Coordination and Support Action

Horizon 2020 - BG-13-2016
Grant Agreement 727453

"Projects supported from H2020 funds and their relationship with the BLUEMED Initiative"

Annex to the D5.1 "BLUEMED 2ndProject Coordinators' Meeting: Sustaining the Lessons Learned and Enhancing the Bluemed Initiative Synergies" – Meeting Report

Actual submission date: September 2019

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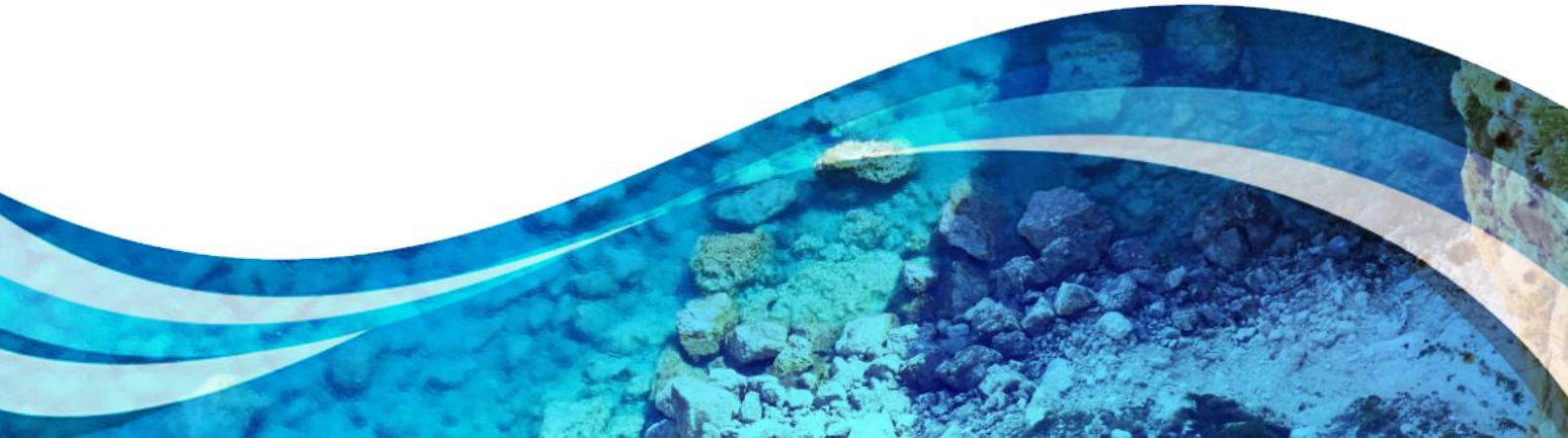

Project Full title	Coordination and Support Action for the supporting the implementation of the BLUEMED Initiative		
Project Acronym	BLUEMED CSA		
Grant Agreement No.	727453		
Coordinator	Fabio Trincardi - CNR (Italy)		
Project start date and duration	01-10-2016 (48 months)		
Project website	www.bluemed-project.eu		
Deliverable Nr.		**Deliverable Date**	
Work Package No			
Work Package Title			
Responsible			
Authors & Institutes Acronyms	Margherita Cappelletto (CNR), George Bugeja (MCST), Mónica Campillos-Llanos (IEO)		
Status:		**Final (F)**	
		Draft (D)	X
		Revised draft (RV)	
Dissemination level:		**Public (PU)**	X
		Confidential, only for members of the consortium (CO)	

MESSAGES FROM THE COORDINATORS

CLAIM PROJECT

CLAIM develops and demonstrates innovative technologies *and approaches, suitable* ***for removing visible and invisible litter at their point of introduction to the marine environmenenvironment****. These include floating booms for collecting litter at river runoffs, small-scale pyroliser that allows an easy and low cost integration onto small vessels and ports, permitting the energy recovery from collected litter at spot, and monitoring in the marine environment. It also facilitates better governance of marine litter by providing tools such as new models and concentration maps to give insights into the distribution of macro and micro litter and scenarios to determine the efficiency of CLAIM's technologies. CLAIM's modelling tools are monitoring the fate and forecasting the distribution of marine plastic litter pollution, both visible and invisible in the Baltic and Mediterranean seas with the aim to provide a clearer understanding of the impacts of human activities on ecosystem services. This instrument will also evaluate the impact of CLAIM cleaning methods in the marine environment using an ecosystem approach that will guide the project through the evaluation of the potential benefit from proposed litter cleaning methods to ecosystem services, by identifying and mapping potentially threatened ecosystems as well as human well-being.*

These ***innovations need synergies with BLUEMED*** *in order to be further assisted and replicated in EU and non EU municipalities, Regions, river runoff areas, waste water treatment plants, ports and marinas. By connecting these products and its promoters with investors, stakeholders and end-users worldwide, CLAIM can go much beyond its original goals and can maximize its impact to the society and the environment.*

George Triantafyllou
Research Director
Institute of Oceanography
Hellenic Centre for Marine Research

ODYSSEA PROJECT

ODYSSEA has been evolving in many important ways. Business development activities, ongoing training of young scientists and professionals, steady engagement of Observatory Managers, deployment of cutting-edge instrumentation and the completion of the first public version of an innovative, user-friendly platform for the Mediterranean Sea are the main drivers of an incredibly complex convergence process. Thus, ***ODYSSEA is on track to achieve results*** *by the end of its implementation period in 2021, contributing to the growing relationship, economic and environmental, between Society and the Ocean in general, and the Mediterranean in particular. Our vision is to demonstrate the sustainability and value of* ***science-based monitoring for improving both an ecosystem-based management approach of ocean resources and sea-related economic activities initially in the Mediterranean*** *and eventually well-beyond.* ***Data that becomes information to improve our life and environment.***

Dr. Georgios SYLAIOS
Professor
Laboratory of Ecological Engineering & Technology, Director
Department of Environmental Engineering
School of Engineering
Democritus University of Thrace

THE BLUE GROWTH FARM PROJECT

Empowering Offshore Aquaculture is one of the European Commission key requirements to sustain the EU Blue Growth sector and its industrial chain, and it is also the emotional driver of the Blue Growth Farm project. ***Demonstrating full scale engineering design*** *through up-scaling models* ***of multipurpose offshore floating installation****, including technologies required to the management of this complex integrated system, and its validation under the economic, environmental and social acceptability conditions, represents the way by which, we believe, the EU offshore aquaculture could* ***remove actual barriers that still impede the EU leadership in this sector****.*

Fabrizio Lagasco
Corporate Research & Development
RINA Consulting S.p.A.

ECOPOTENTIAL PROJECT

Optimization, re-use, sharing, integration and synergy are the main keywords of future strategies for the conservation of the natural capital*, according to the ECOPOTENTIAL experience.* ***That is especially true for an overexploited area like the Mediterranean Sea****. Any initiative building on these pillars will positively and substantially contribute to sustainable development goals.*

Dr. Antonello Provenzale
Director
National Research Council of Italy
Institute of Geosciences and Earth Resources

Carmela Marangi.
CNR -Istituto per le Applicazioni
del Calcolo "M. Picone"

GOJELLY PROJECT

After the initial project phase where we have ***harmonised the protocols, jellyfish harvesting and conducted monitoring of the numbers of microplastic particles in one of the wastewater treatment plants****, the ideal target for applying the mucus filter to trap microplastic particles before they enter into the seas,* ***we are now beginning with the prototyping stage****, which will be followed by the testing stage. The near future will be very busy but we have a vision of future commercialization and exploitation of GoJelly results!*

Dr. Ana Rotter, PhD
Scientific Associate
National Institute of Biology
Marine Biology Station Piran

Jamileh Javidpour
SDU, Denmark

CONTENTS

1. INTRODUCTION

The Blue Growth calls in the Horizon 2020 Work Programme 2016-2017 and DG-MARE Call for a "Sustainable Blue Economy" in the Mediterranean are focused to support the implementation of the themes addressed in the BLUEMED Strategic Research and Innovation Agenda (SRIA), launched in October 2015 with the endorsement of the Venice Declaration. About 50 M € were allocated to the area.

In this context, BLUEMED CSA has selected a number of projects funded through the EC Research & Innovation (R&I) Programme Horizon 2020 Societal Challenge (SC) 2 'Food Security, Sustainable Agriculture and Forestry, Marine, Maritime and Inland Water Research and the Bioeconomy' and SC 5 'Climate Action, Environment, Resource Efficiency and Raw Materials' (referring to programme lines *H2020 - EU.3.2.5 - Cross-cutting marine and maritime research, H2020 – EU.3.5.5 Environmental Observation and Information systems, and H2020 – EU.3.5.2 Protection of the environment*), which main objective is to increase the impact of the Union's seas and oceans on society and economic growth through the sustainable use of marine resources. As well as to address the use of different sources of marine energy and the wide range of different uses that is made of the seas. In addition, it aims to provide knowledge and tools for the management and protection of natural resources, in order to achieve a sustainable balance between limited resources and the present and future needs of society and the economy. Activities shall focus on cross-cutting marine and maritime scientific and technological challenges with a view to unlock the potential of seas and oceans across the range of marine and maritime industries, while protecting the environment and adapting to climate change. A strategic coordinated approach for marine and maritime research across all challenges and priorities of Horizon 2020 will also support the implementation of relevant Union policies to help deliver key blue growth objectives.

These projects have their own specific objectives and results which are related to BLUEMED agenda, and contribute towards the bigger picture by providing evidence, innovative ideas and actions for addressing the challenges and opportunities of the blue economy of the Mediterranean Sea. For this purpose, a questionnaire was distributed to these projects to obtain information on how they contribute to the BLUEMED initiative.

From the numerous projects, the following ones provided a response to the survey:

- **CLAIM Project,** *Cleaning Litter by developing and Applying Innovative Methods in European seas;*

- **ODYSSEA,** *Operating a network of integrated observatory systems in the Mediterranean Sea;*

- **The Blue Growth Farm,** *Development and demonstration of an automated, modular and environmentally friendly multi-functional platform for open sea farm installations of the Blue Growth Industry;*

- **ECOPOTENTIAL,** *Improving future ecosystem Benefits through Earth observations*;

- **GOJELLY**, A *gelatinous solution to plastic pollution*.

Following the structure of the survey reported in Annex 1, this report compiles the information of the collected questionnaires including key achievements, impacts, added values and recommendations. It also pilots the need of exploiting such a tool, to be updated with new projects and further extended to increase the sample, including to other relevant Programmes. Possibly, it should be implemented on-line, for monitoring the developments of actions in relation to the BLUEMED Initiative, also as means for evidence-based update of the Strategic Research and Innovation Agenda and to address the BLUEMED Implementation Plan, including the developments of the *Pilot Action on healthy-plastic free Mediterranean Sea*.

2. H2020 PROJECTS SELECTED

Project	Dates	Summary	Objectives	Partners	
CLAIM	1 November 2017 - 31 October 2021	CLAIM project is an initiative to clean litter by developing and applying innovative methods in European Seas to reduce the amount and impact of plastic pollution. CLAIM project will power 5 new marine cleaning technologies, to innovate the ways in which we clean our seas and oceans. Data modelling will produce maps of concentrations of macro and micro litter, while ecosystem service approaches will identify areas where intervention has the greatest potential to secure impact on human well-being.	• Advance our knowledge on the current status of marine plastic pollution; • Develop innovative technologies able to reduce the amount and impact of plastic pollution on the ecosystem-based services of the Mediterranean and Baltic Seas; • Set the basis for operational forecasting of the impacts of marine plastic litter pollution on ecosystem services; • Utilise an ecosystem services angle (such as fishing industry) to identify areas where intervention with project-developed technologies has the greatest potential to tackle marine litter issues and produce impact on human well-being; • Test the economic feasibility, social acceptance and enabling institutional framework to encourage the uptake and upscaling of innovative marine litter reduction technologies; • Change policy and public perceptions and provide advice for management decision-making through focused stakeholder engagement and communication strategies.	• The Hellenic Centre for Marine Research (HCMR) - Coordinator, • Danish Meteorological Institute (DMI), • Royal Institute of Technology (KTH), • Institute of Marine Sciences (CNR-ISMAR), • Technical University of Denmark (DTU), • Institute for Environmental Studies (IVM), • Pensoft Publishers, • IRIS SRL,	• IkerConsulting, • Kiel University (CAU), • Tallinn University of Technology (TTU), • National Institute of Marine Sciences and Technologies (INSTM), • University of Coimbra (UC), • PP Polymer AB, • Lebanon University (UL), • Waste et Water sarl, • Institute for European Environmental Policy (IEEP), • New Naval LTD, • Aix-Marseille University (AMU).
ODYSSEA	1 June 2017 - 30 November 2021	ODYSSEA Project will develop, operate and demonstrate an interoperable and cost-effective platform that fully integrates networks of observing and forecasting systems across the Mediterranean basin, addressing both the open sea and the coastal zone. The platform will collect its data from the many databases maintained by agencies, public authorities, and institutions of Mediterranean EU and non-EU countries, integrating existing earth observation facilities and networks in the Mediterranean Sea building on key initiatives such as Copernicus, GEOSS, GOOS, EMODNet, ESFRI, Lifewatch, Med-OBIS, GBIF, AquaMaps, Marine IBA e-atlas, MAPAMED and others with marine and maritime links	• Harmonizing existing Earth Observing Systems, • Upgrading operational oceanographic capacities, • Supporting EU policy implementation, • Improving interoperability in monitoring, • Fostering blue growth jobs creation, • Opening participation to non-EU Member States.	• Foundation for Research and Technology Hellas – Coordinator, • Technion - Israel Institute of Technology, • Fundación de la Comunidad Valenciana para la Investigación, Promoción y Estudios Comerciales de Valencia Port, • Universita degli Studi di Roma la Sapienza, • WCMC LBG, • Regional Activity Centre for Specially Protected Areas, • Blue Lobster it Limited, • Stichting Deltares, • ALSEAMAR, • Acondicionamiento Tarrasense Associacion, • Agir Association de Gestion Intégrée des Ressources, • Sarl Nord Sud Ventures, • Edisoft-Empresa de Servicos e Desenvolvimento de Software, S.A., • AGORA P.S.V.D.	• Association Nationale de Developpement Durable et de la Conservation de la Vie Sauvage, • Arab Network for Environment & Development, • Istanbul Universitesi, • Hellenic Centre for Marine Research, • Hidromod Modelacao em Engenharia Lda, • Alma Mater Studiorum - Universita di Bologna, • Develogic Gmbh, • Gtd Sistemas de Información, S.A., • Association Eco Ocean, • The Society for the Protection of Nature in Israel, • Aristotelio Panepistimio Thessalonikis, • Collecte Localisation Satellites, • Thales, S.A.,
theBlueGrowthfarm	1 June 2018 - 30 September 2021	The Blue Growth Farm project aims at developing and demonstrating an automated, modular and environmentally friendly multi-functional platform for open sea farm installations of the Blue Growth Industry by designing for low environmental impact; studying solutions for the diverse interactions (wind rotor – concrete platform; concrete platform modules connection; concrete platform – cage connections; cage connections – mooring system); providing mitigating solutions to the different interactions between the installed technologies; fish farm and living sea environment; and Optimising / maximising production rate and profitability	• Design a multi-purpose offshore platform, capable of accommodating aquaculture, wind and wave energy systems; • Study integration of a commercial offshore wind turbine system (10MW), and a number of wave energy systems; • Design a highly automated aquaculture system; • Design and integrate a metocean condition system and maritime surveillance unit to provide high quality meteorological and oceanographic data; • Design a docking system able to accommodate specialized vessels required to support the aquaculture production and maintenance operations; • Develop a sustainable business model for the platform; • Engage with a wide range of different stakeholders and institutions via workshops; • Evaluate the training needs and Health & Safety issues related to the design and operation of the platform; • Undertake an overall environmental impact assessment of a full scale platform; • Produce Best Practice Guidelines by combining different knowledge inputs (science, stakeholders, authorities, risk justified decision makers).	• RINA Consulting • Fincosit • SAFIER • University of Strathclyde • The Natural Ocean Engineering Laboratory • SAGRO AQUACULTURE • Chlamys • SAMS • Wavenergy.it • Ecole Centrale de Nantes (ECN) • TECNALIA • Politecnico di Milano • Ditrel Industrial	

