



ECO
C²S

Ecosystem services to enhance the resilience of coastal regions and communities to flood risks in a catchment to sea perspective



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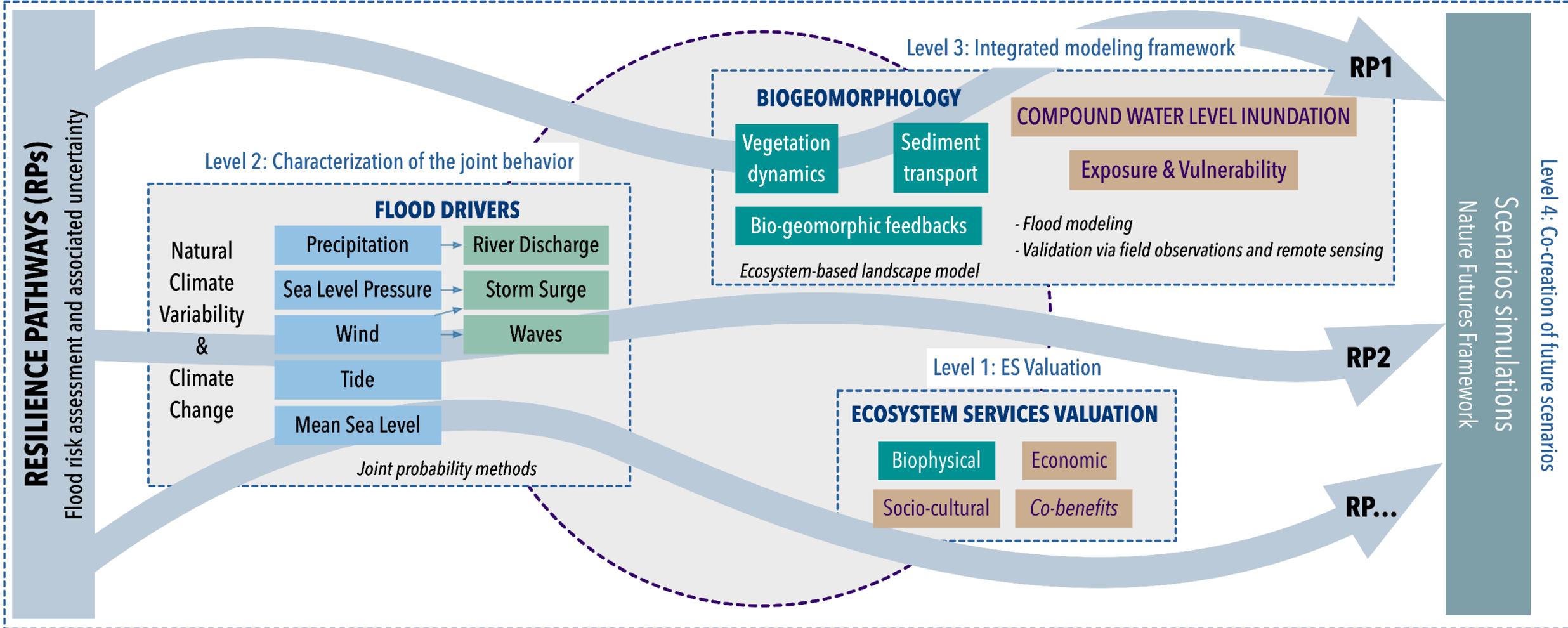
Level 1: Co-definition of knowledge gaps

STAKEHOLDER'S ENGAGEMENT, CO-DESIGN AND CAPACITY BUILDING

Anthropogenic pressures (loss of habitat, changes in hydrological connectivity, landscape organization, etc.)

Perceived risks and protection behaviors

Social and governance barriers to implementation



Level 5: Framework based on resilience pathways

Thank you for your attention

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Background

Globally, and in Europe in particular, coastal floods are one of the most common natural hazards with major economic, social, and ecological impacts on communities. Coastal systems support biodiversity and provide critical ecosystem services, including flood protection. The effects of climate change enhance hazards in such flood-prone areas and place additional physical pressure on ecosystem services, while also adding pressure to the social system, by interacting with people's socio-cultural and socio-economic valuation of such places, with potential consequences for their place identity and their motivation, emotions, cognitions and behaviours associated with them. This creates an **urgent need for reliable risk assessment, management and communication methods and innovative community engagement approaches** through stakeholders' co-design methods, towards reducing vulnerabilities, protecting what people value, and enhancing socio-physical systems adaptation towards building resilience. **Many catastrophic floods have a compound dimension**, where the **interaction of multivariate and multicausal drivers** usually exacerbates their effects. This is particularly true for estuarine cities and regions and calls for a holistic approach to flood risk management, combining both physical and ecological drivers and feedback.

Objectives and Methods

EcoC2S aims to **co-develop a holistic approach to flood risk assessment**, quantifying the contribution of natural systems and blue-green infrastructure to flood protection in transitional and coastal areas and supporting the co-creation of **resilient pathways based on ecosystem services**.

MAIN OBJECTIVES

1. Assessment of flood risk jointly considering geophysical and societal preconditions and relevant flood drivers.
2. Contribution of meteorological, eco-morphodynamic and human drivers to flood impact.
3. Valuation of water flow regulation by inland and coastal ecosystems.
4. Functionality of ecosystems and blue-green infrastructure in a CC context.
5. Socio-cultural and economic value of ES for local communities, and how changes in ES affect perception and acceptance of ES solutions.
6. Co-identification of research areas and co-design of ES-based pathways with local communities and stakeholders.
7. Promotion of resilience pathways based on ES, multifunctional, flexible, gender-responsive and adaptive to uncertainties.

KEY ASPECTS

1. Co-identification of knowledge gaps and ecosystem services valuation, following a participatory approach. Use of counterfactual analysis to assess flood drivers and their contribution, as well as human preferences and perceptions of ecosystem services and their value.
2. Characterization of joint behavior of geophysical preconditions with atmospheric and marine drivers, considering the combination of multiple and concomitant variables to define the probability of occurrence of compound extreme events.
3. Integrated modelling framework that includes eco-morphodynamic effects on compound flood hazard. The long-term eco-morphological evolution, driven by the interactions between vegetation dynamics, water flow and sediment transport, will be analysed with a combination of remote sensing, field measurements and numerical simulations.
4. Co-creation of future scenarios for sustainable and resilient ecosystem services, combining different actors to co-create and co-realize solution-oriented pathways.
5. Establishment of a framework that guides the development of long-term mitigation measures and management strategies that enhance the resilience of coastal systems to extreme events.

The methodology will be tested in two pilot case studies at the river basin level: i) **Cádiz Bay in Spain** and ii) **Scoglietta in Italy**. Both are coastal systems with compound flooding potential and are highly intervened by human activity. They represent typical European archetypes, reflecting different contributions of the flooding drivers, ecosystem services potential, and catchment and coastal typologies. In this context, archetypes are used as a structural way to better classify, understand, and address the complexities of compound flooding. They help identify recurring patterns and assess the potential likelihood and impact of flood events. Additionally, archetypes serve as a useful tool to improve communication among scientists, policymakers, and the public, supporting the collaborative development of strategies to enhance resilience.

WE WANT YOU!

Get in touch

We are looking for additional case studies and new stakeholders. Get in touch if you are interested!

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