



Implementing MEasuRes for Sustainable Estuaries (IMMERSE)

Final Conference
Antwerp, 23 -24 March 2022
Version: 3rd May 2022

REPORT

*'Combining efforts towards stronger, more sustainable
estuaries around the North Sea.'*

[Download the programme here](#)

IMMERSE Project Objective

Improve the design, testing and implementation of estuary management measures by using transnational knowledge and stimulating stakeholder integration.

Expected Results

- Increased potential delivery of measure benefits, resulting from advances in measure development during the project
- Increased stakeholder acceptance of measure designs and subsequent implementation

Conference Objective

The aim of the conference was to share findings from measure development and promote transferability of solutions to other estuaries. Conference sessions were interactive to ensure diverse exchanges were held among participants.

The following report presents a summary of the presentations, discussions, and audience engagement from the main conference day (23 March 2022), hosted by the Flemish Department of Mobility & Public Works, with support from s.Pro – sustainable projects GmbH at the Flanders Meeting & Convention Centre in Antwerp. The conference was attended by 58 individuals. All materials from the conference can be found on the [IMMERSE webpage](#). The event was moderated by Angela Schultz-Zehden from s.Pro – sustainable projects GmbH, the European Project Coordination Office (EPCO) of the IMMERSE project.

Welcome and opening

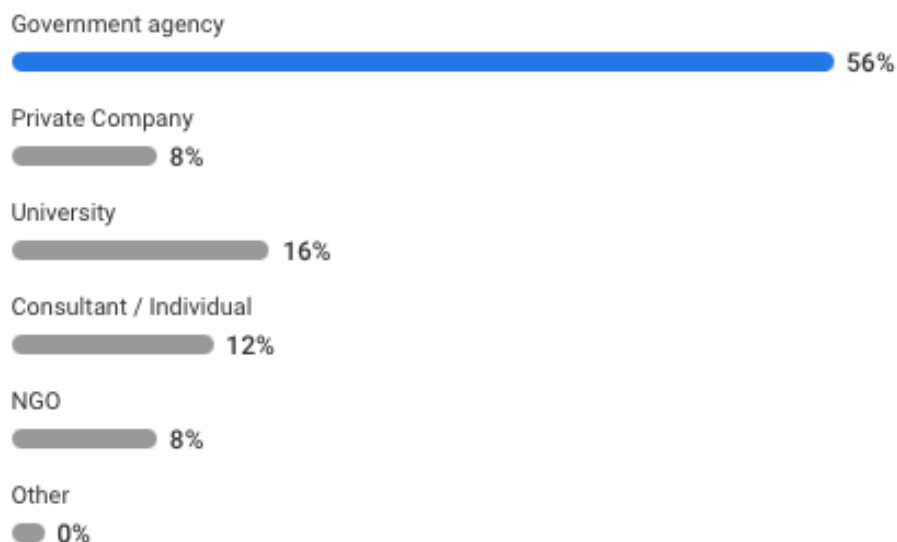


Angela Schultz-Zehden of s.Pro – sustainable projects GmbH (EPCO) opened the conference by welcoming North Sea estuary managers and stakeholders, and immediately engaging attendees through the interactive Slido platform to see what kind of estuary stakeholders were in the room.

Where are you joining us from?



What kind of organisation do you represent? (choose most appropriate)



Graphic Recording

The conference was accompanied by Christian Ridder of Business as Visual, a graphic recorder who captured the IMMERSE project, the main issues and key messages in the user-friendly visualisation below:

Implementing Measures for Sustainable Estuaries

IMMERSE

There are many pressures... and there are many to come!



It's not a SPRINT, it's a TRIATHLON (without a finish)

LEARN together & MANAGE together

It's not "One size fits all"

A common structure to facilitate cooperation

11 Partners



Transnational Estuary Exchange Labs

COAST & MARINE

SEA LEVEL RISE

Models show what may happen in the future



Big measures need big pilots need long preparation! (it's just a start)

scale up!

most valuable when contaminations are high

We need to be braver and test more!



