

# Mapping

## Joint Programming Initiative Healthy and Productive Seas and Oceans



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## INTRODUCTION

The JPI "Healthy and Productive Seas and Oceans" covers cross-cutting activities related to the marine environment, interactions with climate, marine resources and activities (in particular fisheries, aquaculture, marine biotechnology, marine energy, and maritime transport). The corresponding mapping of public marine research activities has therefore covered these areas.

The quantitative figures collected by April 2011 in the mapping process from 16 Member States and the European Commission add up to 1.86 billion €/year expenditure. This covers mainly publicly funded marine research activities<sup>1</sup> and estimated 80% of total marine and maritime investments in Europe. Previous studies have shown that marine infrastructure investments and funding (including running costs and maintenance) is highly expensive (for example ships and major platforms) and represent on average between 40% and 50 % of the total funding.

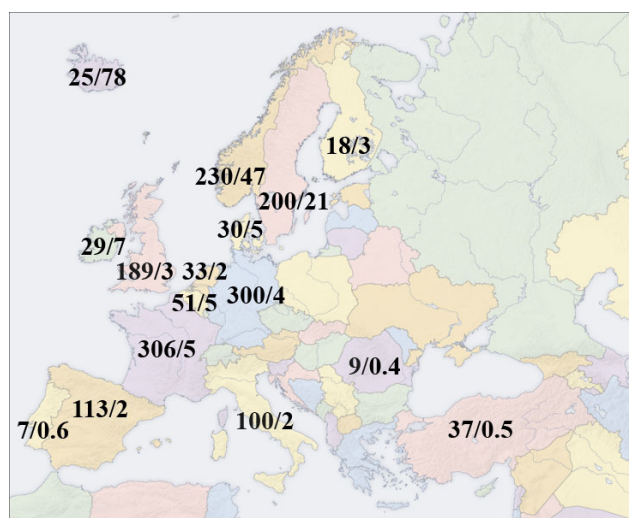


Fig 1: The institutional investments in marine research (numbers on left in million Euros) and the national expenditure per person (numbers on right in Euros).

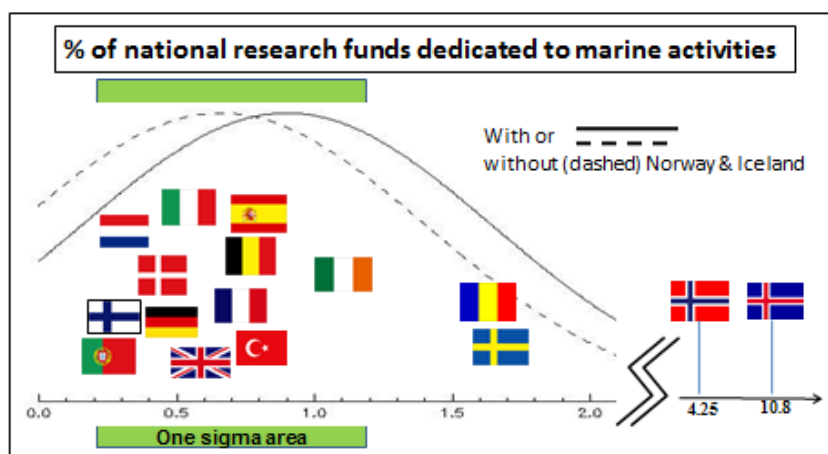


Fig 2: The percentage of national research funds dedicated to marine activities

<sup>1</sup> Industry research funding is not included in this mapping exercise.

## DATA COLLECTION

The mapping has been conducted by two questionnaires circulated through the JPI participants after the meetings of the Interim Management Board (IMB) in June 2010 and January 2011. It consists of a **quantitative** and **qualitative** overview of national research funding and innovation systems, the adoption of competitive and non-competitive funding schemes, funding models as well as capacities in terms of research performing organisations, infrastructure, data and human resources.

In addition, a detailed mapping of marine and maritime research activities at EU level was undertaken by the European Commission (Directorate General for Research and Innovation). It covered areas mentioned above, as well as FP7 cross-thematic marine - maritime calls under the "Ocean of Tomorrow" heading. The Commission annual spending in FP7 has been approx. 213 M€/year.

<b>Marine and Maritime Research</b> <small>(estimates based on input and data analysis)</small>			
Marine – maritime annual research funding of JPI Oceans members		Marine –maritime annual research funding in FP7	
Marine Environment	25 %	Marine Environment *	29 %
Biological resources	25 %	Biological resources	19 %
Non-biological resources	20 %	Non-biological resources	21 %
Fisheries management	10 %	Oceans of Tomorrow (crosscutting)	9 %
Spatial planning and Socio economic research	5 %	Other	22 %
Climate and Ocean	15 %	* Marine environment probably includes climate change	
<b>Total</b>	<b>1684 M €</b>		<b>213,5 M €</b>

The national listings of research performing institutions (mainly Universities and Institutes) have been compiled using the input from the questionnaires as well as the study on marine and maritime research organisation in Europe conducted by ECORYS in 2007 on behalf of the European Commission in view of the Maritime Policy of the European Union.

It has been quite challenging to get a comprehensive quantitative and detailed overview because of the multidisciplinary nature of marine and maritime activities.

The substantial costs of marine research infrastructures have been taken into account, but funding for satellites used for instance in the framework of the Global Monitoring for Environment and Security (GMES) has not been included in the mapping.

Whilst, in terms of marine and maritime activity, the most significant member states and associated countries (in research budget terms) have been covered, some coastal EU member states and associated countries, as well as some landlocked countries with investments in maritime technologies (Austria, Hungary) are not covered in the study.

Therefore the estimate of the total spending should be considered conservative and our assessment is that the total of 1.86 billion € which we have mapped would represent about 80 % of the total annual expenditure in Europe on marine and maritime research.

Thus to conclude, when comparing the mapped investments in marine - maritime research and infrastructure, the MS/AC account for at least 88,5% and the Commission 11,5% of the investments.

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## ANALYSING THE DATA – LINKING THE MAPPING AND THE VISION

The analysis shows that the research- and innovation systems vary quite substantially from country to country regarding for instance the level of research efforts, areas covered and their accessibility. Nevertheless some general aspects can be drawn from the analysis of the qualitative and quantitative mapping.

Data gathering, long term observation and infrastructure are absolutely needed to build a knowledge based support to policy, but they are costly. These long term activities and infrastructure are not planned in the usual short-term and competitive programs and consequently fall outside the present scope of ERA-nets.

The JPI "Oceans" being a long term process with the involvement of high-level decision makers will seek to bridge these gaps, by providing a strategic alignment to all the relevant initiatives taking place at the European level. The JPI will foster cooperation between institutionalised projects and budgets, and between the on-going initiatives like the ERA-nets and the technology platforms.

Also, given the difficulty to organise research across departments, thematic research (focusing on specific areas like marine environment, climate, fisheries, aquaculture, marine renewable energy, maritime transport...) is usually better supported than research that cuts across themes. This is reflected in the structure of the marine ERA-Nets which cover separately the marine environment (SEAS-ERA), fisheries (MARIFISH), maritime transport (MARTEC), marine biotechnology and ocean energy.

Since seas related issues are cross-thematic in nature, it is therefore important that the JPI "Oceans" fills such gaps by focusing on cross-thematic knowledge gaps and the corresponding technological challenges.

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## THIRD COUNTRIES

It has been possible to compile a preliminary mapping of marine research undertaken in the United States, under the coordination of the National Oceanic and Atmospheric Administration (NOAA). A first finding from this exercise is that the overall level of spending on marine research (as defined previously) is comparable in the US and Europe. However, US spending is better integrated in particular thanks to the Integrated Ocean Observing System (IOOS) developed by NOAA. (See annex table comparing the US and Europe). However the US has a more integrated approach including higher and also more integrated investments in infrastructure.

The secretariat of the JPI is also mapping the marine and maritime research funding in Australia and Canada, in contact with the Department of Fisheries and Oceans in Canada and the Integrated Marine Observing System and Australian Ocean Data Network office in Australia.

The exercise should prove useful to exchange practice and compare the total funding and systems between Europe and third countries with substantial marine and maritime research.

## BELGIUM

**Quantitative mapping contribution: 51,69 M€/year <sup>2</sup>**

### BELGIUM (FEDERAL)

#### DESCRIPTION OF THE NATIONAL MARINE AND MARITIME RESEARCH AND INNOVATION POLICIES AND PRIORITIES

Belgium is federal country composed of 7 federated authorities: the Federal State, the three regions and three communities. Each authority has competence in research and innovation.

At federal level the Belgian Science Policy Office (BELSPO) is funding research programmes on different themes. The major marine related programmes are: the Research programme "Science for a sustainable development - SSD" with sub programmes on the North Sea, Biodiversity, Climate and Atmosphere and Antarctic and polar regions; and the Research programme for Earth Observation (STEREO)

Within the "Science for a sustainable development - SSD" 22 marine related projects are funded for a total budget of 17 M€. Within the Earth Observation programme STEREO II 9 marine related projects are funded for a total budget of 3 M€.

BELSPO counts also 10 research institutes within its structure. Regarding marine research the Royal Belgian Institute of Natural Sciences (RBINS); the Royal Museum for Central Africa (RMCA) and the Royal Meteorological Institute (RMI) should be mentioned.

#### RESEARCH PERFORMING ORGANISATIONS

List of RPO's
Royal Belgian Institute of Natural Sciences (RBINS)
Royal Museum for Central Africa (RMCA)
Royal Meteorological Institute (RMI)

#### RESEARCH INFRASTRUCTURE

##### Oceanographic Research vessel BELGICA

The oceanographic research vessel Belgica is owned by the BELSPO on behalf of the Belgian State. The Management Unit of the Mathematical Model of the North Sea (MUMM), a department of the Royal Belgian Institute of Natural Sciences (RBINS), is responsible for the management of the ship and its scientific equipment. MUMM is also responsible for the planning and the organisation of the scientific campaigns at sea. The Belgian Navy provides the crew and takes care of the operational aspects as well as the moorage in Zeebrugge, the Belgica's home port. The ship was commissioned in 1984.

##### BMDC – Belgian Marine Data Centre

The Belgian Marine Data Center is a group of scientists within MUMM, whose expertise is oriented towards the management and the analysis of marine environmental data.

