



Adjuvans bvba
Milieuadvies en
Waterbouw

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General Introduction to Dredging
and Sediment Logistics

1. Ports : challenges through history



History

- ancient times
- medieval times
- industrialisation 1830-1930's
- known history: WWarII, cold war, globalisation
- 1990-present awareness

Nothing new ?

All ports have similar
History ->
Same problems !



Conflicts:

- Living in the docklands vs portuary function
- Industrialisation vs pollution control and related increased cost of handling dredged material
- Increasing volumes, bigger vessels, etc... vs connecting transport & congestion – mobility
- Fluvial vs road transportation of goods in major cities
- Port extension vs Port protection against effects of climate change



Transboundary effects:

pollution imported by and from the neighbours:

- Hamburg vs former Eastern, -
- Netherlands vs Maas and River Rhine .



Today : Climate change

- CO₂-reduction
- Mobility
- energy management & reconversion systems
- Threats from nature:
increasing sedimentation, wind & storms, ...



2. Dredging : blessing or burden?



Classically seen as a blessing : recycling

Recently more a burden due to pollution issue

Technical burdens:

Composition : Sediment – sand – gravel

Chemical compounds

- mineral oils
- heavy metals
- PAH
- PCB
- Asbestos



3. Today's challenges?



More and better analytical methodology -> more compounds

PFAS-GenX-PFOS

Tri-butyl-Tin

Legislation : local – federal – state – EU - OSPAR

Climate change: CO₂-reduction

Logistic requirements: more stringent legislation on engines,
alternative fuels



4. Technical solutions available at large scale experience



Decision making framework

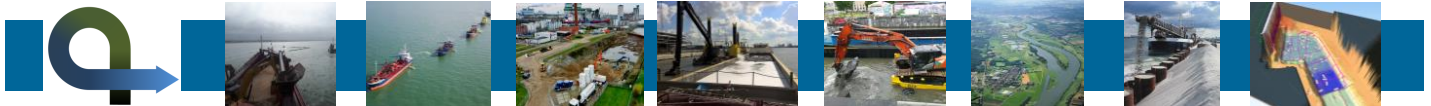
- Small volumes @ high level of contamination vs High quantities @ moderate or low level of contamination.
- On-site treatment facility vs treatment @long haul or abroad
- Reuse in infrastructure projects @port or neighbourhood vs abroad
- Legislative framework : local constraints vs Eu member state
- Biological - FC – Thermal treatment – Isolation & Stabilisation, dewatering & reuse ...



5. Logistic challenge



- Minimising transport effort
- Maximising reuse at short distance,
collaboration between ports
- Transfrontier shipment of waste (EG dir 1013/2006)
 - Belgium <-> Netherlands
 - Denmark <-> Belgium
 - France -> Netherlands
 - Germany -> Norway
 -
- New technology: eg Watertruck⁺ (unmanned vessel for inland water transport)



6. Tools to enhance decision making process



Risk assessment & treatment in relation to final destination
(e.g. potable water treatment vs waterconsumption)

- Focus on local treatment and reuse: nearby principle
- Building with sediments in ports, enhancing flood protection programs, breakwaters & land reclamation projects,...
- Soft soil & sediment stabilisation, immobilisation, ...
- Collaboration between ports to enhance knowledge to be exchanged, to obtain similar tools to tackle challenges
- Change of mind: Waste = raw material if properly managed.