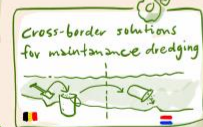
- Ecotoxicological model
- Chemical model
- Biochemical model
- Partitioning model
- hydrodynamic model



Mapping the speed of particle-bound pollution

MORPHOLOGICAL CHANGES

How do we avoid that entrained MICROPLASTICS being re-suspended?



Combination of measures without limitation of borders is needed!



PRESSURES



BIODIVERSITY



Understand how Microplastics interact with Biota to capture, isolate MP in targeted conditions

POLLUTION



FLOODING is proactively managed already ✓



Understanding contributing role of local waterways to flooding

size does matter, from piece-meal to holistic approach!

Combine efforts!



grabbing hold of the problem and beginning to find workable solutions

SOLUTIONS

Measure and Monitor SUCCESS AND FAILURES



Think GLOBAL Start LOCAL



Integrate CATCHMENT



URBANISATION



Antibiotics PFOS accumulation in fish → future problems?



Water treatment



Joint Fact-finding (Monitoring, research, modelling)



STAKEHOLDER ENGAGEMENT



Common understanding of complex findings

holistic Approach

Make Good choices

Expect the UNEXPECTED

How to raise the PUBLIC AWARENESS? → Schools curriculum?

Learn by Doing

field pilot

PROCESS BASED MANAGEMENT

feasibility study

evaluate alternative designs

Risk management

find solutions

Development of MANAGEMENT MEASURES

Ideas

We need MEASUREMENTS & LONG-TERM observations!!

Consider beyond the borders of the estuaries

Adaptive management

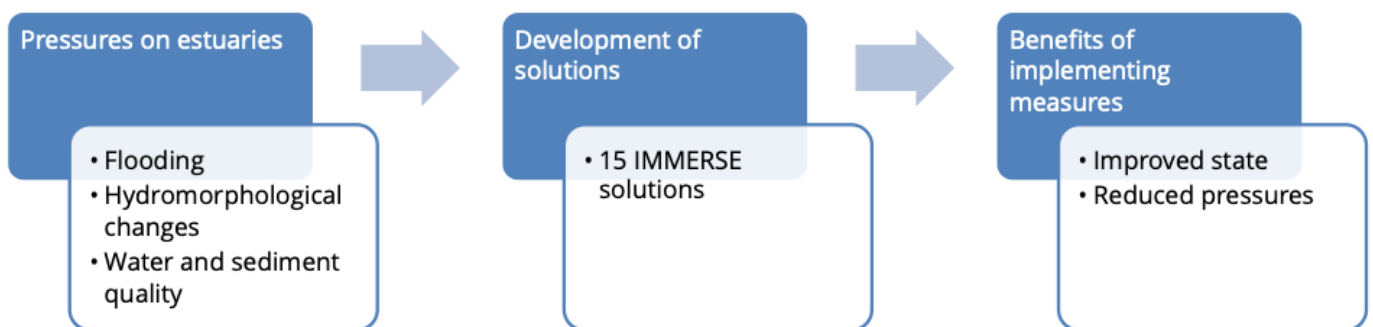
SYSTEM STRATEGY & POLICY

Introduction to the IMMERSE approach and key achievements



Frederik Roose of the Flemish Department of Mobility & Public Works, and lead partner of the IMMERSE project, then introduced the project and partners, followed by the objectives and approach.

[Download the presentation here](#)



Plenary Session I

What environmental and societal pressures do NSR estuaries have in common? A multidisciplinary overview

Keynote presentation by Prof. Patrick Meire (University of Antwerp)

Patrick Meire of Antwerp University was the first keynote speaker, who presented an overview of the main pressures on estuaries with a focus on the North Sea Region. His key messages were firstly that management used to be an endless vortex leading to further tidal amplification, geomorphological changes and loss of biodiversity, requiring ever more management measures to guarantee safety against floods and access to harbours. Secondly, that climate change and the increasing impact of human activities (changing morphology, water quality & quantity) will compound present-day problems, requiring further steps towards truly integrated management.



He concluded that understanding of estuarine functions is improving, along with the insights into their complex interactions. Further, that present-day management is not able to accommodate either the present or future pressures that will be intensified by climate change. Finally, that a more process-based management approach is needed. This approach should extend beyond the physical borders of estuaries themselves to address a more integrated formulation of objectives. This was followed by questions from the audience.



