



European
Commission

The Ocean Of Tomorrow Projects (2010-2012)

Joining Research Forces
to Meet Challenges
in Ocean Management



*Research and
Innovation*

EUROPEAN COMMISSION

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Joining Research Forces to
Meet Challenges in Ocean Management

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PREFACE

Seas and oceans have a huge impact on our daily lives, providing an essential part of our wealth and well-being. They are not only a critical source of food, energy and resources, but also provide the majority of Europe's trade routes and play a key role in climate regulation. The value of living by the sea, while intangible, is high to many of us. However, the impact of human activities on the marine environment keeps increasing. Maritime transport, offshore energy, tourism, coastal development, resource extraction, fisheries and aquaculture are examples of activities which can have a major impact on the marine environment, putting at risk marine ecosystems. Science and technology have a vital role to play to preserve the marine environment as well as to support the "Blue Growth"¹ and unlock the great economic potential of our seas and oceans. It is a key component to foster the 'Europe 2020'² goal of a smart, inclusive and sustainable growth.

The "European Strategy for Marine and Maritime research"³, adopted in 2008, is a key pillar of the EU Integrated Maritime Policy and provides a reference framework for multi-disciplinary and cross-sectorial marine and maritime research at European level. Commissioner Geoghegan-Quinn stated in 2010: *"Just as oceans ignore borders, marine sciences and technologies are by their nature cross-cutting and involve many disciplines. There is no other way but to look beyond traditional sector-specific research to foster sustainable growth of maritime activities"*⁴.

A key FP7 initiative in this context is the launch of "The Ocean of Tomorrow" (FP7-OCEAN) cross-thematic calls⁵. The "Ocean of Tomorrow" aims to foster multidisciplinary approaches and cross-fertilisation between various scientific disciplines and economic sectors on key cross-cutting marine and maritime challenges. Another key feature is the participation of business partners, in particular SMEs, in the research projects that are funded.

This brochure presents the 19 projects selected under "The Ocean of Tomorrow" so far. It comprises 9 projects from the FP7-OCEAN-2010 and FP7-OCEAN-2011 calls for proposals as well as 10 projects funded under "The Ocean of Tomorrow 2012" coordinated topics for a total EU contribution of 124M€ over 2010-2012. Although the "Ocean of Tomorrow" calls have progressively increased in size, it should be mentioned that many marine and maritime research actions⁶ continue to take place in the different thematic priorities and specific programmes of FP7.

More specific description of the FP7-OCEAN calls can be found in the following pages. A third and last "The Ocean of Tomorrow 2013" cross-thematic call is currently running. It is focusing on innovation and marine technologies for a budget of 55M€. The "Ocean of Tomorrow 2013" call is already making the link to Horizon 2020⁷ – it shows how potential synergies could be developed between the three pillars ("Excellent Science", "Industrial Leadership" and "Societal Challenges") and paves the way to the new focus on challenge-driven approaches under the new programme.

1 COM (2012) 494: http://ec.europa.eu/maritimeaffairs/policy/blue_growth/documents/com_2012_494_en.pdf

2 <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:2020:FIN:EN:PDF>

3 COM (2008) 534: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2008:0534:FIN:EN:PDF>

4 See Speech of Commissioner Geoghegan-Quinn at "The Ocean of Tomorrow 2011 Infoday,": <http://europa.eu/rapid/pressReleasesAction.do?reference=SPEECH/10/415&type=HTML>

5 http://ec.europa.eu/research/bioeconomy/fish/research/ocean/index_en.htm

6 http://ec.europa.eu/research/bioeconomy/pdf/ki3111104encmmm_en.pdf

7 <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2011:0808:FIN:en:PDF>

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FP7-OCEAN-2010⁸:

The objective of the FP7-OCEAN-2010 call was to build the knowledge base for a sustainable growth of sea-based activities. It was suggested to do this in two ways: by improving understanding of marine ecosystems' response to a combination of natural and anthropogenic factors, and by providing a scientific foundation for feasible, sustainable management measures supporting policies and possible related technologies. The call consisted of three topics related to: climate change impacts on economic sectors in the Arctic, vectors of changes in marine life and finally sub-seabed carbon storage and the marine environment. It involved Theme 2 "Food, Agriculture and Fisheries, and Biotechnology,, (FAFB), Theme 5 "Energy,, Theme 6 "Environment (including climate change),,, Theme 7 "Transport (including Aeronautics),,, and Theme 8 "Socio-economic Sciences and Humanities,,. As a result, 3 projects⁹ have been selected for a total EU contribution of almost 34M€.

8 http://europa.eu/rapid/press-release_IP-09-1206_en.htm?locale=en

9 http://europa.eu/rapid/press-release_IP-10-1098_en.htm



ACCESS:

Arctic Climate Change Economy and Society

www.access-eu.org/

Climate change is strongly impacting both marine ecosystems and human activities in the Arctic, which in turn has important socio-economic implications for Europe. ACCESS's task marine transportation, fisheries and the extraction of hydrocarbons in the Arctic for the next three decades with particular attention to environmental sensitivities and sustainability. Understanding the socio-economic impacts of these changes along with their influence on Arctic Governance, are key areas of research within ACCESS.

The Arctic has experienced substantial changes in recent years. These are most likely caused by a combination of natural variability of the high latitude climate system and anthropogenic changes. They include changes in the radiation balance, in atmospheric and oceanic heat transports and in feedbacks of the air-sea-ice-ocean coupled system linked to a thinning and shrinking Arctic Sea-ice cover. Thus ACCESS activities encompass an assessment of climate model results for the last 30 years regarding their representation of sea-ice, ocean and atmospheric parameters, their seasonal and inter-annual variability and their trends. With the reduction

of sea-ice ahead, a strong increase in ship traffic in the Arctic can be expected. ACCESS dedicates an important effort to the potential impacts shipping activities might have on the sensitive marine environment, including air pollution and long range transport of pollutants by the atmospheric circulation, soot and black carbon deposition on sea-ice, oil spill and ballasting ship tanks in the Arctic Ocean. ACCESS is focusing on enhancing knowledge related to bio-economic and socio-economic aspects of fish resources and aquaculture in the context of climate change in the Arctic. It is the aim of ACCESS to assess the opportunities and

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multiple risks related to oil and gas extraction in the Arctic Ocean, to highlight potential environmental pressures, provide pathways for technological, legal and institutional solutions and to analyse the socio-economic impacts of resource extraction activity on European, world markets and societies. ACCESS gathers the expertise from 28 partners across Europe including a substantial involvement from the private sector. A key objective of ACCESS is to point out governance options in the context of climate change and the envisioned increase of human activities in the economic sectors mentioned above. The wide range of existing legislative instruments, conventions, agreements at national and international level, provide a complex system of regulation in an area requiring special integrated overview. ACCESS is uniquely positioned to identify lacunae and to offer strategic policy options for the medium and long term future in the context of climate change and the Integrated Maritime Policy.

Modelling activities of the ACCESS project are intended to estimate and interpret the impacts of climate change on human activities in the Arctic Ocean and vice versa. Importantly modelling activities cross all aspects of the ACCESS

project to deliver practical policy and infrastructure options for responding to the rapidly changing Arctic Ocean. Ecosystem Based Management (EBM) in particular and Marine Spatial Planning (MSP) in general are key integration tools for ACCESS. EBM and MSP are the links that relate the basic research component of ACCESS. Monitoring activities for long range and long term observations of the Arctic Ocean including in situ and remote sensing observations of the Atmosphere, Sea-Ice and Ocean, are a major development for the ACCESS project.

ACCESS European Added Value

The scope of this project would not have been reached at any national level. The European dimension of the ACCESS project is in adequacy with the multi-disciplinary and cross-sectorial approach of "The Ocean of Tomorrow.". The diversity of the ACCESS project including Climate related issues, socio-economic impacts and governance aspects is largely benefiting from the European dimension and European resources (human resources, infrastructures and financial support). ACCESS is a unique project with no equivalent at international level. ACCESS is already stimulating a lot of interest abroad in North America and Asia.

Project N°265863	Topic: FP7-OCEAN-2010-1: Quantification of climate change impacts on economic sectors in the Arctic	EU contribution: € 10,978,468	Duration: 48 months	From: March 2011
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Partners:

France (Coordinator), Germany, United Kingdom, Norway, Sweden, Russia, , Spain, Ireland, Finland, Denmark.



VECTORS:

Vectors of Change in Oceans and Seas Marine Life, Impact on Economic Sectors

www.marine-vectors.eu

The increasing and diversifying human activities taking place at sea, such as transport, fishing, renewable energy extraction and leisure, are leading to new and challenging changes for marine life and for society. VECTORS is examining how these changes may affect the range of goods and services provided by the oceans ecosystems, the ensuing socio-economic impacts and some of the measures that could be developed to reduce or adapt to these changes. It is adopting a multi-disciplinary and cross-sectorial approach in line with the objectives of the Integrated Maritime Policy.

With its 38 partners from 16 countries across Europe, VECTORS has reviewed the current understanding of drivers, pressures and vectors of change for marine life that are affecting ecosystems in the North Sea, Baltic Sea and western Mediterranean Sea, and has completed an overview of the current international and European law relating to these seas. By interviewing stakeholders at the regional and EU level VECTORS has sought to understand the barriers and drivers for successful European marine environmental resources management. These reviews have helped to establish the context for the next phase of VECTORS research.

