



Circular economy applications of dredged sediments:

From pilot experiments towards fulfilling the needs of the economy and the society

By Tristan Debuigne, [Arjan Wijdeveld](#), Bruno Lemiere, Joe Harrington



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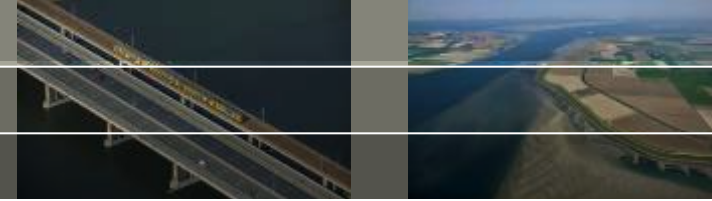
4 juli 2017

Topics

An aerial photograph of a coastal region. On the left, a city with red-roofed buildings is situated near a large body of water. To the right, there are extensive agricultural fields in various shades of green and brown, separated by a network of ditches and roads. A prominent feature is a long, narrow strip of land or a dike that runs parallel to the water's edge, with several small structures or buildings along its length. The water is a deep blue, and the sky is a clear, pale blue.

- 1. Short (and incomplete) reflecting on past EU sediment reuse projects: Successes and dissapointments**
- 2. What changes with regard to sediment use in a circular economy perspective?**
- 3. Sediment Uses as Resources In Circular And Territorial EconomieS**
- 4. Conclusion**

1. Historical reflection



Sediment use has been on the agenda of SedNet since the first conference in **2004**:

SedNet WP 4

DREDGED MATERIAL TREATMENT TECHNOLOGIES IN EUROPE

Pol Hakstege

Aquatic Sediment Expert Centre

Ministry of Transport Public Works and Water Management

The Netherlands



1. Historical reflection

Also, the **PIANC guideline** on dredged material as a resource (EnviComWG 14) has been out since 2009.

All recommendations can still be applied in 2017, also when a circular economy approach is the key:

Recommendations (slightly shortened):

- **Match supply and demand.** Planning, timing, availability and transport issues are key.
- **Economics.** Saving on costs for primary resources. Consider total costs and benefits to society. Look for economies of scale.
- **Legislation.** Do not classify dredged material as a waste by default. Adapt legislation to enable use of dredged material.
- **Promote better understanding of benefits and risks** of using dredged material.
- **Promote sustainable relocation.** Relocation in the aquatic system should be the first option to consider.
- **Carry out pilot projects** to develop expertise, learn and to demonstrate effectiveness .
- **Communicate, communicate, communicate.** Gain trust and support from stakeholders.



1. Historical reflection

Several EU - INTERREG projects on sediment use have carried out **pilot projects**, and tried to come up with new ways to **define economical benefits**, **avoid the legislation traps** and **find support** by involving local communities (avoiding NIMBY).

(biased)
Project Examples:



The screenshot shows the CEAMaS project website. At the top, the CEAMaS logo is followed by navigation tabs: 'Building knowledge', 'Technical potential', 'Opportunities & Environment', 'Education & Training', and 'European approach'. Below this is a main banner with the text 'Experiment new ways of marine sediment valorization'. Underneath the banner are three stacked boxes: 'Sustainable way', 'Economical way', and 'Socially acceptable way'. The background of the banner shows an industrial facility.



The SEDILAB logo features the word 'SEDILAB' in large, bold, brown letters. To the right of 'SEDILAB' is a graphic of a map of France composed of small brown squares. Below 'SEDILAB' is the text 'NEW SOLUTIONS FOR SEDIMENTS'. To the right of this text is the 'cdæ' logo, which consists of the letters 'cdæ' in a blue, lowercase, sans-serif font.