Table Discussion

This was followed by questions from the audience, taken via the Slido app. Participants were also asked to reflect on the keynote presentations and add any input which should be included in the 'Big Picture' graphic recording.

The main conclusions from the table discussions were as follows:

What was new for you?

- *System understanding is the basis of improving measures, so we need to invest in long-term observation to better understand trends*
- *Erosion is linked to eutrophication (related to plant root systems)*
- *Communication of findings to policymakers is crucial*
- *Insights into new pollutants (antibiotics, microplastics)*
- *Need a conceptual model of supply vs. demand of ecosystem services*
- *Land-based policy influences water quality*
- *Estuaries are a plastic sink / collector*
- *Striking levels of estuary pollution which are increasing*
- *Sea level rise won't stop after 2100!*

Key learning points for your own estuary:

- *Better catchment management of freshwater discharge is needed*
- *Process-based management & monitoring is needed*
- *Importance of an integrated approach*
- *Monitoring saves money long-term*
- *Measure new emerging pollutants sooner rather than later*
- *Investigate how to avoid re-suspension of pollutants caused by dredging*
- *Put pressure on governments to fund monitoring and quantify ecosystem services*
- *Consider how to raise awareness of these issues in the public consciousness (e.g. school curricula)*

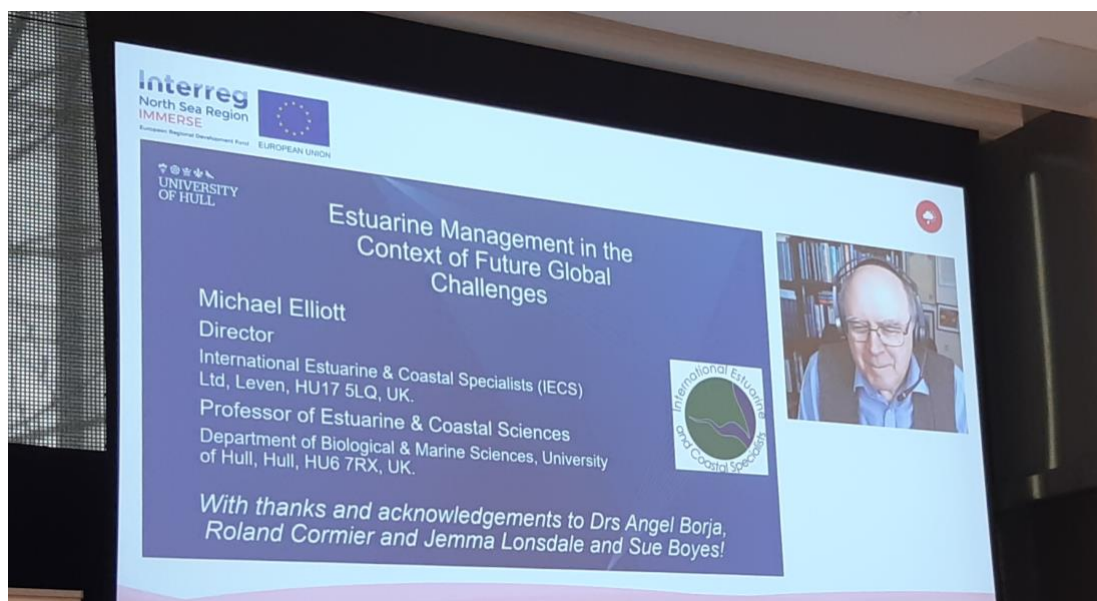


Plenary Session II

Towards sustainably managed estuaries: Perspectives on estuary management in the context of future global challenges

Keynote presentation by Prof. Mike Elliot (University of Hull and IECS Ltd.)

[Download the presentation here](#)



The second keynote presentation was given by Prof. Mike Elliot from the University of Hull. He pointed out three major sets of global challenges and changes against which estuarine management needs to be judged in the coming decades: 1) the estuarine environment; 2) the endogenic and exogenic pressures facing estuaries; and 3) the management of estuaries. Each of these cannot be uncoupled with the features of the catchment and adjoining marine and coastal areas, hence successful connectivity between these systems is paramount to good and effective management. He also suggested that a Systems Analysis Approach is needed to bring all the elements together for a logical and structured approach to study, assessment and management. A Decision Support System is also needed to enable managers to cost-effectively decide on solutions and verify their effectiveness. An Estuarine Planning Support System would also be a beneficial framework to define clear planning or management processes and the tools available to support the process. These three approaches ensure holistic management, with built-in feedback loops which encompass all relevant stakeholder views, and could also be applied to other environmental systems.



