Developing beneficial use alternatives to sediment management projects with the territories

WPLT partners, coordinated by BRGM

15 Dec. 2022

INTRODUCTION

- Dredging ports and waterways is required for sustainable water transport, river and coastline management
- Dredged sediments are the second biggest waste flow at the EU scale, and may be used as secondary minerals instead of primary extraction => Need for a **circular economy of sediments**.
- Circular economy projects are generally less competitive than linear economy projects in tendering processes.
- But they have greater indirect benefits. Therefore, moving from a linear to a circular economy requires expanding the system boundaries. Look beyond the initial dredging objective to see beneficial future development projects in the area, identify future material needs of the territory…
- What are the conditions for a successful sediment **beneficial use project**?
- This was the roadmap for SURICATES long term Work Package (WPLT)

1. Local stakeholders → 2. local features → 3. local options

LOCAL STAKEHOLDERS

SEDIMENT SUPPLY

Challenge

- End-users should have access to a resource that is homogenous in terms of quality and constant over time so that it can be integrated into industrial processes or existing valorisation applications
- Resource should be available at the EU scale, with focus on transboundary regions and projects

SEDIMENT MANAGERS
- in charge of maintaining waterways or harbours
- as the “producers” of sediment

DREDGING COMPANIES
- Offering improved technology
- Developing the business in sediment management

SERVICE COMPANIES AND CONSULTANTS
APPLIED RESEARCH

WASTE MANAGEMENT COMPANIES
- Creation of sediment collection and treatment platforms

ADMINISTRATIONS IN CHARGE OF LOCAL DEVELOPMENT PROJECTS PROMOTION AND ENVIRONMENTAL REGULATIONS
- Elaboration and application
- Objectives at the territory scale

LOCAL STAKEHOLDERS

SEDIMENT DEMAND

Challenges:

- Ensure a significant "demand for sediment" in the territory
- Address the sediment end-user responsability (polluter pays but end-users assumes the uses)

LOCAL AUTHORITIES WITH PUBLIC PROJECTS

- as representatives of the public procurement of development projects
- Proactive approach at the territorial level to include sediment reuse in the ToRs of development projects

PUBLIC FUNDERS COMMITTED TO THE CIRCULAR ECONOMY OF SEDIMENTS

- ADEME, Water Agencies, etc.
- Help local authorities to cover the initial extra costs associated with using sediments rather than cheaper primary resources while a sector is being developed

CIVIL WORKS COMPANIES

- Providing innovative approaches for public and private site holders and in climate change mitigation projects

ADMINISTRATIONS IN CHARGE OF LOCAL DEVELOPMENT PROJECTS PROMOTION AND ENVIRONMENTAL REGULATIONS ELABORATION AND APPLICATION

- Promote beneficial use of sediments with public and private project owners
- Offer a safe methodology (technical, environmental and sanitary) to reduce operational

OPEN PROJECTS TO EU SCALE

- Include options based on transboundary cooperation and benefits

PRIVATE PROJECT OWNERS

- Once the sector is established, develop projects based on secondary material

LOCAL STAKEHOLDERS

SEDIMENT SUPPLY

- SEDIMENT MANAGERS
- DREDGING COMPANIES
- WASTE MANAGEMENT COMPANIES

ADMINISTRATIONS IN CHARGE OF LOCAL DEVELOPMENT PROJECTS PROMOTION AND ENVIRONMENTAL REGULATIONS ELABORATION AND APPLICATION

- NGOS

SEDIMENT DEMAND

- LOCAL AUTHORITIES WITH PUBLIC PROJECTS
- PUBLIC FUNDERS COMMITTED TO THE CIRCULAR ECONOMY OF SEDIMENTS
- CIVIL WORKS COMPANIES
- PRIVATE PROJECT OWNERS