	1 June 2015 - 31 October 2019	ECOPOTENTIAL project focus its activities on a targeted set of internationally recognised Protected Areas, blending Earth Observations from remote sensing and field measurements, data analysis and modelling of current and future ecosystem conditions and services. ECOPOTENTIAL considers cross-scale geosphere-biosphere interactions at regional to continental scales, addressing long-term and large-scale environmental and ecological challenges.	• Developing ecosystem data services, with special emphasis on Copernicus services; • Implementing model output services to distribute the results of the modelling activities; • Estimating current and future ecosystem services and benefits, combining ecosystem functions (supply) with beneficiaries needs (demand).	• Consiglio Nazionale delle Ricerche • Universita del Salento • Accademia Europea di Bolzano • Agencia Estatal Consejo Superior de Investigaciones Científicas • Helmholtz-Zentrum fur Umweltforschung Gmbh-Ufz • Karlsruher Institut fuer Technologie • Universitaet Bayreuth • Deutsches Zentrum Fuer Luft - Und Raumfahrt Ev • Centre National de la Recherche Scientifique CNRS • Université de Montpellier • University of Leeds • Environment Systems Limited • Universitatea Din Bucuresti • Iceta Instituto de Ciencias, Tecnologias e Agroambiente da Universidade do Porto • Instituto Superior Tecnico • Ethniko Kentro Erevnas Kai Technologikis Anaptyxis • Idryma Technologias Kai Erevnas • Ecole Polytechnique Federale de Lausanne • Ben-Gurion University of The Negev • Technion - Israel Institute Of Technology • Israel Nature And National Parks Protection Authority • PSI Hydrobiological Institute Ohrid • Council for Scientific and Industrial Research • Istituto Superiore per la Protezione e la Ricerca Ambientale • Politecnico di Milano • Umweltbundesamt Gesellschaft Mit Beschrankter Haftung (Uba Gmbh) • Universidad de Granada • Narodowa Fundacja Ochrony Srodowiska • Stiftelsen Grid Arendal	• Centro de Investigación Ecológica y Aplicaciones Forestales • Autonoma de Barcelona • Museum Fur Naturkunde - Leibniz-Institut Fur Evolutions- Und Biodiversitatsforschung An Der Humboldt-Universitat Zu Berlin • Fondation Tour du Valat • Stichting Deltares • Aratos Anonymos Eteria Anaptyxis Paragogis & Emporias Proionton Pliroforikis & Ipsilis Technologias • Starlab Barcelona SL • Martin-Luther-Universitaet Halle-Wittenberg • Stichting Nioz, Koninklijk Nederlands Instituut Voor Onderzoek Der Zee • Stichting Nederlandse Wetenschappelijk Onderzoek Instituten • Klaipedos Universitetas • Universite Paul Sabatier Toulouse III • United Nations Educational, Scientific and Cultural Organization - UNESCO • London School of Economics And Political Science • Universitetet I Bergen • Terradue UK LTD • United Nations Environment Programme • University of New South Wales • Eidgenoessische Technische Hochschule Zuerich • Agencia de Medio Ambiente y Agua de Andalucía • Universite de Bretagne Occidentale • Universite de Geneve • Terradue SRL • Universidad De Córdoba • Universitaet Potsdam • WCMC LBG
	1 January 2018 - 31 December 2021	GoJelly Project develops tests and promotes a gelatinous solution to microplastic pollution by developing an up to TRL 5-6 prototype microplastics filter made of jellyfish mucus. It addresses two environmental issues: commercially and ecologically destructive sea and coastal pollution of both jellyfish and microplastics. The initial results look for less micro and nano plastics in the ocean and in turn more jobs for commercial fishers in off-seasons to harvest the jellyfish. In addition, it includes a green innovation initiative and added valueby using jellyfish as additional source of new prototypes: novel, valuable resource for the food and feed industry as well as agro-biological fertilizer for organic farming and as a source of collagen used in cosmetics.	• Advance in the analytical model(s) to predict blooms of important jellyfish species within large marine ecosystems; • Develop protocols for jellyfish biomass collection through both wild catch during jellyfish blooms and aquaculture techniques when blooms are rare; • Establish a set of 5 protocols for handling, preserving and processing harvested jellyfish biomass into innovative commercial products; • Develop an innovative filter for trapping microplastics and nanoplastics particles and fibers in wastewater treatment plants; • Develop actual products and for handle the harvested jellyfish for process the different jellyfish species into commercial products; • Explore is the perception of jellyfish as a pest or a resource within the framework of a trade-off analysis of different eco-system goods and services. • Assess the socioeconomic impact of the jellyfish products and by products of GoJelly project and the potential for their commercialization; • Promote the activities in GoJelly within the consortium, to the stakeholder community and to the general public.	• University of Southern Denmark • Norwegian University of Science and Technology • ARDITI – Regional Agency for the Development of Research, Technology and Innovation • National Institute of Biology • University of Haifa • Ort Braude College • Christian Albrechts University Kiel	• Hanseatische Umwelt CAM GmbH • SINTEF Ocean • Coastal Research & Management • Institute of Sciences of Food Production, National Research Council • Sanpietro Societa' Cooperativa Agricola • Hamburg University • European Science Foundation • Institute of Oceanology, Chinese Academy of Sciences • GEOMAR Helmholtz Centre for Ocean Research Kiel

3. KEY ACHIEVEMENTS OF THE H2020 PROJECTS IN CONTRIBUTING TO THE IMPLEMENTATION OF THE BLUEMED INITIATIVE

The projects (five) that have contributed to this survey have similarities according to their objectives and challenges, all of them are looking for a sustainable ecology, economy and social marine areas, good environmental status of the Mediterranean Sea and sustainable Blue Growth.

Some of the key achievements to be highlighted are:

- **Innovation and technology to be applied on the field:** it means that those projects are improving and developing new technologies to prevent and protect the Mediterranean Sea. Technologies such as pollution/marine plastics filter systems, marine cleaning litter technologies, climatic collecting data tools, multipurpose platforms or new analysis innovative tools are revolutionary in new ways research in ecosystems services and human well-being.

- **Modelling tools:** Use of different modelling methods to create or simulate scenarios (for litter, create informative maps, etc.) where marine resources, or pollutants are displayed in different scales, granularity and quantification of the Mediterranean Sea.

- **Observing systems and data:** Integrating in-situ observing systems and satellite observation for different topics (marine litter, plastics, fish or jellyfish blooms) to collect and monitor data of the Mediterranean Sea.

- **Support activities:** Activities that promote the marine research and innovation in the Mediterranean Sea such as workshops, training, networking events or conferences presentations, it means the involvement of different stakeholders. On other hand, the dissemination of the information includes several activities such as news issues, press releases, social media promotion or scientific publications.

4. CONTRIBUTIONS OF THE H2020 PROJECTS TO THE IMPLEMENTATION OF THE BLUEMED STRATEGIC RESEARCH AND INNOVATION AGENDA (SRIA)

Although connections across enablers of the SRIA between different projects are complex, there are more connections for the knowledge and economic enablers than the technology and cross-cutting ones.

The following table summarizes goals and actions as highlighted by the participating projects (five) analysed. In yellow are marked the actions that matched for at least two projects, resulting as follows:

KNOWLEDGE ENABLER		ECONOMY ENABLER		TECHNOLOGY ENABLER		CROSS-CUTTINGENABLER	
CHALLENGE A. Mediterranean Sea ecosystems: characterize present dynamics, services, resources, vulnerability and resilience to natural and anthropogenic pressures		**CHALLENGE A. Innovative businesses based on marine bio-resources in the Mediterranean**		**CHALLENGE A. Smart, greener and safer maritime transport and facilities in the Mediterranean**		**CHALLENGE A. Smart, greener and safer maritime transport and facilities in the Mediterranean**	
GOAL	**ACTION**	**GOAL**	**ACTION**	**GOAL**	**ACTION**	**GOAL**	**ACTION**
A1. Understanding the functioning of the Mediterranean Sea ecosystem	A1.1 Develop theoretical and operational tools for data analytics towards an end-to-end conceptual and numerical model.	**A1. Developing new methodologies and tools**	A1.5 Develop standardize methodologies to quantify the socio-economic value of natural bio-assets	**A1. Greening vessels, facilities and services**	A1.4 Exploit new technologies and tools to monitor pollution from ships on route coast and in harbours.	**A1. Open data, open science, open innovation**	A1.3 Support planning and management activities by improving access to marine data (connecting to the Blue Cloud) and including economic, social and environmental information.
	A1.3 Assess inputs from atmosphere-land-sea nexus and the effects of natural events and historical and ongoing anthropogenic pressures leading to change in marine and coastal ecosystems.	**A2. Generating new products and services**	A2.1 Identify and assess potentials of marine resources for new products and services.		A1.6 Design and develop innovative green infrastructure solutions and tailored software to improve the sustainability of logistics and ports, with special reference to energy efficiency and externalities related to the surrounding built environment		A1.4 Promote standardization and interoperability of technological solutions with specific reference to the maritime field with innovate "guides to the use" explaining what diverse sets of data are available, standardized sampling and analyses methodologies. Linking all "guides" to their corresponding Blue Cloud database
	A1.4 Fill gaps in understanding the Mediterranean Sea dynamics, biogeographic patterns, biodiversity (including cryptic and microbial), and ecosystem functions (including fishing resources) using novel monitoring, e.g. satellite, marine drones, molecular/genetic tools to develop new end-to-end models forecasting the carrying capacity of the Mediterranean ecosystems.		A2.2 Evaluate the potential reuse of marine litter		A1.7 Develop innovative design and management solutions for eco-friendly vessels, e.g. antifouling, greener propulsion for transport, leisure and fishing boats, fuel saving and noise reduction materials for vessel-water interface	**A2. International Cooperation and Coordinated Transboundary Networks**	A2.1 Promote appropriate investments, homogeneous legislation and capacity building throughout the Mediterranean, together with a sound sense of ownership in order to ensure full participation from all stakeholders
			A2.5 Promote new market opportunities for Mediterranean-labelled products from marine bio-resources	**CHALLENGE B. Observing systems and operational oceanography capacities in the Mediterranean**			A2.5 Improve coordination and cooperation among Member States and non-EU countries to achieve the Good Environmental Status by developing standard methodologies to implement the Marine Strategy Framework Directive and the UNEP-MAP Ecosystem Approach in shared waters
A2. Understanding Pollution Impacts, Mitigation, and Remediation in the Mediterranean Sea	A2.1 Develop coastal and marine potential hazard/pollution sources maps (exploiting Earth Observations and linking to pollutant dispersion models) to identify hot spots and areas that are particularly exposed to the impact of multiple stressors and propose possible solutions.	**CHALLENGE B. Ecosystem-based management of Mediterranean aquaculture and fisheries**		**GOAL**	**ACTION**		A2.8 Develop new concepts and protocols with private companies and maritime operators to maximize the use of infrastructure, ships and platforms for scientific and environmental monitoring, safety and security purposes
	A2.3 Conduct in situ measurements and develop modelling (including Big-Data modelling) tools to understand the distribution, intensity and sources of underwater noise, as well as its effect on marine species.	**GOAL**	**ACTION**	**B1. Towards an observing system of systems**	B1.1 Develop technologies towards an integrated Mediterranean observing system, capitalizing on existing networks and consortia, including European Strategy Forum on Research Infrastructures, and national/regional/local infrastructures, in line with the overall European contribution to global observing systems, such as in the Common Information Sharing Environment (CISE) approach	**A3. Interaction between scientists, stakeholders, policy and decision makers, civil society**	A3.3 Coordinated approach addressing coastal management and conservation of anthropogenic villages/ecosystems involving local communities
	A2.5 Define distribution, concentration and provenance (when possible) of all forms of garbage at sea (including plastic and microplastic debris) at the sea surface, within the water column, the sea floor and the coastal-estuarine environments; rise awareness through literacy and citizen-science initiatives.	**B1. Develop optimal fishing strategies, technologies and practices**	B1.2 Develop best methods to integrate the use of by-products and by-catch from fisheries and aquaculture in the production chain				
	A2.6 Explore and propose solutions to reduce the input of pollutants from atmosphere, land and sea.		B1.4 Develop innovative and efficient maritime monitoring, control and surveillance systems for the fisheries,		B1.3 Implement ICT, Big Data Analysis and Cloud Services Platforms to take advantage of multi-sectoral data management and sharing opportunities for the Mediterranean	**A4. Building capacity, blue skills and blue professionals**	A4.1 Develop a network of training research centres to train new professionals on sampling, recording and working at marine level for environmental, engineering and scientific studies
CHALLENGE B. Mediterranean Sea: forecast changes of the basin under climate and anthropogenic pressures and develop services in the field of sustainable adaptation to climate change and plans for mitigation		**B2. Develop optimal aquaculture strategies, technologies and practices**	B2.1 Develop innovative solutions adapted to confront economic and ecological exploitation constraints for offshore aquaculture.				
			B2.2 Define methods to reduce fishmeal/fishoil use in the aquaculture industry		B1.6 Widen the use of ship of opportunity to improve environmental monitoring (sea state, wave height, traffic, visible pollution such as garbage patches, and early detection of disasters such as oil spills)	**A5. Promoting and implementing strategies and action plans**	A5.2 Develop environmental decision support modelling systems to sustain policy strategies, including adaptation and mitigation, for preserving the socioeconomic and environmental sustainability of marine species and habitats
			B2.3 Develop and implement effective processes using existing and innovative technologies to improve husbandry, biosecurity, control escapes, towards economic sustainability	**B2. Tailor-made sensors and**	B2.1 Develop Autonomous Unmanned Vehicles and related infrastructure to extend actions on deep sea environments - for different types of operations minimizing the presence or cost of support vessels		A5.4 Provide scientific support to legal controls on littering and waste abandonment on river beds, unprotected shores and offshore

GOAL	ACTION
B1. Forecasting the Mediterranean Sea dynamics and climate	B1.1 Sustain and improve ocean observing systems for physical, biogeochemical, and ecosystem parameters by expanding their scope and establishing quality assurance in order to improve modelling and forecasting of system dynamics, and estimates of trends and indicators
	B1.2 Provide numerical modelling, forecasting, indicators to identify diverse trends as well as abrupt shifts in the Mediterranean environmental conditions supported by long-term monitoring, considering land-sea-air interaction processes, with a focus on coastal dynamics
	B1.4 Implement downscaling models of climate change for the Mediterranean Sea and sub-basins; assess the impacts on marine ecosystems and their resources, from regional to local scales
B2. Preparing to climate change and define adaptation/mitigation measures	B2.1 Make a comprehensive assessment of climate and anthropogenic related risks and opportunities in the Mediterranean Sea ecosystem and human environment from the coastal zone to the deep ocean, including extreme climate events, acidification, sea level rise, flooding and invasive species
CHALLENGE C. Hazards and protection of coastal areas and open sea in the Mediterranean	
GOAL	**ACTION**
C1. Reducing the coastal risk of disasters and their effects	C1.4 Fill gaps in understanding coastal morphodynamics at regional and local level including a focus on coastal erosion and on anthropogenically induced erosion processes (e.g. erosion due to maritime transport in near-shore areas next to ports, especially those close to natural protected areas; rockfall of coastal cliffs…)
	C1.5 Develop operational observing platforms, early warning systems and decision matrices to address natural marine disasters such as tsunami events, coastal slides, storms, while assessing and controlling progressive coastal and geological processes such as erosion, habitat destruction, landslides
	C1.7 Identify the risks introduced by anthropogenic features such as ports, oil terminals, offshore platforms, aquaculture plants and map the relevant information defining and assessing possible mitigation scenarios
CHALLENGE D. Innovative blue growth trajectories: biotechnologies, food, and the deep sea resources	
GOAL	**ACTION**
D1. Exploring the	D1.1 Infer and analyse metabolic pathways of marine
	B2.4 Develop aquaculture practices adapted to multipurpose maritime facilities
	B2.5 Foster studies to support non-carnivorous species aquaculture, reducing the demand for fishmeal.
	B2.6 Study and evaluate the best processes to adapt and diversify aquaculture activities (species and systems) and capacities in a changing environment, including for small and medium-scale farms
	B2.7 Determination of food safety hazards of harvested fish and bivalves at Mediterranean level.
	B2.8 Improve health and welfare in marine aquaculture
CHALLENGE C. Sustainable tourism and cultural heritage in the Mediterranean	
GOAL	**ACTION**
C1. Linking tourism, tourists and environment	C1.9 Develop methodology, tools and system for assessing environmental impacts of tourism and its drivers in the Mediterranean area.
CHALLENGE D. Maritime clusters in the Mediterranean	
GOAL	**ACTION**
D1. From traditional maritime economic to blue growth activities	D1.4 Establish innovative methodologies to assess the impacts of different programmes and actions on the evolution of maritime sectors and economy
CHALLENGE E. Governance of maritime space and marine resources in the Mediterranean	
GOAL	**ACTION**
E1. Strengthen synergies among science, industry, policy-makers and society	E1.1 Develop participatory approaches to take decisions by improving the dialogue with civil society, considering its importance (e.g. awareness, inputs, transparency, participation, consensus and support) and its specific technicalities (e.g. engagement at local level, language, ambassadors)
platforms	and ensuring minimal environmental impact.
	B2.3 Use state-of-the-art knowledge and infrastructure/sensors (AUV, USV, UAS, gliders with novel sensors, etc.) to improve monitoring of, particles flux, energy and mass transfer rates and processes
	B2.4 Develop new products relevant for monitoring the global change of the Mediterranean Sea: horizontal and vertical hydrodynamic circulation, T increase, pH reduction, changing biogeochemical cycles, trophic levels and abrupt regime shifts in marine communities
	B2.5 Support R&D on eco-acoustics to assess the overall health of the ecosystem
B3. Security and safety services and technologies in the Mediterranean supporting the Blue Growth	B3.1 Integrate the Information Communication Technologies-ICT (Big Data, IOT-connected objects, Deep Learning, etc.) in the development of observing systems to deliver high-tech products and services for traditional and emerging sectors such as fisheries, aquaculture, MRE, etc.
	B3.2 Develop new cybersecurity-based solutions for securing data and communications in complex and critical maritime systems such as ports and vessels (positioning systems, communication systems, access control systems, …)
	B3.3 Design and implement new on-board systems for security of passengers and crew, based on the integration of multi-sensorial surveillance and monitoring technologies (biometry, computer vision systems, radar,..) supervised by ICT architectures
	B3.4 Develop integrated solutions based on autonomous and unmanned (marine and air) drones/robots for surveillance around the vessel and in port areas, enhanced by advanced (surface and underwater) target detection and tracking systems
	B3.5 Develop advanced Alert Management Systems able to provide a continuously updated situational awareness about the safety and security conditions of a vessel and improve crisis management , in line with international standards in the subject matter, particularly those stipulated by The International Maritime Organisation instruments
	B3.6 Develop advanced space systems (optical, radar) for sea monitoring and surveillance exploiting Copernicus and new satellite