Which estuarine pressures are adequately addressed in estuaries at the moment? (multiple options possible)

30 

Pollution



Flooding



Hydro- and morphological changes



A combination




All of the above



None!

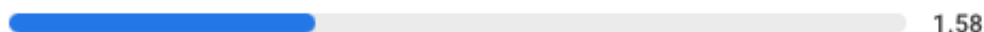


Which estuarine pressures are likely to have the highest priority in the future? 31  ..

1. Flooding



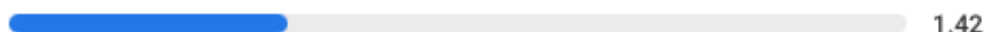
2. Pollution



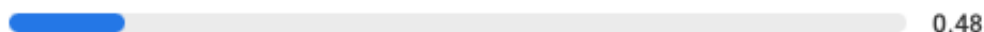
3. Hydro- and morphological changes



4. A combination



5. All of the above



Panel Discussion

The contribution of IMMERSE solutions to the implementation of management plans and strategies



The second keynote was followed by a panel discussion comprising panelists Jos Brils of SedNet, Ben Lamb of the Tees Rivers Trust and Frederik Roose and Willem Vuylsteke of the Flemish Department of Mobility and Public Works. The discussion centered around the issues of transnational cooperation, stakeholder engagement, pollution, timescales of measure implementation, as well as climate change and governance. Key messages of the discussion were that estuary managers should learn together to manage together, using long-term observation and monitoring to develop adaptive management strategies, whilst remaining open to change. The general consensus was that a holistic approach is needed, as well as more international networks to learn from each other, including the Global South. The importance of data was emphasized, especially in the context of short-term European projects, since implementation of estuary management measures often take decades or even longer to implement and evaluate. This is being reflected in recent moves towards macro-regional management, to which IMMERSE is a good example.



Thematic Breakout Sessions:

Presentations of IMMERSE solutions and feedback

After lunch, participants divided into breakout sessions to discuss specific IMMERSE measures in more depth. There were two rounds of sessions, with three sessions in each round, making a total of 6 sessions in total. In each session, 2-3 IMMERSE measures were presented by IMMERSE partners, with other partners acting as moderators.

Sessions 1 & 4: Flooding

Joost Backx of Rijkswaterstaat, moderator of sessions 1. Flooding Strategies and 4. Solutions for Flooding, summarised the two sessions in the final plenary. He began by pointing out that there were significant similarities between Dan & Marco's approaches to optimal site selection in relation to flood prevention measures. The consensus of the two sessions were that we need to move from piecemeal approach to a holistic approach. Also, that large-scale pilots take a long time to prepare for, to implement and to monitor. Other findings were that data should be available and utilised to calibrate models, which can then be used to anticipate effects, thus optimising the effectiveness of measures. In the case of Holbaek Kommun's case, it was noted that municipal networks – also in other regions – should work together on these issues, as they are often not local issues. Finally, the sessions showed that no matter how much or meticulously you plan measures, things change during the planning and implementation phases, which are difficult to predict. Hence the importance of being open to change and planning for unforeseen eventualities.

Sessions 2 & 6: Sediments

Victoria Ortiz of the Bundesanstalt für Wasserbau and Ann-Margret of Chalmers University summarised the sessions on 2. Sediments & Tides and 6. Sediment Quality. The conclusions from the two sessions were that sand extraction can be turned into a benefit and rather than being a problem. In general, the relocation of sediments should aim to achieve balance in terms of ecology and hydromorphology. In the case of BAW's feasibility study into the reconnection of the Dove/Elbe, they successfully applied numerical modelling to anticipate the effects of the measure. They excavated an anabranch, which increased tidal volume and decreased tidal range and pumping. The session also agreed that any measures with an impact on stakeholders is a challenge, and that even the best measure will not work without stakeholder support. Similarly, MOW's measure developing a cross-border solution or sediment management showed a stepwise approach, working within constraints for maximum effects. In the session of sediment quality, the group discussed the recovery of metals, degradation of organics and re-use of sediments after treatment can all be harnessed to create value for society. This included the comparison of different treatment methods, concluding that it's important to be creative and think outside the box when it comes to developing new solutions to complex problems. In terms of mapping the transport of pollutants, the groups discussed how particles can degrade, be eaten or react with other particles, and that



