



# ESPCE report on collaborations and synergies

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<b>DEC</b>	Websites, patents, filing, etc.	
<b>DEM</b>	Demonstrator	
<b>O</b>	Other	
<b>ORDP</b>	Open Research Data Pilot	

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<b>PU</b>	Public	✓
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NAUTILOS - New Approach to Underwater Technologies for Innovative, Low-cost Ocean observation is an H2020 project funded under the Future of Seas and Oceans Flagship Initiative, coordinated by the National Research Council of Italy (CNR, Consiglio Nazionale delle Ricerche). It brings together a group of 21 entities from 11 European countries with multidisciplinary expertise ranging from ocean instrumentation development and integration, ocean sensing and sampling instrumentation, data processing, modelling and control, operational oceanography and biology and ecosystems and biogeochemistry such, water and climate change science, technological marine applications and research infrastructures.

NAUTILOS will fill-in marine observation and modelling gaps for chemical, biological and deep ocean physics variables through the development of a new generation of cost-effective sensors and samplers, the integration of the aforementioned technologies within observing platforms and their deployment in large-scale demonstrations in European seas. The fundamental aim of the project will be to complement and expand current European observation tools and services, to obtain a collection of data at a much higher spatial resolution, temporal regularity and length than currently available at the European scale, and to further enable and democratise the monitoring of the marine environment to both traditional and non-traditional data users.

NAUTILOS is one of two projects included in the EU's efforts to support of the European Strategy for Plastics in a Circular Economy by supporting the demonstration of new and innovative technologies to measure the Essential Ocean Variables (EOV).

More information on the project can be found at: <https://www.NAUTILOS-h2020.eu/>.

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## I. INTRODUCTION

### 1.1. Objectives of this deliverable

Plastic pollution has emerged as a critical environmental challenge, prompting policy responses at national and international levels. In response, the European Commission introduced the European Strategy for Plastics in a Circular Economy (ESPCE)<sup>1</sup> as part of its broader Circular Economy Action Plan. The ESPCE aims to transform the way plastics are designed, produced, used, and recycled within the EU, promoting sustainable material cycles and reducing the environmental footprint of plastic products. By fostering innovation, enhancing recyclability, and supporting the transition toward a more resource-efficient economy, the strategy plays a central role in Europe’s efforts to decouple economic growth from environmental degradation.

The main objective of Task 12.1 is the establishment of collaborations with relevant projects and initiatives in relation to the ESPCE which will allow the NAUTILOS network to expand and achieve crucial synergies. Synergies are essential for the successful implementation of the ESPCE, as they enable co-operation across sectors, policy domains, and value chains. By fostering coordination between stakeholders—such as policymakers, industry leaders, academia, researchers, and civil society—the strategy can leverage complementary expertise and resources to accelerate innovation and systemic change. Moreover, synergies between national initiatives and EU-wide goals help ensure coherence and scalability of circular solutions. Ultimately, these interconnected efforts amplify the impact of the ESPCE, ensuring that the transition toward a circular plastics economy is both efficient and resilient.

Task 12.1 was performed in close cooperation with Task 10.5 “Synergies building with relevant initiatives, projects and programmes”, but with a specific focus on the ESPCE. The scopes, objectives and results of previous and current scientific and educational projects, international initiatives, networks and local authorities and stakeholders related to ESPCE, were incorporated within NAUTILOS, therefore magnifying the impact and building capacity of the EU strategy. These activities are described in the present deliverable D12.1 and they are complementary to the ones developed within WP10 (Task 10.5), which include synergies focused on Research and Innovation marine observation projects and are described in D10.7 “Report on established synergies”.

### 1.2. Area of focus

The deliverable D12.1 supports the implementation of the SO9 as described in the Grant Agreement of the NAUTILOS project, which is relevant to the **promotion and development of a broad range of collaborations and contributions to international, regional, and national levels for the sustainable management of marine resources and the protection of marine biodiversity with a specific focus on the European Strategy for Plastics in a Circular Economy**. D12.1 is a detailed report describing the collaborations and synergies achieved with past and existing projects and initiatives relevant to the ESPCE, which allowed the NAUTILOS network to expand and build crucial and valuable synergies during and after the project.

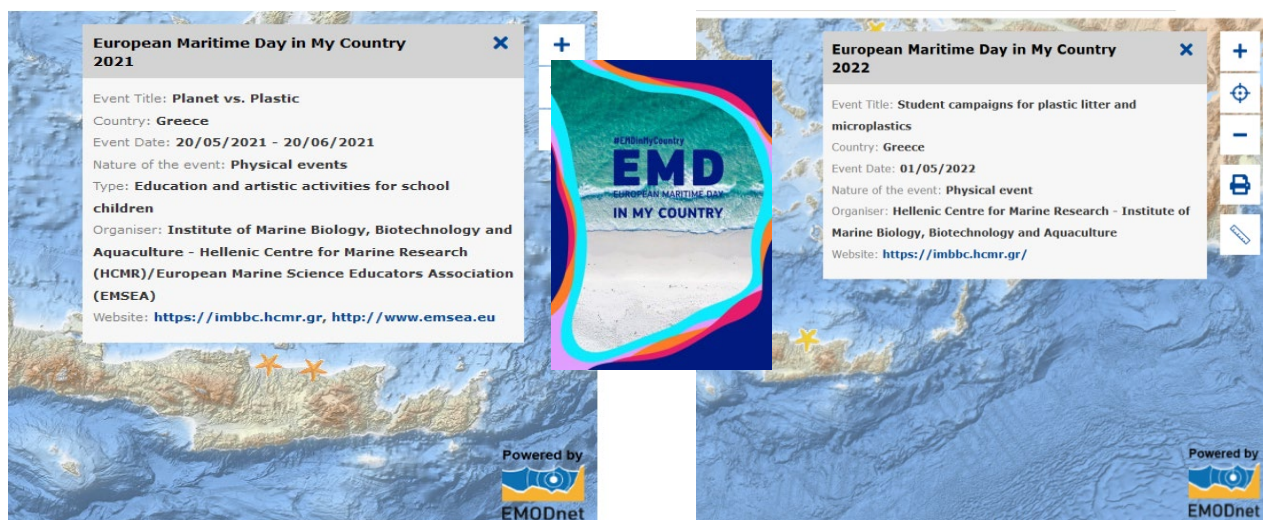
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<sup>1</sup> <https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1516265440535&uri=COM:2018:28:FIN>

## II. SYNERGIES WITH EUROPEAN INITIATIVES

HCMR has established synergies with the **European Maritime Day** by participating in the **EMD - In My Country**<sup>2</sup> events for three consequent years (2021-2023) in connection to the Citizen Science activities of Task 12.2 (see D12.3) (Figure 1). EMD - In My Country is an important part of ocean awareness and activism that has been rising steadily in recent years, and the events under its brand have become more and more popular, attracting more than 25.000 participants every year. NAUTILOS participated in these activities through Citizen Science expeditions and beach cleaning campaigns in Crete for Primary School students that included field visits, experiments and hands-on experiences. An art contest was organised during the EMD – In My Country event for the year 2023 by the students of the Art High School of Heraklion, during which the students used the litter they have collected from the beach to create pieces of artwork. EMD promotional material was disseminated during all the events, and relevant website and social media posts were launched.

CNR-ISMAR participated in the **EMD - In My Country** with a talk dedicated to the Citizen Science survey conducted in the Ligurian sea, as part of the local conference “Le isole del Golfo della Spezia: conoscenze ed esperienze per una gestione sostenibile del territorio” on 20<sup>th</sup> of May 2021. In addition, NAUTILOS partners (HCMR-IMBBC, ETT, CNR-ISMAR and EUROCEAN) participated in the European Maritime Day workshop that took place in Brest on 24-26 May 2023 where they presented the ESPCE-related CS activities of the project

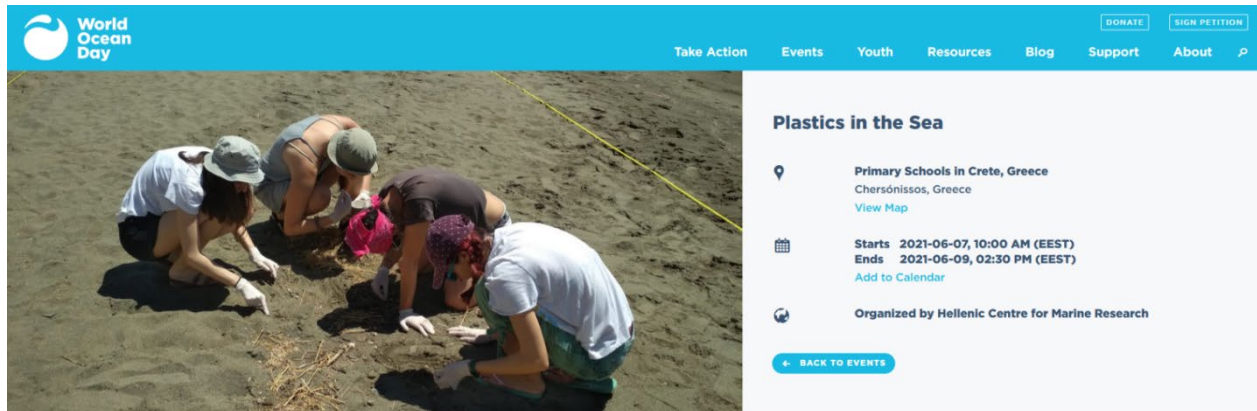


**Figure 1.** NAUTILOS participated in the EMD – In My Country initiative for the years 2021 – 2023 through Citizen Science expeditions and beach cleaning campaigns in Crete.