potential of blue-biotech	organisms with biotech and bioremediation potential				constellations, as well as the future opportunities offered by geostationary platforms for continuous observation	
			E1.3 Take full consideration of long-lasting effects of historical human interventions on coastal systems ranging including river diversions, digging of canals, construction of hard structures for coastal defence, landfills with toxic materials and spread pollution through time (now buried in sediment column)		B3.7 Smart data fusion of terrestrial and Automatic Identification System data for improved Vessel Tracking	
D2. Support solutions for sustainable food production	D2.1 Identify marine biota as a new source of protein for human consumption				B3.8 Develop systems for security of ports based on the integration of sensing technologies from multi-observational platforms (airborne, drones, on-ground, surface water and underwater) for the control of the persons and goods (containers, vehicles, …)	
	D2.2 Characterize ecological niches of target species to improve their preservation and reduce the number of extinctions					
	D2.3 Increase knowledge on biological and ecological aspects of habitat-forming species.		E1.4 Provide scenarios of environmental change, investigating the impacts on biodiversity and ecosystems goods and services, of alternative socioeconomic development pathways, policy options and blue growth scenarios		B3.9: Strengthen and reinforce maritime search and rescue cooperation and coordination in the Mediterranean	
	D2.4 Develop Mediterranean aquaculture: new management tools, ecosystem-based approach, tackling pathogens; develop conceptual models for Integrated Multi Trophic aquaculture (IMTA)				B3.10: Examine the possibility of developing regional directives regarding the safety of fishing ships and the protection from marine pollution generated by these units.	
		E2. Effective maritime spatial planning in the Mediterranean	E2.1 Improve the knowledge on the land-sea nexus to properly address planning, considering co-existence of coast and sea uses and environmental objectives; particular emphasis should be placed on substantially improving the connection between marine traffic with port location/activities and the main supply chains on land (train and free-way networks as well as water ways where appropriate)	**CHALLENGE D. Marine and coastal natural and cultural heritage in the Mediterranean: discovering, protecting and valuing**		
				GOAL	**ACTION**	
			E2.2 Develop coastal ecological engineering solutions and measures taking into account also pressures derived from economical drivers on land	**D1. Technology solutions for the Mediterranean natural and cultural heritage**	D1.2 Assimilation of sensed data in advanced modelling for the definition of mitigation actions against climate change and multi-risk scenarios	
					D1.4 Promote innovative devices for and approaches to limit coastal erosion and pollution and to favour beach stabilization	
			E2.3 Define and study approaches and tools to identify the trade-offs between ecological dynamics and socio-economic needs, taking into account marine ecosystems goods and services and their environmental, economic and social value, in order to inform and improve adaptive planning and management scenarios		D1.5 Blue marinas with nature-based solutions. Design and develop innovative integrated solutions using clean technologies to improve the sustainability and management of infrastructures	
			E2.7 Promote innovative technologies and services for a sustainable management and resulting protection of coastal areas from coastal erosion, flooding and pollution		D1.7 Marine litter: development and testing of new marine litter removal techniques (sea bottom removal, floating litter removal, fishing-for-litter good practices). Include citizen science approach when appropriate	

5. IMPACT OF THE EUROPEAN FUNDING IN IMPLEMENTING THE BLUEMED INITIATIVE

5.1 CALL IMPACTS

The examples given by each project involves developing new technology and innovation tools and observation systems:

- Projects looking for *cleaning technologies* are developing and using innovative new tools as microplastic sensors, filtering systems, photocatalytic nanocoating devices, small-scale thermal treatment device (pyrolizer), seawater sampling device & passive flow-through filtering system, moored systems and automated seawater sampling device and passive flow-through filtering systems. All of them are new innovative examples to collect pollutants and plastics from the Mediterranean Sea.

- Use of *multipurpose platforms* involving different sensors and new integrated tools as: moored systems (surface and benthic), testing and operating submarine cameras or hydrophones.

- *Earth observation systems* are used to obtain different temporal and geography data. These observations' models are also used for ecosystem services assessments and monitoring. A good example is the production of guidelines on how to optimize the use of Earth Observation data. In addition, the initiative of building a community of open data to ensure open access to inter-operable data and a community of data users enjoying the benefits of facilitated access to marine data, is a good example of sharing marine data between research, scientists and general public.

- Establish *professional skills and competences* of personal operating in the blue economy industry.

5.2 IMPACTS FOR SOCIETY, INDUSTRY, ENVIRONMENT

SOCIETAL RELATED IMPACTS

All projects include different ways of involving the society, as surveys, mapping and targeting relevant stakeholders and the general public to assess the social acceptance of new methods to be applying in the Mediterranean Sea for different issues as aquaculture, marine plastics or wind farms. It is indeed recognized that not only the economic feasibility but also social acceptance of the proposed innovative technologies are key factors determining the actual potential for their uptake and upscale.

Other relevant societal impact is making the marine data quickly and easily accessible to a wide range of people by setting up different methods of observation systems.

ECONOMIC IMPACTS

The use of *novel business models* to evaluate the cost-efficiency and feasibility of proposed solutions, taking into account the existing policy and legal frameworks. It includes the economic feasibility for the up-scaling and/or implementation of developed cleaning methods or renewable energies that will be assessed by applying properly designed business models and policy instruments. One project, The Blue Growth Farm, includes as a recommendation on how the integration of the "*polluter-pays*" principle may give new insights regarding the financing, prevention and cleaning-up measures.

Multipurpose platforms and offshore applications will enable a new typology of business for companies involved in the aquaculture sector or renewable energy sector (wind farms), besides bringing significant breakthrough and advancements in such trade.

These new technologies and innovative tools will lead the implementation of the Blue Growth in the Mediterranean Sea to create *new jobs opportunities* and improve *professional skills and competences*. For example, the Blue Growth Farms project is expected to contribute with at least 5 % in creating direct employment.

As for ODYSSEA project, considering *the economic value of the information* that is generated addressing the needs of a wide spectrum of end-users, involving and leveraging on the private sector is a pre-condition for the further development and expansion of applications and services.

ENVIRONMENTAL IMPACTS

The application of new technology and concepts will establish *innovative* pathways to enable Small and medium-sized enterprises (SMEs) to support marine protected areas, site managers and scientists.

It also will involve private companies in the assessment, monitoring and modelling of the ecosystem services by using observation systems for different issues as pollutants or marine plastics. For instance, the incorporation of biological indicators control, for biomass estimates and environmental monitoring, can improve the offshore energy sector.

5.3 ADDED VALUE

These projects improve the implementation of the European policy and Mediterranean regulations and directives such as the EU Marine Strategy Framework Directive (MSFD) and EU Marine Spatial Planning Directive, the Barcelona Convention, the Strategic Framework for Marine Litter and the BLUEMED Initiative.

They also contribute to research and knowledge to future policies and regulations towards sustainable growth of the EU Mediterranean marine and maritime economy.

The enhancement of the professional skills and competences of those working and being trained to work within the blue economy is a key value in connection to BLUEMED.

The visual and communication material ranging from events with influential people, education activities, and exhibitions, notably realized by the projects, can be further connected and emphasised to valorize the impacts also after the end of the projects, including towards the private stakeholders (e.g. in the framework of industrial fairs). Efforts to set-up and develop dedicated methods and channels for engaging key stakeholders, e.g. the *user groups* of the ODYSSEA project, shall also be sustained in the long term.

6. RECOMENDATIONS OF THE H2020 PROJECTS FOR IMPLEMENTING THE BLUEMED INITIATIVE, HOW TO MAKE THE BLUEMED INITIATIVE OPERATIONAL

Not all the projects have provided recommendations. However, those that have given them are focused on:

- These successful projects related to the BLUEMED Initiative should be further assisted and granted with additional funding to fulfil their goals, including development of new products and finalization/scaling-up of prototypes as well as the consolidation of more sustainable business plan for investment, in view of capturing additional investors interest and considering the technology cost reduction through time.

- While the availability of open data and services will contribute to better manage the marine areas with shared legal responsibilities along and across the Mediterranean and thus implement the directives, there is still a gap of knowledge on reference standards, methods, common use, best practices and operational procedures, to be possibly solved with the support of the BLUEMED Initiative.

- The BLUEMED Initiative should also further assist and continuing to promote and encourage international cooperation on R&I and strategies' alignment between EU and non EU Countries as well as the relevant community of stakeholders.

- Keeping track on the number of collaborations that initiated by networking within BLUEMED events. In this sense, promoting working groups to facilitate interaction of research networks with the complex legal framework regulating the Mediterranean Sea.

ANNEX I – THE SURVEY

1. KEY ACHIEVEMENTS IN CONTRIBUTING TO THE IMPLEMENTATION OF THE BLUEMED INITIATIVE

This section should highlight up to four high-level Key Achievements of your Project in contributing to the implementation of the BLUEMED Initiative. It is important to select what is most valuable to be shown in each area, for example: publications, patents, knowledge transfer activities and other measurable achievements. Consider always to include specific achievements and activities for promoting international cooperation along and across the Mediterranean Sea.

Please provide a short (10 lines maximum) description for each Key Achievement. Please provide also references to the key deliverables/reports supporting your answers.

2. CONTRIBUTION TO THE IMPLEMENTATION OF THE BLUEMED STRATEGIC RESEARCH AND INNOVATION AGENDA

This section should highlight how your project is contributing to the implementation of specific challenges and goals of the BLUEMED SRIA (version June 2018). It is important to select what is most valuable to be shown under each of the abovementioned objectives in relation your project's high-level achievements.

3. IMPACT OF EUROPEAN FUNDING IN IMPLEMENTING THE BLUEMED INITIATIVE

The section should highlight how your project responds to the impacts listed in the call text in contributing to the implementation of the BLUEMED Initiative (3.1). It should also indicate how your project liaises with citizens, industry, policy makers and the environment (3.2). This section should also specify why/what in your view would not have been possible to achieve in implementing the BLUEMED Initiative without EU funding (3.3). (10 lines maximum for each subsection)

3.1 Call impacts

Examples of science/innovation-related impacts: new method, data or technology, new/improved product or service, new technical process, new organisational process, better access to international network/markets, better understanding of other countries' issues, improved competences and skills, the outputs will make a contribution to advances in complementary scientific or technology areas, the outputs will provide new information and/or tools for use in education o Improved scientific evidence base

3.2 Impacts for society, industry, the environment…

Examples of societal-related impacts: research jobs will be created, non-research jobs will be created, there will be benefits for public health, safety and/or quality of life, …

Examples of economic impacts: additional research income, additional commercial income

better access to external investment, reduced operating costs, increased European/global market share, ...

Examples of environmental impacts: restoration of biodiversity, improved environmental performance, …

3.3 Added value of EU R&I investment and policy impacts

Examples of policy-related impacts: better evidence to make policy/strategy decisions, higher level of influence on third parties (e.g. policy makers, industry, NGOs), the exploitable outcomes will enable better-informed public policies, the exploitable outcomes will support the development of new or improved regulations/standards, …

Where applicable, please make reference as to how your project contributes to relevant global and/or European policy frameworks, e.g. the WESTMED Initiative, the EUSAIR, the Sustainable Development Goals (SDGs), the Food2030 Strategy, the Bioeconomy Strategy, the Integrated Maritime Policy, the Marine Strategy Framework Directive, the Common Fishery Policy, the Maritime Spatial Planning Directive, etc.

4. VISUALS/WEBSITE/COMMUNICATION ACTIVITIES IN IMPLEMENTING THE BLUEMED INITIATIVE

This section should provide information regarding your past and foreseen communication activities in implementing the BLUEMED Initiative. This should include details of visuals, website(s), social media, brochures, information leaflet(s), participation in relevant events for 2018-2019, visuals on YouTube/short videos (give details), and reference to the BLUEMED Initiative reference documents. to promote the visibility of your project.

5. RECOMMENDATIONS FOR IMPLEMENTING THE BLUEMED INITIATIVE/ HOW TO MAKE THE BLUEMED INITIATIVE OPERATIONAL

In this section you can provide any recommendations regarding the implementation of the BLUEMED Initiative you would like to put forward, and salient issues you think need to be addressed in the future, for example effective solutions to facilitate international cooperation on R&I, strategies' alignment, evidence on societal/economic impact, research funders' networks, agreements, standards etc.

6. OPEN QUESTIONS

6.1 What societal and/or economic impacts do you believe will be realized in the near future (e.g. 5-10 years)? *(5 lines maximum)*

6.2 To what extent the project could leverage private investments/benefit from a tailored network of research and innovators funders for further developments? *(5 lines maximum)*

ANNEX II – COLLECTED ANSWERS

CLAIM PROJECT

Cleaning litter by developing and applying innovative methods in European seas

1. KEY ACHIEVEMENTS IN CONTRIBUTING TO THE IMPLEMENTATION OF THE BLUEMED INITIATIVE

This section should highlight up to four high-level Key Achievements of your Project in contributing to the implementation of the BLUEMED Initiative. It is important to select what is most valuable to be shown in each area, for example: publications, patents, knowledge transfer activities and other measurable achievements. Consider always to include specific achievements and activities for promoting international cooperation along and across the Mediterranean Sea.

Please provide a short (10 lines maximum) description for each Key Achievement. Please provide also references to the key deliverables/reports supporting your answers.

1. CLAIM Technologies

The project is developing 5 innovative marine cleaning technologies and will prevent litter from entering the sea at two main source points: wastewater treatment plants and river mouths. Right after an effective **pre-filtering system** has sorted and collected litter, a **photocatalytic nanocoating device** will degrade microplastics in wastewater treatment plants. Mounted on ships a **small-scale thermal treatment device (pyrolizer)** will be used to turn collected litter intro energy powering ships and heating up ports. At river mouths, **innovative floating boom** will collect and monitor visible litter, while a CLAIM network of FerryBox systems will operate on ships in the Baltic, West & East Mediterranean mounted with an **automated seawater sampling device & passive flow-through filtering system**.

2. CLAIM Modelling tools

CLAIM is developing innovative modelling tools to assess and create informative maps about visible and invisible marine plastic pollution at basin and regional scales (Saronikos Gulf, Gulf of Lyon and Ligurian Sea in the Mediterranean Sea).

3. CLAIM Evaluation of the potential benefit from proposed litter cleaning methods

An ecosystems approach will guide the project through the evaluation of the potential benefit from proposed litter cleaning methods to ecosystem services and human well-being. New business models will enhance the economic feasibility for upscaling the innovative cleaning technologies, taking into account the existing legal and policy frameworks in the CLAIM countries, as well as acceptance of the new technologies by their end-users and relevant stakeholders.

2. CONTRIBUTION TO THE IMPLEMENTATION OF THE BLUEMED STRATEGIC RESEARCH AND INNOVATION AGENDA

This section should highlight how your project is contributing to the implementation of specific challenges and goals of the BLUEMED SRIA (version June 2018). It is important to select what is most valuable to be shown under each of the abovementioned objectives in relation your project's high-level achievements.

