

Beach nourishment

Challenge: Sea level rise

Adaptation response: Built infrastructure for shoreline protection

Description

Beach nourishment is primarily used to address coastal erosion, but it can also result in flood reduction benefits. It is a soft engineering approach that involves addition of suitable quality sediment to a beach area that has a sediment deficit.

The addition rebuilds and maintains the beach at a width that helps provide storm protection. Beach nourishment benefits are tied to wave energy dissipation: when waves run up to a beach and break, they lose energy. Beach nourishment thereby turns an eroding, reflective beach into a wider, dissipative beach with increased wave energy attenuation. In addition, beach nourishment addresses the sediment deficit - the underlying cause of erosion.

Periodic re-nourishments, or 'top-ups', will be needed to maintain effectiveness. This will require regular reinvestment but can be viewed as a maintenance cost, such as those associated with hard engineered structures.

Implementation

Beach nourishment is mainly used on existing beaches at coastlines with exposed or moderately exposed wave conditions. It is usually done with dredging vessels, but trucks or conveyor belts can also be used. The nourishment material can either be placed to extend beach width or as an underwater deposit that will gradually move onshore under normal wave action. Underwater deposits can be beneficial for wave energy dissipation but are sometime not recognized by the public, as the sand is not directly visible. Natural longshore and offshore sediment transport will over time redistribute the sediment and continuous re-nourishment is therefore needed.

Environmental Benefits

- Maintains natural coastal dynamics and processes as well as natural coast appearance.
- Is highly flexible and can be adjusted continuously according to natural dynamics and management requirements, and can also be combined with hard protection measures.

Socioeconomic Benefits

- Maintains an attractive beach environment that is important for tourism and recreational activities.
- Is a cost-efficient technology if sediment-borrowing sites are nearby the nourishment site.

Opportunities and Barriers

Opportunities:

- Material from maintenance dredging of harbours and channels can be used at low or no cost if the sediment is not polluted
- Can be employed in conjunction with other management technologies and can help address the drawbacks of hard protection technologies

Barriers:

- Requires availability of suitable sediment sources nearby the nourishment site
- Requires highly specialized equipment and expertise
- The need for continuous replenishment can be extensive on coastlines with a large sediment deficit. Drawing sands or sediments from other sites may require environmental impact assessments to ensure that these activities are not damaging to surrounding ecosystems

Implementation considerations*

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

* 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.

Sources and further information

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