D2.3 – Scientific contributions

Reliable and innovative technology for the realization of a sustainable MARINe And coastal seabed management PLAN

LIFE Environment and Resource Efficiency project
LIFE15 ENV/IT/000391

Start Date: 01/10/2016
Expected End Date: 31/12/2020

Type of Protocol: Public

Delivery date:
20/12/2020

Last update:
27/12/2020

Project partners

TREVI	**Coordinating beneficiary: TREVI S.P.A.** Private Commercial R&D Project Engineer Via Dismano 5819 47522, Cesena – Italy http://www.trevispa.com Contact: Giovanni Preda - gpreda@trevispa.com
COMUNE DI CERVIA	**Associated beneficiary: Comune di Cervia** Public Body Piazza G. Garibaldi 1 48015, Cervia – Italy http://www.comunecervia.it Contact: Simona Melchiorri - melchiorris@comunecervia.it
ICOMIA International Council of Marine Industry Associations	**Associated beneficiary: International Council of Marine Industry Associations - ICOMIA** Private non-commercial Brigade Pironlaan 132 B-1080, Brussels - Belgium http://www.icomia.com Contact: Albert Willemsen - Albertw@icomia.com
ALMA MATER STUDIORUM A.D. 1088	**Associated beneficiary: ALMA MATER STUDIORUM - Università di Bologna** Public Body Via Zamboni 33 40126, Bologna – Italy http://www.unibo.it Contact: Augusto Bianchini - augusto.bianchini@unibo.it

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Chapter 1. Introduction

Dissemination actions started from the very beginning of the project, involved all the partners and followed the natural evolution of the project (i.e. demo plant design, demo plant installation, preliminary results, final results, environmental and economic assessment).

The main responsible of project dissemination from a scientific perspective was University of Bologna, but all the partners were actively involved in several of the publications included in the Deliverable.

The final goal of the dissemination activities was to publish at least two papers in peer-reviewed scientific journals, which has been achieved at the beginning of 2020.

Face-to-face dissemination actions were limited starting from March 2020 due to the Covid-19 pandemic. In particular, the participation to conferences, exhibitions, workshops, etc... was strongly limited or forbidden, and many of these dissemination actions were postponed or moved on-line.

Chapter 2. Papers published on international peer-reviewed journals

The following papers has been published on international peer-reviewed and indexed journals.

Sediment management in coastal infrastructures: techno-economic and environmental impact assessment of alternative technologies to dredging

Author(s): Bianchini A. (Unibo-DIN), Cento F. (Unibo-DIN), Guzzini A. (Unibo-DIN), Pellegrini M. (Unibo-DIN), Saccani C. (Unibo-DIN).

Journal: Journal of Environmental Management, vol. 248, article number 109332

Journal indexing: https://www.scimagojr.com/journalsearch.php?q=23371&tip=sid

Year: 2019

Link: https://www.sciencedirect.com/science/article/pii/S0301479719310412

Abstract: *The presence of anthropic activity in the coastal or riverine environment modifies the wave as well as the water and sediment current regime. In particular, the body of water around ports is an area where intense currents and sediment transport rates are usually present and can be affected by low water velocities that take place close to the entrance and inside the port basin. Consequently, sediment can be entrained and accumulated in such areas, creating problems to navigation. Ports and moorings are filled with fine sediments due to deposition resulting from solid transport. In particular, silt particles settle because of the weak vertical and lateral shearing of the velocity field. The result is that harbours frequently require ordinary maintenance dredging. The dredging process involves the removal of sediment in its natural deposited condition by using either mechanical or hydraulic equipment. Dredging is a consolidated and proven technology, but involves considerable drawbacks. In particular, dredging has a notable environmental impact on marine flora and fauna, contributes to the mobility and diffusion of contaminants and pollutants already present in the silted sediments, obstructs navigation and is characterized by relatively high and low predictable costs. This paper aims to provide an original structured overview of technologies alternative to dredging that have been tested in the past 50 years. More than 150 articles have been analysed to compare standard dredging technologies with market-ready competitors from techno-economic and environmental perspectives. In particular, the paper focuses on anti-sedimentation infrastructures and on innovative plant solutions characterized by low maintenance costs and by a very limited environmental impact. The final aim of the paper is to describe the currently available technologies that prevent port inlet and channel siltation and to classify them through a techno-economic and environmental impact assessment. The comparison shows that dredging has both the higher costs and environmental impact, while fixed sand by-passing plants are characterized by the lowest environmental impact and operation costs that are competitive with dredging.*

