D 3.3.1
Study visit: Virtual exploration of the Adriatic Sea

Final Version of 30/06/2023

Deliverable Number D.3.3.1

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Partner in Charge	PP3 – Comune di Ravenna
Contributions	Massimiliano Menghini, Alessia Cariani, Luca De Marchi (LP- UNIBO); Silvia Ulazzi, Giulia Cillani, Matteo Parrinello (PP3 – Comune di Ravenna); Simone Libralato, Vinko Bandelj, Igor Celić, Diego Borme (PP4 – OGS); Cristina Frittelloni (PP1 – Agency Marche Agriculture and Fisheries) Marco Palma, Andrea De Camilli (external service PP3: Ubica); Giorgio Resci, Elisabeth De Maio (external service PP4: INKODE); with the support of: Riserva Naturale Marina di Miramare: Saul Ciriaco, Carlo Franzosini, Lorenzo Castelletto, Vera Cirina, Marco Segarich, Lisa Peratoner, Maurizio Spoto
Status	Final
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Partnership:

Summary

Executive Summary

The deliverable describes the activities conducted by the partnership for integrating results from the different cluster projects, i.e., projects SUSHIDROP, ADRIREEF, PRIZEFISH and FAIRSEA. This deliverable contains description of one element of each of the projects and how these elements were integrated and connected using a series of exercises and study visits as exemplificative approaches useful for the integration of previous projects results.
A relevant activity carried out was the study visit at Miramare Marine Protected Area (MPA) in Trieste, performed from November 15th 2022 to November 25th 2022. In particular, the scientific surveys were conducted at three identified sites within the MPA, that are:

- C1 buoy.
- Mambo buoy and sunken mussel farm. The reconstruction with Multibeam is interesting to assess the state of the structure, as MPA Miramare is considering the decommissioning of the structure. Multibeam survey were conducted.
- Shipwreck of a recent past sunken ship.

In these three sites multibeam survey were conducted. The purpose of this study visit was to collect acoustic data through the Multibeam and optical data through the cameras equipped on the Blucy Unmanned Underwater Vehicle (UUV), and provide this data to institutions and stakeholders involved in the blue economy.

List of abbreviations and terms

UUV	Unmanned Underwater Vehicle
MPA	Marine Protected Area
DVL	Doppler Velocity Log
SGUI	Scientific Graphic User Interface
SfM	Structure from Motion
MPA	Marine protected Area
GIS	Geographycal information system
ARFM	Adriatic Responsible Fishery Management

1. Planning and implementing the virtual study visit

TECHERA activities are conceived for transferring of key data-driven approaches from the implemented cluster beyond current partnership using demonstrations, live applications, virtual study visits. The study visit that is the focus of this deliverable was conceived as an occasion to test synergies among project products as well as demonstrate their applicability to new
areas, in particular of the ADRION Region. The basic idea is that TECHERA was focused on the potential for results to be transferred, updated, extended, replicated to other sites, considering also connections with other IT-HR projects.
Moreover, in order to adhere to the principles of FAIR open data, the project outputs are made fully documented and freely available for favouring transfer of data-driven solutions to other organizations, areas and countries. Moreover, different materials and interviews recorded during events and study visits were edited for creating a final video.
The approach implemented consisted in defining a study visit in the form of visual experience on reef data gathering, webGIS application and visualization to pool together the data-driven visual approaches of projects and test them against stakeholders. The virtual study visit is intended to illustrate the digital outputs of the cluster projects previous results and will be opened to students and interested workers of the blue sector. With this objective in mind the partnership conceived the idea of making a visit with the underwater drone developed in SUSHIDROP, using one of the areas previously classified by ADRIREEF. Mapping results would go into the FAIRSEA platform that will also include additional data and results from project PRIZEFISH.
Initial plans included the visit with the drone of one of the rocky outcrops in the northern Adriatic Sea (Trezza San Pietro Bardelli). Nevertheless, logistic difficulties and presence of previous mapping made the partnership to consider the Miramare area (close to Trieste) a much better target for:

- Protection importance and presence of some relevant features;
- Interesting submerged different structures in a close range from the coast;
- Possibilities to use facilities, experience and boat from the Riserva Naturale Marina di Miramare;
- Usefulness of the possible realized 3D maps for future activities of information and transfer of knowledge to young generations and beyond;
- Possibility for using results in successive events.

1.1 Partner's role and involvement

The organization of the study visit required a high level of organization of the project partners in order to conduct a successful monitoring. A team involving experts from the most involved partners (OGS, UNIBO, Comune di Ravenna) was responsible for planning and organizing the visit in terms of logistic and structure, closely cooperating with Lead Partner and WP3 Leader. UNIBO was responsible for the drone visit, assisted by experts from the Riserva Naturale Marina di Miramare and OGS. Comune di Ravenna participated in the elaboration of results also using external services from UBICA. OGS transferred results and maps into the integrated FAIRSEA platform also using the external service from INKODE. The organization required several meetings in early 2022 and it was concluded with the final event organized on the 7th June 2023 in collaboration among all participants mentioned above and the partner AMAP.

2. Results from previous projects used in the Study visit

The study visit was conceived as a series of actions done for integrating four results from the previous projects with the idea of demonstrating their interoperability. The description of the four main results obtained is presented below: Drone Blucy from SUSHIDROP, webGIS platform from ADRIREEF, ecological indicators from PRIZEFISH and integrated platform from FAIRSEA.

2.1 Underwater drone Blucy from SUSHIDROP

Blucy is the multipurpose Umanned Underwater Vehicle prototype developed within the Interreg Italy Croatia Sustainable fiSHeries wIth DROnes data Processing (SUSHI DROP) project. The vehicle was designed and developed with the goal of supporting sustainable fisheries while promoting biodiversity protection and restoration.

Blucy is equipped with acoustical and optical technologies to assess the environmental status of habitats, monitor the biodiversity of marine ecosystems, and evaluate the benefits of optical-acoustic surveys in deriving single species abundance indices for direct input into stock assessments.

To provide higher flexibility, Blucy is designed to be hybrid, meaning that it can operate either as Remotely Operated Vehicle (ROV) or as an Autonomous Underwater Vehicle (AUV).

The main technical features of Blucy are detailed below:

Blucy UUV Technical Information	
Operative Depth	150 m (300 m max)
Mission Time	6 hours
Number of propellers	• 4 Horizontal (2 Longitudinal, 2 Lateral) • 2 Vertical
Navigation Mode	• Remotely Operated (ROV) • Autonomous (AUV)
Communications	• USBL Transponder • Optical Fiber • Radio 169 MHz • Wifi 2.4 GHz
Scientific Payloads	
Pilot Camera – Vivotek IB8369 Network Camera	Live Stream Video
Bottom Camera – Nikon Z6 with NIKKOR Z 24 mm f/1.8 S	High Resolution Imagery
Multibeam Ecosounder (MBES) – MBES R2Sonic 2020	Bathymetry, Water Column
Conductivity Temperature Sensor – Valeport Mini CT	Conductivity, Temperature
Sound Velocity Sensor – Valeport Mini SVS	Pressure, Sound Speed

The sea missions under the SUSHI DROP project took place in the year 2021 near the Italian and Croatian coasts. The sites covered by the mission in Italian territory included the areas near the town of Fano, Pedaso and Ortona in the Costa dei Trabocchi. In Croatian territory several missions

were carried out in the portion of the sea in the waters of Split. With a wide selection of case studies it was possible to evaluate different characteristics of biodiversity by sampling significant areas in the Adriatic Sea basin.

Figure 2.1: The drone BLucy.

The data gathered during the monitoring missions are released through a webGIS in Open Data format for the benefit of all project stakeholders: research institutes, public authorities, management and development agencies, fishermen associations and general public.
SUSHI DROP OPEN ACCESS DATABASE: *https://site.unibo.it/sushidrop/it*

2.2 WebGIS App of the Adriatic reefs from ADRIREEF

The developed geodatabase aggregates the available information on the distribution of hard substrates at coastal and offshore areas across the Adriatic Sea and represents a new and comprehensive cartographic layer informing on the reef kind (natural reefs, artificial reefs and wrecks). The data were collected through a literature review and questionnaires compiled by the Adrireef project partners.

Starting from this assumption, the Map of Adriatic reefs webGIS (https://adrireef.github.io/sandbox2/) has been built with the purpose of geographically representing data regarding the Adriatic natural reefs, artificial reefs and wrecks and making them accessible to scientists, public administrations and citizens. Thus the webGIS page is published online and accessible to users.