The NAUTILOS Citizen Science campaigns in Crete for the year 2021 were also registered and disseminated through the **World Ocean Day (WOD)**<sup>3</sup> initiative (Figure 2). During the WOD, people around our planet celebrate and honour our one shared ocean, with a special emphasis on engaging and connecting youth in order to increase awareness, action and political will for a healthier ocean. Moreover, CNR-ISMAR participated in the activities organised for the WOD on 6-8<sup>th</sup> of June 2024, in Palermo (Italy) as an invited speaker (Dr Silvia Merlini) by the National Institute of Geophysics and Volcanology (INGV) to present the citizen science activities of NAUTILOS project.

<sup>2</sup> [https://maritime-forum.ec.europa.eu/theme/governance/european-maritime-day-my-country\\_en](https://maritime-forum.ec.europa.eu/theme/governance/european-maritime-day-my-country_en)

<sup>3</sup> <https://worldoceanday.org/>



**Figure 2.** NAUTILOS Citizen Science activities registered and disseminated through the World Ocean Day initiative for 2021.

Synergies were developed early in the project with the Mediterranean Working Group of the **European Marine Science Educators Association (EMSEA)**<sup>4</sup>, the Expert Working Group on Ocean Literacy of **EuroGOOS**<sup>5</sup>, and the **EU4Ocean** Coalition and Platform<sup>6</sup> (Working Groups of Climate & Ocean, Healthy & Clean Ocean, Food from the Ocean). Colleagues from HCMR who actively participate in these initiatives as board members disseminated a report with details on the NAUTILOS school activities that were implemented in the Gournes Primary School (Heraklion, Greece) and an introductory presentation was organised (spring 2021). Furthermore, NAUTILOS partners (HCMR-IMBBC, CNR-ISMAR, ETT and EUROCEAN) participated in the **EMSEA's** annual conference in the theme Blue Education organised in the Palma de Mallorca (Spain) during 25-28<sup>th</sup> of September 2022. An oral communication and a poster describing the Citizen Science and educational approaches of the NAUTILOS project were presented.

CNR, HCMR and ETT, together with Surfrider Foundation Europe and the non-profit company Outdoor Portofino, participated in the **EU4Ocean** workshop for Ocean Literacy Summit in Ravenna on the 19-21<sup>st</sup> of May 2022, that was co-organised with the European Maritime Day 2022. The NAUTILOS Citizen Science activities and the CNR-ISMAR project "SeaCleaner" (also launched within NAUTILOS, for details see D12.3) were presented at the EU4Ocean workshop entitled "Democratisation of science: Citizens Empowerment through Ocean knowledge co-production" to an audience of almost 2000 people originating from 78 different countries both within and outside Europe. The SeaCleaner protocol was also used during the campaign "On The Field" by the Zaccagna-Galilei students, who collected litter, built a big "plastic whale" in their classroom and screened a short film titled "Rivers in spring" that was disseminated during the **World Water Day 2022**<sup>7</sup>.

Synergies have been developed with the **United Nations Environment Programme (UNEP)** Regional Office for Asia and the Pacific through the involvement of DFKI to the Science Advisory Board of the CounterMeasure II<sup>8</sup> project. This project named "Promotion of Action Against Marine Plastic Litter in Asia and the Pacific" aims to generate, share and disseminate scientific knowledge on plastic pollution in the Mekong, Ganges and selected rivers in Sri Lanka and Myanmar to inform policy and decision-making processes at the local, national, regional and global level.

<sup>4</sup> <https://www.emseanet.eu/>

<sup>5</sup> <https://eurogoos.eu/ocean-literacy-wg/>

<sup>6</sup> <https://www.marineboard.eu/eu4ocean-coalition-ocean-literacy>

<sup>7</sup> <https://www.un.org/en/observances/water-day/background>

<sup>8</sup> <https://www.cms.int/en/project/countermeasure-ii-project>

In addition, representatives from CNR-ISMAR participated in the 1<sup>st</sup> Integrated Marine Debris Observing System (IMDOS)<sup>9</sup> initiative which was held in Paris on January 8<sup>th</sup> 2025. IMDOS aims to support the development of a comprehensive global system to monitor marine debris, responding to the strong demand expressed by the research community, policy- and decision-making bodies, and the private sector. IMDOS is an initiative of **GEO Blue Planet's** marine litter working group, together with GOOS and UNEP.

NAUTILOS project has a strong involvement in the **Plastic Pirates – Go Europe!**<sup>10</sup> initiative, which is an international Citizen Science project focused on tackling plastic pollution in European rivers and coastlines. It involves training of school students and educators for the collection of plastic waste. The initiative aims to raise awareness about plastic pollution, promote ocean literacy, and also contribute to the collection of valuable scientific data. Plastic Pirates were founded on 2016 a national project in Germany and since 2020 expanded as an EU initiative currently involving 13 countries. The ERA Policy Agenda has identified Plastic Pirates as part of the ERA action “Bring Science closer to Citizens” for the period 2022-2024. More specifically, NIVA participates in the advisory board of the Plastic Pirates, and has given a demonstration of the NAUTILOS activities regarding the Smartphone NIR scanner in a secondary school class in Nieuwport (Oostende, Brussels) during the MSCA Cluster Event on Ocean and Waters that took place on 7-8<sup>th</sup> of June 2022 (Figure 3). In addition, a CS activity - attended by the DG EAC, the DG MARE, the DG RTD and REA - was organized in Belgium (8/6/2022) as part of the Plastic Pirates initiative, where students carried out a plastic litter sampling campaign and used the NIR scanner. NIVA has discussed the use of NAUTILOS sensors (mostly the ones related to marine litter) as a follow up of the Plastic Pirates project. Review of existing data and further possibilities to implement NAUTILOS technologies (i.e. NIR scanner) were explored and incorporation in potential monitoring needs in European policies as well as any gaps/ blind spots were discussed during March 2024.



**Figure 3.** NAUTILOS collaborated with the initiative of Plastic Pirates – Go Europe through the involvement of NIVA in their advisory board for the use of the NIR scanner in educational activities.

NIVA worked closely together with the **Inspiria Science Center**<sup>11</sup> during spring 2023 to organise Citizen Science activities related to marine litter for high school classes. NIVA staff joined the “teaching of teachers” activities on the M/S Ny Vigra III and instructed them how to use a Manta-trawl to collect marine litter. The smartphone plastic NIR scanner developed during NAUTILOS project for the identification of the different plastic polymers was also introduced to the teachers. Teaching material from the Plastic Pirates project was adapted to be used on Oslofjord for the integration of the

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<sup>9</sup> <https://imdos.org/>

<sup>10</sup> <https://www.plastic-pirates.eu/en>

<sup>11</sup> <https://inspiria.no/>

smartphone NIR scanner. Several school classes and more than 300 school students in the Oslo fjord were involved in these activities (see D12.3 “Report on Citizen Science Campaigns (WP12)”) through the developed educational Inspiria system, which allowed them to directly and on-site analyse marine litter collected by themselves.