NEED FOR A "CONDUCTOR" ACTING SO THAT EACH ACTOR PLAYS ITS ROLE ?
CONSIDER PROJECTS AS AN OPPORTUNITY TO DEVELOP THE CIRCULAR ECONOMY OF SEDIMENTS, EU-WIDE RATHER THAN NATIONAL OR LOCAL ECOSYSTEMS

LOCAL STAKEHOLDERS

CASE STUDY: LA RANCE

- Existing need for dredging (hydropower reservoir and navigation channel maintenance)
- Potential beneficial use in agricultural land improvement and other beneficial uses
- Political involvement of authorities, representatives, sector agencies, unions and NGOs
- Dedicated public agency for project development
- Opportunity to secure supporting RTD through a SURICATES extension
- Applying SURICATES outcome to improve operational strategies

LOCAL STAKEHOLDERS

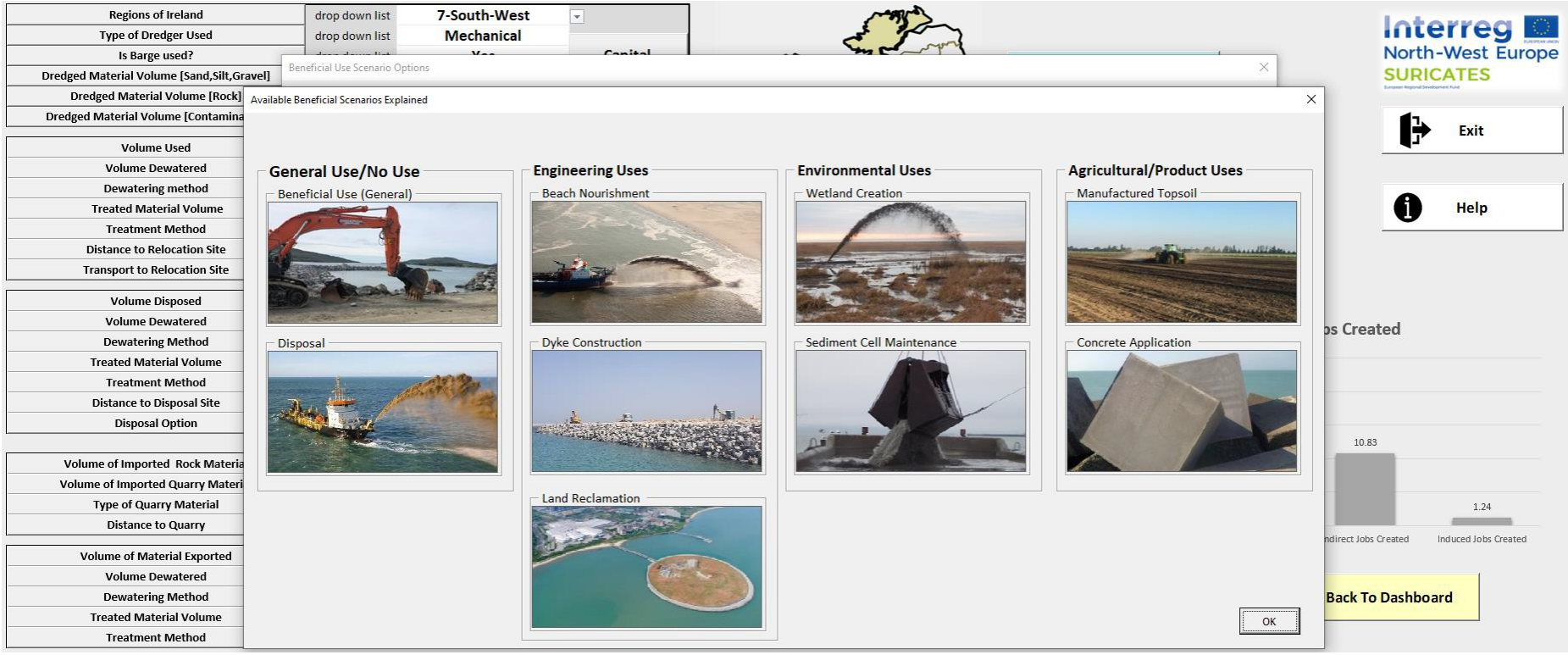
Interreg North-West Europe SURICATES
European Regional Development Fund