Considerable effort has been devoted to increase understanding of the mechanisms that lead to outbreaks (such as jellyfish blooms), invasions of alien species and changes in fish distribution and productivity. A repository of genetic material has been set up to help identification of invasive alien and outbreak forming species and a database of these species, especially around EU ports, has been produced to support ballast water and other management decisions.

Evidence of the impacts of these changes in marine life on marine ecosystems is being reviewed. Public surveys of the socio-economic

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impacts of jellyfish outbreaks on leisure users have been undertaken and further methodologies to determine the wider effects on ecosystem services and their socio-economic values are being developed for implementation later in the project.

Models are being used to investigate relationships between species distributions, growth, survival and environmental conditions (e.g. temperature or currents) as well as to analyse key drivers of fishers' behaviour, such as competition for fish, economic and spatial constraints, maritime traffic and management. Cross-sector modelling frameworks are being developed to project the future changes and consequences of human activity in the marine environment under possible future scenarios.

The project is comprised of seven Work Packages (WPs) and focuses on three regional sea case study areas; the North Sea, the Baltic Sea and the western Mediterranean. For each of these seas VECTORS aims to: identify the main pressures being experienced (WP1), develop a mechanistic understanding of the underlying processes causing change (WP2), evaluate the

implications of change (WP3), integrate information and data across sectors into a common modelling framework (WPs 2-5), and project future changes to the ecosystem, its goods and services as well as the corresponding social and economic consequences (WP5 and 6).

VECTORS European Added Value

VECTORS brings together expertise from a wide range of scientists and stakeholders from public, private and non-governmental organisations across Europe in an integrated, and highly multidisciplinary project to understand common pressures and threats being exerted on our marine environment. The generic and regional understanding developed through the project will contribute the information and knowledge required to inform the development and implementation of forthcoming strategies, policies regional seas conventions, management bodies and regulations across Europe, such as the IMO International Convention for the control and management of ships' ballast water and sediments, EU Maritime Policy, the EU Marine Strategy Framework Directive and the common fisheries policy.

Project N°266445	Topic: FP7-OCEAN-2010.2: vectors of changes in marine life, impact on economic sectors	EU contribution: € 12,484,835	Duration: 48 months	From: February 2011
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Partners:

United Kingdom (Coordinator), Israel, France, Spain, Germany, Greece, The Netherlands, Italy, Denmark, Lithuania, Slovenia, Ireland, Monaco, Belgium, Estonia, Poland.



ECO₂:

Sub-seabed CO₂ Storage: Impact on Marine Ecosystems

www.eco2-project.eu

Carbon dioxide capture and storage (CCS) is considered as a key technology for the reduction of CO₂ emissions from industrial facilities. Consequently, the European Commission promotes the implementation of CCS in Europe at industrial scale by supporting selected demonstration projects, several of which aim to store CO₂ below the seabed. Currently, little is known about the short- and long-term impacts of sub-seabed CO₂ storage on marine ecosystems, consequently, ECO₂ aims to establish a framework of best environmental practices for sub-seabed CO₂ injection and storage.

ECO₂ investigated the sedimentary cover at active and potential CO₂ storage sites (Sleipner, Snøhvit, B3 field) using novel geophysical baseline studies, monitoring and modelling techniques to better understand the mechanisms of CO₂ migration. It assessed the effects of leakage of CO₂ through the sediment at storage sites and natural analogues and quantified the fluxes across the seabed and into the water column by means of sophisticated monitoring techniques and investigated the impact on benthic organisms, through experiments. All fieldwork data is stored in the project database. The main targets of 2011 and 2012

research expeditions were the Utsira CO₂ storage formation (Sleipner) in the Norwegian North Sea where Statoil stores CO₂ since 1996 and the natural CO₂ seepage site Panarea in the Mediterranean Sea. At Sleipner an intensive shallow-focused monitoring programme has been conducted to assess the sedimentary cover and the chemical composition, its fluxes and the techniques to trace any irregularity. Whereas at Panarea the CO₂ migration and the behaviour of gas bubbles within the water as well as the effect on the benthic ecosystem was studied for different spatial and temporal flux rates. The environmental risks

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associated with CCS and how these risks may impact on the financial, legal, and political considerations surrounding the future geological storage were elaborated. The public perception group investigated trust and context as two influencing factors. ECO₂ presents itself and its public results (e.g. cruise reports etc.) on a webpage (eco2-project.eu) and further informs stakeholders and interested individuals about new findings and the project progress via press releases, articles and e.g. lunch briefings at the European Parliament. The results and final product of ECO₂ will be of scientific and political value to all stakeholders within the European Member States and beyond regarding CCS, ocean acidification, climate change and other related issues.

ECO₂ evaluates the likelihood of leakage from sub-seabed CO₂ storage sites, the possible impacts on marine ecosystems and the associated economic and legal issues. Project partners are using cutting-edge monitoring technology and novel approaches, including autonomous underwater vehicles (AUV) with synthetic aperture sonar to detect shallow-focussed irregularities in the integrity of the sedimentary cover of storage sites, and membrane inlet mass spectrometry (MIMS) to trace potential leakage. Sophisticated computer models interlink the natural scientific and economic results and interpretations. The majority of research expeditions, gathering the essential

Partners:

Germany (Coordinator), United Kingdom, Norway, Italy, Belgium, Sweden, The Netherlands, France, Poland.

core data of the project, are funded by national sponsorship. The project follows a multi-disciplinary and comparative approach investigating active and potential storage sites as well as natural CO₂ seep sites.

ECO₂ European Added Value

In 2009 the European Commission adopted the directive on the geological storage of carbon dioxide, and several European states intend to store CO₂ sub-seabed to implement the directive. EU funding through "The Ocean of Tomorrow," made it possible to bring together leading experts from the ocean acidification, natural seepage and CCS communities in Europe from research and industry (e.g. Statoil) to jointly study in a multi-disciplinary way the impact of sub-seabed CO₂ storage on marine ecosystems. Furthermore, the consortium attracted key non-European countries (Australia and Japan) involved in sub-seabed CO₂ storage. Accordingly, the project ensures the pooling of capabilities, short-term scientific exchange, and the validation and dissemination of results throughout Europe and beyond. The scope of this project would not have been reached at any national level.

Project N°265847	Topic: FP7-OCEAN-2010.3: Sub-seabed carbon storage and the marine environment	EU contribution: € 10,500,000	Duration: 48 months	From: May 2011
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FP7-OCEAN-2011¹⁰

The goal of the call was to improve our understanding and the predictive capacity of marine ecosystems' response to a combination of natural and anthropogenic factors, while fostering innovations to make the most of sea resources. The call consisted of four topics. Two were of general nature: Multi-use offshore platforms and Marine microbial diversity while the other two focused on the Mediterranean and the Black Sea regions: (1) natural and human-made pressures in the Mediterranean and Black Sea and (2) marine protected areas and wind energy potential in the Mediterranean and Black Sea. The call was implemented jointly between Theme 2 "Food, Agriculture and Fisheries, and Biotechnology,, (FAFB), Theme 5 "Energy,, Theme 6 "Environment (including climate change),, and Theme 7 "Transport (including Aeronautics),,. As a result¹¹ 6 projects have been selected for funding for a total EU contribution of almost 46M€.

¹⁰ http://europa.eu/rapid/press-release_IP-10-1098_en.htm

¹¹ http://ec.europa.eu/research/bioeconomy/fish/research/ocean/fp7-ocean-projects_en.htm

H2OCEAN:

Development of a wind-wave power open-sea platform equipped for hydrogen generation with support for multiple users of energy

www.h2ocean-project.eu

Offshore platforms have been developed over the years, mainly by the oil and natural gas industry. The increasing interest for a low carbon economy, together with the potential of offshore renewables, has opened an opportunity to develop new concepts for multi-use offshore platforms with energy harvesting as a core activity (i.e. MARINA, ORECCA). H2OCEAN goes a step further and gathers a set of individually proven technologies (renewable energy harvesting + hydrogen generation + aquaculture + environmental monitoring) to develop a proof-of-concept design for a fully integrated multi-component and multi-purpose platform to exploit far offshore ocean resources in a sustainable way and assess the impact at both, environmental and economic levels. Its flexible design will be easily adapted to address the requirements of a particular location and local economics worldwide.

In its first year, H2OCEAN has completed a varied set of tasks. The stakeholder requests to integrate the technologies into the platform (combined Wave Energy Converter-Vertical Axis Wind Turbine structure, desalination and Reverse Osmosis units, electrolysers, aquaculture farm, etc) and the operational requirements (transport and shipping, logistics, safety and security, marine spatial planning, national and international legislation, environment and navigation constraints, deployment and decommissioning, LCA (Life Cycle Analysis) and economic viability assessment) have been identified and collected and will be analysed. Also, three offshore locations meeting the project requirements, with each site giving emphasis to a different aspect of the technology have been identified for analysis and assessment: Atlantic, Mediterranean and North Sea (as

well as a potential fourth site in the Caribbean Sea). Data for these operating scenarios are being collected. As regards the hybrid system, the wave converter initially adopted has been replaced and a new WEC (Wave Energy Converter) has been selected; also, a model for unsteady and 3-dimensional wind profiles to provide quasi-dynamic wind input to the VAWT (Vertical Axis Wind Turbine) model has been developed. On the hydrogen generation, the envisaged electrolysis technologies (Alkaline, Proton Exchange Membrane, Solid Oxide) have been assessed, and the design of the offshore desalination system to coordinate with the electrolyser selection is currently being developed (energy efficiency and environmental impact are to be improved by recovering osmotic energy from the brine). Several methods and technologies to compress and store

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hydrogen for operation and installation on the platform have been assessed. Furthermore, a preliminary design of the multi-trophic aquaculture system has been developed. H2OCEAN is now reviewing marine legislations as well as other legal and design requirements for offshore platforms and activities. A materials database, containing all materials used in all phases of the design, has been prepared with input from all partners and will be analysed for LCA Technical and commercial requirements for the different technologies involved have been collected and potential conflicts between technologies are being identified to remove potential obstacles to the integrated design.

