# Minutes of the

# 20th Meeting
# of the joint meeting of the

# Baltic Earth Science Steering Group (BESSG)

# and

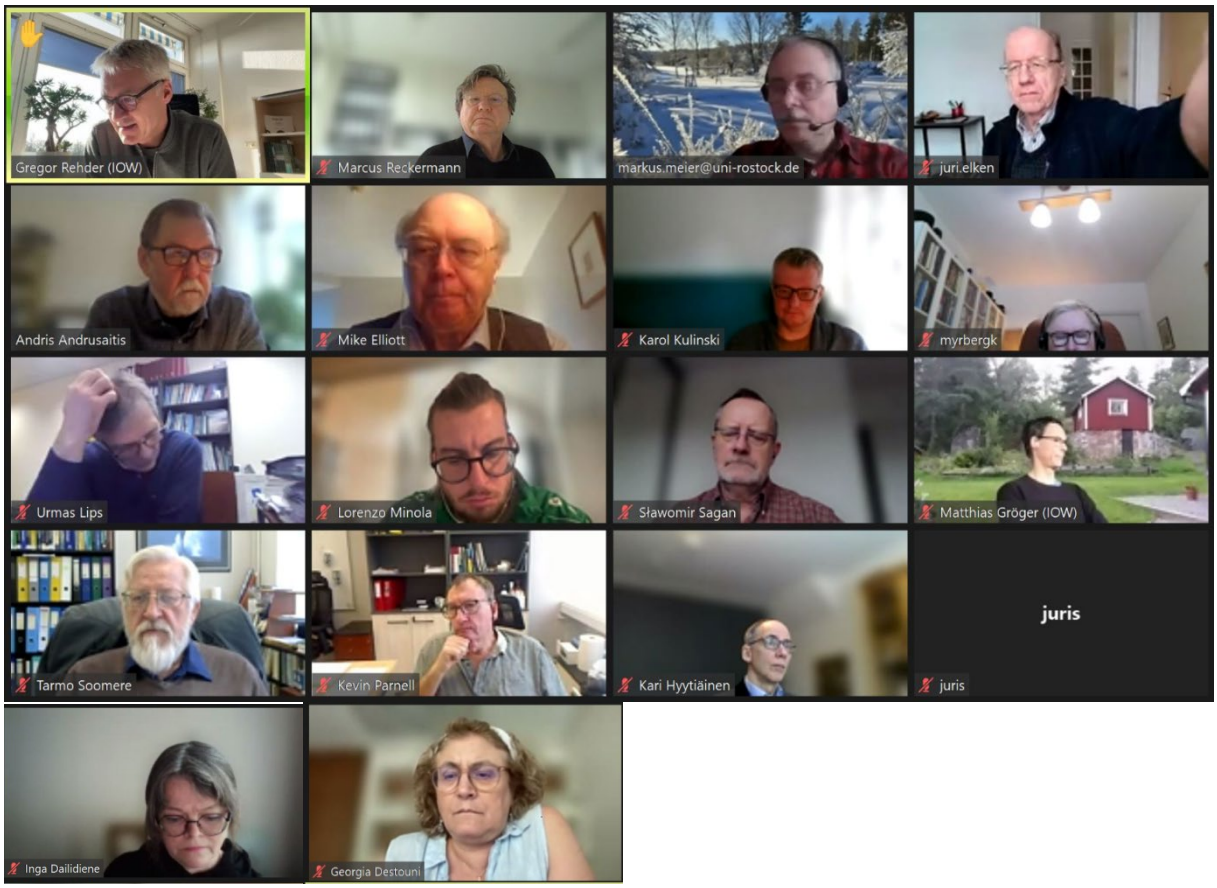
# Baltic Earth Senior Advisory Board (BESAB)

13 February 2024
Online

*Edited by*
***Marcus Reckermann***

## Participants at the 20th Baltic Earth Science Steering Group (BESSG) meeting and Baltic Earth Senior Advisory Board (BESAB) meeting

| Last name | First name | Affiliation | Function |
|---|---|---|---|
| Aigars | Juris | Latvian Institute of Aquatic Ecology, Riga, Latvia | BESSG member |
| Andrusaitis | Andris | BONUS EEIG, Helsinki, Finland | BESAB chair |
| Dailidienė | Inga | Marine Research Institute, Klaipeda University, Lithuania | BESSG member |
| Destouni | Georgia | Department of Physical Geography Stockholm University | BESSG member |
| Elken | Jüri | TalTech, Tallinn, Estonia | BESAB member |
| Elliott | Mike | University of Hull, UK | BESAB member |
| Gröger | Matthias | Leibniz Institute for Baltic Sea Research Warnemünde, Germany | |
| Hyytiäinen | Kari | University of Helsinki, Helsinki Institute of Sustainability Science | BESSG member |
| Kulinski | Karol | Institute of Oceanology IO-PAN, Sopot, Poland | BESSG vice chair |
| Lips | Urmas | TalTech, Tallinn, Estonia | BESSG member |
| Meier | Markus | Leibniz Institute for Baltic Sea Research Warnemünde, Germany | BESSG chair |
| Minola | Lorenzo | University of Gothenburg, Sweden | BESSG member |
| Myrberg | Kai | Finnish Environment Institute SYKE | BESSG member |
| Parnell | Kevin | Laboratory of Wave Engineering: Department of Cybernetics, TUTech, Tallinn, Estonia | BESSG member (as of this meeting) |
| Reckermann | Marcus | International Baltic Earth Secretariat at Helmholtz-Zentrum Hereon, Germany | IBES, BESSG member |
| Rehder | Gregor | Leibniz Institute for Baltic Sea Research Warnemünde, Germany | BESSG member |
| Sagan | Slawomir | Institute of Oceanology IO-PAN, Sopot, Poland | BESAB member |
| Soomere | Tarmo | TalTech, Estonia | BESAB member |




Participants in the 20th Baltic Earth Science Steering Group meeting

## Summary of Decisions and Action Items

### Decisions

1. Lorenzo Minola of University of Gothenburg, Sweden, was approved and welcomed as a new BESSG member.

2. Mike Elliott of University of Hull, U.K. was approved and welcomed as new BESAB member.

3. It was decided to start the activity of a regular online, public Baltic Earth colloquium.

4. The timeline for the update to the Baltic Earth Science Plan was changed. A first draft of contributions shall be available at the 5th Baltic Earth Conference.

## Introduction

The 20th Baltic Earth Science Steering Group Meeting was a full day online meeting, with the main objective to discuss the status of the update of the Baltic Earth Science Plan, and decide on a new time line.

Markus Meier, chairman of BESSG, welcomed all participants to the meeting. Then there was a short introductory round for a short self-introduction of all participants.

## TOP 1: Organizational Issues

**1.1 Approval of the agenda**
The agenda was approved.

**1.2 Approval of the previous 19th Baltic Earth SSG meeting minutes**
The previous meeting minutes were approved.

**1.3 Review of previous action items**

1. Mike Elliott was suggested to be approached as future Baltic Earth Senior Advisory Board member (Action Item to BESSG chairman). *Done. Mike accepted to join the BESAB.*

2. BESSG members to rank the candidates for a young scientist member in BESSG and send this by e-mail to the secretariat, by 16 October. *Done. Lorenzo Minola was invited as new BESSG member.*

3. The Secretariat to place a Doodle to find the best slot for a first colloquium in November. Markus Meier volunteered as the first speaker. Date and title of the talk will be published as soon as possible. *Done. The Baltic Earth Scientific Colloquium was established and two colloquia have already been held.*

4. A Call for Papers and 2nd Announcement for the 5th Baltic Earth Conference in Latvia will be published in November, for which a more detailed description of sessions will be required; that will be prepared together with BESSG members. *Done. 102 abstracts received as of today.*

**1.4 Membership issues**

**Lorenzo Minola** of University of Gothenburg, Sweden, was approved as new BESSG member. Lorenzo had been nominated and selected as new BESSG member of a younger generation, following the discussions at the last Baltic Earth Conference in Poland, to better integrate young scientists. (**Decision 1**). In his Ph.D. thesis entitled "**Changes in near-surface winds across Sweden over the past decades – Observations and simulations**", he explored changes in near-surface wind speed across Sweden since 1956 by using both observations and climate model simulations. The current project is on changes and variations in extreme winds under past and ongoing climate change and how to quantify their impacts on sea level changes across the coastal areas of the Baltic and western Mediterranean Sea.

The BESSG welcomed Lorenzo to the group.

### 1.5 Advisory Board issues

**Mike Elliott**, Professor of Estuarine and Coastal Sciences at the University of Hull, UK, was approved as a new member of the Baltic Earth Senior Advisory Board. Mike is a marine biologist with wide interests and experience in marine and estuarine ecology, human impacts, marine and estuarine management and policy.

The BESSG and BESAB welcomed Mike to the group.

Upon request by Markus Meier, **Andris Andrusaitis**, chairman of the BESAB, recapitulated the recommendations given by the BESAB at the previous meeting on the issue of international collaboration. These recommendations were put down in Annex 1 of the meeting minutes of the 19th Baltic Earth Science Steering Group meeting, and are summarized here:

- Firstly, the AB suggests capitalizing on the global Marginal Seas network coordinated by Prof. Jan Harff.

- Secondly, it is worthwhile to strengthen the ties between the BE and ICES – "an intergovernmental marine science organization, meeting societal needs for impartial evidence on the state and sustainable use of our seas and oceans." ICES operates in the northern Atlantic area. Its member countries include all Baltic Sea states as well as Belgium, Canada, France, Iceland, Ireland, The Netherlands, Norway, Portugal, Spain, the United Kingdom as well as United States of America. Several key BE scientists are already active in ICES. Some of the ICES science priorities seem quite relevant to BE (see BSSG #19 meeting minutes).

- Finally, the international visibility of BE could be strengthened by inviting renowned international scientists as members to join its AB. In particular, members active in pertinent international organizations and networks could be helpful.

- Regarding JPIO and JPIC government, the AB stresses that these initiatives work based on national representation. A way of getting more involved with them would be establishing better communication with the respective national representatives in JPIO and PJIClima and promoting the study themes within the scope of BE. A good example is the involvement of BE scientists in formulating the JPIO joint action on marine lightscapes (see BSSG #19 meeting minutes).

- Regarding Horizon Europe and other appropriate calls for proposals, the AB suggests that the Secretariat timely inform the BE community of such potential funding opportunities. This information can be easily derived from European Commission's Funding and Tenders Portal https://ec.europa.eu/info/funding-tenders/opportunies/portal/screen/home. One HE call of potential BE interest - Ocean models for seasonal to decadal regional climate impacts and feedbacks – opened in October 2023 and closes in February 2024.

It was further mentioned by Andris that Baltic Earth has the important role of an independent player which can afford a non-opportunistic position in the international research funding landscape, solely focusing on good science irrespective of current tendencies towards applied science rather than basic science.

A number of current programmes and projects were mentioned with potential relevance for Baltic Earth:

- JPI Oceans Knowledge Hub on Blue Carbon - a call for projects expected in about 1-2 years (https://jpi-oceans.eu/en)
- JPI Oceans Knowledge Hub on Ocean Carbon Capacity - it may develop into a call in the future - no clear yet (https://jpi-oceans.eu/en)
- An EU call on Digital Twin of the Ocean, FMI is leading a proposal 'DTCoast' (deadline on 12 March 2024) (https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/eu-missions-horizon-europe/restore-our-ocean-and-waters/european-digital-twin-ocean-european-dto_en)
- The RESET-project at Helsinki University which could be a collaborator in the Multiple Drivers Research Topic (https://www.helsinki.fi/en/projects/resilient-and-just-systems/about-reset)
- Mike Elliott contributed with an overview of HorizonEurope EU programmes which are currently active (see Annex 1)

### 1.6 Young Baltic Earth Scientists issues

A Young Scientist event is a regular feature at Baltic Earth conferences, and Lorenzo was asked, together with local young scientists from Latvia and with the help of the organizers of the two organizers at the previous meetings (Florian Börgel, Marcin Stokowski), to take the lead in organizing this event in Jurmala. Upon request by Juris Aigars, the local co-organizer in Jurmala, two young scientists from Latvia volunteered to help in the organization (Astra Labuce, Natalija Suhareva).

## TOP 2: Activities in 2023 and 2024

### 2.1 Past and anticipated Baltic Earth activities in 2023 and 2024

**Current publication projects**

- Special Issue in *Oceanologia* on the 4th Baltic Earth Conference Jastarnia contributions: 26 (31) expressions of interest, submission deadline: 28 February 2023; no fees, open access *almost finalized.* https://www.sciencedirect.com/journal/oceanologia
- Special Issue in *Estuarine Coastal and Shelf Seas* on River mouth systems conference; in process; extended submission deadline: 30 Sept 2024. https://www.sciencedirect.com/journal/estuarine-coastal-and-shelf-science/about/call-for-papers#river-mouth-systems-and-marginal-seas-natural-drivers-and-human-impacts
- *Oxford Research Encyclopedia* "Climate of the Baltic Sea", overview papers; 21 published or in review/accepted; 25 more proposed. https://oxfordre.com/climatescience/browse?t0=ORE_CLI:REFCLI036
- Baltic Earth website and social media (young scientists Facebook page). https;//baltic.earth
- Baltic Earth publication database updated and in new format. https://baltic.earth/publications/publication_libary/index.php.en

**Past Baltic Earth events in 2023 and 2024**

- Marine Geology: Marginal Seas - Past and Future; online conference, Digital Deep Earth, 28-30 November 2023; Guangzhou Marine Geological Survey, China Geological Survey (co-organized by Baltic Earth; https://baltic.earth/marginalseas2023
- Winter term 2023/2024 (October 2023 - January 2024):
  International master course on “Climate of the Earth System", Rostock University

**Upcoming Baltic Earth events in 2023 and 2024**

- 5th International Baltic Earth Winter School for Young Scientists on
  “Earth System Science for the Baltic Sea Region”, Sopot, Poland, 18-22 March 2024
  https://baltic.earth/winterschool2024
- Baltic Earth Session at EGU 2024: “Human and other drivers of change: Impacts and interlinkages in marginal seas and their coastal regions”, Vienna, 14-19 April 2024
  merged with two other sessions. Now joint session: Interdisciplinary approaches to understanding processes in coastal regions and nature-based solutions
  https://meetingorganizer.copernicus.org/EGU24/session/50355
- 5th Baltic Earth Conference, 13-17 May 2024, Latvia
  After the extended deadline, 102 abstracts were received which are now in evaluation. A notification to authors is expected to be issued by the end of February. Further details on the conference and further deadlines can be seen on the conference website
  https://baltic.earth/jurmala2024
- 9th GEWEX Open Science Conference, 7-12 July, Sapporo, Japan
  This conference brings together Earth system scientists from the whole globe. Main topics are: Water, Climate, Anthropocene; Extremes and Risks; Water, Energy and Carbon Processes. A participation of Baltic Earth scientists would be beneficial for the global visibility of our activities. The meeting also hosts the GHP meeting, of which Baltic Earth is a part. However, a direct on-site participation of Baltic Earth representatives will not be possible.
  https://www.gewexevents.org/meetings/gewex-osc2024/
- 10th International Baltic Earth Summer School, Askö, 25 August – 1 September 2024
  https://www.io-warnemuende.de/bess-2024.html
- 2nd Baltic Earth Workshop on Multiple Drivers, Hamburg or Helsinki, autumn/winter 2024
  The time and format of this meeting is unclear because of serious budget restraints at the International Baltic Earth Secretariat.
- Winter term 2024/2025 (October 2024 - January 2025):
  International master course on “Climate of the Earth System", Rostock University

**Anticipated events in 2025**

- Baltic Earth-GEWEX joint GHP Conference and GHP meeting, in the Baltic Earth region, open.
  It had been long planned to organize a joint conference for all the GEWEX activities under the umbrella of the GHP Hydroclimatology Panel (GHP). GHP comprises four different types of projects: (1) Regional Hydroclimate Projects (RHPs), aiming at understanding and predicting hydroclimatology in a specific region; (2) Crosscutting Projects (CCs), encouraging knowledge mobilization and global synthesis of knowledge around a specific topic; (3) Networks, maintaining collaboration and building capacity for activities relevant to GEWEX

science; and (4) Global Data Centers, collecting and distributing hydrologically-relevant data. Baltic Earth has volunteered to act as host region. Time and place need to be negotiated in due time. The year´s GHP meeting would be attached to that conference. https://www.gewex.org

- Baltic Sea Science Congress, 26 – 30 May 2025; Sopot, Poland

## TOP 3: Science Plan 2024 status

**Continuing, updated and modified Research Topics**

- GC2 and WG on Land-Sea biogeochemical linkages (Karol Kulinski, Gregor Rehder)
- GC3 and WG on Natural hazards and extreme events (Anna Rutgersson, Martin Stendel)
- **GC4 and WG on Sea Level Dynamics (Ralf Weisse, Kevin Parnell)**
- GC6 and WG on Multiple drivers of Earth system changes (Marcus Reckermann, Kari Hyytiäinen)
- WG on Education (Markus Meier)
- WG on the "Baltic Sea Model Intercomparison Project" (Matthias Gröger)

**New Research Topic**

- WG on Teleconnections (Florian Börgel, Itzel Baroni)
- **WG on Small-Scale Processes (Urmas Lips)**
- **WG on Philosophy (Anders Omstedt, Hans von Storch)**
- Proposed WG on Marginal Seas (Jan Harff)

The scope and the content of the science plan was discussed. It was suggested (taking up the input by the BESAB) to make the science plan more readable for non-scientists; the descriptions should emphasize on two “burning” issues related to the research topic. Also it was discussed what the difference between a Working Group and a Grand Challenge was. The term “Grand Challenge” was dropped in favor of a less “grand” term (“*Research Topic*”).