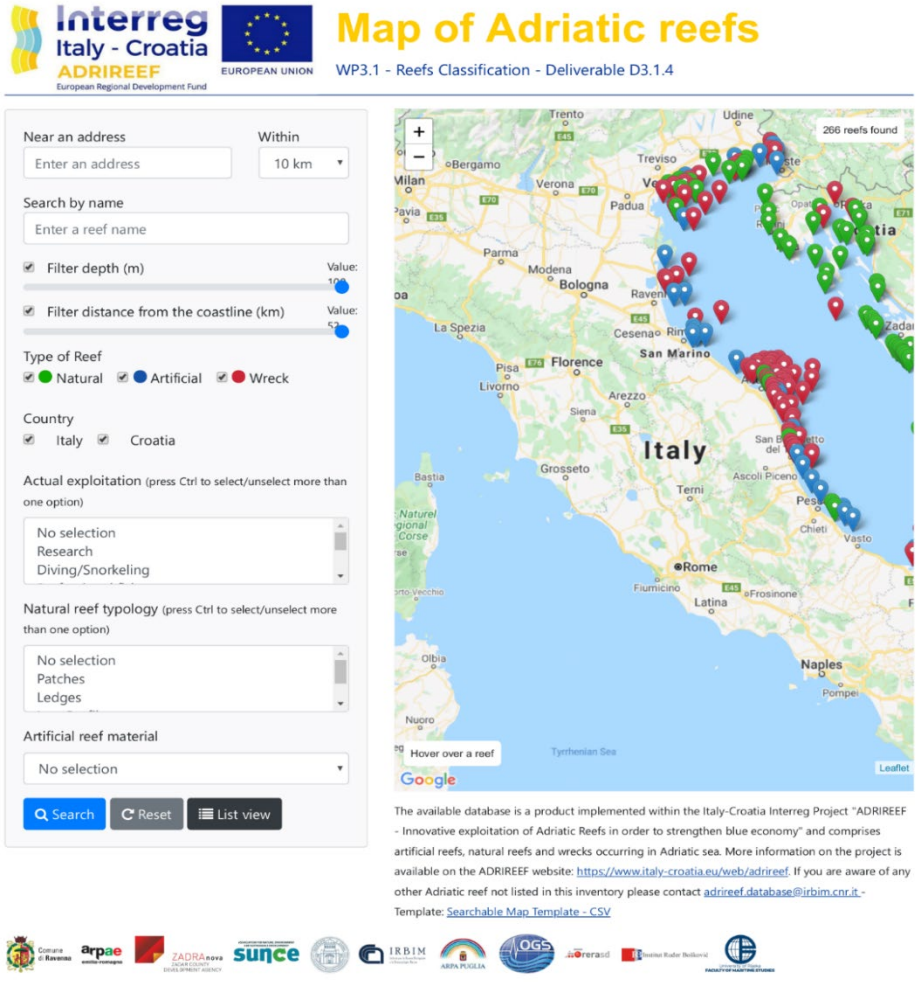


Figure 2.2. The interface of webGIS. On the left side: the filters window. On the right side: the map window with hover function (bottom left) and total number of identified elements (top right).

Input data come from a wide recognition, both from literature review and from surveys conducted through the project partners. Database building included three main steps: literature and available data review, questionnaire design and data aggregation. The questionnaire developed using

Google Forms infrastructure, required four main groups of information: reef identification properties, area hosting the reef properties, reef properties and reef eventual exploitation.
The database counts for 58 columns, 55 of them containing data from the data collection and 3 created by the database responsible (Type of reef, Country, Region). From the total, 9 parameters were finally used for filtering data in the webGIS application and/or for the reefs' classification, while the remaining columns were only used as part of the technical information sheets of each single reef.
The webGIS main page is composed of two windows: the one on the left reports all available filters for data, the one on the right reports the map where points, identifying elements, are divided by colour in Natural reefs (green), Artificial reefs (blue) and wrecks (red). Hovering on a reef with the mouse, Name and Location of the element appear in the left bottom corner of the map (Fig. 1). The total number of currently visualized elements is reported at the top right of the map. Moreover, when an element is clicked, a pop up appears reporting the associated relevant information.
The Geodatabase is transferable to existing cartographic web portals. The webGIS interface could be integrated into existing web pages. The source code for programming the webGIS interface is open-source and freely shareable. The CNR as leader of the tool development should be informed and involved in any further development or use of the geodatabase.

The technical solution adopted takes advantage of Google Maps APIs, JSON objects, Javascript, HTML, CSS and GitHub pages and it represents a rapid and easy-to-use option for our purposes.

2.3 Ecological indicators for fish product certification from PRIZEFISH

For the purpose of product certification in fishery, we used two ecological indicators developed for the Adriatic Responsible Fishery Management (ARFM) certification program within the PRIZEFISH project. Their objective falls within the assessment of the environment and the status of the target resources and the ecosystem that hosts them, considering the specific impact of the fishing activity on the ecosystem. Specifically, adverse impacts of the fishery on the ecosystem have been assessed and effectively addressed by using food web models of the whole Adriatic Sea (GSA17 and 18), modelled with the ecosystem model Ecopath.

The two indicators we adopted assessed firstly the *ecosystem impact* of the fishery on the ecosystem impact (FAO Eco (2009) 30.4, 31, 31.4 FAO Eco (2011) 41.4) measured firstly the negative fishery impact on the whole ecosystem, thus identifying the most impacting fisheries operating in the Adriatic Sea. Secondly, we were interested in knowing the contribution of the impact on the target assessed species to the total negative impact of that fishery. The lower is the total negative impact the less impacting is the fisheries on the ecosystem. The second indicator measured the role of the stock under consideration in the food web, providing which are the most influential species in the ecosystem, and how much the assessed species creates positive and negative impacts on the other species. If it is a key prey species in the ecosystem, management objectives and measures shall be in place to avoid severe adverse impacts on dependent preys and predators (FAO Eco (2009) 31.2).

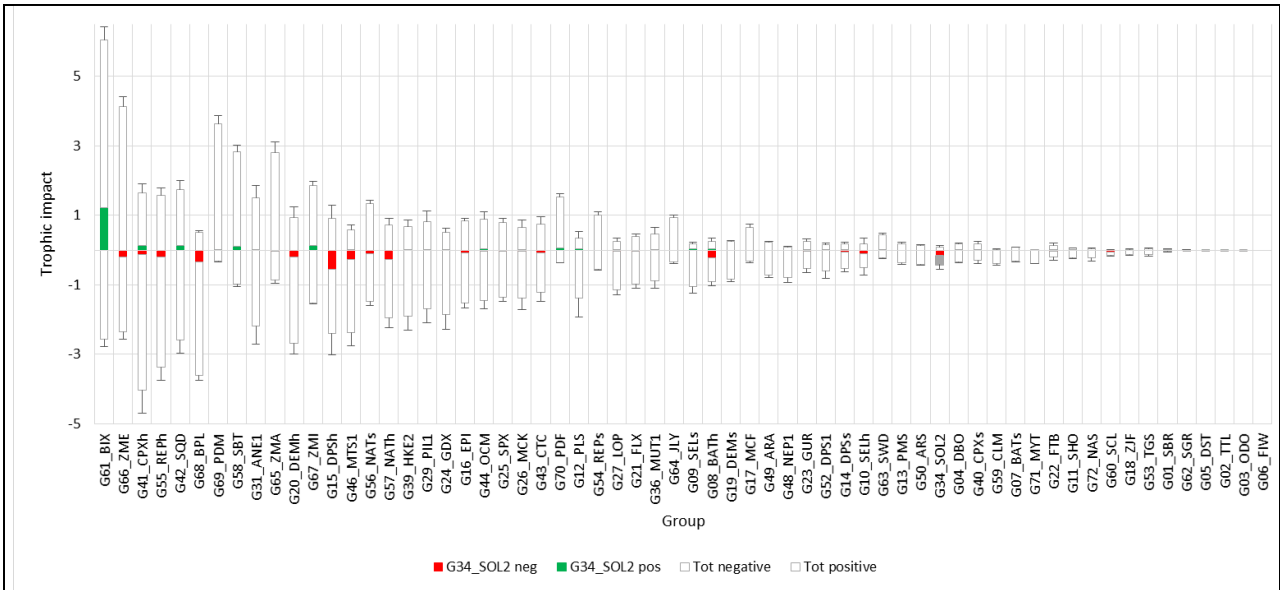


Figure 2.3: Representation of trophic impact of trophic groups on the ecosystem. Trophic groups' total negative and positive impacts (white bars) are represented and the ratio of impact they have on the target species (negative in red, positive in green). The assessed trophic group is highlighted in grey, in this example the common sole (Solea solea).

2.4 Integrated platform from FAIRSEA

The platform developed in FAIRSEA Project results in a highly technological and innovative tool, intensively data-driven. The platform embeds data from oceanography (physics and biogeochemistry) up to socio-economic information on fisheries, it also contains results from scenario analysis useful for "ecosystem approach to fisheries" intended to be useful for policy makers, institutions and organizations.

The platform is accessible at this website: https://fairsea.inkode.it/#/login and its usage is described in "FAIRSEA D.4.8.2 Integrated platform and key elements". Once logged in (user: viewer ; password: fairsea2020) the user can visualize several layers of information, download data, combine and analyse data, as well as run management scenarios and explore the results.

The FAIRSEA integrated platform has high potential transferability that is fully described in "FAIRSEA D5.4.2 Guidelines for potential future implementation of the EAF using FAIRSEA products". The platform can be improved, upgraded and enlarged to other areas. At the state of the art the platform is under the control and responsibility of the FAIRSEA partnership.

Under the TECHERA Project three new modules were implemented into the FAIRSEA Integrated platform: the TECHERA Drone Study Visit module, the 4.7 FWM – Food Web Modelling module and PRIZEFISH Indicators module.

