



Koehoal Mud Motor

The smart use of dredged sediment for the growth of salt marshes

The active encouragement of new salt marsh growth is good for coastal defences and biodiversity, and it is also an example of ‘Building with Nature’. In September 2016, with financing from the Wadden Fund, EcoShape launched a pilot project with the partners below. Dredged material from the harbour of Harlingen was spread as close as possible to Koehoal in a tidal channel, after which the natural currents transported the material to mudflats and salt marshes.

An extensive monitoring programme showed how physical and biological processes affect the growth of salt marshes. Waves and currents had a stronger hydrodynamic effect on sludge erosion than anticipated. The main limitation on the natural colonisation by vegetation of the transitional zone between salt marshes and mudflats proved to be the availability of viable marsh samphire seeds. We can use that knowledge to advise others about using Mud Motors in muddy tidal areas worldwide.

Living Lab for Mud

The Mud Motor is part of the Living Lab for MUD (Multifunctional Use of Dredged sediment). EcoShape and its partners are carrying out five pilot projects to develop knowledge about the sustainable use of sediment. Sediment is an essential material for global sustainable development and unused sediment dredged from lakes, coasts and rivers can be used to strengthen dikes, reclaim land or create natural islands. That generates social benefits in terms of flood risk management, navigability, nature development, water quality and the local economy, and in the form of building material for land reclamation and dike construction. Combining the use of sediment with natural processes like currents and vegetation allows us to build with nature.

Co-financiers



EcoShape partners in this project



For more information:
www.livinglabformud.org or www.ecoshape.org



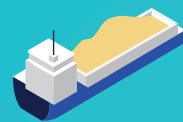
Koehoal Mud Motor



From dredged material to nature development

The Mud Motor is an example of Building with Nature that can be used in ports worldwide to create synergy between port maintenance and nature development.

The dredged sludge is usually thought to be useless and it is spread in the Wadden Sea.



1. Dredging work in Harlingen

Sediment settles in harbours because harbours are sheltered from currents and waves. To keep the port of Harlingen open to shipping, 1,3 million cubic metres has to be dredged annually.

2. Sediment transport to salt marsh

In the Mud Motor project, the dredged material from the port of Harlingen is spread in a tidal channel in front of the salt marshes near Koehoal. If that material is deposited at the right time and in the right place, it moves onto and in front of the salt marshes.

3. Tidal flow and wind

The tidal flow and the wind then transport the material naturally to the salt marsh and the mudflats in front of it. Adequate sediment flows allow salt marshes to grow with sea level rise as long as the sediment can be retained.

4. Salt marsh growth

Sediment arrives at the salt marsh. The mudflats and salt marshes are flooded at high tide. The sediment can then settle to the bed. The salt marsh grows. This process is repeated again and again. In natural conditions, salt marshes are formed by sediment and the vegetation in place slows down the flow of water, allowing sediment to settle.

Benefits of the Mud Motor:



Biodiversity / Nature development

Salt marshes are dynamic ecosystems in the transitional zones between land and sea with high levels of biodiversity. Unique plants live here.



Flood defences

In natural conditions, salt marshes are formed by sediment and the vegetation in place slows down the flow of water, reducing the burden on the dike behind the salt marsh.



Navigability

A mud motor reduces the flow of sediment back into the port, reducing the need for dredging.



Food

Salt marshes are important breeding and foraging grounds for birds, as well as breeding grounds for fish.



Water quality

The salt marsh vegetation in place filters the water and retains sediment, improving the water quality.



CO₂ capture

Salt marshes can capture large amounts of carbon dioxide.

Extensive measurements have taught us a lot about the effect of wind, tide and waves on the transport and storage of sediment and the spread of the vegetation on the salt marsh. The Mud Motor successfully spread sediment to the salt marsh. However, we found only limited growth of the salt marsh. This was possibly due in part to the relatively dynamic conditions in the area and the lack of sufficient seeds. This new knowledge will help us to export the concept of a Mud Motor.

Requirements for the successful application of a Mud Motor are:

1

Inadequate sediment supply to the mudflat and salt marsh system.

2

The sediment must be retained in the long term.

3

The system should not be too dynamic.

An understanding of how the system works is therefore an essential precondition for the introduction of a Mud Motor.