A hybrid Citizen Science Session<sup>12</sup> entitled “Collaborative efforts for addressing Citizen Science challenges in the marine environment” was organized by HCMR within the 8<sup>th</sup> Consortium Meeting of NAUTILOS which took place in Heraklion, Crete on the 16<sup>th</sup> of April 2024. Representatives from international Citizen Science initiatives and organisations presented their activities in order to support strong future collaborations and fruitful synergies. The NAUTILOS Citizen Science Session hosted: Dina Eparkhina, the Senior Policy and Communications Officer of **EuroGOOS**, who presented the Scientists for Ocean Literacy project of the UN Ocean Decade; Roula Andriopoulou, a representative of **Plastic Pirates** in Greece, who presented how this large-scale CS initiative can investigate plastic waste pollution in European rivers, oceans, and seas; Mariana Mata Lara from the **Submariner Network**<sup>13</sup>, who presented the organisation’s focus areas and commitment to promote sustainable uses of marine resources in the Baltic Sea Region and beyond with a specific emphasis on citizen science and engagement; Arianna Liconti from **OutBe**<sup>14</sup>, a company organizing outdoor programs with positive environmental and social impact, who presented how watersport’s activities can contribute to Ocean Monitoring; and Dr Haizea Jimenez as a representative from the **Surfrider Foundation Europe**<sup>15</sup>, who presented their activities within the projects OSPARITO, PLASTIC ORIGINS and CURL.

**Euromarine**<sup>16</sup> is an interdisciplinary, collaborative network of European marine organisations and research institutes, and its mission is to support the identification and initial development of important emerging scientific topics or issues and associated methodologies in marine sciences. The Euromarine Summer School “Emerging topics in coastal marine ecosystems (eTOPs)” took place during July 2023 at the Faculty of Marine and Environmental Sciences of the University of Cadiz, Spain. The summer school aimed to provide interdisciplinary training to 25 European PhD students working in emerging topics in the coastal marine ecosystems. The course mixed theoretical formation with practical laboratory sessions, field trips, oceanographic instructions, and demonstration of unmanned observation technology. Topics included climate change (i.e marine heatwaves, ocean acidification) and relevant mitigation issues (e.g. blue carbon), invasive species, microplastics and emerging pollutants, marine observation technologies (e.g. unmanned vehicles), management and social sciences in the study of Marine Protected Areas. CNR-ISMAR participated as a NAUTILOS invited partner (Dr Giuseppe Suaria) and gave an invited seminar of excellence on “Global occurrence, abundance and distribution of macro- and micro-plastic pollution in oceanic environments”. The EUROMARINE-UCA-SEA EU International Marine Science Seminar Series was jointly organised by EuroMarine, the Institute for Marine Research (INMAR), the European University of the Seas (SEA EU) and the International Doctoral School in Marine Studies (EIDEMAR).

NAUTILOS participated in the **#EUBeachCleanup**<sup>17</sup> initiative during the year 2023, as part of the 44 countries, 555 events, 45,700 participants, and 183,094 kg of waste collected across all inhabited continents during that world-wide campaign. HCMR has organized a beach cleaning campaign on the 8<sup>th</sup> of May 2023 entitled “Transform litter to art” and the students of the Art School of Heraklion (Crete, Greece) joined forces to remove plastic litter from the coast of Gournes. A team of 35 kids aged 14-16 years old cleaned successfully approximately half kilometer of the coastline in just one hour and they have collected in total 9 bags of 45lt each, meaning almost 400lt of litter. The results of

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<sup>12</sup> [https://www.youtube.com/watch?v=1jbJVpiAWLQ&t=2357s&ab\\_channel=NAUTILOSH2020Project](https://www.youtube.com/watch?v=1jbJVpiAWLQ&t=2357s&ab_channel=NAUTILOSH2020Project)

<sup>13</sup> <https://submariner-network.eu/>

<sup>14</sup> <https://www.outbe.earth/>

<sup>15</sup> <https://www.surfrider.eu/>

<sup>16</sup> <https://euomarinetwork.eu/>


<sup>17</sup> [https://oceans-and-fisheries.ec.europa.eu/eu-beach-cleanup\\_en](https://oceans-and-fisheries.ec.europa.eu/eu-beach-cleanup_en)

the amount of litter collected per category have been registered to the #EUBeachCleanup database (Figure 4) aiming to gain the highest visibility as part of a global campaign for clean, plastic-free oceans.

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### #EUBeachCleanup2023 Results

Fields marked with \* are mandatory.



#EUBeachCleanup 2023 - Share your results!

\* Name of your event

\* Date of your event

\* Country

\* City

\* How many people participated in your event?

\* How many kilograms or bags of litter have you collected?

Litter Collected: Quantification  
Not mandatory - however this information will help us gather data for research purposes.

Type	Amount
Cigarettes	52
Plastic bottles	58
Bottle caps	166
Wrappers	18
Plastic bags & fragments	44
Lollipop sticks	
Medical waste : plastic packaging / tubes / vials	33
Masks	2
Cotton swabs	2
Sanitary pads, tampons, applicators	
Wet wipes	
Picnic dishes	1
Straws	30
Fishing gear : nets (including pieces of net), ropes, string, tangled nets and ropes.	42
Fishing gear : fishing lines, hooks, bait boxes	11
Shoes/Sandals	
Glass bottles	
Metal cans	
Bottle caps	

Add any additional information if relevant, or leave blank.

**Figure 4.** Submission of the #EUBeachCleanup results from the campaign implemented in Crete during 2023 by the students of the Art School of Heraklion (Greece).

CNR-ISMAR organized (6-8/5/2024) in the Castle of Lerici (Italy) the **EUROMECH**<sup>18</sup> scientific colloquium on “Microplastics Dispersion Pathways”. EUROMECH, the European Mechanics Society, is an international non-governmental non-profit scientific organization. The event gathered around 40 international experts on plastic pollution working on the fluid mechanics problem of predicting the transport, dispersion, deposition and resuspension of microplastics in lakes, rivers, coastal oceans and beyond. In addition, the meeting aimed to foster new collaborations between researchers with diverse backgrounds but a common interest in predicting the fate of plastic pollution in our waters. During this meeting some of the results obtained during the NAUTILOS project were presented.

An online expert panel was organized on 30/5/2024 during the 2024 **EU Green Week**<sup>19</sup>, where CNR-ISMAR participated as a NAUTILOS representative. The event was the 3<sup>rd</sup> REMEDIES and UPSTREAM Horizon Cluster Meeting entitled: “Microplastic in our waters: Are we losing the battle?”. The EU Green Week is part of a wider communication campaign dedicated to the topic of water resilience while the projects UPSTREAM and REMEDIES are part of the EU Mission “Restore our Ocean and Waters” with a 2030 target to protect and restore the health of our ocean and waters through research and innovation, citizen engagement and blue investments.

### III. SYNERGIES WITH SCIENTIFIC PROJECTS

One of the NAUTILOS partners, NIVA, is leading **EUROqCHARM**<sup>20</sup>, a H2020 CSA project which links

<sup>18</sup> <https://639.euromech.org/639/>

<sup>19</sup> <https://upstream-project.eu/eu-green-week-2024-remedies-upstream-cluster-meeting/>

<sup>20</sup> <https://www.euroqcharm.eu/en/>

directly to the ESPCE through its aim to harmonise existing approaches and methodologies for plastic pollution assessment in the environment. EUROqCHARM focuses on the quality procedures related to European monitoring programmes, and synergies across the projects were encouraged. CNR-ISMAR was invited to participate to the joint online Marine Strategy Framework Directive (MSF) Technical Group on Marine Litter (TGML) / EUROqCHARM Workshop: “Revisiting the marine litter monitoring strategy within MSFD” during 1-2 March 2023. Later the same year, during 9-14 July 2023, CNR-ISMAR participated as a lecturer at the EUROqCHARM field workshop on macro- and micro-plastics sampling and analysis through harmonized methodologies at Constanta, Romania.

The Microplastic detector system<sup>21</sup> developed within NAUTILOS and designed for operation on “ships of opportunity” (FerryBox) is included as part of the in-situ sensing/monitoring innovative solutions map presented within the framework of **BlueMissionMED**<sup>22</sup> Coordination and Support Action. A webinar series was organised by the BlueMissionMED, and Dr Bert van Bavel from NIVA participated in an interview on the 22<sup>nd</sup> of March 2024 as an expert on the feasibility of the usage of a microplastic sensor for large scale monitoring. Also the role of NAUTILOS on minimizing and mitigating water pollution through dissemination and citizen science activities was presented. The purpose of these interviews is to ensure fast progress towards the achievement of the EU Mission to Restore our Oceans and Waters by 2030 objectives and societal impact and to facilitate knowledge sharing and draw actionable conclusions on how we can effectively scale up solutions to address the pressing challenges of pollution in the Mediterranean region.

Synergies were also supported within the **NORMAN** network and **QUASIMEME** interlaboratory comparison exercises, focusing on methods for microplastics analysis in the laboratory. NIVA presented the microplastic sensor development at the NORMAN network WG 4 ‘Nano-and micro scale particulate contaminants’ annual meeting. Reference materials used in the QUASIMEME WEPAL-QUASIMEME/NORMANs first global interlaboratory study on microplastics have been acquired to test the microplastic sensor development and to be in-line with current developments within the EU. NIVA is also participating in **AMAP** Litter and Microplastics Expert group<sup>23</sup> and in **OSPAR** indicators<sup>24</sup> expert group where activities for plastic litter monitoring are linked to the ESPCE.

