Fluvial sediment management

Challenge: Sea level rise

Adaptation response: Accommodation and management

Description

Fluvial sediment management is the holistic management of sediment supply from rivers to the coast, taking the full range of human activities at the river basin level into account.

Sediment transported by rivers makes up 95% of the sediment entering the ocean, with an annual discharge of 15-20 billion tonnes (Syvitski et al. 2003; Milliman and Mei-e 1995). Human activities can both increase and reduce this sediment supply. However, the general reduction of fluvial sediment supply, particularly due to sediment trapping by dams, is a major global challenge. Many of the world's rivers have experienced a dramatic decrease in sediment supply over the past few decades (Walling 2006). Consequently, downstream coastal areas often suffer major sediment deficits, with associated erosion, inundation and flooding.

Implementation

There is no standard approach for fluvial sediment management, but a clear understanding of factors affecting coastal sediment supply for a river basin is a key prerequisite. In some cases, the decline of larger coastal areas due to decreasing fluvial sediment supply and geological sediment compaction is much more significant than global sea level rise, hence fluvial sediment management awareness is of vital importance (Milliman and Mei-e 1995).

Coastal areas suffering from river management decisions that are difficult to reverse may need to focus on management measures such as hard-engineering structures and beach nourishment. However, fluvial sediment management should be considered in all new management decisions made at the river basin level to get a holistic view of the entire river basin and downstream coastline. Construction of modern dams with sluicing designs that improve sediment flow through should also be encouraged.

Environmental Benefits

- Maintains ground elevations in many areas that feature young and weak sediments. Continued sediment supply maintains coastal elevation.
- Provides a continuous supply of nutrient-rich sediments, which is critical for maintaining fertile lands for agricultural purposes, especially in delta areas.

Socioeconomic Benefits

- Encompasses a wide range of benefits, most importantly minimizing coastal erosion, land subsidence and flooding.
- Connects to a range of other activities such as upstream river flooding control, irrigation and energy production.

Opportunities and Barriers

<u>Opportunities:</u>

- The need for holistic sediment management requires improving understanding of sediment flows at the river basin level and enhancing data collection systems
- Addressing sediment dam entrapment makes it possible to increase dam longevity. If sediment flow through measures can be incorporated, it benefits both dam developers and coastal communities
- Some locations have established river basin management institutions, providing opportunities for collaboration with coastal managers.

Barriers:

- Requires balancing the wide range of interests involved in river basin management
- As river damming can provide great societal benefits through hydropower production, agricultural irrigation and flood and drought control, prioritizing upstream versus downstream interests can become political
- Requires highly specialized expertise and collaboration between a range of institutions, and sometimes countries, at the river basin level.

Implementation considerations*

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

* 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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