Its major tasks are :

1. to continuously assess the state of the North Sea

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<sup>2</sup> This amount does not include research funded by the French-Speaking Community (FNRS) nor the Walloon Region

2. to evaluate and improve the monitoring programmes
3. to gather, validate, archive, manage marine and oceanographic data collected (mainly) by Belgian scientists in the frame of research projects and national and international monitoring programmes

The missions of the BMDC are structural and continuous.

It is the BMDC's policy to encourage the public to explore and use its datasets. Therefore, the oceanographic data, including analysis tools, are put at the disposal of a wide range of users: scientists, policy makers, sea professionals and other stakeholders, at the national and international levels. For specific requests, the expertise of the BMDC staff can be provided.

More information: <http://www.mumm.ac.be/datacentre/>

### **New research vessel**

The Oceanographic research vessel *Belgica* has celebrated his 25th anniversary in 2009. The Belgian Science Policy Office is considering the possibilities for a replacement. A feasibility study has been completed end of 2009 on the purchase options for a new oceanographic research vessel or modernization of the actual *Belgica*.

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## **HUMAN RESOURCES AND MOBILITY**

### **Postdoc fellowships to non-EU researchers**

The Belgian Science Policy Office does implement a fellowship scheme for highly qualified researchers (i.e. postdoctoral level or equivalent experience) from specific regions, granting them an opportunity to work a certain period (18 months) in a Belgian research team in the frame of a project funded by BELSPO.

### **Return grants for researchers working abroad**

These grants are aimed to promote the reintegration of highly qualified Belgian researchers working since at least 2 years in a foreign country. Eligible candidates must be Belgian nationals or having spent at least 3 years in Belgium for R&D or higher education purposes, before their post-doctoral stay abroad.

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## **BELGIUM (FLANDERS AND FLEMISH COMMUNITY)**

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### **DESCRIPTION OF THE FLANDERS MARINE AND MARITIME RESEARCH AND INNOVATION POLICIES AND PRIORITIES**

In Flanders, the department of Economy, Science and Innovation (EWI) has no dedicated research programmes as such. The Government of Flanders decided to fund Research and Innovation through 4 main funding lines.

1. The Research Foundation – Flanders (FWO-Vlaanderen): Flanders research foundation is funding mainly basic and cutting edge research. FWO provides PhD-grant and post-doc grants on the basis of excellence. Several of them are related to marine topics.
2. Flanders Innovation & Technology agency (IWT): the agency supports a lot of strategic and applied research. IWT provides yearly also +/- 300 grants in applied research fields, some of them are dealing with marine related topics (biotechnology, aquaculture, marine technology).
3. Strategic research centres: these can be considered as dedicated research programmes: IMEC: micro-electronics, nanotechnology <http://www.imec.be>), VIB: Flanders Biotechnology Institute <http://www.vib.be>; VITO: Flanders Environmental technologies, with an important Remote Sensing division which covers marine topics <http://www.vito.be>; IBBT: Institute for Broad Band Technologies <http://www.ibbt.be>, dealing with ICT innovation.
4. BOF: Special Research Funds: These research funds are provided to the universities in order to develop their own research policy and support their own flagship research priorities.



Each of these funding sources are important for the career development of researchers. FWO and IWT are also important to stimulate the mobility of researchers.

IWT has several programmes related to SME's and industrial activities. Projects can be granted up to 70% of their costs. IWT gives also specific attention to the Industry- University exchange programme. Apart from these research lines, EWI is financing a dedicated service, data and information platform for the marine/maritime research community, i.c. the Flanders Marine Institute (VLIZ): <http://www.vliz.be>.

Flanders Marine Institute host the Integrated Marine Information System 'IMIS'. This database contains most of the information of Flanders marine-maritime research community. IMIS contains next to the persons information also information of the marine research projects and their outcome. The information on project (duration, funding source, budget, partners, etc) is provided by the researchers to IMIS. For some of the projects the funding source or budget was not indicated.

Nevertheless, despite an underestimation of about 15 %, from the information derived from IMIS and the research funding agencies FWO and IWT for the period 2005-2009, the spending on marine and maritime related research projects adds up to an average of **11.7 million Euro a year**, not taken into account the institutional funding for monitoring and logistic support costs of about **11.4 million Euro per year**.

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## RESEARCH PERFORMING ORGANISATIONS

List of RPO's
Flanders Hydraulics Research
Flanders Marine Institute (VLIZ)
Flemish Institute for Technological Research (VITO)
Ghent University (UGent)
Institute for Agricultural and Fisheries Research (ILVO)
Katholieke Universiteit Leuven (K.U.Leuven)
Research Institute for Nature and Forest (INBO)
University of Antwerp (UA)
University of Hasselt
Vrije Universiteit Brussel (VUB)

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## RESEARCH INFRASTRUCTURE

Most of the research in Flanders is done at the universities and strategic research centres. **Flanders marine institute (VLIZ)** is providing services prior to the Marine/Maritime research community and also to all relevant stakeholders in Flanders/Belgium and also abroad. **VLIZ** is also responsible for the planning of the research activities on board the RV Zeeleeuw. A new 36m-long research vessel 'RV Simon Stevin' (11.5 M€) is under construction and will be operational by the spring of 2012.

### List of research infrastructure:

- VLIZ land-based facilities (incl. coastal dune research facility De Haan)
- VLIZ pool of oceanographic instruments
- Flanders Marine Data and Information Centre VMDC, incl. list of major data systems  
[http://www.vliz.be/EN/Data\\_Centre/Data\\_Centre\\_intro](http://www.vliz.be/EN/Data_Centre/Data_Centre_intro)
- ROV GENESIS of UGent



- Flume tank UGent
- Facilities Flanders Hydraulics Research (wave flume, wave basin, test basins, towing tank, current flume etc.)  
<http://www.watlab.be/en/facilities>

## BELGIUM (WALLOON REGION - FRENCH-SPEAKING COMMUNITY)

The Fund for Scientific Research - FNRS has the exclusive support competence for the French-speaking Community of Belgium (Brussels and Wallonia). On a general note, the FNRS fosters research in all scientific fields, following a bottom-up approach of investigator-driven research. The Fund supports individual researchers on the basis of the criterion of excellence by offering temporary or permanent positions; funding to research projects; grants and credits for international collaboration and scientific prizes. The Fund's annual budget amounts to ~150 M EUR.

Marine and maritime research is mainly funded by the following instruments:

1. Support to individual researchers at all levels (salaries and fellowships), accounting for 2/3 of the total budget of FNRS
2. Support to bottom-up research projects ( accounting for 1/3 of the budget)
3. Support to medium and large scale research infrastructures
4. Support to researchers' mobility

Regarding the research projects (both individual and collaborative) honoured in 2008, it is estimated that 10 - 20 projects in the field of marine and maritime sciences were funded accounting for approx. 2 M EUR or 4-5% % of all honoured research projects in 2008. These include mainly research projects related to interactions between oceans and climate as well as marine biodiversity.

At the European level, FNRS is a full member of the ESF Marine Board.

## RESEARCH PERFORMING ORGANISATIONS

List of RPO's
Centre interuniversitaire de Biologie marine, Umons – ULB
Université catholique de Louvain (UCL)
Université de Mons-Hainaut (UMH)
Université Libre de Bruxelles (ULB)
University of Liège (ULg)

## DENMARK

**Quantitative mapping contribution: 29,8 M€/year**

## DESCRIPTION OF THE NATIONAL MARINE AND MARITIME RESEARCH AND INNOVATION POLICIES AND PRIORITIES

Internationally the marine research is undergoing a strong development and many countries see the benefit in having a broad scientific knowledge base. The Danish dependence of the sea, due to large marine areas and a lengthy coastline of renders strong and broad scientific environments, which further can develop our understanding of the key processes in the coastal zone and in the marine environment. This knowledge forms the basis for a future, sustainable management and use of the renewable resources for the benefit the environment as well for business activities.

For generations the marine areas has provided the basis for generation of value in the Danish community activities like through fishing, marine aquaculture, shipping industry, oil and natural gas production and the exploitation of sand and rubble. The successful management of these resources has been facilitated through a high level of Danish applied marine research and through basic research at the Danish universities.

The demands for management of the seas have increased in recent years. Sustainable integrated management of marine resources was introduced in the EU's Common Fisheries Policy in 2002 and in the Marine Strategy Framework Directive 2010.

In the coastal areas, the Natura 2000 directives and the Water Framework Directive clarify the requirements for ecosystem management and the documentation of sustainability. The development of management tools and practices will require scientific advice based on research. This creates substantial challenges for the research to

- improve the understanding of the dynamics of marine ecosystems and,
- develop a more accurate methodology for improved measurements of the physical marine environment, primary and secondary production and fish populations. The increased rate will be required knowledge about seabed conditions and seabed flora and fauna.

During the last couple of years it has been noted that likely major changes in the marine environment will take place due to global warming, icecap retreat and changes in atmospheric circulation. This offers new challenges for the Danish marine research as well as on the European level. Increased focus on climate change and the impact on the marine ecosystems also require studies of climate history and structure of the ecosystems. In our oceans it is expected that climate changes will lead to significant changes in size and distribution of fish and shellfish stocks. Thus, marine flora and fauna, the biodiversity and its biomass, generally can be significantly affected by these changes.

In the northern seas, the distribution of sea ice has already been substantially changed. In order to follow this trend and to predict the effects of climate change, it is necessary to intensify research on marine natural environment and continuously enhance the understanding of coupling between ocean physics, chemistry and biology. Research in exploiting and benefitting the changed marine conditions are also necessary.

The food sector is a cornerstone of the Danish economy and is strong in the global market. The Danish strategic research in food issues offer consumers a wide and diverse range of Danish-produced marine quality food, promoting a competitive development in the fish processing industry and contribute to society's regulation of the profession in the interests of a sustainable and productive use of the marine renewable resources.

To obtain these aims it is the overall Danish strategy to:

- Strengthen the academic environments, including through a concentration of research in fewer and larger environments and conclusion of cooperation agreements.
- Strengthen the interdisciplinary research and increase the national research specialization in order to avoid unnecessary duplication of research.
- Improve the graduate and PhD training opportunities in the marine.
- Expand and upgrade international research and collaboration as well as dissemination and exploitation of results.