The CLAIM project is contributing to the implementation of the following specific challenges and goals of the BLUEMED SRIA (*version June 2018*) as identified in the following pillars and enablers:

BLUEMED Pillars	Specific challenges and goals	CLAIM's contribution
(i) Key enabling knowledge for the Mediterranean >> Knowledge enablers	**A.** Mediterranean Sea ecosystems: characterize present dynamics, services, resources, vulnerability and resilience to natural and anthropogenic pressures	CLAIM will evaluate the potential benefits from the proposed litter cleaning methods that will be developed.
	B. Mediterranean Sea: forecast changes of the basin under climate and anthropogenic pressures and develop services in the field of sustainable adaptation to climate change and plans for mitigation	Marine litter pollution is a complex and multi-dimensional environmental issue that involves human activities (industry, urban waste, tourism, maritime traffic), being its main source, as well as physical processes (ocean currents, waves, wind) that control the fate of litter in the marine environment. Its mitigation requires knowledge on sources and fate of marine litter, as well as the development of cost-efficient methods and policies for its reduction. CLAIM develops and demonstrates **modelling tools** able to identify the regions and services (e.g. fish stocks, aquaculture, sensitive habitats and biodiversity) under increased threat from the introduction of plastics. In parallel, it develops **technologies for their mitigation**.
	C. Hazards and protection of coastal areas and open sea in the Mediterranean	
(ii) Key sectoral enablers in the Mediterranean >> Economy enablers	**B.** Ecosystem-based management of Mediterranean aquaculture and fisheries	In CLAIM's WP4, marine litter hot spot areas in the Mediterranean and Baltic Seas, simulated with modelling tools in WP1, will be mapped against potentially threatened marine ecosystem services (fisheries, sensitive habitats, aquacultures) to assess their risk from plastic pollution, taking into account of known impacts on organisms. Using the efficiency of cleaning devices, determined from their implementation wastewater treatment, floating boom, ships) at selected sites in WP3, a set of scenarios will be defined up-scaling the implementation of cleaning methods. The modelling tools will be used for scenario simulations to evaluate the impact

		of (the up-scaled) cleaning methods in the marine environment and their efficiency in reducing the risk from litter plastic pollution on threatened ecosystem services.
(iii) Enabling technology and capacity creation for the Mediterranean >> Technology enablers	**B.** Observing systems and operational oceanography capacities in the Mediterranean	Automated seawater **sampling device & passive flow-through filtering system embedded** in **Ferryboxes** and pilot use on ships of opportunity in the Mediterranean (Lyon, Ligurian, Aegean, Gabes).
Cross-cutting enablers for Blue Jobs and Blue Growth	-	-
KNOWLEDGE ENABLERS		
CHALLENGE A. Mediterranean Sea ecosystems: characterize present dynamics, services, resources, vulnerability and resilience to natural and anthropogenic pressures		**YES**
Goal	**Action**	
A1. Understanding the functioning of the Mediterranean Sea ecosystem	A1.1 Develop theoretical and operational tools for data analytics towards an end-to-end conceptual and numerical model	Existing modelling systems in the Mediterranean Sea will be further upgraded (data assimilation, resolution, advanced drift model parameterizations) to realistically simulate the time-space variability of visible and invisible plastics.
	A1.3 Assess inputs from atmosphere-land-sea nexus and the effects of natural events and historical and ongoing anthropogenic pressures leading to change in marine and coastal ecosystems	HCMR's operational atmosphere-ocean modelling system POSEIDON is used with a resolution of ~5Km for the entire Mediterranean, downscaled to ~500m fine resolution areas (Saronikos Gulf, Ligurian Sea, Gulf of Lyon and Gulf of Gabes). Wave's effect on plastic particles will be included through off-line coupling with the operational POSEIDON wave model. Data assimilation of sea level altimetry will be employed to provide a realistic description of circulation patterns in the study areas.
	A1.4 Fill gaps in understanding the Mediterranean Sea dynamics, biogeographic patterns, biodiversity (including cryptic and microbial), and ecosystem functions (including fishing resources) using novel monitoring, e.g. satellite, marine drones, molecular/genetic tools to develop new end-to-end models forecasting the carrying	In the CLAIM project, parameterizations on wind forcing, landing and re-activation and releasing strategy of floating plastic litters are tested and optimized. i) Wind forcing. ii) Landing and re-activation terms: land is both source and sink for floating plastics. Both terms are not included in the current drift models. Proper parameterization is developed and tested in the

	capacity of the Mediterranean ecosystems	models. iii) Litter releasing strategy in rivers: different litter releasing strategies in drift simulation and local-scale drift simulation are tested and optimized together with landing schemes. iv) Data assimilation: an ensemble approach is used to quantify the uncertainties caused by the potential errors in surface wind drift term.
A2. Understanding Pollution Impacts, Mitigation, and Remediation in the Mediterranean Sea	A2.1 Develop coastal and marine potential hazard/pollution sources maps (exploiting Earth Observations and linking to pollutant dispersion models) to identify hot spots and areas that are particularly exposed to the impact of multiple stressors and propose possible solutions	Hindcast simulations are performed to track the movement of invisible and visible plastic litter from known source inputs from rivers and beaches. The spatiotemporal distribution of the visible plastic litters and heavily polluted areas will be identified and potential reasons for the heavy pollution analyzed.
	A2.5 Define distribution, concentration and provenance (when possible) of all forms of garbage at sea (including plastic and microplastic debris) at the sea surface, within the water column, the sea floor and the coastal-estuarine environments; rise awareness through literacy and citizen-science initiatives	The drift-dispersion models will be downscaled with a finer resolution in the key study areas, providing a more detailed description of small-scale circulation and dispersion patterns. Collected data from the project field experiments (WP3 Task 3.2, 3.5) will be used to validate the fine-scale models and demonstrate their forecasting capacity.
	A2.6 Explore and propose solutions to reduce the input of pollutants from atmosphere, land and sea: - Obtain marine eco-toxicological data for contaminants in marine waters and sediments, at different levels of biological organization. - Develop and test (bio)remediation measures in diverse areas, considering re-use and recycling of hazardous materials to promote sustainable redevelopment of aquatic contaminated sites	CLAIM will demonstrate the efficacy of litter cleaning devices and microplastics measurement system in real environmental conditions namely, waste water treatment plants for the cleaning nanocoating prototype, ADR vessel and port facilities for visible litter thermal treatment device (pyrolizer), rivers mouth for floating booms (macro-litter collectors) and Ferry lines for Ferryboxes (FBs) measurement system. Data from Ferrybox field demonstration will feed the data depository for the validation of forecasting models in WP1, while cleaning efficiency data will be used to evaluate the benefit from up-scaling the developed cleaning methods on the marine ecosystem in WP4. Additional field data samples of plastic in water and seafood, will be collected in the key study areas to be used for model initialisation and validation in WP1 and also to understand the visible

		and invisible litter impact on specific ecosystem services (commercial fisheries and aquaculture) that will be investigated in WP4. Clearly, this WP will be in close collaboration with WP2 in order to validate the cleaning efficiency and the cost-effective performance of the developed devices. In addition, a close collaboration with WP4 and WP5 and WP6 will be set; in fact, data collection will involve local fishermen and aquaculture associations that is pivotal for the dissemination, communication and outreach activities in WP6.
	- Improve wastewater treatment processes and recycling to prevent the impact of pollution in coastal areas	Innovative methods for cleaning visible and invisible plastic litter close to their sources in the sea will be developed and tested. A method employing visible light (sunlight) **photocatalysis** with nanotechnology-based coatings will be developed for the removal of microplastics in the water. Initially tested on lab-scale, the photocatalysis device will be properly customised to be applied in wastewater treatments, with its operation fortified by a properly designed **automation filtering system**, for coarser particles.
CHALLENGE B. Mediterranean Sea: forecast changes of the basin under climate and anthropogenic pressures and develop services in the field of sustainable adaptation to climate change and plans for mitigation		**YES**
B1. Forecasting the Mediterranean Sea dynamics and climate	B1.1 Sustain and improve ocean observing systems for physical, biogeochemical, and ecosystem parameters by expanding their scope and establishing quality assurance in order to improve modelling and forecasting of system dynamics, and estimates of trends and indicators	CLAIM is developing **advanced forecasting tools and models** with optimised Paramete-terizations that are used to identify most polluted areas. These areas will be mapped against ecosystem services (fisheries, aquaculture etc) to assess the risk from marine litter pollution. The efficiency of the proposed cleaning methods in reducing this risk will be evaluated through properly defined scenario simulations with the modelling tools. The cost-efficiency, economic feasibility and mode of deployment of the proposed cleaning methods will be also quantified for designing and implementing scaled up clean-up efforts thereby reducing clean-up and restoration costs.

B2. Preparing to climate change and define adaptation/mitigation measures	B2.1 Make a comprehensive assessment of climate and anthropogenic related risks and opportunities in the Mediterranean Sea ecosystem and human environment from the coastal zone to the deep ocean,	The anthropogenic related risks of plastic pollution will be shown with advanced modelling tools and new opportunities through developing technologies for mitigation will be demonstrated. Mitigation of plastics (macro, micro and nano plastics) requires knowledge on sources and fate of marine litter, as well as the development of cost-efficient methods and policies for its reduction. CLAIM is contributing in Blue Growth opportunities.
CHALLENGE C. Hazards and protection of coastal areas and open sea in the Mediterranean		**YES**
C1. Reducing the coastal risk of disasters and their effects	C1.7 Identify the risks introduced by anthropogenic features such as ports, oil terminals, offshore platforms, aquaculture plants and map the relevant information defining and assessing possible mitigation scenarios	As a component of marine litter, the presence and accumulation of plastic debris in the marine environment (introduced by anthropogenic features) has been recognized as a major environmental problem due to its implications for marine ecosystems and services to humans.
CHALLENGE D. Innovative blue growth trajectories: biotechnologies, food, and the deep sea resources		**None**
-	-	-
ECONOMY ENABLERS		
CHALLENGE A. Innovative businesses based on marine bio-resources in the Mediterranean		**YES**
A2. Generating new products and services	A2.2 Evaluate the potential reuse of marine litter	CLAIM will evolve two innovative devises for collection and reuse of marine litter: **Floating booms** equipped with cameras to monitor the collection of plastic-waste at river mouths and a **thermal treatment device (pyroliser)** for transforming macroplastics into a combustible reusable gas, syngas, able to be installed on vessels, ports, and wastewater treatment plants. A specially configured vessel will host an autonomous small scale pyroliser for the on-site treatment and energy recovery from macroplastics.
CHALLENGE B. Ecosystem-based management of Mediterranean aquaculture and fisheries		**YES**
B2. Develop optimal aquaculture strategies, technologies and practices	B2.7 Determination of food safety hazards of harvested fish and bivalves at Mediterranean level.	Microlitter abundance will be assessed in the key study areas of Mediterranean (Gulf of Lyon, Ligurian Sea, Saronikos Gulf and

		Gulf of Gabes). In each area two quantification campaigns will be performed. Water sampling and seafood specimens collection will be performed choosing stations along a theoretical impact gradient (e.g close to source and offshore) according to the main plastic litter sources, identified in WP1. Furthermore, data on litter sources will be mapped against ecosystem services from WP4 (T4.2) selecting important fishing, aquaculture and biodiversity hotspots sites and key commercial seafood species.
CHALLENGE C. Sustainable tourism and cultural heritage in the Mediterranean		**YES**
C1. Linking tourism, tourists and environment	C1.9 Develop methodology, tools and system for assessing environmental impacts of tourism and its drivers in the Mediterranean area.	Task 5.3 Survey of stakeholders and the general public to assess the social acceptance of new marine litter reduction technologies and identify institutional and legal drivers and barriers to their diffusion.
CHALLENGE D. Maritime clusters in the Mediterranean		**YES**
D1. From traditional maritime economic to blue growth activities	D1.4 Establish innovative methodologies to assess the impacts of different programmes and actions on the evolution of maritime sectors and economy	Task 5.4 Business model development and business plan.
CHALLENGE E. Governance of maritime space and marine resources in the Mediterranean		**YES**
E1. Strengthen synergies among science, industry, policy-makers and society	E1.1 Develop participatory approaches to take decisions by improving the dialogue with civil society, considering its importance (e.g. awareness, inputs, transparency, participation, consensus and support) and its specific technicalities (e.g. engagement at local level, language, ambassadors)	This task carries out an integrated sustainability assessment of the innovative technologies. To this end, their environmental, social and economic impacts will be evaluated based on data and information collected in the demonstration projects, analyzed in T5.1-T5.4, taking into account values, opinions and preferences of stakeholders, as identified in T5.2 and T5.3 through workshops and interviews. A multi-criteria decision analysis (MCDA) will be performed using different software, such as Visual PROMETHEE or TOPSIS to score and rank the performance of the different technologies against different technical, environmental, social and economic criteria. The results will be summarized in policy recommendations, paying special attention to the management of innovation risks

		and uncertainties and the successful uptake and upscaling of the new CLAIM technologies in shore-based and shipowner industry.
	E1.3 Take full consideration of long-lasting effects of historical human interventions on coastal systems ranging including river diversions, digging of canals, construction of hard structures for coastal defence, landfills with toxic materials and spread pollution through time (now buried in sediment column)	CLAIM developed Models showing human impacts of plastic litter in the Mediterranean.
	E1.4 Provide scenarios of environmental change, investigating the impacts on biodiversity and ecosystems goods and services, of alternative socioeconomic development pathways, policy options and blue growth scenarios	CLAIM, using the input from the implemented cleaning methods (wastewater treatment, floating booms, ships) in terms of litter removal from the water, different scenarios will be defined projecting the effect of different methods on a broader scale. These properly defined scenarios, in terms of reduced sources of litter, will then be used as input for the modelling tools to simulate the effect of different litter reduction methods in the marine environment of the study regions.
E2. Effective maritime spatial planning in the Mediterranean	E2.2 Develop coastal ecological engineering solutions and measures taking into account also pressures derived from economical drivers on land	CLAIM's engineering solution includes **floating automated booms equipped with cameras to monitor the collection of plastic-waste at river mouths.**
	E2.3 Define and study approaches and tools to identify the trade-offs between ecological dynamics and socio-economic needs, taking into account marine ecosystems goods and services and their environmental, economic and social value, in order to inform and improve adaptive planning and management scenarios	CLAIM will do so by developing and demonstrating cost-efficient cleaning methods for visible and invisible plastics, as near as possible to the major sources of marine litter (i.e. coasts and coastal activities) and to limit the amount of litter entering the sea. properly designed business models will be used to evaluate the economic feasibility for up-scaling of the innovative cleaning technologies, taking into account the existing legal and policy framework in the CLAIM countries, as well as the social acceptance with consideration of the "polluter-pays" principle through targeted surveys with relevant stakeholders.
	E2.7 Promote innovative technologies and services for a sustainable management and	Using the cleaning capacity of the new methods, obtained from WP3, as well as their environmental impact, simulated with model

	resulting protection of coastal areas from coastal erosion, flooding and pollution	scenarios in WP4, the cost-efficiency of each method/technology will be evaluated. An integrated assessment for the environmental, social and economic impact of the new technologies will be the end product.
TECHNOLOGY ENABLERS		
CHALLENGE A. Smart, greener and safer maritime transport and facilities in the Mediterranean		**YES**
A1. Greening vessels, facilities and services	A1.4 Exploit new technologies and tools to monitor pollution from ships on route coast and in harbours.	A CLAIM network of FerryBox systems will operate on ships in the Baltic, West & East Mediterranean mounted with automated seawater sampling device & passive flow-through filtering system.
	A1.6 Design and develop innovative green infrastructure solutions and tailored software to improve the sustainability of logistics and ports, with special reference to energy efficiency and externalities related to the surrounding built environment	Thermal treatment device (pyroliser) for transforming macroplastics into a combustible reusable gas, syngas, able to be installed on vessels, ports, and wastewater treatment plants.
	A1.7 Develop innovative design and management solutions for eco-friendly vessels, e.g. antifouling, greener propulsion for transport, leisure and fishing boats, fuel saving and noise reduction materials for vessel-water interface	A specially configured vessel will host an autonomous small scale pyroliser for the on-site treatment and energy recovery from macroplastics
CHALLENGE B. Observing systems and operational oceanography capacities in the Mediterranean		**YES**
B1. Towards an observing system of systems	B1.6 Widen the use of ship of opportunity to improve environmental monitoring (sea state, wave height, traffic, visible pollution such as garbage patches, and early detection of disasters such as oil spills)	CLAIM will develop a network of FerryBox systems that operate on ships of opportunity in West & East Med mounted with automated seawater sampling device & passive flow-through filtering system. on in the Mediterranean (Lyon, Ligurian, Aegean, Gabes)
B2. Tailor-made sensors and platforms	B2.4 Develop new products relevant for monitoring the global change of the Mediterranean Sea:	Novel models as well as automated seawater sampling device & passive flow-through filtering system embedded in Ferryboxes for pilot use on ships of opportunity in the Mediterranean Sea (Lyon, Ligurian, Aegean, Gabes) will collect samples for micro and nano-plastics detection.
CHALLENGE C. Innovative offshore industrial platforms including marine renewable energy and co-use		**None**

CHALLENGE D. Marine and coastal natural and cultural heritage in the Mediterranean: discovering, protecting and valuing		**YES**
D1. Technology solutions for the Mediterranean natural and cultural heritage	D1.2 Assimilation of sensed data in advanced modeling for the definition of mitigation actions against climate change and multi-risk scenarios	Data assimilation techniques are implemented with hydrodynamic biogeochemical model, by assimilating satellite Chl-a data to assess the risk from marine litter to ecosystem services.
	D1.4 Promote innovative devices for and approaches to limit coastal erosion and pollution and to favor beach stabilization	CLAIM's devices will limit coastal pollution.
	D1.5 Blue marinas with nature-based solutions. Design and develop innovative integrated solutions using clean technologies to improve the sustainability and management of infrastructures	CLAIM will modify a small scale thermal treatment device (pyrolizer) for integration on board an advance dynamic recovery vessel and at port facilities (also marinas). The average volume of litter collected, scaling up the device as feasible to treat at least a part of the litter likely to be landed. Ideally, the system should be connected to systems able to use the spare heat (e.g. hot water for rest rooms or heat exchangers for heating/cooling) and the syngas (heating/sanitary water or for auxiliary motors/pumps).
	D1.7 Marine litter: development and testing of new marine litter removal techniques (sea bottom removal, floating litter removal, fishing-for-litter good practices). Include citizen science approach when appropriate	At river mouths, innovative floating booms will collect and monitor visible litter. An advanced dynamic recovery vessel will also clean visible litter in targeted coastal sites, identified with modelling tools and the scale up potential of the different cleaning approaches will be assessed.
CROSS-CUTTING ENABLERS		
CHALLENGE A. Cross-cutting enablers for Blue Jobs and Blue Growth		**YES**
A2. International Cooperation and Coordinated Transboundary Networks	A2.1 Promote appropriate investments, homogeneous legislation and capacity building throughout the Mediterranean, together with a sound sense of ownership in order to ensure full participation from all stakeholders	CLAIM will implement economic feasibility study, social acceptance and will enable institutional framework to encourage the uptake and upscaling of innovative marine litter reduction technologies.
	A2.5 Improve coordination and cooperation among Member States and non-EU countries to achieve the Good Environmental	CLAIM's consortium consists of 19 partners, 5 of which are small and medium-sized enterprises. 2 partners are from non EU

	Status by developing standard methodologies to implement the Marine Strategy Framework Directive and the UNEP-MAP Ecosystem Approach in shared waters	Countries (Lebanon and Tunisia). CLAIM is aligned with the objective of the EU Strategy for international cooperation in research and innovation (COM (2012) 497) as well as the BLUEMED Initiative that implements the Research and Innovation Initiative for Blue Jobs and Growth in the Mediterranean Area by scaling up technologies that will contribute to the cleaning of the seas.
A3. Interaction between scientists, stakeholders, policy and decision makers, civil society	A3.3 Coordinated approach addressing coastal management and conservation of anthropogenic villages/ecosystems involving local communities	The economic feasibility and social acceptance of the proposed innovative technologies are key factors determining the actual potential for their uptake and upscale. One of the WPs in CLAIM, consisting mainly of environmental and resource economists and other social scientists like lawyers will therefore use novel business models to evaluate the cost-efficiency and feasibility of proposed solutions, taking into account of the existing policy and legal frameworks, as well as social acceptance through targeted surveys, local dissemination events and active participation of relevant stakeholders in consultations.