Furthermore it was suggested that the “burning issues” of the environmental state of the Baltic Se should be reflected in the cover of the science plan.

The proposed time line was criticized as too short term, so that a revised time plan was created and sent to BESSG members (see also below).

The updated science plan should undergo an internal and an external review round. As external reviewers, representatives from ICES, HELCOM, CORDEX, GEWEX or similar were suggested.

**Updated time line for Science Plan 2024**

- **13 Feb 2024**: 20th Baltic Earth Science Steering group meeting
  1st Draft available for discussion; WG chairs and WT to revise according to discussions
- **2 May 2024**: First draft of topic descriptions by WG chairs to Writing Team (WT).
  WT to assemble 1st draft
- **8 May 2024**: First Draft ready for internal review
- **13-17 May 2024**: 5th Baltic Earth Conference

No further deadlines were determined after the conference; it is expected that the internal review will be ready after the summer break, and that the external review and final revisions will still allow a final publication in 2024.

## TOP 4: Any other issues

The next joint BESSG and BESAB meeting shall be on site in Jurmala, Latvia, on 12 May 2024 at 14:00 in Hotel Jurmala Spa.

1st Draft, MR, 18 March 2024

Annex 1: Summaries of EU HorizonEurope Marine Projects starting 2022-2023 by M. Elliott

**ABSTRACTS, STUDY AREAS AND IMPACT SUMMARIES OF EUROPEAN MARINE PROJECTS COMMENCING SEPT-OCTOBER 2022 & EARLY 2023**

**PREPARED BY MIKE ELLIOTT (IECS LTD – MIKE.ELLIOTT@IECS.LTD) JANUARY 2023 (*IECS LTD IS A PARTICIPANT IN THE FIRST FOUR GIVEN HERE*)**

## MARBEFES - MARine Biodiversity and Ecosystem Functioning leading to Ecosystem Services

**Lead Partner – IOPAN, Sopot, Poland (Jan-Marcin Weslawski)**

### Abstract

The European Union and its Member States (MSs) have a fundamental need to understand how biodiversity and ecosystem functioning must be maintained to ensure that they deliver ecosystem services, goods and benefits, which in turn must be sustainably used by society. Central to this, and as the raison d'être of this call, the MSs need to value these natural and social capital aspects of ecosystems. The overall aim of MARBEFES is to determine the links between the biodiversity and functioning of coastal and marine ecosystems and the resulting ecosystem services and societal goods and benefits. In this it will achieve ecological and socioeconomic valuation through a validated set of innovative tools in a distributed toolbox (TRL 6) to enhance policy and governance to secure benefits for current and future generation. We will progress substantially beyond the current state-of-the-art understanding of the causes and consequences of the maintenance, loss and gain of biodiversity and ecological and economic value and the repercussions of this for the management and governance of European seas. Involving 23 highly experienced partners, the project outputs and outcomes are based on developing and validating a set of ecological, economic and socio-cultural valuation tools using existing and new information and data in 12 Broad Belt Transect case studies. These cover the breadth of European marine biodiversity, from the Arctic to semi-tropical areas, across dominant habitats and iconic species, and from shallow to deep areas and encompass a range of socio-economic contexts. As such, and through stakeholder co-creation for policy relevance, MARBEFES shows the tools to value different natural capital resources and inform planning from financial allocations to management and with monetary and non-monetary benefits. In this, the project advances our knowledge through linking marine biodiversity and its ecological structure and functioning to ecological and economic valuation.

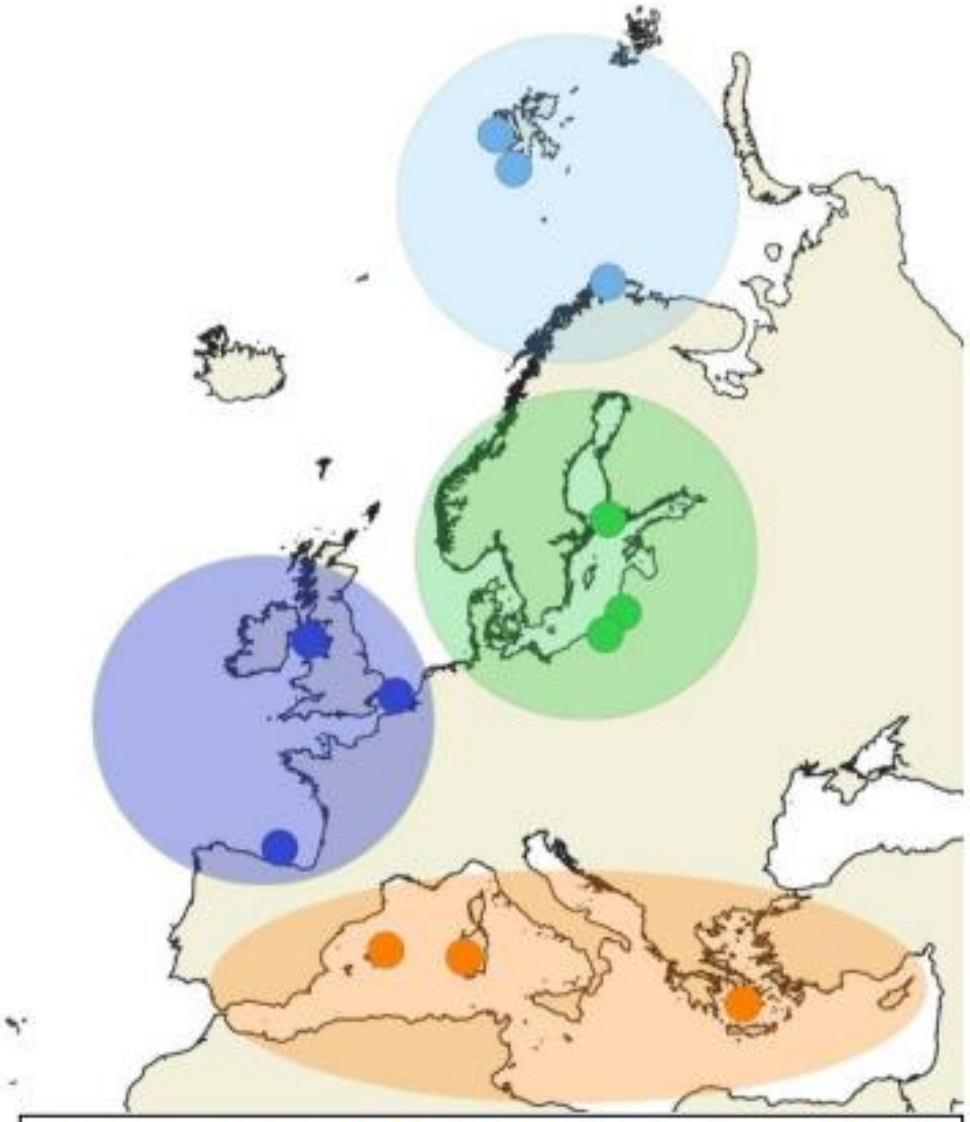


*Figure 4.4 The MARBEFES broad belt transects (BBTs) in the Arctic, Baltic, Atlantic and Mediterranean*

**2.3 Summary**

## KEY ELEMENT OF THE IMPACT SECTION (number 1 in one box relates to number 1 in the other boxes, and so on)

| SPECIFIC NEEDS | EXPECTED RESULTS | D&E&C MEASURES |
|---|---|---|
| **1.** Lack of understanding of biodiversity decline, its main drivers and their interrelations is hindering the effective and science-informed management and protection of natural resources and seascapes.<br>**2.** Current lack of international cooperation and coordinated action thereby hindering progress of biodiversity strategy and Green Deal implementation; the level of international cooperation and coordinated action should be raised<br>**3.** Need to improve knowledge and a strengthened governance framework to ensure implementation and tracking of progress of the biodiversity strategy;<br>**4.** Need to develop robust harmonised methodologies to make information on biodiversity and ecosystem services more comparable, and to relate marine biodiversity and ecosystem services<br>**5.** Member states use different (if any) methods to assess non-financial ecosystem benefits, making information non-comparable across member states<br><br>***The numbers in this box refer to the numbers in the following boxes*** | **1.** Extensive operational datasets, knowledge and understanding on marine and coastal biodiversity at the level of species, the intraspecific/genetic level, ecosystems, functionalities, trophic-interactions and interconnections across temporal and spatial scales, for all 12 BBT areas.<br>- More than 20 early career scientists, i.e. postdocs and PhD students, trained on marine biodiversity and ecosystem valuation issues.<br>**2/3.** Stakeholder networks from local, to regional and international/EU-level that function as community of practice for biodiversity and ecosystem valuation.<br>- Inventory of harmonized rules and regulations for decision-making and policy implementation, informed through high-resolution models<br>**4.** Marine Biodiversity and Valuation Toolbox, ready for use elsewhere including the following tools, validated at 12 BBTs and pilot trials in 2 wider geographies:<br>-a biodiversity catalogue and inventory tools<br>-a typology of ecological and biodiversity valuation and the means of valuing each entry in monetary and non-monetary terms<br>-a suite of economic valuation tools (CBA, Natural Capital Accounting, Balance sheet approach)<br>-an AI approach (ARIES) for mapping and evaluating European marine natural capital in a global context<br>**5.** Successful demonstration of a robust common EU methodology and criteria for the non-financial ecosystem benefits | **1. Exploitation**: MARBEFES datasets delivered and used by existing data initiatives from the European Earth observation programme, Copernicus, and other relevant databases.<br>**Dissemination**: Open access data publication under existing initiatives (e.g. OBIS, LifeWatch). Conferences, congresses and EU-level meetings for Practitioners and Policy advisors. Courses and educational workshops for early career professionals. Public Project website, Twitter page, Instagram and TikTok accounts<br>**2/3/4. Exploitation**: Integration of measures and tools in rules and regulations coordinated at national and EU level<br>**Dissemination**: Workshops and engagement methods for stakeholder collaboration and empowerment (local and national level). EU roundtable meetings, participation in EU-events under biodiversity strategy and MSFD revision, member states meetings (EU and global level)<br>**4. Exploitation**: Integration of toolbox in rules and regulations used by practitioners in the BBTs and 2 wider geograpical areas<br>**Dissemination**: Co-creation process during project (workshops, Community of Practice) to establish stakeholder buy-in, intense stakeholder meetings and workshops from local to regional and international level; training activities, press release, conferences & congresses<br>**5. Exploitation**: CEN standardization of the (financial and non-financial) valuation methodology<br>**Dissemination**: Scientific publication with results of large-scale demonstration in the BBTs. Dissemination to practitioners and policy makers through workshops. EU roundtable meetings with DG and member state representatives |

| TARGET GROUPS | OUTCOMES | IMPACTS |
|---|---|---|
| **1.** Scientists and data analysts<br>- Public at large.<br>**2.-5.** Practitioners, industry, policy advisors, and decision-makers within 12 BBTs and 2 wider geographic areas<br>- CZM managers, and marine spatial planners.<br>- EU member state, and cooperating countries, representatives (also beyond the BBTs), and DG representatives (e.g. DG Environment) for reporting and monitoring of biodiversity, ecosystem functioning and ecosystem benefits, incl for MSFD (and GES) reporting | **1.** Uptake by scientists and analysts, measured through high citation rate, closure of knowledge and data gaps within the BBT areas.<br>- Deeper understanding of the role of marine biodiversity and its relations with Ecosystem Services among the Public at Large<br>**2.-5.** Acceptance and social legitimacy of project outcomes among stakeholder groups. improved international and transboundary cooperation;<br>- Uptake of the Toolbox by practitioners and member states for MSFD reporting purposes in 12 BBTs and for integrated assessment purposes in 2 wider areas. Reduced costs of these activities<br>- Members states within the BBTs, and beyond, adopt the harmonised standard methods and tools during the project, and thereby increase international cooperation and coordination<br>- DG environment adopts the standard methodology in the revision of the MSFD, and key metrics incorporated into MSFD (and GES). | **1. Scientific**: New insights into marine biodiversity, trends and changes, and its relationship with drivers<br>**- Societal**: At least 50 % representation from surveyed communities and their stakeholders at final project conference. Public at large is better informed on marine biodiversity and ecosystem services.<br>**2.-5. Scientific**: Better understanding of the relations between marine biodiversity, ecosystem services, and their benefits.<br>**- Societal: Practitioner**: Better understanding of trends in marine biodiversity in relation to healthy environment, yielding installation of improved marine spatial management in at least 50% (6) of BBT states<br>**- Societal: Economy/Industry**: Understanding of sustainable use of the marine biodiversity, with benefits, in relation to a healthy environment, for a cost-efficient exploitation of marine resources, taken up by at least half (6) of the consulted stakeholder groups.<br>- more cost-effective observation methods for marine biodiversity and ecosystem functioning, yielding lower cost of monitoring<br>**- Policy**: Better informed decision-making and management of biodiversity in all BBT areas and Europe<br>**- Political**: improved international cooperation and collaboration; increased engagement in biodiversity strategy and Green Deal objectives by at least 3 European and global organisations eg HELCOM, OSPAR, ICES, more coherent management of biodiversity across regions; improved implementation of EU biodiversity strategy;<br>**- Policy/Management**: More accurate GES assessments and marine spatial planning by means of the MARBEFES toolbox in at least 6 BBT countries, yielding improved protection, conservation, and restoration of ecosystems;<br>**- Politics/Policy**: Improved, more comparable reporting under MSFD by member states, will allow for better national and local management measures; facilitates decision-making and policy making in favour of non-financial ecosystem benefits, thereby contributing to increased socio-cultural wellbeing. |

**GES4SEAS - Achieving Good Environmental Status for maintaining ecosystem SErvices, by ASsessing integrated impacts of cumulative pressures**

**Lead Partner – AZTI, San Sebastian, Spain (Angel Borja)**

**Summary**

GES4SEAS will inform and guide marine governance in minimizing human pressures and their impacts on marine biodiversity and ecosystem functioning, while maintaining the sustainable delivery of ecosystem services. This will be achieved through developing an innovative and flexible toolbox, tested, validated, demonstrated and upscaled, in the context of adaptive Ecosystem-Based Management (EBM). This will allow competent authorities to assess and predict the effect of multiple stressors (including climate change) and pressures from human activities, at the national, sub-regional, regional and European level. This will ensure they achieve Good Environmental Status (MSFD), and support different policies at national, European and global levels (e.g. BHD, Biodiversity Strategy, SDG). This will be achieved by integrating stakeholders and the key competent authorities in a Practitioner Advisory Board, in co-creating and validating the toolbox and the EBM approach. In this, we focus on real problem solving and following an iterative and incremental development approach. This will allow GES4SEAS to achieve Technological and Societal Readiness Levels 6, since our solutions will be tested and demonstrated at 11 Learning Sites (LSs) covering important regions and environments. These LSs have been selected to explore geographical specificities, in the four regional seas, with regards to the impacts of cumulative pressures (including climate change) on the functioning of ecosystems, and their capacity for providing ecosystem services, to ensure better management. This includes LSs to explore transboundary issues and a LS at pan-European scale, to explore comparability and harmonization across regional seas, and gain understanding on the functioning of transverse topics (e.g. invasive species, HABs and jellyfish blooms, and top predators). Finally, to internationalize outputs, we have included a LS in the Caribbean Sea, in relation to the SDGs framework and intense extreme events.