This screenshot shows a list of project partners and funders. Under the heading 'PARTNERS', logos for 'cdæ', 'TU Delft', 'UCC', 'CORK INSTITUTE OF TECHNOLOGY', 'Université Lille 1', 'bbri', and 'brgm' are displayed. Below this, under the heading 'FUNDERS', there is a logo for 'EUROPEAN UNION' and a text box stating: 'INTERREG IVD provides funding for interregional cooperation across Europe. It is implemented under the European Commission's territorial cooperation objective and financed through the European Regional Development Fund (ERDF)'. At the bottom, under the heading 'CO-FUNDERS', the logo for 'RÉGION NORD-PAS DE CALAIS' is shown.

Partners of the SEDIMATERIALS approach



This block contains logos for the partners of the SEDIMATERIALS approach. From left to right, the logos are: the French Republic flag, the Nord-Pas-de-Calais region flag, the 'MINES Douai' logo, the 'cdæ' logo, and the 'RÉGION NORD-PAS DE CALAIS' logo.

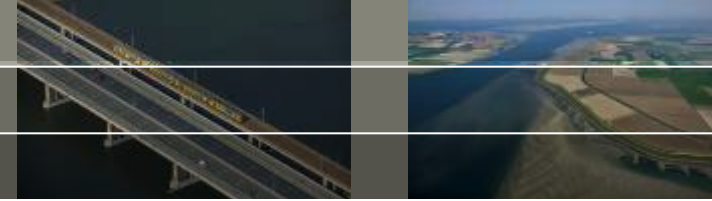
Funders



This block contains logos for the funders. From left to right, the logos are: the European Union flag, the Nord-Pas-de-Calais region flag, the 'l'Europe Nord-Pas-de-Calais' logo, and the 'RÉGION NORD-PAS DE CALAIS' logo.

Deltares

1. Historical reflection



Examples of sediment applications:

These projects were often successful on a local scale, experimenting with new (or renewed) solutions.



Sediment used in concrete for coastal defense blocks. SEDIMATERIAUX, port of Dunkirk



Sediment used in harbour road base. SEDIMATERIAUX, Ibid.



Lift up of Lowlands
CEAMaS, Jisperveld.

1. Historical reflection

However, many of the projects face a common fate:

- *How to disseminate the results after the project is finished?*



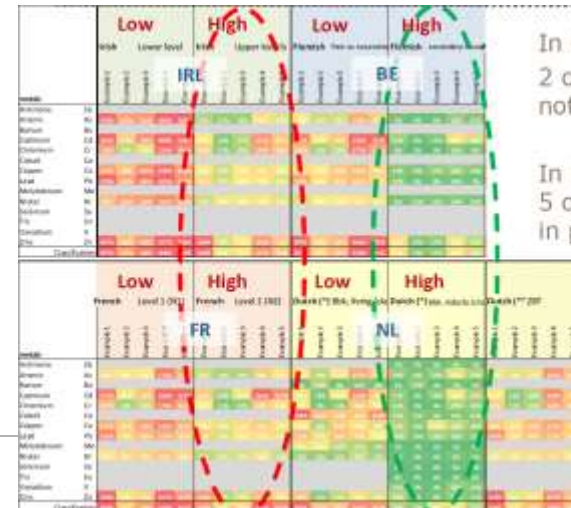
- *How to upscale pilot results to an economic viable solution?*



(Kennemer Mop, no market)

- *How to change legislation?*

(remember the PIANC recommendations)



In Ireland and France, 2 out of 5 sediments can not be reused.

In Flanders and Holland, 5 out of 5 sediments are in potential reusable.

2. A circular economy perspective on sediment use

Sediment use does not 100% fit the definition of a circular economy.



It might be better to talk about:

- Avoidance of the use of new resources (sand, clay, gravel)
- Sustainable system use (including compensation for subsidence, erosion protection and restoring the natural sediment balance)

2. A circular economy perspective on sediment use

While these goals are mostly similar to the earlier defined goals of dredged material as a resource (*did I mention PIANC EnviComWG 14?*), the driver for sediment use is not only the local (economical) benefits.