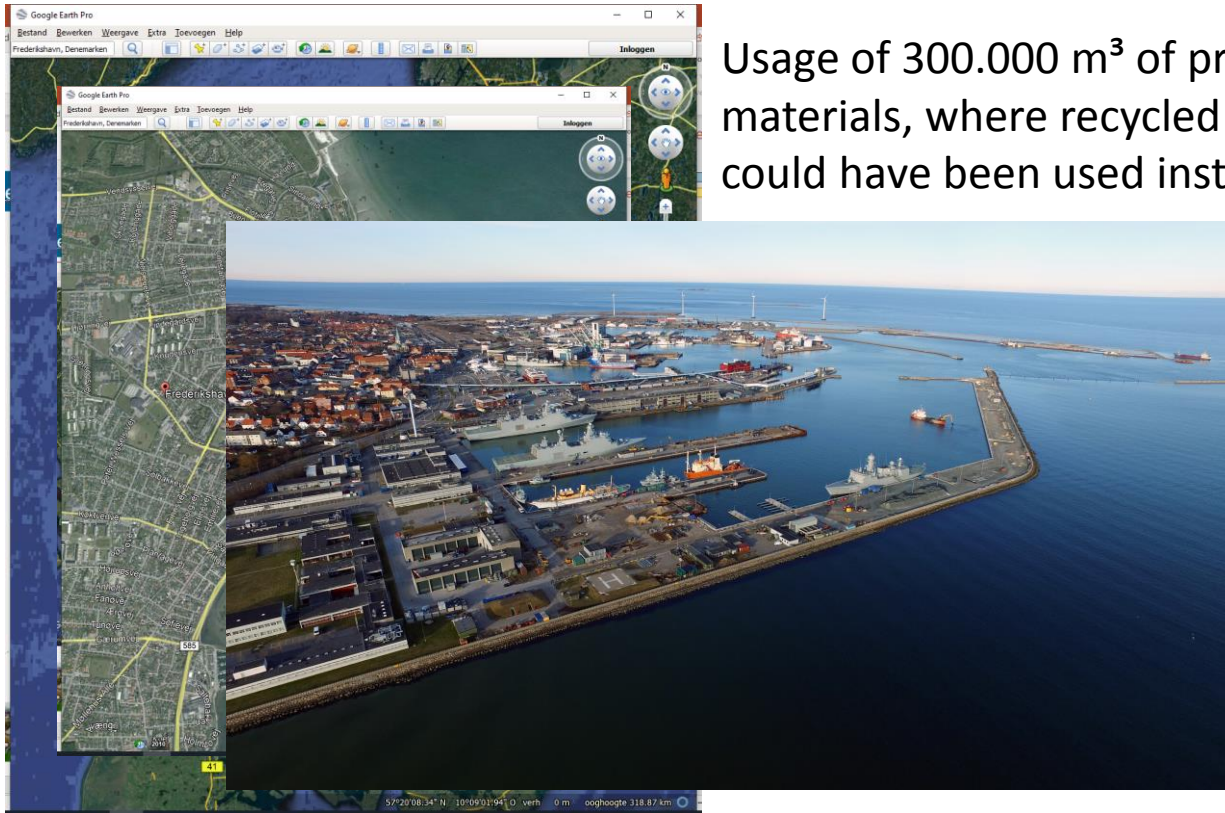


7. Some examples Projects

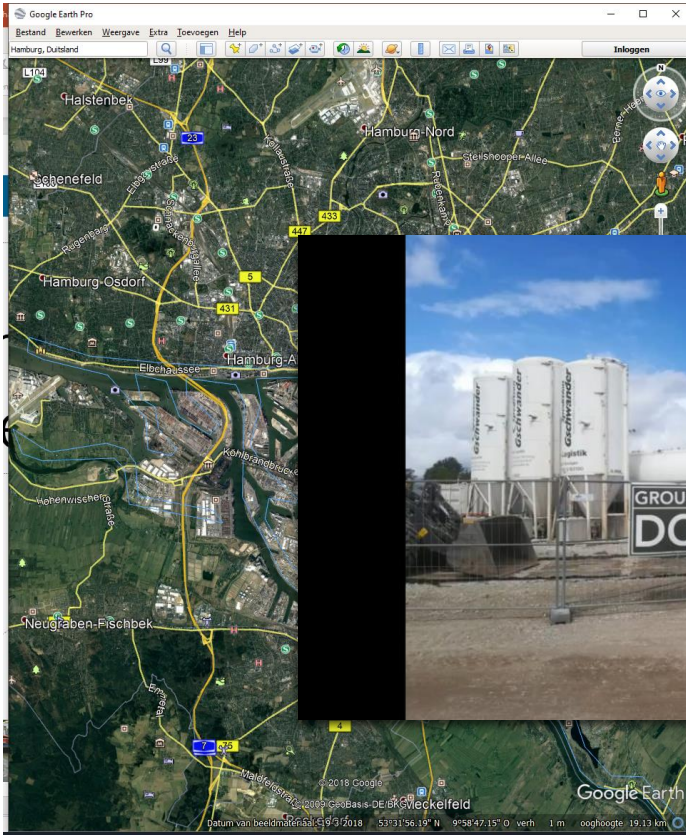


Frederikshaven DK

Usage of 300.000 m³ of primary materials, where recycled materials could have been used instead



Hamburg D



In situ stabilisation & immobilisation
of 25.000 m³ of polluted material
Reuse of 15.000 m³ recycled sand
for capping.

