

#SROCC

Implementing Adaptation to Sea level Rise

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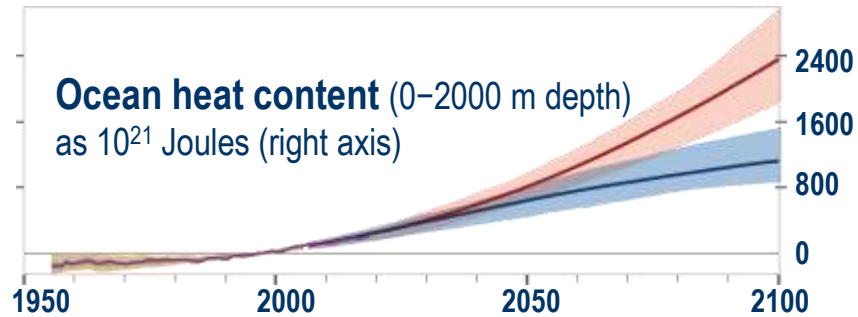
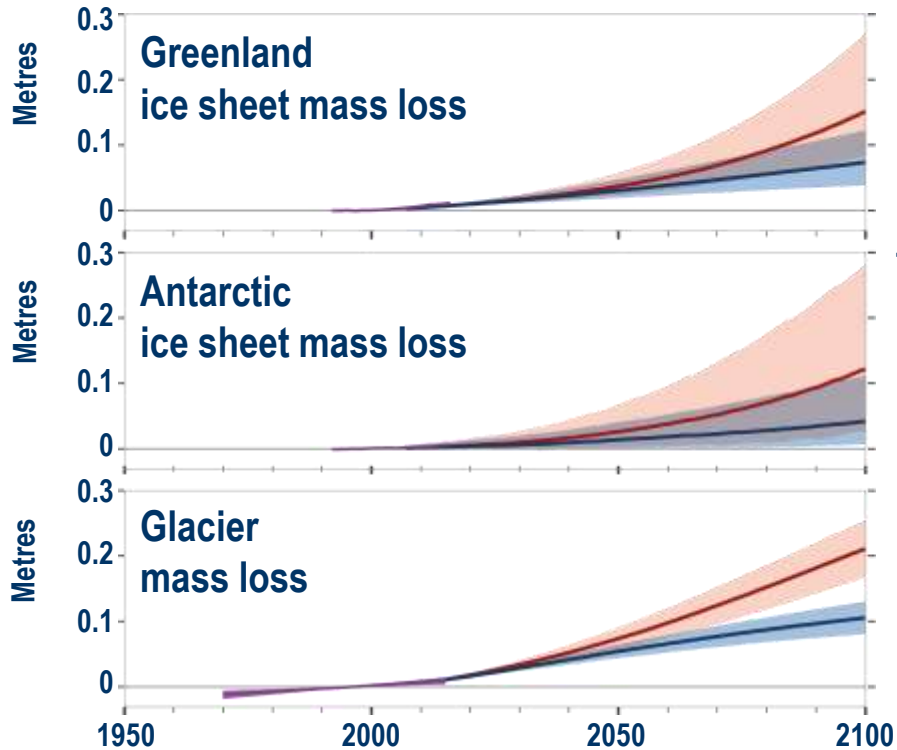


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INTERGOVERNMENTAL PANEL ON climate change

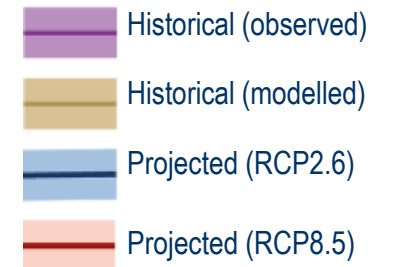




We have the choice between below 1 metre and up to several metres of sea level rise by 2300