3. IMPACT OF EUROPEAN FUNDING IN IMPLEMENTING THE BLUEMED INITIATIVE

The section should highlight how your project responds to the impacts listed in the call text in contributing to the implementation of the BLUEMED Initiative (3.1). It should also indicate how your project liaises with citizens, industry, policy makers and the environment (3.2). This section should also specify why/what in your view would not have been possible to achieve in implementing the BLUEMED Initiative without EU funding (3.3). (10 lines maximum for each subsection)

3.1 Call impacts

Examples of science/innovation-related impacts: new method, data or technology, new/improved product or service, new technical process, new organisational process, better access to international network/markets, better understanding of other countries' issues, improved competences and skills, the outputs will make a contribution to advances in complementary scientific or technology areas, the outputs will provide new information and/or tools for use in education o Improved scientific evidence base

The CLAIM project will power 5 innovative marine cleaning technologies and will prevent litter from entering the sea at two main source points: wastewater treatment plants and river mouths, using low cost (energy and cost) methods. Right after an effective **pre-filtering system**, a **photocatalytic nanocoating device** will degrade microplastics in wastewater treatment plants. Mounted on ships a **small-scale thermal treatment device (pyrolizer)** will be used to turn collected litter intro energy powering ships and heating up ports. At river mouths, **innovative floating boom** will collect and monitor visible litter, while a CLAIM network of FerryBox systems will operate on ships in the Baltic, West & East Mediterranean mounted with an **automated seawater sampling device & passive flow-through filtering system**.

3.2 Impacts for society, industry, the environment…

Examples of societal-related impacts: research jobs will be created, non-research jobs will be created, there will be benefits for public health, safety and/or quality of life, …

Examples of economic impacts: additional research income, additional commercial income

Better access to external investment, reduced operating costs, increased European/global market share, …

Examples of environmental impacts: restoration of biodiversity, improved environmental performance, …

The economic feasibility and social acceptance of the proposed innovative technologies are key factors determining the actual potential for their uptake and upscale. WP 5 in CLAIM will use novel business models to evaluate the cost-efficiency and feasibility of proposed solutions, taking into account of the existing policy and legal frameworks, as well as social acceptance through targeted surveys, local dissemination events and active participation of relevant stakeholders in consultations.

The economic feasibility for the up-scaling and/or implementation of developed cleaning methods will be assessed by applying properly designed business models and policy instruments. The integration of the "polluter-pays" principle may give new insights regarding the finance up prevention and cleaning-up measures. Different types of surveys will be carried out, targeting relevant stakeholders and the general public to assess the social acceptance of the new methods.

3.3 Added value of EU R&I investment and policy impacts

Examples of policy-related impacts: better evidence to make policy/strategy decisions, higher level of influence on third parties (e.g. policy makers, industry, NGOs), the exploitable outcomes will enable better-informed public policies, the exploitable outcomes will support the development of new or improved regulations/standards, …

Where applicable, please make reference as to how your project contributes to relevant global and/or European policy frameworks, e.g. the WESTMED Initiative, the EUSAIR, the Sustainable Development Goals (SDGs), the Food2030 Strategy, the Bioeconomy Strategy, the Integrated Maritime Policy, the Marine Strategy Framework Directive, the Common Fishery Policy, the Maritime Spatial Planning Directive, etc.

CLAIM is working in conjunction with key policy directives and measurements on both European and national level, such as the EU Marine Strategy Framework Directive (MSFD), the Barcelona Convention and the associated Strategic Framework for Marine Litter, and BLUEMED: Research and innovation initiative for blue jobs and growth in the Mediterranean area. CLAIM will aim to contribute with its research to future policies and regulations both

within its operational area (Mediterranean and Baltic Sea) and in larger EU and world contexts.

4. VISUALS/WEBSITE/COMMUNICATION ACTIVITIES IN IMPLEMENTING THE BLUEMED INITIATIVE

This section should provide information regarding your past and foreseen communication activities in implementing the BLUEMED Initiative. This should include details of visuals, website(s), social media, brochures, information leaflet(s), participation in relevant events for 2018-2019, visuals on YouTube/short videos (give details), and reference to the BLUEMED Initiative reference documents. to promote the visibility of your project.

The CLAIM project started on November of 2017 and is currently on its 15th month. The project has a web site (*http://www.claim-h2020project.eu*) and presence in the social media facebook (*https://www.facebook.com/CLAIM.H2020/* and twitter (*https://twitter.com/CLAIM_H2020*). A media pack has been developed and is available on http://www.claim-h2020project.eu/media-pack/. It includes Press releases, Promotional materials (CLAIM Flyer in EN/GR/IT, General Poster, a CLAIM General Poster for non-scientists in EN/GR/AR, a CLAIM Local Engagement Poster in EN/GR/AR, a CLAIM Game Poster in EN/GR/AR, stickers and post cards. For the moment there are more than 30 CLAIM Symposia & Meetings, more than 40 General Dissemination Activities and 3 publications in press (1 KTH, 2 HCMR).

To promote the visibility of the project CLAIM:

- Participates in high-end events to establish contacts with influential figures, including policy days in Brussels, and others.
- Invite representatives of European initiatives and Projects to CLAIM's workshops and events.
- Publish white papers and policy briefs to ensure project recommendations are presented in a suitable form for policy.
- Regularly engage with key Commission accounts via Twitter.
- Project promotion at industrial and policy events, workshops and conferences
- Results dissemination at scientific level, which includes in scientific publications and at conferences.
- CLAIM's public website, where periodic executive summary reports will be made available, reflecting the on-going key project developments and results, which will be also announced through the main online social networks.

In these plans, three main audiences are targeted: Policy, Industry, Academia and general public.

5. RECOMMENDATIONS FOR IMPLEMENTING THE BLUEMED INITIATIVE/ HOW TO MAKE THE BLUEMED INITIATIVE OPERATIONAL

In this section you can provide any recommendations regarding the implementation of the BLUEMED Initiative you would like to put forward, and salient issues you think need to be addressed in the future, for example effective solutions to facilitate international cooperation on R&I, strategies' alignment, evidence on societal/economic impact, research funders' networks, agreements, standards etc.

Selected successful projects that fall into the scope of the BLUEMED Initiative and are deemed of strategic importance, should be further assisted and granted with additional funding to fulfil their goals. Perhaps through direct access or a fast track mechanism to the European Innovation Portal (EIPP), the EU's online match-making portal, that is connecting EU project promoters with investors worldwide (see https://ec.europa.eu/eipp/desktop/en/index.html).

The BLUEMED Initiative should also further assist and encourage international cooperation on R&I and strategies' alignment between EU and non EU Countries.

6. OPEN QUESTIONS

6.1 What societal and/or economic impacts do you believe will be realized in the near future (e.g. 5-10 years)? *(5 lines maximum)*

CLAIM is focusing on small scale and cost effective solutions of little initial investments that aim to make easier social acceptance and adoption, having the potential to be adopted by ports, coastal authorities, wastewater plants and vessels and thereby to tackle marine litter problem with a nearly as comprehensive, low cost cleaning approach. By defining approaches that focus on the major points of entry of litter into the sea and technologies that allow its treatment where litter is found, CLAIM translates to the marine litter management the guiding principles of waste management, i.e. the waste hierarchy (prevention first) and the proximity principle (waste treated as close as possible to the point of arising).

In addition, bio-based products that will substitute plastics, will certainly be a significant solution in the near future. For example, innovative bio-based plastics for food packaging and seafood production (nets for fisheries and aquaculture) will assist.

6.2 To what extent the project could leverage private investments/benefit from a tailored network of research and innovators funders for further developments? *(5 lines maximum)*

As an industry driven project, CLAIM and its key developments aim to be promoted at the industrial level through distinct approaches in order to maximize its potential impact, namely by further attracting important stakeholders and capitalizing on that by developing fruitful synergies and effective collaboration during and after the project duration. CLAIM developments and technologies will be presented in industrial fairs and exhibitions mainly by the industrial partners in the consortium, as well as regional fairs and exhibitions mainly by the Regional Authorities partners.

ODYSSEA

Operating a network of integrated observatory systems in the Mediterranean Sea

1 KEY ACHIEVEMENTS IN CONTRIBUTING TO THE IMPLEMENTATION OF THE BLUEMED INITIATIVE

This section should highlight up to four high-level Key Achievements of your Project in contributing to the implementation of the BLUEMED Initiative. It is important to select what is most valuable to be shown in each area, for example: publications, patents, knowledge transfer activities and other measurable achievements. Consider always to include specific achievements and activities for promoting international cooperation along and across the Mediterranean Sea.

Please provide a short (10 lines maximum) description for each Key Achievement. Please provide also references to the key deliverables/reports supporting your answers.

1.) Use & Business Cases

Analyses of end-users and their specific needs/requirements have been conducted as part of WP2 and WP9. A proposed set of products per use case (D2.2) as well as an analysis of the potential business case for each use case is part of the project's impact generation and is driving platform development. Ten Use & Business Cases were selected and ranked according to the economic value that ODYSSEA data and information would represent for them.

2.) Platform Development

A strategy for the architecture of the ODYSSEA platform, based on the requirements is provided (D3.1)

- Platform architecture and design document for launch of the ODYSSEA Platform V0 (D6.2)
- First draft of the data management plan has been prepared (D3.2), though there is still much to do regarding practical implementation of these procedures. A first release of the SOS service will be available soon.

3.) Observatories Operation

- Nine model Observatories have been defined including the main potential users list per area and methods to approach them at each Observatory (D2.1). The Observatories will be established in the coming period.
- Modelling chain analysis and testing interfaces to link them, sensors to be deployed and exact locations of deployments, users responsible for maintenance. Existing models and monitoring systems in operation at Observatories reviewed (D2.3).
- Observatories have "named" representative/contact persons to take responsibility for the modelling and monitoring modules.
- Set-up of hydrodynamic models for all Observatories through FEWS and AQUASAFE
- Microplastic Sensor development and integration on static (surface moorings and benthic landers) and mobile (gliders) systems.

4.) Support activities

- Initiating the framework for capacity building activities including training workshops and a summer school
- Inventory of data sources and data gaps has been accomplished (D13.1)
- Recommendations and legal frameworks for sharing data is in place (D13.3)
- Effective dissemination & visibility activities–brand name "ODYSSEA" is well established and contact with many stakeholders is increasing as the project progresses (D11.1 and D11.2)
- Ethics requirements monitoring in process (D1.1 and 1.2) to assure data is collected and shared in compliance with national and European regulation.

2 CONTRIBUTION TO THE IMPLEMENTATION OF THE BLUEMED STRATGEGIC RESEARCH AND INNOVATION AGENDA

This section should highlight how your project is contributing to the implementation of specific challenges and goals of the BLUEMED SRIA (version June 2018). It is important to select what is most valuable to be shown under each of the abovementioned objectives in relation your project's high-level achievements.

KNOWLEDGE ENABLERS

CHALLENGE A. Mediterranean Sea ecosystems: characterize present dynamics, services, resources, vulnerability and resilience to natural and anthropogenic pressures

GOAL A1. Understanding the functioning of the Mediterranean Sea ecosystem

ACTION

A1.1 Develop theoretical and operational tools for data analytics towards an end-to-end conceptual and numerical model

A1.4 Fill gaps in understanding the Mediterranean Sea dynamics, biogeographic patterns, biodiversity (including cryptic and microbial), and ecosystem functions (including fishing resources) using novel monitoring, e.g. satellite, marine drones, molecular/genetic tools to develop new end-to-end models forecasting the carrying capacity of the Mediterranean ecosystems

GOAL A2. Understanding Pollution Impacts, Mitigation, and Remediation in the Mediterranean Sea

ACTION

A2.3 Conduct in situ measurements and develop modelling (including Big-Data modelling) tools to understand the distribution, intensity and sources of underwater noise, as well as its effect on marine species

A2.5 Define distribution, concentration and provenance (when possible) of all forms of garbage at sea (including plastic and microplastic debris) at the sea surface, within the water column, the sea floor and the coastal-estuarine environments; rise awareness through literacy and citizen-science initiatives

CHALLENGE B. Mediterranean Sea: forecast changes of the basin under climate and anthropogenic pressures and develop services in the field of sustainable adaptation to climate change and plans for mitigation

GOAL B1. Forecasting the Mediterranean Sea dynamics and climate

ACTION

B1.2 Provide numerical modelling, forecasting, indicators to identify diverse trends as well as abrupt shifts in the Mediterranean environmental conditions supported by long-term monitoring, considering land-sea-air interaction processes, with a focus on coastal dynamics

B1.4 Implement downscaling models of climate change for the Mediterranean Sea and sub-basins; assess the impacts on marine ecosystems and their resources, from regional to local scales

CHALLENGE C. Hazards and protection of coastal areas and open sea in the Mediterranean

GOAL C1. Reducing the coastal risk of disasters and their effects

ACTION

C1.4 Fill gaps in understanding coastal morphodynamics at regional and local level including a focus on coastal erosion and on anthropogenically induced erosion processes (e.g. erosion due to maritime transport in near-shore areas next to ports, especially those close to natural protected areas; rockfall of coastal cliffs…)

C1.5 Develop operational observing platforms, early warning systems and decision matrices to address natural marine disasters such as tsunami events, coastal slides, storms, while assessing and controlling progressive coastal and geological processes such as erosion, habitat destruction, landslides

CHALLENGE D. Innovative blue growth trajectories: biotechnologies, food, and the deep sea resources

GOAL D2. Support solutions for sustainable food production

ACTION

D2.3 Increase knowledge on biological and ecological aspects of habitat-forming species.

ECONOMY ENABLERS

CHALLENGE B. Ecosystem-based management of Mediterranean aquaculture and fisheries

GOAL B1. Develop optimal fishing strategies, technologies and practices

ACTION

B1.4 Develop innovative and efficient maritime monitoring, control and surveillance systems for the fisheries,

CHALLENGE E. Governance of maritime space and marine resources in the Mediterranean

GOAL E1. Strengthen synergies among science, industry, policy-makers and society

ACTION

E1.4 Provide scenarios of environmental change, investigating the impacts on biodiversity and ecosystems goods and services, of alternative socioeconomic development pathways, policy options and blue growth scenarios

GOAL E2. Effective maritime spatial planning in the Mediterranean

ACTION

E2.1 Improve the knowledge on the land-sea nexus to properly address planning, considering co-existence of coast and sea uses and environmental objectives; particular emphasis should be placed on substantially improving the connection between marine traffic with port location/activities and the main supply chains on land (train and free-way networks as well as water ways where appropriate)

TECHNOLOGY ENABLERS

CHALLENGE B. Observing systems and operational oceanography capacities in the Mediterranean

GOAL B1. Towards an observing system of systems

ACTION

B1.1 Develop technologies towards an integrated Mediterranean observing system, capitalizing on existing networks and consortia, including European Strategy Forum on Research Infrastructures, and national/regional/local infrastructures, in line with the overall European contribution to global observing systems, such as in the Common Information Sharing Environment (CISE) approach

B1.3 Implement ICT, Big Data Analysis and Cloud Services Platforms to take advantage of multi-sectoral data management and sharing opportunities for the Mediterranean

B2. Tailor-made sensors and platforms

ACTION

B2.1 Develop Autonomous Unmanned Vehicles and related infrastructure to extend actions on deep sea environments - for different types of operations minimizing the presence or cost of support vessels and ensuring minimal environmental impact.