D2.3 – SCIENTIFIC CONTRIBUTIONS

Sustainable sediment management in coastal infrastructures through an innovative technology: preliminary results of the MARINAPLAN PLUS LIFE project

Author(s): Pellegrini M. (Unibo-DIN), Abbiati M. (Unibo-CIRSA), Bianchini A. (Unibo-DIN), Colangelo M. (Unibo-CIRSA), Guzzini A. (Unibo-DIN), Mikac B. (Unibo-CIRSA), Ponti M. (Unibo-CIRSA), Preda G. (Trevi), Saccani C. (Unibo-DIN), Willemsen A. (Icomia).

Journal: Journal of Soils and Sediments, vol. 20, pag. 2685-2696.

Journal indexing: https://www.scimagojr.com/journalsearch.php?q=99584&tip=sid&clean=0

Year: 2020

Link: https://link.springer.com/article/10.1007/s11368-019-02546-6

Abstract: *The paper aims to show the preliminary monitoring and field test results of the innovative technology tested in the framework of the MARINAPLAN PLUS LIFE project for sustainable management of sediment in harbour areas. The technology is based on a patented jet pump that will be able to keep the seabed at a certain level over the time through a continuous removal of silting sediments. Preliminary field tests were performed to optimise the design of the demo plant and a monitoring plan was devised to evaluate the technical, economic and environmental impacts of the technology, in particular in comparison with dredging. The preliminary tests showed promising results in terms of efficacy and efficiency of the sediment bypassing device. At the maximum sediment removal capacity, the ejector tested in Cervia showed a sediment flow rate of about 2 m^3 $h-1$, with an electric consumption of about 3.5 kW, and an influence diameter of about 5–7 m, after 15 days of working operation. On the basis of the preliminary results, a 10-ejector demonstrator plant has been designed and realised, and it is now in operation. The analysis of sediment and marine flora and fauna in the installation area in comparison with control areas indicates the negative impact of cyclic dredging in the harbour inlet area. The innovative technology promoted by the MARINAPLAN PLUS LIFE project is a promising solution to manage sediment siltation in harbour areas through a cost-effective and low environmental impact technology. The monitoring of the demo plant operation is fundamental to fully validate the technology and to demonstrate its efficacy and sustainability.*

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Coastal erosion mitigation through ejector devices application

Author(s): Pellegrini M. (Unibo-DIN), Bianchini A. (Unibo-DIN), Guzzini A. (Unibo-DIN), Saccani C. (Unibo-DIN), Gaeta M.G. (Unibo-DICAM), Archetti R., (Unibo-DICAM).

Italian Journal of Engineering Geology and Environment, vol. 1, pag. 13-22.

Journal indexing: https://www.scimagojr.com/journalsearch.php?q=19700202707&tip=sid&clean=0

Year: 2020

Link: http://www.ijege.uniroma1.it/rivista/scacr19-9th-11th-september-2019-short-course-conference-on-applied-coastal-research-2019/coastal-erosion-mitigation-through-ejector-devices-application/ijege-20_special_issue_bianchini_et_al.pdf

Abstract: *To mitigate coastal erosion and harbors siltation, new strategies are required in the immediate term. In fact, even if many traditional solutions are available, their application is usually limited due to economic, environmental and social reasons. This situation is particularly evident in the case of small marinas or in those areas where the local economy is strongly affected by harbor operation such as in the case of the port of the municipality of Cervia (Italy). To solve the problem occurred in this specific case, an innovative device, called the "ejector", is proposed and implemented in a dedicated experimental plant characterized by low operative costs and no environmental impact. Starting from the description of the technology, the paper aims to show the ejector's potentials with respect to siltation and erosion problems. For the purpose the first results derived from the application in the case study at the municipality of Cervia are reported.*

Chapter 3. Papers and abstracts published in international and national conferences

The list of papers and abstracts published in conference proceedings by the project partners is given as follows:

Sustainable sediment management in coastal infrastructures through an innovative technology: the MARINAPLAN PLUS LIFE project

Book of Abstracts 11th International SedNet Conference, Sediment as a dynamic natural resource from catchment to open sea, pg. 86, 3-5 April 2019, Dubrovnik.

