



Project part-financed by the European Union (European Regional Development Fund)



'Sediment-Trap near Wedel'

Measure analysis 05
in the framework of the Interreg IVB project TIDE

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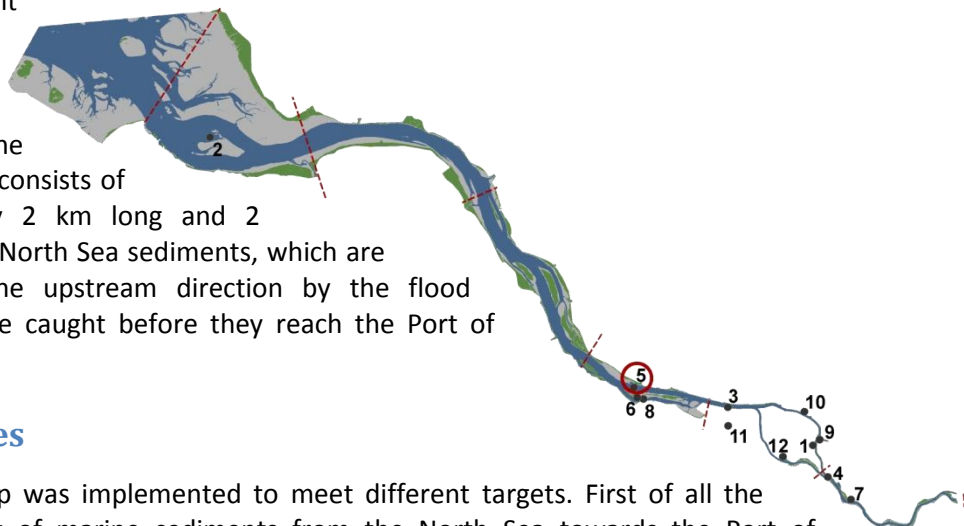


Part 1: Measure description

measure category	hydrology, morphology
estuary	Elbe
salinity zone	freshwater
pressure	gross change in morphology and hydrographic regime
status	Implemented in 2008
river km	640
country/location	Germany, near Wedel
responsible authority	Hamburg Port Authority

1.1 Introduction

The “Sediment Trap near Wedel”, built in 2008 downstream of the City of Hamburg, consists of an approximately 2 km long and 2 meters deep sag. North Sea sediments, which are transported in the upstream direction by the flood current, should be caught before they reach the Port of Hamburg.



1.2 Objectives

The sediment trap was implemented to meet different targets. First of all the residual transport of marine sediments from the North Sea towards the Port of Hamburg should be reduced in order to achieve a reduction of dredging amounts and costs in the Hamburg port area itself. Secondly the less contaminated North Sea sediments are trapped before they reach the port area and mix-up with higher polluted sediments in the harbor. Therefore the less contaminated sediments do not have to be treated on land and can be relocated further downstream where the ebb current dominates the flow regime. Thirdly the limited clearing of only the sediment trap also leads to economically optimized maintenance dredging activities.

1.3 Background and side conditions

The Hamburg Port Authority (HPA) and the Federal Administration of Waterways and Navigation (WSV) installed the sediment trap in spring 2008. This sediment trap in Wedel was realized as one of the first steps of a recently designed River Engineering and Sediment Management Concept (RESMC) for the tidal influenced Elbe estuary.

1.4 Measure

The trap is in average about 2km long and 2m deeper than the actual water depth and spans the whole of the 300m width of the navigation channel (Fig. 1). The geometry of the trap is aligned to zones of maximum sedimentation in the past. Therefore, it has a triangular geometry on the western side. By the end of 2010 a total amount of about 4 mill. m³ of fine sediments was removed from the trap and relocated in four maintenance campaigns to an area about 50 km downstream at Elbe-km 689.