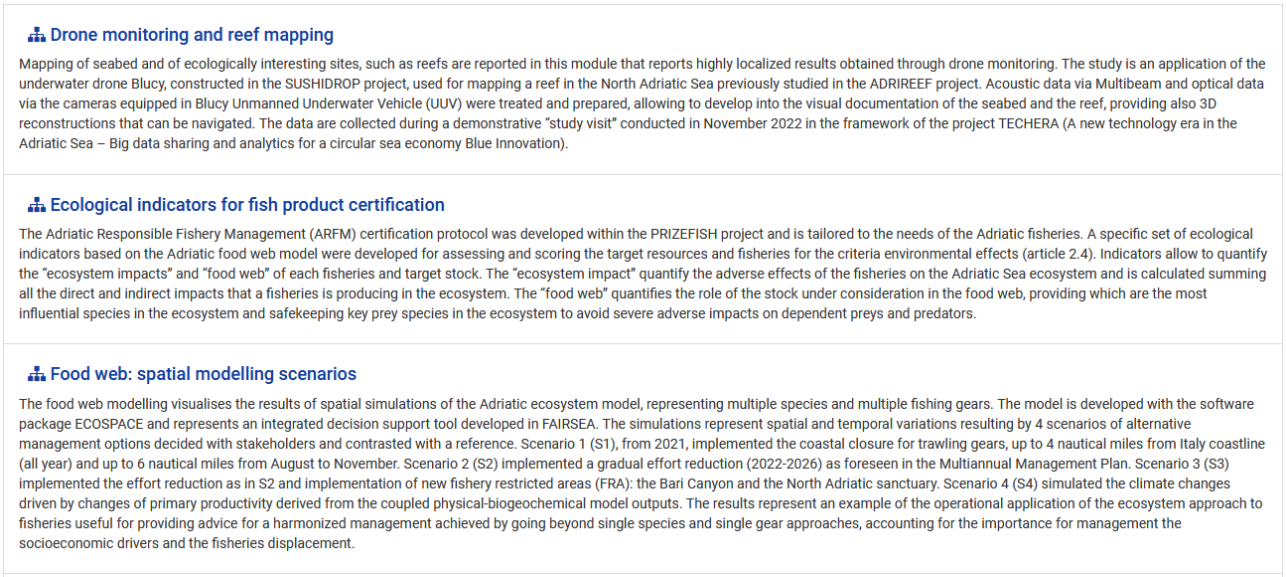


Figure 2.4: Integrated platform from FAIRSEA: the new modules added in TECHERA for integrating SUSHIDROP, ADRIREEF and PROIZEFISH results.

Different technologies were used for each module implementation according to the most suitable for the best data visualization.

3. Monitoring a coastal reef in the Northern Adriatic Sea: Study visit at Miramare MPA

3.1 Mission Purposes

The mission was carried in the period 15-25/11/2022 and covered the Miramare Marine Protected Area (MPA Miramare). The activities performed during the mission can be divided into two typologies:

- Hardware and software engineering setup of Blucy Unmanned Underwater Vehicle (UUV)
- Scientific survey of C1 buoy, Mambo Buoy and Shipwreck

The results of the mission are transformed into elaborated maps and 3D images that are made interoperable in the webGIS and integrated platform.

3.2 Engineering Mission

Regarding activities inherent to Engineering mission typology, the following activities were carried out:

- Calibration and validation of the Doppler Velocity Log sensor and its implementation within the Navigation system
- Debug of the new Scientific Graphic User Interface (SGUI), which allows the scientific pilot to control the scientific subsystems of the drone, such as: Multibeam, Pilot Cam, Bottom Cam, Lights, Environmental Parameters, Datalog of Navigation parameters, and State Variables of the Drone during the missions. This allows more interactivity during the missions as the software runs directly on the scientific laptop and the scientific pilot is able to keep track of not only the scientific data but also the health status of Blucy. Resulting in improved safety during missions.

Figure 3.1: SGUI Home View

Figure 3.2: SGUI Telemetry

- Validation of correct setup of QPS software for Multibeam data collection, as well as optimization of multibeam acquisition parameters based on the areas to be monitored. In particular, for each area involved in the scientific survey, the best acquisition parameters in terms of swath area, frequency pulse length, gain and survey depth were identified in order to ensure the least noise disturbance and the best stability of the drone during the surveys

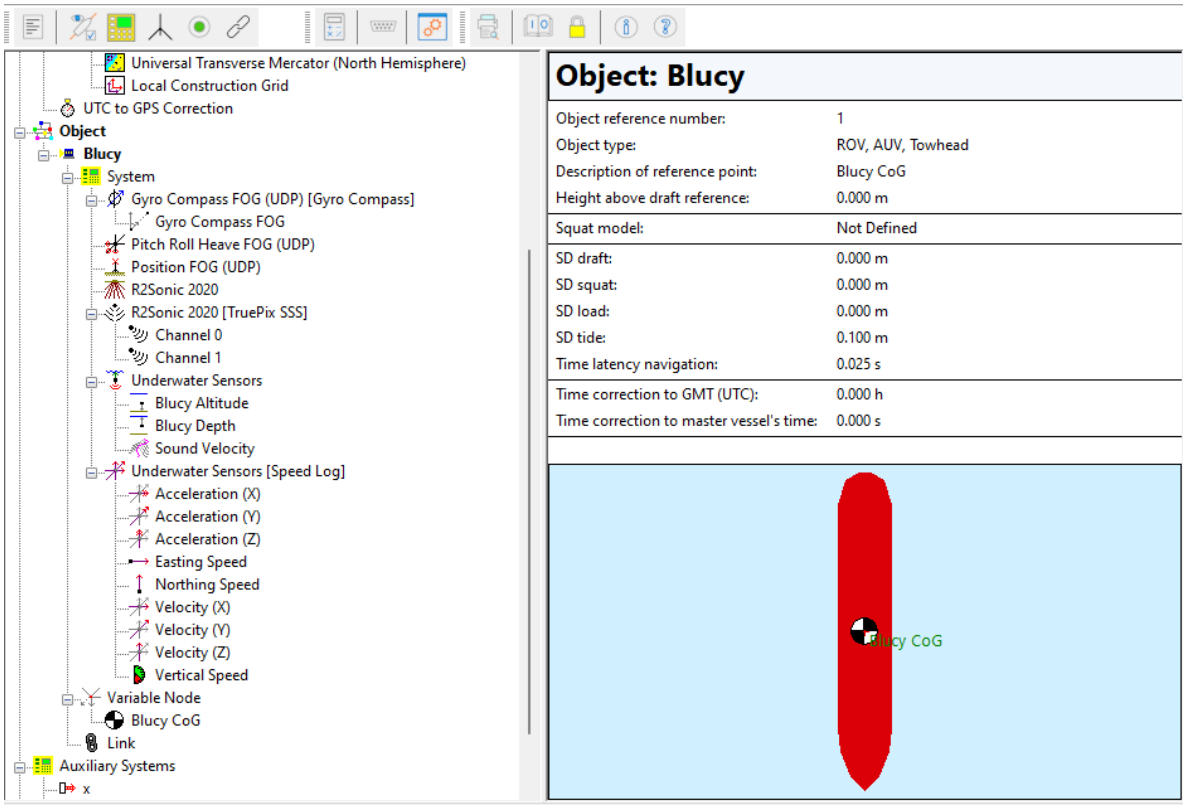
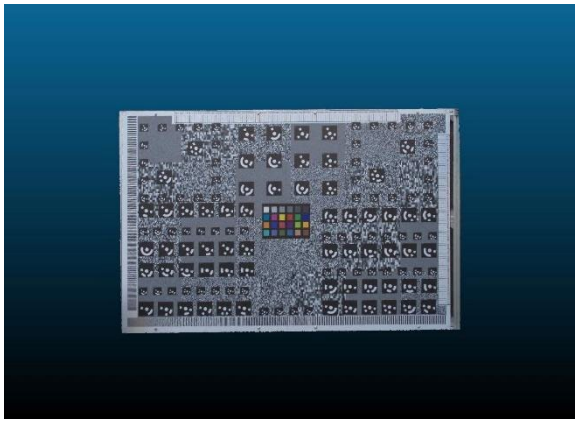
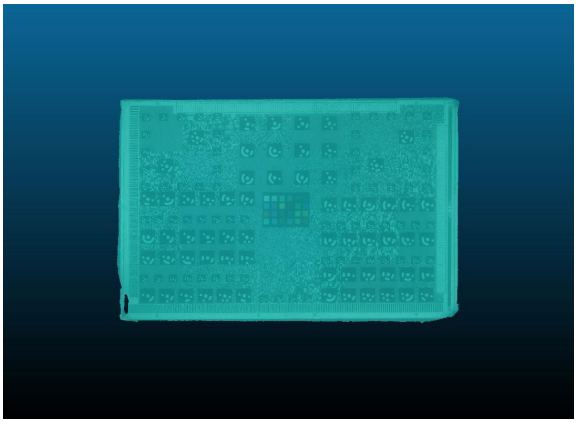


Figure 3.3: QPS Blucy Template, Digital Twin of Blucy for Multibeam data Acquisition

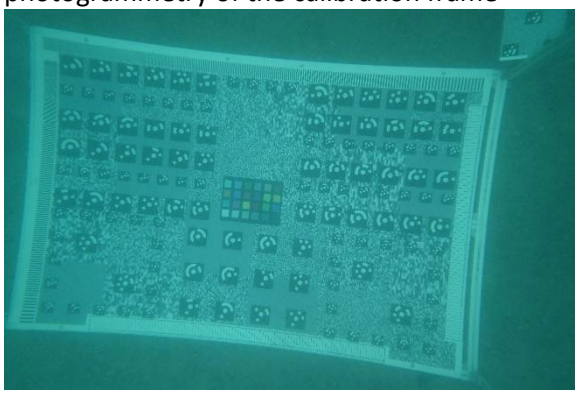
- Telemetry data collection for Fossen's mathematical model identification of Blucy through navigation and control tests: to experimentally identify Blucy's mathematical model, it was necessary to collect telemetry data by performing specific manoeuvres, e.g. constant velocity motion at steady depth and different speed regimes, circular constant velocity motion at steady depth.
- Calibration of Bottom Cam through Structure from Motion (SfM) of Calibration frame (Colors and Optical Distortion): survey of calibration frame equipped with coded targets and resolution pattern for the purpose of realizing bottom cam calibration and obtaining a more reliable metric result in dense point cloud construction. Calibration of the bottom cam allows the removal of distortions induced by the water medium and its turbidity conditions.



