Training Session 2: Project Realisation

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Theme: **Project Realisation**
Specific LOs:
After completion of this training session, you will be able to:

- assess long-term variability of workability;
- define and optimise a project strategy based on cost or duration;
- calculate spillage of fines during dredging operations;
- model turbidity;
- calculate energy consumption during dredging.

Duration: Homework estimated 6hrs - Session of 2hrs.
Topics: This training session consists of the following blocks:

- Long-term assessment of workability.
- Project Strategy based on production, project duration, project cost.
- Sources and release of fines without overflowing.
- Turbidity modelling without overflowing.
- Energy consumption and emissions assessment.

Instructions

For the training sessions we provide several homework questions in a blank Python notebook related with the topics above. Through the completion of these questions, you build up knowledge and develop methods that you can use and apply to elaborate and discuss recommendations in the final assignment. Thus, for these questions we provide data, give directions on the approach to hand in the answer, and help you on making assumptions when needed. During the TS2 session we will ask and address those questions that remain challenging to you.

Course material

- Lecture slides L8, L9.
- Collegerama recordings L8, L9.
- Johannes Becker, Erik van Eekelen, Joost van Wiechen, William de Lange, Thijs Damsma, Tijmen Smolders and Mark van Koningsveld (2015). Estimating source terms for far field dredge plume modelling. *Journal of Environmental Management 149*, pp. 282-293.

Detailed building blocks content per topic

Workability (long-term assessment):
Assess contingencies in workability for a sequence of works and a project planning realisation by doing long-term statistical analysis of historical data.

- Input:
  - Wind, Waves, Currents, Tide.
  - Bathymetry.
  - Equipment.
  - Operations (dredging, sailing, disposal, etc).

    - Min. operational time / window per operation.
    - Work method and project strategy.
- Output:
    - Long-term analysis of workability.
    - Long-term analysis of downtime (tactical/strategic, work method combining operations).
    - Contingencies - Likelihood based on historical data (in contrast with using known data).

Project Strategy (Strategic-Why?):
Define a project strategy as a sequence or combination of work methods. Iterate throughout different strategies.

- Input:
    - Sequence and dependencies of operations.
    - A metric for optimization (production, cost, time, emissions, etc).
- Output:
    - Project strategy.
    - Project production per work method.
    - Project production for a project strategy.

Duration and Cost:
Calculate duration and cost per work method.
Calculate total project duration and total cost.

- Input:
    - Number of operational hours per week.
    - Operation hour production.
    - Project strategy including work method.
    - Number of operational hours, persistence, and downtime.
- Output:
    - Duration and cost per work method.
    - Total project duration and cost.

Spillage of fines:
Identify source terms following the four-step approach (Becker et al., 2015).
Estimate release of fines mass during dredging operations, per work method, and for the project duration.

- Input:
    - Project scope.
    - Project strategy including work method with volumes to be dredged.
- Output:
    - Identify and quantify source terms following the four-step approach (Becker et al., 2015)
    - Justify choices on factors taken for different source terms calculations.
    - Release of fines mass per operation and work method.
    - Total release of fines mass for the total project duration.
    - Release of fines per week.

Turbidity modelling (Far-field SSC).
Evaluate far-field suspended sediment concentration (SSC) from fine sediment sources.

- Input:
  - Sources of fines.
  - Impact area definition.
  - Reference far-field suspended sediment concentration in the impact area.
  - Met-ocean conditions (waves, currents, depth, wind, etc).
- Output:
  - Assessment of SSC during the project realisation using a 1D steady-state approach.

Energy consumption and Emissions assessment:
Assess energy consumption during dredging and sailing, and for the total project duration.
Translate energy consumption into emissions.

- Input:
  - Production level.
  - Sailing speed.
- Output:
  - Power and energy required for several production level.
  - Power and energy required for sailing.
  - Total energy consumption.
  - Emissions.