EU Strategy for the Adriatic and Ionian Region
EUSAIR

EUSALP
EU STRATEGY FOR THE ALPINE REGION
PRESIDENCY SLOVENIA 2024

EUSBSR
EU STRATEGY FOR THE BALTIC SEA REGION

DANUBE REGION strategy
Prosperity through Diversity

TEDEN SREDOZEMSKE OBALE IN MAKROREGIONALNIH STRATEGIJ
Izola, Slovenija
16. – 20. september 2024

MEDITERRANEAN COAST AND MACRO-REGIONAL STRATEGIES WEEK
Izola, Slovenia
16 – 20 September 2024

Consultation within TSG 3:
Construction Activities in the Sea and on the Seashore and Achieving good environmental status of the Sea

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

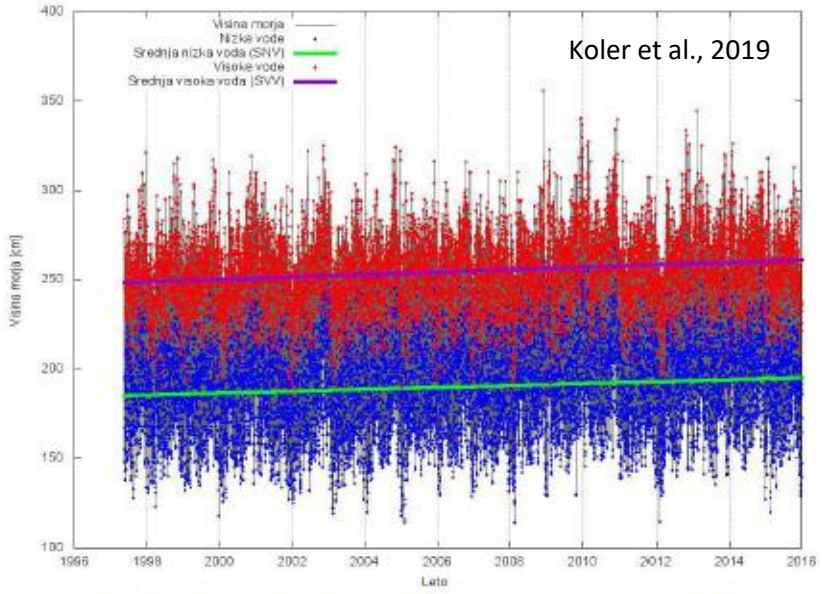
Loads on coastal structures due to sea level rise

Dušan Žagar

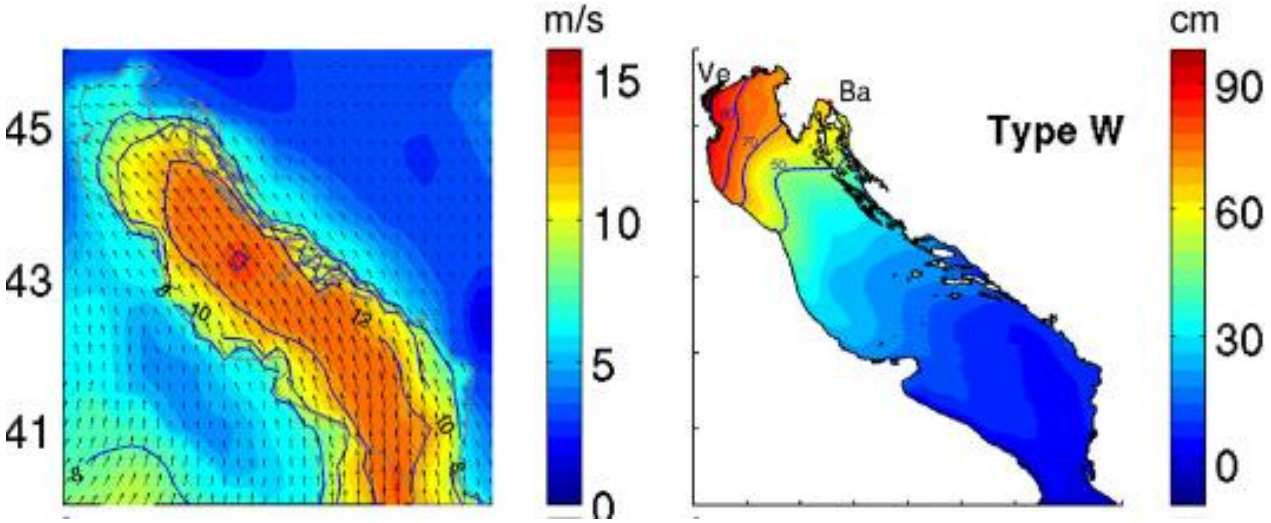
UNIVERSITY OF LJUBLJANA | FGG Faculty of Civil and Geodetic Engineering