(Inter)national awareness that unlimited use primary resources is unwanted, combined with awareness that degradation of the natural system also costs resources and money on the long term, gives a new impulse to sediment use.

Recent INTERREG projects like USAR (Using Sediment As a Resource) focus on both the local cost benefits, and the avoidance of the use of primary resources.



This approach is now so successful that sustainable sediment solutions can be the core of a company's business model.

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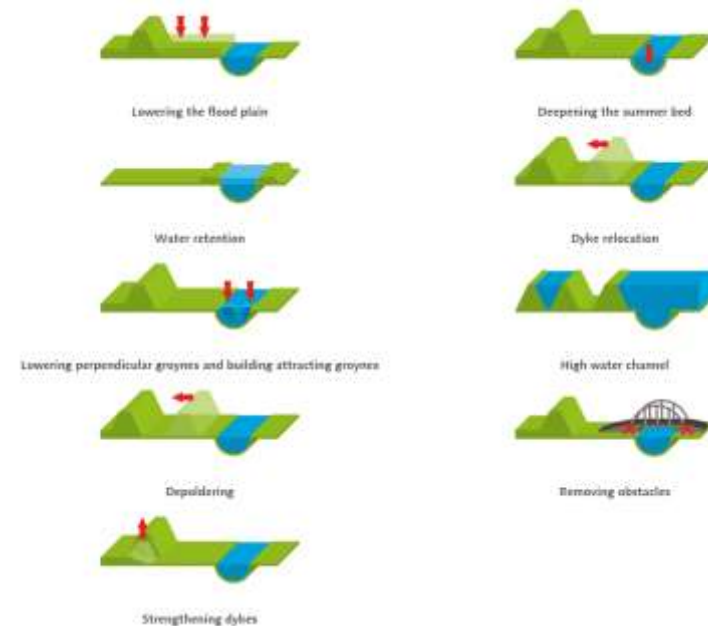
2. A circular economy perspective on sediment use

As stressed by *PIANC*, a large part of the success of a program is based on multiple stakeholder acceptance and participation.

A good example is the “*Room for the River*” project (budget € 2.3 billion, ~35 mln. m³ of soil/sediment reallocation).

By defining **common goals** (safety against flooding combined with nature development) solutions were found that stressed the beneficial use of the removed materials (top soils and sediments) with acceptable risks.

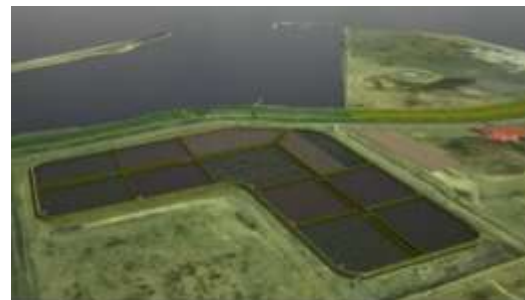
Legislation was no longer an obstacle, but **part of the reuse solution**.



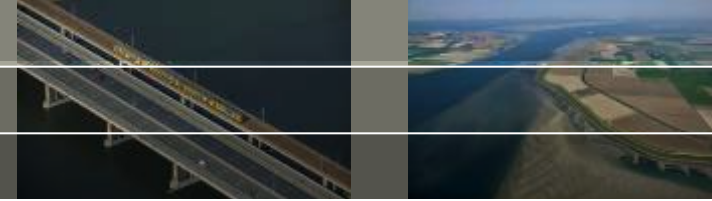
2. A circular economy perspective on sediment use

Using “Room for the River” as an example, a new large scale program to restore an estuarine system on the Dutch/German border (the Eems-Dollard) specifically targets marine sediment reuse to save on cost and primary resources.

Pilot clay ripening, application of clay in a dike:



3. SURICATES



A new INTERREG NWE project, **SURICATES** (Sediment Uses as Resources In Circular And Territorial EconomieS), is ready to be submitted. This project builds upon the **available knowledge of beneficial sediment use**, but also innovates by looking at **location specific applications** and it includes the society need to move towards a **more sustainable economy**.