## RESEARCH PERFORMING ORGANISATIONS

List of RPO's
Aalborg University - Department of Development and Planning/Innovative Fisheries Management
Aarhus University
Danish Hydraulic Institute
Danish Technological Institute
FORCE Technology, including the Maritime Division
Geological Survey of Denmark and Greenland
Greenland Institute of Natural Resources
Maritime Growth Centre
Orbicon
Roskilde University
Technical University of Denmark – National Institute for Aquatic Resources
The Danish Meteorological Institute, Centre for Oceans and Ice
University of Copenhagen
University of Southern Denmark

## FINLAND

**Quantitative mapping contribution: 18,0 M€/year**

## DESCRIPTION OF THE NATIONAL MARINE AND MARITIME RESEARCH AND INNOVATION POLICIES AND PRIORITIES

Finland aims to enhance our understanding of the sea and its marine ecosystems by building up scientific information. To achieve this goal Finland is also actively involved in international marine research organisations. Finnish marine research largely focuses on the Baltic Sea, with such studies accounting for about 90% of internationally published Finnish marine research. Marine research conducted in Finland is funded by various ministries and from the budgets of public research institutes and universities, as well as from competitive research funds.

Important sources of competitive research funding include the Academy of Finland, the EU's research framework programmes, and the BONUS – Baltic Organisations Network for Funding Science EEIG, which funds marine research all around the Baltic Sea. Tekes, the Finnish funding agency for technology and innovation, is a major provider of funds in certain specialist areas. Several Finnish foundations also provide significant funding for Baltic marine research, including the Walter and Andrée de Nottbeck Foundation, the Nessling Foundation and the Kone Foundation.

In Finland marine and maritime research is a relatively small research field. Studies in the water sector, of which marine research is estimated to account for approximately a quarter in terms of funding, only received about 0.7% of government research funding in 2005. The Academy of Finland has estimated that during the same year competitive research funding accounted for about half of total research funding granted to the water sector.

Finland is currently preparing a national strategy for marine and maritime research.

## RESEARCH PERFORMING ORGANISATIONS

List of RPO's
Åbo Akademi University

Academy of Finland
Agrifood Research Finland (MTT)
Aronia-Institute (Novia University of Applied Sciences and Åbo Akademi Univ.)
Finnish Environment Institute, marine research centre
Finnish Food Safety Authority (Evira)
Finnish Game and Fisheries Research Institute
Finnish Meteorological Institute
Geological Survey of Finland
National Institute for Health and Welfare
Nordic Network of Excellence in Sea Ice Research (NetIce)
The Finnish Institute of International Affairs
University of Helsinki,
University of Turku
VTT Technical Research Centre of Finland

## FRANCE

**Quantitative mapping contribution: 305,5 M€/year**

### DESCRIPTION OF THE NATIONAL MARINE AND MARITIME RESEARCH AND INNOVATION POLICIES AND PRIORITIES

French marine research is mainly driven by the Ministry of Higher Education and Research (MESR), through the Universities and Research Performing Organizations, funded under the National Strategy for Research (SNRI) based upon 5 principles and 3 research priorities which are :

#### Principles:

1. Basic research and large research infrastructures is a necessity
2. Research must support competitiveness and address innovation
3. Limitation of risks and increased security in our societies
4. Development of social sciences
5. Increased multidisciplinary approach in the scientific developments

#### Priorities:

1. Health, welfare, food and biotechnologies
2. Important and impacting environmental topics and development of ecotechnologies
3. Information and communication technologies, nanotechnologies

**The overall budget for marine research could be roughly estimate at 300 M€/year of non-competitive funds (research infrastructures are included)** while competitive money comes mainly from European Projects under the Framework Program, from Structural Funds (Interreg, FEDER) and the National Research Agency (ANR) in France.

Marine research themes are addressing to oceanography (air-sea interactions, physics, biogeochemistry, acidification, modelling, variability prediction), climate change impact and the marine environments, including paleoclimatology, ocean technologies (renewable energy, oil and gas, robotics, sensors), energy extraction from the sea, food from aquaculture and fisheries, safe and sustainable use of marine and coastal space, marine biodiversity and biotechnologies, new frontiers (deep sea resources, polar and tropical environment), regional integrated programs (Mediterranean, arctic), observation programs (e.g. ARGO, oceansites), socio-economic and policy support (WFD, MSFD, MPAs).

From 2010, research organizations and universities involved in the environment sciences are represented in the French Alliance for the Environment, where a cluster for marine science is represented. The aim of this cluster is to produce by mid-2011 a national program for marine research incorporating the major research performers in France (see §2). This program will be the basis for the French contribution to the JPI Oceans and will also have an impact on the ANR programs.

In 2008, the French Government decided to launch technology and science cluster to support the innovation process enterprise involving major companies, SMEs, research centres and higher education institutions. Two marine cluster have retained in a bottom up selective process (in Brest and Toulon). Now twined, their mission is to identify and promote the emergence of innovative projects that will satisfy the demands of new markets. The project partners, who are key stakeholders in the maritime world, draw on the sea for inspiration and, by networking, develop their ideas into sustainable products and services. They focus on maritime safety and security, shipbuilding and leisure boat building, marine energy resources, marine biological resources, coastal and environmental planning and management, and operate through calls for proposals and the projects are financed by public and private funding.

Due to the fact that sea embraces different sectors, relevant funds come also from other Ministries, the Ministry of Ecology, sustainable development and transport, the Ministry of Agriculture Food and Fisheries, the Ministry of Economic Development and from the Local Administrations (mainly the Regions).

## RESEARCH PERFORMING ORGANISATIONS

List of RPO's
Agrocampus Ouest
BEC
Bureau de Recherches Géologiques et Minières (BRGM)
Centre national d'études spatiales (CNES)
Centre national de la recherche scientifique (CNRS)
CPU
Ifremer
Institut National de Recherche sur les Transports et leur Sécurité
Institut pour la Mer et Polaire
L'institut de recherche en sciences et technologies pour l'environnement (Cemagref)
L'Institut national de la recherche agronomique (Inra)
Laboratoire d'Océanographie de Villefranche
L'Institut de recherche pour le développement (IRD)
L'Institut polaire français Paul-Emile Victor (IPEV)
MERCATOR
Meteo France
Museum National d'Histoire Naturelle (MNHN)
Museum national d'Histoire Naturel
Observatoire Oceanologique Roscoff
SAFINA
Service hydrographique et océanographique de la marine française (SHOM)
SOGREAH
Université de Nantes
Université de Brest

## GERMANY

**Quantitative mapping contribution: 300 M€/year**

### DESCRIPTION OF THE NATIONAL MARINE AND MARITIME RESEARCH AND INNOVATION POLICIES AND PRIORITIES

German expenditures on marine on maritime RTD according to the Bundeshaushaltsplan 2010 are approximately 300 million Euro (institutional funding included)

#### **BMBF Federal Ministry of Education and Research**

The main body responsible for scientific research funding is the German Federal Ministry of Education and Research (BMBF).

One of the priorities for future activities is marine research on all local and global seas and oceans with three focal points for Marine and Earth System Science:

1. Arctic
2. German coastal seas
3. South-western African rim

#### **DFG German Research Council**

Basic research in the marine sciences is mainly funded through the DFG. The DFG Senate Commission for Oceanography plans and coordinates the activities of the DFG in the area of marine research and oversees the key programs and collaborative research grants concerned. In addition, the senate committee functions as the German national committee for the affairs of the Scientific Committee on Oceanic Research (SCOR) of the International Council of Scientific Unions (ICSU).

Applied marine and maritime research and technology development is funded by

- **The Federal Ministry of Food, Agriculture and Consumer Protection (BMELV)** provides research capacities via the Johann Heinrich von Thünen Institute in the fields of fisheries and aquaculture research.
- **The Federal Ministry of Transport, Building and Urban Development (BMVBS)** in the field of maritime transport. The BSH German Maritime and Hydrographic Agency has substantial capacities in the fields of operation marine research, including, but not limited to, ocean observations, marine environmental monitoring, maritime geospatial data, maritime spatial planning, etc.
- **The Federal Ministry for Economics and Technology (BMWi)** in the fields of maritime technology research. The BGR German Federal Institute for Geosciences and Natural Resources has extensive capacities related to marine resources RTD.

### RESEARCH PERFORMING ORGANISATIONS

List of RPO's
Alfred Wegener Institute for Polar and Marine Research (AWI), Bremerhaven
Bundesanstalt für Geowissenschaften und Rohstoffe
Centre for Marine and Climate Research (ZMK), University of Hamburg, Hamburg
Coastal Research Centre of the University of Hannover and the Technical University Braunschweig
Company for environment and coast
Department Maritime Systems, Interdisciplinary Faculty, University of Rostock
Erwin Sander
Federal Research Centre for Fisheries

Fraunhofer Institutes – at least 5 with a maritime focus (e.g. Fraunhofer Centre for Logistics etc.)
German Centre for Artificial Intelligence (Institute for Robotics, Bremen)
German Oceanographic Museum
German Oceanographic Museum (DMM), Stralsund
GKSS Research Centre
Hamburgische Schiffbau Versuchsanstalt
Helmholtz Zentrum Geesthacht, Centre for Materials and Coastal Research
HSVA
HYDROMOD
Institut für Seeverkehrswirtschaft und Logistik
Institute for Chemistry and Biology of the Marine Environment (ICBM), Oldenburg
Institutions operated by the 5 German Federal States in coastal regions (e.g. for coastal engineering, etc.)
Jacobs University of Bremen
Johann Heinrich von Thünen Institutes - Aquatic Resources (vTI)
Leibniz Center for Tropical Marine Ecology (ZMT), Bremen
Leibniz Institute for Baltic Research Warnemünde (IOW), Warnemünde
Leibniz Institute of Marine Sciences (IFM-GEOMAR), Kiel
MARUM Centre for Marine Environmental Sciences, Bremen
Max-Planck-Institute for Marine Microbiology (MPI Bremen), Bremen
Max-Planck-Institute for Meteorology (MPI Hamburg), Hamburg
Schiffsbauversuchsanstalt (Potsdam Model Basin SVA) Potsdam, etc.)
Senckenberg Forschungsinstitut und Naturmuseum
Senckenberg Research Institute (FIS), Wilhelmshaven
Technical University Clausthal
Technische Universität Hamburg
Universität Rostock
University of Applied Sciences Bremerhaven
University of Applied Sciences Stralsund
University of Applied Sciences Wismar
University of Bremen
University of Greifswald
University of Oldenburg

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## HUMAN RESOURCES

There are at least 2500 full-time marine scientists working in Germany.