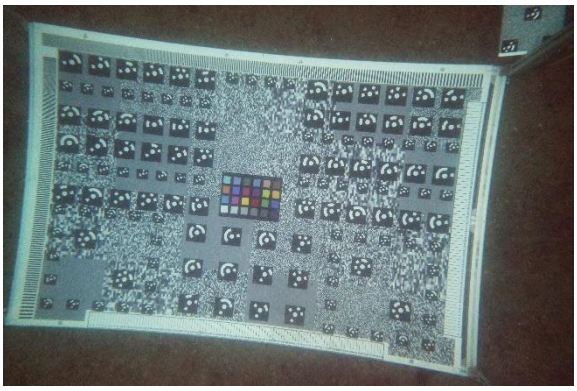
a) Terrestrial survey by means aerial photogrammetry of the calibration frame



b) Underwater survey conducted by Blucy of the calibration frame



c) Underwater snapshot taken by Blucy of the calibration frame



d) Underwater color corrected snapshot taken by Blucy of the calibration frame

Figure 3.4: Point Cloud and Color correction of Calibration frame of Bottom Cam

3.3 Scientific survey

The places of interest for the mission are the following:

- C1 buoy where there is an artificial reef appropriately placed for the purpose of encouraging the housing of marine species. Multibeam surveys were conducted.
- Mambo buoy: area where there is a sunken mussel farm. The reconstruction with Multibeam is interesting to assess the state of the structure, as MPA Miramare is considering the decommissioning of the structure. Multibeam surveys were conducted.
- Shipwreck of an ancient sunken ship. The site became a marine species aggregation center. Surveys were conducted with both multibeam and bottom cam.

The purpose of this study visit was to collect acoustic data through the Multibeam and optical data through the cameras equipped on the Blucy Unmanned Underwater Vehicle (UUV), and provide this data to institutions and stakeholders involved in the blue economy.

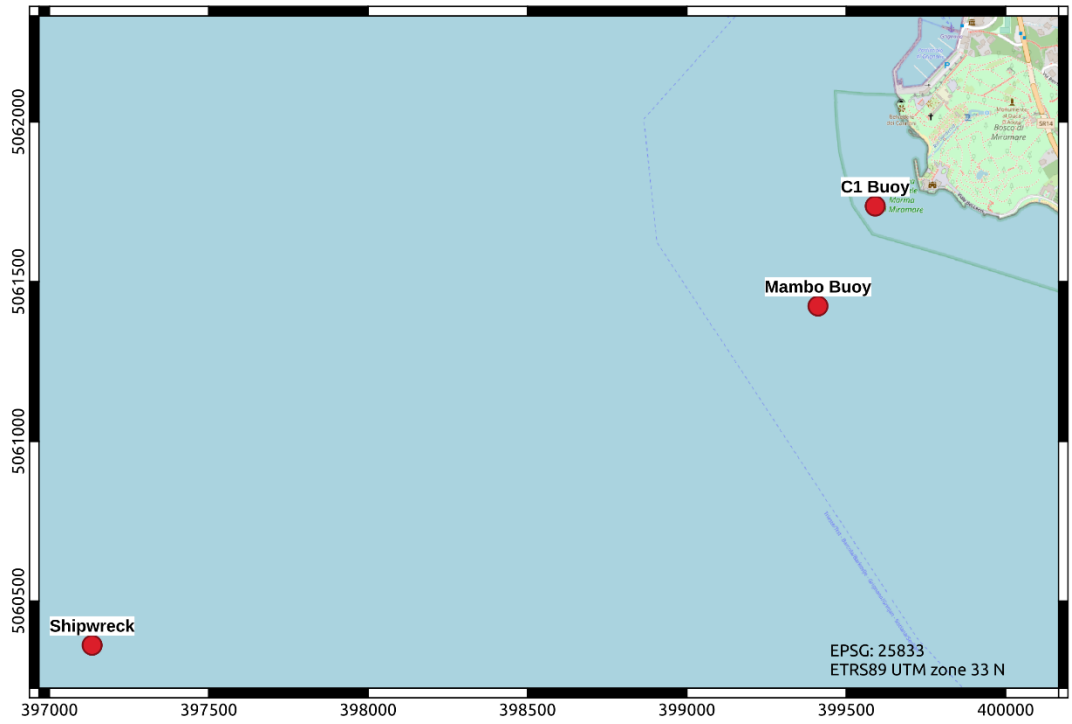


Figure 3.5: Scientific Area Location: C1 Buoy, Mambo Buoy, Shipwreck

The data collected during the missions were analysed and processed using QPS software and were integrated within the webGIS platform.
The pipeline followed for post processing of the multibeam data is shown in the figure below:

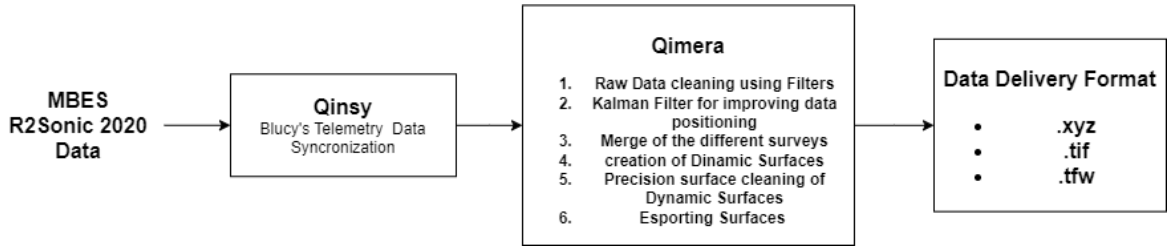


Figure 3.6: MBES Data Pipeline

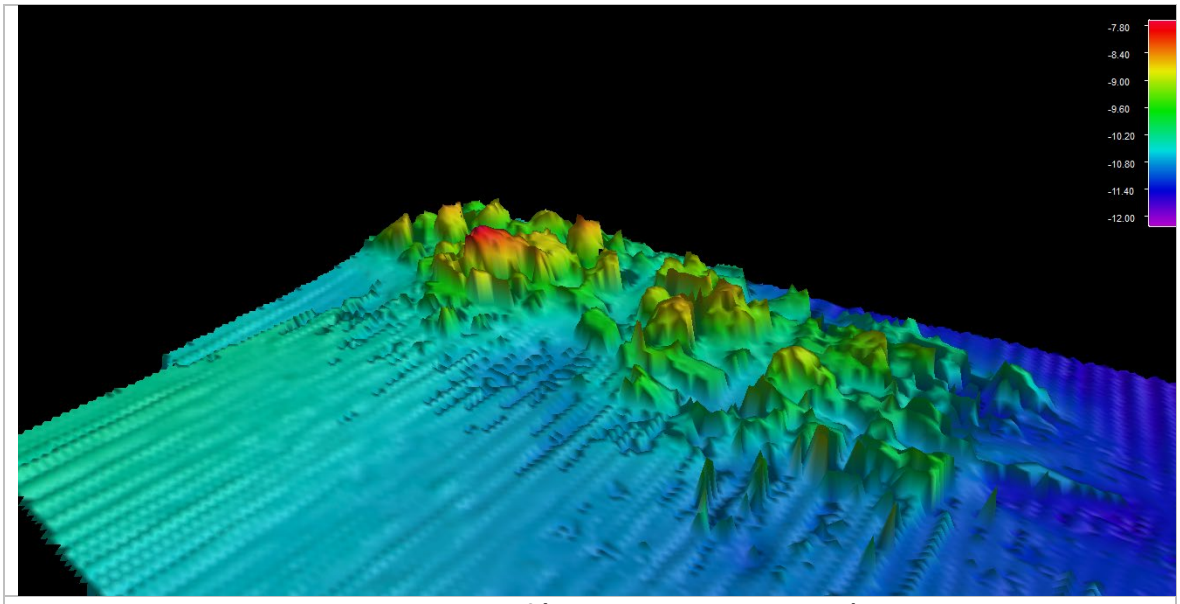


Figure 3.7: C1 Buoy, Miramare Castle Reef (Multibeam 3D Raw Data)