In Europe 200 mln. m³ sediment is dredged yearly. The current reuse of this dredged sediments is estimated to be around 2 mln. m³ a year (*).

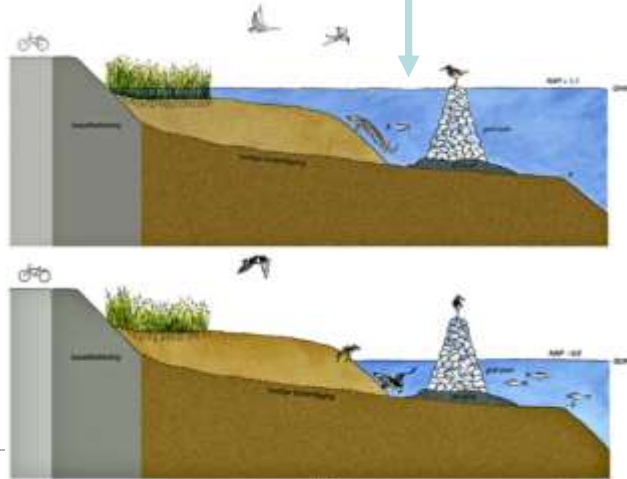
Learning from past successes, upscaling of earlier pilots and using recently developed tools to assess benefits, costs and risks on a system scale should help to double this reuse percentage in Europe in 5 years.

The SURICATES project alone targets the **reuse of 550.000 m³ of sediment**, to strengthen an ecological river bank and help beach nourishment.

(*) Not counting the beneficial sediment use applications in Flanders and The Netherlands, since legislation differs in these countries.

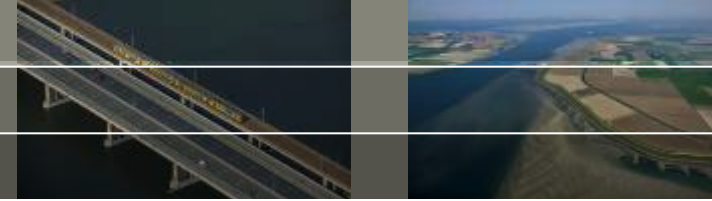
3. SURICATES

Port of Rotterdam carries out the largest sediment application, dredging 500.000 m³ of sediment from the **fresh water** part of the harbor, reallocating this in the **salt water** part to help a **natural river bank development** project.



GHW = Gemiddeld hoog water (GHW = Gemiddeld hoog water)

4. Conclusion



Circular economy applications of dredged sediments goes back to the Sednet roots of 2004 with dredged material as a resource, **but with a twist**.

Many of the solutions for a circular economy driven sediment use are the same as for dredged material as a resource. But even more than in the past, for **upscaling** of solutions **social acceptance is crucial**.

Therefore the focus is on:

- Involvement of multiple stakeholders to find **common goals**, and
- Developing tools for an **integral assessment** of the benefits and costs of primary resources versus sediment use, explicitly including the long term system impact.

New INTERREG projects and innovative businesses take up this challenge!

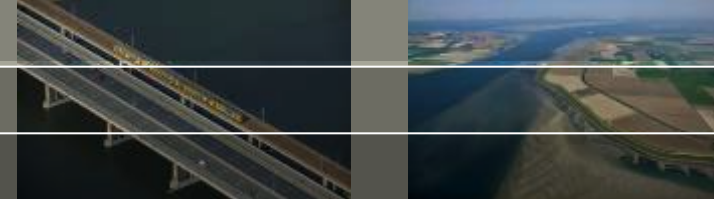
5. Addendum

CEDA decided there is need for a new information paper on sediment reuse and a position paper on how to look at legal restrains when dealing with contaminated sediment.



The draft paper will be discussed during the CEDA Dredging Days, [9-10 November 2017](#) at Ahoy Rotterdam, the Netherlands.

6. Information and Questions



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Questions?