## ICELAND

**Quantitative mapping contribution: 25 M€/year**

### DESCRIPTION OF THE NATIONAL MARINE AND MARITIME RESEARCH AND INNOVATION POLICIES AND PRIORITIES

Icelandic policy on ocean issues is based on maintaining the future health, biodiversity and sustainability of the ocean surrounding Iceland, in order that it may continue to be a resource that sustains and promotes the nation's welfare. This means sustainable utilisation, conservation and management based on scientific research and applied expertise and guided by respect for the marine ecosystem as a whole. The health of the ocean and sustainable utilisation of its living resources provides the main basis for Iceland's economic welfare. In view of the importance of the waters surrounding Iceland, the government considers ocean issues to be central to its activities for the foreseeable future.

Icelandic policy is based on three pillars: the United Nations Convention on the Law of the Sea; the concept of sustainable development, and the view that responsibility for the conservation and utilisation of marine ecosystems is best placed in the hands of those states directly affected by the decisions taken and with the greatest interests at stake.

Iceland must participate actively and take the initiative internationally to win support for the tenets of sustainable development, and thus recognition for its own perspectives. Iceland should be a leader among states that prioritise improved treatment of the marine ecosystem. The country and its policy should be a model for other states, increasing the country's credibility in international discussions on the utilisation and protection of the marine ecosystem.

Sustainable utilisation is the key to rational and responsible conservation and management of marine resources. Iceland's policy places special emphasis on the importance of preventing ocean pollution. The application and further development of the ecosystem approach lays the basis for achieving Iceland's objectives in ocean issues.

### RESEARCH PERFORMING ORGANISATIONS

List of RPO's
Holar University
Icelandic Maritime Administration
Marine Research Institute
Matis – Icelandic Food and Biotech R&D
University in Akureyri
University of Iceland

**Quantitative mapping contribution: 24,58 M€/year<sup>3</sup>**

## DESCRIPTION OF THE NATIONAL MARINE AND MARITIME RESEARCH AND INNOVATION POLICIES AND PRIORITIES

The *Sea Change* Strategy (A Marine Knowledge, Research and Innovation Strategy for Ireland: 2007-2013) is the marine research component of the broader National Strategy for Science, Technology and Innovation (SSTI: 2006-2013).

The Strategy for Science, Technology and Innovation (SSTI: 2006-2013), launched by the Irish government in 2007, sets out ambitious goals for Ireland in the attainment of a knowledge society offering new opportunities for employment and social advancement whilst setting out a shared vision of placing Ireland firmly on the global map in terms of the excellence of its research and the application of research for the benefit of society.

The *Sea Change* Strategy builds on the vision and strategy outlined in the National Strategy for Science, Technology and Innovation with the aim of bringing about a transformation of the marine sector from a traditional one which is primarily associated with food harvesting to one which is multifaceted, embracing a range of new, high value, knowledge-intensive, commercial opportunities developed in a sustainable manner.

More specifically the *Sea Change* Strategy aims to:

- Assist existing, and largely indigenous, marine sub-sectors to improve their overall competitiveness and engage in activity that adds value to their outputs by utilising knowledge and technology arising from research;
- Build new research capacity and capability and utilise fundamental knowledge and technology to create new marine-related commercial opportunities and companies;
- Inform public policy, governance and regulation by applying the knowledge derived from marine research and monitoring;
- Increase the marine sector's competitiveness and stimulate the commercialisation of the marine resource in a manner that ensures its sustainability and protects marine biodiversity and ecosystems;
- Strengthen the economic, social and cultural base of marine dependant regional/rural communities.

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<sup>3</sup> Ireland has invested circa 116.8 M€ in a broad portfolio of strategic marine science, technology and innovation projects and programmes under its Sea Change Strategy (A Marine Knowledge, Research and Innovation Strategy for Ireland, 2007-2013) covering the period 2007-2013.

INDUSTRY RESEARCH MEASURE	DISCOVERY RESEARCH MEASURE	POLICY SUPPORT RESEARCH MEASURE
<ul style="list-style-type: none"> <li>Research Programme 1: Shipping &amp; Maritime Transport</li> <li>Research Programme 2: Seafood Processing</li> <li>Research Programme 3: Finfish Aquaculture</li> <li>Research Programme 4: Shellfish Aquaculture</li> <li>Research Programme 5: Fisheries Resources</li> <li>Research Programme 6: Seaweed</li> <li>Research Programme 7: Offshore Oil &amp; Gas</li> </ul>	<ul style="list-style-type: none"> <li>Research Programme 1: Marine Biodiscovery / Biotechnology</li> <li>Research Programme 2: Marine Technology</li> <li>Research Programme 3: Marine Functional Foods</li> <li>Research Programme 4: Renewable Ocean Energy</li> <li>Research Programme 5: Rapid Climate Change</li> </ul>	<ul style="list-style-type: none"> <li>Research Programme 1: Marine Environment Research</li> <li>Research Programme 2: Knowledge &amp; Information Management</li> <li>Research Programme 3: Socio-Economic &amp; Legal Research</li> </ul>
<b>MARINE INNOVATION SUPPORTING PROGRAMME</b> To support industry to develop R&D management and development capability and to support the commercialisation of R&D outputs		
<b>MARINE RESEARCH INFRASTRUCTURE PROGRAMME</b> <ul style="list-style-type: none"> <li>Seabed &amp; Resource Mapping</li> <li>Extension of Ocean &amp; Coastal Monitoring Network</li> <li>Robotic Platforms</li> <li>Test &amp; Demo Facilities for Marine &amp; Coastal Observations &amp; Monitoring Systems</li> <li>Access to High-End Computing</li> <li>Test facilities for Offshore Energy</li> <li>Fund to Access Ship Time</li> <li>National Equipment Pool</li> <li>Specialist Labs &amp; Infrastructure</li> </ul>		

The **priority marine research topics** covered by the *Sea Change* Programme, under the sub-headings: Industry, Discovery Policy Support and Marine Research Infrastructures, are outlined above.

#### Achievements to-date

Over the period 2007 -2010, a total of **116.8 M€** has been invested in marine research from national competitive research funding programmes. This includes:

- **51.9 M€** from the dedicated Marine Research Sub-Programme of the National Development Plan, comprising:
  - 45.6 M€ for competitive marine research projects
  - 6 M€ for specialist marine research infrastructures
- **64.9 M€** for marine research projects from other national research funding programmes (National Development Plan).

The investment is spread across a wide range of disciplines/marine sectors, with particular focus on Seabed and Resource Mapping (13.7%); Marine Biodiscovery/Biotechnology (14.4%); Renewable Ocean Energy (19%) and Fisheries Research (10%).

This investment has resulted in **excess of 200** competitive marine research projects—linking **11** public research institutes, **17** third level institutions (including two in Northern Ireland) and over **40** SMEs—and the creation/retention of **350** research positions, including 160 PhD Scholarships.

#### Filling strategic marine research capability gaps.

Further to a strategic **Marine Foresight Analysis** carried out in 2004-2005, a number of key gaps in Ireland's marine research capacity, essential for the implementation of the *Sea Change* Strategy, were identified. A significant number of these gaps have/are being filled through the establishment of research competencies linking existing and new researchers and specialist facilities under the Beaufort (Marine) Parsons (Energy) and Griffith (Geology) Research Funding Schemes. Specialist teams created to-date include:

- Access to Marine Geological Data (Griffith Award).

- Ecosystem Approach to Fisheries Management (Beaufort Award).
- Fish Population Genetics (Beaufort Award).
- Marine Biodiscovery (Beaufort Award).
- Marine BioGeoSciences (Griffith Award).
- Marine Economic and Social Research (Beaufort Award).
- Marine Functional Foods (Marine Institute / DAFF Award).
- Marine Sensors and Communications (Beaufort Award).
- Renewable Ocean Energy (Parsons Award).

#### Future Directions:

The SSTI and *Sea Change* Strategies are presently under review with a view to a more focussed prioritisation consistent with current national priorities (i.e. economic recovery and job creation) and available (reduced) research funding. The Irish government is, however insistent, that Research and Development remains central to its Economic Recovery Strategy.

**Further Information:** For further information on the *Sea Change* Strategy (including Annual Progress Reports) see: <http://www.marine.ie/home/SeaChange.htm>

#### RESEARCH PERFORMING ORGANISATIONS

List of RPO's
Aqua-FATc International Services
Athlone Institute of Technology
Cork Institute of Technology
Dublin City University
Dublin Institute of Technology
Galway-Mayo Institute of Technology
ICARUS
Institute of Technology Carlow
Institute of Technology Tralee
Letterkenny Institute of Technology
Marine Institute
National Maritime College of Ireland
National University of Ireland, Galway
National University of Ireland, Maynooth
Nautical Enterprise Centre
Sligo Institute of Technology
The Martin Ryan Institute
Trinity College Dublin
University College Cork
University College Dublin
University of Limerick
Waterford Institute of Technology

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## RESEARCH INFRASTRUCTURE

### Planned Research Infrastructure

#### SmartBay – A National Research, Test and Demonstration Platform (Galway Bay)

The SmartBay concept/infrastructure is designed to act as a focal point for the development of innovative solutions to important environmental issues and harness indigenous intellectual and technological creativity to establish Ireland as a hub for the emergence of next-generation marine, communications and environmental sensing technologies’.

SmartBay has also been an important catalyst for the proposal to establish a SmartOcean Innovation Cluster. (<http://www.marine.ie/home/SmartOcean.html>).

In July 2010, the SmartBay Consortium was awarded 3.8 M€ under the Irish Government's Programme for Research in Third-Level Institutions (PRTL). This funding will enable the expansion of the current pilot infrastructure deployed of the west coast of Galway.