CNR-ISMAR participated to a research cruise that took place in the Arctic during 2021 on-board the RV Heincke (AWI) to study the fate and transport of microplastics from Europe to the European Arctic. The mission was organised by the project **FACTS**<sup>25</sup> “Fluxes and fate of microplastics in northern European waters” funded by the JPI-OCEANS and focused on understanding the sources, transport, occurrence, and fate of small microplastics ( $\leq 500 \mu\text{m}$ ) in northern marine waters.

CNR-ISMAR participated in the “Researcher’s Night” in collaboration with the **BlueNIGHTs**<sup>26</sup> project with a booth where the NAUTILOS activities were showcased, both during the years 2022 and 2023. The BlueNIGHTs project entitled as “A touch of Blue in the EU Research Nights for a more Sustainable Use of the Ocean”, aims to bring people working in ocean science close to the general public of Europe. The aim of the project was to organize a series of interconnected events in 17 cities at different European Marine Regions (Finland, France, Italy, Malta, Portugal and Romania) to celebrate the European Night of Researchers editions 2022 and 2023. During the event on 30<sup>th</sup> September 2022 in Venezia (Italy) posters and a video presentation on “Why marine science matters for ocean conservation?” were promoted by NAUTILOS. A seminar was organised on 23<sup>rd</sup> of January 2023 for students of the Galilei Zaccagna High School in Carrara in synergy with BlueNIGHTs, during which methods for involving citizens and students in the activities of collecting and cataloguing marine litter

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<sup>21</sup> <https://bluemissionmed.eu/microplastic-detector-system/>

<sup>22</sup> <https://bluemissionmed.eu/>

<sup>23</sup> <https://litterandmicroplastics.amap.no/>

<sup>24</sup> <https://www.ospar.org/work-areas/eiha/marine-litter>

<sup>25</sup> <https://jpi-oceans-facts.eu/>

<sup>26</sup> <https://bluenights.eu/>

on the beach and in coastal areas were explained, as well as the role of the NAUTILOS project in such activities. In addition, a photographic competition “PLASTIC CLICK” on the theme of marine litter was organised for the same High School as a result of the synergy among NAUTILOS and the BlueNIGHTs. NAUTILOS also participated in the “30<sup>th</sup> Delta and Wetland International Symposium” in June 2023 and presented the Marine Litter Trackers Citizen Science project implemented within BlueNIGHTs by the Capellini Sauro school of La Spezia. BlueNIGHTs project was honoured on 31/5/2024 during the European Maritime Day Conference 2024 in Svendborg, Denmark, as the winner of the MakeEUBlue Awards 2024 in the Sky Blue category.

HCMR has presented the planning for the ESPCE Citizen Science activities of NAUTILOS during the online final meeting of the **RECONNECT**<sup>27</sup> project on the 22<sup>nd</sup> of December 2020. The ESPCE related Citizen Science activities of NAUTILOS were also presented during the National Steering Committee of **LifeWatch ERIC**<sup>28</sup> (16/12/2020, online) and during the 8<sup>th</sup> General Assembly of LifeWatch ERIC (26/11/2020, online). The “Science for all” CS activities of NAUTILOS have been advertised and promoted through the 15<sup>th</sup> issue of the LifeWatch ERIC Newsletter that was published on the 29<sup>th</sup> June 2022 as the photo of the month (Figure 5).

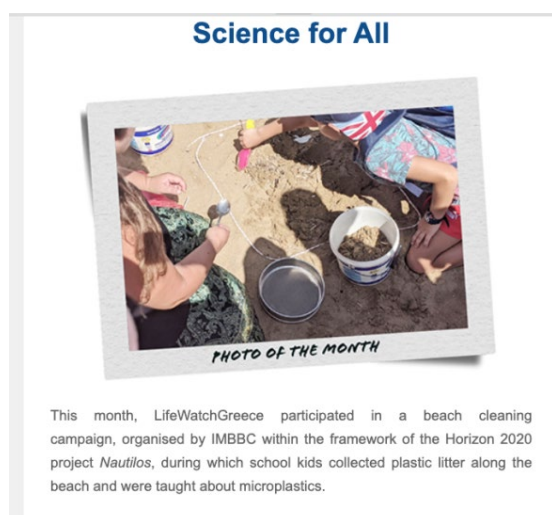


Figure 5. The “Science for all” CS activities of NAUTILOS have been promoted through the 15<sup>th</sup> issue of the LifeWatch ERIC Newsletter.

NAUTILOS was invited to participate in the round table performed during the **NEWSERA**<sup>29</sup> EU Project Final Conference, on the 29<sup>th</sup> of March 2023 at the BIP Meeting Centre in Brussels. During the event, members of the NEWSERA Consortium, including NAUTILOS represented by CNR-ISMAR, presented the NEWSERA Blueprints on innovative Citizen Science Communication, as the result of the many lessons learned from the #CitSciComm Labs<sup>30</sup> performed through the participation of 39 Citizen Science initiatives involved in the project.

The Citizen Science activities of NAUTILOS were presented by HCMR-IMBBC during a meeting focused on “Training, Education and Ocean Literacy” that was organised in Crete on the 6<sup>th</sup> of July 2023 in order to support synergies with the European Project (Horizon Europe) **MARBEFES**<sup>31</sup>. Colleagues from

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<sup>27</sup> <https://reconnect.hcmr.gr/>

<sup>28</sup> <https://www.lifewatch.eu/>

<sup>29</sup> <https://newsera2020.eu/>

<sup>30</sup> <https://newsera2020.eu/labs/>

<sup>31</sup> <https://marbefes.eu/>

IOPAN<sup>32</sup> (WP7 leaders of MARBEFES) and the Today We Have foundation<sup>33</sup> participated in the meeting where extensive discussions for future collaborations took place.

Additional synergies with European Research projects were developed during the 2<sup>nd</sup> NAUTILOS Summer School (see deliverable D12.4)<sup>34</sup>, where representatives from the European projects **CLAIM**<sup>35</sup> and **TechOceanS**<sup>36</sup> participated as invited speakers. More specifically, the coordinator of CLAIM Dr Georgios Triantafyllou, presented the results and outcomes of this Horizon 2020 Innovation Action focused on “Cleaning Litter by developing and Applying Innovative Methods in European seas”, while Dr Martha Valiadi provided a brief overview of the technologies developed within TechOceanS and their early testing results.

NAUTILOS has implemented synergies with the European project **RESIsles**<sup>37</sup> (spring – summer 2025) which aims to raise awareness of citizens (youth, women, and residents of rural or remote areas) for the better understanding of the EU policies and local democratic participation in processes concerning climate change and the environment. Joint activities for interactive presentations at schools, a video competition and award ceremony, co-creation cafés and participation in festivals (e.g. ξξάσ8 – you alone will save the world in Nofalia Lasithiou on 21/6/2025) were performed in collaboration to NAUTILOS during the period spring – summer 2025.

## IV. SYNERGIES WITH LOCAL AUTHORITIES

A cycle of informative and popular conferences was organised by CNR-ISMAR in collaboration with the **Museum of the University of Pisa** and the **National Institute of Geophysics and Volcanology** (INGV), on the themes of plastic pollution in the marine environment, and connected to the exhibition “La Plastica e Noi/Plastic and Us”<sup>38</sup> during the period 24/7/2020 – 31/5/2021. The titles of the conferences were: “Microplastiche nell’ambiente: un nemico invisibile” (20/01/2020)<sup>39</sup>; “Comunità sostenibili: dalla teoria alla pratica” (25/12/2020)<sup>40</sup>; “(Ri)-pensiamo la plastica: riuso, riduco, riciclo” (11/11/2020)<sup>41</sup>; “La plastica e il Mar Mediterraneo” (21/10/2020)<sup>42</sup>.