Izola, 19. 9. 2024

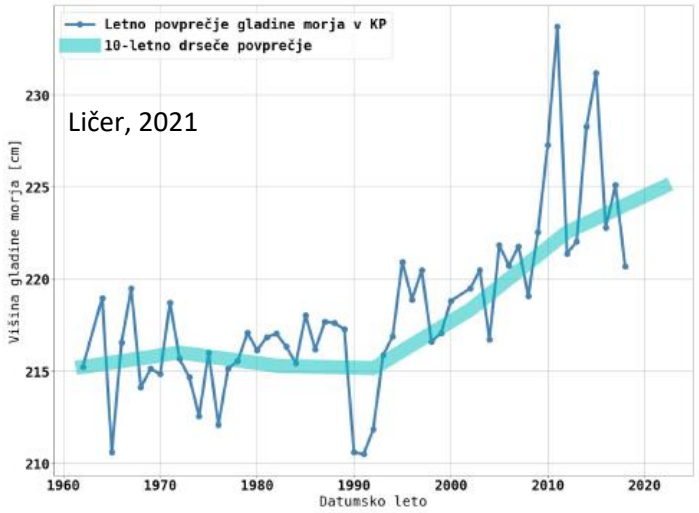
Sea-level rise



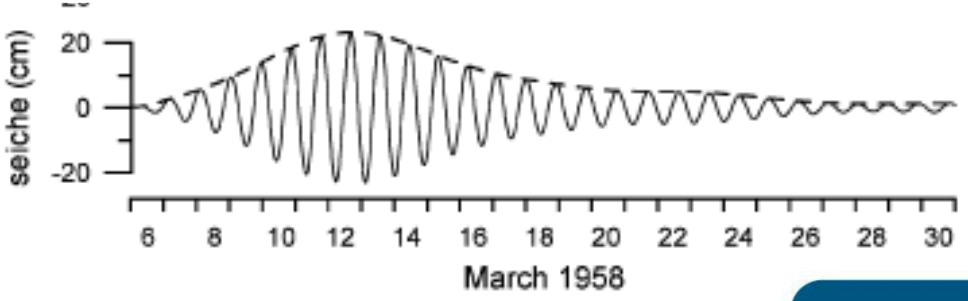
Koler et al., 2019



Storm surge: Međugorac et al., 2018

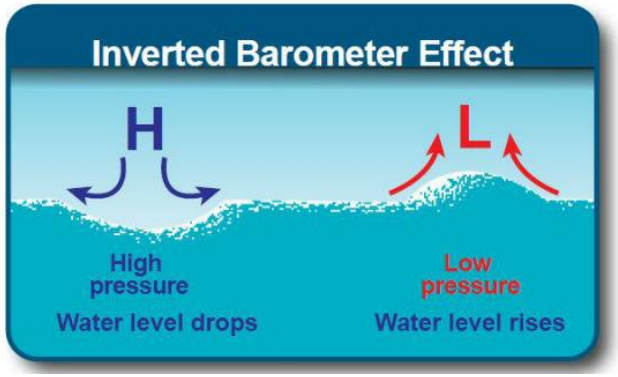


Ličer, 2021

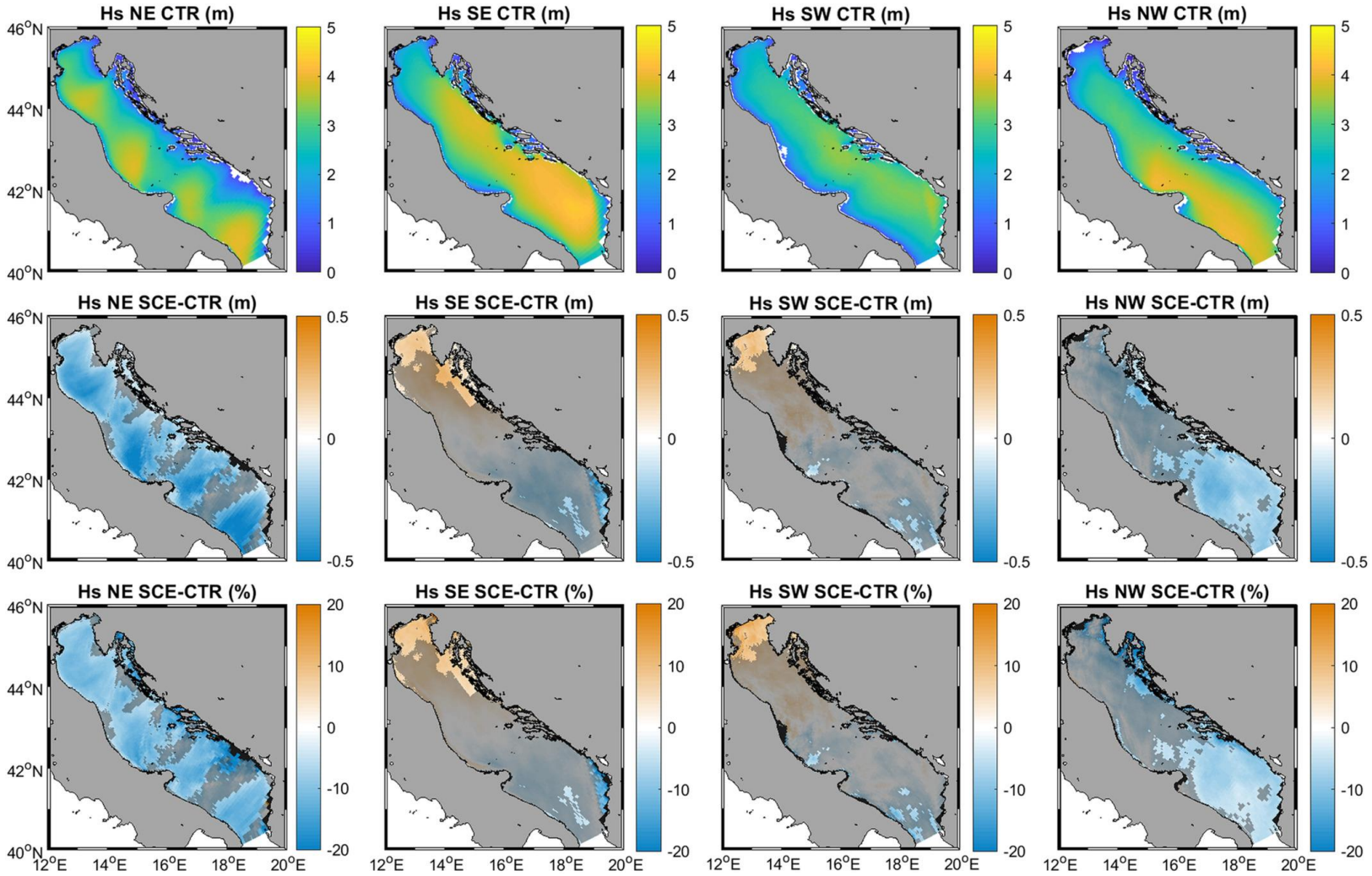


Seiche: Vilibić, 2006