Author(s): Pellegrini M. (Unibo-DIN), Bianchini A. (Unibo-DIN), Preda G. (Trevi), Saccani C. (Unibo-DIN), Willemsen A. (Icomia).

Link:
https://www.researchgate.net/publication/332344491_Sustainable_sediment_management_in_coastal_infrastructures_through_an_innovative_technology_the_MARINAPLAN_PLUS_LIFE_project

Dredging disturbance imprinted in the structure of benthic communities: The case of the Port of Cervia

Book of abstracts, 2nd International Conference on Community Ecology, pg. 106-108, 4-6 June 2019, Bologna (Italy).

Author(s): Mikac B. (Unibo-CIRSA), Ponti M. (Unibo-CIRSA), Colangelo M.A. (Unibo-CIRSA), Abbiati M. (Unibo-CIRSA)

Link: https://cris.unibo.it/handle/11585/715475#.Xn4YPHLSJPY

Coastal erosion mitigation through ejector devices application

Proceedings of the 9th Short Course/Conference on Applied Coastal Research – Coastal zone strategies under climate change: engineering, geology, ecology, management and adaptation, pag. 13-18, 9–11 September 2019, Bari. ISBN: 978-88-97181-73-6

Author(s): Bianchini A. (Unibo-DIN), Guzzini A. (Unibo-DIN), Pellegrini M. (Unibo-DIN), Saccani C. (Unibo-DIN), Gaeta M.G., Archetti R.

Link:
https://www.researchgate.net/publication/339079325_Coastal_erosion_mitigation_through_ejector_devices_application?ev=project

Tecnologie innovative ad eiettori per la gestione sostenibile di fondali costieri, bocche portuali e porti turistici

Atti dei Convegni, Gestione sostenibile dei sedimenti e crescita blu in ambito costiero e nei medi e piccoli porti, Ecomondo, pag. 379-385, Rimini, 5-8 novembre 2019. ISBN: 978-88-916-3857-1.

Author(s): Pellegrini M. (Unibo-DIN), Saccani C. (Unibo-DIN).

Link:
https://www.researchgate.net/publication/340127381_Tecnologie_innovative_ad_eiettori_per_la_gestione_sostenibile_di_fondali_costieri_bocche_portuali_e_porti_turistici

Chapter 4. Presentations and posters shown in international and national conferences, meetings, workshops

A list of contributions to international and national conferences, meetings and workshops is given below per main responsible and in chronological order.

Responsible	*Preda G. (Trevi)*
Other partners	-
Title	*Innovazione tecnologica ed evoluzione normativa*
Kind of contributions	*Presentation*
Event	*"Sedimenti marini: caratterizzazione, dragaggio, trattamento e riutilizzo",* Assoporti, 18th May 2017, Roma (Italy).

Responsible	*Preda G. (Trevi)*
Other partners	-
Title	*Dissabbiamento dei porti: il progetto LIFE Marinaplan Plus*
Kind of contributions	*Presentation*
Event	Workshop with the Port Authority of Taranto, 19th September 2017, Taranto (Italy).

Responsible	*Preda G. (Trevi)*
Other partners	-
Title	*L'approccio tecnologico a supporto della sostenibilità: esperienze in cantiere e ricerche di una grande Impresa*
Kind of contributions	*Presentation*
Event	*"La sostenibilità nel progetto e nei cantieri di costruzione: come le competenze professionali degli ingegneri possono generare valore",* Forlì and Cesena Order of Engineers, 10th November 2017, Forlimpopoli (Italy).

Responsible	*Preda G. (Trevi)*
Other partners	-
Title	*ENV/IT/000391 Marinaplan Plus, un innovativo progetto contro l'insabbiamento delle bocche di porto e per la gestione sostenibile dei sedimenti*
Kind of contributions	*Presentation and posters*
Event	*"L'Italia dei Porti - IV Sessione Casi applicativi e best practice per la gestione dei sedimenti",* Remtech Exhibition, 20th September 2017, Ferrara (Italy).

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Responsible	*Preda G. (Trevi)*
Other partners	-
Title	*Trevi e l'ambiente*
Kind of contributions	*Presentation*
Event	Workshop with Syndial Spa, 13th March 2018, Milan (Italy).