An event for 70 students of the 40<sup>th</sup> and 43<sup>rd</sup> Primary Schools of Heraklion (Crete, Greece) was organised during 2<sup>nd</sup>-5<sup>th</sup> of April 2024 by HCMR-IMBBC in collaboration with the **Municipality of Heraklion**<sup>43</sup> (Deputy Mayor of Cleanliness, Environment and Energy) and the company **Follow Green**<sup>44</sup>. During the event IMBBC scientists presented the impact of plastic and micro-plastic pollution

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<sup>32</sup> <https://www.iopan.gda.pl/>

<sup>33</sup> <https://todaywehave.com/home/>

<sup>34</sup> [https://nautilus-h2020.eu/wp-content/uploads/2025/05/D12.4-Educational-material-for-the-Capacity-Building-Learning-Labs\\_V2.pdf](https://nautilus-h2020.eu/wp-content/uploads/2025/05/D12.4-Educational-material-for-the-Capacity-Building-Learning-Labs_V2.pdf)

<sup>35</sup> [www.claim-h2020project.eu](http://www.claim-h2020project.eu)

<sup>36</sup> <https://techoceans.eu/>

<sup>37</sup> [https://www.akti.org.cy/projects\\_research/resisles-resilient-euro-mediterranean-islands-democratic-participation-for-informed-and-responsible-decisions-on-climate-and-the-environment/](https://www.akti.org.cy/projects_research/resisles-resilient-euro-mediterranean-islands-democratic-participation-for-informed-and-responsible-decisions-on-climate-and-the-environment/)

<sup>38</sup> <https://www.msn.unipi.it/it/eventi/la-plastica-e-noi/>

<sup>39</sup> <https://www.msn.unipi.it/it/eventi/microplastiche-nellambiente-un-nemico-invisibile/>

<sup>40</sup> <https://www.msn.unipi.it/it/eventi/comunita-sostenibili-dalla-teoria-alla-pratica/>

<sup>41</sup> <https://www.msn.unipi.it/it/eventi/19854/>

<sup>42</sup> <https://www.msn.unipi.it/it/eventi/la-plastica-e-il-mar-mediterraneo/>

<sup>43</sup> <https://www.heraklion.gr/en>

<sup>44</sup> <https://www.followgreen.gr/>

in the ocean and the marine organisms, while employees of the Cleanliness and Recycling Department of the Municipality explained the procedures of litter management and recycling. The students also participated in a beach cleaning campaign organised in the local beach of Xiropotamos on 20/5/2024 under the NAUTILOS methodology.

An additional event was organised by the **Municipality of Heraklion** for celebrating the World Environment Day on 5<sup>th</sup> of June 2024 (Figure 6). During the event an award ceremony took place for the 88 Primary and High Schools that participated in a School Recycling Marathon by collecting recyclable materials. Also 20 Kindergarten and Primary Schools participated in an art competition with projects made from recyclable materials. NAUTILOS was present in this event and organized educational activities, games and craft making with the support of Follow Green.



Figure 6. NAUTILOS coorganised an event for the World Environment Day in 2024 with the Municipality of Heraklion.

An event was organised by the **Municipality of Chersonisos**<sup>45</sup> and more specifically the Deputy Mayor of Environment, Recycling and Circular Economy, in collaboration with NAUTILOS project (HCMR-IMBBC scientists) on the 25<sup>th</sup> of April 2024 for the 167 students of Mallia High School (Crete). The event was the final celebration of the action “Keep it, don’t throw, recycle with us” that took place throughout the school year aiming to create awareness to students for good recycling practices. The results of the competition between the different school groups were also announced and all students received a T-shirt with the NAUTILOS logo included. During the event IMBBC scientists presented the impact of plastic and micro-plastic pollution in the ocean and the marine organisms.

A presentation on plastic pollution was organized for families, young kids and their parents, in the CretAquarium (HCMR) (Heraklion, Greece) within the framework of the educational project “Healthy ocean, healthy me” which is funded by the **Region of Crete**. During the session “Plastic Litter” members of HCMR-IMBBC presented information about the origin of plastic pollution, suggested solutions that can be applied by the general public for everyday life activities and presented the relevant Citizen Science approaches of NAUTILOS project, including the beach cleaning campaigns and the CS App<sup>46</sup>. The event was repeated in three occasions, on 27/4/2025, 17/5/2025 and 18/5/2025.

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<sup>45</sup> <https://www.hersonisos.gr/en/>

<sup>46</sup> <https://nautilus-h2020.eu/nautilus-cs-app/>

## V. SYNERGIES WITH EDUCATIONAL PROJECTS

CNR-ISMAR has established synergies with the EU **Erasmus+** project BLUE Schools MED<sup>47</sup> which was launched in January 2021 and is joining 10 partners from four Mediterranean countries: France, Italy, Greece and Malta. Joint CS educational/research activities have been organised in the framework of the initiatives "ML-DAR" (A multidisciplinary method to study the Marine Litter Dispersion from the Arno River mouth: a study case to support citizen science) and ML-CSA (Study the Marine Litter dispersion: Citizen Science Application case), for the study of marine litter dispersion at the mouth of the Arno River. Details for these projects are described in deliverable D12.3. CNR-ISMAR participated in the national multiplier event in Forli (Italy) on the 5<sup>th</sup> of May 2023 for the promotion of the La Spezia BlueSchool Capellini Sauro project dealing with the study of transport of marine litter using special smart drifters built by the students. Furthermore, CNR-ISMAR participated as invited speaker in the Erasmus + project of the Fossati Da Passano High School of La Spezia, on the 14<sup>th</sup> of March 2024, presenting some of the citizen science activities performed within NAUTILOS, such as the "smart-drifters project" and the "Adopt a beach" project. The first prize for the schools category of the Sea Film Festival<sup>48</sup> was awarded on 25/5/2024 to the film made by Fossati High School for their activities within NAUTILOS (Figure 7).



**Figure 7.** Award of the first prize of the Sea Film Festival to the film of Fossati High School for their Marine Litter Trackers activities within NAUTILOS.

HCMR-IMBBC collaborated with the **Erasmus+** programme "From Local to Global Environmental Awareness" and participated in the 4<sup>th</sup> transnational meeting about "Plastic Pollution in the Mediterranean" which took place in the 12<sup>th</sup> High School of Heraklion during 10 - 14 October 2022. More than 40 students and teachers from high schools of Greece, Poland, Romania, Spain, Turkey and Portugal participated in this programme. Additional collaborations of HCMR-IMBBC with Erasmus + projects included the educational activities performed in Crete during the year 2025 with High Schools from Germany (20/3/2025, 18 students) and France (5/5/2025, 24 students).

Educational activities related to ESPCE and NAUTILOS were organised by HCMR-IMBBC for students of the 1<sup>st</sup> Primary School of Agios Nikolaos (Crete, Greece) which participate in the **SHORE**<sup>49</sup> project (7/5/2025, 40 students), and more specifically in "Blue Actions for a Sustainable Future-Teaching students to be more active! - BeBlueActive". The SHORE project aims to enhance ocean literacy by empowering students as agents of change and to restore the health of our oceans and waters across 5 regions (Baltic Sea, Black Sea, Mediterranean Sea, Danube River and Rhine River). It aims to

<sup>47</sup> <https://www.blueschoolsmed.eu/>

<sup>48</sup> <https://www.seafilemfestival.it/>

<sup>49</sup> <https://shoreproject.eu/>

implement the objectives of the EU Mission 'Restore our Ocean and Waters' through activities and collaborative projects in schools, offers guidance to educators and provides students with the right skills and knowledge to become eco-citizens.

HCMR-IMBBC has developed strong synergies with the European H2020 project **CONNECT**<sup>50</sup> WHICH SUPPORTS “Inclusive open schooling through engaging and future-oriented science” within the framework “Science for the Society” and actively participates in Open-Schooling initiatives with Science-Action scenarios for primary and secondary school students under the theme “Students and Scientists solving real problems”. Since January 2023, HCMR is organizing online and physical lectures about marine plastic pollution related to the NAUTILOS Citizen Science activities. Three schools in Crete and one school FROM northern Greece (137 students IN TOTAL) have been involved.

NIVA has used the NAUTILOS Citizen Science activities on microplastics as an example during the first of a three-workshop series of National workshops for the **Norwegian Research Council** for the ‘Reflab’ project. The use of the NAUTILOS smartphone NIR scanner on cruise expedition ships, high school students and within the Plastic Pirates project was highlighted on the first workshop which took place the 21<sup>st</sup> of March 2024.

The NAUTILOS Citizen Science activities were also presented by HCMR-IMBBC in the **UNESCO 2022 Hybrid Summer University of Asterousia** that took place in Crete during 12-14<sup>th</sup> of September 2022. The main subject of the UNESCO Summer School was Ocean Literacy and Biosphere Reserves / Protected Areas. The event was co-organized with the Hellenic National Committee Man and the Biosphere Programme (MAB/UNESCO) and the Mediterranean Information Office for Environment, Culture and Sustainable Development (MIO – ECSDE).