**Figure 4:** Geographical distribution of GES4SEAS partners and the Learning Sites (LSs) proposed.

**2.3 Summary**

**KEY ELEMENT OF THE IMPACT SECTION**

| SPECIFIC NEEDS | EXPECTED RESULTS | D & E & C MEASURES |
|---|---|---|
| *What are the specific needs that triggered this project?* | What do you expect to generate by the end of the project? | What dissemination, exploitation and communication measures will you apply to the results? |
| To ensure that multiple marine and coastal human activities are sustainably balanced with achieving the goals of the Biodiversity Strategy for 2030, GES, under the MSFD, and a favourable conservation status of vulnerable habitats and species under the BHD.<br><br>That marine regulators need cost-effective and efficient means to uncover the complexity of marine systems, specifically aiming to assess the effects of multiple stressors, for a fit-for-purpose management that minimizes human pressures and their impacts on coastal and marine biodiversity and ecosystem functioning, while maintaining the sustainable delivery of ecosystem services. | (i) a tested, validated, and demonstrated toolbox, that allows policy makers and implementing authorities, to assess and predict the impacts of multiple stressors and pressures from human activities, on marine biodiversity and ecosystem services delivery, taking into account climate change;<br>(ii) an EBM approach and policy measures for activities to reduce pressures to ensure GES;<br>(iii) a proposal for better management and impact assessment of stressors, including invasive species, HABs and jellyfish blooms;<br>(iv) a proposal for a systemic approach for the integrated impact assessment of cumulative stressors, and<br>(v) a strategy for monitoring top predators, including biologging technology and molecular methods. | **Communication:** Website (www.ges4seas.eu), YouTube Channel and social media accounts (including Twitter, LinkedIn), Office Teams. Three short videos, 5 posters, and 7 brochures, with key messages. An annual internal and PAB satisfaction survey.<br><br>**Dissemination:** Six policy briefs, six videos, seven infographics, five Educational MOOCs, five dissemination articles peer-reviewed by young people of primary-secondary schools on key messages and outcomes; all to be organized on five education modules to be disseminated through the Ocean Teacher Global Academy and EuroGOOS. Nine workshops with the PAB. Four summer schools will be organized, coinciding with the World Ocean Day (8th June). 100+ scientific OA papers and one OA book in Frontiers in Marine Science. At least six special sessions in international conferences (i.e., ICES Annual Science Conference, ASLO, CERF, ECSA, EMECS). 200+ oral and poster contributions to international conferences Four meetings with the KCBD, cooperation with the UN Decade of the Oceans initiatives with regular (six monthly) meetings. Links with other EU projects (at least 6); networks of excellence (at least 4) and end-users.<br><br>**Exploitation:** Training of stakeholders on the framework tools developed, by physical (at least 4) and remote courses (at least 3). One video and online tutorials on the use of the toolbox. Once the project has concluded, we will organize training over three additional years for stakeholders and scientists. The educational modules will organize content by end-user so they can be used after the end of GES4SEAS. |

## TARGET GROUPS

*Who will use or further up-take the results of the project? Who will benefit from the results of the project?*

The target audiences of GES4SEAS are: (1) key stakeholders, (2) scientists, (3) society at large and (4) young people and educators.

(1) The key stakeholders using our results include: (i) national authorities from EU Member States, and associated countries, implementing the MSFD and BHD and reporting for the Biodiversity Strategy; (ii) RSCs authorities; (iii) EEA, DG-ENV, DG-MARE, EFCA; (iv) consultancies providing services to the governments for monitoring, assessing and reporting; and (v) international end-users in non-European RSCs and countries with Ocean Acts (e.g. Canada, USA, Australia, etc.), and SDG.

(2) Scientists include the whole scientific community, but especifically those working on assessing cumulative pressures and impacts (e.g. in ICES), and early career researchers.

Key messages of GES4SEAS will be brought to the (3) society at large, and specifically to (4) young people (aiming to inspire scientific vocations) and educators.

## OUTCOMES

*What change do you expect to see after successful dissemination and exploitation of project results to the target group(s)?*

- Policy implementing authorities at national and regional level (MSFD, BHD, RSCs, and Biodiversity Strategy) master the use of the toolbox, being able to assess and predict impacts (incl. tipping points) of multiple stressors on coastal and marine biodiversity, ecosystems functioning and relevant services (including climate change adaptation, resilience and human health), in a flexible and harmonized way, by using the developed, tested and demonstrated toolbox.
- Better management and impact assessment of invasive species, harmful algal and jellyfish blooms, will be possible by adopting the approaches proposed. Adoption of GES4SEAS approaches by implementing authorities.
- The MSFD is implemented in an easier and harmonized way, by determining pressure levels that clearly equate to acceptable levels of environmental impact on the GES, using the toolbox developed.
- MSs and RSCs use the EBM approaches and policy measures proposed by GES4SEAS, for activities to reduce pressures and ensure GES, and the CFP considers it. This outcome contributes to the SDG by enabling the sustainability of coastal and marine ecosystems to deliver services and be resilient to rapid climate and environmental changes.
- A systemic approach for the integrated impact assessment of cumulative stressors on processes and services and assessment of the state of coastal and marine ecosystems "health" or condition, and resilience to cumulative pressures will be available at the end of GES4SEAS.
- Society becomes ocean literate

## IMPACTS

*What are the expected wider scientific, economic and societal effects of the project contributing to the expected impacts outlined in the respective destination in the work programme?*

**Scientific/Technological:**

Experts from MSs and RSCs, by using GES4SEAS toolbox and approaches:

- are able to more efficiently assess and report impacts by using the innovative validated toolbox
- can undertake accurate assessment of invasive species, HABs and jellyfish, reducing their impacts
- can use harmonized monitoring and assessment methods for top predators
- are able to determine pressure levels that prevent GES (MSFD) and favourable status being achieved (BHD), using more accurate thresholds
- increase our knowledge of the functioning of marine systems

**Economic/Policy:**

- Key stakeholders will be more efficient reporting in a comparable and flexible way across MSs and RSCs, and be ablo to establish adecuate management measures.
- Trained scientists will be employed in consultancies, companies and research institutes

**Societal:**

- In the long-term pressures are minimized and GES can be attained, reversing biodiversity decline and ensuring a sustainable delivery of ecosystem services
- Minimizing pressures, and achieving GES, results in more resilient marine systems, allowing to mitigate the effects of climate change, and ultimately improving human health and well-being (SDGs)
- Society will have more ocean responsible behaviour

**MarinePlan - Improved transdisciplinary science for effective ecosystem-based maritime spatial planning and conservation in European Seas**

**Lead Partner – Thuenen Inst, Germany (Vanessa Stelzenmüller)**

**Abstract**

One of today's most pressing challenges is to safeguard the loss of ecosystem biodiversity and functioning, while simultaneously allowing for their exploitation by those who depend on their services, goods and benefits. In Europe, Maritime Spatial Planning (MSP) is the main governance process to ideally integrate sustainability and exploitation. This requires tools and knowledge to align MSP and marine protected area (MPA) designation processes, which are lacking particularly regarding transboundary coordination and connectivity. Founded on a large amount of expertise and a solid theoretical basis, MarinePlan will co-develop with stakeholders a Decision Support System (DSS) for ecosystem-based maritime spatial planning (EB-MSP) together with best practice guidance to enhance the effectiveness of spatial conservation and restoration measures for marine biodiversity in European Seas. Tools will comprise operational criteria for ecologically or biologically significant marine areas (EBSA), enabling the allocation of conservation and restoration areas at various scales in complex sea areas with multiple uses, while including the effects of climate change. The DSS will be developed and applied at eight European planning sites, from coastal ecosystems to open ocean and the deep sea and from local to trans-boundary scales. Applying and validating the DSS will incorporate realistic planning scenarios, key action points to achieve the EU Biodiversity Strategy, and policy recommendations how to enhance EB-MSP implementation in European Seas. MarinePlan will communicate results to decision-makers at horizontal (between sectors) and vertical (from local to European) levels and enable the transfer of knowledge to areas in differing socio-ecological settings. The improved natural and social science base will ensure effective policymaking to support a greater coherence in implementing environmental policies as well as to enable streamlined planning for marine industries.

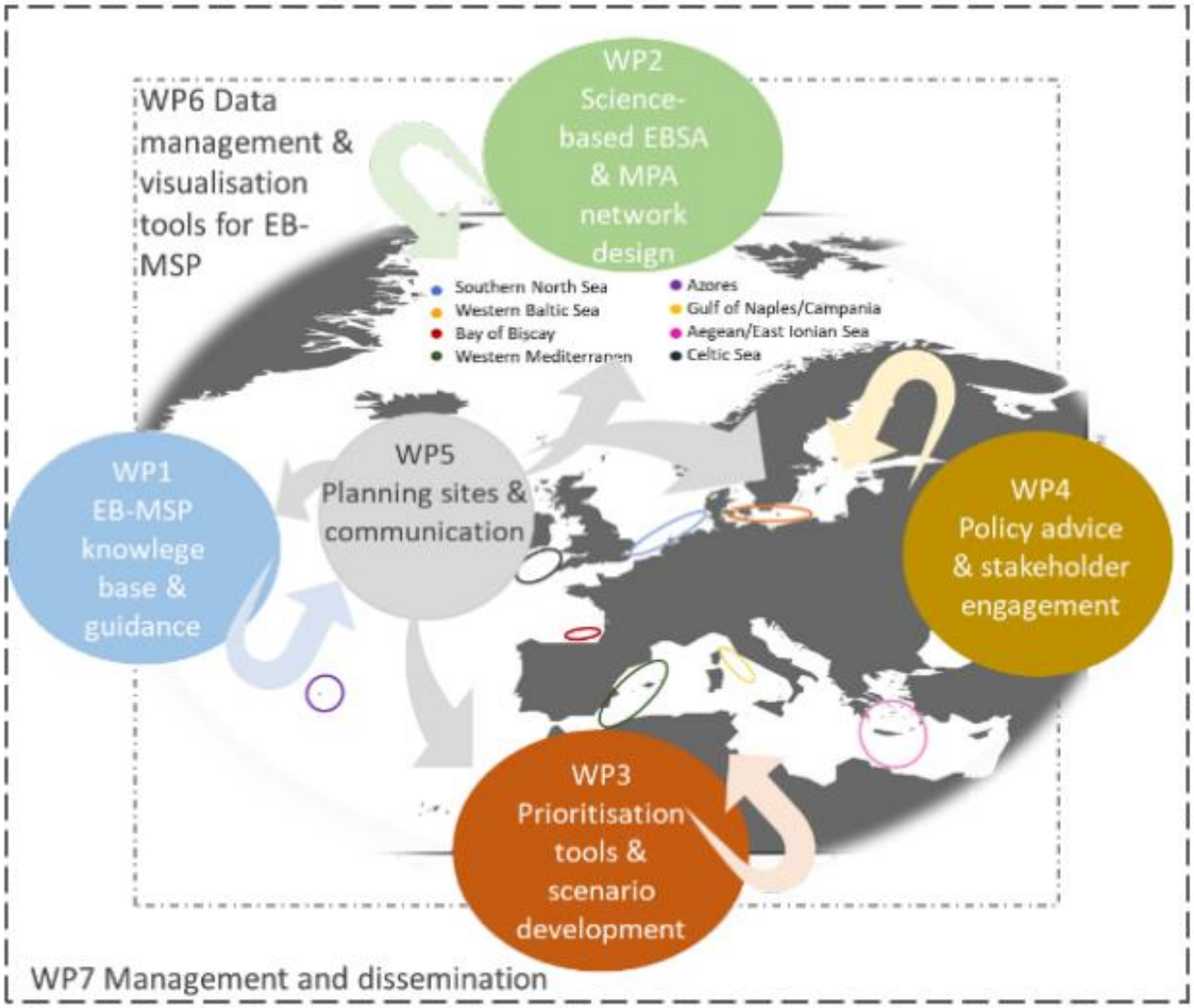



**Figure 6**: MarinePlan project structure and linkages of the seven WPs together with an approximate allocation of the Plannig Sites.

## *2.3* Summary

| SPECIFIC NEEDS | EXPECTED RESULTS | D & E & C MEASURES |
|---|---|---|
| *What are the specific needs that triggered this project?*<br>-An urgent need to understand the dynamics of marine biodiversity decline and to mitigate the related impact on ecosystem functions and services and human well-being<br><br>-The urgent requisite to improve the effectiveness of Marine Protected Areas (MPA) networks by aligning them with adaptive and synergistic MSP processes<br><br>-The need to mobilise ecosystem-based maritime spatial planning (EB-MSP) to overcome fragmented marine governance<br><br>-A necessity to enhance member states' scientific capacity to achieve the EU 2030 Biodiversity Strategy protection target of 30 % of all European Seas by 2030 (with strict protection for at least 10% of the marine area).<br><br>-The need to exploit synergies and secure coherence among policies such as the Marine Strategy Framework Directive, the Habitats and Birds Directives, the Maritime Spatial Planning Directive, and the Biodiversity Strategy for 2030. | *What do you expect to generate by the end of the project?*<br><br>-A flexible and efficient Decision Support System (DSS) comprising guidelines and tools for EB-MSP implementation together with best practice guidance<br><br>-Operational criteria for ecologically or biologically significant areas (EBSA) to be used for better representing biodiversity attributes in conservation planning<br><br>-Practical guidelines and tools (including software, scripts and optimisation algorithms), for improved systematic conservation planning accounting for functional connectivity and climate change impacts, securing integrated land-freshwater-marine planning, assessing the conservation potential of OECMSs, encompassing the prioritisation of restoration actions, addressing biological invasions, and properly analysing socio-ecological trade-offs<br><br>-Planning options to achieve the 2030-30%-10% targets of the Biodiversity Strategy in eight Planning Sites across European Seas, covering ~3 million $km^2$<br><br>-Policy recommendations how to enhance the implementation of EB-MSP in European Seas | *What dissemination, exploitation and communication measures will you apply to the results?*<br>**Dissemination:** engaging marine conservation managers, industry represenatives and marine planners within eight Planning Sites; co-developed EB-MSP DSS best-practice guidance, and EBSA guidance, that will be sent to competent authorities for marine conservation and MSP; 20+ scientific publications in high impact international journals (of which min 7 will be published OA); 10+ presentations at EU and international symposia and conferences and a final symposium (100+ attendees); 8 stakeholder factsheets, 1 policy briefs, and 15+ public reports that will be hosted on the project website and disseminated through relevant practitioner networks (e.g. EU MSP Platform, MPA News) targeting policy makers, marine managers and NGOs; 3 newspaper/magazine articles<br>**Communication**: project website, social media activities, 24 (8x3) stakeholder workshops, 1 project flyer, 6 newsletters, 3 press releases, project podcast (10 episodes), communication and collaboration platform for consortium, regular project meetings (virtual and in-person)<br>**Exploitation:** a policy roundtable with policymakers from across the EU to co-develop EB-MSP recommendations, 6 trainings (various tools and DSS) attended by 60+ participants (3 for the scientific community and 3 for key end users), direct input into national and international advisory bodies, policy briefs and direct advice, improved MPA spatial models and EB-MSP scenarios made available to conservation and planning practitioners through project website, flyers and reports. |

## TARGET GROUPS

*Who will use or further up-take the results of the project? Who will benefit from the results of the project?*

-Policy makers, marine managers: DSS, guideline and tools will be up-taken for the implementation of the Biodiversity Strategy for 2030, and providing important inputs for new legislative instruments

-National authorities, responsible for the implementation of MSP, statutory and non-statutory consultees in the planning and environmental impact assessment processes will benefit from MarinePlan's practical solutions as to how to reach the Biodiversity Strategy's 30%-10% targets

-Scientific community: Improving the science base for integrated ecosystem-based MSP, and providing new understanding to the spatial ecologists, conservation biologists, fisheries scientists and the broader scientific community to support advancement of research and development

-MSP and conservation practitioners: providing end users with the knowledge, tools and training that will support them to make vital business decisions in a changing environment

-Fisheries, navigation and oil and gas and renewable energies sectors and related industries, NGOs, and general public will be the end-receiver of the socioeconomic benefits of improved and efficient conservation and securing ecosystem functioning and services.

