



ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA



European Maritime Days

HOW LIFE ADDRESSES MARINE POLLUTION

20-21 May 2021

LIFE MARINAPLAN PLUS

**An innovative technology for
sustainable marine and coastal
seabed management near
harbours**

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ENVIRONMENTAL ISSUES ADDRESSED

The problem: Sediment dynamic in harbours and ports usually creates **sedimentation** and/or **erosion** concerns, producing navigability limitations or beach erosion.

The available solution: **Dredging**, which is a well-known and effective technology, but accompanied by high environmental impacts.

The environmental issues related to dredging:

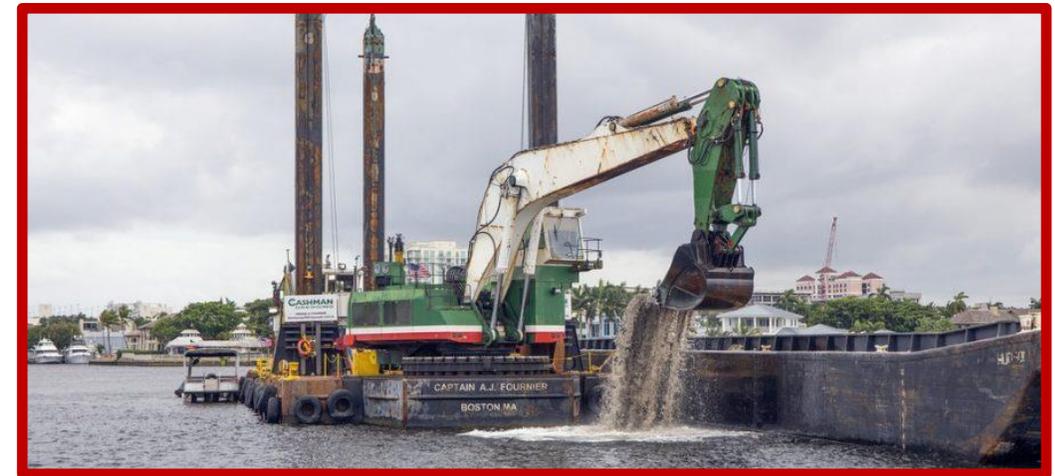
- sediment **dispersion** and **resuspension**,
- **turbidity**,
- damaging of marine **fauna and flora**,
- emissions (**GHGs and pollutants**) into air and water,
- **underwater noise**.

Moreover, dredging has also relevant technical and economic issues:

- negative impact on water bathing,
- variable cost,
- complicated routes for permit/authorization,
- during operations, the dredge hinders navigation,
- the dredge cannot operate if the weather and sea conditions do not allow it,
- the dredge is not always available.



Bray Harbour (Ireland)



Mechanical dredge in operation



LIFE MARINAPLAN PLUS: EXPECTED RESULTS

TRL-5

Riccione
16 ejectors



2005

TRL-6

Portoverde
2 ejectors



2012

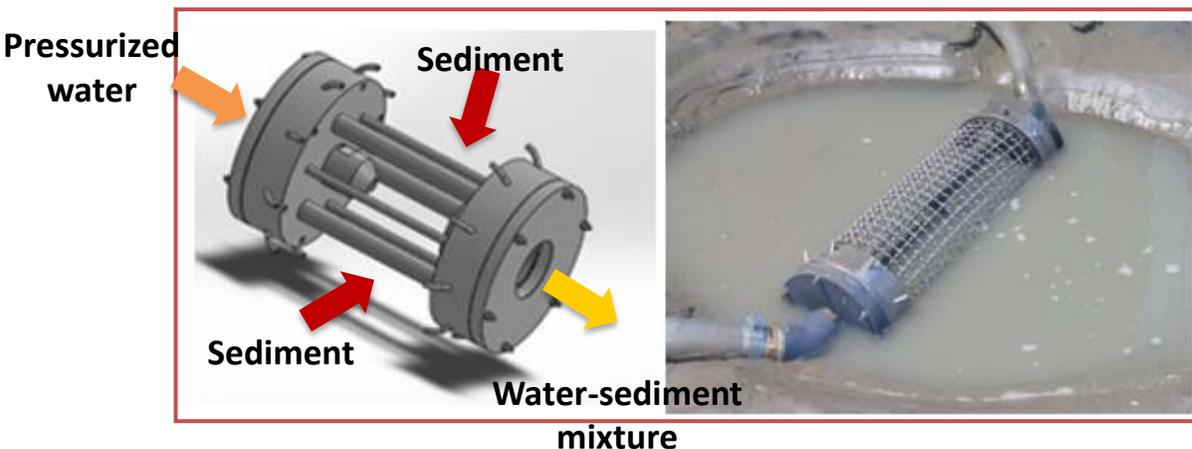
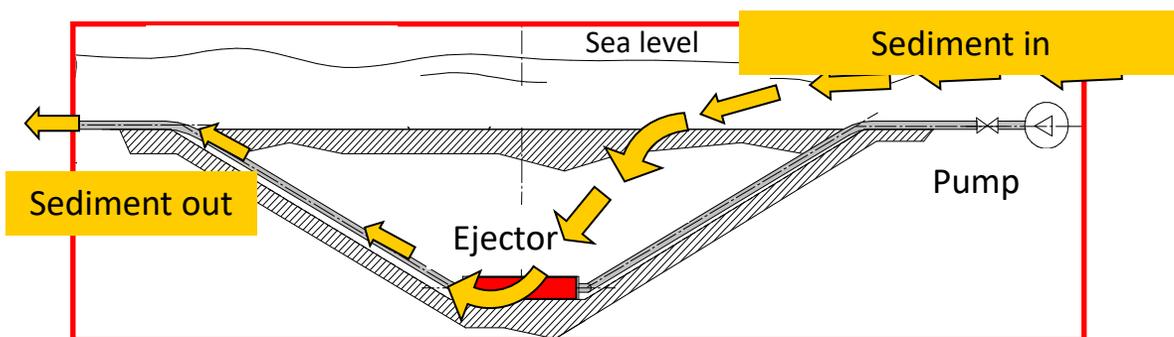
TRL-7