B2.3 Use state-of-the-art knowledge and infrastructure/sensors (AUV, USV, UAS, gliders with novel sensors, etc.) to improve monitoring of, particles flux, energy and mass transfer rates and processes

B2.4 Develop new products relevant for monitoring the global change of the Mediterranean Sea: horizontal and vertical hydrodynamic circulation, T increase, pH reduction, changing biogeochemical cycles, trophic levels and abrupt regime shifts in marine communities

B2.5 Support R&D on eco-acoustics to assess the overall health of the ecosystem

CROSS-CUTTING ENABLERS

CHALLENGE A. Cross-cutting enablers for Blue Jobs and Blue Growth

GOAL A1. Open data, open science, open innovation

ACTION

A1.3 Support planning and management activities by improving access to marine data (connecting to the Blue Cloud) and including economic, social and environmental information

A1.4 Promote standardization and interoperability of technological solutions with specific reference to the maritime field with innovate "guides to the use" explaining what diverse sets of data are available, standardized sampling and analyses methodologies. Linking all "guides" to their corresponding Blue Cloud database

GOAL A2. International Cooperation and Coordinated Transboundary Networks

A2.3 Establish a coordinated network of marine institutes, universities, stations, observatories and public and private companies

A2.5 Improve coordination and cooperation among Member States and non-EU countries to achieve the Good Environmental Status by developing standard methodologies to implement the Marine Strategy Framework Directive and the UNEP-MAP Ecosystem Approach in shared waters

A2.8 Develop new concepts and protocols with private companies and maritime operators to maximize the use of infrastructure, ships and platforms for scientific and environmental monitoring, safety and security purposes

GOAL A4. Building capacity, blue skills and blue professionals

ACTION

A4.1 Develop a network of training research centres to train new professionals on sampling, recording and working at marine level for environmental, engineering and scientific studies

GOAL A5. Promoting and implementing strategies and action plans

ACTION

A5.2 Develop environmental decision support modelling systems to sustain policy strategies, including adaptation and mitigation, for preserving the socioeconomic and environmental sustainability of marine species and habitats

A5.4 Provide scientific support to legal controls on littering and waste abandonment on river beds, unprotected shores and offshore

3 IMPACT OF EUROPEAN FUNDING IN IMPLEMENTING THE BLUEMED INITIATIVE

The section should highlight how your project responds to the impacts listed in the call text in contributing to the implementation of the BLUEMED Initiative (3.1). It should also indicate how your project liaises with citizens, industry, policy makers and the environment (3.2). This section should also specify why/what in your view would not have been possible to achieve in implementing the BLUEMED Initiative without EU funding (3.3). (10 lines maximum for each subsection)

3.1 Call impacts

Examples of science/innovation-related impacts: new method, data or technology, new/improved product or service, new technical process, new organisational process, better access to international network/markets, better understanding of other countries' issues, improved competences and skills, the outputs will make a contribution to advances in complementary scientific or technology areas, the outputs will provide new information and/or tools for use in education o Improved scientific evidence base

ODYSSEA

- *is expanding existing monitoring systems towards new variables, in particular the biological dimension, linked to emerging pollutants through (a) Testing and operating microplastics sensor integrated at (i) the glider, (ii) moored systems (surface and benthic); (b) Testing and operating submarine cameras integrated at moored systems (surface and benthic); (c) Testing and operating of hydrophones integrated at (i) the glider, (ii) moored systems (surface and benthic).*
- *is consolidating and increasing the temporal and geographic coverage of observational data through results from the fine resolution 'chain' of models applied at regional Model Observatories*
- *is extending and improving prediction capacity of existing modelling systems, directly serving end-users' needs*
- *building a community of open data creators who follow agreed standards to ensure open access to inter-operable data and a community of data users enjoying the benefits of facilitated access to marine data.*

3.2 Impacts for society, industry, the environment…

Examples of societal-related impacts: research jobs will be created, non-research jobs will be created, there will be benefits for public health, safety and/or quality of life, …

Examples of economic impacts: additional research income, additional commercial income

better access to external investment, reduced operating costs, increased European/global market share, …

Examples of environmental impacts: restoration of biodiversity, improved environmental performance, …

ODYSSEA

- *is making information quickly and easily accessible to a wide range of people by setting up a platform linked to main EO systems (Copernicus, GEOSS, GOOS, EMODNet) and capable to produce easily intelligible information in real time as required, without round-the-clock human intervention*
- *is enabling 9 regional Model Observatories to apply operational numerical modelling module that will support a system describing the functions of vulnerable marine*

ecosystems, supporting biodiversity conservation, forecasting and managing environmental risks and emergencies in a real-time.

3.3 Added value of EU R&I investment and policy impacts

Examples of policy-related impacts: better evidence to make policy/strategy decisions, higher level of influence on third parties (e.g. policy makers, industry, NGOs), the exploitable outcomes will enable better-informed public policies, the exploitable outcomes will support the development of new or improved regulations/standards, …

Where applicable, please make reference as to how your project contributes to relevant global and/or European policy frameworks, e.g. the WESTMED Initiative, the EUSAIR, the Sustainable Development Goals (SDGs), the Food2030 Strategy, the Bioeconomy Strategy, the Integrated Maritime Policy, the Marine Strategy Framework Directive, the Common Fishery Policy, the Maritime Spatial Planning Directive, etc.

ODYSSEA will:

1) *Provide an additional European contribution to established global observing systems*
2) *Provide a Mediterranean Sea Integrated Observing system as a component for GEOSS*
3) *Contribute to increasing temporal and geographic coverage of observational data in the Mediterranean Sea and identify gaps*
4) *Provide qualified data to improve the predictive capacity of model products and improve the cost effectiveness of data collection in support of ocean-related industrial and societal activities*
5) *Improve knowledge base needed in order to cope with global challenges; this would make it possible to make better informed decisions within key sectors, and increase safety of offshore activities and coastal communities*
6) *Improve implementation of European maritime and environmental policies and international agreements by providing knowledge base needed to support policy decisions towards sustainable growth of the EU Mediterranean marine and maritime economy*
7) *Improve the professional skills and competences of those working and being trained to work within the blue economy*

4 VISUALS/WEBSITE/COMMUNICATION ACTIVITIES IN IMPLEMENTING THE BLUEMED INITIATIVE

This section should provide information regarding your past and foreseen communication activities in implementing the BLUEMED Initiative. This should include details of visuals, website(s), social media, brochures, information leaflet(s), participation in relevant events for 2018-2019, visuals on YouTube/short videos (give details), and reference to the BLUEMED Initiative reference documents. to promote the visibility of your project.

ODYSSEA has a communication strategy that aims to promote the project, products and services to its stakeholder user groups, and to inform and actively engage users in the project and its activities. 11 key stakeholder user groups representing public, policy, industry, education, environmental conservation and scientific / research sectors have been identified as target audiences. A key message to communicate the main activities, purpose and benefits to stakeholder user groups has been proposed. The key message will be refined and agreed by the consortium and additional key messages targeting specific audience types will be defined. 14

channels of communication and dissemination targeting individual or groups of stakeholder user groups at the local, national or international level are included in the plan. Methods for evaluating the success of the communication strategy are given. A schedule for implementing the communication plan over the next 12 months has been developed. The plan is iterative and will be reviewed at least annually.Website : http://odysseaplatform.eu/

Project graphics: http://odysseaplatform.eu/project-information/project-graphics-and-templates/

5 RECOMMENDATIONS FOR IMPLEMENTING THE BLUEMED INITIATIVE/ HOW TO MAKE THE BLUEMED INITIATIVE OPERATIONAL

In this section you can provide any recommendations regarding the implementation of the BLUEMED Initiative you would like to put forward, and salient issues you think need to be addressed in the future, for example effective solutions to facilitate international cooperation on R&I, strategies' alignment, evidence on societal/economic impact, research funders' networks, agreements, standards etc.

6 OPEN QUESTIONS

6.1 What societal and/or economic impacts do you believe will be realized in the near future (e.g. 5-10 years)? *(5 lines maximum)*

The conversion of scientific and technological advances into operational tools through platforms such as that of ODYSSEA hosting multiple skills and technologies and targeting a broad range of end users, will transform the way industry and public sector actors operate in the sea and coastal environment in the Mediterranean, like everywhere else. With science untapping new potential and technology making new activities possible, there are bound to be transformative and sometimes even highly disruptive change – to products and processes, to business models in the Blue Economy sector

6.2 To what extent the project could leverage private investments/benefit from a tailored network of research and innovators funders for further developments? *(5 lines maximum)*

ODYSSEA partnership is keenly aware of the economic value of the information that is generating and of its ability to address the needs of a wide spectrum of end-users. Therefore, it considers the involvement of the private sector as a prior condition for the further development and expansion of its applications and services.

THE BLUE GROWTH FARM

1 KEY ACHIEVEMENTS IN CONTRIBUTING TO THE IMPLEMENTATION OF THE BLUEMED INITIATIVE

This section should highlight up to four high-level Key Achievements of your Project in contributing to the implementation of the BLUEMED Initiative. It is important to select what is most valuable to be shown in each area, for example: publications, patents, knowledge transfer activities and other measurable achievements. Consider always to include specific achievements and activities for promoting international cooperation along and across the Mediterranean Sea.

Please provide a short (10 lines maximum) description for each Key Achievement. Please provide also references to the key deliverables/reports supporting your answers.

The Blue Growth Farm started on 1st June 2018 and is expected to end on September 2021. Key achievements so far secured that are relevant to the BLUEMED Initiative are:

KEY ACHIEVEMENT	KEY DELIVERABLES /REPORTS
Collection of climatic data relating to a number of marine sites, representative of the likely environmental conditions affordable by the Blue Growth Farm Platform, including Mediterranean.	D 2.2 – Representative site selection and associated climatology characteristics (31st July 2018)
Architectural concepts to enable development and validation of an automated, modular and environmentally friendly multi-functional platform design for open sea farm installations of the Blue Growth Industry. This fully integrated and efficient offshore multipurpose floating platform provides a central protected pool to host an automated aquaculture system, capable of producing high quality fish, as well as a large storage and deck areas to host a commercial 10 MW wind turbine and a number of wave energy converters (WEC). The conceptual mindset at the base of the Blue Growth Farm approach is then based on these pillars: A. Guarantee a nominal **2.000t/y fish production**, operating with advanced automation and remote control capabilities; B. Minimize the introduction of pollution to the ecosystem when exploiting the marine natural resources; C. Maximize the electricity production in the Blue Growth Farm potential installation area ecosystem, guaranteeing energy supply to onboard electrical equipment, dispatching extra produced electric energy to the grid and providing sea electric station service to shipping.	Paper submitted to the 38th International Conference on Ocean, Offshore and Arctic Engineering, OMAE 2019, June 9 – 14 2019, Glasgow, UK, "New engineering approach for the development and demonstration of a multi-purpose platform for the Blue Growth Economy"

2 CONTRIBUTION TO THE IMPLEMENTATION OF THE BLUEMED STRATGEGIC RESEARCH AND INNOVATION AGENDA

This section should highlight how your project is contributing to the implementation of specific challenges and goals of the BLUEMED SRIA (version June 2018). It is important to select what is most valuable to be shown under each of the abovementioned objectives in relation your project's high-level achievements.

The Blue Growth Farm project is expected to contribute to the BLUEMED key knowledge challenge n. ***D. Innovation blue growth trajectories: biotechnologies, food, and the deep sea and offshore resources; D2. Support solutions for sustainable food production****. In particular, the Blue Growth Farm concept is built around an efficient, cost-competitive and environmentally friendly multi-purpose offshore farm based on a modular floating structure, moored to the seabed, meeting requirements of efficiency, cost-competitiveness and environmental friendless, where aquaculture and renewable energy production systems are integrated and engineered for profitable applications in the open sea.*

The Blue Growth Farm project is expected to contribute to the BLUEMED key economy challenge n. ***B. Ecosystem-based management of Mediterranean aquaculture and fisheries, B2. Develop optimal aquaculture strategies, technologies and practices****. In particular, the Blue Growth Farm concept includes the presence of the protective service platform that opens up opportunities for system automation and management not normally available to offshore fish farms. Typical aquaculture operations, such as net cleaning and repair, fish grading and vaccination, and the fish harvesting, processing, packing and storing, can be greatly simplified by automation. The proposed automation system for the Blue Growth Farm project is required to enable real time estimation of total number of fish and size distribution, biomass control, in parallel to environmental monitoring and biological indicators. In particular, the following functions are covered:*

- *better feed management, including performance monitoring, with benchmark cage / population data;*
- *continuous automated monitoring to optimize farming operations & fish welfare, based on continuous automatic environmental monitoring (i.e. dissolved oxygen, temperature, chlorophyll, etc.) in order to assess fish reaction to different farming operations and environmental influences and to adjust husbandry practices, such as feeding, accordingly;*
- *data measurement to quantify juvenile quality (physiology, health, stress);*
- *monitoring deviations from the desired standards;*
- *data analysis to reduce the risk of disease and improve diagnosis.*

The ***BGF Control System*** *has then as the final target to develop faster, cheaper and non-invasive methods for in situ and after harvesting monitoring to improve product quality or production efficiency.*

The Blue Growth Farm project is also expected to contribute to the BLUEMED key technology challenge n. B. Observing systems and operational oceanography capacities in the Mediterranean, B3. Security and safety services and technologies in the Mediterranean supporting the Blue Growth. In particular, the Blue Growth Farm concept wants to provide design requirements for an integrated central monitoring / control system that makes use of the control and monitoring information of each of the sub-systems as well as display alarms, faults detection and structural safety monitoring. The control system also includes security checks, on the basis of security equipment and procedures established for the platform operations. In particular, security alarms related to visual sensors are limited to two different zones (internal

and external). Tracking and monitoring of human operators during their interventions are carried out in order to prevent or mitigate adverse effects on them, such as falls, knocks, among others. A monitoring of the surrounding mobile elements (mainly watercraft) is addressed by a combination of radar & long-distance visual systems. Radar systems indicate near-platform elements that describe trajectories constituting a potential hazard. After this detection, the long distance cameras will focus on the object and perform a classification and possible detection, to perform a correlation with AIS Maritime Traffic information of detected watercraft. Information is displayed at Control Room level (local and remote), making diffuse use of charts to synthesize information.

3 IMPACT OF EUROPEAN FUNDING IN IMPLEMENTING THE BLUEMED INITIATIVE

The section should highlight how your project responds to the impacts listed in the call text in contributing to the implementation of the BLUEMED Initiative (3.1). It should also indicate how your project liaises with citizens, industry, policy makers and the environment (3.2). This section should also specify why/what in your view would not have been possible to achieve in implementing the BLUEMED Initiative without EU funding (3.3). (10 lines maximum for each subsection)

At EC level, there is increasing recognition that aquaculture can contribute to additional EU policies and strategies, including Blue and Green Growth and the Bioeconomy, the use of sustainable resources, food security and public health by providing sustainably produced, high quality and healthy food. Whilst open sea farming has evident benefits, infrastructure facilities have to undergo an innovative design and a suitable development to overcome the challenges to replace more traditional inshore fish farming facilities. Infact, offshore farm systems must be able to withstand extreme weather conditions. Although the technology may be based on traditional cage technology farming, materials and structures must be much stronger to cope with large waves and strong currents. Difficulties in anchoring and/or submerging structures in medium/deep water is challenging as well. From the aquaculture point of view, there is the need to develop and implement greater mechanisation and automation of routine operations for maintenance and harvesting, ranging from automated feeder systems and robotic cage cleaners to long-range WiFi communications, so to promote safety and efficiency by reducing human effort and make commercial-scale open ocean farming a reality.

Preservation of environmental resources is a fundamental issue in planning and management of aquaculture sites, and the Ecosystem Approach to Aquaculture (FAO) is one of the guiding international principles. Expected results from the project are in terms of suitable performance indicators, modeling approaches and indicator selection criteria adapted to offshore integrated aquaculture and renewable areas to facilitate policy-makers and business drivers to set environmental standards and identify best practices and technologies. In parallel, the Blue Growth Farm project wants to put the basis to develop new concentration approach to multipurpose offshore platform development, based on recent social license to operate (SLO) theory, either at local scale (project validation and demonstration site) and on the larger scale in relation to full scale offshore deployments where the main actors are likely to be industrial and non-governmental organizations. Thus gaining SLO requires more than communication of the development's benefits: it has to be a two-way process in which developers and communities explore each other's motives. It must further be understood that many citizens are no longer willing to accept expert opinion; instead, what are accepted as facts, must be jointly arrived at in a process of knowledge co-production.

The Blue Growth Farm project benefits from the multi-use economic feasibility issued in the precedent EC funded H2Ocean project (the only one dealing with wind, wave and aquaculture), but it very much rely on the knowledge planned to be produced within the project, because of different kind of infrastructure, technologies and strategy involved. In particular, in order to address crucial topics for the expansion of offshore multi-purpose platform technology solutions, being environmentally sustainable and socially accepted by the different stakeholders and communities involved, complementarily in several disciplines is required, with seamless cooperation of scientists and industrial organizations, from multiple domains & expertise.. This expertise is not nationally resided and the project targets cannot be pursued without EU financing instruments. Once the feasibility is demonstrated in the relevant environment, potential funding for the full scale development will be possible from private investors.

3.1 Call impacts

Examples of science/innovation-related impacts: new method, data or technology, new/improved product or service, new technical process, new organisational process, better access to international network/markets, better understanding of other countries' issues, improved competences and skills, the outputs will make a contribution to advances in complementary scientific or technology areas, the outputs will provide new information and/or tools for use in education o Improved scientific evidence base

A significant improvement is expected from the Blue Growth Farm response to the call topic in terms of:

- ***scientific advancement** on the **sustainability** **of candidate aquaculture technology** working in combination with offshore electric energy production capabilities, for next generation multi-purpose platforms for open sea applications;*
- *preparing the ground for their **social acceptability and authorization**, in conjunction with a hopefully **more clear understanding of risks**, including above all **those concerning the impact on environment and the commercial profitability**, in addition to the **confidence of their effective and realistic management**.*

Addressing health and safety issues associated with multipurpose marine platforms has been the object of different recent EC research projects of the "The Oceans of Tomorrow". Nevertheless, many of them have simply derived best practices from the oil&gas platform knowledge and adapting to the new application requirements. The Blue Growth Farm approach aims at customizing needs for a commercial size of multipurpose platform, exploiting return of experience from a comprehensive experimental campaign on indoor model in ocean basin tank and on a scaled outdoor prototype in sea environment. Training needs for operation and maintenance of the multipurpose platform, which include automated aquaculture system, will be fully characterized, for a further validation in the full scale engineering development. The contribution expected from the project is then to clearly establish professional skills and competences of personnel operating in the blue economy industry.

3.2 Impacts for society, industry, the environment…

Examples of societal-related impacts: research jobs will be created, non-research jobs will be created, there will be benefits for public health, safety and/or quality of life, …

Examples of economic impacts: additional research income, additional commercial income

better access to external investment, reduced operating costs, increased European/global market share, …

Examples of environmental impacts: restoration of biodiversity, improved environmental performance, …

The development of an efficient and innovative Multipurpose Offshore Installation (MOI) for open sea applications will enable a new typology of business for companies involved in the aquaculture sector, besides bringing significant breakthrough and advancements in such trade. In particular, the main points of innovation of this MOI system consist of:

1) advanced automation and remote control; 2) offshore aquaculture; 3) improved safety for operators; 4) continuous monitoring; 5) cost reduction; 6) renewable energy (electricity) production (and onshore selling).

