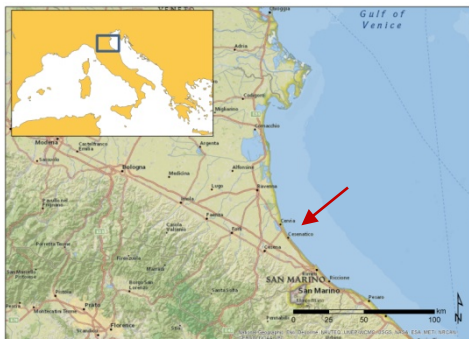




A new wave in coastal protection

Cesenatico case study site

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Cesenatico is a well-known touristic resort of the Emilia Romagna Region, Italy, facing the Northern Adriatic Sea. Its low-lying coastline is threatened by erosion and flood, due to the combination of high subsidence and low riverine sediment supply. To preserve inland areas and tourism activities (9.8 billion € in 2006 along the 130 km regional coastal stretch), specific defences to high water events were built in Cesenatico, consisting of a sea gate equipped with a by-pass system, expansion basins and a soil dike, integrated into the urban use of the back beach. The estimated costs of all these works exceeds 30 M€.

Key challenges and main activities

Subsidence and anthropogenic pressure are the major drivers of flood risk.

- ◆ The **low-lying coastline** of the Emilia Romagna Region is threatened by storm surges, especially from South East, while storms from North East severely erode the beach.
- ◆ The **high subsidence rate**, mainly related to water and gas extraction from the subsoil, results to be the major driver of increasing flood risk.
- ◆ **Ecosystem services** contributing to the coastal system resilience are threatened by the high **anthropogenic stressors**, basically driven by the tourism activities.
- ◆ The **high fragmentation** in the decision-making process compromises the follow up of a long-term view of coastal management.



Cesenatico beach in summertime



Flood of the historical urban area



The «Gardens» in front of the beach: a soil dike integrated into urban use

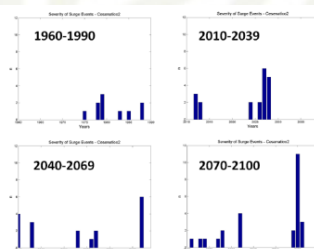


The «Porte Vinciane»: a sea gate to protect the harbour entrance

Key outcomes

Long term sustainability : building adaptive capacity

- ◆ The expected sea level rise (+0.2m in 100 years) and increased number of storms, combined with the high subsidence (-0.01m/year) and low bottom elevations (+1.5m asl), require immediate **long-term plans**.
- ◆ Flood of the beaches and of the urban area is frequent and rapid (tens of minutes for the beaches, up to few hours for the urban area).
- ◆ The increase of **risk awareness** is a primary issue for increasing local coastal resilience. The existing defences are estimated to be poorly effective. A **participatory multi-stakeholder** approach to risk governance is essential.
- ◆ Defence strategies should integrate the existing hard defences with **cost-effective climate-proof measures** such as insurance and evacuation plans.



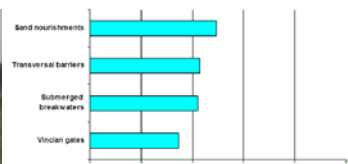
Increase of the Storm Surge Severity Index



Maximum surface elevations, medium term (2050), return period of 10 years



The winter dunes to reinforce the sea bank affect benthic communities



Low perceived effectiveness of existing defences (1: lowest, 10: highest)