Responsible	*Preda G. (Trevi)*
Other partners	-
Title	*LIFE Marinaplan Plus Project Pre-assessment del progetto con protocollo Envision*
Kind of contributions	*Presentation*
Event	*"Costruire sostenibile: la certificazione EPD e il protocollo Envision"*, Ravenna Lab, 17th May 2018, Ravenna (Italy).

Responsible	*Preda G. (Trevi)*
Other partners	*Pellegrini M. (Unibo-DIN), Willemsen A. (Icomia)*
Title	-
Kind of contributions	*Posters*
Event	International Boat Exhibition, Assomarinas stand, 18th September 2018, Genova (Italy).

Responsible	*Preda G. (Trevi)*
Other partners	-
Title	*Ejector technology: short overview on technological, economic and environmental benefits*
Kind of contributions	*Presentation*
Event	*"Ricerca e innovazione nella gestione dei sedimenti in ambito portuale"*, 26th September 2019, Bologna (Italy).

Responsible	*Preda G. (Trevi)*
Other partners	-
Title	*An innovative system for the sustainable management of sediment in water basins: the ejector technology*
Kind of contributions	*Presentation*
Event	*"Sediment management in harbours and other water basins - Italian innovation that can be adopted in Lebanon"*, 28th May 2020, on-line.

Responsible	*Preda G. (Trevi)*
Other partners	*Pellegrini M. (DIN)*
Title	*Applicazioni industriali di tecnologie innovative per la gestione dei sedimenti in ambito costiero e portuale*
Kind of contributions	*Presentation*
Event	*"Gestione e riuso dei sedimenti in ambito costiero da fonti litoranee, strutture portuali, bacini artificiali e corsi d'acqua, per una crescita blu sostenibile"*, Ecomondo, 3rd November 2020, on-line.

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Responsible	*Preda G. (Trevi)*
Other partners	-
Title	*Il Progetto LIFE MARINAPLAN PLUS – risultati raggiunti e nuovi obiettivi*
Kind of contributions	*Presentation*
Event	*"La tecnologia innovativa per una gestione sostenibile dei sedimenti in ambito portuale", Final LIFE MARINAPLAN PLUS project conference,* 10th December 2020, on-line.

Responsible	*Saccani C. (Unibo-DIN)*
Other partners	-
Title	*LIFE MarinaPlan Plus project – the industrial plant for seabed redesign in port areas*
Kind of contributions	*Presentation*
Event	"*Blue Growth – Green harbours: Ravenna port as model in the framework of the World Harbour Project*", 18th May 2017, Ravenna (Italy).

Responsible	*Saccani C., Pellegrini M. (Unibo-DIN)*
Other partners	-
Title	*Tecnologie innovative per una gestione sostenibile dei fondali marini e costieri che previene le esigenze di dragaggio*
Kind of contributions	*Presentation*
Event	"*COAST conference*", RemTech Exhibition, 21st September 2018, Ferrara (Italy).

Responsible	*Saccani C., Pellegrini M. (Unibo-DIN)*
Other partners	-
Title	*Innovative technologies for sustainable marine and coastal seabed management preventing dredging needs*
Kind of contributions	*Presentation*
Event	"*How to make Sediment Management part of Blue Growth in the Mediterranean Sea*", Ecomondo Exhibition, 9th November 2018, Rimini (Italy).

Responsible	*Pellegrini M., Saccani C., Bianchini A. (Unibo-DIN)*
Other partners	*Preda G. (Trevi)* *Willemsen A. (Icomia)* *Giovannini L., Ghedini E. (Cervia Municipality)*
Title	*Sustainable sediment management in coastal infrastructures through an innovative technology: the MARINAPLAN PLUS LIFE project*
Kind of contributions	*Poster and pitch presentation*
Event	"*11th International SedNet Conference*", 3rd April 2019, Dubrovnik (Croatia).

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Responsible	*Pellegrini M., Saccani C., Bianchini A., Guzzini A. (Unibo-DIN)*
Other partners	-
Title	*Coastal erosion mitigation through ejector devices application: the case study of Cervia*
Kind of contributions	*Presentation*
Event	"*International Short Course/Conference on Applied Coastal Research Engineering, Geology, Ecology & Management*", SCACR19, 10th September 2019, Bari (Italy).