The above mentioned innovative points represent the value proposition of the product/service aiming to be developed and then commercially exploited by the project Consortium.

The successful implementation of the Blue Growth Farm concepts at larger scale is promising to create new jobs opportunities in Europe and elsewhere for what concern the engineering, the procurement and construction of the Blue Growth Farm platforms as well as in their operation, not only in the Mediterranean sea but also in other sea basins and ocean. Additional jobs opportunities are also expected in the marketing and sales of both the new technologies (wind and wave). In particular, EWEA expects the wind industry to support 366,000 direct and indirect jobs, also thanks to offshore wind booming. The impact of the Blue Growth Farm project is expected to contribute with ***at least 5 %*** *in creating direct employment in turbine manufacturing and electricity production but also indirectly in the R&D, insurance and finance sector.*

3.3 Added value of EU R&I investment and policy impacts

Examples of policy-related impacts: better evidence to make policy/strategy decisions, higher level of influence on third parties (e.g. policy makers, industry, NGOs), the exploitable outcomes will enable better-informed public policies, the exploitable outcomes will support the development of new or improved regulations/standards, …

Where applicable, please make reference as to how your project contributes to relevant global and/or European policy frameworks, e.g. the WESTMED Initiative, the EUSAIR, the Sustainable Development Goals (SDGs), the Food2030 Strategy, the Bioeconomy Strategy, the Integrated Maritime Policy, the Marine Strategy Framework Directive, the Common Fishery Policy, the Maritime Spatial Planning Directive, etc.

Guidelines coming out from the Blue Growth Farm experience will combine findings of technical and social studies with requirements and responsibilities of governance for implementing the Maritime Spatial Planning, and Marine Strategy, Framework Directives. In particular, they will provide for ongoing and adaptive maintenance of social licence, considered as a synthesis of civil-society-provided SLO and governance-implemented maritime spatial planning.

4 VISUALS/WEBSITE/COMMUNICATION ACTIVITIES IN IMPLEMENTING THE BLUEMED INITIATIVE

This section should provide information regarding your past and foreseen communication activities in implementing the BLUEMED Initiative. This should include details of visuals, website(s), social media, brochures, information leaflet(s), participation in relevant events for 2018-2019, visuals on YouTube/short videos (give details), and reference to the BLUEMED Initiative reference documents. to promote the visibility of your project.

The Blue Growth Farm image is fully exploitable thanks to its website: http://www.thebluegrowthfarm.eu/.

*Additional info is available at the following **RINA Channels links**:*

https://www.linkedin.com/feed/update/urn:li:activity:6481094531583348736
https://twitter.com/RINA1861/status/1075312135608168448
https://twitter.com/RINA1861/status/1075328014341292032
https://twitter.com/RINA1861/status/1075389322680066048

5 RECOMMENDATIONS FOR IMPLEMENTING THE BLUEMED INITIATIVE/ HOW TO MAKE THE BLUEMED INITIATIVE OPERATIONAL

In this section you can provide any recommendations regarding the implementation of the BLUEMED Initiative you would like to put forward, and salient issues you think need to be addressed in the future, for example effective solutions to facilitate international cooperation on R&I, strategies' alignment, evidence on societal/economic impact, research funders' networks, agreements, standards etc.

One of the critical aspects when moving food production offshore is, in addition to operational and financial risks, the gap of knowledge on reference standards, common use best practices and operational procedures, international agreements among stakeholders and sea users. A better involvement of specifically these latter would be helpful to support transnational cooperation and to deploy more reliable international production synergies.

Furthermore, stringent quality- and safety-related import standards, together with requirements for products meeting international animal health and environmental standards and social responsibility requirements, might act as barriers to small-scale fish producers and operators attempting to penetrate international markets and distribution channels. Future prices might be influenced not only by higher feed prices but also by the introduction of more rigorous regulations on the environment, food safety, traceability and animal welfare.

*For these reasons, progression of open sea aquaculture opportunity brought by the **Blue Growth Farm project** in terms of suitable protective base structure to adequately host aquaculture production system as well as the envisaged renewable energy production devices **is key in facing the above potential threats, whilst benefiting of a more favorable husbandry environment of open sea conditions.***

6 OPEN QUESTIONS

6.1 What societal and/or economic impacts do you believe will be realized in the near future (e.g. 5-10 years)? *(5 lines maximum)*

Onshore wind has shown dramatic cost reductions over the last decade, such that today, facilities can be built at a lower per MW capital cost than all but gas-fired plant. Offshore wind energy, as well as WEC technology, is at an earlier stage of development than onshore, but it is expected to achieve cost reductions with scale and with 'learning by doing'. As well, aquaculture growth is currently limited by factors research and innovation could unlock. Thorough biomass estimates and environmental monitoring with incorporation of biological indicators control can dramatically improve.

In particular, aquaculture offers a big potential, both in production and growth. Despite the advances in research and technological development taking place in Europe that could allow the EU to have a more prominent position in the aquaculture sector, innovations are not brought into practice. The following difficulties seem to hamper the adoption of innovations in EU offshore aquaculture: ***i)*** *systems require important investments and maintenance costs and they are perceived to face higher economic risks,* ***ii)*** *important time delay to project approval,* ***iii)*** *uncertainty for longer term investments due to possible changes in the regulations regarding environmental, health and safety constraints,* ***iv)*** *competition from third countries with lower production cost rates. EU aquaculture sector future is then conditioned by the removal or reduction of these threats, especially on the adoption of new technologies and innovation, in the next years.*

6.2 To what extent the project could leverage private investments/benefit from a tailored network of research and innovators funders for further developments? (5 lines maximum)

Both CAPEX&OPEX are expected to be reduced with respect to SoA possibilities when the project challenges and objectives are successfully achieved. Today, return of investment (ROI) for such infrastructure is far to become positive within a reasonable number of years. From a very preliminary ROI estimate, depending on the production efficiency of the platform improved by in-depth design, the breakeven point should be reached between 10 and 15 years, with appropriate setting of the initial investment. Further reduction (between 5 and 7 years) is also expected when the opportunity to specialize farm to different high value fish species has been successfully exploited. Great potential would be given by the presence of incentives program. Furthermore, the predisposition to employee specialized vessels with hybrid or full electric propulsion will enhance again the opportunity to consolidate a more sustainable business plan for investments. These latter targets would enable to capture additional funding of investors interest, taking also care of the technology cost reduction through time.

ECOPOTENTIAL

Improving future ecosystem benefits through earth observations

1 KEY ACHIEVEMENTS IN CONTRIBUTING TO THE IMPLEMENTATION OF THE BLUEMED INITIATIVE

This section should highlight up to four high-level Key Achievements of your Project in contributing to the implementation of the BLUEMED Initiative. It is important to select what is most valuable to be shown in each area, for example: publications, patents, knowledge transfer activities and other measurable achievements. Consider always to include specific achievements and activities for promoting international cooperation along and across the Mediterranean Sea.

Please provide a short (10 lines maximum) description for each Key Achievement. Please provide also references to the key deliverables/reports supporting your answers.

ECOPOTENTIAL main achievements:

1) Use, improvement and development of tools and services for the assessment of status and trend of ecosystems and ecosystem services, including marine and coastal ecosystems. The data and the products generated by integrating in-situ and satellite data have been made available through the web application *"Protected Areas from Space" (http://maps.ecopotential-project.eu/)*

Deliverables:

(Available on http://www.ecopotential-project.eu/products/deliverables.html)

- D4.1 EO data preprocessing and fusion modules
- D4.2 EO biophysical parameters, land use and habitats extraction modules

EO Data toolbox for Marine Ecosystems

Data integration of in-situ, EO products and Copernicus Marine Environment Monitoring Service (CMEMS) products for the assessment of marine food provision ecosystem service: toolbox developed by ISPRA. The toolbox output is a suitability scenario delimiting the area of the study basin in which, according to the considered parameters related to fish vitality, fish growth is suitable.

Marine, coastal and transitional water monitoring

Marine, coastal and transition water monitoring variables generated in the context of ECOPOTENTIAL Protected Areas requests:

- Ocean Color Products (CHL-a, CDOM, TSM) (ISPRA)
- Wind Fields (CNR)
- Sea Surface Temperature (ISPRA)
- Chlorophyll-a (open waters and inland waters) (ISPRA, CREAF, HIO)
- Shoreline delineation (STARLAB)
- Bathymetry (ISPRA)

2) Development of the Earth Observation Data for Ecosystem Monitoring (EODESM) system (UNSW), which makes full use of and integrates all of the biophysical, LCLU and Environmental Variables retrieved for the different PAs in order to investigate both

natural and anthropogenic change. EODESM has been applied to monitor changes in the primary productivity of the Pelagos Mammal Sanctuary

Deliverable:

D4.3 EO change detection Modules

Maps of changes (examples)

1) Pelagos Sanctuary, Mediterranean Sea (to monitor changes in the primary productivity of the Pelagos): Sea Surface Temperature (SST), Chlorophyll-a and bathymetry (UNSW).
2) Camargue (to monitor changes in the flow, distribution and condition of water): Hydro-period, water depth, water turbidity and depth, extent of aquatic life forms (UNSW).
3) Publications

TITLE	AUTHORS	JOURNAL	ECOP partner
Satellite sensor requirements for monitoring essential biodiversity variables of coastal ecosystems	Muller-Karger F. E., Hestir E., Ade C., Turpie K., Roberts D. A., Siegel D., Miller R. J., Humm D., Izenberg N., Keller M., Morgan F., Frouin R., Dekker A. G., Gardner R., Goodman J., Schaeffer B., Franz B. A., Pahlevan N., Mannino A. G., Concha J. A., Ackleson S. G., Cavanaugh K. C., Romanou A., Tzortziou M., Boss E. S., Pavlick R., Anthony Freeman A., Rousseaux C. S., Dunne J., Long M. C., Klein E., McKinley G. A., Goes J., Letelier R., Kavanaugh M., Roffer M., Bracher A., Arrigo K. R., Dierssen H., Zhang X., Davis F. W., Best B., Guralnick R., Moisan J., Sosik H. M., Kudela R., Mouw C. B., Barnard A. H., Palacios S., Roesler C., Drakou E. G., Appeltans W., Jetz W.	Ecological application https://doi.org/10.1002/eap.1682 2018	**UNESCO**
Complementarity of the multidimensional functional and the taxonomic approaches to study phytoplankton communities in three Mediterranean coastal lagoons of different trophic status	Leruste A., Villéger S., Malet N., De Wit R., Bec B.	Hydrobiologia https://doi.org/10.1007/s10750-018-3565-4 2018	**CNRS**
Mapping Mediterranean Wetlands With Remote Sensing: A Good-Looking Map Is Not Always a Good Map	Perennou C., Guelmami A., Paganini M., Philipson P., Poulin B., Strauch A., Tottrup C., Truckenbrodtk J., Geijzendorffer I. R.	Advances in Ecological Research https://doi.org/10.1016/bs.aecr.2017.12.002 2018	**TdV**
How will climate change affect endangered Mediterranean waterbirds?	Ramırez F., Rodrıguez C., Seoane J., Figuerola J., Bustamante J.	PlosOne https://doi.org/10.1371/journal.pone.0192702 2018	**CSIC**
Potential and realized connectivity of the seagrass Posidonia oceanica and their implication for conservation.	Jahnke M., Casagrandi R., Melià P., Schiavina M., Schultz S. T., Zane L., Procaccini G.	Diversity and Distributions https://doi.org/10.1111/ddi.12633 2017	POLIMI
Implications of sensor design for coral reef detection: Upscaling ground hyperspectral imagery in spatial and spectral scales.	Caras T., Hedleyb J., Karnieli A.	Geoinformation doi: 10.1016/j.jag.2017.07.009. 2017	**BGU**

Climate impacts on global hot spots of marine biodiversity.	Ramírez F., Afán I., Davis L.S., Chiaradia A.	Science Advances doi:10.1126/sciadv.1601198 2017	**CSIC**
Creating a safe operating space for wetlands in a changing climate.	Green A.J., Alcorlo P., Peeters E.T.H.M., Morris E.P., Espinar J.L., Bravo M.A., Bustamante J., Díaz-Delgado R., Koelmans A.A., Mateo R., Mooij W.M., Rodríguez-Rodríguez M., van Nes E.H., Scheffer M.	Frontiers in Ecology and the Environment doi:10.1002/fee.1459 2017	**CSIC**
Effect of Protection Level in the Hydroperiod of Water Bodies on Doñana's Aeolian Sands.	Bustamante J., Aragonés D., Afán I.	Remote Sensing doi: 10.3390/rs8100867 2016	**CSIC**
Long-Term Monitoring of the Flooding Regime and Hydroperiod of Doñana Marshes with Landsat Time Series (1974–2014)	Díaz-Delgado R., Aragonés D., Afán I., Bustamante J.	Remote Sensing https://doi.org/10.3390/rs8090775 2016	**CSIC**
Earth Observation for Maritime Spatial Planning: Measuring, Observing and Modeling Marine Environment to Assess Potential Aquaculture Sites.	Valentini E., Filipponi F., Nguyen Xuan A., Passarelli F.M., Taramelli A.	Sustainability https://doi.org/10.3390/su8060519 2016	**ISPRA**

2 CONTRIBUTION TO THE IMPLEMENTATION OF THE BLUEMED STRATGEGIC RESEARCH AND INNOVATION AGENDA

This section should highlight how your project is contributing to the implementation of specific challenges and goals of the BLUEMED SRIA (version June 2018). It is important to select what is most valuable to be shown under each of the abovementioned objectives in relation your project's high-level achievements.

a) Key enabling knowledge for the Mediterranean >> Knowledge enablers

ECOPOTENTIAL contributes to challenge A, B, D as follows:

- By identifying and estimating indicators for the nutrition - biomass provisioning service, i.e the estimated annual fish growth (natural marine biomass potential) and the potential fish harvest (aquaculture marine biomass potential). The physical and biological variables influencing fish vitality and growth, are derived from remote sensing products and from numerical modeling assimilating remote sensing and in-situ measured data (ISPRA)
- Status and evolution of food provision service: sea surface temperature time series analysis using Seasonal Trend Decomposition (STL) and EOF on Mediterranean LME (ISPRA)
- By identifying hotspots of Posidonia oceanica connectivity within the LME. POLIMI applied a biophysical modelling of an important habitat former species for the Mediterranean Large Marine Ecosystem, Posidonia oceanica, and provided an EO-informed map on locations of hotspots candidate for protection. The model includes biological as well as socio-economic factors.

b) Key sectoral enablers in the Mediterranean >> Economy enablers

ECOPOTENTIAL contributes to challenge C:

- Assessing recreation visitor groups by collecting and interpreting photos downloaded by Flickr with a novel technique, borrowing techniques from machine learning (image analysis) and natural language processing (Latent

Semantic Analysis (LSA)). The study demonstrates how Protected Area managers can harness social-media to monitor recreation and improve their management decision making.

Moreover ECOPOTENTIAL contributes Cross-cutting enablers for Blue Jobs and Blue Growth, challenge A1 Open data, open science, open innovation.

3 IMPACT OF EUROPEAN FUNDING IN IMPLEMENTING THE BLUEMED INITIATIVE

The section should highlight how your project responds to the impacts listed in the call text in contributing to the implementation of the BLUEMED Initiative (3.1). It should also indicate how your project liaises with citizens, industry, policy makers and the environment (3.2). This section should also specify why/what in your view would not have been possible to achieve in implementing the BLUEMED Initiative without EU funding (3.3). (10 lines maximum for each subsection)

3.1 Call impacts

Examples of science/innovation-related impacts: new method, data or technology, new/improved product or service, new technical process, new organisational process, better access to international network/markets, better understanding of other countries' issues, improved competences and skills, the outputs will make a contribution to advances in complementary scientific or technology areas, the outputs will provide new information and/or tools for use in education o Improved scientific evidence base

In ECOPOTENTIAL the open and interoperable access to data and knowledge is assured by a GEO Ecosystem Virtual Laboratory Platform, fully integrated in GEOSS. The concept of GEO Ecosystem Virtual Laboratory stems from the need of moving from open data to open science as a new vision of participatory scientific research. Therefore, it aims not only to data sharing but more generally to provide support the ecosystem community-of-practice in research activities. The ECOPOTENTIAL Community of Practice includes scientists, practitioners and managers of Protected Areas. Capacity building, development of apps for citizen science, serious gaming for participatory management, educational games are further instruments implemented by the project to share the knowledge, raise the awareness, engage a wider community.

3.2 Impacts for society, industry, the environment…

Examples of societal-related impacts: research jobs will be created, non-research jobs will be created, there will be benefits for public health, safety and/or quality of life, …

Examples of economic impacts: additional research income, additional commercial income

better access to external investment, reduced operating costs, increased European/global market share, ...

Examples of environmental impacts: restoration of biodiversity, improved environmental performance, …

ECOPOTENTIAL establishes innovative pathways to enable SMEs to support protected site managers and scientists in the use of EO data, and involves large private companies in the assessment of Ecosystem Services and use of monitoring and EO data. By providing

guidelines on how to optimally use EO data for ecosystem monitoring and modeling and assessing ecosystem services and the requirements of future PAs, ECOPOTENTIAL supports the definition of efficient and transparent policy options and improvement of future ecosystem benefits.