Industrial site



Antwerp B



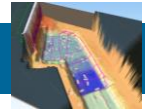
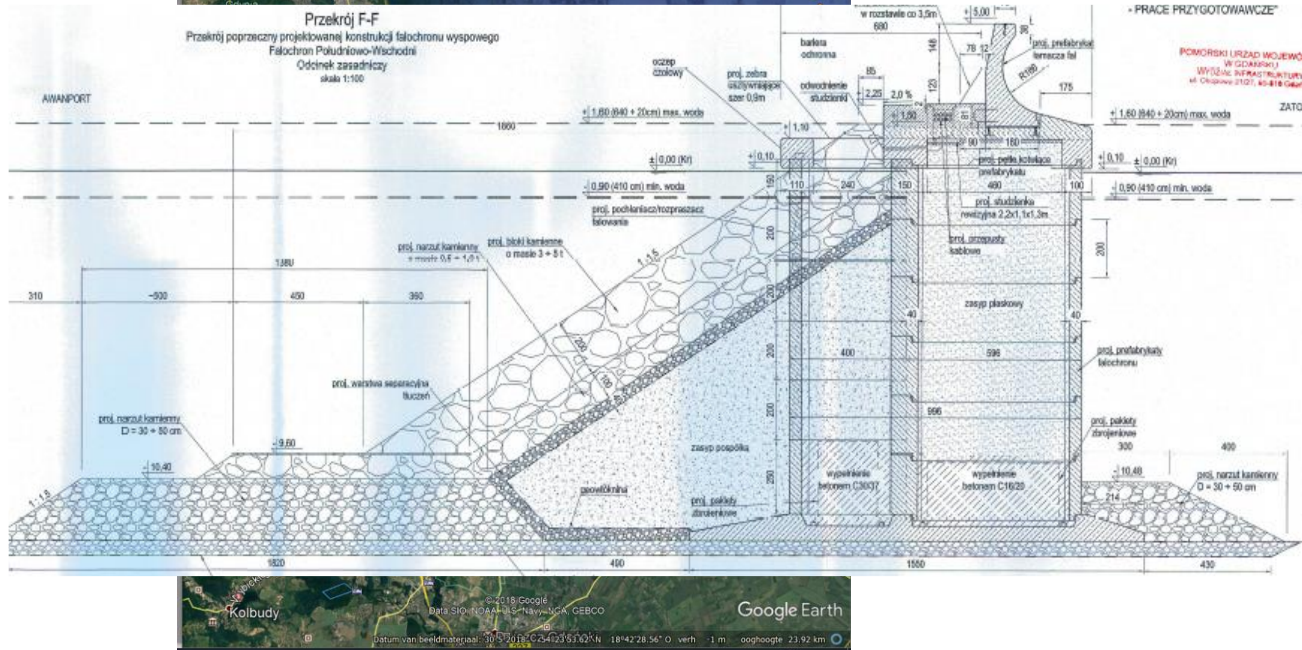
Port of Antwerp

- 95.000 m³ heavily polluted sediments
- 20.000 m³ transported to Slufter depot in Rotterdam
- 75.000 m³ TBT containing material transported to Bioterra for treatment
- After dewatering:
 - 45.000 T : Fysico-Chemically
 - 20.000 T : thermal treatment
 - 10.000 T : Biologically treated
- 65.000 Tonnes reused !



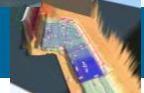


The screenshot shows the Google Earth Pro application window. The title bar reads "Google Earth Pro". The menu bar includes "Bestand", "Bewerken", "Weergege", "Extra", "Toetsen", and "Help". The toolbar contains various icons for navigation and editing. The main map area displays a satellite view of a coastal region with the label "Galynia" and "Lithuania". A large, semi-transparent watermark "Usage recyc" is overlaid on the right side of the image.