#### Full Scale Wave Energy Test Site (Bellmullet)

Sustainable Energy Authority of Ireland (SEAI), in co-operation with the Marine Institute, is in the process of establishing with a full scale Off-shore Wave Energy Test Site at Bellmullet (west of Ireland) to complement the existing quarter scale Ocean Energy Test Site at Spiddal, County Galway.

<http://www.marine.ie/home/aboutus/organisationstaff/researchfacilities/Ocean+Energy+Test+Site.htm>

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## HUMAN RESOURCES AND MOBILITY

Over the period beginning 2007 - 2010, 350 marine research positions, including 160 PhD Scholarships, have been created/retained through national investment in marine research.

## ITALY

**Quantitative mapping contribution: 100 M€/year**

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## DESCRIPTION OF THE NATIONAL MARINE AND MARITIME RESEARCH AND INNOVATION POLICIES AND PRIORITIES

Italian marine research is mainly driven by the Ministry of Education, University and Research (MIUR), through the Universities and Research Performing Organizations and funded under the National Research Plan. The primary objective of the National Research Plan is the promotion of: a mission oriented research, best uses of human resources, excellence of research groups, public-private collaboration, multidisciplinary actions, policy support and sustainable growth.

The overall budget for marine research could be roughly estimated 100 M€/year of non-competitive funds (research infrastructures are included) while competitive money comes mainly from European Projects under the Framework Program and from Structural Funds.

Marine research lines are addressed to oceanography, climate change and marine environment, ocean technologies, energy, food, oceans and health, safe and sustainable use of marine and coastal space, new frontiers (deep sea, polar and extreme environment), socio-economic and policy support.

From 2008, research organizations and universities involved in the marine activities are represented in the Italian Oceanographic Commission (COI) a National Research Council (CNR) commission established to fulfil the duties of the Italian National

Coordination Body for the Intergovernmental Oceanographic Commission (IOC). The COI discusses also on marine research strategies.

A Technological National Platform (PTNM), led by the Ministry of Infrastructures and Transportation (MIT), has been established and involves all the stakeholders in the sea-related technologies. It aims at reaching a consolidated networking among stakeholders and building a shared vision in terms of technological growth, developing initiatives of national relevance. Innovation is pursued in synergism with close technological sectors (cross-fertilization) and integrating research and industry (speeding up of innovation). In particular, the actions on Marine Technologies are run in line with the *Industry 2015* Program that indicates strategic guidelines for the future Italian productive system development and competitiveness.

PTNM is in tune with the EU Waterborne Technological Platform and has already published a Strategic Research Agenda.

Due to the fact that the sea embraces different sectors, relevant funds come also from other Ministries: the Ministry of Environment, the Ministry of Agricultural, Food and Forester Policy, the Ministry of Economic Development and the Local Administrations and Technological Districts.

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## RESEARCH PERFORMING ORGANISATIONS

List of RPO's
CNR – National Research Council
CoNISMA - Consorzio Nazionale Universitario per le Scienze del Mare
ENEA – National Agency for New Technologies, Energy and Sustainable Economic Growth
Hydrographical Navy Institute
IMG
INFN – National Institute for Nuclear Physics
INGV – National Institute for Geophysics and Volcanology
ISILS
ISPRA – Institute for the Environmental Protection and Research
OGS – Institute for Oceanography and Experimental Geophysics
Shoreline
SZN – Anton Dohrn, Zoological Station of Naples

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## HUMAN RESOURCES AND MOBILITY

Personnel: 1100

Personnel Cost: 55.5 M€

Activities: Marine biology, Marine geology, Marine ecology, Marine technologies, Marine forecast, Physical Oceanography, Remote sensing, Fishery, Evaluation and diagnosing on food production, Evaluation and diagnostic on energy production, Environmental impact, Climate change, observations and modeling, Risks, Coastal management.

## THE NETHERLANDS

**Quantitative mapping contribution: 32,5 M€/year**

### DESCRIPTION OF THE NATIONAL MARINE AND MARITIME RESEARCH AND INNOVATION POLICIES AND PRIORITIES

Marine and maritime issues play a prominent role in The Netherlands. Large parts of the country are situated below sea level, implying the need for up-to-date coastal protection and efficient water management. Considerable effort and funds are allocated to research in this area. Technical and applied research is often commissioned by the ministry of Infrastructure and Environment (formerly transport and waterways) and is often carried out by the technical university of Delft and/or Deltares. This last research institution is dealing with many aspects of applied coastal and marine research (mainly abiotic and low trophic levels).

The harbour of Rotterdam (second-largest in the world) is one of the main drivers of the Dutch economy. Consequently, maritime issues (transport, harbour business, off-shore industry) are at the heart of Dutch policies. Fisheries play an important role too. The ministry of Economic Affairs, Agriculture and Innovation commissions extensive research through its research organization IMARES, which is linked to Wageningen University and focuses mainly on biotic studies incl. fisheries.

Academic research is mainly centred around the Royal Dutch Institute for sea Research (NIOZ), which is part of the national funding agency NWO (funded by the ministry of Education, Culture and Science).

Competitive money for academic research is channelled through the national funding agency NWO which administers the national program sea and coastal research (see below).

### RESEARCH PERFORMING ORGANISATIONS

List of RPO's
Centre for Estuarine and Marine Ecology (N IOO-CEME)
Delft Hydraulics
Deltares
ECORYS
Erasmus University Rotterdam
Free University of Amsterdam
Gittenberger Marine Research Inventory & Strategy
IMARES
Marin
Marine Analytics
MARIS
Mermayde
National Museum of Natural History
Naturalis
Netherlands Council for Scientific Research
Royal Dutch Institute for Sea Research (NIOZ)
SenterNovem
Technical University Delft
The Netherlands Institute of Ecology (NIOO-KNAW)
TNO



University of Amsterdam
University of Groningen
University of Utrecht

## OTHER RELEVANT ACTIVITIES

- **Funding program: National program Sea- and Coastal Research (NWO):** funded for 5 years (2008-2012, 20M€) by different ministries and industry. Competitive money distributed by national funding agency through tender procedures.
- **Economic top sector water:** Large-scale policy instrument launched by the Dutch government (Water is one of 9 “top sectors”). The aim of this initiative is to join forces between science, industry and authorities in stimulating economic development. Is currently being set up.
- **Delta Program:** the Dutch government has approved a huge long-term program (50+ years) to safe-guard the country with respect to sea level rise. Planning has started but funding of the initial period is still unclear. After 2020 the government will spend 1 billion € a year on this program.

## NORWAY

**Quantitative mapping contribution: 230,14 M€/year**

## DESCRIPTION OF THE NATIONAL MARINE AND MARITIME RESEARCH AND INNOVATION POLICIES AND PRIORITIES

Meeting global challenges is one of five strategic goals in the Norwegian research policy. Sustainable oceans and coastal areas is one of these challenges. Seas and oceans are affected by climate change, pollution, economic activity and other human activity. More knowledge is needed to secure management.

Main priorities in Norwegian maritime research and innovation are:

- Responsible resource management, including knowledge about and monitoring of the marine environment and the marine ecosystems.
- Aquaculture research, mainly related to salmon, trout and cod.
- Consequences of climate change and the oceans role in climate change. Research also includes consequences of acidification
- Seafood safety, quality and effects on human health
- Main Biotechnology, seafood innovation and market-adjusted production.
- Environmentally friendly maritime operations and advanced transport and logistics
- Maritime transport infrastructure
- Energy

### Funding:

Total public funding of marine and maritime research was in 2009 approximately 1,9 billion NOK or 230 M€. Approximately 1,7 billion NOK for Marine research and approximately 187,4 million NOK for Maritime research. Approximately 600 million NOK directly funded from the Government to Marine Research Institutes.

Marine research is allocated through the Research Council to various research programs, through Research Institutions and through the Universities. Within marine research in particular there is an objective to increase private funding.

In 2010, the maritime industry launched a strategy for research and innovation in maritime industries, called Maritime 21.

Norway has 2 core funding organisation for research and innovation, the Research Council of Norway and Innovation Norway funding research and science based innovation, and Innovation Norway which funds competitive activities. In addition to this Norway has a tax deduction scheme (Skattefun) to stimulate innovation in industries. The Norwegian government has set up a Fisheries and Aquaculture Fund for research and innovation to stimulate these activities in the mentioned sectors. The research Council is funded by all relevant Ministries in addition to substantial investments through the Norwegian oil fund. A number of Ministries are engaged in marine and maritime research. To echo the JPI Oceans they have a Ministerial reference group coordinated by the Norwegian Ministry of Fisheries and Coastal Affairs in agreement with the Ministry of Education and Research.

## RESEARCH PERFORMING ORGANISATIONS

List of RPO's
Aalesund University College
Akvaforsk
Bergen University College
Bjerknes centre for climate research
Det Norske Veritas
Fugro OCEANOR
Geo -42 AS
Institute of Marine Research in Bergen
Marintek-Sintef (Trondheim)
Nansen Environmental and Remote Sensing Center
National Institute of Nutrition and Seafood Research
NGI
NINA – The Norwegian Institute for Nature Research
NIVA – Norwegian Institute for Water research
Nofima, The Norwegian Institute of Food, Fisheries and Aquaculture Research
Norwegian School of Economics and Business Administration
Norwegian University of Life Sciences
Norwegian University of Life Sciences
Norwegian University of Science and Technology
Norwegian University of Science and Technology, Institute of Marine Technology, Trondheim
Sintef Fisheries and Aquaculture
Sintefs Materials and Chemicals
Stord/Haugesund University College
The Norwegian Polar Institute
University Centre in Svalbard
University of Agder
University of Bergen
University of Nordland
University of Oslo
University of Stavanger
University of Tromsø
Vestfold University College

## OTHER RELEVANT ACTIVITIES

Norway is hosting the large scale infrastructure project SIOS (Svalbard Integrated Arctic Earth Observing System) that aims at establishing an Arctic Earth Observing System in and around Svalbard that integrates and complements existing research and monitoring platforms, including those connected to seas and oceans.

On infrastructure concerning research vessels (17 vessels) , aquaculture research facilities (16) and RoVs (3) please see the mapping behind.

