

Integrated science for the co-creation of global change adaptation pathways: Ria de Aveiro lagoon region, Portugal

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Outline

- Global change challenges
- Ria de Aveiro lagoon region
- Adaptation measures
- Co-creation pathways
- Conclusions





Climate
change

Population
growth

Geo-political
shifts

Economic
development

Global change

Global change challenges in coastal areas

- Implications:
 - Rising sea levels
 - Extreme rainfall events
 - Increased storm surge frequencies
 - Reduced sediment delivery to the coast
 - Anthropogenic transformations of natural coastal areas
- Consequences for:
 - Built capital: settlements, ports and infrastructure
 - Natural capital: terrestrial, coastal and aquatic ecosystems
 - Human, social & cultural capital: people, knowledge, communities, tourism and heritage



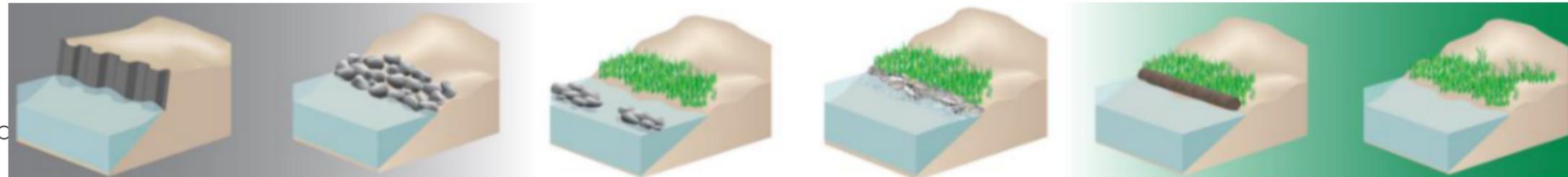
Global change challenges in coastal areas

- Responses:

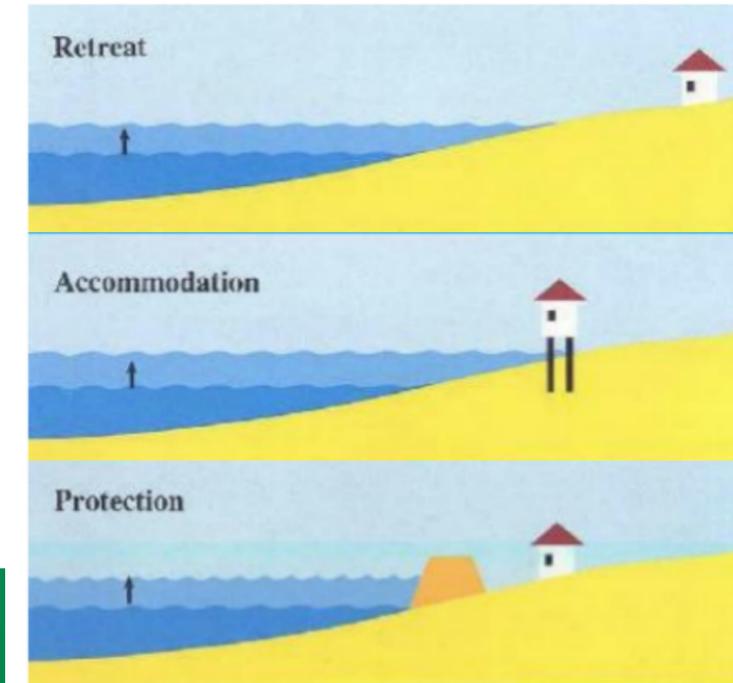
- Retreat: accept natural processes and re-locate
- Accommodate: accept natural processes and live with them
- Protect: don't accept natural process and (try to) stop them

