework Directive 2000, Marine Strategy Framework Directive 2008 and EU biodiversity policies)? How will links be made to the UN 2030 Agenda's Sustainable Development Goals 6 (Clean Water & Sanitation) and 14 (Life below Water)?

The increasing demand to jointly enable intensive human use and environmental protection in river-sea systems requires holistic and integrative research approaches with the ultimate goal of enhanced system understanding. It is becoming widely recognised that there is a need to study River-Sea-Systems as an entire continuum, to provide scientifically underpinned information to enable better-informed and holistically engaged environmental protection of River-Sea systems, to maintain their ecosystem functioning and thus their capacity to provide ecosystem services.