Tidal forcing: ~1,40 m remains unchanged



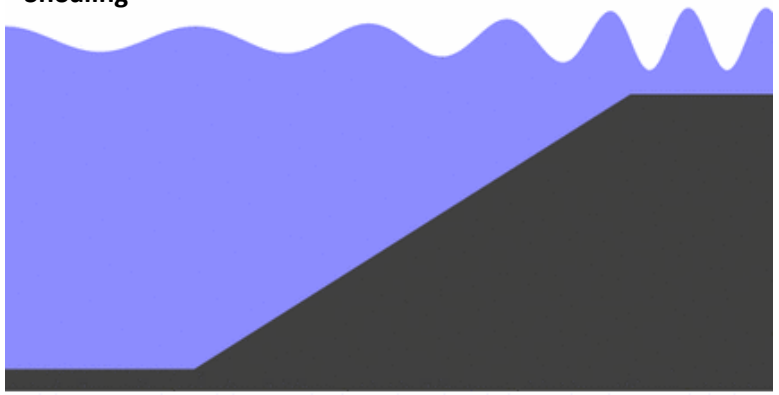
(Wind induced)wave climate change under RPC 8.5

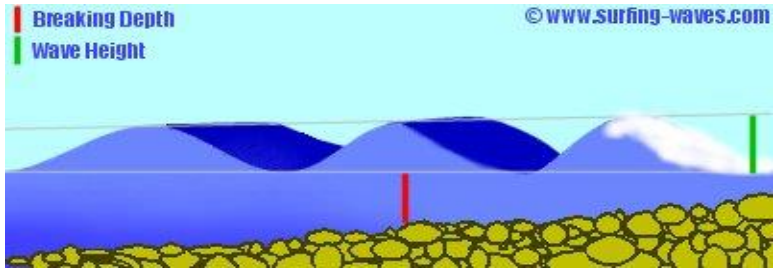


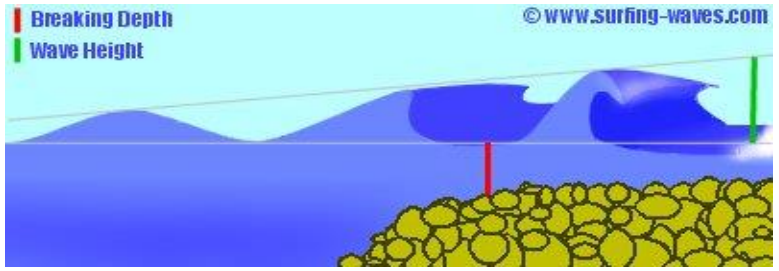
Severe storm conditions (99th percentile): Bonaldo et al., 2020