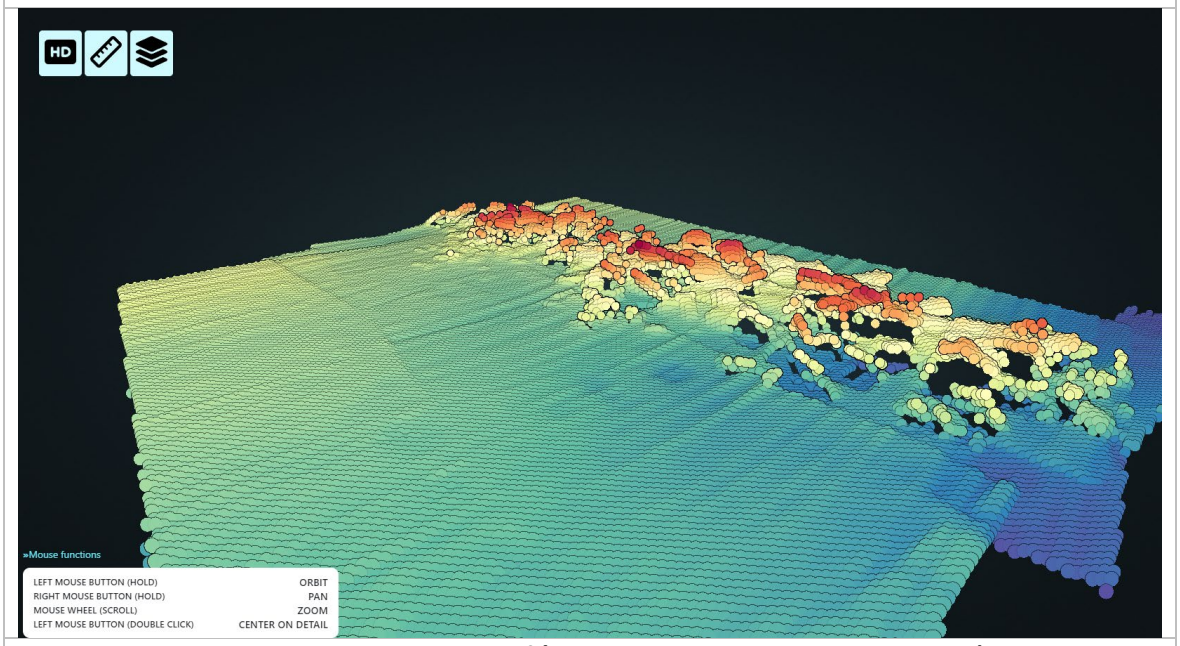


Figure 3.8: C1 Buoy, Miramare Castle Reef (Multibeam 3D Post Processed Data)

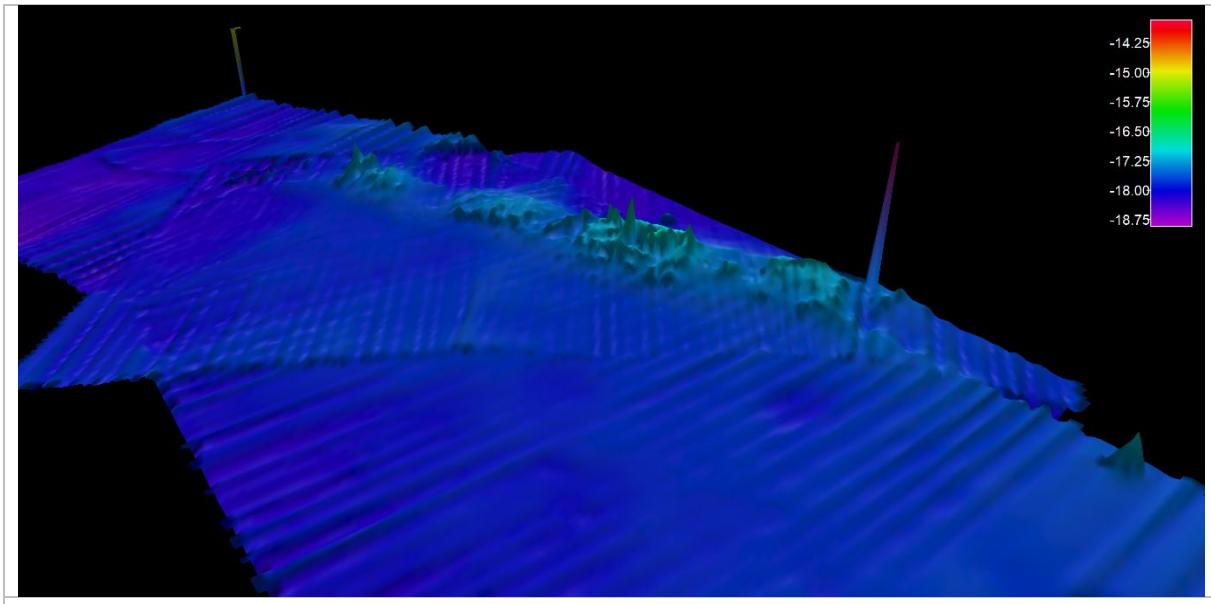


Figure 3.9: Mambo buoy, sunken mussel farm (Multibeam 3D Raw Data)

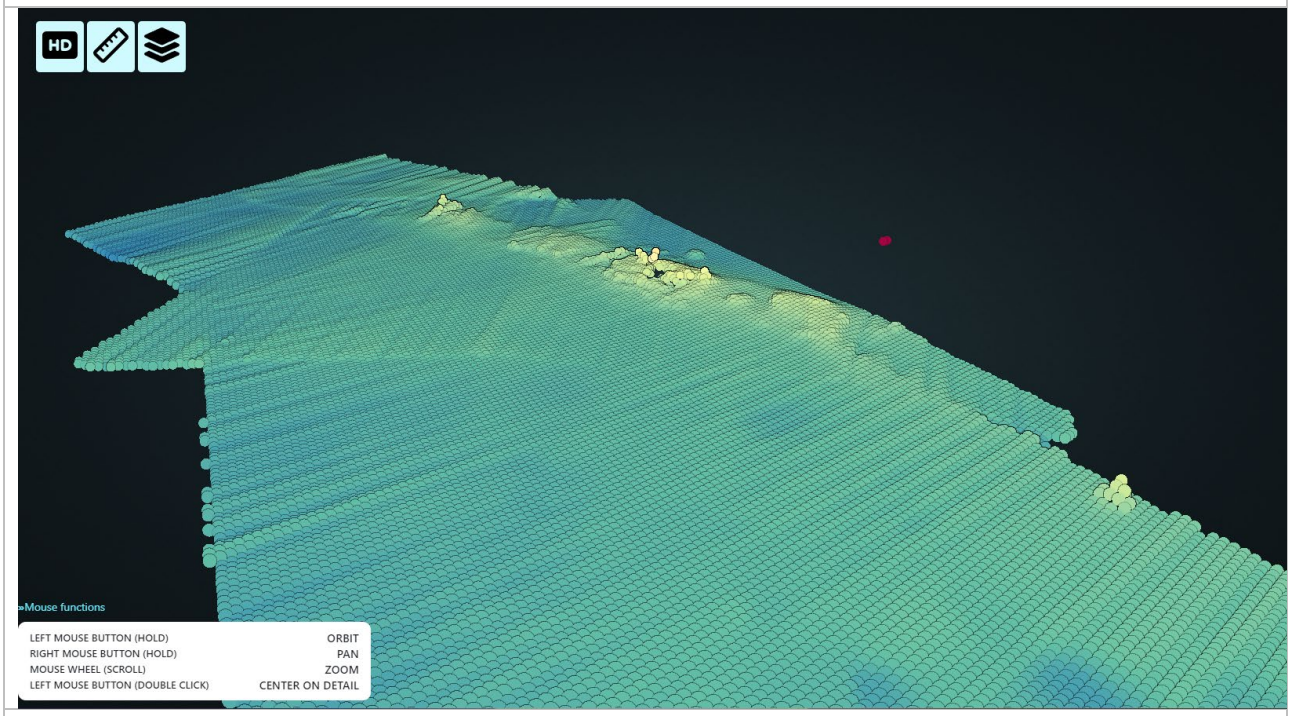


Figure 3.10: Mambo buoy, sunken mussel farm (Multibeam 3D Post Processed Data)

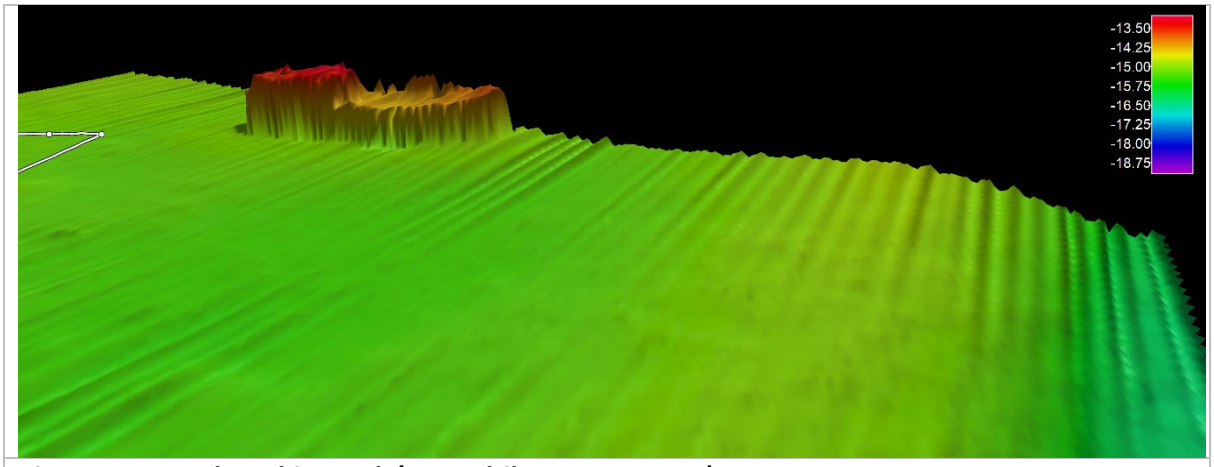


Figure 3.11: sunken Shipwreck (3D Multibeam Raw Data)