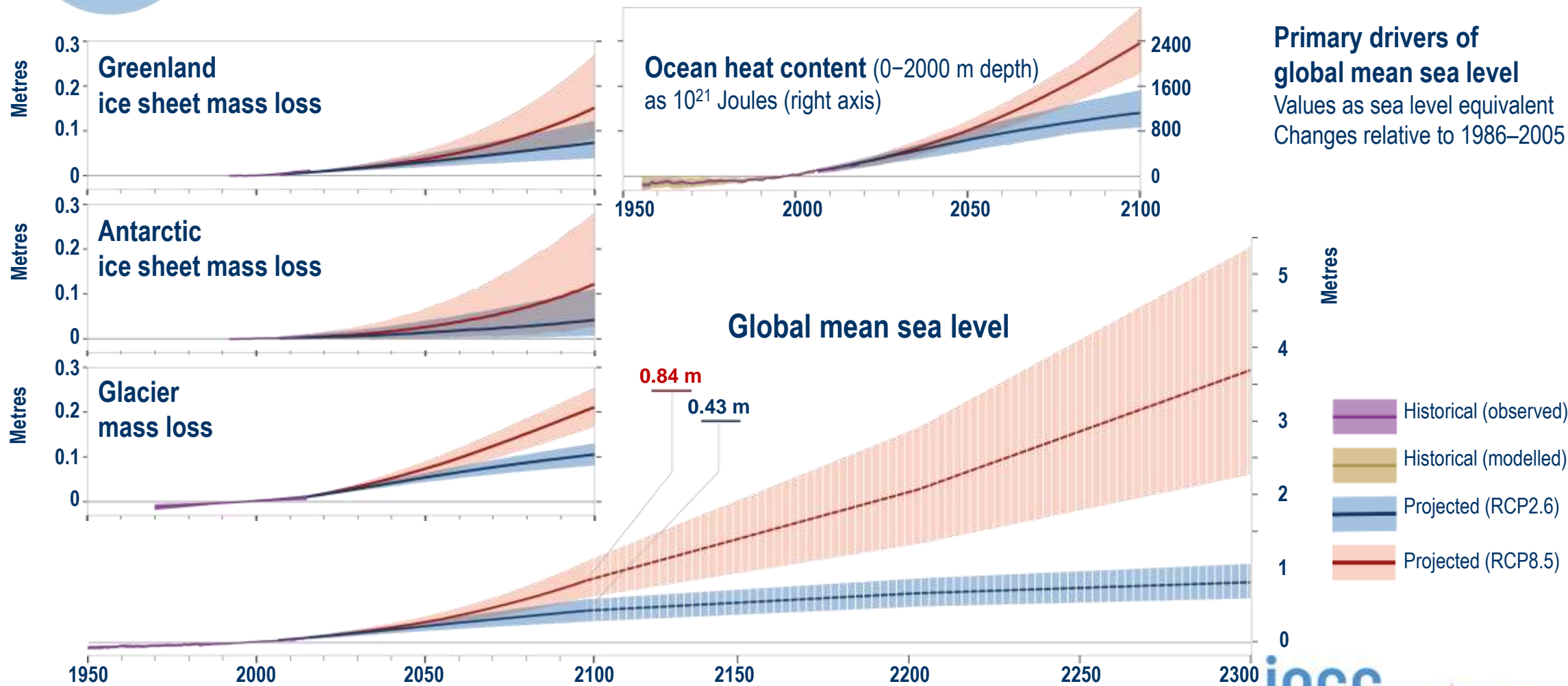


Primary drivers of global mean sea level
Values as sea level equivalent
Changes relative to 1986–2005