Wave transformation / breaking → forces

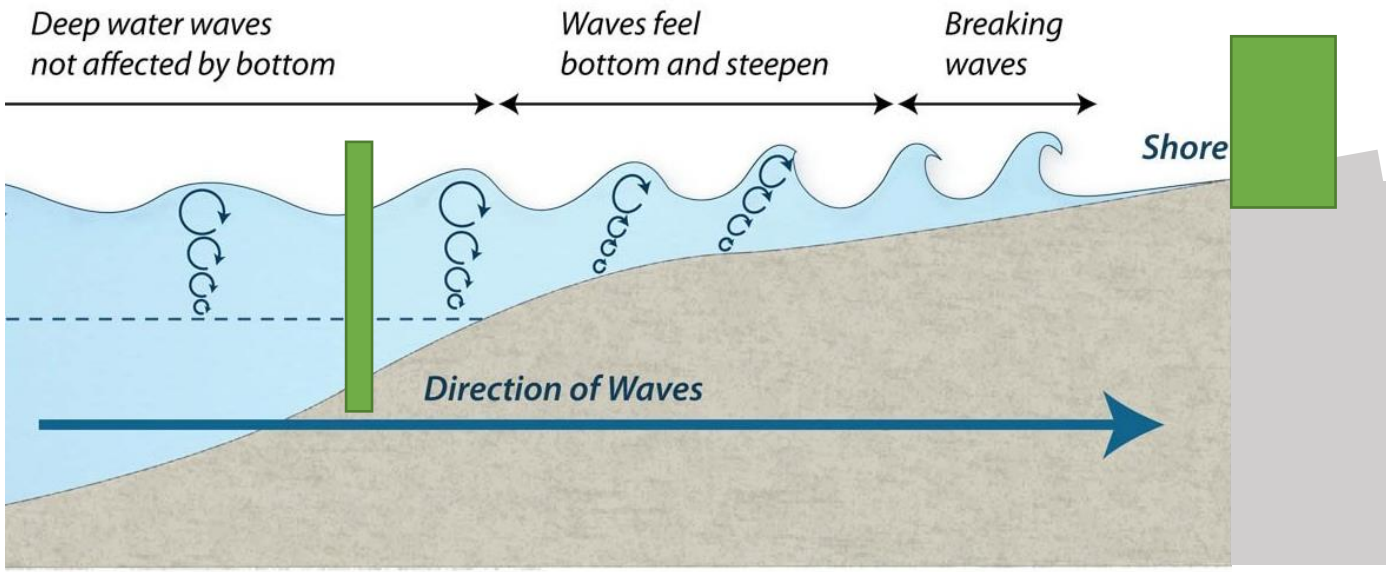
Shoaling



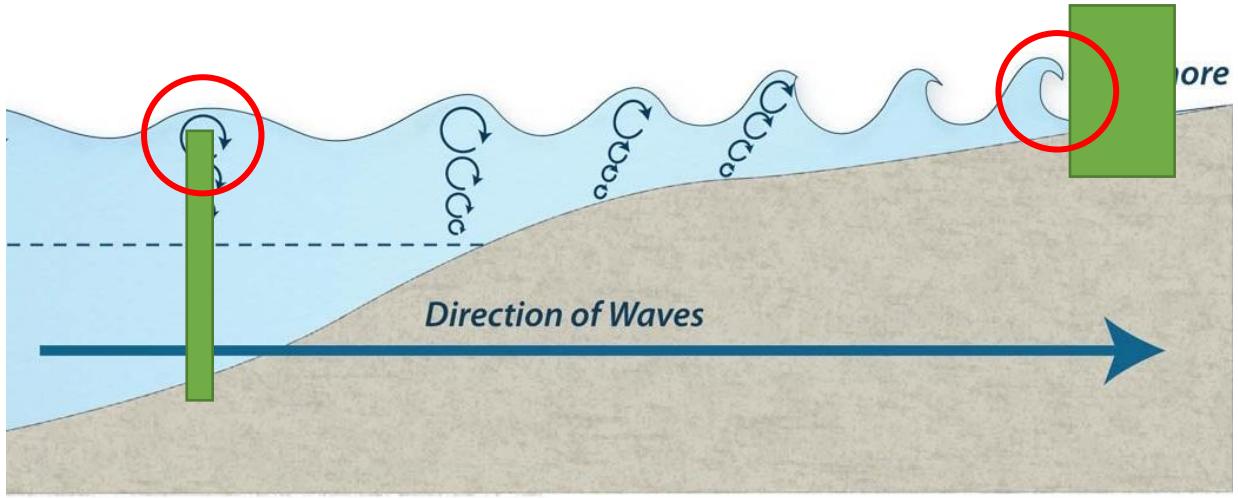