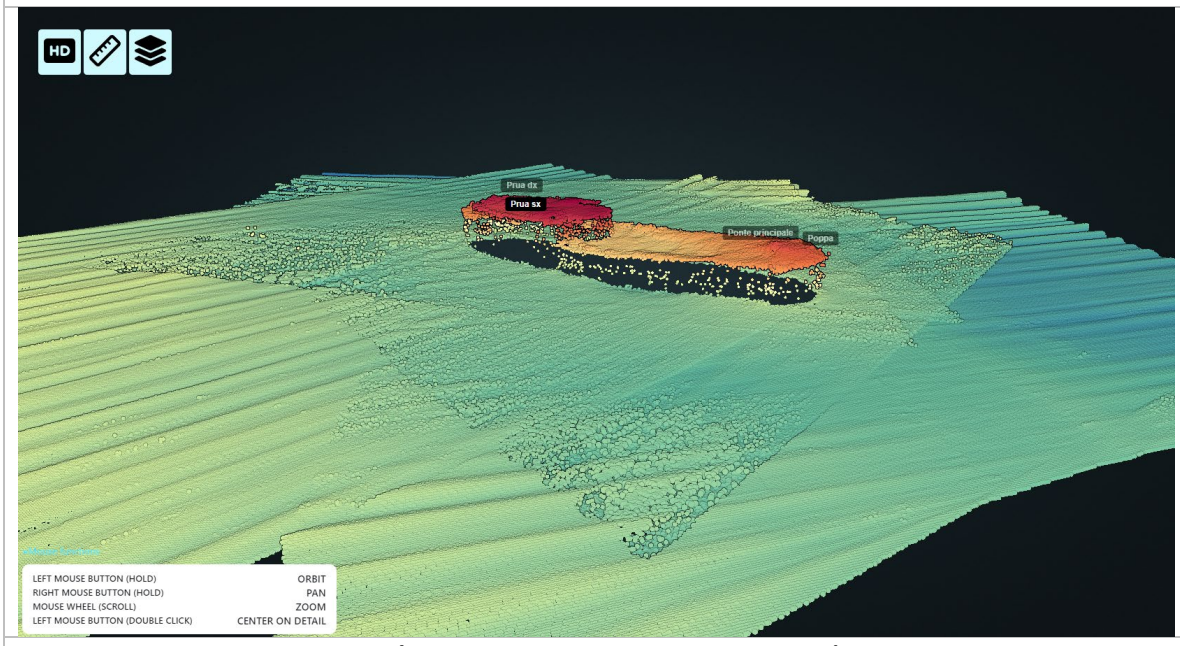


Figure 3.12: sunken Shipwreck (3D Multibeam Post Processed Data)

Figure 3.13: Blucy Crew during operations

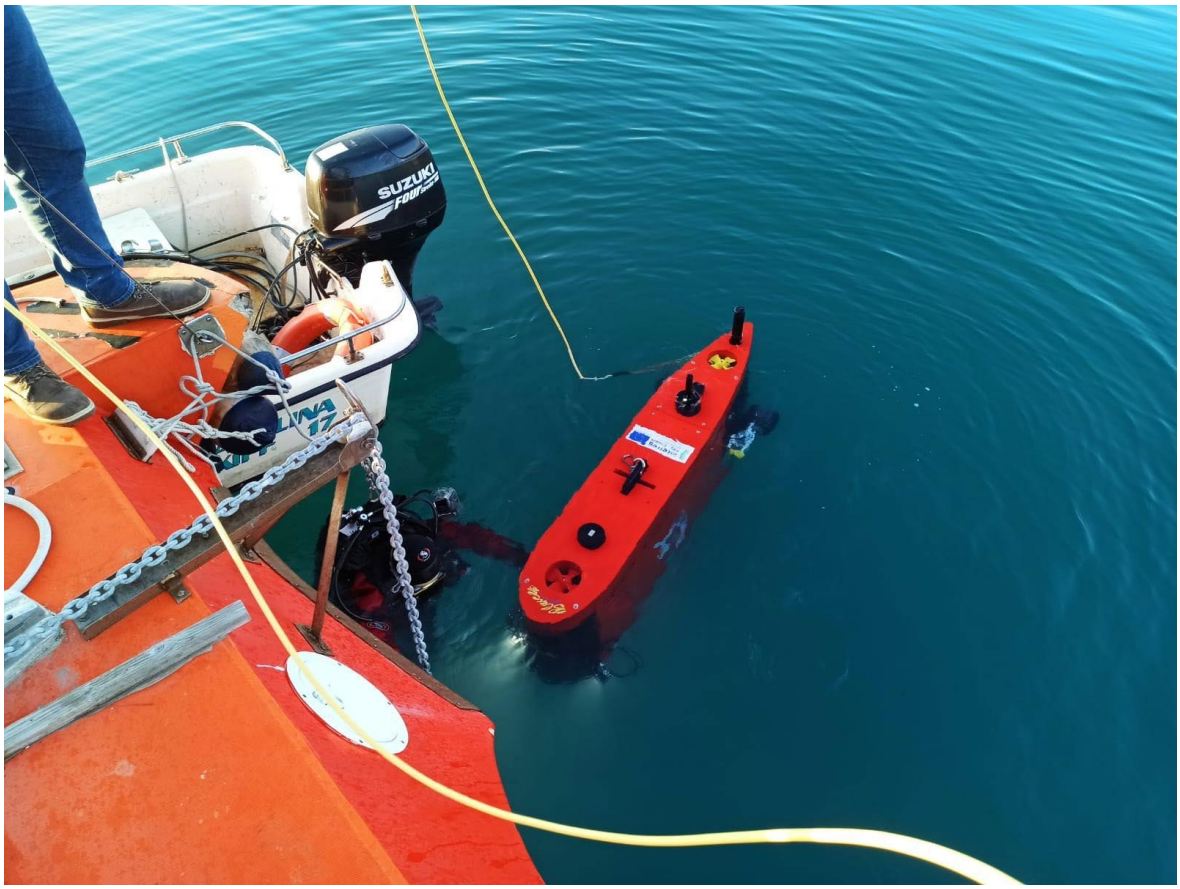


Figure 3.14: Blucy UUV deployment

Figure 3.15: Mission Control station of Blucy UUV

4. WebGIS visualization and integration of acquired new local data in the platform (SUSHIDROP, ADRIREEF and FAIRSEA)

4.1 The TECHERA Drone Study Visit module

For the integration of the TECHERA Drone Study Visit module was used an instance of MapStore2, an open-source web application designed for creating, publishing, and sharing interactive maps and geospatial data. The tool GeoStory from MapStore2 was implemented to create an immersive GeoStory by combining text, interactive maps, and other multimedia content with the aim to display the information regarding the study visit. For more information about the TECHERA Drone Study Visit module see the chapter “Underwater drone Blucy from SUSHIDROP”.

Fig. 4.1. Preview of TECHERA Drone Study Visit GeoStory. This was developed in order to promote an immersive, multiplatform, easy to share content.

5. Integrating ecological indicators and other results in integrated platform (PRIZEFISH & FAIRSEA)

5.1 FWM – Food Web Modelling scenario results

Throught this module it is possible to explore the Food Web Modelling results of the FAIRSEA project.

The development was carried out inside a Django Framework (version 1.11.1) . The graphical user interface (GUI) was implemented using the REACT library, specifically using React Bootstrap components for faster and easier web development; React Bootstrap is a popular open-source library that combines the power of React, a JavaScript library for building user interfaces, with the components and styling of Bootstrap, a popular front-end framework. It provides a set of pre-designed, reusable components that can be easily integrated into React applications. The map was integrated and customized using React Leaflet, an open-source JavaScript library.

The interactive maps allows to select:

- the Scenario: Baseline, Coastal Closure, Effort reduction, Effort reduction and FRAs, Climate, All FRAs only;
- the Species, one of the eight relevant species groups;
- the Period, is possible to choose a 5 years slot between 2021 and 2050;

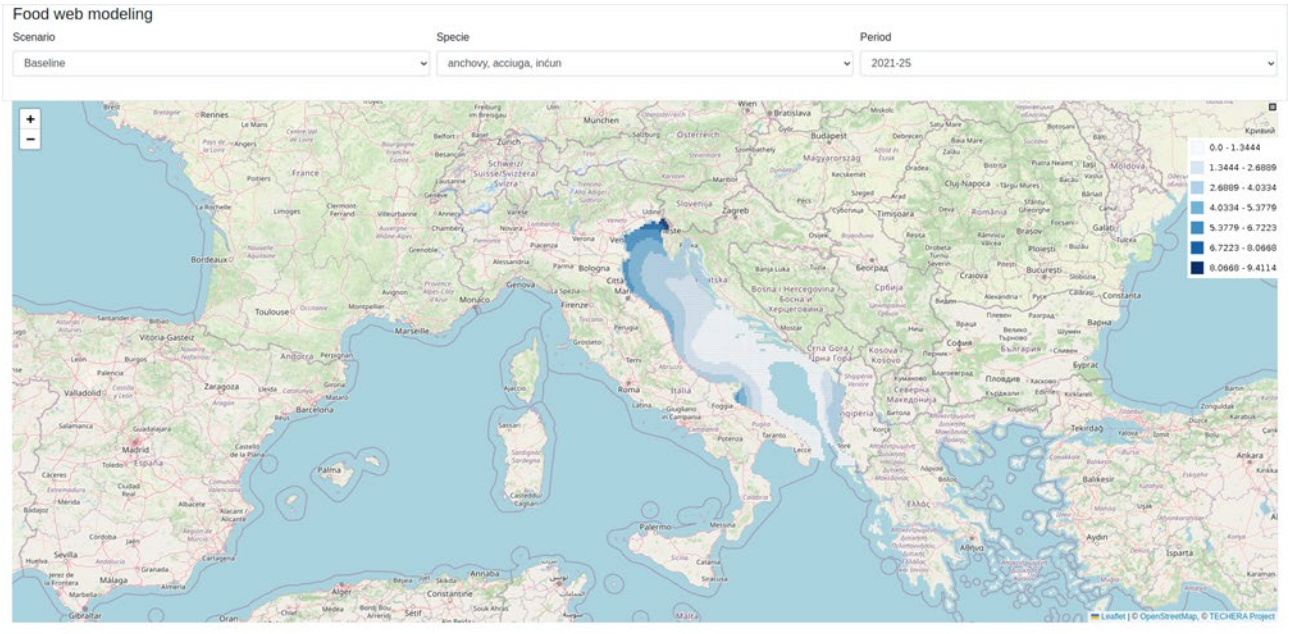


Figure 5.1. Overview of the Food Web Modelling map page. On the top are displayed the parameters selectors.