An existing design of floating WEC is the basis for the energy units. The hybrid modular structure with a high flow water power take-off system is designed by integrating a novel VAWT into the WEC and modelling the coupling effects (aerodynamic/hydrodynamic loading, dynamic response and structural dynamics). The energy output will be used both in the form of electricity and as hydraulic power. New low fouling high-pressure membranes will be developed for the RO (Reverse Osmosis) plant (surface modification and carbon nanotubes). For the aquaculture units, a fully integrated system will be designed taking into account the constraints of the trophic chain (fish, seaweeds, sea urchins and bivalve molluscs), the adaptation to various cold and warm water locations (culture of different suited species) and the exploitation by remote automation. To mitigate organic pollution caused by the aquaculture system, a novel type of floating digester (capable to recover

Partners:

Spain (Coordinator), Denmark, Germany, Italy, United Kingdom.

additional energy from the residual marine biomass) will be developed. Finally, a web-based geographic information system will be developed, linking data influencing the establishment of an H2OCEAN platform with the potential locations (potential for energy harvesting, aquaculture farming, logistics and shipping operations, environmental impact, economic assessment, etc).

H2OCEAN European Added Value

H2OCEAN deals with a range of interdisciplinary and interrelated challenges from sectors as diverse as ocean energies, green technologies, food/fisheries, maritime transport and shipbuilding. Also, the intrinsic nature of the oceans, require an international approach. Thanks to EU funding and “The Ocean of Tomorrow,” initiative, it was possible to bring together contributions from a well-balanced transnational consortium with the necessary range of multi-disciplinary knowledge, competences and experience, including strong management skills. Scientific and technological expertise from partners (RTOs, SMEs and LE) will be coherently applied and integrated to achieve the envisaged H2OCEAN proof-of concept design. H2OCEAN is also establishing close links with the TROPOS and MERMAID projects funded under the same “The Ocean of Tomorrow,” topic in order to enhance complementarities and synergies.

Project N°288145	Topic: FP7-OCEAN-2011-3: MPA's and wind potential in the Mediterranean and Black Sea	EU contribution: € 4,525,934	Duration: 36 months	From: January 2012
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MERMAID:

Innovative Multi-purpose off-shore platforms: Planning, Design and Operation

www.mermaidproject.eu

European oceans will be subject to massive development of marine infrastructure in the near future that is why the concept of multi-use offshore platforms is particularly interesting, especially in connection with the development of energy facilities e.g. offshore wind farms, exploitation of wave energy, and also development and implementation of marine aquaculture. These developments require effective marine technology and governance solutions. Simultaneously, both economic costs and environmental impacts have to remain within acceptable limits. These concerns are at the core of the MERMAID project funded under "The Ocean of Tomorrow,, call for proposals.

The MERMAID began on the 1st January 2012 and has been now running for around 11 months. The first phase of the project was initiated at the kick-off meeting that took place in March 2012. At the end of the year MERMAID will have finalised an inception report and QA (Quality Assurance)-plan for the entire project. The inception report will be the solid foundation for the research that will be carried out during the remaining part of the project. So far, a process involving stakeholders from government offices, industry, facility managers, NGO's and other stakeholders has been initiated

for each of the four selected project sites: Baltic Sea, North Sea, Atlantic and Mediterranean in order to clarify the most important issues regarding technical, environmental and social-economic analyses. An inventory on existing legislative framework and policies regarding offshore wind farms and aquaculture in EU has been elaborated. A methodology for Integrated Socio-Economic Assessment (ISEA) has also been developed. The end product of MERMAID will include guidelines for project development in order to facilitate a smooth and safe management and implementation of the

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Multi Use Platforms (MUP) concept. The knowledge and science base for multi-disciplinary approaches will be strengthened. As part of this activity, the accumulated effect of various large scale structures interaction with for example waves, currents or seabed as well as the mixing and dispersion processes will be analysed in detail. This will be useful for designers, manufacturers, contractors. A decision-support system regarding transport infrastructure and the economic and environmental feasibility of Multi-use offshore platforms will be tackled. Specific questions will be addressed such as: will the environmental impact decrease or increase? Will the multi-use approach lead to a better exploration of ocean space for aquaculture? Addressing such key questions will be of interest to Governmental agencies, spatial planners (private and public), investors and NGO's (Non-Governmental Organisations)

Four test areas have been selected in the Baltic Sea, the North Sea, the Atlantic and the Mediterranean. The test areas were chosen to represent different marine environments, socio-economic conditions, data accessibility. The potential to create direct connections between local research teams, stakeholders, decision makers, SMEs and the industry were also key elements when selecting the case studies. Early engagement of multiple stakeholders from a wide array of sectors is critical to

Partners:

Denmark (Coordinator), Germany, Belgium, Italy, Sweden, Spain, Greece, Norway, Netherlands, Poland, Turkey, Cyprus, United Kingdom.

address such complex issues and will facilitate cooperation for the future. MERMAID is also establishing close links with the TROPOS and H2OCEAN projects funded under the same "The Ocean of Tomorrow," topic in order to enhance complementarities and synergies.

MERMAID European Added Value

At the end of the project, a set of specific guidelines will be produced in order to assist future stakeholders within the offshore industries in order to plan, establish and operate their businesses in the most optimal way possible. The multi-disciplinary and cross-sectorial approach of this project is very innovative and the EU added value also lies in the case studies that address four EU regional seas. Multi Use Offshore Platforms do not yet exist so the research is based on existing production facilities to help provide a realistic picture of the challenges that future Multi Use Offshore Platforms must be equipped to handle. The objective is to lead to a rational and sustainable use of the European oceans.

Project N°288710	Topic: FP7-OCEAN-2011.1: Multi-use offshore platforms	EU contribution: € 5,483,411	Duration: 48 months	From: January 2012
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TROPOS:

Modular multi-use deep water offshore platform harnessing and servicing Mediterranean, subtropical and tropical marine and maritime resources

www.troposplatform.eu/

While availability of space on land is already limited, it is especially restricted and acute in coastal regions, hence the increasing interest in offshore areas. The TROPOS Project considers the design and set-up of a floating modular Multi-use Offshore Platform System integrating a broad range of specific functions from different sectors. The innovative platform will be adapted to deep waters and will enable integrated exploitation of oceanic resources (including maritime transport, energy, aquaculture, and leisure), with a focus on tropical, subtropical and Mediterranean areas.

The TROPOS project has now been running for over 9 months. The foundations of the project have been established and the methodology and benchmarking scheme for the engineering design were set up as a baseline for the overall project. Real use-case scenarios were also selected for tropical, subtropical and Mediterranean areas: Taiwan, The Canary Islands (Spain) and Crete Island (Greece) respectively. Ocean resources and related synergies are being studied in order to specify the best locations for each of the selected areas, taking into account socio-economic and environmental

impacts. As the relationships among the sectors of Transport, Energy, Aquaculture and Leisure (TEAL components) are complex, a specific committee, the so-called Interdisciplinary Cohesion Subcommittee was founded in order to warrant a well-balanced and beneficial integration. In order to address different innovative design concepts and scales, two platform cases have been defined: the "Industrial multi-use complex design," vs. "Multi-use design mainly focused on one component,.." These concepts will provide bounds to the framework, a necessary milestone before moving on to the platform design phase.

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The multi-disciplinary nature of TROPOS represents a significant challenge in terms of standardizing approaches and methodologies of such diversified sectors as TEAL (Transport, Energy, Aquaculture and Leisure). With a view to overcome this diversity, the project work package: "Geographic and Module Benchmarking and Decision Methodology" provides the necessary focus by setting unified methodological tools based on quantitative evaluation of specifications of each of the TEAL components, wherever applicable. The grounds for the initial outline of a TROPOS platform have been set through establishing an evaluation methodology and creating the tools to be used for the analysis of constraints and synergies between platform components. TROPOS is also establishing close links with the MERMAID and H2OCEAN projects funded under "The Ocean of Tomorrow," topic in order to enhance complementarities and synergies.

TROPOS European Added Value

The development of the Multi-Use Oceanic Platforms concept has clearly become one of

the EU's most interesting and ambitious projects in order to ensure the integrated, sustainable and ecological exploitation of oceanic resources. Such objectives are in complete accordance with the aim of the TROPOS Project. These objectives require a multidisciplinary and highly specialised team in areas such as offshore structures, energy, aquaculture and maritime transport. Its strong innovative character and the project's key conditions motivated the collaboration of 18 partners from 9 countries: 17 European and 1 from Taiwan including national public research institutions, large companies and small and medium-sized enterprises with strong expertise in these sectors.

Partners:

Spain (Coordinator), United Kingdom, Germany, Portugal, France, Norway, Denmark, Greece, Taiwan.