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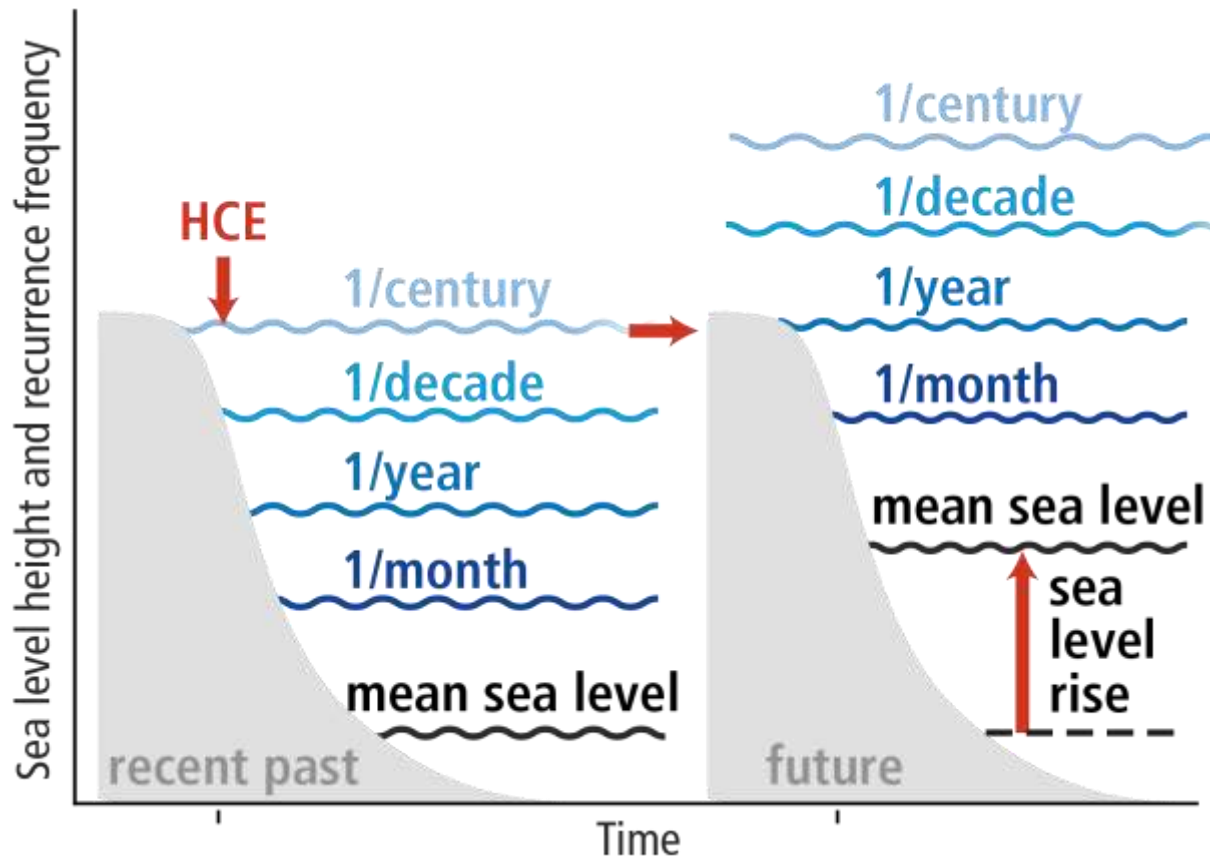


Uncertainty at the end of the century is mainly determined by the ice sheets, especially in Antarctica

- Acceleration of ice flow and retreat in Antarctica has the **potential to lead to sea-level rise of several metres** within a few centuries.
- Currently, there is **unclear** if the onset of an **irreversible ice sheet instability** has started in Antarctica
- Major uncertainty exist related to how ice sheets will react to warming beyond 2100



Local sea levels that historically occurred once per century (historical centennial events, HCEs) are projected to recur more frequently in the future