## OUTCOMES

*What change do you expect to see after successful dissemination and exploitation of project results to the target group(s)?*

-Application of MarinePlan's tools to prioritise protected and restoration areas in the context of EB-MSP at Planning Sites (medium-term) and across European sea basins (long-term), thereby contributing to the achievement of 2030-30%-10% targets

-Increased effectiveness of EU MPA networks, through the implementation of MarinePlan´s tools leading to an improved understanding of cumulative effects from human activities, biological invasions, climate change, and land-freshwater-marine interactions on biodiversity attributes

-Implementation of MarinePlan's good practice guidance for EB-MSP that aligns well-connected MPA networks, priority areas for active restoration, MSP and sectoral plans, to reach the EU 2030 Biodiversity Strategy, CBD-post 2020, and Blue Economy targets

-Better accounting of socio-ecological trade-offs aiming for coherence between different policies such as the Biodiversity Strategy and Sustainable Blue Growth;

-The identified shortcomings and opportunities of prevailing governance processes to implement EB-MSP are addressed through the adoption of MarinePlan's policy guidance

-The open data and knowledge development through MarinePlan are used by others to further EB-MSP

## IMPACTS

*What are the expected wider scientific, economic and societal effects of the project contributing to the expected impacts outlined in the respective destination in the work programme?*

-The improved, science-based, and operational EBSA framework developed by MarinePlan forms the basis for regional collaboration and the development of transboundary MPA networks, hence the Trans-European Nature Network.

-A more comprehensive, holistic and integrated understanding of the ecological, economic and societal aspects of EB-MSP in complex sea areas.

-A more cost-effective means of MSP with benefits to industries through the recommended streamlining of the regulatory process.

-A greater contribution by the EU member states and associates to the implementation of the SDGs, the UN Decades of the Oceans for Sustainability and of Ecosystem Restoration, and the UNEP GEMS Oceans assessment and management frameworks.

**Marine SABRES Marine Systems Approaches for Biodiversity Resilience and Ecosystem Sustainability**

**Lead Partner – University College Cork, Ireland (Jeremy Gault)**

**Abstract**

Marine Biodiversity loss is continuing to decline despite current conservation efforts. Reversing the decline in biodiversity requires rapid roll out of effective conservation measures that can also enable a sustainable and resilient blue economy. Social-ecological systems-thinking and Ecosystem-Based Management are globally recognized tools to enable balanced marine development and conservation. Marine SABRES will co-design as Simple Social Ecological Systems approach (the Simple SES) to rapidly enable and upscale EBM across Europe and abroad. Marine SABRES will set European marine management on a course to reverse biodiversity decline, it will conserve and protect biodiversity by integrating sustainable ecosystems and a resilient blue economy; enable managers to make sustainable decisions; empower citizens to engage with marine biodiversity conservation; promote sustainable development and in coastal and marine sectors. Marine SABRES is comprised of an interdisciplinary consortium including world leaders in the field of EBM and Social Ecological System distributed across Europe and focusing demonstration of practical management efforts in three Demonstration Areas (Tuscan Archipelago, the Arctic North-East Atlantic and Macaronesia) before upscaling throughout Europe and beyond.

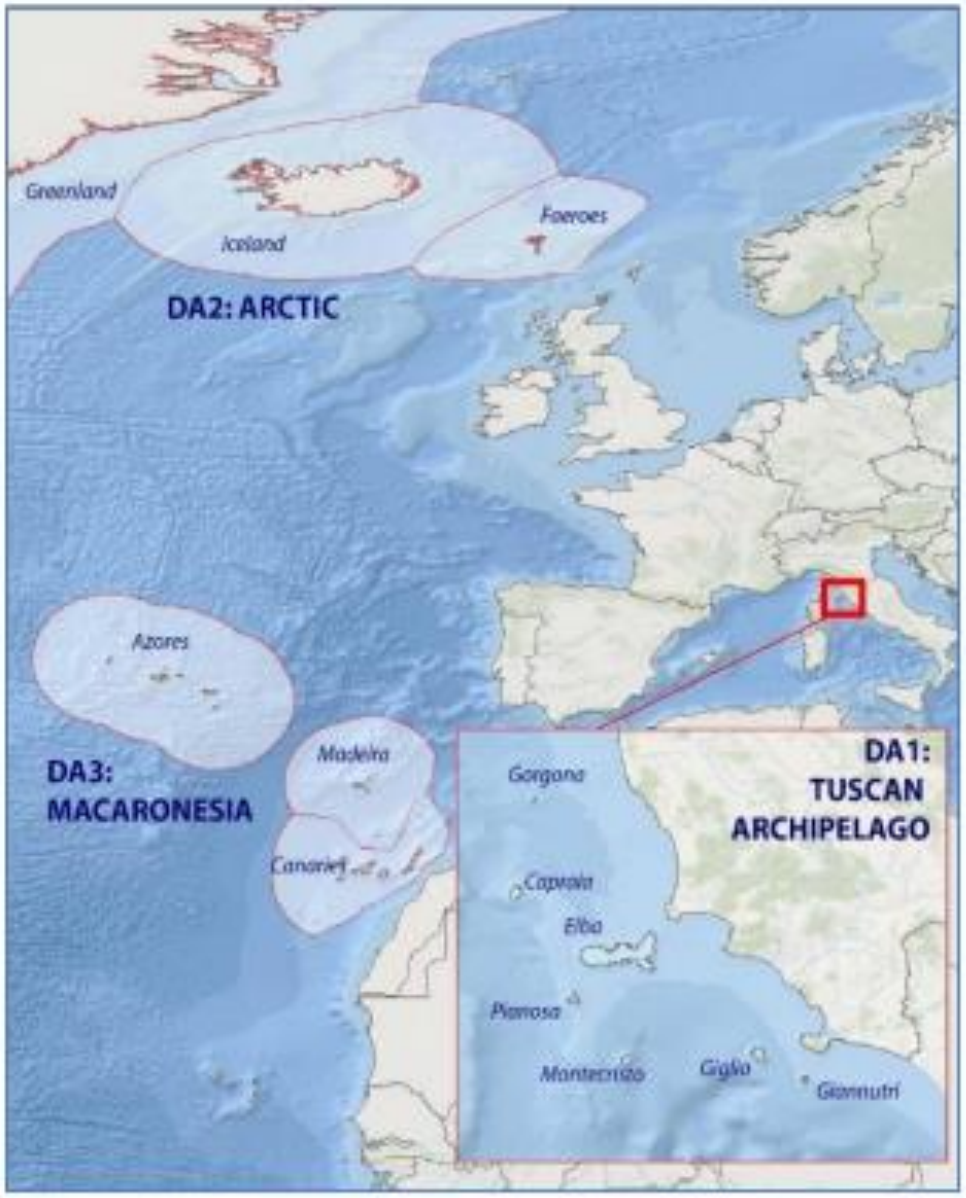



*Figure 4: Map of the three Marine SABRES DA Archipelagos.*

2.3 Impact Summary

## KEY ELEMENT OF THE IMPACT SECTION

| SPECIFIC NEEDS | EXPECTED RESULTS | D & E & C MEASURES |
|---|---|---|
| 1: Engaged participants to ensure pathways for transition to a sustainable economy are representative, just, fair and balanced. | 1: Representative stakeholder groups comprised of engaged participants to ensure project outputs are useful, usable and socially acceptable | 1: **Dissemination:** Marine SABRES WEB TV- a dedicated web channel to communicating the advantages of multi-Actor approach. **Exploitation.** Co-Develop test and appraise project outputs and develop a wider community of practice. **Communication:** Direct engagement downloadable project communication, snowball sampling. |
| 2: Integrated approaches to balancing biodiversity conservation and sustainable development of marine ecosystems. | 2: Demonstration of the Simple SES in three DAs (Tuscan Archipelago, Arctic, Macaronesia) **12 x cross cutting themes:** Incorporating the dynamics of social ecological systems. | 2: **Exploitation:** Open Access Simple SES and DSS promoted through Regional Seas Conventions and Common Implementation Strategy. **Dissemination** towards the scientific community: 6 x open access high IF Scientific publications illustrating essential elements and key integrative components. **Communication** towards citizens**:** Serious games to illustrate the connectivity, synergies and trade-offs between human activities and biodiversity. |
| 3: Conservation and restoration measures that are tailored to individual locations and balance conservation with sustainable blue economy. | 3: Bespoke solutions to management of conservation and management of the marine environment developed using the Simple SES | 3: **Exploitation:** Experiences from the DA areas will refine the Decision Support System from TRL 6-to TRL-8. **Dissemination:**6 x open access high IF Scientific publications with the results of application (2 in each of the 3 DAs). Presented at each of the four regional seas conventions. **Communication:** Marine SABRES Web TV. Blue Sustainability Fairs. |
| 4: Application of Ecosystem Based Management in and beyond Europe's Seas | 4: Credible salient and legitimate, Co-designed co-produced and co-delivered Decision Support System Open access DSS which contains the tools and solutions that marine mangers need to make conservation decisions | 4: **Exploitation:** Open Access for maximum uptake**. Dissemination:** Conferences including UN conference on Areas Beyond National Jurisdiction. **Communication:** Project website, articles (blogs) and social media. |

| TARGET GROUPS | OUTCOMES | IMPACTS |
|---|---|---|
| 1: All **Marine Users**: Extractors, Inputters (economic sectors), Beneficiaries (recreational users), Affectees, Regulators and Influencers (NGOs) | 1: Filling the knowledge and emotional gap between citizens and the sea- all individual reached become citizens of our ocean | 1: Engaged ocean citizens- whose behaviours are informed by knowledge. |
| 2. Project Stakeholders, Coastal and marine area managers, Marine policy and decision makers including the regional Seas Conventions, Regional Fisheries management and task groups of the MSFD | 2: Increased **resilience** and long-term **sustainability** in DA areas and associated DSS have been adopted. Reverse of biodiversity decline due to specific interventions. | 2: **Biodiversity decline, its main direct drivers and their interrelations are better understood and addressed** High Quality new knowledge balancing conservation and restoration. **maintaining natural carbon sinks**, and **enhancing the sequestration and storage of carbon in ecosystems**, **unfolding the potential of nature-based solutions**, **adaptation to foster climate resilience** |
| 3. Project Stakeholders, Coastal and marine area managers, Marine policy and decision makers including the regional Seas Conventions, Regional Fisheries management and task groups of the MSFD | 3. Application and adoption of the MARINE SABRES Simple SES (TRL 8) **outside of the project DA** | 3: a socially led digital innovation which will lead to better understanding of the interactions between socioeconomic and behavioural drivers of change to develop **balanced development and conservation**. |
| 4., Marine policy and decision makers including the regional Seas Conventions, Regional Fisheries management, and task groups of the MSFD | 4. Application and adoption of the MARINE SABRES Simple SES (TRL 8) outside of the project DA | 4.Bending the curve on biodiversity- upscaling of the Simple SES to enable Ecosystem Based Management within and beyond Europe's seas. |

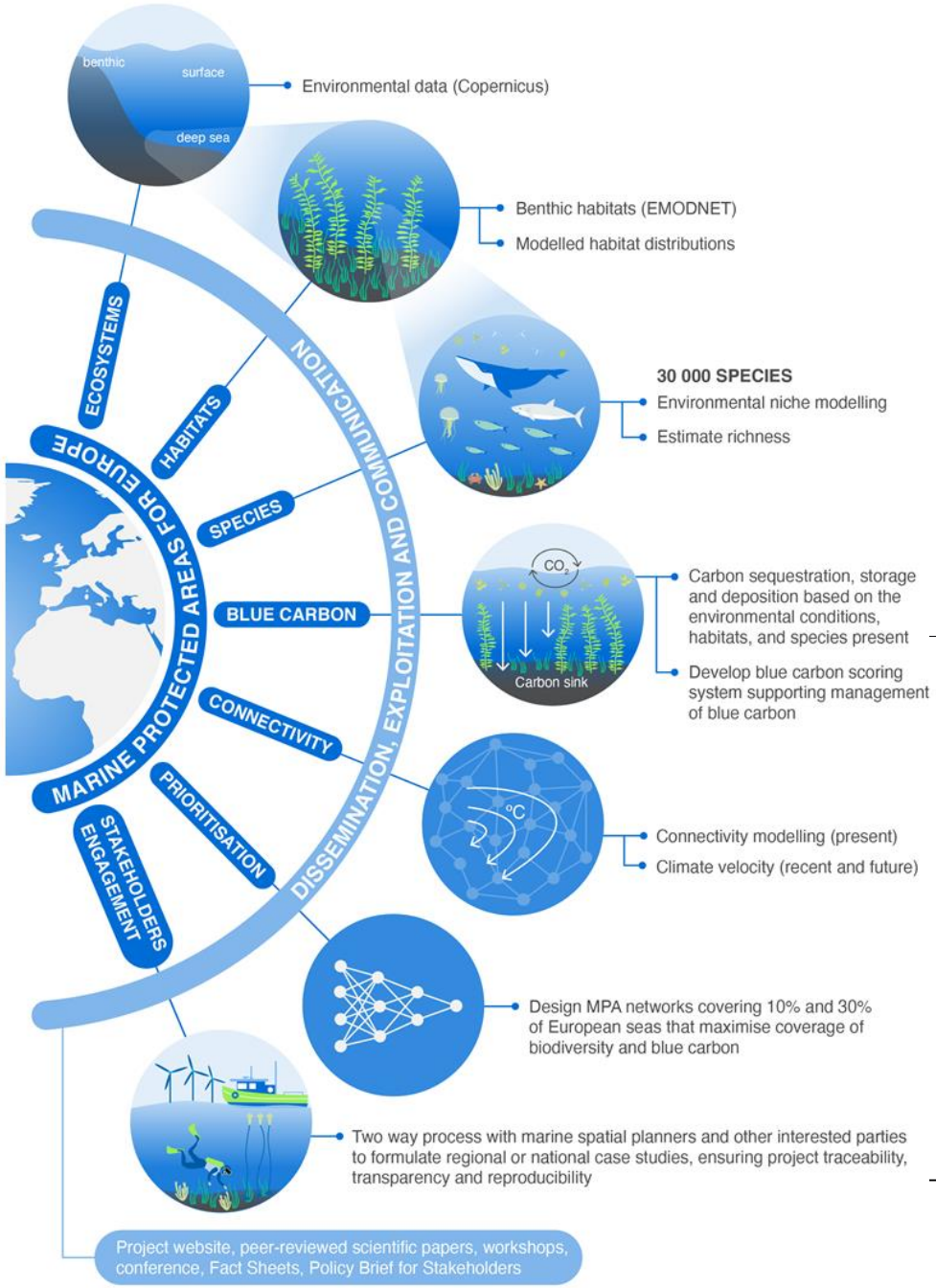



**Figure 1.** Illustration of the six scientific components of this project and stakeholder engagement.

MARINE PROTECTED AREAS EUROPE

| No. | Participant organisation name | Short name | Country | Key people |
|---|---|---|---|---|
| 1 | Nord universitet | NORD | NO | Mark Costello, Alexander Oliver Jüterbock |
| 2 | The Scottish Association for Marine Science LBG | SAMS | UK | Michael Burrows |
| 3 | Centro de Ciencias do Mar do Algarve | CCMAR | PT | Jorge Assis |
| 4 | Scitation - Science Communication Lda | Science Crunchers | PT | Miguel Leal |
| 5 | Aarhus Universitet | AU | DK | Dorte Krause-Jensen, Signe Høgslund |
| 6 | United Nations Educational, scientific and Cultural Organization – UNESCO (OBIS) | UNESCO | FR | Ward Appeltans, Pieter Provoost |
| 7 | Climazul E. E. | CLIMAZUL | EL | Thanos Smanis, Anna Maria Urgeghe, Belinda Bramley |
| 8 | Ocean University of China | OUC | CN | Qianshuo Zhao |
| 9 | University of the Ryukyus | RYUKYUS | JP | Kubota Yasuhiro |
| 10 | JNCC Support CO LBG | JNCC | UK | Helen Lillis |