Project N°288192	Topic FP7-OCEAN-2011.1: Multi-use offshore platforms	EU contribution: € 4,877,911.00	Duration: 36 months	From: February 2012
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Micro B3:

Marine Microbial Biodiversity, Bioinformatics and Biotechnology

www.microB3.eu

With technological advances in the fields of 'Omics' analyses, oceanography and lab automation, marine scientists are now starting projects they only dreamed of 10 years ago. The deluge of data produced is beyond the skill-set of many marine scientists and very little data management infrastructure exists. Micro B3 (biodiversity, bioinformatics and biotechnology) will facilitate the whole process from sampling and data acquisition to analysis, leading to better understanding of marine ecosystems and their (meta)genomic background thus paving the way for novel biotechnological applications.

Nine interdisciplinary teams of experts in bioinformatics, computer science, biology, ecology, oceanography, bioprospecting, biotechnology, ethics and law are working together in this project. The primary objective is to integrate biodiversity, genomic, oceanographic and earth observation databases into one Micro B3 Information System (MB3-IS), based on global standards for sampling and data processing. The nine work packages are integrated into three main pillars:

- 1) Biodiversity: On June 20 2012, a pilot Ocean Sampling Day (OSD) was launched. Worldwide 20 marine research stations volunteered to take samples of plankton biodiversity using standardized sampling techniques. It was the first test-case to train logistics and best practice in sample processing, analysis, as well as in intellectual property management for the "Micro B3 Ocean Sampling Day", planned in June 2014.

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- 2) **Bioinformatics:** The bioinformatics-driven teams established a software development environment, technical infrastructure components, and a communication workflow. This includes a wiki, a software issue tracker system and a source code repository for the publicly transparent access to our open source developments.
- 3) **Biotechnology:** Industry leaders have been targeted through Think Tanks to promote understanding of the value of integrating environmental and 'Omics' data. Related Intellectual Property Rights issues are being addressed through model agreements facilitating access to and benefit sharing of marine genetic material, data and databases.

Micro B3 has begun to train young scientists including representatives from our industry partners. A range of expert and stakeholder workshops focussing on application-driven topics are planned.

The innovative Micro B3 Information System will allow for seamless processing, integration, visualisation and accessibility of the huge amount of marine data collected in ongoing biodiversity sampling campaigns and long-term observations. Interoperability is a key feature for seamless data transfer of sequence and contextual data to public repositories. Therefore, as a starting point, all entries will adhere to the Minimum Information checklists Standard (MIxS) for describing molecular samples as outlined by the international Genomic Standards Consortium www.genisc.org. We also offer analytical and feedback tools on our platform - unique in terms of integrating genetic and ecological information

and generating collective knowledge. This will in turn offer new perspectives for the modelling and exploration of marine microbial communities. The project's integrated Micro B3 Information System will provide other members of the team with information to generate hypotheses for more cost- and time-efficient biotechnological testing and applications.

MICRO B3 European Added Value

Micro B3 is set to revolutionise Europe's capacity for bioinformatics and marine microbial data integration to the benefit of a variety of scientific disciplines in bioscience, technology, computing and law. The size of the consortium, 25 European research groups with 32 participants from universities, institutes and companies, reflects the spirit of European researchers to jointly address pressing challenges in marine sciences and policy. Such critical mass could not be achieved by a single Member State. With Micro B3 we expect to achieve a new communication culture crossing traditional boundaries. Improved communication between disciplines as promoted by the spirit of "The Ocean of Tomorrow," approach will significantly enhance Europe's ability to make use of the Petabytes of data produced for in-silico modelling of key microbial ecosystem components to develop marine ecosystems biology and biotechnology.

Partners:

Germany (Coordinator), United Kingdom, Greece, France, Spain, Italy, Belgium, Turkey, The Netherlands, Denmark, Ireland, Monaco, Swiss, Iceland, Macedonia.

Project N°287589	Topic: FP7-OCEAN 2011-2: Marine microbial diversity	EU contribution: € 8,987,491	Duration: 48 months	From: January 2012
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A photograph showing several divers underwater in a blue, slightly hazy environment. They are wearing scuba gear, including tanks and masks. One diver in the foreground is looking towards the camera, while others are positioned around him, some appearing to be working on something on the seabed.

CoCoNet:

Towards Coast to Coast NETWORKS of marine protected areas (from the shore to the high and deep sea), coupled with sea-based wind energy potential.

www.coconet-fp7.eu/

Marine Protected Areas (MPAs) are restricted to national boundaries. CoCoNet will provide guidelines to shift the protection of our “natural capital,” (seas and oceans) from a national to a transnational perspective, with the creation of networks of MPAs. Clean energy production is a strategic EU objective. Offshore Wind Farms (OWF) are crucial for the achievement of this goal in Northern Europe, while being absent in Southern European Seas. CoCoNet will contribute to fill this gap by producing an enriched wind atlas for the Mediterranean and the Black Sea.

The CoCoNet consortium comprises 39 research institutes and SMEs based in 22 Countries, covering the Black Sea, and, for the Mediterranean Sea, a significant part of North Africa and Middle East, and the European Union. Scientific communities that seldom interact and collaborate are now working together in this project, to achieve two strategic goals: 1 - improve the efficacy of the protection of the marine environment with the creation of networks of MPAs, including the protection of offshore and deep sea habitats 2 - explore the feasibility of the development of wind farms. The first achievement of the project

is the creation of a compact group of multi-disciplinary scientists sharing a vision that will be substantiated by the results of their work. In the first year of activity the partners have met several times including at the kick-off meeting, 4 focus workshops, 3 virtual focus workshops, one planning meeting for the practical organization of the pilot projects, and a summer school. The aim of the virtual focus workshops is to set a conceptual platform that will lead the fieldwork in two pilot areas, in the Mediterranean Sea and in the Black Sea respectively. The existence of conceptual barriers hinders the dialogue

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among disparate disciplines and sub disciplines. The summer course on meta-analysis provided a solid conceptual tool to extract information from published accounts so as to assemble it into a coherent way. The main achievement is the creation of a shared vision that is propagated through the outreach activities of the project with much coverage from the media in many countries. CoCoNet promotes transnational collaboration through the sharing of data, infrastructures, and people. Scientific publications are produced, and the project has strong links with FP7 projects such as VECTORS and PERSEUS, further widening the network of collaborations. With these “Ocean of Tomorrow,” projects, the EU is a powerful “glue,” that will have long lasting effects on the scientific development of the area.

The most stringent objective is to synthesize disparate pieces of knowledge, so as to create a unitary vision of the manifold aspects involved in environmental management and conservation. Workshops and summer schools are promoting dialogue across disciplines, producing state of the art accounts on the various aspects of our research, treasuring the results of previous EU projects. This will lead to common fieldwork to test previously elaborated hypotheses. Pilot projects will involve the use of large oceanographic vessels and of smaller boats for coastal research for collecting data. The various layers

Partners:

Italy (Coordinator), Belgium, France, Spain, Denmark, Romania, Greece, Bulgaria, Montenegro, Ukraine, Tunisia, Israel, Morocco, Turkey, United Kingdom, Georgia, Norway, Russia, Malta, Germany, Croatia, Albania.

of information will be organized in a single GIS (Geographic Information System) database: the factual platform on which the guidelines for the establishment of networks of MPAs and of OWF will be produced.

CoCoNet European Added Value

CoCoNet involves important EU and non-EU countries across the Mediterranean and Black Sea in a strategic scientific and management enterprise promoting a shared vision that will enhance collaboration and capacity building initiatives throughout the Southern European Seas. Only the pooling of many scientific expertise can warrant results in such a complex domain. The results of previous EU projects will be used, along with new information, providing knowledge-based guidelines on environmental protection and clean energy production, two stringent priorities of EU policies. The creation of a database and the improvement of research facilities will foster transnational collaboration.

Project N°287844	Topic: FP7-OCEAN-2011-1 Multi-use offshore platforms	EU contribution: € 9,000,000	Duration: 48 months	From: February 2012
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PERSEUS:

Policy-orientated marine Environmental Research for the Southern European Seas

www.perseus-net.eu

PERSEUS assesses the dual impact of human activity and natural pressures on the Mediterranean and Black Seas, by merging natural and socio-economic sciences through a multi-disciplinary approach to predict the long-term effects of these pressures on marine ecosystems. It aims to design an effective research governance framework as the basis for policymakers to prevent further marine ecosystem degradation by achieving Good Environmental Status (GES) of EU marine waters as requested by the Marine Strategy Framework Directive (MSFD) by 2020, thus contributing to the better coordination of national policies.

The Project has identified the interacting patterns of natural and human-derived pressures at basin, sub-basin and coastal scale level through an extensive literature review. A thorough gap analysis on data and knowledge has been prepared. In parallel and in order to achieve the necessary integration, the pressures in socio-economic terms have been analysed. In order to upgrade and expand the observing capacity in the Southern European Seas (SES) for the implementation of the MSFD, a review of the ocean observing systems in these areas and recommendations on upgrades have been prepared.

The stage towards engaging remotely operated monitoring and modelling capabilities as scientific tools to evaluate the environmental status in these areas has been set by generating and distributing the forcing functions: surface and land-based fluxes (run off and nutrient loads) for current and scenario conditions, needed to provide model boundary conditions. Upgrading existing models towards an “Ecosystem E2E (End to End model)” perspective that will link and couple together Lower and Higher Trophic Levels models has also been set. In order to advance towards the Basin wide (EU and non-EU) promotion of

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MSFD principles, PERSEUS has reviewed the EU MSFD Initial Assessments (data, methodologies and/or principles) and identified knowledge/data gaps. An effort was also made to promote the principles of MSFD, by training ministry officials of the Black Sea Economic Cooperation countries (BSEC) and by presenting PERSEUS work in several Mediterranean and Black Sea countries. The Adaptive Policy Framework has been identified along with the participating stakeholders. Finally, scientific and operational needs of the new vessel have been identified and evaluated by scientists and operators.