Cervia
10 ejectors



2016

2020



Expected results to be reached within the LIFE project

Bring the ejectors plant technology **over TRL-7** through the realization of a **demo plant**

Monitoring for at least 15 consecutive months demo plant operation

Environmental impact assessment

Develop a **business model**

Evaluate the impact and synergies with **Maritime Spatial Planning**

Reliable and innovative technology for the realization of a sustainable marine and coastal seabed management plan:

LIFE MARINAPLAN PLUS (LIFE15 ENV/IT/000391)



COMUNE
DI CERVIA



ICOMIA
INTERNATIONAL COUNCIL OF
MARINE INDUSTRY ASSOCIATIONS

Total budget: 2.519 mil Euro

EC contribution: 1.453 mil Euro (57.7%)

Project duration: Oct 2016 – Dec 2020



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LIFE MARINAPLAN PLUS: DEMO PLANT VIDEO



→ Link to the video <https://www.youtube.com/watch?v=BtAm1xOK1F0>



LIFE MARINAPLAN PLUS: MAIN RESULTS ACHIEVED

No impact on marine fauna and flora

Species richness of marine macro-invertebrates, reduced in the impacted area near the harbour before demo plant operation started, **significantly increased only eight months after the demo plant was put into operation.**

No impact on underwater noise

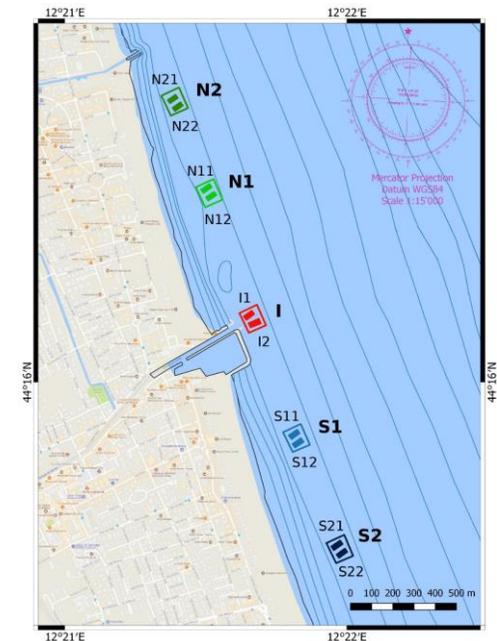
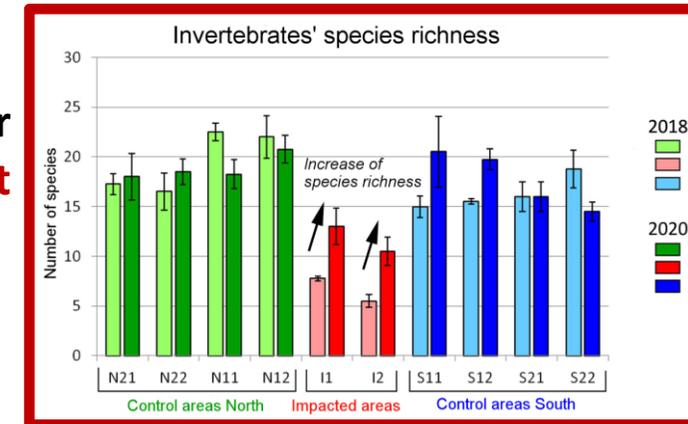
The ejectors had **no impact on underwater noise level.**

Potential for GHGs and pollutants emission reduction

Emission (kg/year)	Dredging	Ejectors plant	Ejectors plant powered by renewables
CO ₂	59096 (100%)	82%	5%
CO	138 (100%)	10%	<1%
NO _x	1468 (100%)	2%	<1%
SO _x	374 (100%)	3%	<1%
VOC	52 (100%)	23%	2%

Effectiveness demonstrated

The demo plant **operated continuously for 15 months** by keeping the minimum water depth always over the target of 2.5 meters at the harbour entrance.