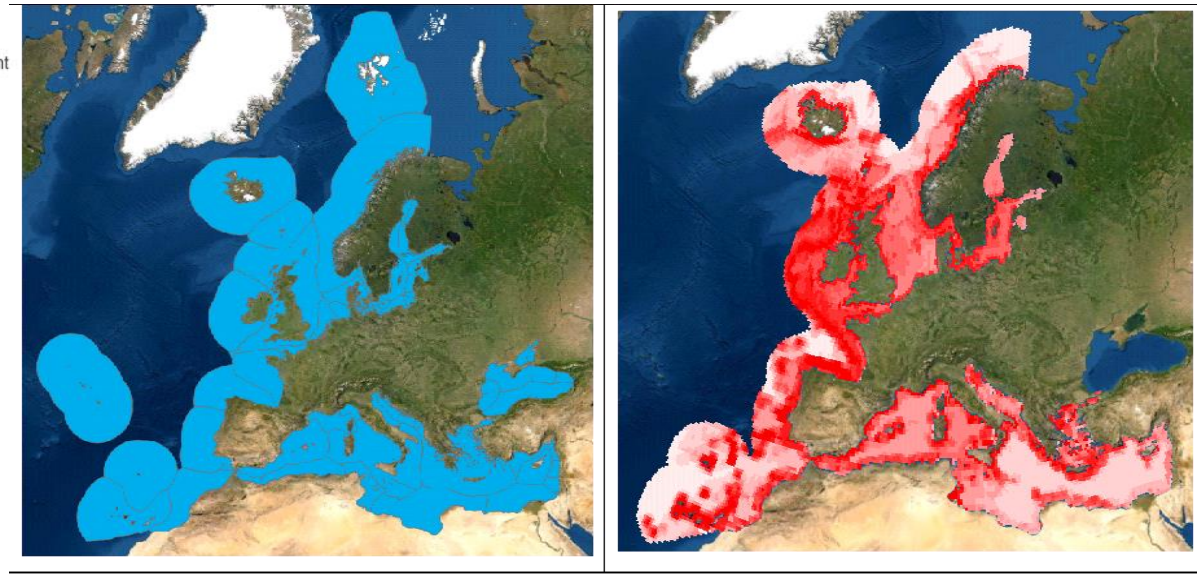


**Figure 2.** The study area for this project is shown in light blue on the left map. The red shading on the map to the right illustrates how cells of biodiversity may appear when prioritised (darker red being higher priority).

## SPECIFIC NEEDS

1. International targets to protect biodiversity in 30% of ocean area and the EU commitment to 10% no-take (fully protected) have not yet been achieved and existing MPA designation fails to consider all aspects of biodiversity holistically.
2. The need to link ecological, social and economic elements spatially to meet long standing commitments from EU and associated countries to protect marine biodiversity through Natura 2000 and other measures, including (Marine) Spatial Planning towards a Sustainable Blue Economy.
3. The EU Biodiversity Strategy recognising the need to both protect biodiversity, sustainable use of natural resources, and mitigate the effects of climate change.

## D & E & C MEASURES

1. An online atlas of all the key biodiversity and blue carbon data layers to show **traceability** of the methodology and to illustrate and explain the approach as an educational resource for students, researchers, industry and policy makers.
2. All data and results available open access to enable **reproducibility** of the recommend MPA network, and alternative prioritisations based on stakeholder feedback.
3. Policy Brief co-developed with Marine Spatial Planning stakeholders, Fact Sheets associated with infographics and animations, communicating the underlying science and issues.
4. Communication of key messages and results to the general audience through videos, factsheets, digital brochures and articles for children.

## EXPECTED RESULTS

1. The primary results is a map of the optimal locations for a Marine Protected Area network for Europe that include as high a proportion of species, habitats and ecosystem level measures of biodiversity as possible. The maps will highlight the top 10% and 30% area, while showing the relative ranking of other areas.
2. Added value will be a ranking of all areas in European seas by their blue carbon value, and supplementary prioritisations of how best to protect these ecosystem functions, and synergies with biodiversity protection.
3. Underpinning these maps will be new datasets, models, and several peer-reviewed papers in international scientific journals validating the results and methods.

## TARGET GROUPS

- The results will be of wide interest to the public because of their significance for protecting biodiversity and mitigating climate change through wise ocean management. Policy makers at EU and national level, regional and national environmental NGOs, and all marine industries will take interest. The latter include all blue economy sections, including tourism, energy, fisheries, aquaculture, transport, and oil, gas and aggregate extraction industries.
- Using the projects online atlas, stakeholders and Marine Spatial Planners will be able to overlay maps of features of their special interest (e.g., potential windfarm locations, aquaculture zones, cable zones, shipping routes) to see how they may interact with the top areas for biodiversity protection.
- Regional workshops for the Atlantic, Baltic, Mediterranean and Black Sea basins will include outlines of future case studies of how to implement MPA to both protect biodiversity in context of climate change mitigation and adaptation, and sustainable use of resources.

## OUTCOMES

- National authorities designating MPAs within the proposed network areas, including expanding Special Areas of Conservation, and increasing levels of protection in existing areas.
- Inclusion of marine areas in national climate change mitigation plans to safeguard blue carbon deposits and aid increased carbon capture.
- Improved science-based Marine Spatial Planning for EU sea basins which ensures full aspects of biodiversity, blue carbon and ecosystem services under a changing climate are incorporated in decision-making.

## IMPACTS

Wider and deeper societal awareness of the importance of and benefits from protecting marine biodiversity and blue carbon mechanisms in terms of a healthy planet, sustainable development and reducing climate change. This will enhance public and political support for an Integrated Maritime Policy.

**Indicative titles of scientific papers that will arise from this project:**

- A Marine Protected Area network for Europe optimised for conservation of biodiversity, carbon capture, and climate change (WP 5)
- An online atlas of marine biodiversity, blue carbon, and environmental conditions for use in research, education and Marine Spatial Planning in Europe (WP 5)
- Demonstration of a methodology for mapping blue carbon capture and storage (WP 4)
- Inter-relationships of species, habitat and ecosystem measures of biodiversity and use of surrogates to address data gaps (WP 5)
- A classification of shallow and deep-sea ecosystems for Europe (WP 2)
- Present and future spatial connectivity within a regional MPA network (WP 2)
- A wave exposure index for the coasts of Europe and what it means for marine ecology (WP 2)
- Viewpoints of stakeholders regarding a proposed European wide MPA network (WP 6)

**ACTNOW - Advancing understanding of Cumulative Impacts on European marine biodiversity, ecosystem functions and services for human wellbeing**

**Lead Partner – NIOZ, Den Burg (Texel), the Netherlands (Myron Peck)**

**Abstract**

ACTNOW advances the state-of-the-art in climate change and cumulative impacts understanding and forecast required to halt loss of the EU's marine biodiversity, restore and protect its habitats, ecosystem processes and their contributions to human well-being (services). ACTNOW is co-developed with EU policy stakeholders to deliver:

1) Cause-and-effect understanding of the mechanisms behind the responses of organisms and ecosystems to multiple drivers (including stability, resistance, resilience, tipping-points) and corresponding indicator development in support of management;

2) Improved monitoring and new indicators of marine biodiversity based on state-of-the-art biologging technology, molecular methods and modeling;

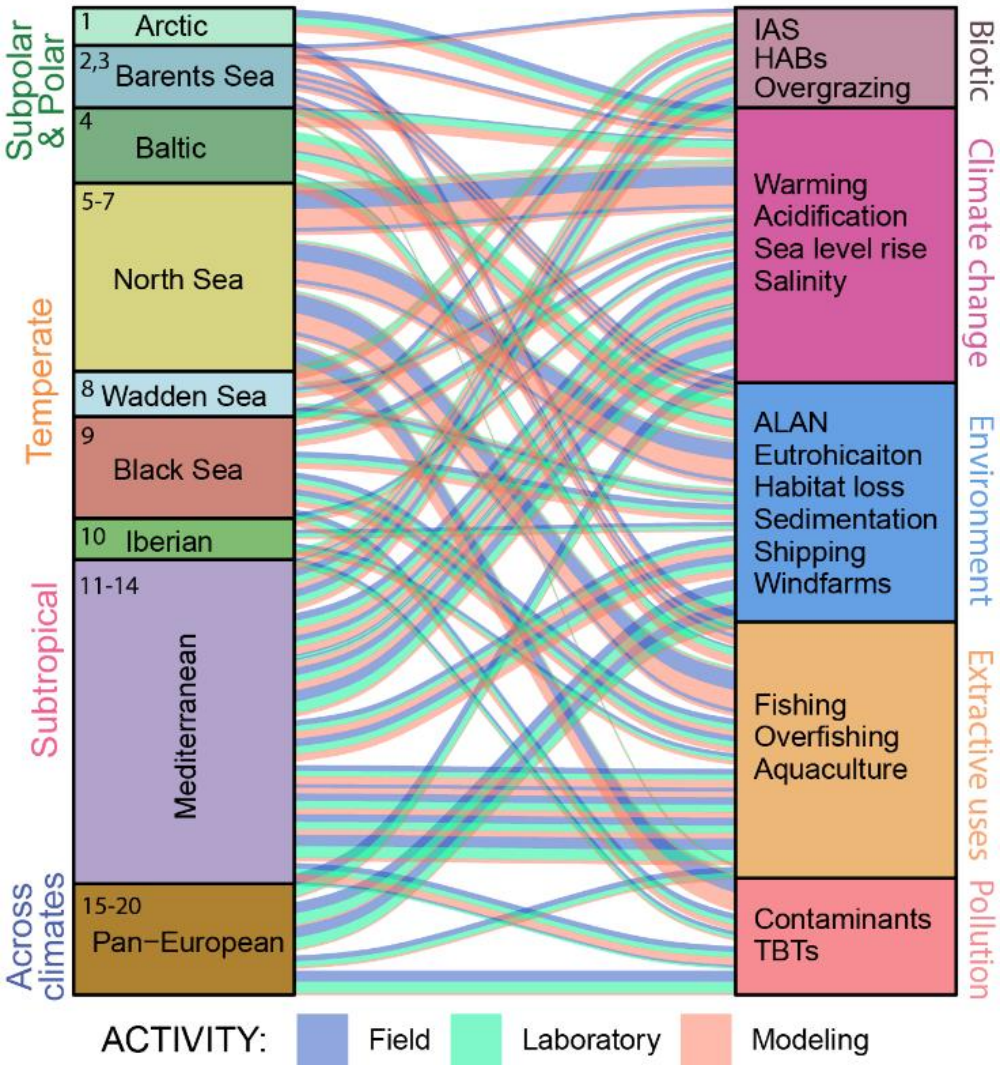
3) Increased capabilities to characterize, measure, and understand combined impacts of climate change and pressures managed by the MSFD on marine biodiversity, food webs, and ecosystem integrity and services;

4) Enhanced forecasts of European marine biodiversity, ecosystem functioning and services using co-created regionalized scenarios of multiple drivers and management, as well as systemic integrated impact assessment methods;

5) Fit-for-purpose decision-support tools enabling regulators to deliver regionally-appropriate assessments and actions to restore and maintain good environmental status;

6) State-of-the-art training for the next generation of biodiversity researchers and capacity building to enhance public literacy of links between biodiversity, ecosystem functioning and human health.

ACTNOW builds predictive capacity of multiple driver impacts and integrated indicators assessments of biodiversity across 20 Case Studies capturing all European climate zones and regional seas including pan-European research on key groups at the base and top of marine food webs.