The work plan has been initiated with the aim to identify the gaps of knowledge and, building on these gaps, to propose the sampling and experiment strategy for next year while scenarios have been agreed in an initial common workshop. The state of play for the implementation of the Adaptive Policy Framework has been defined by taking an initial stock of the scientific, technical, economic, legal and institutional knowledge needed and by developing the necessary Stakeholder platforms, using participatory methods. PERSEUS has developed an excellent plan for dissemination of knowledge, collaboration with existing projects and engagement of the public that goes beyond borders and regions.

Partners:

Greece (Coordinator), Turkey, France, Spain, Italy, Romania, Malta, Belgium, United Kingdom, The Netherlands, Cyprus, Israel, Slovenia, Ukraine, Russia, Bulgaria, Egypt, Morocco, Germany, Croatia, Tunisia.

PERSEUS European Added Value

PERSEUS brings together leading researchers from 21 EU and non-EU countries to work on common issues of European interest. PERSEUS's consortium has a high level of knowledge on marine research and socioeconomics, further increasing its added value by working closely together. This facilitates knowledge exchange, design of common approaches/protocols, development of a common vision, increase in scientific capacity of less developed partners and training opportunities for young scientists and stakeholders across the EU and beyond. The EU approach is critical, as the research activities and the large number of participants raise the profile and impact of such an international project creating a leverage effect, enabling PERSEUS to build new links beyond country borders and regions.

Project N°287600	Topic FP7-OCEAN-2011.3: Natural and man-made pressures in the Mediterranean and Black sea	EU contribution: € 12,973,123.4	Duration: 48 months	From: January 2012
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"The Ocean of Tomorrow 2012"¹² - Coordinated topics

Following the two previous "The Ocean of Tomorrow,, cross-thematic calls, several topics have been launched with "The Ocean of Tomorrow 2012,, initiative to support the implementation of the Marine Strategy Framework Directive (2008/56/C). Cooperation involved Theme 2 Food, Agriculture, Fisheries and biotechnology, Theme 5 Energy, Theme 6 Environment, (including climate change), and Theme 7 Transport (including Aeronautics). The focus was on research gaps about the definition and monitoring of the "Good Environmental Status,, (GES) of EU waters, to be achieved by 2020. Nine coordinated topics were launched covering a wide range of marine related issues relevant to several descriptors of the Marine Strategy Framework Directive¹³. As a result, 10 projects¹⁴ (including 2 on mitigation of noise impacts of maritime transport) have been selected for funding for an EU contribution of almost 44M€. Most projects have just started or about to start.

12 http://ec.europa.eu/research/agriculture/ocean2012/index_en.html

13 <http://ec.europa.eu/environment/water/marine/ges.htm>

14 http://ec.europa.eu/research/bioeconomy/fish/research/ocean/ocean_tomorrow_2012_en.htm



AquaTrace:

The development of tools for tracing and evaluating the genetic impact of fish from aquaculture

Escapes or releases of domesticated aquaculture fish pose a potential risk of adverse effects on native fish gene pools. In order to assure a prosperous and sustainable future for European aquaculture, the development of tools for identifying wild and farmed fish, interbreeding between them and effects on key fitness traits (survival and reproduction) is essential. AquaTrace will develop innovative molecular genetic tools, which will vastly improve the ability for tracing farmed fish in the wild and for documentation of their potential effects on wild conspecifics. The project will also contribute to environmental protection under the Marine Strategy Framework Directive (MSFD) and is relevant for the descriptor n°1 on biological diversity as well as descriptor n°2 on non-indigenous species.

The rationale behind AquaTrace is to develop reliable and cost-effective molecular tools for the identification of the genetic origin of both wild and farmed fish (genetic traceability), as well as for the detection of interbreeding between farmed and wild stocks. This work will be carried out on three marine fishes of economic significance and with growing aquaculture activities, the European sea bass, gilthead sea bream and turbot. To address the expected magnitude of effects of interbreeding of farmed fish on wild

conspecifics, the rationale is to use controlled experiments to examine links between key fitness and life-history differences and specific functional genetic differences at the DNA level between wild and farmed fish. Atlantic salmon and brown trout will be used as model species. AquaTrace scientific objective is to address and assess the genetic impact of aquaculture escapes. Such non-indigenous fish can potentially introduce genes to wild populations that have been undergoing adaptation to farmed conditions

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through breeding and domestication selection. The methods and tools developed will also have implications for general knowledge on adaptation to local environmental conditions in wild populations, and could also apply in a restocking context. It is also critical that the tools developed are validated to internationally recognized forensic standards to allow uptake by end-users. The application of tools for monitoring and mitigation must be seen as being supportive to the industry. It represents one of the many approaches that should be used to secure growth, economic prosperity and social acceptance. Similarly, traceability of products has become a specific request of consumers, sustained by national and European policies. Here, genetic tools offer cost-effective strategies for supporting quality plans, enforceable by law where required, aimed at tracing and monitoring the origin of aquaculture products.

The project will develop SNP (Single Nucleotide Polymorphisms) genetic markers for the marine species and apply these markers to baseline samples of wild and aquaculture fish. Subsequently, small, specific and cost effective SNP panels (consisting of minimum numbers of markers with maximum statistical power for determining the origin of the fish), will be developed as end-user traceability tools. Already existing large SNP panels for salmon and trout will be applied to these species maintained

Partners:

Denmark (Coordinator), United Kingdom, Spain, France, Italy, Belgium, Norway, Israel, Turkey, Greece.

under controlled experimental conditions. It will allow identification of the genetic background of the fitness effects related to domestication and interbreeding.

AquaTrace European Added Value

This project addresses the common challenge of Europe to develop sustainable aquaculture through improved competitiveness and environmentally-friendly production. As the potential adverse effects of aquaculture's escapees or releases are expected to affect all Member States, international collaboration is the only option. This project benefits from the collective cutting-edge expertise and infrastructure of research institutions and aquaculture industry across Europe. The outcome of the project will be made available through a common database allowing researchers, the industry, policy makers and the European consumer a long term benefit. Overall the project will support the development of sustainable European aquaculture and contribute to achievement of the "Good Environmental Status", (GES) as requested under the Marine Strategy Framework Directive.

Project N° 311920	Topic FP7-KBBE.2012.1.2-12: Molecular tools for assessing and monitoring the potential genetic impact of aquaculture on native populations	EU contribution: € 2,999,184	Duration: 48 months	From: November 2012
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AQUO:

Achieve QUIeter Oceans by shipping
noise footprint reduction

www.aquo.eu/

Recent researches outline the need to mitigate underwater noise footprint due to shipping, to prevent negative consequences to marine life. The project is expected to achieve important scientific and technical advances, and to bring significant impacts, in the context of the Marine Strategy Framework Directive (MSFD) adopted in 2008 by the European Union, in order to contribute to marine environmental protection.

The ultimate goal of the AQUO project is to provide policy makers with practical guidelines in order to mitigate underwater noise impacts of shipping on marine life. It will propose solutions for ship design, including propeller and cavitation noise, and solutions related to shipping control and regulation. Main objectives are the following:

- develop and validate a shipping underwater noise footprint assessment tool related to AIS (Automatic Identification System) data,
- improve and/or validate models and methods to predict radiated noise from ship propellers, taking into account cavitation phenomena and interaction effects,
- propose a standard for ship underwater radiated noise measurement method,
- develop new vibro-acoustic measurements tools and methods applied to real experiments at sea,
- establish criteria and good practices for noise protection on marine life, based on analysis of available data and specific bio-acoustic experiments on representative marine species,
- establish a list of design improvement solutions to reduce ship underwater radiated noise, without reducing fuel efficiency of the ship,
- establish practical guidelines to reduce shipping noise for a quieter ocean, providing responses to the needs of policy makers.

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Most technical results will be available to general public through the publication of reports, the website and to the scientific community. A dedicated conference will be organized in 2015 on ship vibro-acoustics and impact on marine life. In addition, links will be established with stakeholders in the maritime sector (e.g. shipyards, ship owners, end users) in order to discuss the research results and their applicability. The project is expected to have a large impact on design guidelines for new ships and on ship traffic control.

The project is supported by different methods and tools, which will be used to assess the effectiveness of noise mitigation measures in order to select the most appropriate ones. For example, we can outline the underwater noise footprint assessment tool derived from an existing operational system, connectable with AIS shipping data and able to run in real time, dedicated bio-acoustic studies conducted on different marine species in order to derive criteria regarding shipping underwater noise acceptable limits, and experiments at sea on different

Partners:

France (Coordinator), Spain, Italy, Sweden, United Kingdom, Poland, Netherlands, Belgium.

ships, including commercial vessels. AQUO will closely cooperate with the SONIC project, which will adopt a complementary approach on cavitation noise.

AQUO European Added Value

The AQUO project consortium is a well-balanced team composed of ship industry, specialized small companies, a classification society, research centres and academics. Eight European countries are represented. The team includes a large panel of specialists covering the different technical topics to address, allowing a multi-disciplinary approach. Running the project at European level allows to share the research effort at a larger scale and to merge the partner's expertise with a good completeness that could not be reached at national level.