Breaking

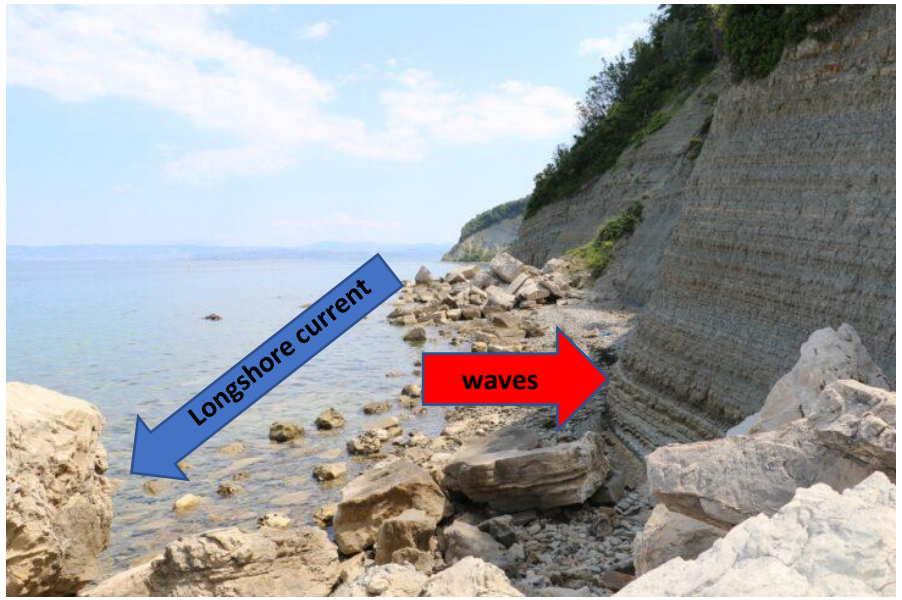


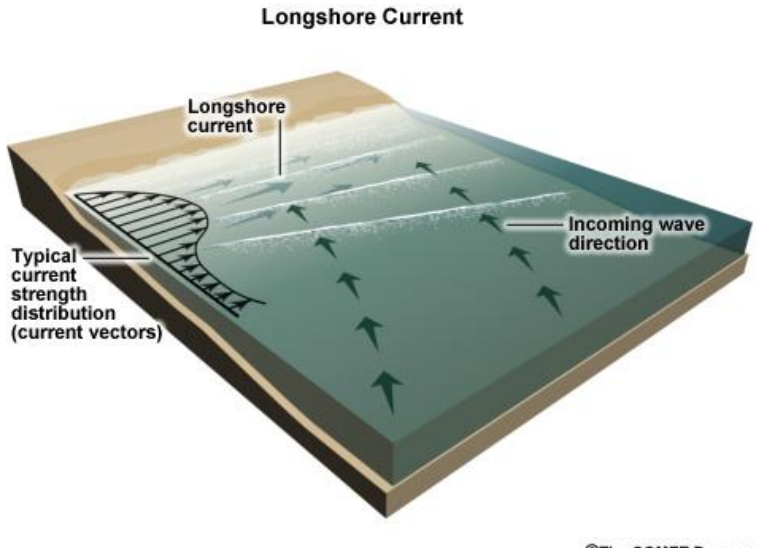
Built coast: overtopping, stability/strength