**KEY ELEMENT OF THE IMPACT SECTION**

| SPECIFIC NEEDS | EXPECTED RESULTS | D & E & C MEASURES |
|---|---|---|
| Robust, science-based advice is urgently needed to implement actions to halt biodiversity loss and restore natural habitats and ecosystem services.<br><br>The EU's MSFD has established 11 descriptors of GES that allow for close monitoring of biodiversity status across marine habitats and ecosystems. However, there are considerable differences in the interpretation of the MSFD among countries and a need for standardized approaches in accordance with international best-practice.<br><br>The UN Decade of Ocean Science for Sustainable Development (Ocean Decade) vision is to "develop scientific knowledge, build infrastructure and foster relationships for a sustainable and healthy ocean."<br><br>The UN Decade for Ecosystem Restoration (2021–2030) places clear emphasis on Nature-based Solutions (NBS) to halt biodiversity loss, restore habitat functioning and rebuild natural capital to support the delivery of ecosystem services, in alignment with the current EU Biodiversity Strategy.<br><br>Scientists are not taking advantage of cutting-edge tools and different biodiversity indicators and indicator frameworks exist that cause confusion if not appropriately applied. | (1) Regionalized 'what if' scenarios of multiple interacting drivers and management actions to forecast impacts on the biodiversity and ecosystem functioning in European coastal and marine regions.<br>(2) A systemic approach for the integrated impact assessment of cumulative direct and indirect effects of multiple drivers on coastal and marine biodiversity, ecosystem processes and services, including climate change and pressures of interest to the MSFD.<br>(3) Improved understanding of combined impacts of different types of pressures or perturbations (chemical, nutrient and energy pollution, invasive species, extraction activities, hypoxia, pH, warming, etc.) on coastal and marine biodiversity and ecosystems condition.<br>(4) Increased understanding of the biological mechanisms determining the response of organisms and ecosystems to environmental changes (including components of stability, such as resistance, resilience and recovery) and limiting their adaptation capacity (tipping points), and the implications for the management of aquatic areas, habitats and species.<br>(5) State-of-the-art biologging technology and molecular methods, in combination with knowledge on oceanographic processes to understand the effects of agents of change on the ecology and population dynamics through marine food webs.<br>(6) Strategies for monitoring European populations of marine species at the top of food chains, especially those that can indicate important changes in the oceanic environment and have life histories that make them especially susceptible to change.<br>(7) Integration of existing and new biodiversity data and knowledge from multiple origins, including other EU (H2020 and previous framework Programmes), international and national research projects.<br>(8) Technologies, methods and models to quantify and forecast how cumulative anthropogenic perturbations can affect the sustainability, productivity and resilience of marine ecosystems against environmental drivers. | **Exploitation:**<br>Web-based decision-support tools for policy makers and managers [T4.2, T5.2] (freely available through the project website); open source projection tools to identify and disentangle the multiple processes (e.g. DEBs, EwE, OSMOSE, Atlantis) [T2.3, T3.3].<br>**Dissemination towards policy makers:**<br>Planned project-wide and task-specific stakeholder engagement workshops for regional, national and EU-wide stakeholders to enable co-development of programme activities, from the onset of ACTNOW and through its lifetime. This schedule ensures that our policy community is aware of (and part-takes in) our research and ensures that our workplan has a maximum fit to evidence provision pathways and mechanisms affecting the management of marine biodiversity within the EU. Specifically, the consortium's strong links to (and membership of) the key regional, national and EU-level stakeholder groups (including ICES, OSPAR, HELCOM, DG Mare), as well as broader groups (IPCC, IOC-UNESCO, IPBES) and research partnerships within the EU (e.g. NetworkNature) ensures the ACTNOW workplan is well aligned and embedded within the delivery of the priorities of policy makers in Europe, their broader regulatory commitments and bilateral agreements.<br><br>**Dissemination towards the scientific community:**<br>~150 Peer-reviewed publications; Field and model data sets for ICES portal, EMODNET, OBIS, etc.; social media (Twitter, Research-Gate, LinkedIn), >100 Symposia presentations, Zenodo accounts for Open Access to publications, Google Scholar account for links to partner publications, 24 public Deliverables on website, 4 Workshops/Training, Staff |

| | | |
|---|---|---|
| Increasing ocean literacy so that the public better understand the links between biodiversity, climate change and ecosystem health and the steps they can take via citizen science or other, community-based actions (e.g. NBS). | (9) Enhanced awareness and understanding of links between marine biodiversity, ecosystem functioning and human health through capacity building, public outreach and by creating decision-support tools for regulators to achieve or restore good environmental status. | (e.g. PhD students) exchange among partner institutions, demonstrations of 3 online tools at workshops (cross Destination 1 projects).<br>**Communication towards citizens:**<br>Project website, social media (e.g. Twitter), 3 Project flyer(s), ~10 press releases, ~10 popular press (e.g. newspaper) articles, >5 explanatory video clips, thematically / regionally focused input to public events, school visits, common newsletter with other funded projects (biodiversity, farm-to-fork, etc.). |

| TARGET GROUPS | OUTCOMES | IMPACTS |
|---|---|---|
| **Government departments and regulators developing national MSFD targets and monitoring plans.** This includes direct links of project partners with environmental government agencies in 14 countries (Bulgaria, Denmark, Finland, France, Germany, Greece, Israel, Italy, Portugal, Spain, Sweden, the Netherlands, Turkey the UK] | Design of targets for MSFD descriptor indicators that account for the response of European biodiversity, ecosystem processes and services to climate-related stressors of interest to their region, as well as their interactions with pressures managed by the MSFD. This affects both ecosystem state indicators (D1, D3, D4, D6), as well as pressure indicators (D2, D5, D7-11). | Targets for indicators for MSFD descriptor D1 Biodiversity are robust to climate change impacts at the national and regional level, and interactions between climate-related stressors and regionally relevant management pressures are considered in target-setting. |
| **Within-country decision-makers and regulators including MPA practitioners implementing EU biodiversity strategy**. Includes 10 MPAs along west-east gradient in Mediterranean Sea from Spain, France, Italy and Greece and managers of UNESCO World Heritage sites in Germany, Denmark, Netherlands and Norway (Wadden Sea and Svalbard). | Implementation of the EU Biodiversity Strategy for 2030's ambition to expand conservation and restoration sites is designed with suitable information that reflects how marine biodiversity, ecosystem processes and services respond to climate change related stressors and pressures managed by the MSFD. | MPA network expansion in the EU covers 30% of EU seas (and 10% strict restriction) based on the designation of climate-resilient sites, and regionally-relevant pressures are managed to support that resilience. |
| **Regional Seas Conventions (e.g. OSPAR, HELCOM, CEISM Barcelona Convention, Bucharest Convention).** | Stronger science supporting policy goals of these regional seas conventions including establishing new policy goals and targets on specific multiple, interacting drivers to reduce negative impacts on marine biodiversity and ecosystem functions and services. | Countries work together to sustainably manage their marine and coastal environments, to protect the marine environment from the harmful effects of human activities on land, and support protected areas to conserve, manage and recover marine species. |

| | | |
|---|---|---|
| **European Union e.g. EU DG-Environment, EU DG-Maritime Affairs and Fisheries** | ACTNOW has informed the MSFD Common Implementation Strategy between the Commission and the Member States and a regional approach to the implementation of its objectives. | Stronger, more integrative descriptors of GES are adopted in MSFD Common Implementation Strategy. Monitoring programmes for marine biodiversity are improved with clearly defined thresholds and safe operating space. Ocean resources are used sustainably, coastal communities and blue sectors have a prosperous future (from fishing to tourism). |
| **Scientific community (research and education) including the network of PhD researchers in ACTNOW and participants of the training courses offered through the ICES training programme.** | Scientists with a stronger background in quantitative ecology with a larger toolbox of biodiversity risk and assessment methods. Better use of molecular and biologging technologies for deriving indicators of biodiversity and GES. Increased capacity to provide fit-for-purpose solutions to restore marine biodiversity. Adopted frameworks will provide a more unified approaches to assessing impacts of multiple drivers across all habitats (marine, terrestrial). | Strong, clear science-based advice for solutions to combat the combined biodiversity and climate crisis. |

**CLIMAREST Coastal Climate Resilience and Marine Restoration Tools for the Arctic Atlantic basin**

**Call HORIZON≠MISS≠2021≠OCEAN≠02**

**Lead Partner SINTEF Ocean**

The project CLIMAREST integrates multiple expertise into a holistic approach that aims to develop a flexible overarching toolbox designed to establish guidelines for ecosystem restoration and to enhance climate resilience in coastal communities. The concept is to develop, test and optimise a modular toolbox that integrates expert knowledge, scientific information, multilevel stakeholder and community involvement, ecosystem service improvement analysis¨ cost–benefit analysis¨ priority of actions¨ and custom designed protocols for restoring and monitoring multiple coastal habitat. The toolbox framework will have common and specific tools that will be tested, optimised and demonstrated in five different ecosystems, across a latitudinal gradient of the Arctic≠Atlantic basin, ranging from the high Arctic Svalbard in the north to the Madeira archipelago in the south. The variety of environmental conditions and restoration needs of the five demonstration sites will provide different restoration scenarios with particular specificities in terms of biodiversity¨ pressures and threats, ecosystems services and stakeholder. The diversity in restoration scenarios will create a unique opportunity to develop a modular toolbox¨ that integrates common tools with tools that are specific for each restoration scenario into a collective framework. Ecosystem specific innovations in nature–based solutions for habitat restoration that improve local climate resilience will also be developed, tested, and integrated into a general toolbox framework¨ establishing guidelines and innovative workflows. The toolbox and tools developed in each demonstration site, for different restoration scenarios, will be made available and tested for replication and upscaling in comparable ecosystems and similar communities¨ with particular emphasis in promoting stakeholder involvement.

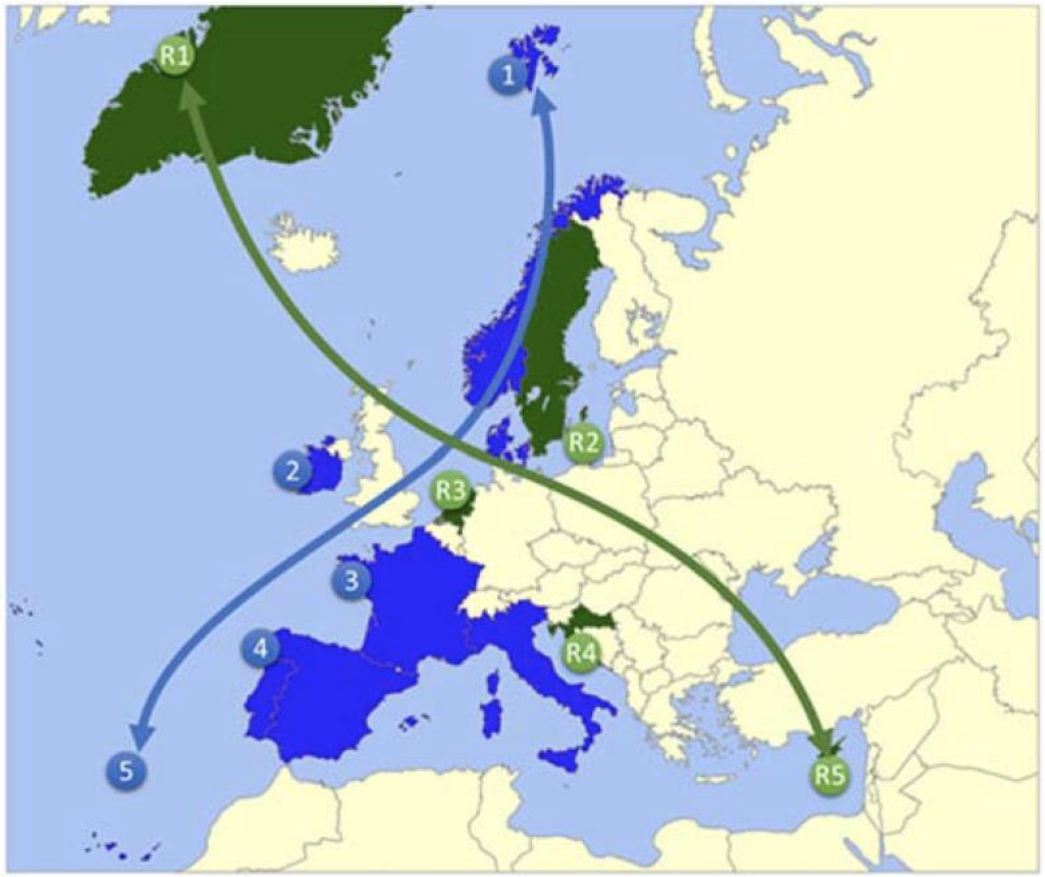



Figure 4 (right). Partner countries (Blue) and demonstration sites (Blue circles) with the corresponding planned replication sites (Green) of CLIMAREST. The arrows represent the latitudinal gradient that CLIMAREST will cover across Europe.

## SPECIFIC NEEDS

Harmonised protocols and tools for efficient implementation to reach the missions objective of restored ecosystems by and climate resilient coastal communities by 2030.

There is disperse and non-integrated data, need to identify and integrate socio-environmental data and sources.

Locally adapted measures are needed to address diverse pressures and climate mitigation needs.

Low awareness and lack of financing models for marine restorations in Europe.

## TARGET GROUPS

Users:

- ☐ Consultants, businesses and scientists
- ☐ Stakeholders
- ☐ Governance bodies and local authorities

Beneficiaries:

- ☐ Marine life and coastal ecosystems
- ☐ Citizens and local communities

Screenshot

## EXPECTED RESULTS

Open and online toolbox integrating protocols, tools and best practice guides for an efficient science-society-governance interface in marine ecosystem restoration and enhancement of coastal climate resilience.

The tools and restoration approaches will have been successfully demonstrated through implementation of restoration measures in five different ecosystems across Europe by 2025.

## EXPECTED RESULTS

The collection of tools and protocols will continue to grow under the administration of the SER and will by 2030 include all relevant ecosystems in Europe. Further expansion to worldwide relevance is foreseen.

New economic models for marine ecosystems will have been implemented across Europe by 2030.

Bigger and consolidated network among professionals and scientist.

Built synergies, connections and knowledge exchange with other Lighthouse's restoration activities in Europe.

*Increased awareness and empowerment in coastal communities.*

## D & E & C MEASURES

Scientific publications in open access journals and project reports

Project website to present news, media and public deliverables.

Social media content, recording webinars and podcasts, and blog posts.

Popular science publications and trade press coverage.

Workshop at European Conference on Ecological restoration, SERE 2024.

Participation in connecting activities organized by CSA to share results and exchange knowledge (Water Lighthouse Alliance and cross-basin working groups).

Utilizing the DTO platforms in Europe.

## *IMPACTS*

*The main impact will be restored and health marine ecosystems across Europe by 2030.*

*Coastal communities will have improved resilience to climate change.*

*Double the investment in marine restoration (including blue carbon investments and other compensation mechanisms) by 2025.*

# OBSERVING AND MAPPING MARINE ECOSYSTEMS – NEXT GENERATION TOOLS (OBAMA-NEXT)

Lead Partner: Aarhus University – Coordinator: Jacob Carstensen. 22 Project partners in total.

**The main objective of OBAMA-NEXT is to develop a toolbox which generates and delivers the information required to evaluate and communicate the status and trends of marine ecosystems and their biodiversity in an accurate, user-friendly and cost-effective manner.** This will be achieved by developing tools which translate observations and knowledge into user-friendly and openly available information products, which are tailored to the needs of decision makers at national, regional and European levels. In doing so **OBAMA-NEXT will strengthen Europe's capability to acquire and use sustained and continuous biophysical ocean observations in order to support the effective management of marine ecosystems and the services they provide.**