Project N°314227	Topic: FP7-SST.2012.1.1-1. Assessment and mitigation of noise impacts of the maritime transport on the marine Environment:	EU contribution: € 2,999,571	Duration: 36 months	From: October 2012
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BENTHIS:

Benthic Ecosystem Fisheries Impact Study

The sea bed provides a place to live for a wide diversity of plants and animals. Fisheries negatively impact these benthic ecosystems, for instance by reducing biodiversity, sea bed integrity, food for bottom dwelling fish and fisheries yield. BENTHIS will provide the science base to assess the impact of current fishing practices and, in collaboration with the industry, develop innovative fishing technology and management scenarios to mitigate the adverse impacts. In this respect it also contributes to the objective of the Marine Strategy Framework Directive (MSFD) to achieve a Good Environmental Status of marine EU waters by 2020, especially regarding the descriptors on biological diversity (descriptor n°1) and seafloor integrity (descriptor n°6).

To support an integrated approach to the management of human activities in the marine environment, in particular fishing, as required in the Common Fisheries Policy and the Marine Strategy Framework Directive, there is a need to develop quantitative tools to assess the impact of fisheries on the benthic ecosystem. BENTHIS will provide this knowledge. It will study the vulnerability of different benthic ecosystems in European waters and analyze the physical impact of the current fishing practices on benthic organisms and geo-chemical processes. In collaboration with the fishing

industry, options to mitigate the adverse impact will be reviewed and sea trials will be conducted to study the performance of technological innovations in the five major European seas (Baltic, North Sea, Western waters, Mediterranean and Black Sea). Fisheries studied comprise flatfish and shrimp fisheries with beam trawls, nephrops and roundfish fisheries with otter trawls, and shellfish fisheries with dredges. Finally, new management approaches will be developed in direct collaboration with the fishing industry and other stakeholders and tested on their effects on the ecosystem and the

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socio-economic consequences. BENTHIS will inform managers about the benthic habitats that are impacted most and about the fishing gears that have the biggest impact and provide information on options to mitigate the adverse impacts.

The project follows a multi-disciplinary approach with strong stakeholder involvement. Sea trials will be conducted with innovative fishing gears such as pelagic otter boards and pulse trawls. Generic tools will be developed to assess the impact of fishing gears based on the physical characteristics of the gear and the morphological and life history characteristics of the benthic organisms. Bio-economic models will be developed to quantify the effect of mitigation measures on the socio-economy of the fishing sector. The models will allow an integrated assessment of both the ecology and the socio-economic consequences.

Partners:

The Netherlands (Coordinator), Italy, United Kingdom, Denmark, France, Ireland, Faroe Islands, Sweden, Belgium, Norway, Greece, Turkey.

BENTHIS European Added Value

Bottom trawl fisheries provide a critical source of highly valued fish products and employment to coastal regions all over Europe. Mitigation of the adverse effects of these fisheries on the ecosystem will contribute to the sustainability of the European fishing sector. The project will stimulate innovations supporting a “green fishing technology” and contribute to the implementation of an ecosystem-based approach to fisheries management.

Project N° 312088	Topic: FP7-KBBE.2012.1.2-9: Integrating the role of marine benthic ecosystems in fisheries management	EU contribution: € 2,999,184	Duration: 60 months	From: October 2012
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BIOCLEAN:

New BIOTEchnologiCaL approaches for biodegrading and promoting the environMental biotrAnsformation of syNthetic polymeric materials

The worldwide and EU production of plastics obtained from fossil resources is about 280 and 58 mil ton/y, respectively. About 40% of plastic waste is currently disposed of in landfills, where it undergoes (photo)degradation with the production of small fragments which enter the marine environment, where they can exert adverse effects. Innovative eco-efficient solutions to degrade/detoxify plastics accumulated in landfills, persisting in composting facilities and in aquatic environments are sought.

BIOCLEAN aims at developing innovative, eco-efficient pilot-scale and/or field validated biotechnological solutions for degrading (and valorizing) plastic wastes in terrestrial (landfills, composting facilities) and aquatic environments. Novel, robust naturally-occurring plastic-degrading mixed and pure cultures will be obtained and characterized and then exploited in hybrid physical/chemical-biotechnological processes for the biodegradation/detoxification or the valorization (i.e. transformation towards useful chemicals) of polyethylene (PE), polypropylene (PP), polyvinyl

chloride (PVC) and polystyrene (PS) plastics. They will also be useful in bio-augmentation/biostimulation strategies for enhancing biodegradation of plastic waste in composting and waste treating facilities as well as in marine environments. The processes and strategies developed at the pilot scale will be assessed for their effectiveness and economical sustainability. They will be validated via field trials and preliminary exploited in the formulation of measures for mitigating plastic pollution in the Aegean Sea as a case study. These new/innovative processes and solutions would remarkably

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contribute to a) the eco-efficient safe disposal of plastic waste currently sent to or accumulating in landfills, b) intensify the mineralization of plastic entering terrestrial waste treating facilities and aquatic environments and c) support the EU Member States to take the necessary measures to achieve or maintain Good Environmental Status in the marine environment by the year 2020, according to the Marine Strategy Framework Directive (MSFD). The novel pilot- and field-scale validated treatments and strategies as well as the microbes/enzymes which will be obtained and characterized during the project can deserve patenting and dedicated market opportunities.

BIOCLEAN includes 18 partners from 9 different EU Countries and 1 from China. The Consortium includes Universities (6), Research Institutes (4), SMEs (7), multimunicipality and the Association of European plastic producers (PlasticsEurope). Such a consortium was set-up to encompass the broadest range of complementary RTD expertise and facilities required (that no single Member State could provide), to promote the establishment of a common scientific background, as well as methods and measures for safe plastic disposal and marine litter.

Partners:

Italy (Coordinator), Greece, China, Germany, Czech Republic, Norway, Belgium, France, Swiss, Poland.

BIOCLEAN European Added Value

BIOCLEAN would result in innovative eco-efficient processes and strategies able to improve the environmental status of the EU aquatic environments with regards to marine litter. It will in turn mitigate the current environmental impact of the plastic sector thus allowing its gradual transition towards the scenario in which the EU market will mainly consist of fully recyclable and biobased/biodegradable plastics. The project would also result in novel and shared monitoring tools and mitigation measures necessary for better addressing MSFD requirements regarding the achievement and maintaining Good Environmental Status in the marine environment. With its focus on plastics, BIOCLEAN is complementary to the CLEANSEA project addressing the issue of marine litter. Both are funded under "The Ocean of Tomorrow 2012", coordinated initiative.

Project N°312100	Topic: FP7- KBBE.2012.3.5-02: Biotechnological solutions for the degradation of synthetic polymeric materials	EU contribution: € 2,995,988	Duration: 36 months	From: September 2012
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CLEANSEA:

Towards a Clean, Litter-Free European Marine Environment through Scientific Evidence, Innovative Tools and Good Governance

www.cleansea-project.eu/

Marine litter is widely recognized as a threat to Europe's marine ecosystems. It is a major societal challenge because it impacts the vast natural marine capital that supports economies, societies and individual well being. Political and public awareness about marine litter has been increasing over the last few years. Marine litter is explicitly identified as a descriptor for determining Good Environmental Status (GES) under the Marine Strategy Framework Directive (MSFD). Europe aims to achieve GES by 2020 and CLEANSEA – the first ever framework programme research project dedicated to the marine litter issue – will be providing key scientific knowledge and tools for marine litter action plans.

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providing key scientific knowledge and tools for marine litter action plans.

The CLEANSEA project will i) provide a comprehensive characterization and analysis of the marine litter problem (biological, chemical, social, economic, legislative and policy-oriented) in the EU's four marine regions, ii) propose innovative monitoring tools and standard protocols to facilitate monitoring marine litter in a harmonized way, and iii) present management measures and policy options to meet MSFD and other international objectives regarding marine litter.

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The CLEANSEA Stakeholder Platform and elements of the Dissemination and Media Plan, such as a documentary film production, are designed to maximize the project's impact, transparency and relevance in addressing the marine litter issue. The unique combination of disciplines integrated within the project will be able to provide knowledgeable input into a European roadmap for marine litter reduction. Results will be made available to Member States in order to be applied in their MSFD implementation planning and goals.

Project outcomes will benefit the MSFD, but there are also important linkages with the Thematic Strategy on the Prevention and Recycling of Waste, the Waste Framework Directive, the Common Fisheries Policy, the Water Framework Directive and the EU-funded Horizon 2020 Capacity Building/Mediterranean Environment Programme. Management measures and strategies highlighted in CLEANSEA may also contribute to the Europe 2020 Strategy, and especially the "Resources Efficiency, Flagship initiative. Measures and policies that promote upstream sustainable production and use of plastics or recycling of waste that will be highlighted in the Road map can also contribute to the EU's policies for a Resource Efficient Europe. In that sense, the CLEANSEA project is also complementary to the BIOCLEAN project funded under "The Ocean of Tomorrow 2012," coordinated initiative.

With a Consortium diverse in expertise and experience, CLEANSEA aims to break down interdisciplinary barriers by synthesizing data and knowledge generated across its 5 RTD work packages. Advanced techniques in the fields of (eco)toxicology, analytical chemistry, satellite

Partners:

The Netherlands (Coordinator), United Kingdom, Spain, Belgium, Bulgaria, Sweden, Greece, Norway, Denmark, Germany.

imaging, oceanographic modelling and materials biodegradation testing will be used to assess the distribution, fate and impacts of marine litter. The participatory approach, policy analysis, ecosystem services mapping and economic policy instruments evaluation will be applied to identify financial, social and governance barriers to GES – and to recommend effective policy options and management measures to remove these barriers.