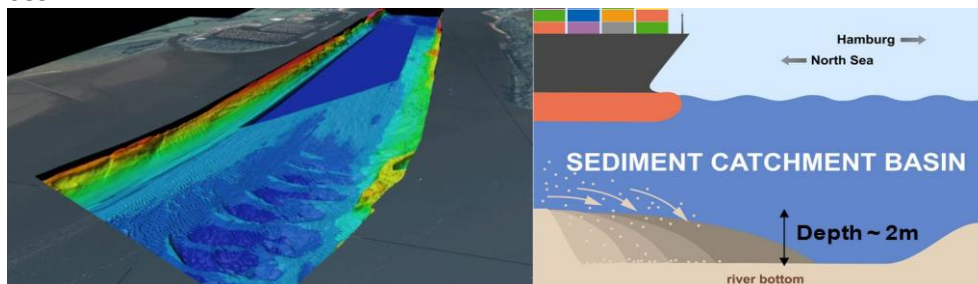


Figure 1 : Position and design of the sediment trap

1.5 Expected effect

HPA and WSV consider the construction and the operation of this trap as maintenance work in a broader sense, aiming at reducing dredging costs. They are striving to further improvement of the overall sediment management and dredging activities by implementing this sediment trap.

The operation of the sediment trap enables flexible and effective maintenance work of the fairway. First of all, sedimentation is located within one defined area from which the sediments can be dredged more efficiently through the use of optimized equipment, e.g. larger hopper dredgers. Furthermore, after a longer period of sediment consolidation the hopper dredgers could achieve higher densities (i.e. dredging more sediments and less water).

Part 2: Execution of the main effectiveness criteria

2.1 Effectiveness according to development targets of measure

Definition of development targets:

- The main goal is to reduce the sediment transport towards the Port of Hamburg. Furthermore less contaminated sediments shall be trapped and easily relocated before they mix up with more contaminated sediments originating from the harbor.

Achievement of development targets

- The monitoring is still ongoing. The expected positive effect on the dredging amounts within the harbor could not be confirmed so far. A benefit for the dredging and relocation procedure was achieved (see 2.3).

2.2 Impact on ecosystem services

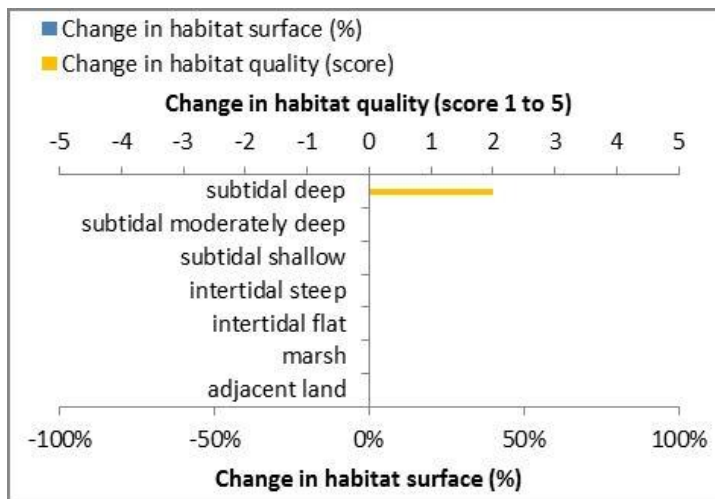


Figure 2: Ecosystem services analysis for Sediment-trap near Wedel: Indication of habitat surface and quality change, i.e. situation before versus after measure implementation.

- From the ES assessment it is concluded that this measure generates overall a slightly positive expected impact for several ES, mainly for:
 - o “biodiversity”
 - o Cultural services
 - o Some regulating services: Erosion and sedimentation regulation (by water bodies); Water quality regulation: transport of pollutants and excess nutrients; Water quantity regulation: transportation
 - o Some provisioning services: Water for industrial use; Water for navigation
- The expected impact for the two development targets (“Water quality regulation: transport of pollutants and excess nutrients” and “Water for navigation”) is slightly positive.
- The expected impact for the different beneficiary groups is limited, with a slightly positive expected impact for indirect and future use and for local and region use.



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Table 1: Ecosystem services analysis for Spadenlander Busch/Kreetsand (1) expected impact on ES supply in the measure site and (2) expected impact on different beneficiaries as a consequence of the measure