**KEY ELEMENT OF THE IMPACT SECTION**

| SPECIFIC NEEDS | EXPECTED RESULTS | & E & C MEASURES |
|---|---|---|
| *What are the specific needs that triggered this project?* | What do you expect to generate by the end of the project? | What dissemination, exploitation and communication measures will you apply to the results? |
| To improve our capacity to quantitatively describe marine ecosystem services and biodiversity across all organism groups as well as their pressures. To understand the underlying drivers of marine biodiversity decline in order to support the implementation of the Green Deal and the Biodiversity Strategy. To investigate the potential of new monitoring techniques for obtaining relevant biological information. To develop next generation observation, monitoring and mapping tools for European marine waters. To increase awareness of marine biodiversity, ecosystem services and their threats. To inform and involve society at large about the need for biological observation and implementation of marine conservation measures. | (i) validated and tested tools for mapping marine biodiversity and ecosystem services for national, regional and global assessments<br>(ii) an improved quantitative description and understanding of marine biodiversity decline and its connection to the underlying drivers<br>(iii) NIS mapping and understanding environments that promote their presence<br>(iv) identification of new cost-efficient and information-rich measurement techniques that can supplement/replace traditional monitoring techniques for improving our capacity to produce biological observations<br>(v) improved and harmonised design of biological monitoring programmes in European marine waters<br>(vi) establishment of citizen science data collection networks to supplement other data sources<br>(vii) contribution to a global framework for EBV/EOVs and marine indicators to support SDG and CBD goals and targets | **Dissemination:** Workshops with PAB. Five education modules based on the main results expected, disseminated through the Ocean Teacher Global Academy and EuroGOOS. Summer schools will be organized, coinciding with the World Ocean Day (8th June). At least five dissemination articles, peer-reviewed by children between 8-10 years old, disseminated through EuroGOOS and Frontiers for Young Minds. Participation in six international conferences. Links will be established with at least 6 other EU projects; networks of excellence and end-users. Videos, posters, and brochures with key messages.<br><br>**Exploitation:** Upon project finalisation, organisation of additional training for stakeholders and scientists on the framework tools developed and the lessons learnt. At least 4 physical and remote courses and one final seminar organised to train stakeholders.<br><br>**Communication:** Website (www.obama-next.eu), social media accounts (Twitter, LinkedIn, and YouTube), and Office Teams. Short videos and brochures with key messages. |

| TARGET GROUPS | OUTCOMES | IMPACTS |
|---|---|---|
| *Who will use or further up-take the results of the project? Who will benefit from the results of the project?*<br><br>The primary end-users of our results will be national authorities from EU Member States, and associated countries, implementing the MSFD, WFD and BHD and reporting for the Biodiversity Strategy; RSC authorities; EEA, and DG-ENV. Other end-users are scientists working on all kinds of biodiversity aspects, including predictive models; international organisations coordinating biological data collection and analyses efforts (e.g., GOOS, MBON, GEOSS, ESA, KCBD), consultancies providing services to regulatory bodies, private sectors and industries responsible for activities leading to pressures on biodiversity. Finally, we aim to address international end-users, in non-European RSCs, in countries with Ocean Acts (e.g., Canada, USA, Australia, etc.), as well as the whole scientific community. | *What change do you expect to see after successful dissemination and exploitation of project results to the target group(s)?*<br><br>(i) Information products, including mapping tools, are employed by national authorities, RSC and EEA for status assessment and reporting<br>(ii) Policies for conserving and restoring marine biodiversity are based on predictive decision-support models that utilise developed mapping products<br>(iii) Recommended novel monitoring methods are implemented in national and regional monitoring programmes following the recommendations from OBAMA-NEXT<br>(iv) Procedures for biological monitoring as well as the associated data protocols and processing are standardised at national, European and global level<br>(v) The public becomes strongly engaged in the collection of biological observations to supplement monitoring by authorities, following the produced basic guidelines<br>(vi) Information products, such as EOV/EBV maps, are adopted by the international scientific community and organisations | *What are the expected wider scientific, economic and societal effects of the project contributing to the expected impacts outlined in the respective destination in the work programme?*<br><br>**Scientific:**<br>(i) Quantitative methods for describing biodiversity and ecosystem services across all marine organism groups are standardised and widely used in the scientific community<br>(ii) The impact of cumulative pressures on biodiversity is well understood at all marine trophic levels<br>(iii) Access to scientific information with high spatial and temporal resolution is facilitated through implementing new technology for marine monitoring at the European and global level<br>**Economic:**<br>(iv) Marine ecosystems are managed to maintain their natural capital and deliver a combination of ecosystem services that support human welfare in an optimal way<br>**Societal:**<br>(v) Human pressures affecting biodiversity are regulated to ensure the integrity of marine ecosystems and their services<br>(vi) Marine protected areas are designated based on their ecological importance determined by best available science<br>(vii) The general public understands the need for conservation of marine ecosystems and their biodiversity, and that individuals can contribute by changing their lifestyles and through helping science with data and information |

## MSP4BIO - Improved Science-Based Maritime Spatial Planning to Safeguard and Restore Biodiversity in a coherent European MPA network

With an overall aim to support the coherent implementation of the EU (European Union) Biodiversity Strategy (EUBS) 2030, the Convention on Biological Diversity (CBD) post-2020 framework, as well as the EU Green Deal, MSP4BIO develops and demonstrates the ways in which knowledge-based MSP becomes a vehicle and a tool for the protection and recovery of ecosystems. Specifically, MSP4BIO will develop an integrated flexible socio-ecological management to cope with a rapidly changing environment for coastal, offshore, and deep-sea ecosystems and validate its concrete applicability in 6 test sites in 5 European Sea Basins. The management relies on improved systemic biodiversity prioritization criteria for MPAs and EBSAs, based on the best available scientific knowledge on biodiversity attributes, and linking spatial ecological features (including migratory ones) with socio-economic considerations.

MSP4BIO uses a participatory approach to co-develop ecosystem services trade-off scenarios to prioritize the areas and assess the suitability of spatial and strategic management measures from the ecological and socio-economic perspectives. The approach integrates the criteria and objectives of relevant maritime and biodiversity policies as well as the EUBS 2030 to ensure coherent policy implementation. As such, the project will develop and improve approaches, methods, and tools to feed scientific knowledge, making it of direct use to planners and MPA managers, while producing site-specific results informing site-specific, and broader policy processes and decisions. The project builds on and integrate existing knowledge and results from multiple origins, and ensures effective collaboration with relevant projects and initiatives to fill present gaps on marine biodiversity, speeding up the scientific brake while paving the way for effective biodiversity management.

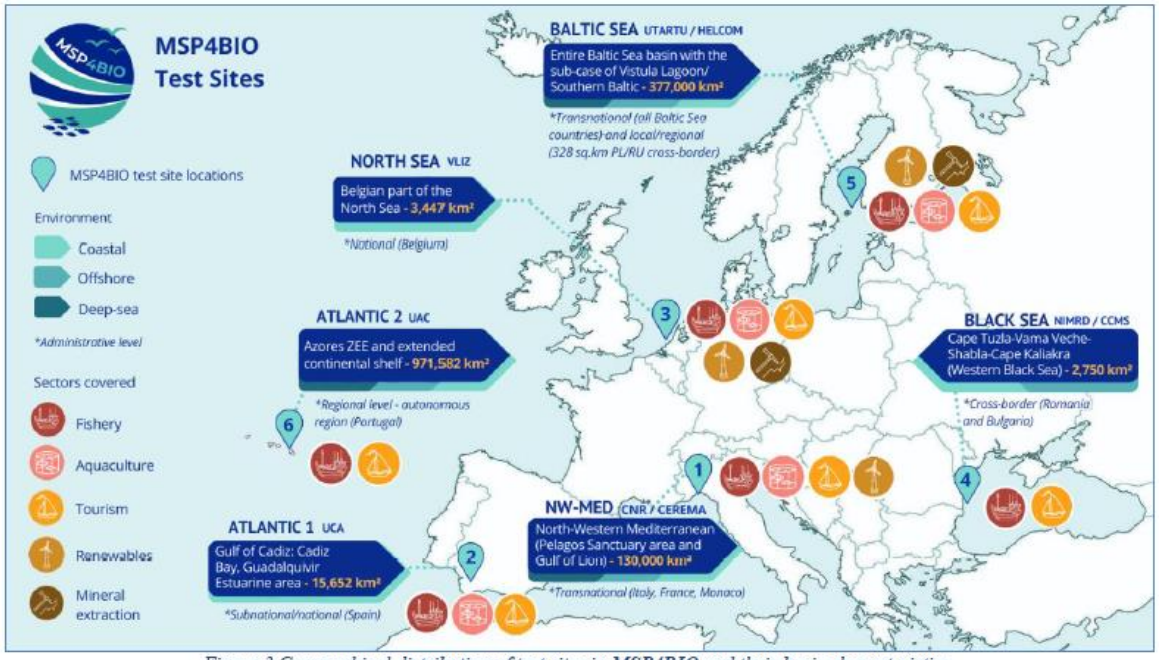


*Figure 3 Geographical distribution of test sites in MSP4BIO and their basic characteristics*

| SPECIFIC NEEDS | EXPECTED RESULTS | D&E&C MEASURES |
|---|---|---|
| - **MSP needs: In practice, MSP has not fully integrated the nature conservation targets.** EBSA and MPA designation is often a separate process from the MSP. MSP's potential to steer sea uses in ways that minimise their impacts is not fully utilised. Consideration of **connectivity in MSP** – lack of: transnational MPAs; land-sea interactions to address land-based impacts; blue-green corridors to strengthen the MPA network. Consideration of **climate change impacts in MSP** is lacking. **Practical management frameworks** lack integration of social-environmental-policy aspects in a holistic manner that allows for adaptations in MSP. **Biodiv. data is scattered/ unsuitable** format - not used in MSP<br>- **Biodiversity decline**: < 20 % of all biodiv. features are in "Good Environmental Status", only 11.1% marine areas are protected. Guidance is needed on **how to designate the right areas for protection** and restoration of vulnerable species, climate refugia, biodiversity hotspots. Existing **DTSs are not widely used** and lack the multifunctionality to consider a variety of elements (e.g. social values, policy, economics, CC effects).<br>- **Designated MPAs lack effective management or are not protective enough**. Adoption of a real participatory process is needed to obtain acceptance and support for proposed and legally adopted measures for a more effective management.<br>- **Implementation of biodiversity policies** have not been successful in marine realm due to barriers in biodiversity mainstreaming at the EU and national levels. Now that higher biodiversity policy objectives are set in the EUBS and expected to come from the CBD post-2020 framework, the implementation needs to be enhanced considerably.<br>- **Business**: Sectoral policies to better mainstream biodiversity; Better participation of private sectors in the planning process. | - **Improved ecological criteria** for identification of MPAs and EBSAs and improvement of MPAs network. It integrates wide ecological processes that have not been systematically considered so far, as well as CC effects on vulnerable ecological features (D3.2)<br>- **EU-wide overview of biodiv. data availability** per identified needs (D2.1)<br>- **Ecological Toolkit** that allows for better integration of data in decision making tailored for the concrete conservation and planning needs including the use of improved DSTs (D3.4)<br>- **Integrated modular management framework as a key output of the project** (ESE D4.4). The novel framework will integrate the different aspects and priorities of management: ecological, socio-economic and policy considerations, while allowing for wider participation and adaptations in the flexible management for a changing environment.<br>- **6 demonstrators at different governance levels** (local region, national, transnational/sea basin) in 5 European sea basins producing site specific solutions (D5.3).<br>- **Recommendations for scaleup of effective biodiversity mainstreaming in MSP** addressing each of the European sea basins (D5.4)<br>- **Overview and catalogue of barriers and levers for biodiversity policy coherence** (D6.1)<br>- **Policy solutions** - guidance for the coherence with a special (but not exclusive) focus on MSP (D6.2) to strengthen its compatibility with the new biodiv. policy requirements.<br>- **Guidance on more coherent implementation of the new biodiversity policy framework** (D6.3). | **Communication:** Social media campaign, Communication kit (flyer, banner, poster); Website, E-Newsletter, Press releases (T7.1).<br>**Engagement activities:**<br>CoPs in test sites (T5.3), Science-Policy Dialogues in a form of Think Thank including collaboration with other projects, NextCloud exchange platform (T6.3)<br>**Exploitation:** 6 training demos for each of the test sites (T7.2)<br>EU-wide validation workshop (T7.3), CoP validation of tools and methods (T5.3), Transferability & scaleup report validation (D5.4), Exploitation roadmap validation (D7.4)<br>**Dissemination:**<br>Visualisation tools: StoryMap and interactive platform for trade-off scenarios (T7.4), Presentation at conferences and meetings to share with policy-makers, scientist, and business reps. (min 25x) (T7.3), Scientific journal manuscripts (5x) and book chapter/ special issue together with other projects (T7.3), Factsheets highlighting key project results (min 4x), Videos presenting the key project results (x2) (T7.3) |

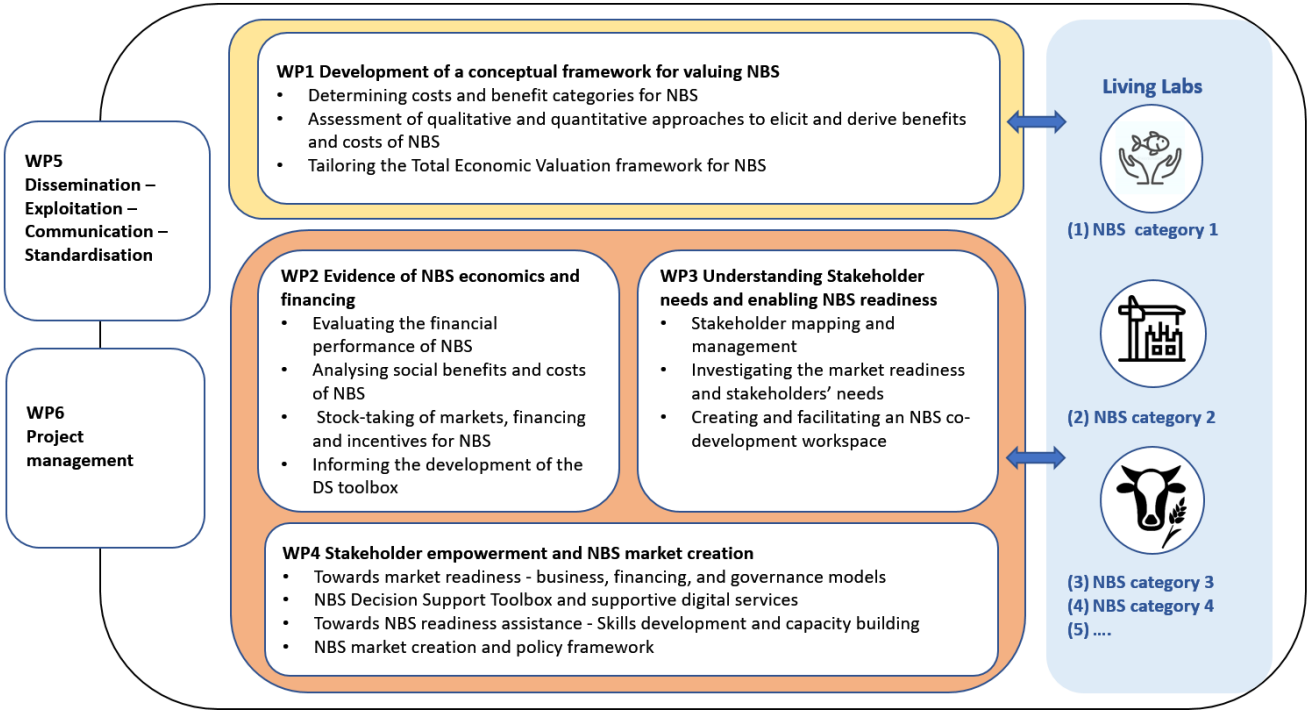
| TARGET GROUPS | OUTCOMES | IMPACTS |
|---|---|---|
| **Key users**<br>*Primary:* Spatial planners (coastal and marine areas), MPA managers, environmental authorities;<br>*Secondary:* sectoral authorities for the sectoral planning and project level tendering and permits.<br>**Beneficiaries**<br>*Primary:* High-level policymakers at EU, regional seas and national levels, NGOs, scientists, and experts covering biodiversity, MSP and sectors;<br>*Secondary:* Business representatives especially fisheries, aquaculture as these are not always included in MSP, as well as energy, shipping and tourism representatives;<br>*Tertiary:* Those who will in the future deal with biodiversity management (students); General public. | - Future and ongoing MSP **uses additional biodiversity data**: new data and scientific knowledge feeding not only into the EU data repositories but also into national and regional MSP processes.<br>- **An integrated prioritisation criteria and management is validated and used in future and ongoing MSP and designing of MPAs network** as well as in monitoring for future MSP adaptations. Better consideration of socio-economic impacts, policy aspects in MPA prioritization. Better integration of MSP and MPA. Better integration of biodiversity considerations in sectoral planning and understanding of what can be achieved via MSP and what measures fit better to other policies - reflected in updated sectoral plans.<br>- **Concrete solutions and knowledge** resulting from the testing sites taken up by planners / MPA managers.<br>- **Integration of MSP4BIO tools, methods and generated knowledge in ongoing and next revision of MSPs** in the test sites and beyond.<br>- **Planners from EU Member States informed** about ESE and validation in test sites<br>- **Decision makers in all test sites are trained** in using the improved DTSs, criteria and/or data.<br>- **Reference to MSP4BIO made in the work of other projects** and initiatives e.g. Missions, Biodiversity Partnership, GOBI, ICES.<br>- **Ongoing collaboration between biodiversity projects** for better research synergies and impact.<br>- **MSP4BIO recommendations are expected to improve guidelines at the sea basin level** (e.g. HELCOM-VASAB, OSPAR). | **MSP:** The next round of national MSP planning will have a higher capacity to incorporate biodiversity conservation objectives into the planning processes and plans [capacity improved by 60% comparing to current estimates]. The MSP revisions in the EU will be capable to fully support the achievement of new biodiversity targets set in the EUBS and in the CBD's post-2020 framework [80% of planners feel confident about this]. Increased use of ecosystem-based MSP as a 'new normal', incl. better integration between MSP and MPA processes allowing for better steering of maritime sectors in ways that effectively support biodiversity conservation and produce benefits for the economy and society through the improved state of marine biodiversity.<br>**MPA:** Decisionmakers motivation for MPA management implementation and follow up is increased [30% spike in motivation], and thus, management effectiveness is improved [increased number of management plans that mention biodiversity indicators and criteria]. More designated areas [estimate 10%]; Improved network of MPAs in Europe [estimate 10%] Identifying the social impacts of protected areas, while providing a better framework for management, will contribute to the commitment to and success of designated areas in test sites [improved long-term commitment in min. 4 sites].<br>**Policy:** Implementation of the new biodiversity policy framework will be efficient at different levels and across levels. More efficient and coherent implementation of the biodiversity policy is ensuring good status of marine biodiversity. Policy integration in decision-making processes across sectors are reached faster and the number of controversial decisions will reduce [20% reduction estimate].<br>**Environment:** Human impact on marine biodiversity is avoided and the state of marine biodiversity will improve. Improved CC preparedness and impacts reduced.<br>**Business:** Increase in business actors' participation in planning [70%]. Willingness to accept and adhere to measures increases [60%]. Private actors show higher biodiversity stewardship in their actions by increasingly considering nature-inclusive operations [30% est.]. **Research:** Improved collaboration across projects as well as academics, business, and society, enables faster breakthrough and responds to relevant issues in the society. |

# The economics of nature-based solutions: cost-benefit analysis, market development and funding

Promoting investments in NBS and accelerating market uptake by gaining a better understanding of the economic performance of NBS, considering climate mitigation and risk reduction

Invest4Nature

The **overall project aim** of Invest4Nature (I4N) is to gain a better understanding of the economic and financial performance of NBS, considering their role for mitigation as well as climate risk reduction, to promote upscaling and investments in NBS, and to accelerate market uptake.