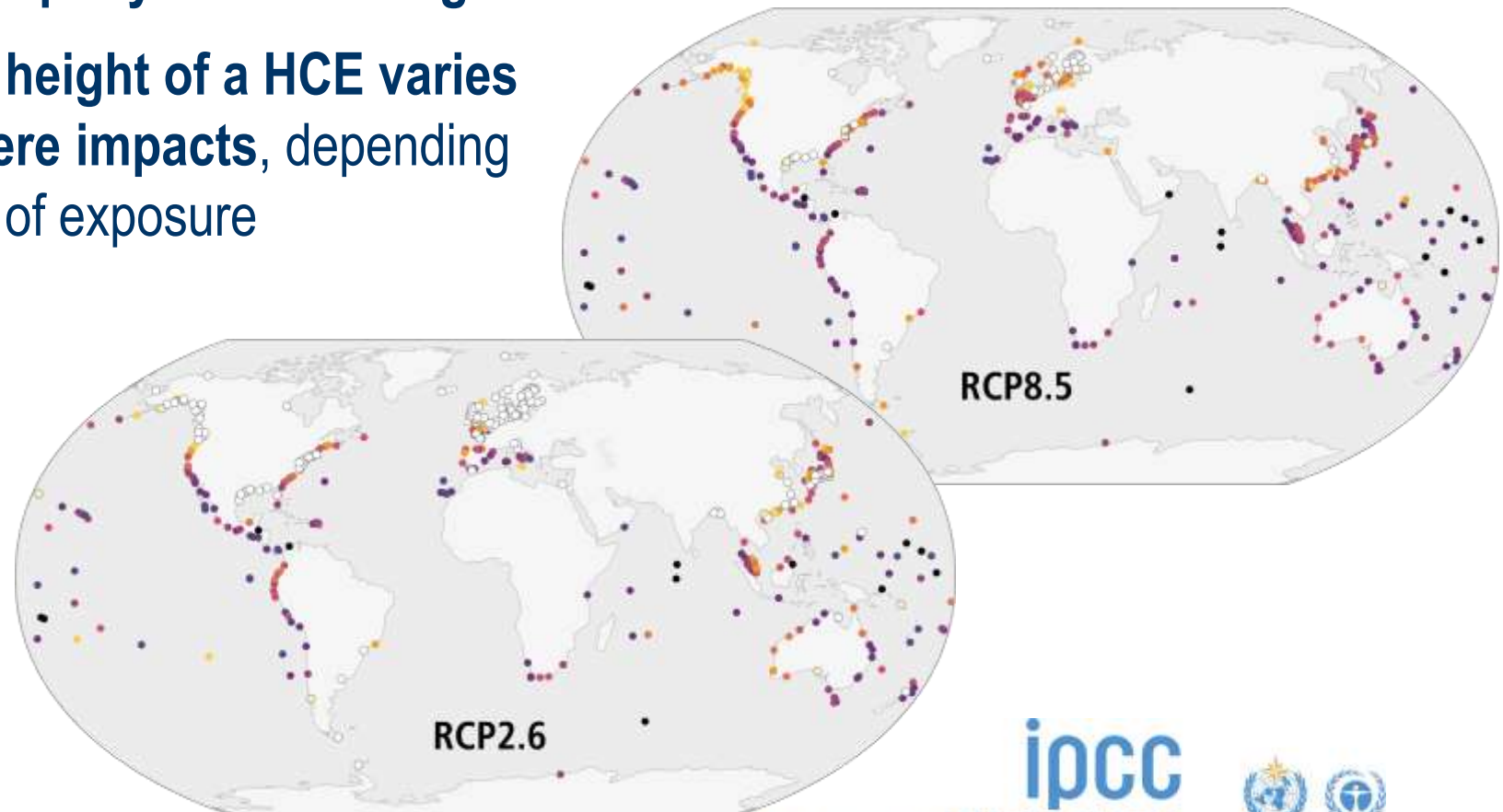
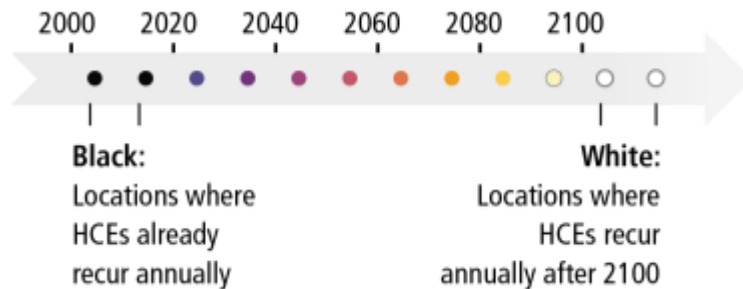


- Many low-lying coastal cities and small islands will be exposed to risks of flooding and land loss annually by 2050, especially without strong adaptation



The effect of regional sea level rise on extreme sea level events at coastal locations.

- Each dot indicates year when Historical Centennial extreme sea level Events (HCEs) are projected **to recur once per year on average**
- Depending on location **the height of a HCE varies widely** but can **cause severe impacts**, depending on frequency and the level of exposure



These ocean changes have major impact on marine life and all humans directly or indirectly depending on it.