CLEANSEA European Added Value

With this project, the European Union firmly establishes itself as a serious and committed contributor to marine litter research worldwide. No other country or group of countries has funded a marine litter research project of this kind before. Combining scientific groups from 11 European countries in the 4 marine regions will provide a clear European added value. Exchange of scientists and technical staff will stimulate further cooperation and demonstrate Europe's capacity to approach a complex problem from multiple perspectives. CLEANSEA contributes to an ecosystem approach to the management of human activities in EU marine regions. In addition, we expect some of the protocols and tools developed to be implemented on a larger scale, generating additional projects and business for SMEs, participating in CLEANSEA. The innovation foreseen will help to build and enhance European leadership in marine litter monitoring and remediation.

Project N° 308370	Topic: FP7- ENV.2012.6.2-4 Management and potential impacts of litter in the marine and coastal environment	EU contribution: € 2,986,571	Duration: 36 months	From: January 2013
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DEVOTES:

Development of innovative tools for understanding marine biodiversity and assessing good environmental status

www.devotes-project.eu/

The Marine Strategy Framework Directive (MSFD) requires EU Member States to take measures to achieve Good Environmental Status (GES) in the marine environment by 2020. DEVOTES will develop tools to understand and describe biodiversity status at an European scale, including as many components of the ecosystem as possible, providing the scientific knowledge, upon which appropriate monitoring and management strategies under the new directive can be designed and made available for managers.

There are five key objectives: (i) Improve our understanding of the impact of human activities and climate change on marine biodiversity; (ii) Test the relevant selected indicators - currently being compiled by the Regional Sea Conventions - and develop new, innovative ones to assess biodiversity at several ecological scales; (iii) Develop, test and validate innovative integrative modelling and monitoring tools to further improve our understanding of ecosystem and biodiversity changes in space and time, applying both traditional sampling and autonomous data acquisition devices;

(iv) Implement cost-effective indicators, monitoring and assessment strategies; and (v) Propose and disseminate strategies and measures for ecosystems' adaptive management, with consultation of Member States. The application areas of DEVOTES' innovative results relate to development and implementation of consistent monitoring methods, sampling analyses, and management practices across the EU. The advantages of the resulting technologies, compared to those presently available, will be harmonised methodologies and internationally consistent application across regional seas.

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The exploitation plan includes the use of results of DEVOTES for scientific (i.e. understanding of biodiversity responses to pressures and climate change), technological (e.g. monitoring tools, software), commercial (i.e. potential uses of the findings), but also for societal (i.e. societal participation in marine conservation), and regulatory (i.e. new coherent management tools for the MSFD) purposes. DEVOTES will also prepare new PhD researchers, as this new piece of legislation is challenging for marine scientists and managers will require well-trained staff. Several master courses and summer schools will incorporate lectures from DEVOTES.

DEVOTES will cover the 4 EU Regional Seas, with 8 case studies which will focus primarily on biodiversity, which is one of the qualitative descriptors identified in the MSFD to characterize the Good Environmental Status. It will also consider food-webs and seafloor integrity descriptors where they relate to the impacts of human activities and climatic influences on biodiversity. The project will use existing databases and new data from national networks. Innovative tools (e.g. remote sensing, ecological modelling, metagenetics), together with

Partners:

Spain (Coordinator), United Kingdom, Turkey, Finland, Greece, Germany, Bulgaria, Italy, Belgium, Latvia, Portugal, Norway, Netherlands, Saudi Arabia, Ukraine, Denmark, France.

socio-economic approaches (cost-based assessment) and integrative tools will also be used.

DEVOTES European Added Value

Member States should assess the Good Environmental Status of their shared regional seas as part of the MSFD. The added value of DEVOTES primarily consists in a European concerted research effort to reach this goal. DEVOTES will provide integrative, harmonized and validated tools and indicators able to be used across EU. Non-EU countries (Ukraine, USA, Canada, Saudi Arabia) are also involved, giving to the EU a lead role. DEVOTES is highly relevant to many EU policies: MSFD, Water Framework Directive, Habitats Directive, Maritime Spatial Planning, Integrated Coastal Zone Management, Integrated Maritime Policy, Common Fisheries Policy, Biodiversity Strategy 2020.

Project N° 308392	Topic: FP7-ENV.2012.6.2-3 Innovative Tools for Understanding and Integrated Assessment of Good Environmental Status (GES) of Marine Waters	EU contribution: € 8,997,984	Duration: 48 months	From: November 2012
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ECsafeSEAFOOD:

Priority environmental contaminants in seafood: safety assessment, impact and public perception

Despite seafood has been recognized as a high quality, healthy and safe food item, some seafood can accumulate environmental chemical contaminants with impact on human health. Limited information is available for contaminants without limits set by authorities for seafood, like priority chemical contaminants, biotoxins from harmful algal blooms and marine litter. In order to increase seafood safety to consumers, ECsafeSEAFOOD aims to assess safety issues related to non-regulated priority chemical contaminants and evaluate their impact on public health. In this respect, the project is relevant for the Marine Strategy Framework Directive (MSFD) and especially for the descriptor n°9 on contaminants in fish and seafood which will be useful to determine the Good Environmental Status of EU waters.

The ECsafeSEAFOOD project will monitor the presence of priority environmental contaminants in the environment and in seafood, prioritize those that are real hazards for human health, and assess the transfer of relevant priority environmental contaminants between the environment and seafood, taking into account the effect of climate change. The project will develop, validate and provide new tools to make the assessment of the presence of environmental contaminants in seafood products easier and faster. It will also study the effect of processing/cooking

on the behaviour of priority environmental contaminants in seafood and further understand the public health impacts of these chemical hazards, through the toxicological characterization of the selected seafood contaminants in realistic conditions. Such information will be crucial to accomplish accurate risk assessment in order to measure the potential impact of seafood contaminants on public health using in-depth probabilistic exposure tools. Several potential mitigation measures will be studied for contaminants representing a risk to consumer health, like an online

tool and guidelines for stakeholders, and assess innovative phycoremediation mitigation technologies on fish and environment at pilot scale. Concerning dissemination activities, the project will investigate what information is needed and how it should be disseminated, in coordination with risk managers, to the general public and to vulnerable groups of consumers in order to reduce public health risks from seafood consumption. In this way, the new information gathered in ECsafeSEAFOOD will enable to confirm/refine the European Maximum Reference Levels (MRLs) in seafood for those contaminants or biotoxins that are real hazards and for which no legislation exists or the information is still insufficient.

ECsafeSEAFOOD will create a database with relevant information about priority contaminants from literature and national monitoring programmes. For contaminants with limited information available, a sampling strategy will be implemented, taking into account toxicological

aspects. Risk assessment and mitigation strategies will be implemented. Fast screening/detection methods will be designed for relevant chemical contaminants. The links between the level of contaminants in the environment and that in seafood will be targeted taking into account the effect of climate changes.

ECsafeSEAFOOD European Added Value

ECsafeSEAFOOD will have tangible impacts in terms of (i) European competitiveness and innovation particularly of food-producing SMEs and local communities; (ii) offering safe and high quality seafood to consumers; (iii) positive economic effects as a result of increasing seafood consumption; (iv) scientific breakthroughs including priority chemical contaminants monitoring, risk assessment and toxicity; and (v) societal impacts: improving education, increasing employment, improving nutrition and increasing the sustainability of an important food sector.

Project N° 311820	Topic: FP7-KBBE.2012.2.4-01: Contaminants in seafood and their impact on public health	EU contribution: € 3,999,874	Duration: 48 months	From: February 2013
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Partners:

Portugal (Coordinator), Spain, Slovenia, Belgium, Norway, Denmark, The Netherlands, Italy, Ireland, France.



KILL•SPILL:

Integrated Biotechnological Solutions for Combating Marine Oil Spills

www.killspill.eu/

Oil spill disasters are a worldwide problem and current technologies do not satisfactorily address the issue. It is important to recognize that “miracle microorganisms” and “magic elixirs” sprinkled on an oil spill will not do the job. An integrated approach considering at the same time: (1) metabolic requirements of biodegrading organisms alongside the properties of the oil, (2) environmental limitations on oil biodegradation and (3) innovative delivery mechanisms for agents that alleviate these bottlenecks is critical. This is the essence of the Kill•Spill project. It represents a European initiative fully committed to tackle oil spill disasters in an integrated and interdisciplinary fashion employing highly efficient remediation strategies.

The principal objective of Kill•Spill is to develop highly efficient, economically and environmentally viable solutions for the clean-up of oil spills caused by maritime transport or offshore oil exploration and related processes, which have been fully validated in large mesocosm facilities under controlled conditions and by application to real life oil spills.