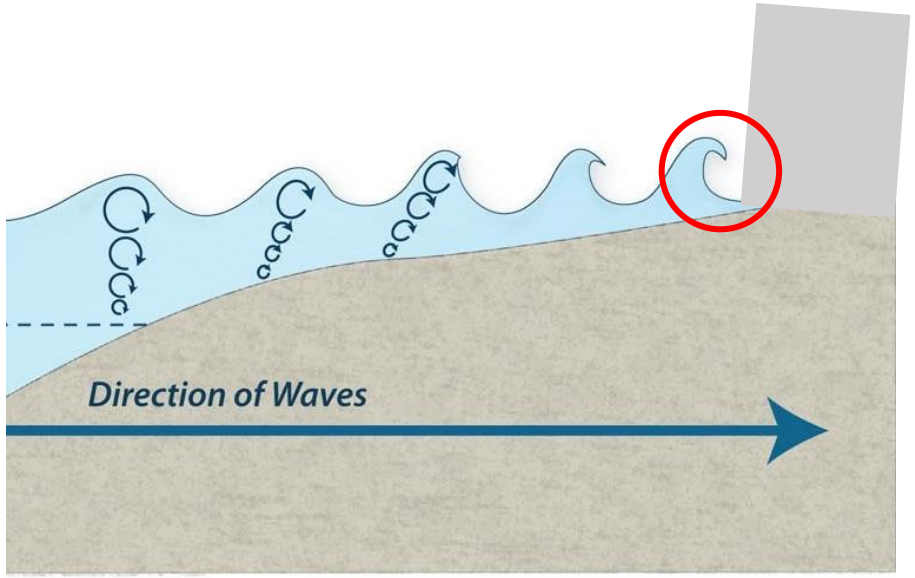


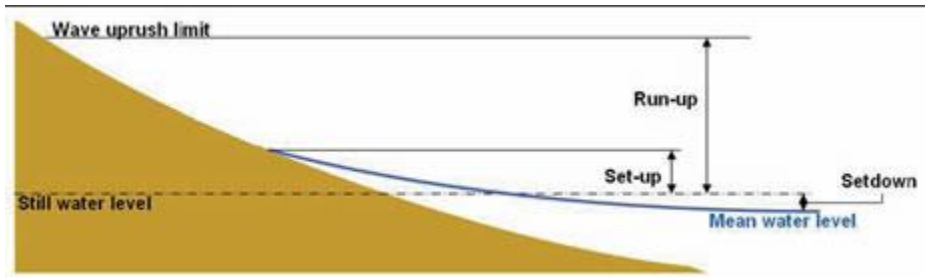
Natural coast – wave action and erosion

https://obalaplus.si/





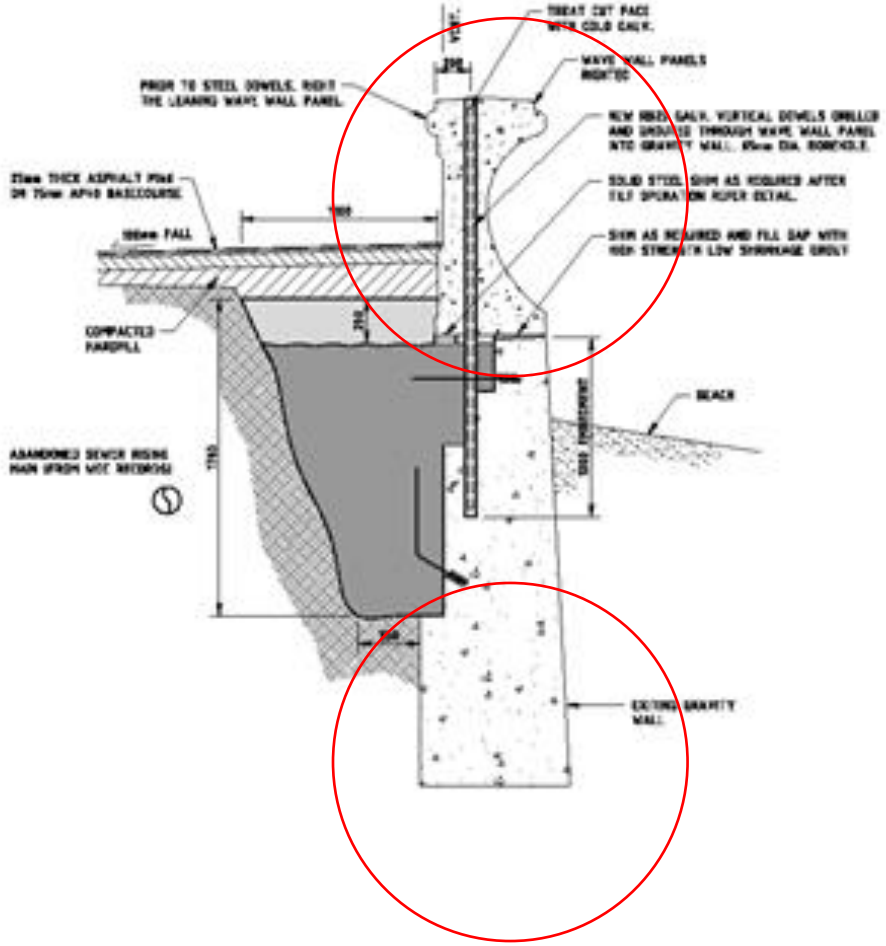




Consequences (built coast)

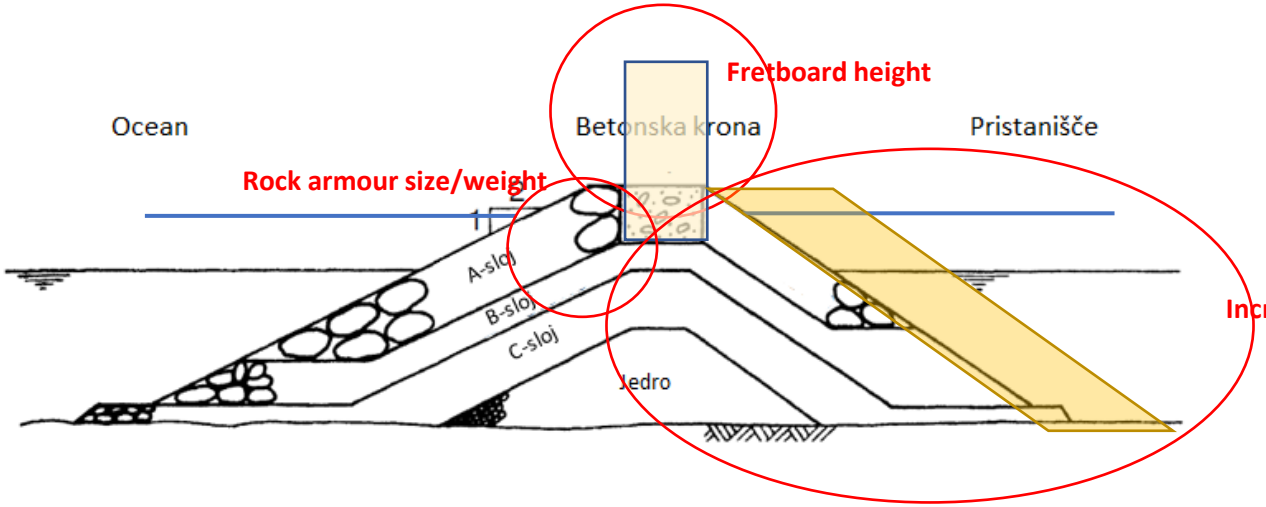
On-shore measures (seawalls)