sediments are often a source of pollutants due to legacy pollution from earlier times. The required modelling is therefore very complex and requires further research. Models that can be applied include ecotoxicological; chemical; biochemical; partitioning and hydrodynamic models.

Session 3: Water quality

Ben Lamb of Tees Rivers Trust summarized that behavioral changes are needed to address several estuary pressures, especially water quality. There are elements of optimism in the presented measures (even if they are a bit theoretical – referring to the co-location of mariculture). As regards the reduction of microplastics, interventions seem to be promising and possible (use of biological agents to filter). There were calls for estuary managers to establish a nature recovery network with a focus on nature-based solutions as a low-cost and resilient approach to estuary management in the future, and green financing mechanisms such as carbon credits to get the ball rolling.

Session 5: Habitat Creation

Frederik Roose of MOW summarized this session, concluding that as shown by IMMERSE, the upscaling of pilots is possible (intertidal habitat creation). In any pilot you have to continuously re-assess and adapt. The group agreed that a stepwise approach is also the best, and to stay optimistic in the face of setbacks during planning and implementation, such as red tape, stakeholder acceptance and other hurdles. The group emphasized the importance of being open to change, and to keep monitoring and incorporate data into an adaptive, holistic, process-based management strategy.



Final Plenary Session

Conclusions of the Day

The final session of the day saw conclusions being drawn from the breakout sessions summarized above, as well as further discussion with IMMERSE partners on the long-term impact of the IMMERSE project and how the momentum gained in the project can be maintained into the future. Participants were engaged again via the Slido app to evaluate the impact of the IMMERSE approach and share their take-home message of the day and from the IMMERSE project as a whole.

Increased stakeholder acceptance of measure designs and subsequent implementation

Would you say the IMMERSE approach (transnational exchange & stakeholder engagement) improves the quality of estuary management strategies?

28 

Yes



No



Not sure



What should be the final statement of the IMMERSE project?

- *Providing input to the European discussion on habitat restoration in view of the European biodiversity strategy 2030*
- *Think big. Start small*
- *There are many aspects and therefore also many stakeholders to a complex system like an estuary. Hence, chances are high you are one of them (stakeholders)*
- *Estuarine management has to be integrated and process-based and requires the matching (long-term) monitoring.*
- *Implement strategies step by step with endless endurance*
- *Holistic view and Corporation*
- *Think, Learn, Share and Adapt when managing an estuary.*
- *Integrated set of solutions for variety of problems with and for various stakeholders*
- *Together we are stronger!*
- *Implementation of Measures*
- *System and process approach!*
- *Think holistic and locally while taking the stakeholders by hand through it*
- *Caring for estuaries involves monitoring, studying, researching, testing and preparing for future scenarios*
- *Sharing knowledge between partners will lead to better solutions and future planning of estuary management.*
- *Exchange of knowledge and experience*



- *Monitoring is crucial to elaborate measures*
- *It is complicated*
- *Learning together to manage together*
- *Nature based solutions*
- *Interact at the beginning with stakeholders*
- *Learn from each other.*
- *Exchange of practices*
- *Adaptation*
- *Engage stakeholders to make them drivers of change*
- *Work together and think long term*
- *A healthy estuary benefits all!*
- *Patience*

Participant Evaluation Forms

What was your highlight of the conference?

- *Keynote presentations*
- *Broadening insight into ecological & socioeconomic interconnections*
- *Inspirational & well organized!*
- *Panel discussion on international cooperation*
- *The 'Big Picture' from Christian Ridder*
- *Transnational exchange & discussions*
- *Fresh perspectives*
- *Plenty of coffee breaks to meet people & talk in person*
- *Inspiration*
- *Networking*
- *Interactivity*
- *Knowledge transfer*

Will you use any content for your future work?