Responsible	*Pellegrini M., Saccani C. (Unibo-DIN)*
Other partners	-
Title	*Tecnologie innovative ad eiettori per la gestione sostenibile di fondali costieri, bocche portuali e porti turistici*
Kind of contributions	*Presentation*
Event	"*Gestione sostenibile dei sedimenti e crescita blu in ambito costiero e nei piccoli e medi porti*", Ecomondo Exhibition, 5th November 2019, Rimini (Italy).

Responsible	*Pellegrini M. (Unibo-DIN)*
Other partners	-
Title	-
Kind of contributions	*Participation to the networking table "Ports & maritime infrastructures onshore & offshore (transport, energy, industry, etc.), maritime transport, shipping, cruising".*
Event	"*Maritime Spatial Planning in Italy and in the Western Mediterranean Basin*", 25th June 2020, on-line.

Responsible	*Pellegrini M., Saccani C. (Unibo-DIN)*
Other partners	-
Title	*Il progetto LIFE MARINAPLAN PLUS – visione e obiettivi*
Kind of contributions	*Presentation*
Event	"*La tecnologia innovativa per una gestione sostenibile dei sedimenti in ambito portuale*", LIFE MarinaPlan Plus final conference, 10th December 2020, on-line.

Responsible	*Mikac B., Ponti M., Colangelo M.A., Abbiati M. (Unibo-CIRSA)*
Other partners	-
Title	*Dredging disturbance imprinted in the structure of benthic communities: The case of the Port of Cervia*
Kind of contributions	*Poster*
Event	*"2nd International Conference on Community Ecology"*, 4-6 June 2019, Bologna (Italy).

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Responsible	*Ponti M. (Unibo-CIRSA)*
Other partners	-
Title	*Gli impatti sull'ecosistema marino delle attività finalizzate alla gestione dei sedimenti, dal dragaggio al ripascimento*
Kind of contributions	*Presentation*
Event	*"L'impatto della gestione dei sedimenti sul turismo costiero"*, 28 September 2019, Riccione (Italy).

Responsible	*Mikac B. (Unibo-CIRSA)*
Other partners	-
Title	*Il Progetto LIFE MARINAPLAN PLUS – valutazione dell'impatto sull'ecosistema marino*
Kind of contributions	*Presentation*
Event	"*La tecnologia innovativa per una gestione sostenibile dei sedimenti in ambito portuale*", LIFE MarinaPlan Plus final conference, 10th December 2020, on-line.

Responsible	*Capitani D. (Cervia Municipality)*
Other partners	-
Title	*La strategia del Comune di Cervia per la rigenerazione dei luoghi identitari: i finanziamenti europei come veicolo di innovazione e sviluppo*
Kind of contributions	*Presentation*
Event	*"L'impatto della gestione dei sedimenti sul turismo costiero"*, 28 September 2019, Riccione (Italy).

Responsible	*Willemsen A. (Icomia)*
Other partners	-
Title	*LIFE MarinaPlan project*
Kind of contributions	*Presentation*
Event	ICOMIA meeting at Split (Croatia), June 2019.

Responsible	*Willemsen A. (Icomia)*
Other partners	-
Title	*LIFE MarinaPlan project*
Kind of contributions	*Presentation*
Event	ICOMIA shipyard meeting at Monaco Yacht Show, September 2019.

Responsible	*Willemsen A. (Icomia)*
Other partners	-
Title	*LIFE MarinaPlan project*
Kind of contributions	*Presentation*
Event	ICOMIA environment committee, November 2019.

Responsible	*Willemsen A. (Icomia)*
Other partners	-

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Title	*LIFE MarinaPlan project*
Kind of contributions	*Presentation*
Event	Navigation Task Force meeting, Brussels, November 2019.

Responsible	*Willemsen A. (Icomia)*
Other partners	-
Title	*LIFE MarinaPlan project*
Kind of contributions	*Presentation*
Event	IMG/ICOMIA Marina Group board meeting, February 2020.

Responsible	*Willemsen A. (Icomia)*
Other partners	-
Title	*LIFE MarinaPlan project*
Kind of contributions	*Presentation*
Event	IMG members meeting, August 2020.