Responses to Sea Level Rise

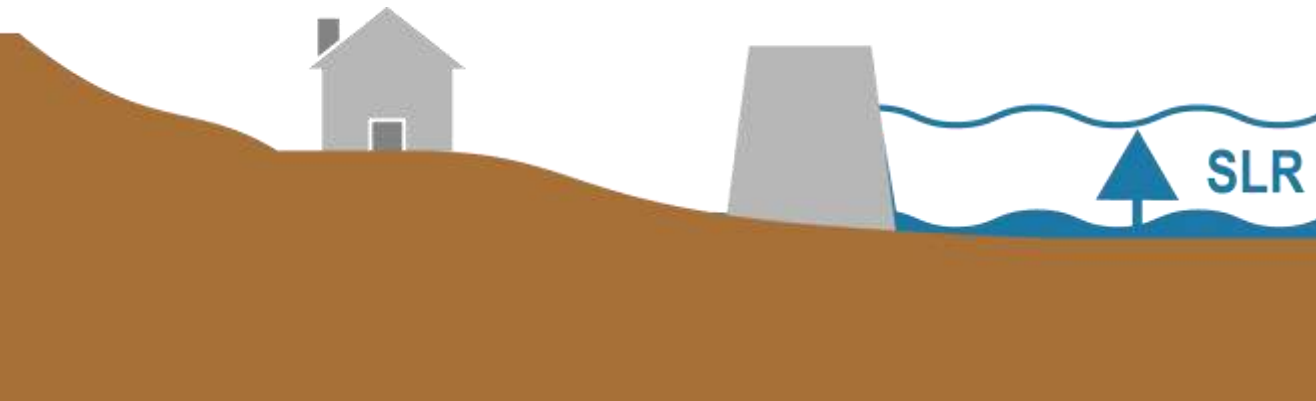
Various adaptation approaches are already being implemented:

- Hard protection
- Sediment-based protection
- Ecosystem-based adaptation
(corals, wetlands)
- Coastal advance
- Coastal accommodation
- Retreat



Hard Protection

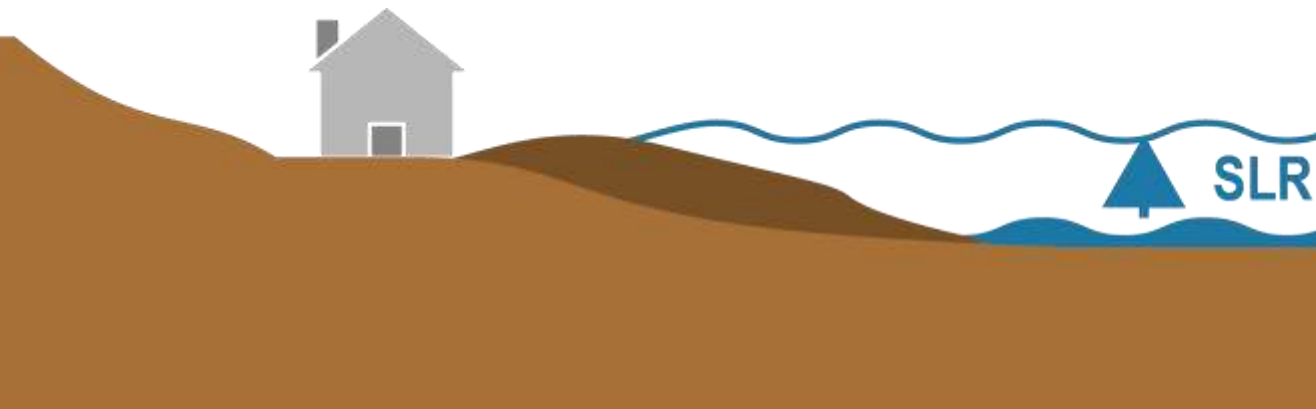
- **Effectiveness:** multiple metres of Sea level Rise
- **Advantages:** predictable levels of safety
- **Co-benefits:** multifunctional dikes (e.g. recreation, other land use)
- **Drawbacks:** destruction of habitat
- **Economic Efficiency:** high if the value of assets behind protection is high
- **Governance Challenges:** often unaffordable for poorer areas





Sediment-based protection

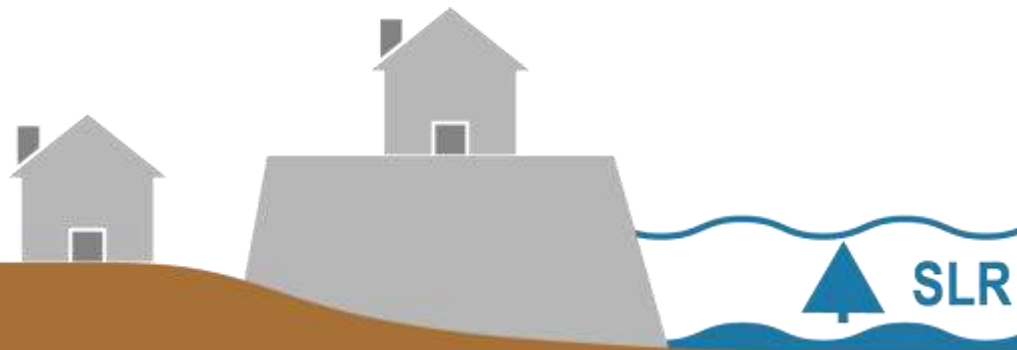
- **Effectiveness:** effective but depends on sediment availability
- **Advantages:** high flexibility
- **Co-benefits:** preservation of beaches for recreation/ tourism
- **Drawbacks:** destruction of habitat, where sediment is sourced
- **Economic efficiency:** high if tourism revenues are high
- **Governance challenges:** conflicts about the distribution of public budgets