Copenhagen DK

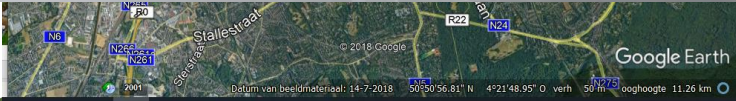
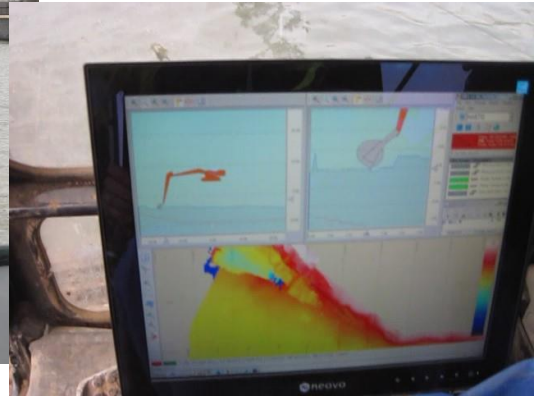
Google Earth Pro
Bestand Bewerken Weet
Copenhagen, Denemarken



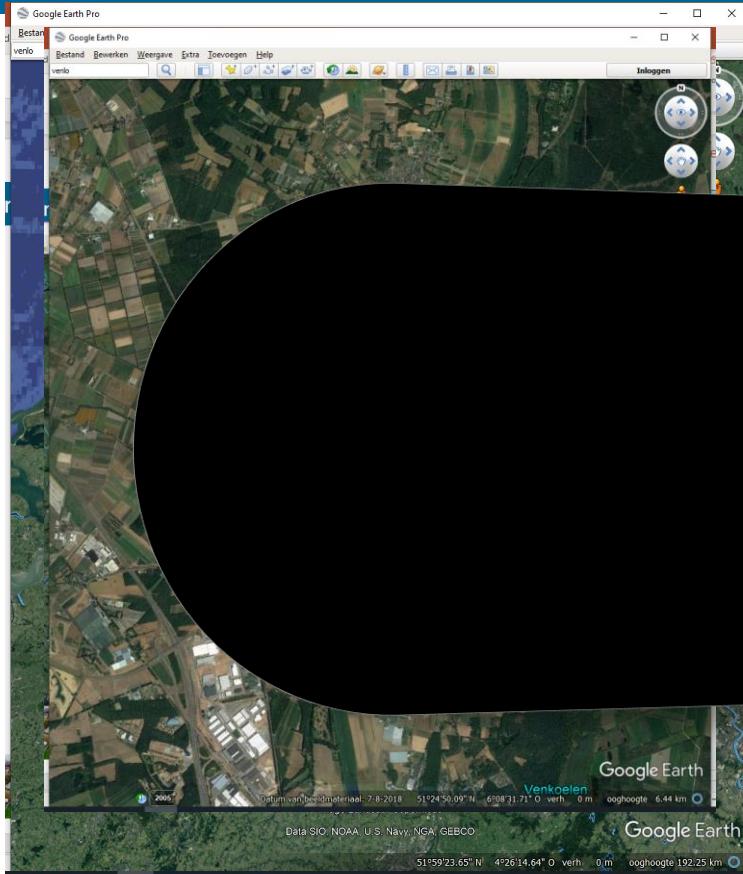
Figures : Redmolen project

- Old Petrol port
- Contamination light fuels – gasoil
- Entirely surrounded by city & housing
- 170.000 tonnes to be removed
- 6.500 tonnes send to belgium for FC-washing
- (transferred in R'dam on inland vessels)
- 80.000 tonnes : biologically treated by DC-Resources CPH
- 35.000 tonnes of clean material redelivered





River Rhine – Scheldt N



Reuse of dredged material
& cleansed soils for
landscaping projects. Goal
to achieve better water
management control of
the river systems. Creation of
new habitats



Conclusions

- Think smart during planning: cut the 'big' problem in pieces.
- One 'solution' can consist of different partial solutions
- Go for local solutions if available, but don't hesitate to look abroad if needed
- Establish collaboration between ports
- Combine logistics for different streams in/out