CASE STUDY: LA RANCE

- Working Group “La Rance sediment reuse” under the authority of the “Sous-Préfet de Dinan”
- Scientific Council for the Rance Estuary Sediment Management Plan
- Field visits and exchanges
- Answering citizen concerns about sediments

LOCAL FEATURES

Identifying site-specific features which may be favourable or unfavourable for circular options. These features will allow selecting the most suitable options among many circular economy strategies, as alternatives to business as usual, and reject options that are locally inadequate.



LOCAL FEATURES

Key features	Challenges
Well-connected dredging area, ideally connected to both the sea and the canal network	Handling large volumes, impacts of transports

Dunkerque, FR (OpenStreetMap)

LOCAL FEATURES

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Dunkerque, FR (source GPMD)

Temporary storage (photo BRGM)

Road base use. In the background, landscaping mound (source Sedilab)

LOCAL FEATURES

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A developed waste management industry, Waste management companies with platforms for grouping, sorting and treating sediments	Available space for treatment and temporary storage platforms Having a "sediment supply" that is quantitatively predictable, of known quality, and if possible constant

Delfzjil, NL, Ecoshape (Photo: van Oord)

Ghent, BE, Envisan (Photo: Jan de Nul)

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Antwerp, BE – Amoras (Photo: Jan de Nul)

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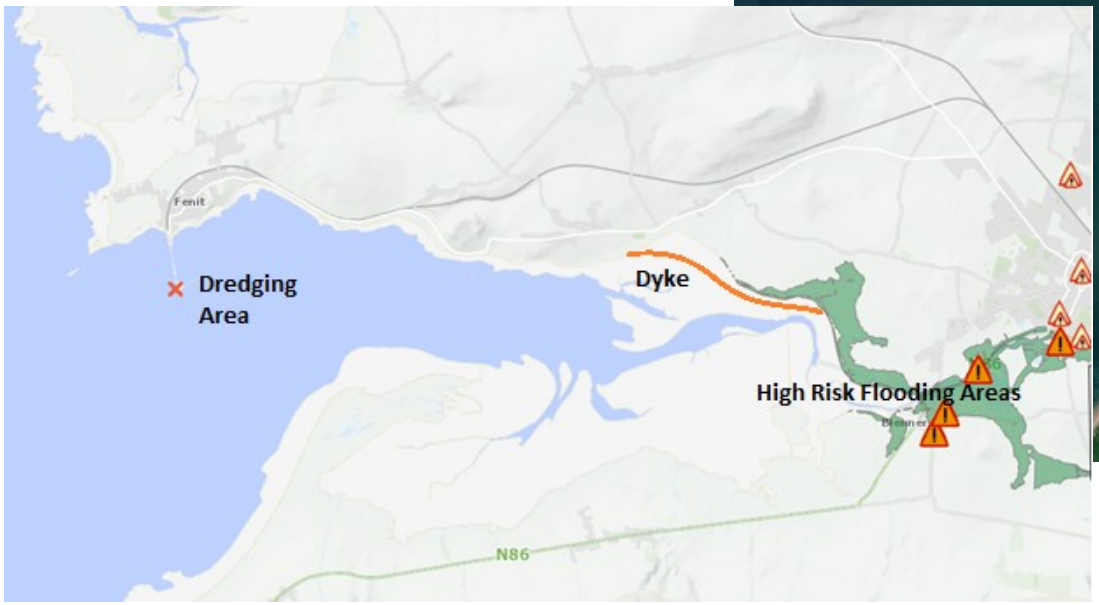
Infrastructure or uses that need materials, including sediments, within a limited radius of the dredging site or transit site	Transporting sediment at the lowest possible cost, limiting the distance between the place of availability of sediments and the place of potential use