## PORTUGAL

**Quantitative mapping contribution: 6,84 M€/year**

## DESCRIPTION OF THE NATIONAL MARINE AND MARITIME RESEARCH AND INNOVATION POLICIES AND PRIORITIES

In Portugal, Fundação para a Ciência e a Tecnologia (FCT) is the main funder of marine and maritime research. FCT is responsible for following the bilateral and multilateral international agreements in science and technology. It is a public autonomous institute under the aegis of the ministry of Science, Technology and Higher Education, which covers all fields of science, from natural sciences to humanities, normally in a responsive mode, aiming at capability enhancement and research excellence. FCT's mission consists in continuously promoting the advancement of scientific and technological knowledge in Portugal, exploring opportunities that become available in any scientific or technological domain to attain the highest international standards in the creation of knowledge, and to stimulate their diffusion and contribution to improve education, health, environment, and the quality of life and wellbeing of the general public.

Funding is structured around the following schemes:

1. Promotion of training and career development (fellowships, scholarships, mainly for PhD, Post-doc and PhD in industry)
2. Support of centres of excellence (associated laboratories) and research centres (institutional funding)
3. Support to research infrastructures
4. Promotion and development of scientific activity (research projects) and the diffusion of scientific culture.

FCT has experience in coordinated actions at national level (joint calls with other Ministries) and at an international level. FCT participates in several marine and maritime research related ERA-Nets and CSA and represents Portugal on the Joint Programming Initiative in Neurodegenerative Diseases.

The competitive research activities financed by FCT are sub-grouped in thematic areas for evaluation and management purposes. Marine and maritime research was in 2009 considered under the following sub-programmes: "Environment and Global Changes – Environment", "Environment and Global Changes - Global Changes", "Biological Sciences - Biodiversity and Conservation", "Marine Sciences and Technologies", "Electrical Engineering - Control and Robotics", "Electrical Engineering - Electronics and Computers". The value awarded in the last the call in responsive mode, a funding of approximately 6,2M€ was awarded for R&D projects in this field.

## RESEARCH PERFORMING ORGANISATIONS

List of RPO's
Centro de Ambiente e Tecnologia Marítimos - MARETEC- Univ. Tecnica de Lisboa
Centro de Estudos dp Ambiente e do Mar
Centro de Investigação Marinha e Ambiental (CIMA) – Iniv. Algarve
Centro de Oceanografia - Faculdade de Ciências da Universidade de Lisboa

Centro Interdisciplinar de Investigação Marinha e Ambiental (CIIMAR)
CIMAR - University of Porto, Portugal
Departamento de Oceanografia e Pescas da Universidade dos Açores
Fac. Ciencias do Porto - Universidade do Porto
Fac. Ciencias e Tecnologia, Universidade Nova Lisboa (FCT-UNL)
Geology department - Universidade da Madeira (UMa) -
IMAR - Institute of Marine Research
IMAR- Centro Interdisciplinar de Coimbra
Instituto de Hidraulica e Recursos Hidricos da Faculdade de Engenharia da Universidade do Porto
Instituto de Oceanografia Science Faculty - Lisbon University -
Instituto de Oceanografia, Faculdade de Ciencias da Universidade de Lisboa (IOCEANO)
Instituto de Sistemas e Robotica (ISR-FEUP) (University of Porto)
Instituto Hidrografico-Centro de dados Tecnico-Cientificos (IHPT)
Instituto Nacional de Engenharia Tecnologia e Inovação (INETI)
Laboratório Nacional de Engenharia Civil (LNEC)
Laboratório Nacional de Engenharia Civil (LNEC)
Marine Biology and Oceanography Department - Universidade da Madeira (UMa)
Portuguese Geological Survey (IGM) (INETI)
Portuguese Institute for Fisheries and Sea Research (IPIMAR)
Unidade de Investigação em Eco-Etologia- Instituto Superior de Psicologia Aplicada, Lisboa
Universidade de Aveiro - Unit Coastal Zone and Ocean Research Centre
University of Algarve (UAlg)

## ROMANIA

**Quantitative mapping contribution: 8,91 M€/year**

### DESCRIPTION OF THE NATIONAL MARINE AND MARITIME RESEARCH AND INNOVATION POLICIES AND PRIORITIES

Romania has no dedicated marine and maritime R&D Programme. This applies to both National Agency for Scientific Research and the Romanian Academy Grants Programme.

Funding available for marine and maritime research projects is available through the National Programme for Research, Development and Innovation II (NPRDI II), under development between 2007 and 2013.

The NPRDI II is divided into several sub-programmes, aiming at developing Romanian R&D activities and better integrating Romanian R&D system in the European Research Area.

These sub-programmes are:

- **Partnerships** – developing R&D projects by consortia grouping universities, R&D institutes and private companies
- **Ideas** – funding research on new scientific ideas. Obtaining of top R&D results, at European level
- **Human Resources** – increment of numbers and capabilities of Romanian researchers
- **Capacities** – improving R&D capacity and infrastructure of significant scientific entities and opening towards the European Research Area

- **Innovation** – incrementing the capacity of innovation, technological development and assimilation of RD &I products in economy.
- **Sustaining the institutional performance** – sustaining institutional performance by ensuring the continuity and stability of activities developed by R&D entities in agreement with the National R&D Strategy.

All these programmes are competitive, competitions being open at the national level. Each of these programmes covers a series of priorities in which marine and maritime research may find their positions and opportunities to participate.

Romanian Academy Grants may also be open to fund Marine research ideas, provided a high scientific value of the research topic – under other various priorities.

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## RESEARCH PERFORMING ORGANISATIONS

List of RPO's
Danube Delta National Institute for Research and Development
Maritime Hydrographic Directorate
National Institute for Marine Geology and Geo-ecology - GeoEcoMar
National Institute for Marine Research and Development "Grigore Antipa" (NIMRD),

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## RESEARCH INFRASTRUCTURE

### - National Institute of Marine Geology and Geoecology – GEOECOMAR

- R/V Mare Nigrum
- Year of building: 1971, rebuilt 2002
- Length: 82 m
- Draft: 5 m
- Displacement: 3200 tons
  
- R/V Istros
- Year of building: 1986
- Length: 32 m; Width: 6,90 m;
- Draft: 1,25 m
- Displacement: 175 t
  
- Laboratory/House Boat Halmyris
- Length: 32 m
- Width: 6,60 m
- Draft: 0,60 m
- Displacement: 90 t

### - National Institute for Marine Research and Development "Grigore Antipa" (NIMRD)

- R/V Steaua de Mare 1
- Length: 25,80 m
- Draft: 3,5 m

**Quantitative mapping contribution: 107,12 M€/year**

## DESCRIPTION OF THE NATIONAL MARINE AND MARITIME RESEARCH AND INNOVATION POLICIES AND PRIORITIES

The main principles and general objectives that should govern the science and technology policies, both at national and regional levels, in the period 2007-2015 are defined in the [Science Act](#) and in the [National Science and Technology Strategy \(ENCYT\)](#), prepared with the collaboration of members of the Spanish Science and Technology System (General State Administration, Autonomous Regions, R&D&I executives, social agents, etc.).

The main instrument to implement the country's goals and priorities of the research, development, and technological innovation policy defined in the ENCYT is *The National Scientific Research, Development and Technological Innovation Plan (National R&D&I plan)*. A General Directorate of the **Ministry of Science and Innovation** (MICINN) (<http://www.micinn.es/>) is the responsible for the preparation, monitoring and assessment of the Plan, as well as for writing its Activity Log and the annual Work Programme, for its ulterior approval by the Government. The Plan has a 4 year duration (2008-2011), with a budget of 1220 M€ for R+D competitive projects. Pre- and post-doctoral fellowships, mobility programmes and international cooperation are not included in this budget.

The annual [Work Programme](#) mainly includes information on the expected schedule of public calls for research projects, stating the terms for presentation and resolution of proposals, the distribution of the annual budget by area and priority programmes, the managing bodies for each one of the actions and the type of beneficiaries and sectors that may receive grants.

Although academic research is a major target, specific actions are also included to support innovation through several ways, by granting Spanish companies financial assistance and facilitating them access to third parties (e.g. bank financing) for the execution of research and development projects, and by supporting Technological Platforms for reducing the fragmentation within the RDTI and enhancing the knowledge technology transfer among stakeholders. In this way, scientific and technological cooperation between public and private actors of a given sector is fostered in order to identify and prioritize technology needs and research, in the medium and long term, and to promote technological capabilities and competitiveness.

The Programme identifies several strategic areas (Nanotechnologies, Energy and Climate change, Biosciences, Biomedicine and Communications). Albeit no specific reference is made to marine sciences and technology issues, the Programme is open to them following a bottom up approach and they are managed through a particular sub-program.

Besides this general instrument, other actions are implemented to comply with the international conventions or regulations, calling for research activities. In this respect, the **Ministry of Environment and Rural and Marine Affairs** is committed to fulfill the requirements of the Regional Seas Conventions (OSPAR and MAP) and the EU Directives (MSFD). In turn, the **Ministry of Public Works**, through the State Ports Authority (Puertos del Estado), operates a number of marine observatories and forecasting systems to implement its marine and maritime policy.

## INNOVATION

MICINN has a strong policy to support innovation through the Centre for the Development of Industrial Technology (CDTI), which objective is to help Spanish companies to increase their technological profile by granting them financial assistance for the execution of both national and international research and development projects. It also promotes technology transfer and technological cooperation between enterprises and helps Spanish companies to internationally exploit technologies that they have developed. The annual budget spent in these activities in the last years was 55 M€, part of it in the form of loans to be returned.

Other important tools implemented by the MICINN to promote innovation are the Technology Platforms (TP). These entities, driven by the industry, try to catalyse the research into innovation. They provide a framework for stakeholders to define research priorities and actions on the strategic areas that require major research and technological advances at medium to long term. Nowadays there are 50 TP in Spain, three of them related to marine and maritime issues, namely PT MARITIMA (Maritime industries), PTEPA (Fisheries and Aquaculture) and [PROTECMA](#) (Coastal and Marine Environment Protection).