3.3 Added value of EU R&I investment and policy impacts

Examples of policy-related impacts: better evidence to make policy/strategy decisions, higher level of influence on third parties (e.g. policy makers, industry, NGOs), the exploitable outcomes will enable better-informed public policies, the exploitable outcomes will support the development of new or improved regulations/standards, …

Where applicable, please make reference as to how your project contributes to relevant global and/or European policy frameworks, e.g. the WESTMED Initiative, the EUSAIR, the Sustainable Development Goals (SDGs), the Food2030 Strategy, the Bioeconomy Strategy, the Integrated Maritime Policy, the Marine Strategy Framework Directive, the Common Fishery Policy, the Maritime Spatial Planning Directive, etc.

ECOPOTENTIAL supports the assessment and estimates of current and future ecosystem services, which can set (changes in) the management strategies and policy options for current and (the identification of) novel PAs, taking into account potential impacts of drivers of changes and the social and economic needs of ecosystem services beneficiaries. These results will ease the political decision making on the future protection of new areas by supporting Coastal Zone Management and other policies, with concrete tools for steering the process. ECOPOTENTIAL is strongly committed in enabling better-informed public-policies. The Science-Policy brief at the EU Parliament, held on 27 September 2018 is an example of the activities in this direction. ECOPOTENTIAL is also contributing to GEO initiatives: during the GEO Week 2018, in Kyoto, Japan, ECOPOTENTIAL and GEO ECO have convened a side event to present contributions on monitoring SDG15.

4 VISUALS/WEBSITE/COMMUNICATION ACTIVITIES IN IMPLEMENTING THE BLUEMED INITIATIVE

This section should provide information regarding your past and foreseen communication activities in implementing the BLUEMED Initiative. This should include details of visuals, website(s), social media, brochures, information leaflet(s), participation in relevant events for 2018-2019, visuals on YouTube/short videos (give details), and reference to the BLUEMED Initiative reference documents. to promote the visibility of your project

(Some) communication activities:

a) Photo exhibition at the European Parliament (CNR):
   From 8 to 12 January 2018, the ECOPOTENTIAL exhibition "SPACED: Using Earth Observations to Protect Natural Landscapes" has been hosted at the European Parliament in Bruxelles. Through the 26 exposed panels it has been possible to know more about the protected areas studied in the project, among the most beautiful in Europe and in the world, and the research activities carried out by the project partners. Beautiful pictures and satellite images, accompanied by short texts, illustrated how researchers and managers of protected areas are working together to study mountain, arid, coastal and **marine ecosystems**. Two panels are devoted to Mediterranean ecosystems.

b) Storymap: "Protecting Marine Mammals in crowded waters" (http://www.grida.no/publications/387) (UNEP)

More details about communication activities (brochures, videos, posters, events) can be found on the ECOPOTENTIAL website (http://www.ecopotential-project.eu/) in the "Outreach" section.

5 RECOMMENDATIONS FOR IMPLEMENTING THE BLUEMED INITIATIVE/ HOW TO MAKE THE BLUEMED INITIATIVE OPERATIONAL

In this section you can provide any recommendations regarding the implementation of the BLUEMED Initiative you would like to put forward, and salient issues you think need to be addressed in the future, for example effective solutions to facilitate international cooperation on R&I, strategies' alignment, evidence on societal/economic impact, research funders' networks, agreements, standards etc.

R1. Establish a better link to GEO initiatives, like "Oceans and Society: Blue Planet" or the "Geo Wetlands Initiative" to boost the use of remote sensing for environmental protection of the Mediterranean ecosystems.

R2. Promote working groups to facilitate the interaction of research networks with the complex legal framework regulating the Mediterranean Sea. Indeed, the implementation of strategies and actions for the conservation and restoration of relevant Mediterranean ecosystems strongly depends on the conditions set by international regulations.

6 OPEN QUESTIONS

6.1 What societal and/or economic impacts do you believe will be realized in the near future (e.g. 5-10 years)? *(5 lines maximum)*

Better implementation of the directives due to the availability of open data and open services. Efficient monitoring of status and trends of coastal/marine ecosystems and ecosystem services provision, in support to decision making and management of marine areas with shared legal responsibilities along and across the Mediterranean.

6.2 To what extent the project could leverage private investments/benefit from a tailored network of research and innovators funders for further developments? *(5 lines maximum)*

The main goal of ECOPOTENTIAL is the conservation of the natural capital, providing data and knowledge to inform future policies on environment protection. That in turns generate a huge demand of data, data quality and up to date technologies that are, at the same time, an output and an input to the project, with this generating opportunities for joint exploitation among the research and the private investors component.

GOJELLY

1 KEY ACHIEVEMENTS IN CONTRIBUTING TO THE IMPLEMENTATION OF THE BLUEMED INITIATIVE

This section should highlight up to four high-level Key Achievements of your Project in contributing to the implementation of the BLUEMED Initiative. It is important to select what is most valuable to be shown in each area, for example: publications, patents, knowledge transfer activities and other measurable achievements. Consider always to include specific achievements and activities for promoting international cooperation along and across the Mediterranean Sea.

Please provide a short (10 lines maximum) description for each Key Achievement. Please provide also references to the key deliverables/reports supporting your answers.

1. Networking events: workshops for fisheries, tourism, students, children, general public, policy makers. The aim of these events is/was to present the project, the implementation strategy and possibly initialize future collaborations

2. Promotion and awareness raising: activities that promote the R&I innovation in the Mediterranean and beyond:

    a. Over 100 media appearances globally, interest by countries that are not part of the consortium;

    b. Proactive social media outreach (2.600 https://gojelly.eu website visitors in the first 8 months of its activity, 500 https://www.facebook.com/GoJellyEU/ followers and 466 https://twitter.com/GoJellyEU followers in the first year)

    c. Conference presentations: Ocean Plastics Lab (global travelling exhibition), Mission – Plastic Free Ocean (April 2018), NTNU Ocean Week 2018 (May, 2018), Texas Plastic Pollution Symposium (October 2018),

3. Publications: 1 article "Food quality matters: Interplay among food quality, food quantity and temperature affecting life history traits of *Aurelia aurita* (Cnidaria: Scyphozoa) polyps", 2 press releases (https://gojelly.eu/results/)

2 CONTRIBUTION TO THE IMPLEMENTATION OF THE BLUEMED STRATGEGIC RESEARCH AND INNOVATION AGENDA

This section should highlight how your project is contributing to the implementation of specific challenges and goals of the BLUEMED SRIA (version June 2018). It is important to select what is most valuable to be shown under each of the abovementioned objectives in relation your project's high-level achievements.

GoJelly contributes to these challenges, as identified within BLUEMED:

A2. Understanding Pollution Impacts, Mitigation, and Remediation in the Mediterranean Sea

A2.6 Explore and propose solutions to reduce the input of pollutants from atmosphere, land and sea:

Improve wastewater treatment processes and recycling to prevent the impact of pollution in coastal areas

Within GoJelly we will develop TRL 5-6 prototype microplastics filter for commercial and public use, where the main raw material is jellyfish mucus. The particle-binding properties of jellyfish mucus have been shown before. GoJelly intends to take advantage of the particle-binding properties of JF mucus in order to develop an innovative filter to trap the small plastic particles at wastewater treatment plants that are an important source of microplastics pollution. We will thus address two environmental issues with one approach by removing the commercially and ecologically destructive sea and coastal pollution of both jellyfish and microplastics.

B1. Forecasting the Mediterranean Sea dynamics and climate

> B1.2 Provide numerical modelling, forecasting, indicators to identify diverse trends as well as abrupt shifts in the Mediterranean environmental conditions supported by long-term monitoring, considering land-sea-air interaction processes, with a focus on coastal dynamics

The project will acquire insights into the physical, chemical, oceanographic and hydrographic conditions that will help to build an ecological model to trace the origin of jellyfish seed populations and develop a short term prediction tool on JF aggregations and drifting. Our primary focus is on the eastern Mediterranean costs, explicitly on the northern Adriatic Sea and coastal areas of the Israel. We will use this knowledge to ensure sustainable harvesting of JF communities from various Northern and Southern European populations.

D1. Exploring the potential of blue-biotech

> D1.1 Infer and analyse metabolic pathways of marine organisms with biotech and bioremediation potential

We will develop innovative JF products for application in cosmetics, using collagen from various European jellyfish species.

D2. Support solutions for sustainable food production

> D2.1 Identify marine biota as a new source of protein for human consumption

We will consider JF not only as a pest but rather also as a novel, valuable resource for the food, taking into consideration all the safety requirements, as well as organoleptic characteristics of developed products.

> D2.4 Develop Mediterranean aquaculture: new management tools, ecosystem-based approach

We will develop JF derived and feed to be used in aquaculture. An innovative cage (Flow2Vortex) has been used off the coasts of Madeira for the first time to cultivate jellyfish next to the aquaculture farms.

A1. Developing new methodologies and tools

> A1.5 Develop standardize methodologies to quantify the socioeconomic value of natural bio-assets

We will conduct socio-economic trade-off and impact analysis of JF blooms and benefit analysis of the new process for harvesting and processing JF and removing microplastics to clean our seas; by involving local communities, stakeholders and others we will increase awareness and visibility of the usefulness of our innovative approach. These topics include

trade-off analysis, experimental surveys, stakeholder workshops and the socio-economic game.

A2. Generating new products and services

A2.1 Identify and assess potentials of marine resources for new products and services

Jellyfish are seen as a pest because of their potential negative impacts on ecosystem goods and services. We will develop bio filters which can be applied for wastewater treatment plants of industries where microplastics accrue as residues. Moreover, different species of JF offer a range of bio-compounds which can be used for a number of valuable products, like organic fertilizers, sustainable feed for aquaculture and stock farming or healthy food for humans as defined from the recently approved regulation on novel food EU 2015/2283 of 25/11 1Furthermore we will utilise JF as a new source of collagen.

A2.5 Promote new market opportunities for Mediterranean labelled products from marine bio-resources

The project partners around the Mediterranean (partners from Portugal, Slovenia and Israel) will test their JF species and thus promote new marketing opportunities within the Mediterranean region.

B1. Develop optimal fishing strategies, technologies and practices

B1.2 Develop best methods to integrate the use of by-products and by-catch from fisheries and aquaculture in the production chain

Fishermen are often faced with large JF biomasses, which negatively impact their nets and their catches. Therefore, if JF usability legally established, JF bloom phenomena can turn into an opportunity also for European fishermen.

D1. From traditional maritime economic to blue growth activities

D1.1 – D1.5

The multi disciplinary team of GoJelly consists of Marine biology scientists, Aquaculture, Fishery, Oceanographic and data modelling experts, socio-economic researchers, as well as applied researchers and practitioners of the fields of bio-agriculture, food and feed supplements, soil fertilizer, engineering and business management. The partners represent academic, scientific institutions, as well as SMEs.

E1. Strengthen synergies among science, industry, policy-makers and society

E1.1 Develop participatory approaches to take decisions by improving the dialogue with civil society, considering its importance (e.g. awareness, inputs, transparency, participation, consensus and support) and its specific technicalities (e.g. engagement at local level, language, ambassadors)

The partners are conducting the stakeholder workshops with industrial stakeholders, tourism representatives, youth, policy makers, using a conceptual participatory methodology. On the workshops, stakeholders will create shared “mind maps” of their socio-ecological system as they experience it, resulting in the collective identification of elements of the system that stakeholders hold to be more or less significant with respect to their levels of risk and consequence perceptions.

We have conducted a global questionnaire survey with all relevant industries (aquaculture, fisheries) to explicate the extent to which they are affected by or aware of any negative effects of jellyfish blooms and offered solutions. We did this to draw out the industries that have an economic interest in jellyfish control, as these may be others; apart from those we have initially identified (tourism, fisheries, and aquaculture).

3 IMPACT OF EUROPEAN FUNDING IN IMPLEMENTING THE BLUEMED INITIATIVE

The section should highlight how your project responds to the impacts listed in the call text in contributing to the implementation of the BLUEMED Initiative (3.1). It should also indicate how your project liaises with citizens, industry, policy makers and the environment (3.2). This section should also specify why/what in your view would not have been possible to achieve in implementing the BLUEMED Initiative without EU funding (3.3). (10 lines maximum for each subsection)

3.1 Call impacts

Examples of science/innovation-related impacts: new method, data or technology, new/improved product or service, new technical process, new organisational process, better access to international network/markets, better understanding of other countries' issues, improved competences and skills, the outputs will make a contribution to advances in complementary scientific or technology areas, the outputs will provide new information and/or tools for use in education o Improved scientific evidence base

- At least 2 innovative methods for removing jellyfishes and MP from the seas;
- At least 6 innovative methods for processing jellyfish for use as MP filter, fertilizer, feed/food ingredient or biomedical applications
- Children's book
- Socio-economic game
- Predictive model of jellyfish blooms

3.2 Impacts for society, industry, the environment…

Examples of societal-related impacts: research jobs will be created, non-research jobs will be created, there will be benefits for public health, safety and/or quality of life, …

Examples of economic impacts: additional research income, additional commercial income

better access to external investment, reduced operating costs, increased European/global market share, ...

Examples of environmental impacts: restoration of biodiversity, improved environmental performance, …

Environmental/ecological impact: the results of the project will serve as pillars for a dynamic management of marine natural resources rather than on a fixed exploitation plan. Understanding the shifts of the marine food web affecting fin fish catch, gained within the project, will even have an impact on fishery and global environmental issues. The project will also add new answers with regard to the growing demand for the diversification

Improved competence: improved professional skills and competences for those working and being trained to work within the blue economy.

3.3 Added value of EU R&I investment and policy impacts

Examples of policy-related impacts: better evidence to make policy/strategy decisions, higher level of influence on third parties (e.g. policy makers, industry, NGOs), the exploitable outcomes will enable better-informed public policies, the exploitable outcomes will support the development of new or improved regulations/standards, …

Where applicable, please make reference as to how your project contributes to relevant global and/or European policy frameworks, e.g. the WESTMED Initiative, the EUSAIR, the Sustainable Development Goals (SDGs), the Food2030 Strategy, the Bioeconomy Strategy, the Integrated Maritime Policy, the Marine Strategy Framework Directive, the Common Fishery Policy, the Maritime Spatial Planning Directive, etc.

The Marine Strategic Framework Directive MSFD: the qualitative descriptor 10 on marine litter includes the monitoring of micro-plastics (MSFD indicator 10.1.3). Regarding the qualitative descriptor addressing marine litter, there is a need for further development of indicators related to biological impacts and to micro-particles, as well as for the enhanced assessment of their potential toxicity for marine biota.

Sustainable Development Goal 14 – (Conserve and responsible use the oceans, seas and marine resources for sustainable development). The indicator for this (14.1.1) is among others an index of the density of plastic debris in the oceans. The implementation of the GoJelly micro plastics filter will benefit this SDG, and contribute to lowering the index for 14.1.1.

Sustainable Development Goal 6 – (Ensure availability and sustainable management of water and sanitation for all). Target 6.3 specifies that water quality has to be improved by 2030, by reducing pollution. The indicator for this is among others (6.3.1) the proportion of wastewater that is safely treated.

4 VISUALS/WEBSITE/COMMUNICATION ACTIVITIES IN IMPLEMENTING THE BLUEMED INITIATIVE

This section should provide information regarding your past and foreseen communication activities in implementing the BLUEMED Initiative. This should include details of visuals, website(s), social media, brochures, information leaflet(s), participation in relevant events for 2018-2019, visuals on YouTube/short videos (give details), and reference to the BLUEMED Initiative reference documents. to promote the visibility of your project.

The work packages within GoJelly reflect the BLUEMED initiative as we will produce benchmark knowledge and actions of use to a large community of stakeholders. Moreover, GoJelly will bring together leading research groups from BLUEMED countries (Italy, Portugal, France and Slovenia) and go beyond (Germany, Norway, Israel, Denmark). A significant goal of GoJelly with long-term impacts is to involve both stakeholders and society through education and training, by a number of dissemination and educational activities (Dissemination plan table and WP9) in order to share the concept of the sustainable exploitation and management of marine resources. BLUEMED initiative is presented in all regional events.

5 RECOMMENDATIONS FOR IMPLEMENTING THE BLUEMED INITIATIVE/ HOW TO MAKE THE BLUEMED INITIATIVE OPERATIONAL

In this section you can provide any recommendations regarding the implementation of the BLUEMED Initiative you would like to put forward, and salient issues you think need to be addressed in the future, for example effective solutions to facilitate international cooperation on R&I, strategies' alignment, evidence on societal/economic impact, research funders' networks, agreements, standards etc.

Organization of brokerage events, sponsored by BLUEMED in its implementing countries. Keeping track on the number of collaborations that initiated by networking within BLUEMED events. Presenting BLUEMED in Brussels with the EC representatives and introducing it as one of the calls in next H2020 and H_Europe calls (similar to Baltic and Atlantic calls).

6 OPEN QUESTIONS

6.1 What societal and/or economic impacts do you believe will be realized in the near future (e.g. 5-10 years)? *(5 lines maximum)*

- Develop a JF mucus "flucculant" like product to be used for efficient removal of MPs and NPs in wastewater treatment plants
- Mathematical model development to include biochemical variables.
- launch of: first skin care products on the basis of the newly defined project's jellyfish sources and anti-aging cosmeceuticals
- Socio-ecologic game available for educational purposes in languages that go beyond that of the project case areas. Game should be widely used in case area countries.
- Product process implementation for the new JF-derived products.

6.2 To what extent the project could leverage private investments/benefit from a tailored network of research and innovators funders for further developments? *(5 lines maximum)*

By being present on brokerage events to establish future collaboration that would enable the development of new products and finalization of existing prototypes.


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