- Hard-gray measures

[-] - - - - - [-] Nature-based measures

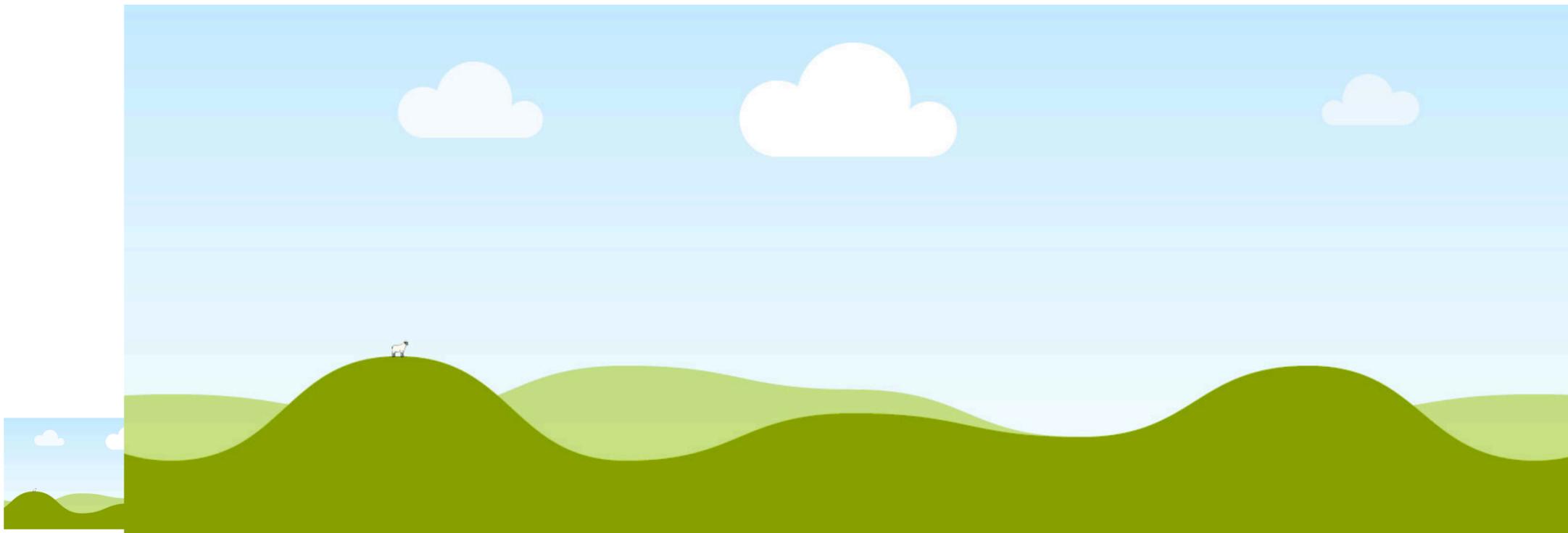
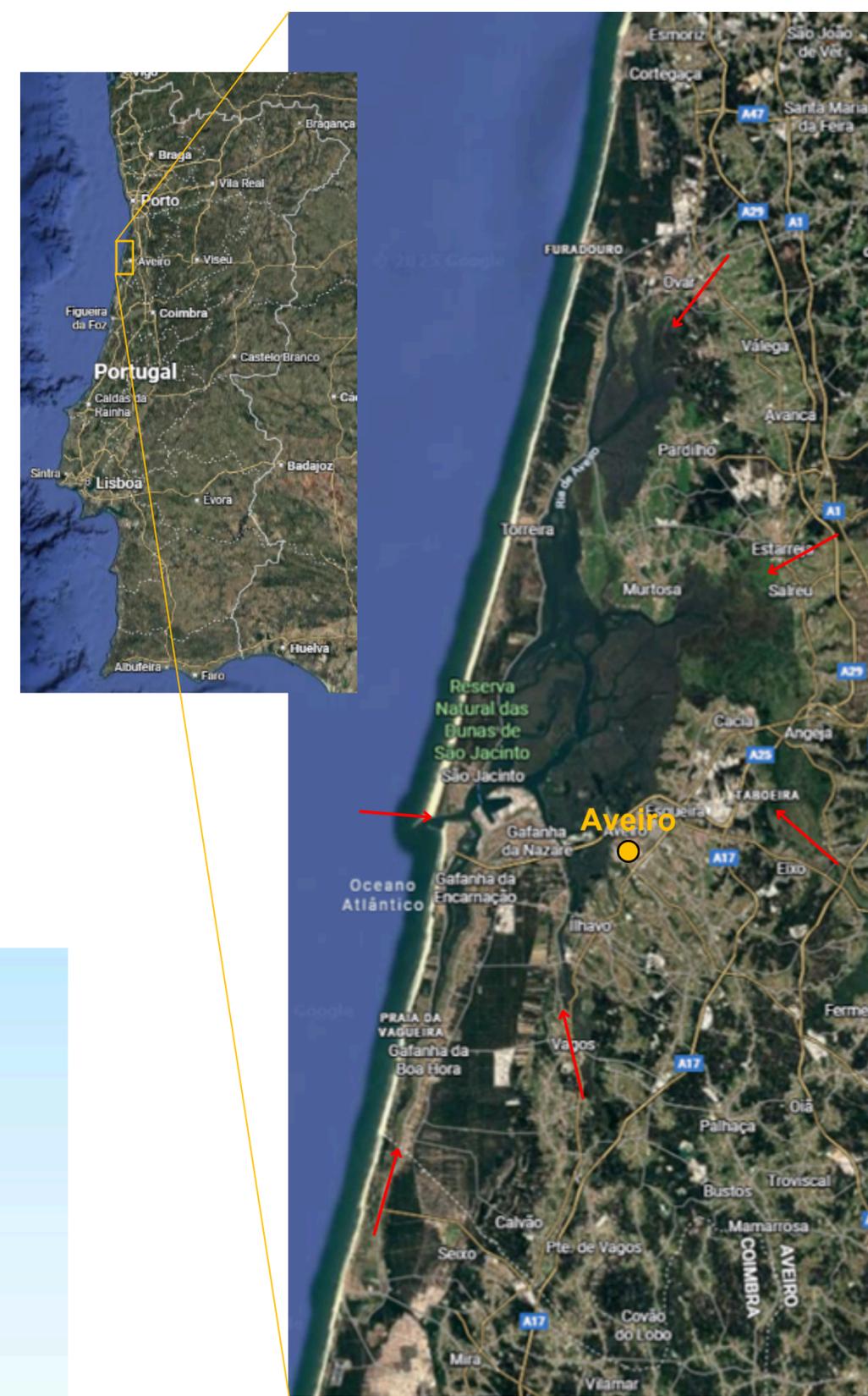