Responsible	*Willemsen A. (ICOMIA)*
Other partners	*Preda G. (Trevi)*
Title	*LIFE MarinaPlan – anti-sedimentation system*
Kind of contributions	*Presentation*
Event	*"World Marinas Conference Industry Reconnect Webinar Series",* 20th October 2020, on-line.

Chapter 5. Milestones

Two dissemination activities are defined as LIFE MARINAPLAN PLUS project milestones:

- "*World Marinas Conference event by ICOMIA (workshop)*" – 01/10/2019;
- "*Final Conference of the Project*" – 08/11/2019.

Both milestones were postponed due to the prolongation up to 31/12/2020 of the project.

Furthermore, due to the SARS-CoV-2 pandemic and related worldwide restrictions, both dissemination activities have been organized as on-line events.

The **ICOMIA World Marinas Conference**, originally planned in Dubai in October 2020, moved on-line and the workshop "*Technology looking forward*" has been organized by ICOMIA on 20th of October 2020. The video of the event can be found at the following link, while the agenda is shown below.

https://www.youtube.com/watch?v=xg3ehsHJttU

3. Technology looking forward – (20th October at 11-12:30 UTC)

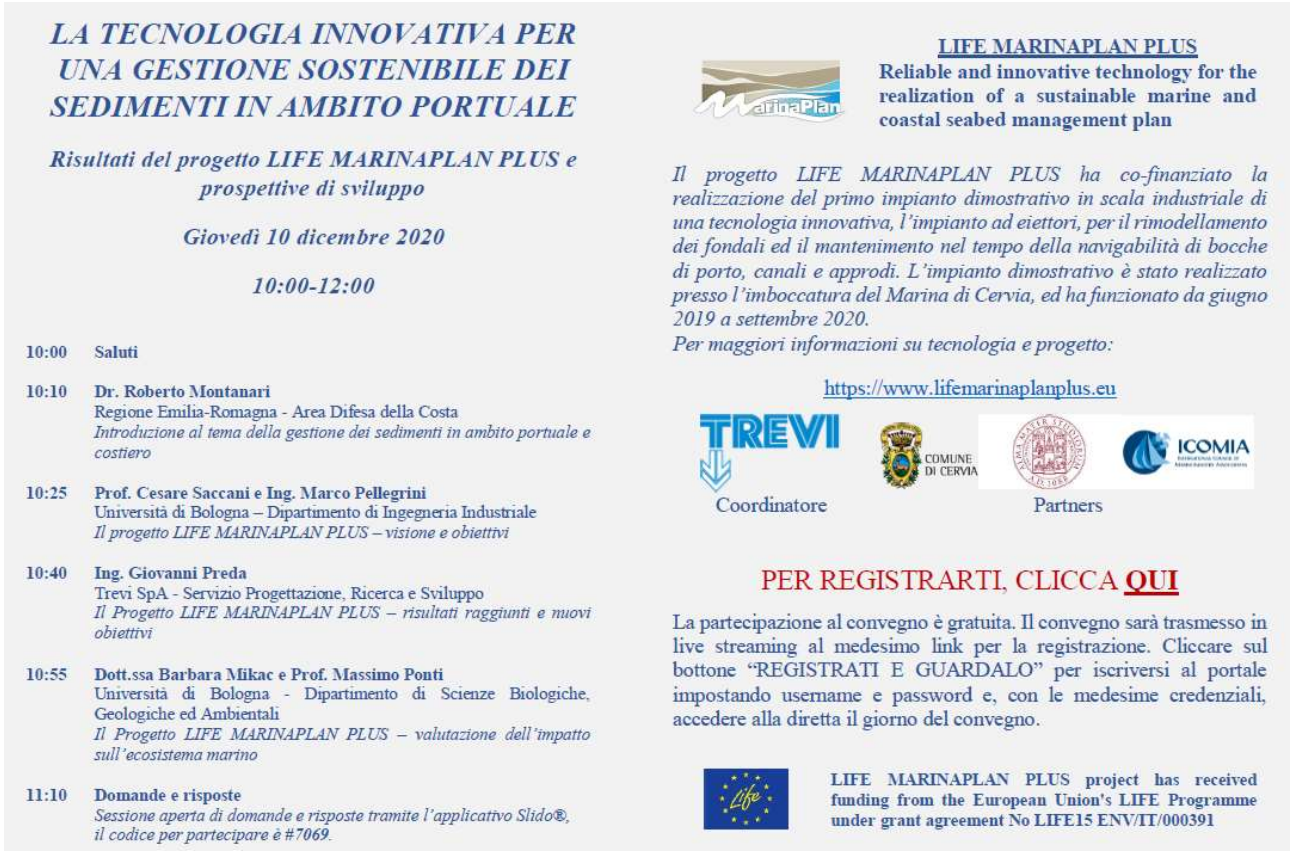
Insights on first changes in terms of technology in marinas (during the summer) and what the experts see as the focus for new developments.
Moderator: **Idan Cohen**