CNR-ISMAR (G. Suaria) was invited to give a lecture as a representative of NAUTILOS for the 1<sup>st</sup> edition of the **CRIMAC INTERNATIONAL SUMMER SCHOOL: Multidisciplinary approach for the study of plastic litter pollution in MEDiterranean ecosystems: from impacts to potential solutions (PLASTMed)** which was held in Stazione Zoologica Anton Dohrn – Calabria Marine Centre, Research Centre and Marine Advanced Infrastructures in Calabria (CRIMAC), Amendolara, during 22-25<sup>th</sup> of October 2024

HCMR-IMBBC was invited to participate in a workshop about creativity in the educational system and the school environment named “**Thinking bites**” which was organised on 17<sup>th</sup> of February 2023 by Dr Dimitris Grammenos from FORTH – Institute of Computer Science<sup>51</sup>. This workshop promoted synergies with the educational activities of NAUTILOS which have the advantage of being performed outside the defined walls of a classroom.

The **1<sup>st</sup> Student Conference for Sustainable Development**<sup>52</sup> was organised by the 2<sup>nd</sup> High School of Piraeus (Greece) during 2-9<sup>th</sup> of May 2025. The conference was entitled “Building the future - 17 steps for a better world”. HCMR-IMBBC has been invited to give a dedicated presentation within the framework of NAUTILOS and to discuss the importance of the marine environment, the effects of plastic pollution and the possible solutions, focusing on the baselines of the ESPCE.

## VI. SYNERGIES WITH OTHER INITIATIVES AND STAKEHOLDERS

Synergies have been established between NAUTILOS project and the **Sail & Explore Association**<sup>53</sup>. HCMR-IMBBC organized a joint campaign<sup>54</sup> for the collection of plastic litter by volunteer citizen

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<sup>50</sup> <https://www.connect-science.net/>

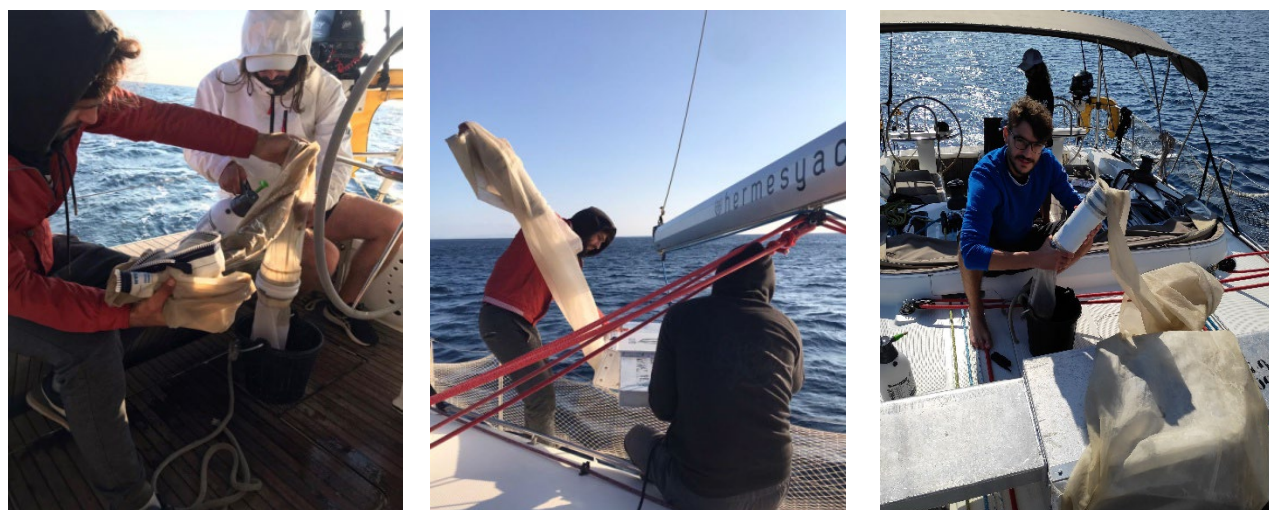
<sup>51</sup> <https://www.ics.forth.gr/>

<sup>52</sup> <https://2gym-peiraia.att.sch.gr/?p=501>

<sup>53</sup> <https://www.sailandexplore.com/>

<sup>54</sup> <https://www.sailandexplore.com/greece>

scientists during October 2021 (Figure 8). The sailing campaign started from Lavrion-Attica and was implemented in Cyclades islands (Greece – Central Aegean Sea East Mediterranean) between 15-30<sup>th</sup> of October 2021. Two scientists from IMBBC-HCMR were onboard offering scientific guidance and tutorials to the participating volunteers, mainly focusing on NAUTILOS ESPCE related CS activities, marine ecosystems, marine pollution and alien species in ports. The aim of the expedition was to investigate plastic pollution in this area in relation with meteorological data and sea currents. The duration of the sailing expedition was 14 days during which the team implemented samplings at 10 stations around nine islands of the Cyclades. Microplastics were collected using two Manta Trawl nets of 300µm and 150µm diameter.



**Figure 8.** Sailing campaign organised by HCMR-IMBBC in collaboration with the Sail & Explore Association for the collection of plastic litter and microplastics by volunteer citizen scientists.

Similarly, CNR-ISMAR co-organised a workshop for European students entitled “Plastic at sea, Solutions on the island – Phase II” together with the **Sail & Explore Association** during 26-30<sup>th</sup> of June 2023 in order to investigate the flows and losses of plastic waste on the island of Elba (Italy) and to identify projects that represent long-term solutions to the plastic waste problem. This 2<sup>nd</sup> phase of the workshop aimed to elaborate and test small projects helping to reduce, reuse, refuse and recycle plastics. The ideas and projects developed by the students during the workshop were presented to the public and to the island authorities in Marciana Marina at the SEIF (Sea Essence International Festival), organized by the Acqua dell'Elba Foundation.

HCMR-IMBBC was invited to participate in the workshop “Citizens for the Environment” which was organised by **WWF Greece** and the Open Technologies Alliance on the 18<sup>th</sup> of February 2023 and was hosted at the Natural History Museum of Crete in Heraklion (Crete, Greece). This meeting involved scientists, citizens and stakeholders (i.e. governmental officers, lawyers, NGOs, local business and hotel owners) and was aiming to support the processes of public interference in environmental issues, including pollution monitoring and citizen awareness.

HCMR-IMBBC contributed in the **Athens Science Festival 2022** «Worlds of Tomorrow» (#ASF2022)<sup>55</sup> (Athens, Greece, 21 – 23 October 2022) and presented the Citizen Science Activities of NAUTILOS (Figure 9a). The visitors, mainly young kids, had the opportunity to participate in a hands-on experiment, create hand crafts using plastic garbage and assist scientists to identify marine benthic sessile organisms and litter using underwater photos through the online Zooniverse project “Marine Creatures” (deliverable D10.9).

<sup>55</sup> <https://www.athens-science-festival.gr/>

Also, HCMR-IMBBC collaborated with the 2<sup>nd</sup> innovation exhibition **INNODAYS**<sup>56</sup> that took place in Heraklion (Crete, Greece) during 24-26<sup>th</sup> of November 2023 and presented the Citizen Science Activities of NAUTILOS (Figure 9b). The visitors and young kids had the opportunity to participate in a hands-on experiment aiming to create awareness for marine pollution, they were informed about the macro- and micro-plastic marine pollution, and created hand crafts using plastic beach waste. The INNODAYS exhibition is a popular event that engaged more than 5,000 of visitors, including companies, institutions, governmental authorities and stakeholders.



**Figure 9.** Participation of NAUTILOS in a) the Athens Science Festival 2022 «Worlds of Tomorrow» and b) in the 2<sup>nd</sup> innovation exhibition INNODAYS.

Similarly, CNR-ISMAR collaborated with the “**Science is Wonderful!**”<sup>57</sup> science fair at Maison de la Poste, Brussels, Belgium during 16-17<sup>th</sup> of March 2023 and created a booth called “Trace the trash”, involving over 4,000 school children in several marine litter and plastic pollution-related activities (Figure 10). During the fair, students from all over Belgium and Europe were able to learn about the problem of plastic pollution in our seas, learn why some kind of plastic items sink while other plastics items will remain floating, experience how long plastic will remain in the marine environment, search for the hidden microplastics in beach sand and make their pledges for a trash free ocean.



**Figure 10.** Participation of NAUTILOS in the “Science is Wonderful!” science fair.

<sup>56</sup> <https://2023.innodays.gr/>

<sup>57</sup> <https://ec.europa.eu/newsroom/eusciencehubnews/items/781722/en>

HCMR-IMBBC participated in the event "Celebrating Natural Sciences in Chania, 2023" on 6/5/2023 which was organized by the **EKFE** of Chania<sup>58</sup> (Laboratory Center of Natural Sciences) and presented "The effects of plastics and microplastics in the marine environment. Around 40 participants (teachers, students and the general public) attended this presentation. Prior to the event an interview on plastic pollution and NAUTILOS activities was given to the radio show "in the first plural" of the local radio Zarpa<sup>59</sup>.