- Provide multiple ecosystem functions, services and values
- Provide direct benefits and multiple co-benefits
- Adapt to changing environmental conditions



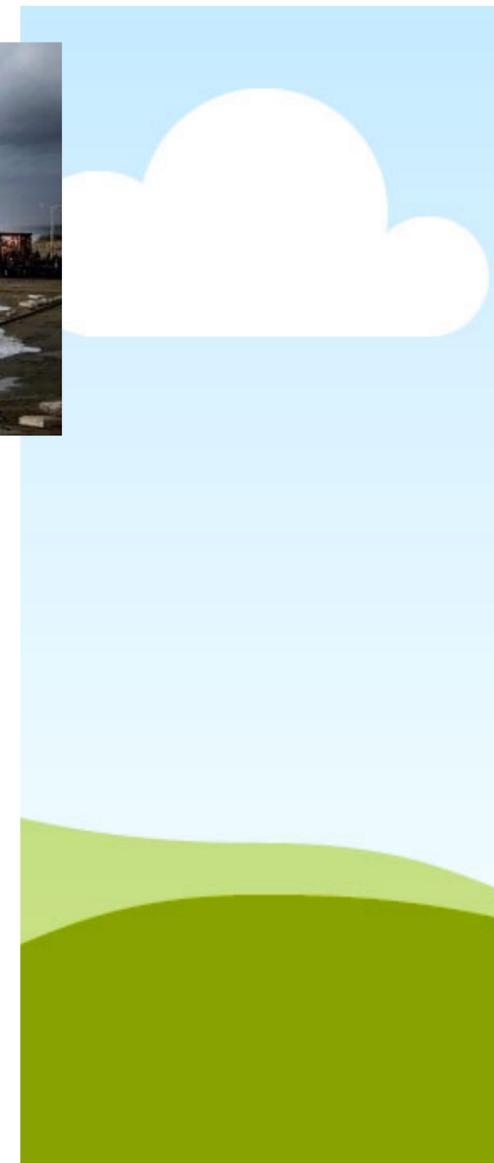
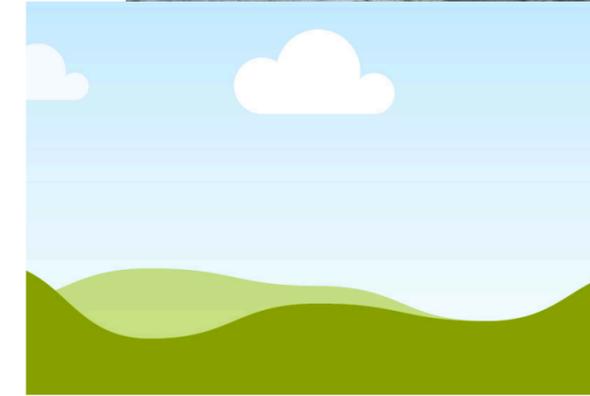
Ria de Aveiro lagoon region

- Characteristics:
 - Area 50 km (N-S) by 15 km (E-W)
 - Shallow coastal lagoon and Natura 2000 area (wetlands, saltpans, ...)
 - Five rivers flowing into lagoon (*Vouga, Antuã, Boco, Caster, Mira*)
 - One single inlet from Atlantic Ocean (port entrance *Barra*)
 - Protected by sandy coastal dune system
 - Strong morphodynamics



Ria de Aveiro lagoon region

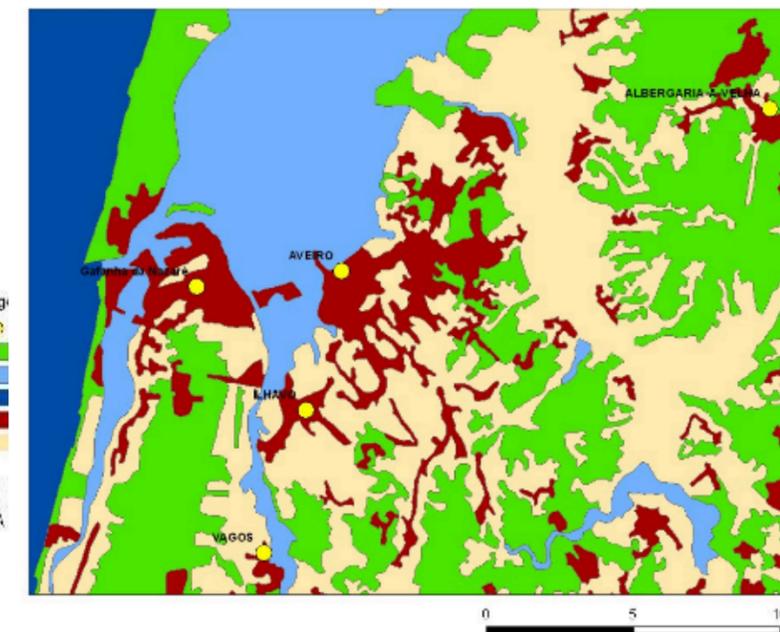
- Challenges:
 - Coastal erosion
 - Coastal flooding
 - Fluvial flooding
 - Urban residential expansion
 - Industrial and port development