The Spanish Maritime Technology Platform (PT MARITIMA) brings together all maritime activities except fishing and aquaculture. The platform has more than 200 members and 11 working groups divided in technological areas working together with other Spanish TP's. Currently PT MARITIMA is updating the Strategic Research and Innovation Agenda (SRIA) published in 2007. PTEPA has also more than 200 members and working groups in the areas of leaving resources, aquaculture, fishing technologies and marketing. PROTECMA has working groups on contingency plans against marine pollution, waste management in ports and coastal areas, dispersants and bioremediation, preparedness and response against chemical spills, etc.

A number of private non-for-profit organisations (e.g. INNOVAMAR, CETMAR) have been established to contribute to improving the competitiveness and internationalisation of the Spanish marine and maritime industries, facilitating collaboration and the use of synergies between different sub-sectors and promoting activities to enhance the development of the culture of innovation.

In addition, the marine research performing organizations (RPO) (e.g. IEO) are highly involved in capacity building and knowledge and technology transfer to SMEs. However, the funds involved are difficult to estimate.

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## RESEARCH PERFORMING ORGANISATIONS

Belonging to the Spanish Ministry of Science and Innovation through the Secretary of State for Research, there are several marine RPOs. The main ones are:

- a. The Spanish Research Council (Consejo Superior de Investigaciones Científicas, **CSIC**) (<http://www.csic.es/>), which is the largest public institution dedicated to research in Spain and the third largest in Europe. According to its Statute (article 4), its mission is *to foster, coordinate, develop and promote scientific and technological research, of a multidisciplinary nature, in order to contribute to advancing knowledge and economic, social and cultural development, as well as to train staff and advise public and private entities on this matter.*

CSIC plays an important role in scientific and technological policy, since it encompasses an area that takes in everything from basic research to the transfer of knowledge to the productive sector. Its research is driven by its centres and institutes, which are spread across the country, and its more than 12,000 staff, of whom more than 3,000 are staff researchers and the same number again are doctors and scientists who are still training. It also manages a range of important facilities (e.g. R/V Sarmiento de Gamboa, Polar Station Juan Carlos I); the most complete and extensive network of specialist libraries, and also some joint research units with the Universities. **CSIC has 6 research institutes specifically dedicated to marine sciences**, albeit other 12 have research lines developed in the marine and maritime sectors.

- b. The Spanish Institute of Oceanography (Instituto Español de Oceanografía, **IEO**) (<http://www.ieo.es/>) which is the only Spanish research institution devoted exclusively to the study of the sea and its resources. The IEO provides advice to the Spanish Government in marine environmental issues, fisheries and aquaculture and represents the Spanish Government at international organisations, committees, forums and meetings on oceanography, marine sciences, including fisheries, marine environmental protection and climate change (such as ICES, ICCAT, OSPAR, UNESCO-IOC, NAFO, CECAF, ESF-MB, CGPM, among many others) in coordination with different Spanish ministries (Ministry of Science and Innovation, the Ministry of Environment, Marine and Rural Affairs, the Ministry of Foreign Affairs and the Inter-Ministerial Commission of Science and Technology).

The IEO has a wide geographical distribution all over Spain, with **9 Oceanographic Centres** (Santander, Gijón, La Coruña, Vigo, Cádiz, Málaga, Murcia, Mallorca and Tenerife) with the headquarters in Madrid. Among its facilities, the IEO owns research aquaculture facilities, associated to the Centres of Vigo, Santander, Murcia, Tenerife and Coruña. The staff is



made up by more than 700 permanent positions, 60% of them devoted to research. The research activities are focused on three main areas: 1) Marine environment and environmental protection, 2) Fisheries and 3) Aquaculture.

CSIC and IEO generate approximately 50% of the scientific production of marine sciences and technology in the country.

Up to 30 universities in Spain are involved in marine research, and Las Palmas, Cadiz, Vigo, Alicante and Valencia have, specifically, a faculty of marine science that offers graduate, master and doctorate studies. Postgraduate programs in marine sciences are also taught at several other universities (e.g. A Coruña, Santiago de Compostela, Granada, Cantabria and Barcelona). The level of institutional funding is difficult to know.

The Spanish Ministry of Public Works has the global responsibility for the state-owned port system, comprising a total of 27 port authorities. The Institution which is in charge of co-ordinate the mentioned system and implementing the governmental ports policy is the State Ports Authority (Puertos del Estado).

One of the roles of the organisation is the monitoring of the physical environment affecting the Ports. The services developed by the Puertos del Estado are being used today by a wide range of users and the public in general.

Puertos del Estado develop four main areas of activities: A) observatory networks, B) forecasts systems and C) database and D) Climate studies. The open service is made available mainly via web page (<http://www.puertos.es>). Several thousands users access daily to the services allocated at Puertos del Estado server.

#### List of RPO's

CEDEX - Ministry of Public Works (CEDEX)

Centro de Estudios Avanzados de Blanes (CSIC)

FUNDACIÓN AZTI - AZTI FUNDAZIOA

Geological Survey of Spain, Marine Geology Group (ITGE)

Instituto Canario de Ciencias del Mar

Instituto de Acuicultura "Torre de la Sal" (CSIC)

Instituto de Ciencias del Mar de Barcelona (CSIC)

Instituto de Ciencias Marinas de Andalucía (CSIC)

Instituto de Investigaciones Marinas de Vigo (CSIC)

Instituto Español de Oceanografía – Centro Oceanográfico de A Coruña (IEO – A Coruña)

Instituto Español de Oceanografía – Centro Oceanográfico de Cádiz (IEO - Cádiz)

Instituto Español de Oceanografía – Centro Oceanográfico de Gijón (IEO - Gijón)

Instituto Español de Oceanografía – Centro Oceanográfico de Málaga (IEO - Málaga)

Instituto Español de Oceanografía – Centro Oceanográfico de Murcia (IEO – Murcia)

Instituto Español de Oceanografía – Centro Oceanográfico de Baleares (IEO - Baleares)

Instituto Español de Oceanografía – Centro Oceanográfico de Santander (IEO - Santander)

Instituto Español de Oceanografía – Centro Oceanográfico de Canarias (IEO - Canarias)

Instituto Español de Oceanografía – Centro Oceanográfico de Vigo (IEO - Vigo)

Instituto Español de Oceanografía –Sede Central (IEO - Madrid)

Instituto Mediterráneo de Estudios Avanzados – Universitat de les Illes Balears (CSIC-UIB)

PLOCAN, Great Infrastructure MICINN-Canary Gov.

Puertos del Estado – Ministry of Public Works (EPPE)

SOCIB Great Infrastructure, MICINN-Balearic Gov.-CSIC

Universitat Politècnica de Catalunya (UPC)

University of Alicante, Faculty of Sciences

University of Basque Country/Euskal Herriko Unibertsitatea (UPV/EHU)
University of Cadiz, Centro Andaluz Superior de Estudios Marinos (CASEM)
University of Cadiz, Faculty of Marine Sciences
University of Cantabria. Ocean and Coastal Research Group
University of Las Palmas de Gran Canaria, Faculty of Marine Sciences
University of Oviedo, Faculty of Sciences
University of Santiago de Compostela, Faculty of Biology
University of Valencia (UVEG)
University of Vigo, Faculty of Marine Sciences
University of Vigo, Faculty of Sciences

## RESEARCH INFRASTRUCTURE

In 2007, the Spanish Government and the Autonomous Regions agreed to develop a Roadmap of Unique Scientific and Technological Facilities (ICTS, *Infraestructuras Científicas y Tecnológicas Singulares*), some of them related to Marine and Maritime Sciences. They include, at present, 3 research vessels (RV Hesperides, RV Sarmiento de Gamboa and RV Las Palmas), two Antarctic Stations where some marine research activities are carried out and two marine observatories in development in the Balearic Islands (SOCIB) and in the Canary Islands (PLOCAN). SOCIB is a coastal ocean observing, forecasting, managing and data distribution system, and PLOCAN an oceanic platform designed to house an experimental facility and laboratories for accessing the depth of the ocean using submarine vehicles and instruments used to observe, produce and make use of the marine resources. The budget spent by MICINN in 2009 in these infrastructures was:

HESPERIDES	7,947,000 €
SARMIENTO	5,326,000 €
LAS PALMAS	2,944,000 €
Antarctic Stations	1,400,000 €
SOCIB	1,500,000 €
PLOCAN	2,255,000 €
TOTAL	21,372,000 €

Other ICTS facilities include the four maritime research and experimentation Wave Flumes (Madrid, El Pardo, Barcelona and Santander).

Furthermore the Spanish Research Council (CSIC) and the Institute of Oceanography (IEO) have a fleet of 2 and 6 oceanographic research vessels, respectively, with a current expenditure of **4 M€/year**. Presently, two additional research vessels (40 m length), are under construction.

The IEO and CSIC manage a number of aquaculture facilities. The IEO also manages a nationwide network of tide gauges, current meter moorings and buoys as well as a remote sensing station. Under the framework of an agreement with the UNESCO-IOC the IEO is the host institution of the Scientific and Communication Centre on Harmful Algae. The expenditure under these concepts amounts to **7,2 M€/year**.

In support of fisheries the Ministry of Environment runs 3 research vessels (RV Emma Bardan; RV Miquel Oliver, RV Vizconde de Eza) involving an expenditure of **10,1 M€/year**.

Finally, the State Ports Authority (Puertos del Estado) operates the following infrastructures:

The *Deep Sea buoy network*, based on 14 Seawatch and 3 WaveScan buoy stations. The instruments, located at depths between 200 and 800 m, measure atmospheric and oceanographic parameters. Measurements are transmitted every hour via satellite to Puertos del Estado and directly posted in the web.

The *Coastal buoy network* (22 stations), providing real time data in some specific points located at shallow waters. The main objective of the measurements is to complement those of the Deep Sea Network at those locations of special interest for the port operations or wave modelling validation. The buoys employed are scalar Waverider and directional Tryaxis.

The *REDMAR tide gauge network* (40 tide gauges) is in operation since 1992. The objective is the real time monitoring of sea level and the generation of historical series for further study. At this moment the network is composed of Radar, acoustic and pressure sensors. In a short future, all the sensors will be of the radar type.

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## OTHER RELEVANT ACTIVITIES

Regarding marine and maritime activities, there are several Ministries, Agencies and Regional Organizations that are involved in different ways.