- Moderator Introduction
- **Albert Willemsen, ICOMIA** (Life Marina Plan)- anti-sedimentation system

- **Tom Mukamal, CEO of IGY Marinas** – The new era of marina-boater communication. Where this relationship is going and what are the differences between the biggest markets- US/Europe
- **Pontus Fernstrom, EMEA Marine Segment Director in Garmin Europe**– New boating technologies and how they change the way we do boating in the near future.
- **Shimrit Perkol-Finkel, ECOncrete** - Integrating environmentally sensitive technologies into the planning, design, and construction of urban, coastal, and marine Infrastructure.
- **Iaian Archibald**, **Swell Advantage** - Smart marinas and the technologies that can improve them.
- Q&A session

The final conference of MarinaPlan Plus project was originally planned in November 2020 as an in presence meeting with demo site visiting, but then it was moved on-line in December and organized

as a web conference. The event has been organized in Italian to maximize the dissemination impact on potential customers. The agenda is shown below.



LA TECNOLOGIA INNOVATIVA PER UNA GESTIONE SOSTENIBILE DEI SEDIMENTI IN AMBITO PORTUALE

Risultati del progetto LIFE MARINAPLAN PLUS e prospettive di sviluppo

Giovedì 10 dicembre 2020

10:00-12:00

10:00 **Saluti**

10:10 **Dr. Roberto Montanari**
Regione Emilia-Romagna - Area Difesa della Costa
Introduzione al tema della gestione dei sedimenti in ambito portuale e costiero

10:25 **Prof. Cesare Saccani e Ing. Marco Pellegrini**
Università di Bologna – Dipartimento di Ingegneria Industriale
Il progetto LIFE MARINAPLAN PLUS – visione e obiettivi

10:40 **Ing. Giovanni Preda**
Trevi SpA - Servizio Progettazione, Ricerca e Sviluppo
Il Progetto LIFE MARINAPLAN PLUS – risultati raggiunti e nuovi obiettivi

10:55 **Dott.ssa Barbara Mikac e Prof. Massimo Ponti**
Università di Bologna - Dipartimento di Scienze Biologiche, Geologiche ed Ambientali
Il Progetto LIFE MARINAPLAN PLUS – valutazione dell'impatto sull'ecosistema marino

11:10 **Domande e risposte**
Sessione aperta di domande e risposte tramite l'applicativo Slido®, il codice per partecipare è #7069.

LIFE MARINAPLAN PLUS
Reliable and innovative technology for the realization of a sustainable marine and coastal seabed management plan

Il progetto LIFE MARINAPLAN PLUS ha co-finanziato la realizzazione del primo impianto dimostrativo in scala industriale di una tecnologia innovativa, l'impianto ad eiettori, per il rimodellamento dei fondali ed il mantenimento nel tempo della navigabilità di bocche di porto, canali e approdi. L'impianto dimostrativo è stato realizzato presso l'imboccatura del Marina di Cervia, ed ha funzionato da giugno 2019 a settembre 2020.
Per maggiori informazioni su tecnologia e progetto:

https://www.lifemarinaplanplus.eu

Coordinatore Partners

PER REGISTRARTI, CLICCA **QUI**

La partecipazione al convegno è gratuita. Il convegno sarà trasmesso in live streaming al medesimo link per la registrazione. Cliccare sul bottone "REGISTRATI E GUARDALO" per iscriversi al portale impostando username e password e, con le medesime credenziali, accedere alla diretta il giorno del convegno.

LIFE MARINAPLAN PLUS project has received funding from the European Union's LIFE Programme under grant agreement No LIFE15 ENV/IT/000391