When all the parameters are set up, the interactive map changes according to the selection and displays the results.

5.2 PRIZEFISH Indicators into the FAIRSEA platform

The following PRIZEFISH Indicators module displays the results collected during the PRIZEFISH Project (in-depth study in the chapter “Ecological indicators for fish product certification from PRIZEFISH”).

The graphical user interface (GUI) was implemented using the REACT library, specifically using React Bootstrap components for faster and easier web development; React Bootstrap is a popular open-source library that combines the power of React, a JavaScript library for building user interfaces, with the components and styling of Bootstrap, a popular front-end framework.

It provides a set of pre-designed, reusable components that can be easily integrated into React applications. The charts were implemented with EChart React, a JavaScript library that combines the functionality of ECharts, a popular data visualization library, with the flexibility and ease of use of React. It provides React components that wrap the ECharts library, enabling developers to easily integrate interactive and dynamic charts into their React applications.

The final layout of the new App was customized according to the visual identity of the FAIRSEA Integrated platform. The charts are interactive and show the impacts related to specific fishing fleets and species (by selecting the fishing fleets and the species of interest using the selector, Fig 5.2 top) and, as a result, changing the displayed data likewise (Fig. 5.2, 5.3 and 5.4).

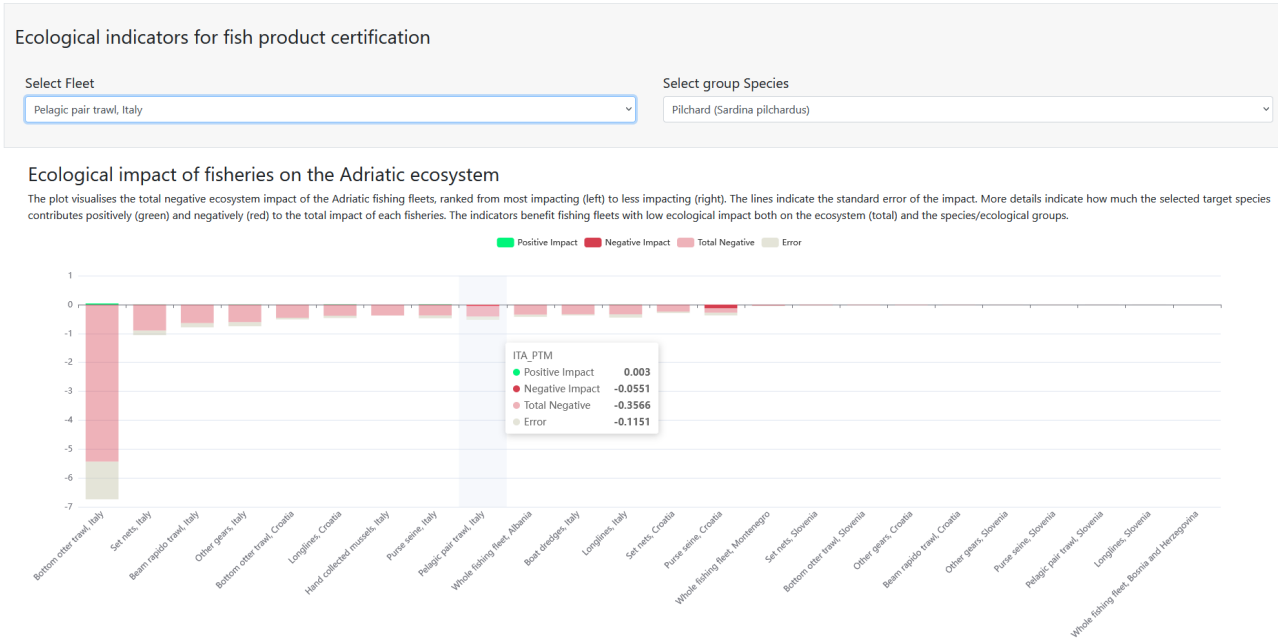


Figure 5.2 Ecological impact of fisheries on the Adriatic ecosystem. The plot visualises the total negative ecosystem impact of the Adriatic fishing fleets, ranked from most impacting (left) to less impacting (right). The lines indicate the standard error of the impact. More details indicate how much the selected target species contributes positively (green) and negatively (red) to the total impact of each fisheries. The indicators benefit fishing fleets with low ecological impact both on the ecosystem (total) and the species/ecological groups.

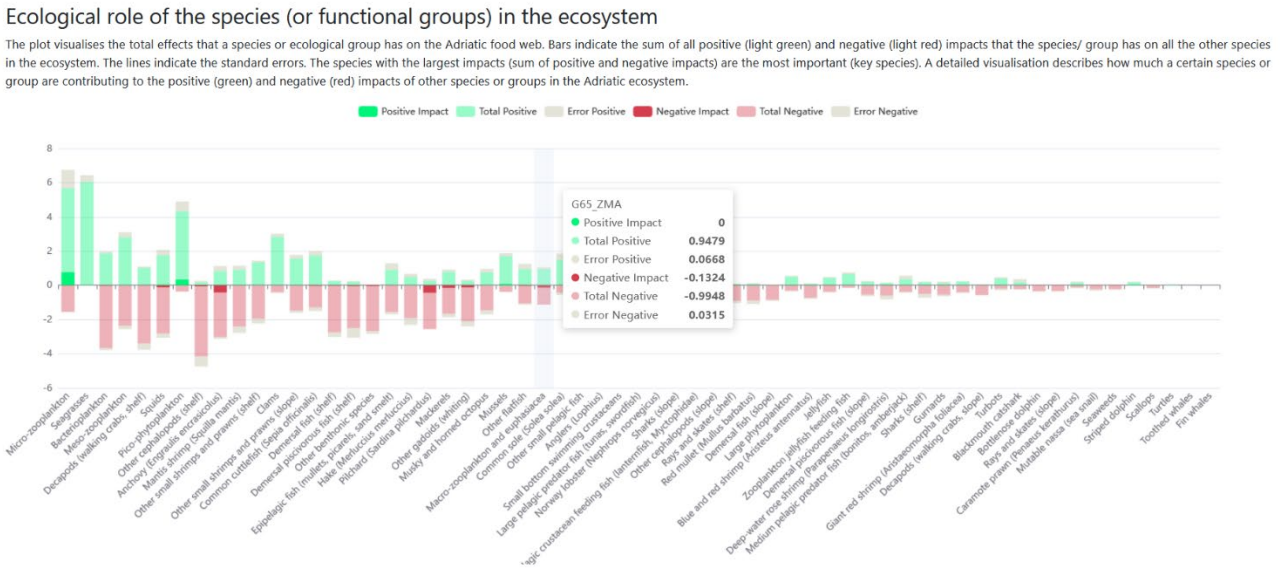


Figure 5.3 Ecological role of the species (or functional groups) in the ecosystem. The plot visualises the total effects that a species or ecological group has on the Adriatic food web. Bars indicate the sum of all positive (light green) and negative (light red) impacts that the species/ group has on all the other species in the ecosystem. The lines indicate the standard errors. The species with the largest impacts (sum of positive and negative impacts) are the most important (key species). A detailed visualisation describes how much a certain species or group are contributing to the positive (green) and negative (red) impacts of other species or groups in the Adriatic ecosystem.

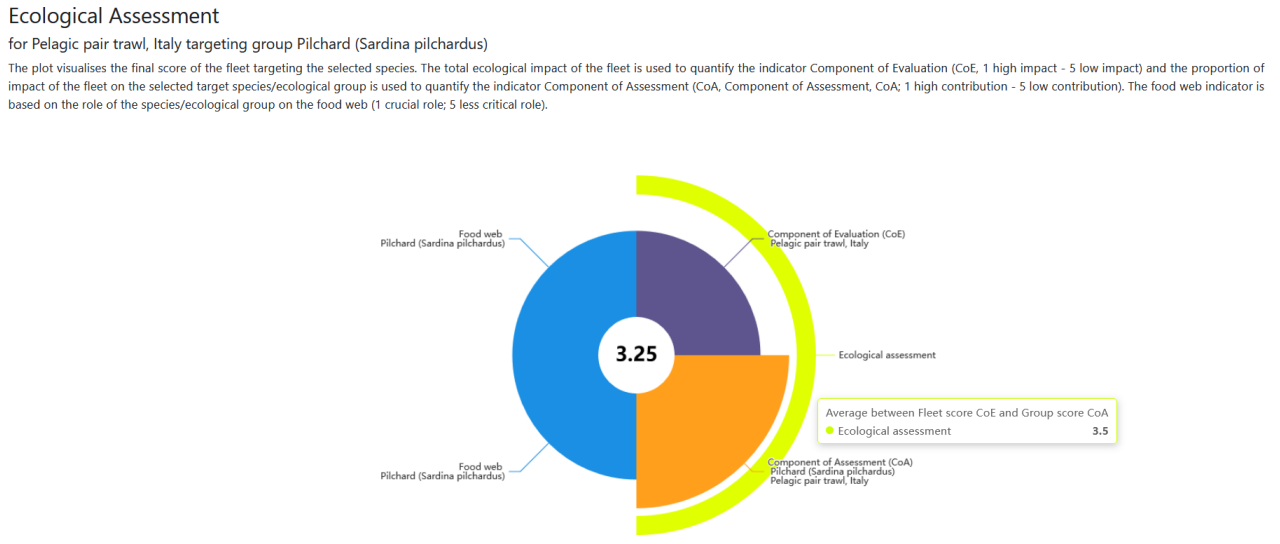


Figure 5.3 Ecological Assessment. The plot visualises the final score of the fleet targeting the selected species. The total ecological impact of the fleet is used to quantify the indicator Component of Evaluation (CoE, 1 high impact - 5 low impact) and the proportion of impact of the fleet on the selected target specie/ecological group is used to quantify the indicator Component of Assessment (CoA, Component of Assessment, CoA; 1 high contribution - 5 low contribution). The food web indicator is based on the role of the species/ecological group on the food web (1 crucial role; 5 less critical role).