LOCAL FEATURES

Materials needs for flood protection and for wetland restoration

Fenit, IE (SURICATES WPLT)



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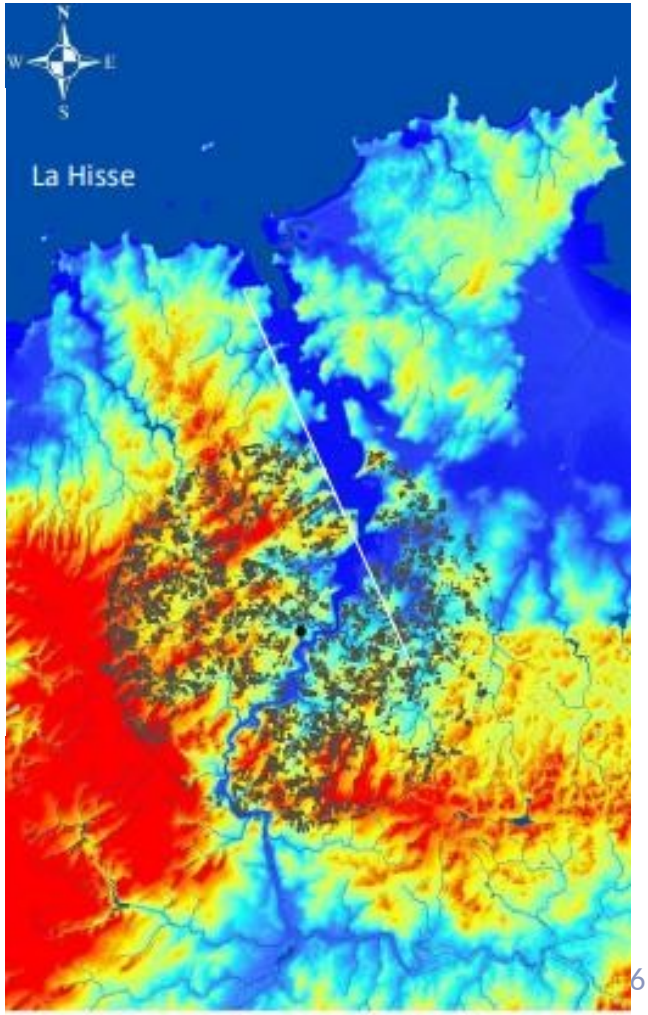
Locally scarce primary resources *The NL case: lack of sand, gravel and aggregate*	Suitability of available sediment for technical purposes
Works agenda – matching production and use dates	Time required for beneficial use implementation *(WPLT – Ringaskiddy case)*
Agricultural activities and needs (improvement and fertilisation) within a limited radius of the dredging site or transit site	Dewatering or desalination may also be required, needs space

LOCAL FEATURES

Identification of suitable receiver plots within 8 km excluding shell farming protection zone

Rance, FR (SURICATES WPLT): 3.25 Mm^3 / 10 years



LOCAL FEATURES

Application on fields and Soil quality monitoring

Photo EPTB/BRGM

Application in fields and bulldozer grading
(photo © V. Chopin / France Télévisions)

Photo Le Télégramme
Quentin-Mathéo Pihour

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Upstream activities and resulting contamination *The Rhine and Maas case, legacy from neighbour countries*	Constraints on sediment possible uses, acceptability Including transboundary cooperation to facilitate them

LOCAL OPTIONS

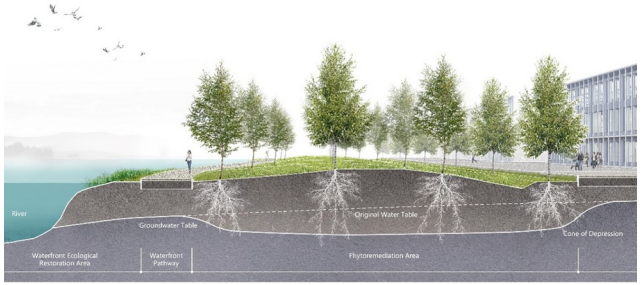
Options for beneficial use are investigated and listed by the industry (CEDA, WEDA), by knowledge networks (SedNet), by operators (PIANC) (links provided)