- *Holistic & collaborative approach*
- *Contacts, insights & presentations from breakout sessions*
- *Push for more studies on system understanding*
- *Content from presentations*
- *The 'Big Picture' from Christian Ridder*
- *Use of biot / bioactives for water treatment*
- *Improving sediment-bound pollutant modelling*
- *Apply process-based management & monitoring*
- *Use of sediment for tidal dampening*
- *Citizen science for monitoring*
- *Outcomes of Scheldt cross-border pilot*
- *Adaptive / responsive management*
- *Look for solutions in other regions more proactively*



- *Cited literature*
- *Ecological models & nature-based solutions*
- *Gathering concepts for flood risk management*
- *Learning about pilot projects*
- *Positive impacts of restoration projects for tidal amplitude*
- *Creation of intertidal areas to mitigate tidal amplification & benefit ecology*
- *Urgently adopt pollution issues into management measures*
- *Mike Elliott's presentation as a "helicopter view"*

Would you support an annual international event or webinar dedicated to estuary management?

- Yes **100%** (2-3 days biannually)
- No 0%

Participant List

First Name	Last Name	Organisation
Pedro	Brosei	s.Pro (EPCO for IMMERSE)
Annelies	Boerema	IMDC
Frederik	Roose	Department of Mobility and Public Works
Joergen	Grubbe	Holbaek Municipality
Michael	De Beukelaer-Dossche	Vlaamse Waterweg NV
Steven	Kaptein	WL
Marcel	Taal	Deltares
Cynthia	Pauwels	Port Of Antwerp
Joris	Vanlede	WL
Jürgen	Suffis	Maritieme Toegang
Eline	Van Malderen	MOW
Mark	Zindorf	Bundesanstalt für Gewässerkunde
Joost	Backx	Rijkswaterstaat
Beatrice	Claus	WWF Deutschland
Victoria	Ortiz	Federal Waterways Engineering and Research Institute (BAW)
Holger	Rahlf	Federal Waterways Engineering and Research Institute (BAW)
Daniel	Ruppert	WWF
Ann-Margret	Strömvall	Chalmers University Technology
Dieter	Sauvage	Mow
Bart	De Maerschalc	Flanders Hydraulics Research
Daniel	Parsons	University of Hull
Jannie	Dhondt	De Vlaamse Waterweg NV
Kirsten	Wolfstein	HPA



Anna	Norén	Chalmers University of Technology
Marta	Merino	The Danish Coastal Authority
Charlotte	Hebditch	Tees Rivers Trust
Jurre	de Vries	Rijkswaterstaat
Lotte	Meldaard	Sweco
Amrit	Cado	Deltares
Jeroen	Stark	Flanders Hydraulics Research
Daniela	da Rosa	Niedersachsen Ports
Frederick	Bruce	s.Pro
Johan	Wulteputte	VO
Fabian	Große	Federal Institute of Hydrology, Germany
Gijsbert	van Holland	IMDC
Gunther	Van Ryckegem	Research Institute for Nature and Forest
Joachim	Vansteenkiste	IMDC
Patrick	Van Goethem	Maritieme Toegang
Youri	Meersschaut	Vlaamse Overheid - dep MOW - Maritieme Toegang
Matthias	Sandra	VLIZ
Qilong	Bi	Flanders Hydraulics Research
Tom	Maris	Universiteit Antwerpen
Christian	Ridder	BUSINESS as VISUAL
Ben	Lamb	Tees Rivers Trust
Joost	Vanoverbeke	INBO
Piet	Thys	De Vlaamse Waterweg nv
Valerie	Biernaux	Antea Group
Bart	Hendrikx	Rijkswaterstaat WVL
Erika	Van den Bergh	INBO
Dick	As	Rijkswaterstaat Noord-Nederland
Sytske	Hoekstra	Provincie Fryslân
Jos	Brils	Deltares & SedNet
Lucy Gwen	Gillis	IMDC
Willem	Vuylsteke	MOW - Policy division
Patrick	Meire	University of Antwerp
Frank	Neumann	IMIEU
Dieter	Meire	Waterbouwkundig Laboratorium