Coastal Advance

- **Effectiveness:** multiple metres of sea level rise
- **Advantages:** predictable levels of safety
- **Co-benefits:** generates land and land sale revenues
- **Drawbacks:** groundwater salinisation, enhanced erosion and loss of coastal ecosystems and habitat
- **Economic Efficiency:** very high if land prices are high
- **Governance Challenges:** often unaffordable for poorer areas





Ecosystem-based Adaptation

(coral and wetland conservation or restoration)

- **Effectiveness:** effective up to 0.5–1 cm y⁻¹ sea level rise
- **Advantages:** opportunity for community involvement
- **Co-benefits:** habitat gain, biodiversity
- **Drawbacks:** corals: long-term effectiveness depends on ocean warming, acidification and emission scenarios; wetlands: safety levels less predictable, a lot of land required
- **Economic Efficiency:** limited evidence on benefit–cost ratios
- **Governance Challenges:** permits difficult to obtain, lack of finance, lack of enforcement of conservation policies





Coastal accommodation

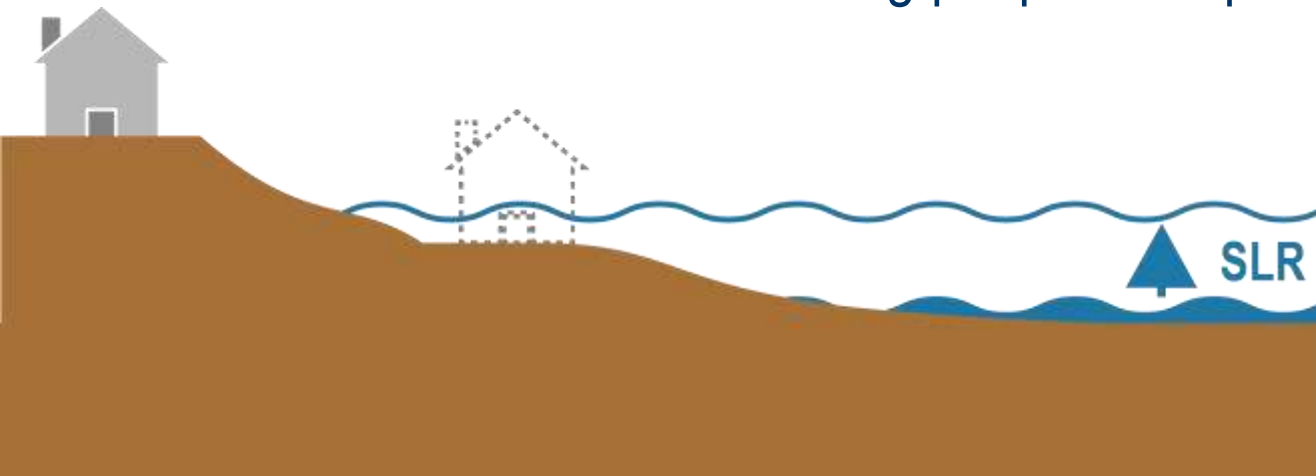
- **Effectiveness:** very effective for small sea level rise
- **Advantages:** mature technology
- **Co-benefits:** maintains landscape connectivity
- **Drawbacks:** does not prevent flooding/impacts
- **Economic efficiency:** very high for early warning systems and building-scale measures
- **Governance challenges:** Early warning systems require effective institutional arrangement





Retreat (planned relocation)

- **Effectiveness:** effective if alternative safe localities are available
- **Advantages:** sea level risks at origin can be eliminated
- **Co-benefits:** access to improved services
- **Drawbacks:** loss of social cohesion, cultural identity and well-being
- **Economic efficiency:** limited evidence
- **Governance challenges:** reconciling the divergent interests arising from relocating people from point of origin and destination



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