Feasible options for beneficial use depend tightly on local features and context and may be picked from such lists. They include:

BENEFICIAL USE AS RAW MATERIAL

BENEFICIAL USE AS PROCESSED MATERIAL

BENEFICIAL USE FOR RESTORATION AND RESILIENCY



(Image O'Connor, et al.)

LOCAL OPTIONS

Options to be picked from examples:

- creation of infrastructure, landscape mounds, noise barriers, levelling/raising of plots of land, rainwater reserves, coastal erosion mitigation works and adaptation to climate change (dykes, concrete blocks), amendment or thickening of agricultural soil, polluted sites or wasteland to be rehabilitated, etc.
- Several of them were tested by the SURICATES pilots
- Many more were considered for SURICATES WPLT case studies. The reasons for rejecting options were linked to sediment characteristics and local features.

LOCAL OPTIONS

Beneficial use as raw material

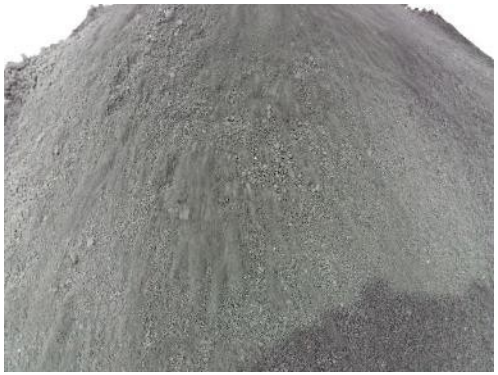
This allows the use of large quantities with limited costs

- Flood protection dykes
- Water storage dykes
- Shoreline recharge: Feeding the natural system through natural dispersive processes (Sand Engine)
- Wetland protection and development
- Noise protection walls
- Sand and gravel for civil works and concrete manufacture

Rotterdam: Wetland protection and development

LOCAL OPTIONS

Beneficial use as processed material



- Incorporation in cement crude and high grade concrete
- road construction and cycle paths
- Processing platforms and facilities providing homogenised sediment for reuse (IXSANE (top right), METHA Hamburg (bottom right), AMORAS Antwerp..)
- Agricultural land improvement or uplift
- Minerals for concrete-based climate applications (water storage road base, permeable surfaces, tide defence blocks…)

Photos CTP, IXSANE and METHA/HPA

LOCAL OPTIONS

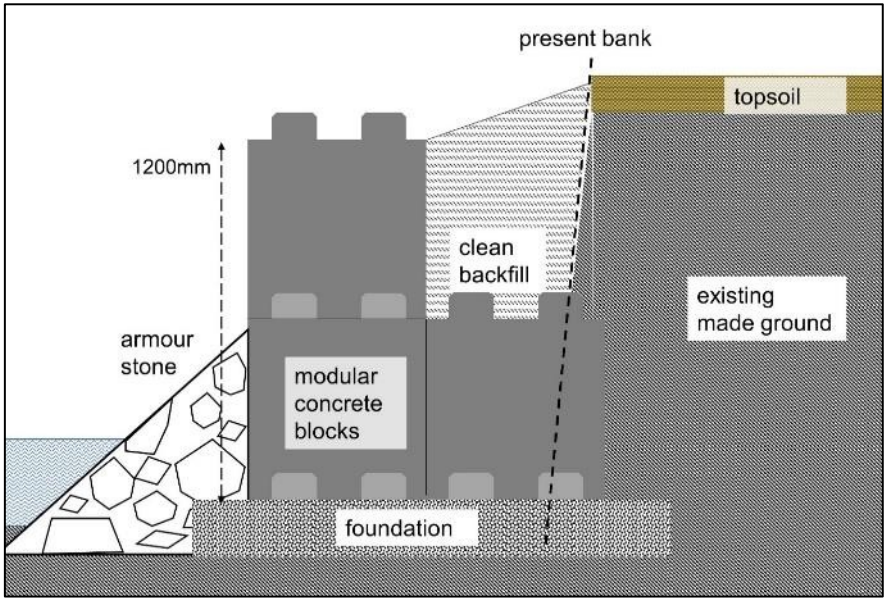
Beneficial use for land restoration and resiliency