6. Concluding event to showcase the study visit as an integration of projects results

An event was organized to present the results of the study visit and the demonstrative integration of results from SUSHIDROP, ADRIREEF, PRIZEFISH and FAIRSEA.

Date and venue of the final event:

The event **"Visors and Virtual Reality to Tell the Sea"** to showcase the study visit was held on the 7th of June 2023 in Trieste (Room TCC of Trieste Station) as part of the wider initiative MAREDIREFARE, a festival held every year to reflect on the conservation and future of marine resources.

Figure 6.1: flyer for disseminating the TECHERA event in the framework of the festival "MareDireFare".

Ad-hoc invitations have been sent by the project partners to the most interested stakeholders.

Buongiorno,
Abbiamo il piacere di invitarLa all'evento:

Visori e realtà virtuale per raccontare il mare
che si terrá Mercoledí 7 giugno 2023 alle ore 17.30-19.00, presso la Sala TCC Stazione FS di Trieste.

Durante l'evento verranno presentate alcune tecnologie innovative utilizzate per il monitoraggio ambientale-marino e finalizzate alla realizzazione di percorsi di visita virtuale.
Attraverso l'utilizzo di visori 3D esploreremo aree marine protette, relitti e zone di ripopolamento artificiale in Adriatico.
I monitoraggi e i dati sono predisposti in strumenti digitali a supporto della gestione dello spazio marino e delle risorse marine rinnovabili.

All'incontro interverranno esperti di OGS, AMP Miramare, Università di Bologna e Comune di Ravenna e altri partners del progetto TECHERA.
E' gradita la conferma di partecipazione

Evento organizzato in ambito del Festival MareDireFare

maredirefare
festival degli oceani

dal progetto Cluster Interreg Italia-Croazia TECHERA - A new technology era in the Adriatic Sea — Big data sharing and analytics for a circular sea economy

Figure 6.2: Invitation e-mail sent to a list of 60 selected target groups.

The National Institute of Oceanography and Applied Geophysics – OGS wit the cooperation of other project partners (University of Bologna and Municipality of Ravenna) shared during the event the different technologies for environmental and marine monitoring and for the realization of virtual sea tours, developed in the framework of previous Interreg Italy-Croatia projects and capitalized by the TECHERA project.

The event started at 17.30. After an introduction from Simone Libralato (OGS), the following presentations took place:

- Results of the SUSHIDROP drone monitoring of Miramare Marine area (Massimiliano Menghini – UNIBO, Saul Ciriaco - Miramare Marine Protected area)

- the Embedding of other project's results (SUSHIDROP, PRIZEFISH) into the FAIRSEA platform (OGS, Elisabeth De Maio - Inkode)


FAIRSEA Integrated Platform
Software overview
DENTRO E FUORI DALL'ACQUA
DENTRO E FUORI DALL'A

- the virtual reality tools produced by ADRIREEF project (Municipality of Ravenna, Andrea De Camilli - Ubica)

After the presentations, the participants had the opportunity to explore through the use of 3D viewers protected marine areas, wrecks, artificial reefs such as the Paguro platform and natural ones such as the Trezze rocky outcrops and actual biodiversity hot-spots.

The Partner AMAP, Agency for innovation in the Agrifood and Fisheries sector, supported the OGS in the event communication and dissemination activities.
One press release in Italian and English language has been issued and a TV report organized, where speakers and project partners were interviewed to tell a wider audience about the project results.

Il progetto TECHERA a "MAREDIREFARE", il festival degli oceani

Mercoledì 7 giugno i Partner del Progetto TECHERA hanno organizzato un evento di divulgazione del Progetto dal titolo **Visori e realtà virtuale per raccontare il mare.**
L'evento si è tenuto presso la Sala TCC della Stazione FS di Trieste in occasione del festival MAREDIREFARE, importante occasione di riflessione sulla conservazione e sul futuro delle risorse marine dove il mare viene raccontato in tutte le sue sfaccettature e con linguaggi diversi.

Durante l'evento sono state presentate diverse tecnologie innovative per il monitoraggio ambientale-marino e per la realizzazione di percorsi di visita virtuali realizzati nell'ambito di progetti di cooperazione Italia Croazia e capitalizzate dal progetto TECHERA.

Tutti i monitoraggi e i dati raccolti nei diversi progetti sono predisposti in strumenti digitali a supporto della gestione dello spazio marino e delle risorse marine rinnovabili. L'università di Bologna ha illustrato i risultati del monitoraggio dell'area marina protetta Miramare effettuato con l'utilizzo di Blucy, un drone sottomarino pensato e realizzato nell'ambito del Progetto SUSHIDROP per monitorare lo stato di salute dei fondali dell'Adriatico e mappare gli ecosistemi marini in modo non invasivo.
L'Istituto nazionale di Oceanografia e di geofisica sperimentale (OGS) in collaborazione con la società Inkode ha illustrato la piattaforma per la gestione della pesca secondo un approccio ecosistemico realizzata con il progetto FAIRSEA ed integrata con ulteriori dati raccolti ed analizzati dai progetti PRIZEFISH e SUSHIDROP. Un punto di partenza per creare un insieme di conoscenza condivisa e per fornire una nuova prospettiva sulle misure di gestione in Adriatico.
Il pubblico presente in sala ha avuto poi la possibilità di esplorare tramite l'utilizzo di visori 3D aree marine protette, relitti e zone di ripopolamento artificiali come la piattaforma Paguro e naturali come le Trezze affioramenti rocciosi, veri e propri hot-spot di biodiversità.

Il progetto TECHERA presenterà i risultati finali a Dubrovnik il prossimo 19 giugno. Finanziato dal Programma di cooperazione Italia Croazia ha capitalizzato e posto in atto approcci e pratiche data-driven nei settori della pesca e dell'acquacoltura per lo sviluppo di un'economia blu sostenibile nell'Adriatico. Il progetto è coordinato dall'Università di Bologna ed oltre all'Agenzia per l'innovazione nel settore agroalimentare e della pesca "Marche Agricoltura Pesca", partecipano in qualità di partner l'Istituto Nazionale di Oceanografia e di Geofisica Sperimentale (OGS), il Comune di Ravenna, Veneto Agricoltura, la Contea di Zara, il Ministero Croato dell'Agricoltura e l'Associazione internazionale Euroregione Adriatico-Ionica.

TECHERA event at the third edition of MareDireFare – Festival dell'Oceano

On Wednesday, June 7, the National Institute of Oceanography and Applied Geophysics - OGS in cooperation with other TECHERA Project Partners organized a Project event **"Visors and Virtual Reality to Tell the Sea"**. The event was held in Triste on the occasion of the MAREDIREFARE festival, an opportunity to reflect on the conservation and future of marine resources.

During the event, several innovative technologies for environmental and marine monitoring and for the realization of virtual sea tours, developed in the framework of previous Interreg Italy-Croatia projects and capitalized by the TECHERA project, were presented.

All the data collected in the different projects have been processed in digital tools to support the management of marine space and the protection of marine resources. The University of Bologna presented the results of the monitoring implemented within Miramare Marine Protected Area using Blucy, an underwater drone designed and built within the SUSHIDROP project to map the marine ecosystems in a non-invasive way.

The OGS together with experts from the IT company Inkode has shown the platform for fisheries management using an ecosystem approach realized through the FAIRSEA project and integrated with additional data collected and analyzed by the PRIZEFISH, SUSHIDROP and ADRIREEF projects. A starting point to create a shared knowledge and to provide a new perspective on the management measures in the Adriatic Sea.
The attending audience then had the opportunity to explore through the use of 3D viewers protected marine areas, wrecks, artificial reefs such as the Paguro platform and natural ones such as the Trezze rocky outcrops, actual biodiversity hot-spots.

The TECHERA project will present its results on June 19 in Dubrovnik. Funded by the Italy-Croatia Cooperation Programme, the project has used and implemented data-driven approaches for the development of a sustainable blue economy in the Adriatic Sea. The project is coordinated by the University of Bologna, and partnership also the Agency for Innovation in Agribusiness and Fisheries "Marche Agricoltura Pesca", the National Institute of Oceanography and Experimental Geophysics (OGS), the Municipality of Ravenna, Veneto Agricoltura, Zadar County, the Croatian Ministry of Agriculture and the international association Adriatic-Ionian Euroregion.

The TV report is available at the following link:

https://www.youtube.com/watch?v=F4bYufHIpio&feature=youtu.be&ab_channel=Pirene

Annexes

Annex I - TECHERA study visit final event agenda
Annex II - TECHERA study visit final event list of participants