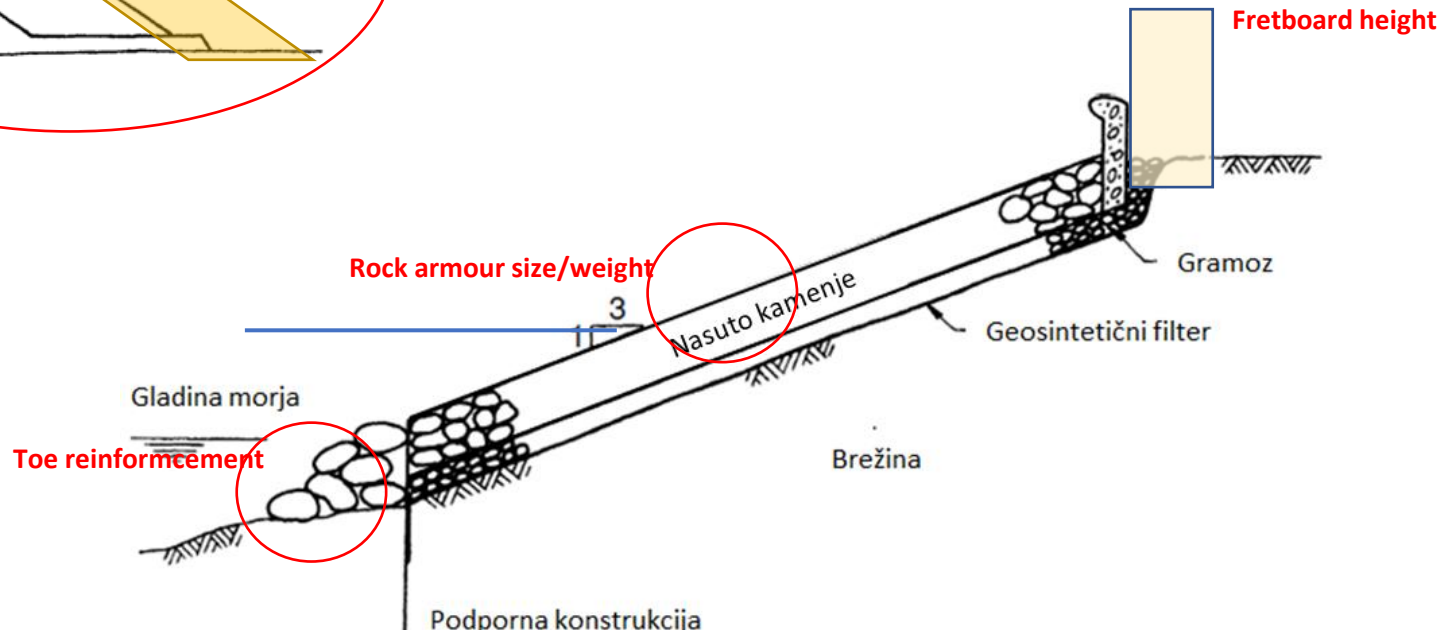
- **Reconsidering the loads** and redesigning: reinforcing, raising, rebuilding



On-shore measures (revetments, breakwaters)

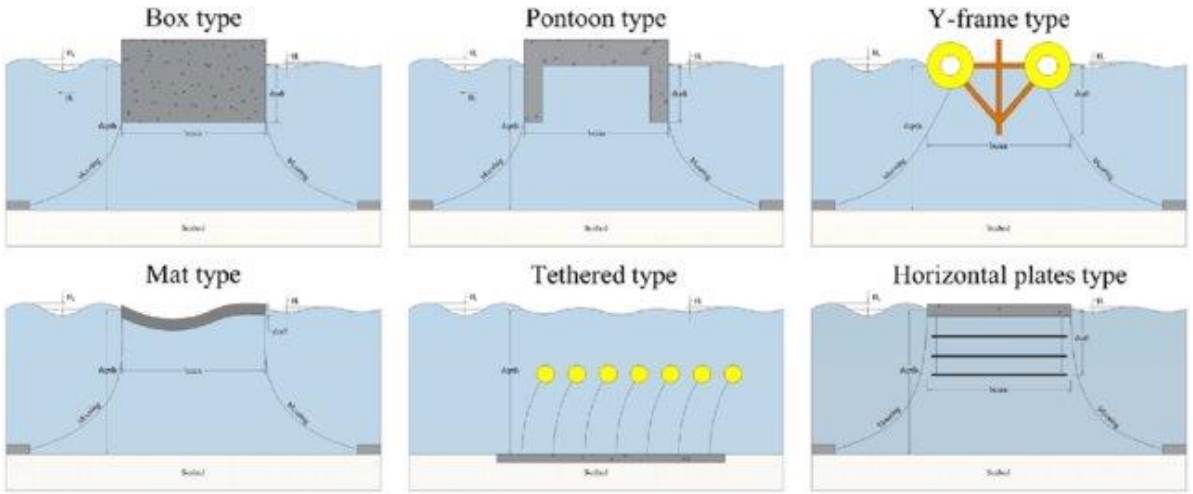
- **Reconsidering the loads** and redesigning: reinforcing, raising, rebuilding





Off-shore measures (built coast)