1975



1990

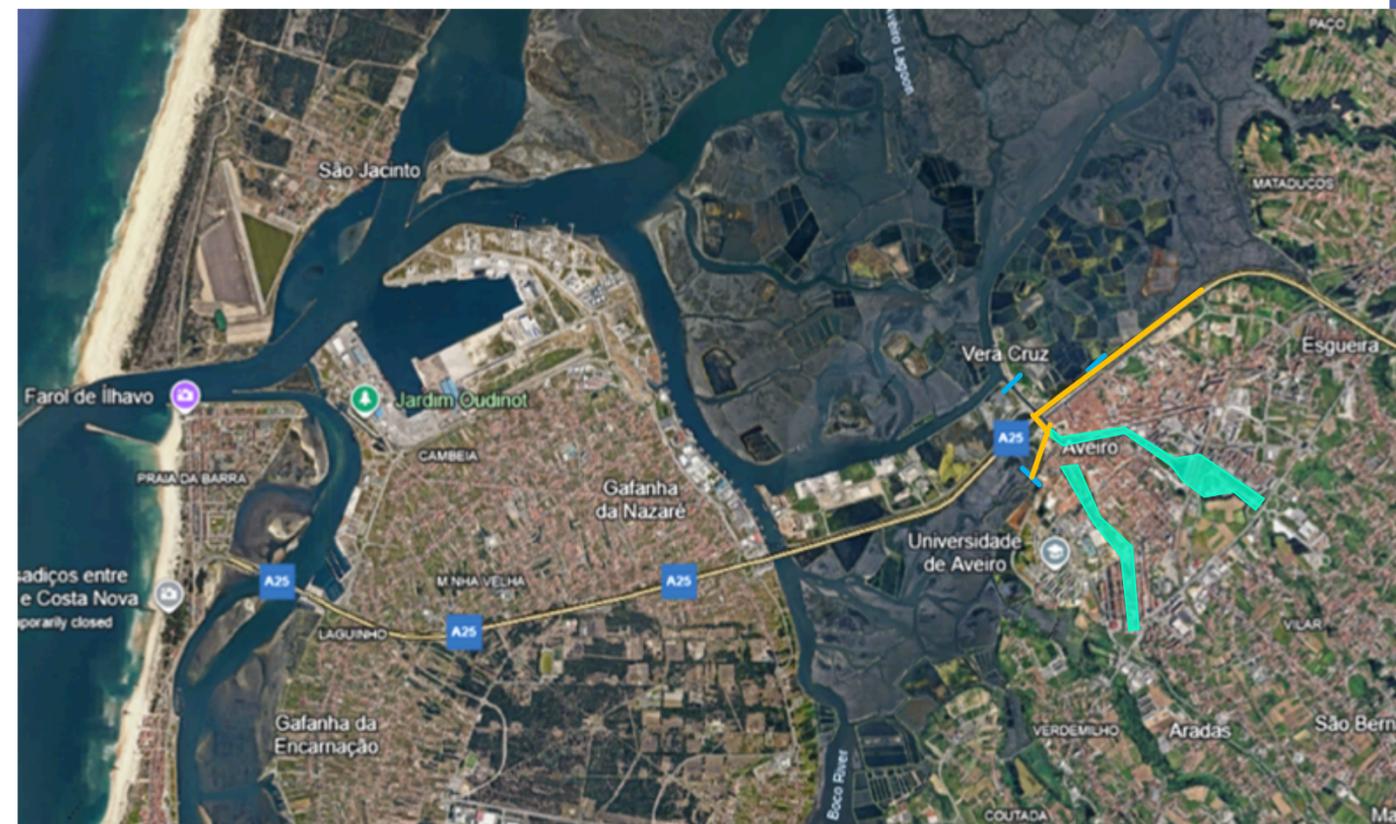
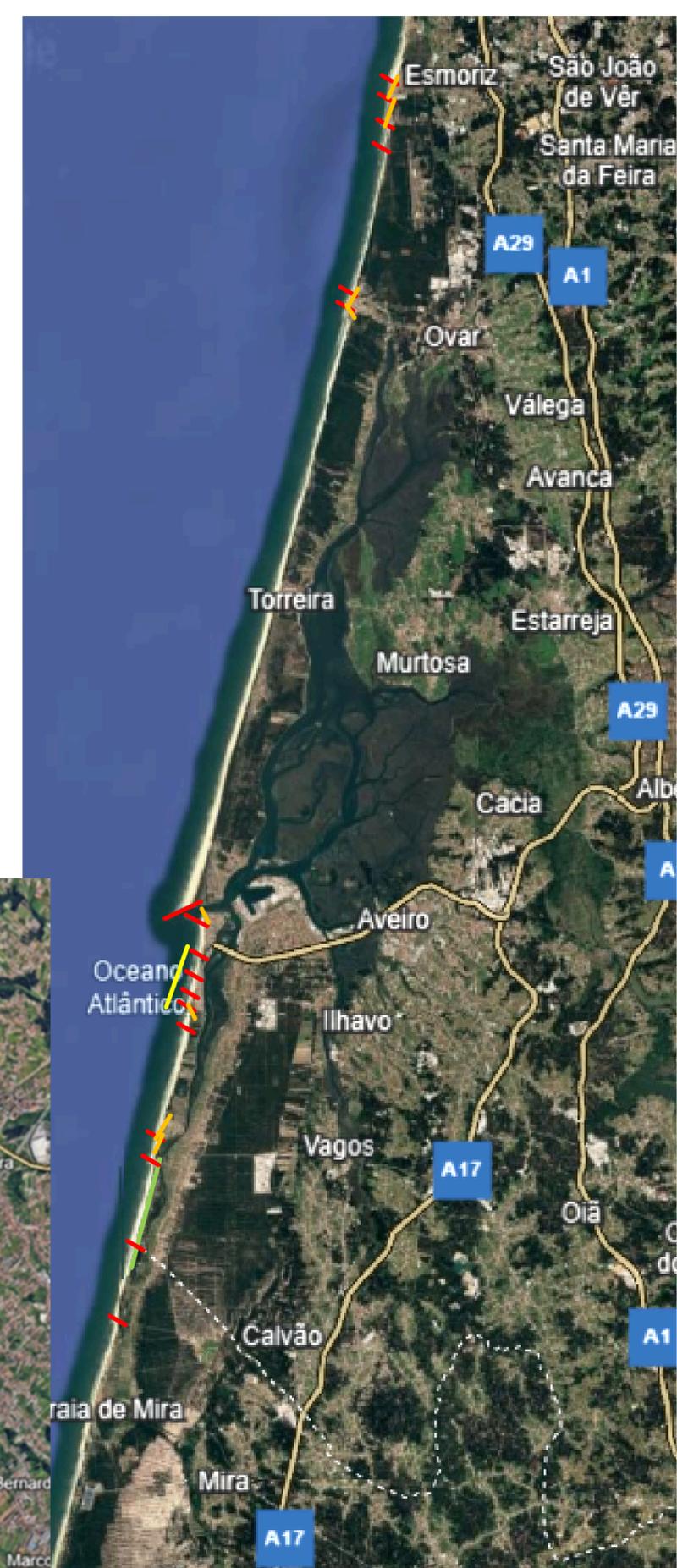