- Habitat and wetland restoration
- Backfilling of contaminated sites and brownfields,
- Creation of harbour facilities and large scale industrial sites
- Civil works for shoreline defence and flood protection

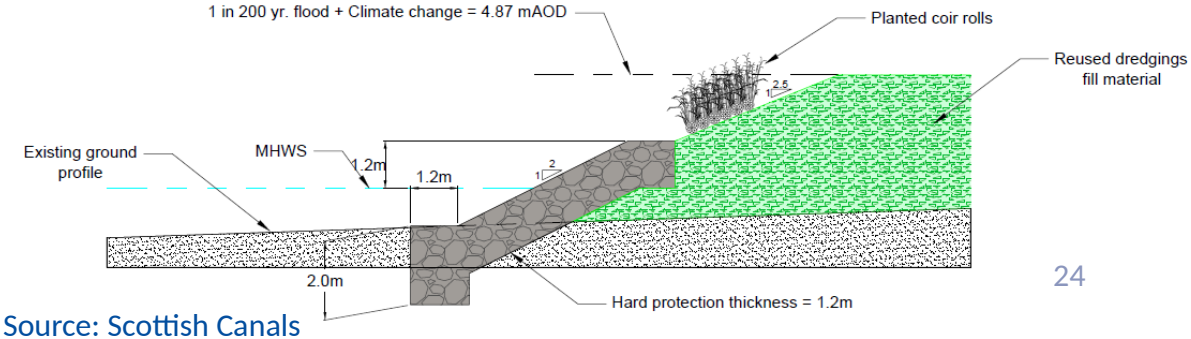
Project Lift Up Lowlands (NL) : application of dredged sediments to compensate subsidence and to improve land fertility (source CEAMaS, InterReg NWE)

LOCAL OPTIONS

Case study Bowling (Scotland)
Clyde shoreline protection



Sediment source:
canal maintenance dredging
Sediment destination:
coastline protection



Source: Scottish Canals

LOCAL OPTIONS

Case study: Baie de Somme (N France)

Sediment source:

Tidal basin clogging - flood risk

Source: Christian Traisnel

LOCAL OPTIONS

Case study: Baie de Somme (N France)

Sediment destination:
Coastline protection

Source: Christian Traisnel

CONCLUSIONS

Developing beneficial use options for dredged sediments, in line with Circular Economy and Building with Nature principles, and contributing with climate change mitigation is desirable and necessary.

The SURICATES project real size pilots (Rotterdam, Scotland) investigated the technical options, and their economic and environmental implications. But maybe even more important, they constituted public demonstrations that beneficial use alternatives are **achievable and reliable**.

WPLT complemented them by the in-depth desk analysis of beneficial use alternatives of actual projects, to identify better the potential bottlenecks, regulatory barriers and economic/social issues to tackle. These aspects allow:

- forecasting the future development of beneficial use projects, and
- Identifying paths for improving it, including filling technology gaps, developing economic incentives and addressing regulatory barriers, especially those between EU member states.

Thanks

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LOCAL FEATURES

Dunkerque, FR, source (GPMD)

temporary storage (BRGM)

Road ba

- Butte paysagère derrière ?

LOCAL FEATURES

Available space needed for treatment and temporary storage platforms

Delfzjil, NL

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Photo: van Oord

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