- Prevent the waves to break near/at the coastline



Floating breakwaters: Cebada-Relea et al., 2021

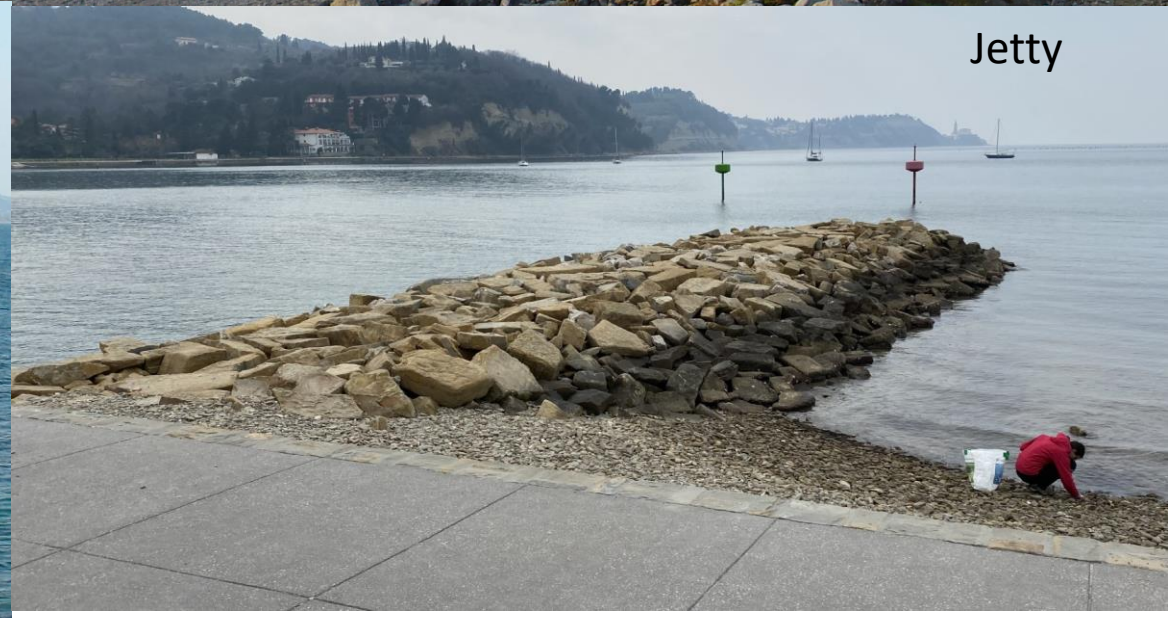
Submerged breakwater

Off-shore measures against erosion (& wave action)

Detached breakwaters

Groynes

Jetty



Analysis: problems → impacts →measures

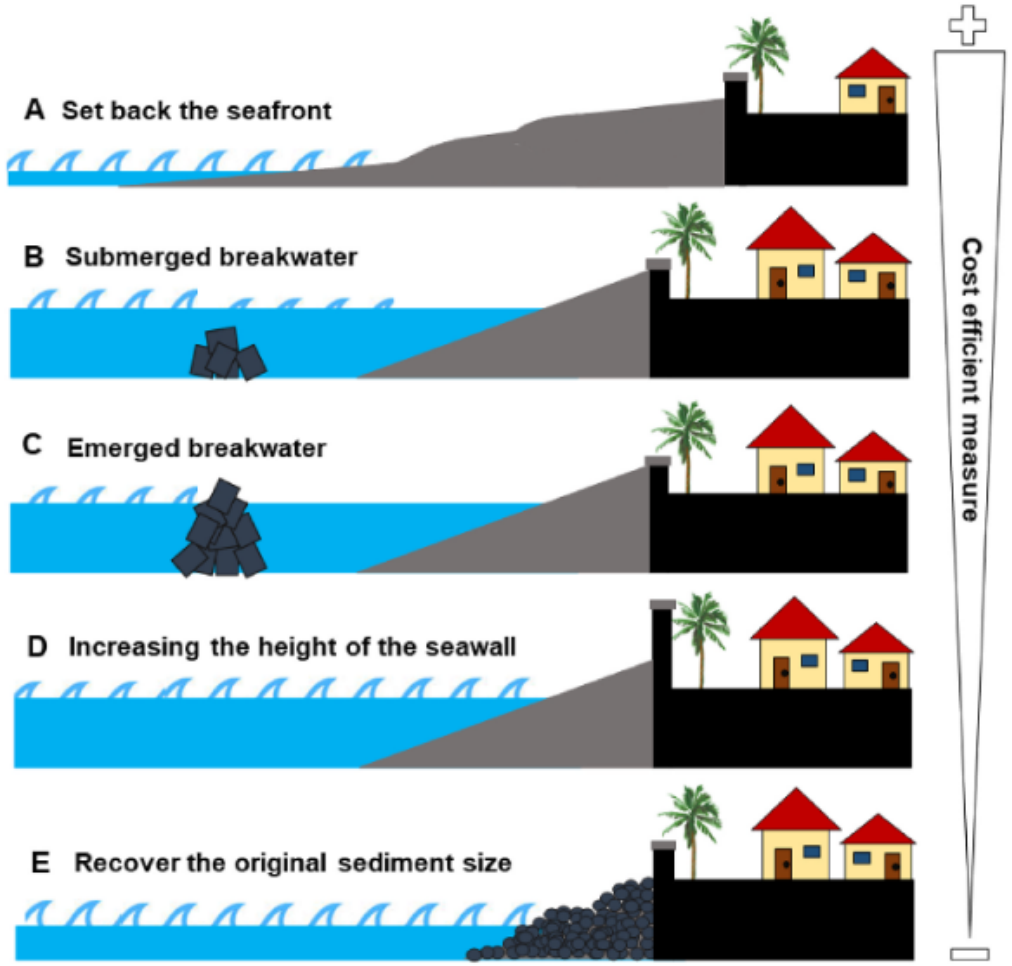


Fig. 13. Diagram of the management proposals for Tazacorte beach.

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Using multi-scale spatio-temporal shoreline analysis of an urban beach adjacent to a basin system on an oceanic island for its integrated planning

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[b] Geoturvol Research Group, Departamento de Geografía e Historia, Facultad de Humanidades, Universidad de La Laguna, Spain
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- Technical and cost – efficiency analysis
- A good basis for analysis of impacts of:
  - Raised seawall (spatial planning →„quality of life“??)
  - Breakwaters and sediment size (biology → impact on litoral zone??)

Conclusion:

- Mean sea-level (MSL) rise will induce **changes in wave action** at the coast
- At the increased MSL the **wave impact** on coastal structures and natural coast **can increase**
- Reinforcing, raising or redesigning and rebuilding should be based on **reconsidered wave loading**
- Resilience of coastal structures and natural coasts require **different approaches**
- Appropriate measures must be adopted **in consensus** between spatial planners, biologists and civil engineers.