2006



Adaptation measures

- To date:
 - Longitudinal: dikes
 - Perpendicular: groins; breakwaters
 - Beach nourishments
 - Dune reinforcements
 - Locks
 - Green/blue spaces



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Adaptation measures

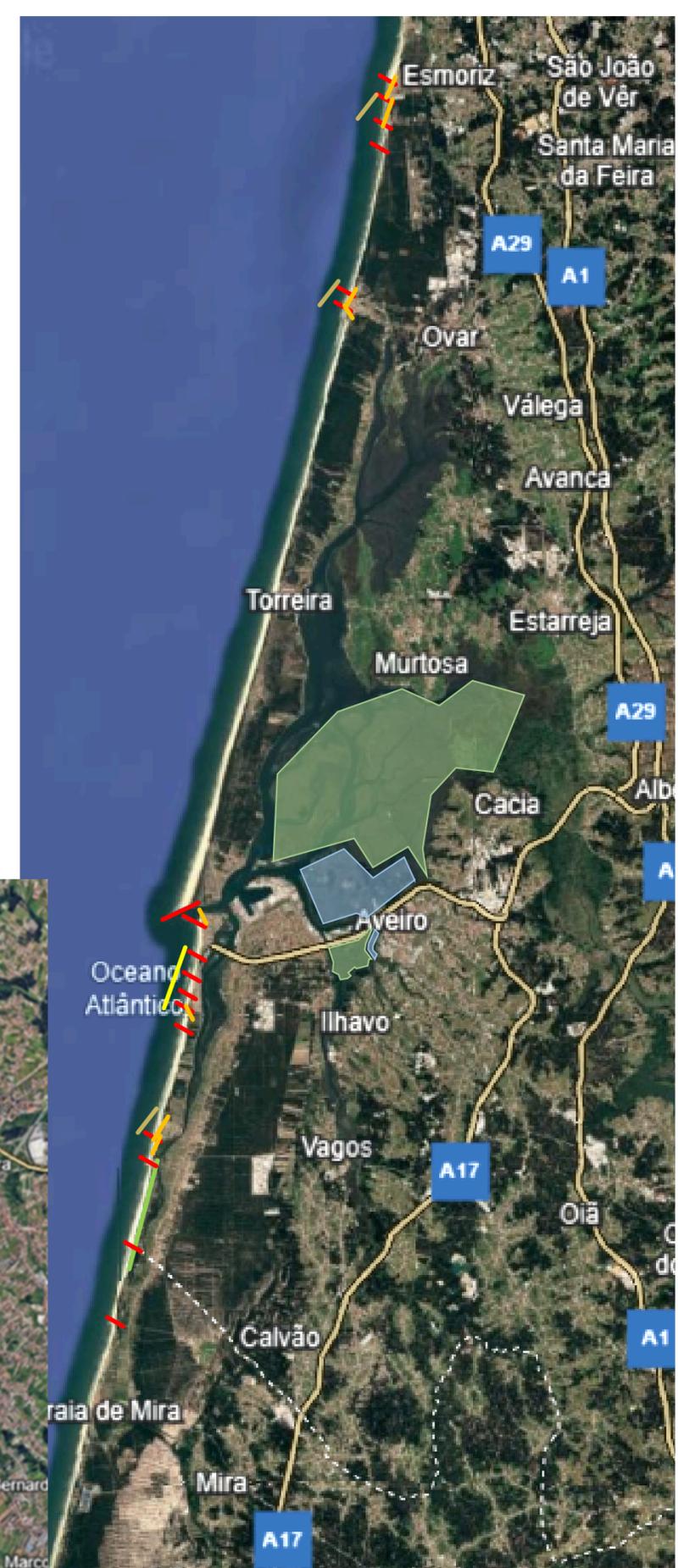