Sediment-trap near Wedel		
Cat.	Ecosystem Service	Score
S	"Biodiversity"	1
R1	Erosion and sedimentation regulation by water bodies	1
R2	Water quality regulation: reduction of excess loads coming from the catchment	0
R3	Water quality regulation: transport of pollutants and excess nutrients	1
R4	Water quantity regulation: drainage of river water	0
R5	Erosion and sedimentation regulation by biological mediation	0
R6	Water quantity regulation: transportation	0
R7	Water quantity regulation: landscape maintenance	0
R8	Climate regulation: Carbon sequestration and burial	0
R9	Water quantity regulation: dissipation of tidal and river energy	0
R10	Regulation extreme events or disturbance: Wave reduction	0
R11	Regulation extreme events or disturbance: Water current reduction	0
R12	Regulation extreme events or disturbance: Flood water storage	0
P1	Water for industrial use	1
P2	Water for navigation	1
P3	Food: Animals	0
C1	Aesthetic information	1
C2	Inspiration for culture, art and design	1
C3	Information for cognitive development	1
C4	Opportunities for recreation & tourism	1

Beneficiaries:	
Direct users	0
Indirect users	1
Future users	1
Local users	1
Regional users	1
Global users	0

Legend: expected impact*	
3	very positive
2	positive
1	slightly positive
0	neutral
-1	slightly negative
-2	negative
-3	very negative

X Targeted ES

*: Indicative screening based on ES-supply surveys and estimated impact of measures on habitat quality and quantity. Quantitative socio-economic conclusions require local supply and demand data to complement this assessment.

2.3 Degree of synergistic effects and conflicts according the uses

One synergistic effect is that the dredging activities can be planned more easily by the responsible authorities of the dredging section Wedel. Dredging activities in the spawning season of the *Twaite shad* can be avoided.

Part 3: Additional evaluation criteria in view of EU environmental law

3.1 Degree of synergistic effects and conflicts according WFD aims

Table 2: Effect of the measure concerning the main pressures in the estuarine freshwater zone

Indicator Group	Code	Main pressures freshwater zone Elbe	Effect?					Description: Aim of the Sediment trap near Wedel
			--	-	0	+	++	
S.I.	-	Habitat loss and degradation during the last about 100 years: Subtidal			0			
S.I.	1.1	Habitat loss and degradation during the last about 100 years: Intertidal			0			
S.I.	1.4/ 1.5	Gross change in morphology/hydrographic regime during the last about 100 years			0			
S.I.	3.1/3.2	Decrease of water and sediment chemical quality			0			
D.I.	2.3	Discharge of nutrients or harmful substances			0			
D.I.	1.3	Land claim during the last about 100 years			0			
D.I.	2.6	Capital dredging			0			

S.I. = state indicator; D.I. = driver indicator

The aim and the effects of the measure ‘Sediment trap near Wedel’ have neither positive nor negative effect on the main pressures of the freshwater zone of the Elbe estuary.

3.2 Degree of synergistic effects and conflicts according NATURA 2000 aims

Table 3: Effect of the measure concerning the main conservation objectives in the operational area 3

Operational area (zone)	Natura 2000 conservation objectives	Effect of Measure on conservation objectives			Description
		Positive	No effect	Negative	
3		Positive	No effect	Negative	
3	Improvement of the hydro morphological habitat conditions of the habitat type Estuaries, if possible conservation and improvement of estuary typical dynamics	+			
3	Conservation and development of tidal reeds, hydrophilous tall herb fringe communities (6430) and floodplain/alluvial forest (*91E0) esp. on islands.		+		
3	Conservation, reestablishment and development of meadows with vegetation typical for the Elbe region, like lowland hay meadows (6510) with respect to their avifaunistical function.		+		
3	Conservation and partly reestablishment of the primarily 'Elbe Water Dropwort' (<i>Oenanthe conioides</i>) populations with typical dynamics, esp. on the island of Neßsand and Hanskalbsand, as well as Hahnöfersand, development of additional habitats for the improvement of the habitat network.		+		
3	Conservation and reestablishment of the outstanding relevance of the functional zone for the reproduction of the twaite shad.		?	?	
3	Conservation, partly reestablishment and development of the brooding function esp. for the species on extensive used meadows, large-scale reeds and grassland-ditch complexes of the marshes and the associated habitats.		+		
3	Conservation and development of the resting function esp. for nordic goose and swans, as well as for waders (Limicoles) on the widespread, low disturbed grasslands.		+		
3	Conservation of the resting ducks, gulls and sea swallows		+		

Part 4: Crux of the matter

The accompanying monitoring showed that the predicted effects occurred only to some extent (see above). Instead other favorable effects appeared which were previously not mentioned as development targets (see above).

The scientific supervision of this project by a monitoring program turned out to be necessary in order to transfer the project's results to other areas where the building of additional sediment traps might be possible.



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