IMBBC-HCMR co-organised the public festival "**έξασθ – you alone will save the world**" with the University of Crete in Nofalia Lasithiou (Crete) on 29<sup>th</sup> June 2024 and on 21<sup>st</sup> of June 2025. Educational actions within the framework of NAUTILOS were presented, including an interactive experiment to display the effect of pollution on marine organisms, and a demo for the collection and identification of microplastics from coastal sediment samples. Also the kids were able to create a set of handcrafts using recycled plastic litter.

CNR co-organized together with CNR Institutes IGG and IBE the workshop "**PIANOSA Projects**", in Firenze, Osservatorio Ximeniano, on the 22<sup>nd</sup> of February 2024, during which various projects for the mapping and study of the marine protected area of Pianosa Island were presented, including possible applications of the different types of devices made within the NAUTILOS project, with a particular focus on the issue of marine litter and its interaction with biota.

## VII. DISSEMINATION AND EVENTS

The dissemination activities of NUTILOS are presented in detail in deliverables D10.4<sup>60</sup> and D10.10. All the dissemination activities that are related to the ESPCE actions and synergies are also listed in this section.

### 7.1 Scientific conferences and workshops

1. CNR-ISMAR attended and presented results about plastic pollution at MICRO2020 Conference (Online, 23-27 Nov. 2020).
2. CNR-ISMAR gave an invited talk at the International Workshop "Plastics & Circular Economy" organized by Accademia Nazionale dei Lincei e Fondazione «Guido Donegani». Online Event. 8-9 April 2021.
3. ETT, CNR-ISMAR, HCMR-IMBBC and EUROCEAN attended the 2022 IEEE International Workshop On Metrology for the Sea, October 3-5 2022, Milazzo, Italy. An oral talk "Uptake, explore and champion best practices of Citizen Science (CS) projects", was presented by Antonio Novellino.

*Novellino, A., Jimenez, H., Pieri, G., Merlino, S., Machado Toffolo, M., Chatzinikolaou, E., Suaria, G., Goffredo, S., Granchinho, S., Tixi, L., Sa, S. (2022). Uptake, explore and champion best practices of Citizen Science (CS) projects. IEEE Metrology for the Sea. 3rd - 5th October 2022, Milazzo, Italy*

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<sup>58</sup> <https://ekfechanion.eu/>

<sup>59</sup> <https://zarparadio.gr/>

<sup>60</sup> <https://nautilos-h2020.eu/wp-content/uploads/2023/08/NAUTILOS-D10.4-Dissemination-impact-report.pdf>

4. CNR-ISMAR attended the Conference “Ocean from Space” 24-28 October 2022, Scuola Grande di San Marco, Venezia and gave an oral talk “The use of Citizen Science for aerial monitoring of marine litter pollution”.

*Alvisi, F., Merlino, S., Locritani, M., Paterni, M. (2022). The use of Citizen Science for aerial monitoring of marine litter pollution. “Ocean From Space” Symposium, 24-28 October 2022, Scuola Grande di San Marco, Venezia*

5. CNR-ISMAR presented an oral communication during the MonGOOS Workshop on the dispersal of floating litter in Florence (Italy) on 22-24<sup>th</sup> of November 2022.

*Merlino, S., Locritan, M., Guarnieri, A., Delrosso, D., Bianucci, M. and Paterni, M. (2022). Tracking our own trash: following the dispersal of floating litter from the Arno river using open source technology and a citizen science-based approach. MonGOOS Workshop & GA November 22-24, 2022. Florence, Italy.*

6. CNR-ISMAR presented a poster including the Citizen Science activities of NAUTILOS at the International Conference ASLO Aquatic Sciences Meeting 2023 - Resilience and Recovery in Aquatic Systems that took place in Palma de Mallorca, Spain at 4–9 June 2023.

*Galgani, L., Corsi, A., Gumiero, B., di Grazia, F., Sheffield, D., Suaria, G., Aliani, S., Conversi, A., Loisel, S. (2023). OceanScience is Wonderful! Fostering curiosity through positive storytelling and emotional connection while “talking trash”. ASLO Aquatic Sciences Meeting 2023 - Resilience and Recovery in Aquatic Systems. 4–9 June 2023, Palma de Mallorca, Spain.*

7. CNR-ISMAR participated in the International Marine Debris Data Harmonisation Workshop (August 2023) organized by the Japanese Ministry of Environment in Yokohama (CNR).

8. CNR-ISMAR participated to the 11<sup>th</sup> Workshop on Volcanic Lakes, in Sao Miguel Island, Azores, Portugal, from 1 to 5 September 2023, presenting the results obtained with the Marine Litter Trackers developed within the NAUTILOS project and their possible application in lakes.

9. CNR-ISMAR gave an invited talk on "Monitoring plastic pollution in the marine environment: main findings and future perspectives" at the Biological Monitoring Symposium organized by the School of Biological Sciences of the National University of Costa Rica during the Congress of Integration of Knowledge for a Sustainable Ocean (CISOS24), on 3-6th June 2024, in San José, Costa Rica. During this meeting results obtained during the NAUTILOS Citizen Science activities were also presented.

10. CNR-ISMAR participated in the GI-SIMP Joint Congress “Geology for a sustainable management of our Planet”, in Bari, Italy, on 3-5 September 2024, with two oral presentations 1) Adopt-a-Dune project: use of 'virtual adoption' and citizen science approach to increase knowledge and raise student awareness on coastal systems management, in “Geoscience at school” session; 2) Plastic accumulation on a marine protected area: the case study of the Giannutri Island in Tuscan Archipelago, in “The global challenge of plastic pollution: causes, impacts and solutions” session.

11. CNR-ISMAR was invited to give a keynote lecture on “Marine litter and microplastic pollution in the Antarctic environment: a general overview” at the 2nd European Polar Science Week which was held on 3-6 September 2024 in Copenhagen, Denmark.

12. CNR-ISMAR participated in the International Conference MICRO 2024 Plastic Pollution: from Macro to Nano, on 23-27 September 2024 in Lazarote, Spain, presenting the results of several Citizen Science activities performed during the NAUTILOS project.

13. CNR-ISMAR participated to the METROSEA2024 meeting which took place in October 14-17, 2024 in Portoroz (Slovenia), as the chairman of the special session “An integrated Perspective to Monitor Coastal Environments: Sensors, Methodologies and Analysis Tools”, and also presented some of the CS results obtained during the NAUTILOS project.

14. HCMR-IMBBC participated in the 6<sup>th</sup> International Marine Science Communication Conference<sup>61</sup> (CommOCEAN 2024) that took place on 26-27<sup>th</sup> November 2024 (Figure 11). The conference was hosted at the Málaga Oceanographic Centre and was organised by the European Marine Board Communication Panel and the Spanish Institute of Oceanography (IEO-CSIC). The Citizen Science and educational activities of NAUTILOS were presented during Session 2 “How to ensure engagement in your Citizen Science project”.



**Figure 11.** NAUTILOS in the 6<sup>th</sup> International Marine Science Communication Conference (CommOCEAN 2024)

15. CNR-ISMAR participated in 12th February 2025 in the International Workshop “Approaches for Measuring and Identifying Microplastics” presenting some of the Citizen Science results obtained by the NAUTILOS project. The international workshop was organized by the Institute of Oceanography of the Hellenic Centre for Marine Research (HCMR) in Athens (Greece) under the Harm-Plast EUROMARINE-OYSTER cooperation project and was dedicated to supporting Early Career Scientists in advancing their expertise in microplastic measurement and identification.
16. CNR-ISMAR participated in the “MARTECH”<sup>62</sup> Conference, held in Pasaia, Basque Country, Spain, on 28-29/5/2025. The activities for the design and use of Marine Litter Trackers carried out within the NAUTILOS project were demonstrated. Also, the work performed regarding the storage and visualization of plastic litter data collected through ERDDAP data management system, in collaboration with CNR-ISTI, was presented.
17. CNR-ISMAR participated in the meeting “One Ocean Science Congress”<sup>63</sup> (OOSC) held in Nice, France during 4-6th June 2025 by presenting a poster for the NAUTILOS Citizen Science activities. This was a UN Special Event and the scientific foundation for the Third United Nations Ocean Conference (UNOC3) that will take place in Nice, France from June 9 to 13, 2025.