- To date:

- Longitudinal: dikes
- Perpendicular: groins; breakwaters
- Beach nourishments
- Dune reinforcements
- Locks
- Green/blue spaces



- Envisaged:

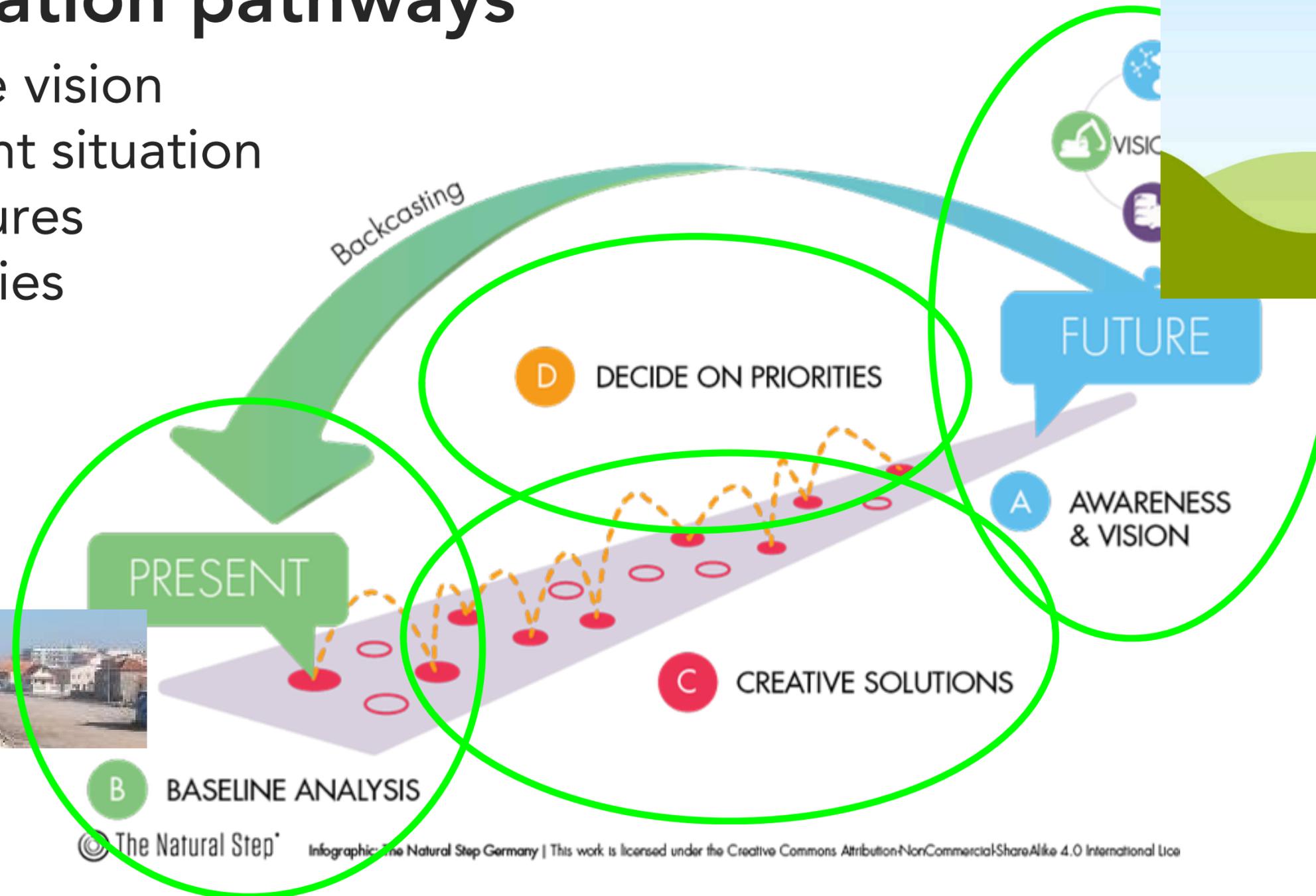
- Locks
- Artificial reefs
- Wetland restoration
- Saltpan restoration