In general, once crude oil is spilled, it takes at least one week before biodegradation processes

begin to take effect. Kill•Spill aims to shorten this start-up period to the absolute minimum by providing technologies for example, that provide the necessary nutrients together with hydrocarbon degrading consortia and/or enhancing compounds (biosurfactants) to both accelerate and maximize bioremediation rates from the time of application. In addition, when the use of dispersants is recommended, the previously mentioned biostimulation and bioaugmentation formulations will be applied together with specific compounds acting as

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dispersants that take the oil from the surface to the water column and ultimately to the sea floor. Taking into account that as we go deeper in the water column, the amount of dissolved oxygen is more difficult to replenish by diffusion, Kill-Spill also offers specific novel technologies (Oxygel™ and Aerobeads™) that release oxygen over longer periods of time. As a result, it maintains greater bioremediation rates of dispersed oil in the water column, even when it reaches the sediments. In cases where it is not feasible, this approach will be complemented with the development of processes to stimulate oil biodegradation anaerobically in anoxic sediments. Once the dispersed oil reaches the sediments, bioremediation rates are substantially reduced due to the prevailing anoxic conditions. Kill-Spill provides a series of highly innovative technologies (e.g., “Kill-Spill snorkel,” “Kill-Spill Robot,” “Kill-Spill Sed-Cleaner,”) that overcome this problem and induce enhanced biodegradation rates in the sediments. These technologies can also be used for the remediation of recurrently polluted sediments (from old oil spills) in all types of environments from the Eastern Mediterranean to Disko Bay in Greenland. In addition, several other innovative products will be developed, e.g. “Kill-Spill All-in-One,” “Kill-Spill Deep-sea”, “Kill-Spill Bio-boom,” besides the “Kill-Spill Biosensor,” for in situ monitoring of oil degradation.

A toolbox of highly innovative (bio)technologies will be developed and made readily available to all emergency response personnel subject to final approval by the European Marine Safety Agency and related Member State agencies. An important aspect of the Kill-Spill project is

Partners:

Greece (Coordinator), Swiss, Italy, United Kingdom, Denmark, Spain, Belgium Czech Republic, Germany, Ireland, Norway, Slovenia, United States.

the field testing of the developed technologies in actual oil spills that will occur in Eastern Mediterranean Sea and in North/Norwegian Sea over the next 4 years. Kill-Spill has secured the partnership of two SMEs whose primary business is the emergency response for combating oil spills in both marine regions.

Kill-Spill European Added Value

The Kill-Spill project involves 14 SMEs active in complementary areas, contributing to the development of innovative and integrated solutions and tailored strategies for the oil spill cleanup market. Thus, Kill-Spill consortium will generate new industrially driven foreground and deliver innovative processes and services to policy makers and European citizens. The Kill-Spill project has also much to offer to the Marine Strategy Framework Directive (MSFD). For example, all the technologies developed for hydrocarbon polluted sediments can be part of the mitigation measures to return marine environments to Good Environmental Status (GES). Furthermore, the monitoring tools can be used by Member States in their requested initial assessment to identify current environmental status. Moreover, many of the Kill-Spill biostimulation strategies can be applied to sea areas faced with chronic pollution.

Project N° 312139	Topic: FP7-KBBE.2012.3.5-01: Innovative biotechnologies for tackling oil spill disasters	EU contribution: € 8,996,599	Duration: 48 months	From: January 2013
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SONIC:

Suppression Of underwater Noise Induced by Cavitation

With the steady growth of shipping activities over the last decades, underwater noise is increasing. It may be hindering sea mammals, or may even be harmful to them. Underwater noise is a European concern and is identified as a qualitative descriptor for determining the Good Environmental Status under the Marine Strategy Framework Directive. The main sources of noise are the ships' propellers, especially if the flow around the propellers is cavitating. Most propellers are cavitating when the ship is sailing at its designed speed. The surge for more fuel-efficient propellers is increasing cavitation. Therefore the dilemma is: less CO₂ emissions into the air yields more noise emissions under water.

The first goal of the project is to enhance the understanding of radiated noise from ships. From earlier studies, it is known that the kind of noise generated far away from the ship can vary according to the form of cavitation. Based on this knowledge, the project aims to improve computational and measurement techniques used in the design of a ship. Numerical tools are extended and tuned to correctly predict the noise level; measurement techniques in model basins and cavitation tunnels are calibrated to correct noise

measurement for the reflection of noise from the walls of the facilities. Both the numerical and experimental tools need to be validated for the frequency ranges that are most harmful to sea mammals. Once a ship is designed, it is critical to establish the actual noise level with a trial. Such trials are usually conducted at ballast conditions, for which cavitation is absent. Noise measurements, therefore, need to be performed during service of the ship with the minimum possible hindrance to the economical operation of

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the ship. New techniques will be tested to measure the noise generated by the propeller on-board the ship. Another technique is to measure the noise off-board with buoys or sound arrays. Both techniques will be compared in order to obtain a reliable and cheap measurement procedure. With data available on the noise level of ships, it becomes possible to estimate underwater noise given the actual shipping activity. Using AIS (Automatic Identification System) data, the project will develop a technique for mapping underwater noise in the North Sea. This map can be used by authorities to manage shipping or to study the influence of mitigation measures.

The project will use model basins to study the noise emission from ships in design stage. Full-scale measurements at sea will be performed to establish accurately the noise of several ships, but also to determine long-term noise profiles of seas. All measurements will be fed into a database which will be made available to ship designers outside the project. The project will finally use computational tools to predict the noise in a given sea for a longer period, showing

Partners:

Netherlands (Coordinator), Italy, Germany, Spain, Sweden, United Kingdom, France.

the hinder to sea mammals in a noise map. SONIC will closely cooperate with the AQUO project, which will adopt a complementary approach to study cavitation noise.

SONIC European Added Value

The Member states of the EU have committed themselves to marine environmental protection. One of their commitments is to monitor and limit the level of noise in their respective seas. The project will enhance the knowledge on noise radiated from individual ships, and on noise in seas due to shipping. The consortium consists of all major propeller manufacturers and ship model basins in Europe. With the knowledge generated, the Member States will be able to take protective measures, like spatial planning of shipping, and recommend legislation to the International Maritime Organization (IMO).

Project N° 314394	Topic: FP7-SST.2012.1.1-1. Assessment and mitigation of noise impacts of the maritime transport on the marine Environment	EU contribution: € 2,999,972	Duration: 36 months	From: October 2012
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STAGES:

Science and Technology Advancing Governance on Good Environmental Status

www.stagesproject.eu/

EU Member States are required to implement measures in order to ensure their marine waters achieve Good Environmental Status (GES) by 2020. Defining what constitutes GES is challenging. Advances are being made in marine research that can underpin environmental assessments. Projects funded under “The Ocean of Tomorrow 2012”, coordinated initiative are part of this effort. As a matter of fact, uptake of knowledge from research projects is often an issue. It is hindered by the lack of awareness of the current research effort and outputs; and the lack of an interface between science and policy. STAGES, as a support action, will work to directly address these gaps in order to facilitate access research results relevant to the Marine Strategy Framework Directive (MSFD).

The drive for healthier seas and oceans was conceived as part of the Marine Strategy Framework Directive, which became European environmental legislation in 2008. The MSFD outlines 11 key descriptors of GES to assess the marine environment. These descriptors are intended to provide guidance towards achieving overall GES status. STAGES will initiate a series of targeted support activities that will develop additional scientific understanding for assessing GES and offer

solutions to make this knowledge accessible, relevant and usable by policy-makers and stakeholders in the Member States affected.

Key Objective 1: Identify, extract and synthesise the knowledge generated through EU and national research-funded activities relating to the MSFD, and make this information widely accessible to policy-makers and MSFD stakeholders.

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Key Objective 2: Conduct a thorough mapping of existing research efforts and consult with Member State experts and DG ENV to establish where further research needs to be conducted to improve the scientific knowledge underpinning implementation of the MSFD.

Key Objective 3: STAGES will provide pragmatic and ready-to-use recommendations to establish an effective European science-policy interface (SPI) platform to support GES research and implementation of the MSFD.

Through the above mentioned actions, the project will bridge the MSFD science – policy gap and improve the current scientific knowledge base to allow Member States to achieve GES.

Through close engagement with DG ENV, Member States' representatives and MSFD stakeholders, STAGES will carry out a range of supporting activities. For example, a comprehensive knowledge collection process will help build an inventory of MSFD-relevant research projects and knowledge outputs. Through scientific foresight workshops, MSFD knowledge

Partners:

Spain (Coordinator), Portugal, France, Ireland, Denmark, Belgium, Norway.

gaps will be identified. Recommendations for a Science-Policy Interface will be based on stakeholder consultation and assessment of existing structures, processes and global best practices.

STAGES European Added Value

MSFD is the environmental pillar of the Integrated Maritime Policy (IMP) that provides, for the first time, a Europe-wide policy framework to holistically and sustainably manage human activities in EU territorial waters. It aims to support the continued development of a sustainable maritime economy in Europe, whilst protecting and restoring the environmental health of Europe's marine environments. To achieve this, multi-disciplinary and multi-stakeholder cooperation at a European level is needed. As part of "The Ocean of Tomorrow," 2012 coordinated initiative, STAGES will contribute to this goal.

Project N° 308473	Topic: FP7-ENV.2012.6.2-5 Scientific knowledge base to support the implementation of the Marine Strategy Framework Directive	EU contribution: € 999,733	Duration: 24 months	From: September 2012
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The aim of this brochure is to present the 19 projects that have been selected under “The Ocean of Tomorrow” initiative (2010, 2011 and 2012). “The Ocean of Tomorrow” calls fall within the activities launched under FP7 to implement the “European Strategy for Marine and Maritime Research” COM (2008) 534 and to address marine sciences and technologies as a challenge that cut across themes. “The Ocean of Tomorrow” aims to foster multidisciplinary approaches and cross-fertilisation between various scientific disciplines and economic sectors on key cross-cutting marine and maritime challenges. Research projects funded under these calls bring together scientists, technology providers, industrial partners (including SMEs) and end-users. “The Ocean of Tomorrow,” also links to the “Horizon 2020,” proposal, which acknowledges the importance of cross-cutting approaches.

Project information