BLUEMISSION AA
Building a coordination hub to support the mission implementation in the Atlantic and Arctic Basins

BlueMissionAA will be the coordination hub that will support the implementation of the EU Mission Restore our Ocean and Waters by 2030 in the Atlantic and Arctic basins with focus on restoration of marine and coastal ecosystems and increased climate resilience. It will have a structuring effect to mobilise a wide community of relevant stakeholders and EU citizens towards the achievement of Mission objectives at basin level. It will deliver an effective governance framework aligned with policies, initiatives and actions at national, regional and EU level [WP1], build a well-coordinated monitoring framework to assess the progress of the implementation on an ongoing basis [WP2], provide a wide range catalogue of supporting services [WP3], foster an attractive innovation ecosystem for ecological restoration [WP4], and give the opportunity and empower EU citizens to engage in the preservation and restoration of oceans and waters through participative means [WP5]. The consortium is comprised of 15 partners who have worked extensively in the Atlantic and Arctic basin over the years. They combine the benefits of a comprehensive geographical coverage with an evenly balanced mixture of unique capabilities, knowledge and access to relevant stakeholder and citizen networks needed to pursue the objectives of the project.

BlueMissionAA is focused on the following specific objectives:

**SO1**. **Build and mobilise governance frameworks and networks through multidisciplinary and multi-sectoral cooperation** needed to deliver the Mission targets in the Atlantic and Arctic Sea basins and inland water systems, building on existing initiatives, in particular those linked to ecological restoration.

**SO2**. **Develop and deploy a comprehensive monitoring and reporting framework** to measure the progress of the implementation of the Mission in the Atlantic and Arctic Sea basins on an ongoing basis, including the development a set of indicators in coordination with the Mission Implementation Platform, the PREP4BLUE project and all other lighthouse projects in the four sea and river basins.

**SO3**. **Develop and maintain a FAIR catalogue of existing scientific and practical actionable knowledge as well as innovative solutions** and making it accessible for stakeholders in the Atlantic and Arctic basins and beyond to enable researchers to make their work available to industry policy makers, and citizens to ensure expertise can be easily accessed for preservation and restoration projects.

**SO4**. **Develop a dynamic entrepreneurial innovation ecosystem in the Atlantic and Arctic basin**, building on and aligning with existing initiatives identified in the catalogue, with the goal of supporting mature technologies and solutions on their path to market and productive use through the connection to investments, funders, donors as well as public and private customers.

**SO5**. **Engage and empower citizens to contribute to the Mission and boost society uptake of new solutions** by performing a systematic and meaningful involvement of all relevant stakeholders, implementing a holistic evaluation framework, and securing a dissemination and an exploitation strategy for the whole project that will be developed and executed according to Open Science standards and Good Scientific Practices.

BIOcean5D - MARINE BIODIVERSITY ASSESSMENT AND PREDICTION ACROSS SPACIAL, TEMPORAL AND HUMAN SCALES
Proposal number: 101059915 - HORIZON-CL6-2021-BIODIV-01-03
Type of Action HORIZON-RIA
Start date 1 december 2022 duration 48 m
Coordinators EMBL - EUROPEAN MOLECULAR BIOLOGY LABORATORY & CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE CNRS (Roscoff)
Scientific coordination Colomban de Vargas vargas@sb-roscoff.fr

Abstract *
Marine biodiversity sustains ecosystem services for planetary and human health. Recent surveys of marine ecosystems have unveiled our ignorance of the richness and functioning of marine life, which is changing in the Anthropocene at a faster pace than terrestrial life.
BIOcean5D unites major European centers in molecular/cell biology (EMBL), marine biology (EMBRC), and sequencing (Genoscope), together with 26 partners from 11 countries, to build a unique suite of technologies, protocols, and models allowing holistic reexploration of marine biodiversity, from viruses to mammals, from genomes to holobionts, across multiple spatial and temporal scales stretching from pre-industrial to today. A focus is to understand pan-European biodiversity land-to-sea gradients and ecosystem services, including marine exposomes, notably with an expedition (TREC, 2023/24) that will deploy mobile labs, research vessels including the Tara schooner, and innovative citizen science tools, across 21 coastal countries and 35 marine labs from the Mediterranean to Arctic seas. New data will be harmonized with existing data into an open-access data hub, leveraging international infrastructures, and generating transformative, cross-technologies/cross-scales standard marine biodiversity knowledge at the socioecosystem level. Knowledge will inform and constrain (i) new theories and models of marine biodiversity ecological and evolutionary dynamics and drivers, at both taxonomic and functional scales, (ii) a portfolio of novel holistic indicators of marine ecosystem health, (iii) innovative methods and protocols for economic and legal valuations of marine biodiversity and services integrating the dynamical and functional complexity of marine life. BIOcean5D will create a unique opportunity to bridge molecular/subcellular biology to organismal biology, theoretical ecology and econometrics, and marine complex systems to social sciences, toward the sustainable preservation of our oceans and seas.

Lots of work on connectivity, see the map of the samples sites in the next page. UNIPD is involved but mostly working on Risk assessment and modelling

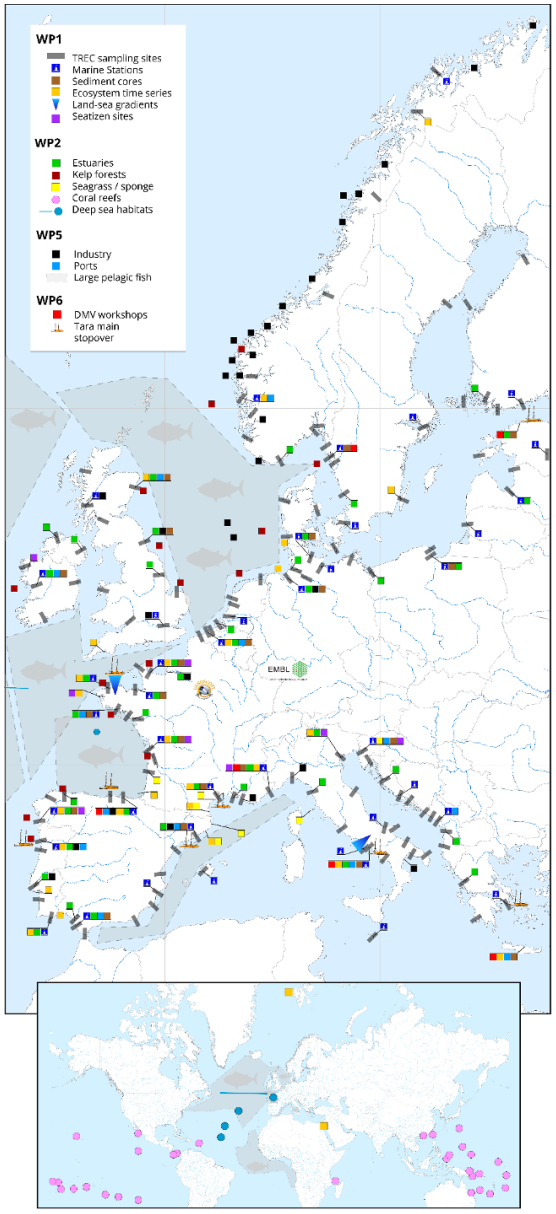



*Fig 1:Location of the 120 European sampling sites, gradients, and features explored during BIOcean5D, using a holistic-biodiversity assessment strategy. Bottom Insert: overseas coral reefs, deep-sea habitats, and ecosystem time-series.*

Another one was recently funded from the reserve list under HORIZON-MISS-2021-OCEAN-02 - Blue4All, coordinated by Steven Degraer at the Royal Belgian Institute of Natural Sciences (RBINS) - also with a focus on MPAs - abstract below.

UCD is a partner, along with VLIZ and UTARTU, among 21 in total.

Best regards,

Tas

BLUE4ALL will align top-down regulatory demands about European (networks of) MPAs with bottom-up societal expectations as a guarantee for achieving effective, efficient and resilient MPAs and networks of MPAs which meet EU Biodiversity Strategy 2030 objectives. By mobilizing stakeholders from BLUE4ALL's 25 information sites and Living Labs, i.e. locations where (networks of) MPAs have been established and from which lessons learned can be drawn about success and failure relative to how challenges were tackled, we will co-create robust and replicable social, governance, ecological and environmental tools to meet conservation and/or restoration objectives in socially sustainable and acceptable ways. These science-based tools will be tested in Living Labs, i.e. locations where (networks of) MPAs are in the process of establishment and where these tools can be fed into the ongoing MPA process. The operationalized and tested frameworks will ultimately be generalized into a Blueprint Platform for the co-creation of effective, efficient and resilient (networks of) MPAs. This scheme will separate generically encountered challenges and applied solutions from MPA (network)-specific challenges and solutions and develop guidance in a user-friendly manner to end-users (i.e. MPA (network) managers and authorities). This guidance will take the shape of an interactive web-based Blueprint Platform directing the end-users to those challenges and solutions most applicable to their site(s). User-friendliness and applicability will be maximized by cross-checking the Blueprint Platform development with the actors and stakeholders of the Living Labs throughout the whole process of its development. Knowledge transfer and interaction with stakeholders and society-at-large at local to regional scales will lead to the development of a platform for MPA networking to interact with communities of practice boosting the BLUE4ALL legacy to its ultimate goal to restore our oceans and waters.

Dear Mike,

As promised, I am writing to you to put you in touch with Sergio (in CC), who is the PI of an HORIZON project which will start in January (and in which I am also involved) which I believe has some potential connections with MARBEFES. The project is called OCEAN CITIZEN and it is funded by the call ORIZON-MISS-2021-OCEAN-02-01. A few details below about OCEAN CIZENS are below.

All the best,

Carlo

Title: Marine forest coastal restoration: an underwater gardening socio-ecological plan

Sergio ROSSI <sergio.rossi@unisalento.it>

Abstract: Following the non-achievement of the AICHI targets and most of the Good Environmental Status objectives for 2020, active restoration has been emerged (also envisaged by the EU) as one of the preferred tools that may boost sequels of marine protected areas and other conservation measures. Restoration acts promote biodiversity, enhance carbon sequestration and accelerate coastal and offshore resilience. Yet, we still lack a program that combines conservation and restoration under a unified setting, as the involvement of local citizen, embracing socio-economic parameters into opportunities. Thus, an advanced restoration program must conjoin ecological perspectives together with societal commitment and clear economic benefits for local communities. Above all, it must be designed with continuity beyond the lifespan of a project. Responding to the above, OCEAN CITIZEN proposal represent a novel restoration approach in which (1) restoration is depicted as a toolbox holding ubiquitous properties and as such it is experienced in 3 sites, representing different marine ecosystems (in one of the sites all tools are used in concert) and different environments: subtropical, tropical and cold temperate; (2) a profession of “gardeners of the sea” is created and endorsed, including detailed curriculum; (3) the project targets the restoration of the most neglected marine biome, encompassing the various types of Marine Forest (MF) organisms (seagrasses, seaweeds, sponges, corals, gorgonians, etc.);(4) new ecoengineering aspects are applied, including Integrated Multitrophic Aquaculture and Smart Enhanced Reefs (SER); the SERs act as substrates for massive recruitment and transplantation of MF organisms (5) the is performed on land, and in situ, from shallow, mesophotic to continental shelf areas (to 90-100 meters depth); (6) a novel approach for C sequestering and sink (7) the full involvement of citizens and local stakeholders with a complete business plan.

# European Commission grants 7,6 Million Euros to AquaINFRA Project

The European Commission awards the AquaINFRA Project 7,6 million Euro to develop an EOSC compliant innovative interaction platform for restoring healthy oceans, seas, coastal and inland waters.

The AquaINFRA project will support the ongoing development of the European Open Science Cloud (EOSC) as an overarching research infrastructure. The overall objective of the 4-year project is to develop an AquaINFRA Interaction Platform equipped with FAIR multi-disciplinary data and services to support marine and freshwater scientists and stakeholders in restoring healthy oceans, coastal and inland waters.

The 21 partner international consortium, led by Aalborg University, Department of Planning, will develop an innovative AquaINFRA Interaction Platform (AIP). The platform will allow seamless data discovery and processing through a single interface.

The AIP will be the central gateway for scientific communities in the aquatic realm to interact seamlessly with European Open Science Cloud (EOSC), the EU flagship initiative aimed at enabling Open Science practices in Europe. This will include the development of a cross-domain and cross-country search and discovery mechanism, as well as building services for spatio-temporal analysis and modelling through Virtual Research Environments (VREs).

The AquaINFRA VRE will enable stakeholders to store, share, access, analyse and process research data and information from their own discipline, as well as across research infrastructures, disciplines, and national borders. AquaINFRA will address the specific needs for enabling researchers from the marine and freshwater communities to work and collaborate across the two domains. A set of strategic use cases, including use cases in the Baltic Sea, the North Sea, and the Mediterranean Sea, as well as a Pan-European use case will provide the setting for co-designing and testing services in the targeted research communities.

In addition to contributing to the use and uptake of EOSC as the overarching European research infrastructure, the AquaINFRA project will be carried out in close collaboration with the sister project BlueCloud26 and other flagship projects, such as ILIAD and EDITO Digital Twins of the Ocean.

The project starts January 1, 2023.

Contact
Project Coordinator
Henning Sten Hansen,
Professor, dr.scient.
Aalborg University Copenhagen
A.C. Meyers Vænge 15
DK-2450 Copenhagen
E-mail: hsh@plan.aau.dk