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Co-creation pathways

- Future vision
- Current situation
- Measures
- Priorities



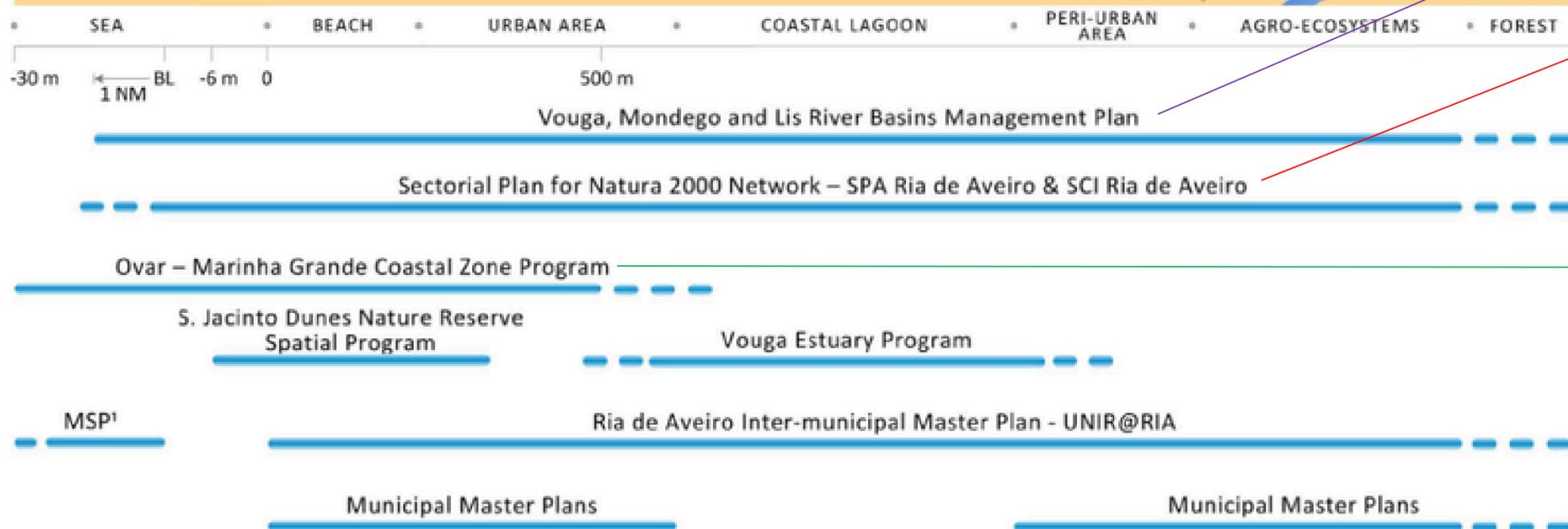
Co-creation pathways

- Stakeholder engagement
 - to identify issues, visions, values and solutions
 - current and future
- Informed decision-making
 - based on best-available data, information and knowledge
 - to assess multiple impacts, costs and benefits across time, space and stakeholders
- Participatory planning
 - to discuss multiple impacts, costs and benefits across time, space and stakeholders
 - to facilitate creation of business models allowing for re-distribution of benefits
 - to maximize societal benefits from adaptation