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<sup>61</sup> <https://www.commocean.org/2024-malaga-spain>

<sup>62</sup> <https://www.azti.es/en/event/martech-2025-the-12th-international-workshop-on-marine-technology/>

<sup>63</sup> <https://one-ocean-science-2025.org/>

## 7.2 Seminars

1. CNR-ISMAR gave a seminar on plastic pollution for the students of the University of Bari (Italy) organized by LINK-Coordinamento Universitario on 08/04/2021
2. CNR-ISMAR participated to the Base Camp Project<sup>64</sup> for Future Education on spring 2021 with a talk on plastic pollution organized by ENEL Cuoreonlus to provide study opportunities for disadvantaged teenagers on the outskirts of Rome, Naples and Palermo.
3. CNR-ISMAR gave an invited keynote presentation during the webinar “Microplastics for breakfast: 10 years of plastic pollution research - main findings and future perspectives” organized by the Slovenian Association of Microplastic Researchers which was held online on 6<sup>th</sup> of March 2024 presenting some of the Citizen Science activities carried out during the NAUTILOS project.
4. CNR-ISMAR was invited to give a seminar on the role of citizen science in the study of marine litter at Tarapacá University, Arica, Chile, on 13/8/2024.

## 7.3 Public events

1. CNR-ISMAR took part in the national event BRIGHT organised in collaboration to the Researchers' Night in Pisa on 23/11/2021, together with other CNR institutes.
2. CNR-ISMAR gave an invited talk on marine pollution, monitoring and conservation for the “RitMare” event organized by TEDxLerici, La Spezia, Italy on 24th June 2023.
3. CNR-ISMAR participated in the world event "Ocean Race" in Genoa (26/6 – 1/7/2023), within the "INNOVATION VILLAGE" that was a sea science and technology village set up during the 6 days of the sailing competition. On the occasion of the Grand Finale, NAUTILOS was able to set up an exhibition space where, on 29 and 30/6/2023, presented the Marine Litter Trackers citizen science activity during the "Low-cost technologies for Ocean Data monitoring and participatory actions" day-meeting.
4. CNR-ISMAR participated as invited speaker in the Education Fair "DIDACTA" that took place in Florence, Italy on 20-22 March 2024, presenting the NAUTILOS Citizen Science and relevant educational projects.
5. CNR-ISMAR (Dr Silvia Merlino) received the “FIDAPA DONNA 2024” award, on 10/5/2024 in Pisa, from the association “FIDAPA BPW - ITALY”<sup>65</sup> (Business and Professional Women), Pisa section, for NAUTILOS activities in research and science popularization through citizen science approaches.
6. CNR-ISMAR participated to the “De Portibus” Festival with a keynote lecture about “Port areas, microplastics and sustainability in the era of the great acceleration” on 10-12<sup>th</sup> May 2024 in La Spezia, Italy. This innovative festival focused on the sustainable relationship between cities and their ports, with all the issues relating to interaction with communities and territories. During this meeting results obtained during the NAUTILOS Citizen Science activities were also presented.
7. CNR-ISMAR participated as an invited speaker (Dr Silvia Merlino) in the celebrations for the conclusion of the Underwater Dome event on 28-29<sup>th</sup> of June 2024 in Genova. The event took

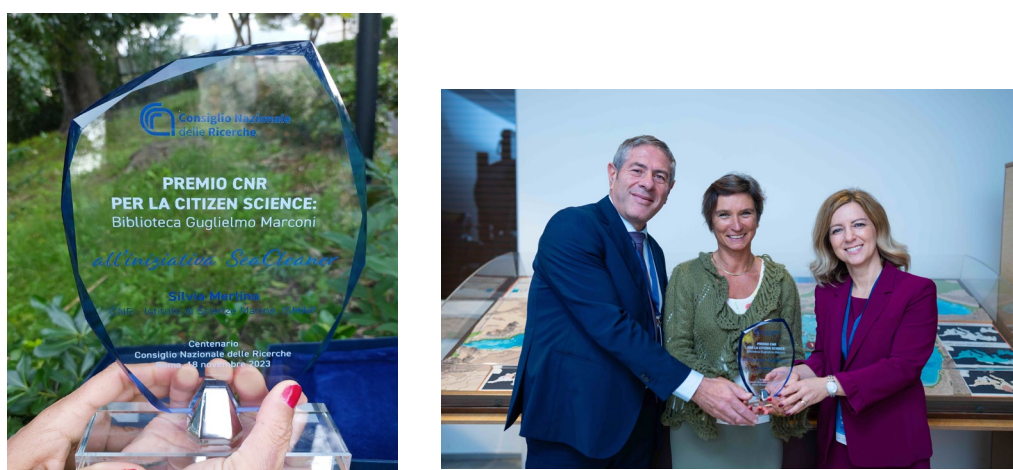
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<sup>64</sup> <https://www.enelcuore.it/en/projects/articles/2019/12/base-camp-enel-cuore>

<sup>65</sup> <https://www.fidapa.org/HomePage>

place on board the GNV cruise boat “Rapsody” and hosted exponents from the world of sea-related sports and representatives working on the research and protection of the marine environment.

8. CNR-ISMAR participated in the event ‘The Future is in the Ocean: the hidden face of the planet’<sup>66</sup>, in the CNR Conference Hall in Rome, 12<sup>th</sup> November 2024, at the presence of CNR President Maria Chiara Carrozza and of the Director of the CNR Department of Earth System Sciences and Technologies for the Environment, Francesco Petracchini. Emphasis was placed on “Citizen Science and Marine Environment” and in this context, the winner of the first edition of the Citizen Science Prize Marconi Library (Figure 12), Dr Silvia Merlino, presented the project ‘Little Big Scientists and Citizens Grow’ by the Piaget-Majorana Comprehensive Institute and also moderated a session dedicated to Citizen Science.



**Figure 12.** Dr Silvia Merlino (CNR-ISMAR) was awarded with the "Guglielmo Marconi" citizen science prize for the "SeaCleaner" Citizen Science project that was launched within NAUTILOS.

## VIII. CONCLUSIONS

The activities performed within Task 12.1 for the complete duration of NAUTILOS resulted in the establishment of a total of 52 synergies related to the European Strategy for Plastics in a Circular Economy (ESPCE). More specifically, synergies and collaborations were developed with 17 European Initiatives, 14 scientific projects, 5 local authorities (e.g. municipalities, regions), 8 educational projects (e.g. Erasmus +, Connect, SHORE) and 8 more with additional initiatives and stakeholders (e.g. companies, organisations). NAUTILOS has further enhanced synergies through the participation of partners in 10 international conferences, 7 workshops, 4 seminars and 9 public events, related to the ESPCE. Activities of Task 12.1 were disseminated through social media, websites and events reaching overall a multivariate audience (scientific community, educational community, general public, students, policymakers, environmental agencies, industry and EU/local authorities). In addition, 4 conference papers were produced and the project’s activities and collaborators have been awarded with 4 prizes (1 more is under evaluation).

<sup>66</sup> <https://www.cnr.it/it/evento/19523/il-futuro-e-nell-oceano-la-faccia-nascosta-del-pianeta>

According to the Annex 1 – Description of Action of the project NAUTILOS, the number of collaborations in relation to ESPCE are defined in SO9 *“Promote and develop a broad range of collaborations and contributions to international, regional, and national fora concerned with the sustainable management of marine resources and the protection of marine biodiversity with a specific focus on the European Strategy for Plastics in a Circular Economy”*, should exceed the number of 20. Following the 57 months of the complete project’s duration, this number has been achieved and exceeded by 32 more synergies, reaching a total of 52 collaborations which will hopefully pave the ground for future developments and advancements on the ESPCE area.

## APPENDIX 1: REFERENCES AND RELATED DOCUMENTS

Deliverable 12.1 has been developed following the provision outlined within the subsequent related documents:

ID	Reference or Related Document	Source or Link/Location
1	NAUTILOS Grant Agreement	NAUTILOS Team GDrive, SyGMa platform
2	D12.4 Educational material for the Capacity Building Learning Labs	NAUTILOS Team GDrive, SyGMa platform
3	D12.3 Report on Citizen Science Campaigns (WP12)	NAUTILOS Team GDrive, SyGMa platform
4	D10.9 Report on Citizen Science Campaigns (WP10)	NAUTILOS Team GDrive, SyGMa platform
5	D10.4 Dissemination impact reports - 1	NAUTILOS Team GDrive, SyGMa platform
6	D10.10 Dissemination Impact Reports - 2	NAUTILOS Team GDrive, SyGMa platform
7	D10.7 Report on established synergies	NAUTILOS Team GDrive, SyGMa platform
8	NAUTILOS website	<a href="https://nautilus-h2020.eu/news/">https://nautilus-h2020.eu/news/</a> <a href="https://nautilus-h2020.eu/nautilus-cs-app/">https://nautilus-h2020.eu/nautilus-cs-app/</a>