References:

https://www.mdpi.com/2077-1312/9/2/197/review_report
<https://www.iadc-dredging.com/article/sustainable-coastal-seabed-plan/>

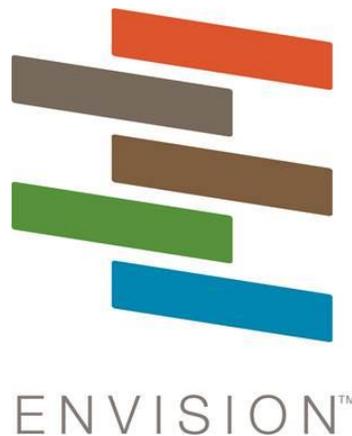


LIFE MARINAPLAN PLUS: MAIN RESULTS ACHIEVED

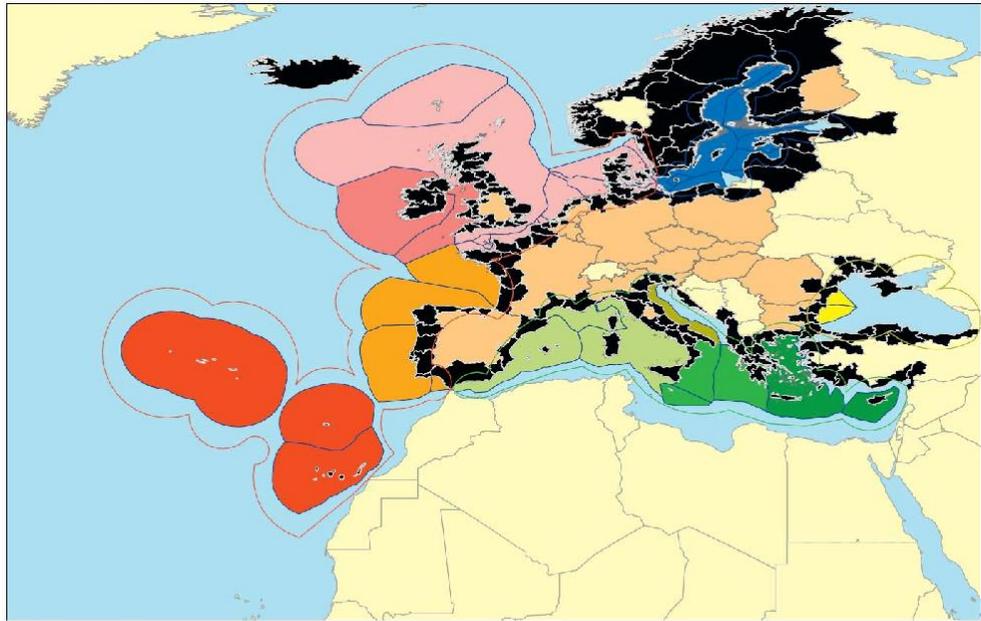
Involvement of stakeholders – crucial especially in the design phase



(Un-expected) cross-border cooperation



CONCLUSIONS



Marine Regions (MSFD) Marine Subregions (MSFD)

— Baltic Sea	Greater North Sea	— Aegean Levantine Sea	— Western Mediterranean Sea	— Coastal Regions (NUTS 2)
— Atlantic NE Ocean	Celtic Sea	— Ionian Sea	— Bay of Biscay and Iberian Coast	— EU member states
— Mediterranean Sea	Baltic Sea	— Adriatic Sea	— Black Sea	
— Black Sea		— Atlantic Ocean		



The ejectors plant technology is a key element for **effective and sustainable planning of sediment management** within maritime space management plans, especially in harbour and port areas, because:

- ejectors plant adoption helps to **mitigate the pressure produced by anthropogenic activities on the marine ecosystem**, since it generates substantially zero impacts on biodiversity, bottom integrity and underwater noise indicators, unlike the dredge;
- when coupled with **renewable energy sources**, the ejectors plant impact on greenhouse gas emissions is negligible and can have **relevant equivalent CO₂ and pollutant emissions reduction** if compared with traditional dredging.





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