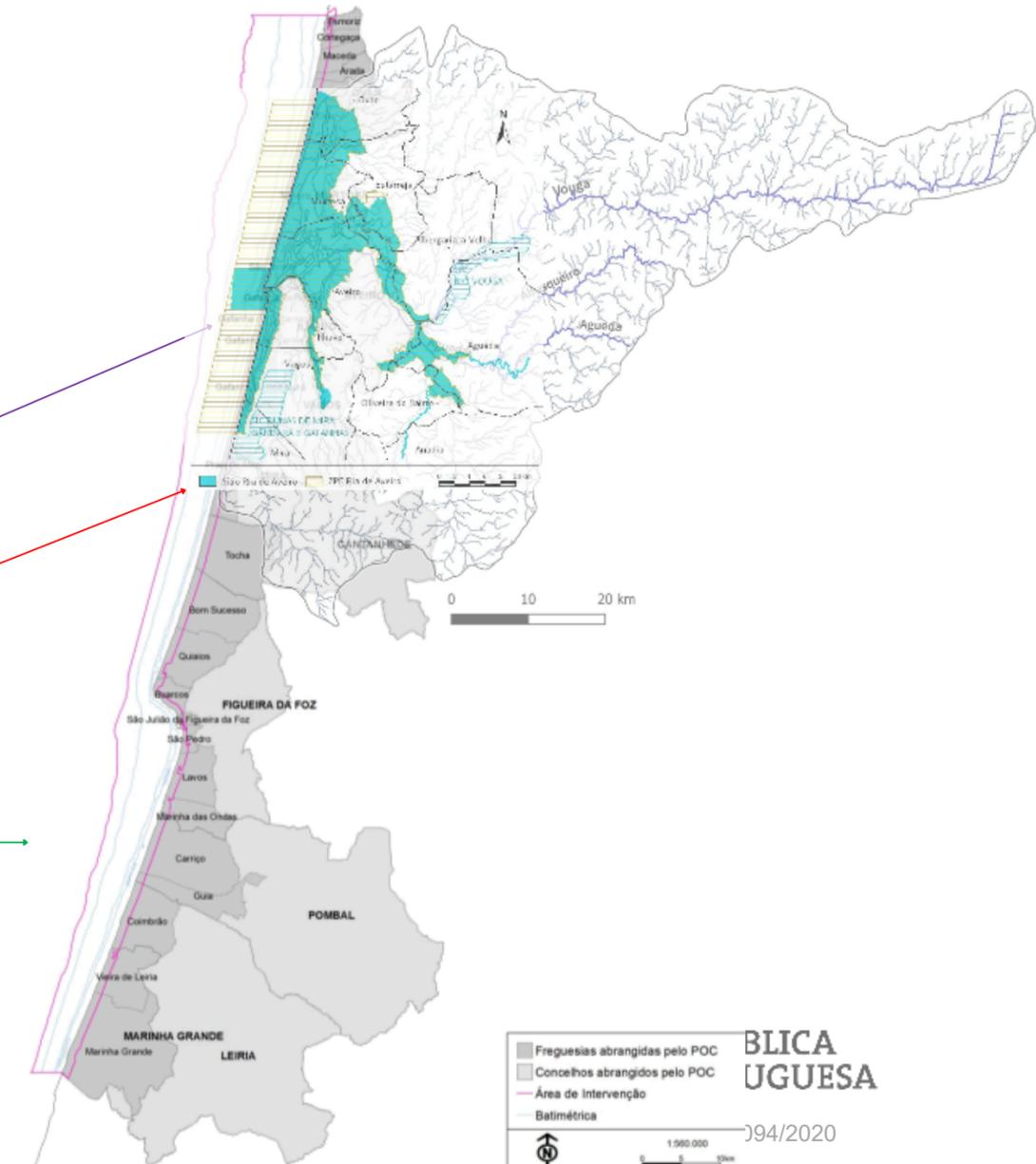


Co-creation pathways

- Governance systems
 - Coordination, integration, roles, responsibilities and financing

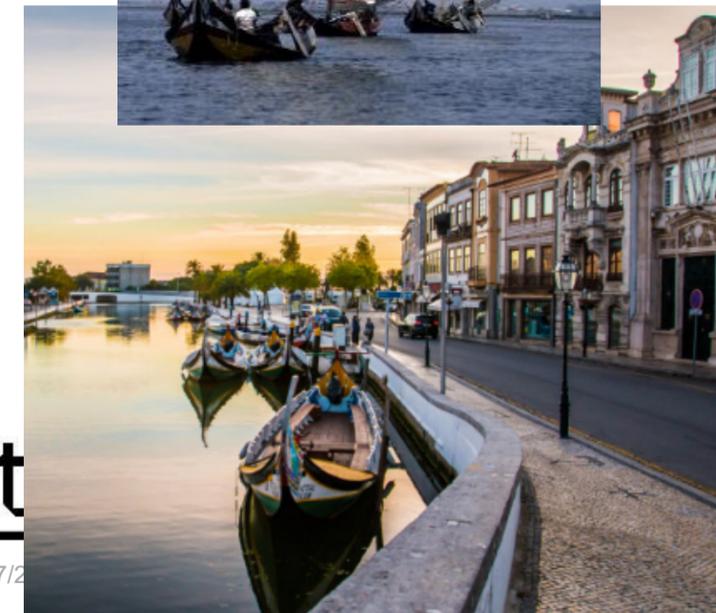


Sousa et al. (2016)



Conclusions

- Ria de Aveiro lagoon region faces several challenges
- Hard-gray and nature-based measures used and envisaged
- Nature-based measures provide multiple functions, services and values
- Adaptation pathways developed through co-creation
- Based on informed and transparent decision-making
- Through participatory planning process
- Governance issues need to be explicitly addressed





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