Coastal wetlands

Challenge: Sea level rise **Adaptation response:** Green infrastructure for shoreline protection

Description

Coastal wetlands include both freshwater and saltwater ecosystems that are situated in coastal watersheds where the water drains into the ocean. There are two main types of coastal wetlands, tidal (affected by ocean tides) and non-tidal marshes, swamps, mangroves and sea grass beds. Both grow directly in the intertidal zone. Coastal wetlands play an important role for climate change adaptation. They are effective carbon sequesters, while the vegetation and stable sediment and soil conditions of the wetlands decrease the velocity of waves, protecting coastlines from storms and flooding. They are also highly productive systems that support a diversity of species and positively affect water quality through purification and sedimentation processes. Coastal wetlands are often hotspots of biodiversity, providing a favourable environment for breeding, feeding and the existence of many species.

Land conversion and development, combined with other uses of coastal waters such as shrimp farming, have contributed to the rapid decline of coastal wetlands. Sustaining climate adaptation functions (coastal storm protection, mitigation effects of sea level rise, erosion) requires conservation or restoration of coastal wetlands. One of the most effective strategies is eliminating drivers of degradation, allowing for natural regeneration. Threats can be stopped by eliminating physical dangers (for example constructing a fence around the wetlands), implementing laws limiting land conversion, or enacting land conversion compensation schemes. Severely degraded coastal wetlands may require restoration efforts. Common interventions include replanting vegetation, sediment trapping and hydrological restoration.

Implementation

Assessment of the state of the wetland before commencing any intervention is important in order to document current key ecosystem functions and those at risk. This activity should be tied to identification of any potential and known drivers of land conversion and/or degradation of key ecosystem functions of the wetland. Intervention may include actions to eliminate or mitigate these threats, such as implementation of restrictive land use regulations, establishment of compensation schemes, establishment of protection zones, etc. In some cases, active restoration interventions may be necessary, for example native vegetation planting, unwanted vegetation removal, sediment trapping, and hydrology restoration. Long-term maintenance efforts include: ensuring activity limitations and regulations are followed, removing unwanted vegetation, renovating protective structures, and monitoring key ecosystem services and hydrological variables.

Environmental Benefits

- Provides shoreline storm and flooding protection, mitigating impacts of sea level rise.
Stabilizes the shore and reduces erosion risks.
- Provides habitat for a diverse range of plant and animal species (breeding and nurseries for fish, birds, shellfish, mammals).
- Releases organic matter to the ocean in some wetland types, such as mangroves, providing support for marine life.

Socioeconomic Benefits

- Provides shoreline and coastal community protection from the effects of storms and other natural hazards (e.g. tsunami impacts). Can potentially save costs due to avoided construction and maintenance of built infrastructure.
- Serves as an important source of food and resources for livelihoods (for example wood, fishing, tourism) for local communities.
- Enhances aesthetic and recreational value of coastal wetlands, and can provide income, for example from tourism.

Opportunities and Barriers

Opportunities:

- Coastal wetlands are relatively good at re-establishing on their own. Little hands-on management and restoration work is required when degradation drivers are eliminated
- Provide several climate change adaptation benefits for local communities, along with high economic and biodiversity value

Barriers:

- Coastlines often have high economic activity and investment, and there is high competition for land, for example land development for tourism and other economic activity
- Real costs of protection of solutions such as mangroves may be high as land development income is bypassed. Compensation fees paid to farmers or investors to minimize pollutants, or to attain land-rights permits, can be a solution
- Sources of climate change and associated sea level rise and warming that negatively affect wetland cannot be addressed or mitigated locally

Implementation considerations*

Technological maturity:	4-5
Initial investment:	2-5
Operational costs:	1-3
Implementation timeframe:	2-4

* This adaptation technology brief includes a general assessment of four dimensions relating to implementation of the technology. It represents an indicative assessment scale of 1-5 as follows:
Technological maturity: 1 - in early stages of research and development, to 5 – fully mature and widely used
Initial investment: 1 – very low cost, to 5 – very high cost investment needed to implement technology
Operational costs: 1 – very low/no cost, to 5 – very high costs of operation and maintenance
Implementation timeframe: 1 – very quick to implement and reach desired capacity, to 5 – significant time investments needed to establish and/or reach full capacity
This assessment is to be used as an indication only and is to be seen as relative to the other technologies included in this guide. More specific costs and timelines are to be identified as relevant for the specific technology and geography.

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