As the leading Ministry for funding and conducting research in Spain, **MICINN** is mainly engaged in bottom up research funding through fully fledged programmes and in funding and maintaining large infrastructures. The main actors in the competitive calls are the Spanish Research Council (CSIC), the Oceanographic Institute (IEO) and other RPOs like Universities.

The main research areas are:

- Marine ecosystem functioning and dynamics
- Climate change effect on the oceans dynamics and marine ecosystems.
- Relationships between oceanographic processes, marine living resources and fisheries.
- Dynamic of fish populations and stocks assessments.
- Trophic interactions in marine food webs.
- Harmful algae blooms and proliferation of alloctonous species
- Characterization of the seabed and subseabed in the continental margin and deep ocean (seabed mapping and characterisation of habitats, sedimentary structures, sedimentary and geochemical processes)
- Effects of human activities on marine ecosystems: pressures and impacts of marine pollution, fisheries and other human activities on the marine environment.
- Marine Biodiversity and Marine Protected Areas.
- Marine Spatial Planning
- Improvement of culture techniques fish and shellfish, development of new techniques for the self sustainable culture of new species and potential applications and use of marine algae (food, biotechnology, etc.).

MICINN supports formation programmes for predoctoral and graduate scientists as well as for tenured scientists (Ramón y Cajal, Juan de la Cierva Programmes). There are specific programmes to facilitate mobility for Spanish and for visitor scientists.

The **Ministry of Environment and Rural and Marine Affairs** is in charge of developing and enforcing the Spanish policy for protecting the environment, including seas and oceans, the biodiversity, water resources, renewable resources (forestry, stocks, fisheries), human food and acting against the climatic change. The Ministry promotes the economic development ensuring the sustainability of the natural resources (<http://www.marm.es/>).

The wide range of activities of the Ministry include: i) monitoring of fisheries, ii) monitoring of coastal zones, iii) producing statistics and reports, iv) funding research activities in the Network of National Parks (some of them with a maritime component), v) maintaining and Observatory and some RPO, and vi) supporting the compliance of European Directives by funding the required programmes.

The **Ministry of Public Works** has an organisation Puertos del Estado (<http://www.puertos.es/>) in charge of the oceanographic and climate forecasting, operational oceanography and network of sensors, data management, etc.

The following forecasting systems are available online:

The *Storm Surge Forecast System* (Nivmar) is a group of applications designed to provide a forecast of the sea levels in the Spanish coast based on wind and pressure parameters provided by the National Meteorological Institute (INM, Instituto Nacional de Meteorología). The forecast horizon is 72 hours.

Forecast of *Astronomic Tide* for any date selected by the user. The results are derived from data obtained after analysis of the measurements recorded by the REDMAR tide gauges network.

The *Wave Forecast System* (Sistema de Predicción de Oleaje (SPO)) was developed at Puertos del Estado in 1995. It is the result of the works developed in the field of the wave models and fulfils a need of the Port Authorities of having a planning and management system for their port activities. The system is based on a version of the WAM code.

The *Circulation forecast system*, developed in ESEOO project and nested into MERSEA models, Puertos maintains current forecast for the Iberian Atlantic waters, the Canary Islands and The Western Med Sea. Results can be found at <http://www.esooo.org> and are being actually used in Search and Rescue operations by the Spanish marine safety organization (SASEMAR).

The climate studies consist of long term numerical simulations of climate variables, including hind casts and scenario studies.

## SWEDEN

**Quantitative mapping contribution: 200 M€/year**

### DESCRIPTION OF THE NATIONAL MARINE AND MARITIME RESEARCH AND INNOVATION POLICIES AND PRIORITIES

Swedish marine and maritime research is driven via several ministries, namely The Ministry of Education and Research; The Ministry of the Environment; The Ministry for Rural Affairs; The Ministry of Enterprise, Energy and Communications through the universities and research performing institutes and authorities.

Marine research is partly funded via non-competitive money directly distributed to Universities, University Colleges and Research Institutes. There are also several official funding organisations (e.g. The Swedish Research Council Formas, The Swedish Research Council, Swedish Energy Agency and VINNOVA), official foundations (e.g. Mistra – The Foundation for Strategic Environmental Research) and private foundations (e.g. Baltic Sea 2020) that fund marine and maritime research. Competitive funding via the official research funding organisations to marine research is about 14 M€/year (for the years 2002 – 2006). EU funding is not included here but Sweden is among the top 10 countries that so far has received most funding via FP 7.

Swedish marine and maritime research encompass many problem areas and disciplines, including **natural sciences** (e.g. ecology, climate sciences, fish and fisheries, aquaculture, ecotoxicology, biotechnology), **social sciences** (e.g. ecological economics, socio-economics, governance), **humanities** (e.g. history, religion, archeology), **medicine** (e.g. farmaceutical contamination, new drugs), and **technical sciences** (e.g. wave energy, shipping, aquaculture, restoration procedures).

There are more than 100 internationally prominent marine research groups in Sweden and a wide range of universities, university colleges and other research organisations with marine and/or maritime research on its agenda. Marine research is conducted in several sea and ocean areas, including the Arctic, the Atlantic Ocean, the North Sea, the Baltic Sea and the Mediterranean, the North Sea and Baltic Sea being the main areas.

### RESEARCH PERFORMING ORGANISATIONS

List of RPO's
Baltic Nest Institute
Chalmers University of Technology
Geological Survey of Sweden

Göteborg University
Gotland University College
KTH Royal Institute of Technology
Linköping University
Linnaeus University
Luleå University of Technology
Lund University
Mid Sweden University
Södertörn University
Stockholm Environment Institute
Stockholm Resilience Centre
Stockholm University
Swedish Board of Fisheries
Swedish Defence Research Agency (FOI),
Swedish Environmental Research Institute (IVL
Swedish Meteorological and Hydrological Institute (SMH)
Swedish University of Agricultural Sciences (SLU)
The Swedish Institute for the Marine Environment
Umeå University
Uppsala University

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## RESEARCH INFRASTRUCTURE

### Field Stations

- UMF Norrbyn, [www.umf.umu.se](http://www.umf.umu.se)
- Askö Laboratory, [www.smf.su.se](http://www.smf.su.se)
- Klubban Biological Station, [www.ibg.uu.se](http://www.ibg.uu.se)
- The Sven Lovén Centre for Marine Sciences (including Kristineberg Marine Lab and Tjärnö Marine Lab), [www.loven.gu.se](http://www.loven.gu.se)
- Ar Field Station, [www.hgo.se](http://www.hgo.se)

Several large and small Research Vessels are associated to the field stations. Other equipment includes mesocosm facilities, marine molecular laboratory, ocean acidification laboratory, aquaria facilities with marine and brackish water, ROVs, etc.

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## OTHER RELEVANT ACTIVITIES

### Stockholm Resilience Centre

The Stockholm Resilience Centre is an international centre that advances interdisciplinary research for governance of social-ecological systems with a special emphasis on resilience - the ability to deal with change and continue to develop. The Stockholm Resilience Centre was established on 1 January 2007 and is a joint initiative between Stockholm University, the Stockholm Environment Institute and the Beijer International Institute of Ecological Economics at The Royal Swedish Academy of Sciences. The centre is funded by the Foundation for Strategic Environmental Research, Mistra. [www.stockholmresilience.org](http://www.stockholmresilience.org)

## BalticSTERN Secretariat

The BalticSTERN Secretariat coordinates an international research network, aiming to produce a socioeconomic and ecologic analysis of cost-effective measures needed to secure the ability of the Baltic Sea ecosystem to provide ecosystem services. The BalticSTERN Secretariat was established at the Stockholm Resilience Centre in September 2009, financed by the Swedish EPA (SEPA). In December 2009 SEPA decided to finance the Secretariat for a further three year period; 2010 - 2012. [www.stockholmresilience.org](http://www.stockholmresilience.org)

## Mare Novum

Mare Novum is a Swedish Centre for development of marine innovations. It is a partnership between the University of Gothenburg and the five northern coast municipalities in Bohuslän; Strömstad, Tanum, Sotenäs, Munkedal och Lysekil. [www.marenovum.se](http://www.marenovum.se)

## The Centre for Environment and Sustainability (GMV)

GMV creates and encourages research projects and multidisciplinary initiatives. Co-operation with the business community in western Sweden as well as the provision of information and education to the general public are part of GMV's brief. Both research and training are firmly founded in existing scientific disciplines. About 500 scientists and 500 representatives from industry, local authorities and other environmental organisations, are involved in GMV's research network. [www.chalmers.se/gmv](http://www.chalmers.se/gmv)

## TURKEY

**Quantitative mapping contribution: 36,97 M€/year**

### DESCRIPTION OF THE NATIONAL MARINE AND MARITIME RESEARCH AND INNOVATION POLICIES AND PRIORITIES

As the leading agency for funding and conducting research in Turkey, TUBITAK (Scientific and Technological Research Council of Turkey) is mainly engaged in bottom up research funding through fully fledged programmes carried out by **Academic Research Funding Program Directorate (ARDEB)** and **Technology and Innovation Funding Programmes Directorate (TEYDEB)**. **Research Grant Committees** of ARDEB namely *Environment, Atmosphere, Earth and Marine Sciences; Engineering; Basic Sciences; Public Research* provide specified support to seas and oceans related research in their respective fields. Seas and oceans related issues are largely covered by **Environment, Atmosphere, Earth and Marine Sciences Research Grant Committee (CAYDAG)** and **Public Research Grant Committee (KAMAG)** housed by ARDEB. The former builds up the researchers conducting R&D activities in all areas of Environment, Atmosphere, Earth and Marine Sciences by supporting and improving these researches in accordance with the universal developments and national priorities while the latter supports the public institutions to solve the problems and satisfy the needs by R&D projects in line with country priorities and global changes. In 2009, the total amount of research grants given by ARDEB to Turkish researchers was around 70 million Euros.

**Technology and Innovation Funding Programmes Directorate (TEYDEB)** is mainly responsible for funding of industry and SMEs carrying out market-driven research. The total amount of funding in 2009 by TEYDEB was around 250 million Euros.

The major funding, budget distribution and cooperation decisions are taken by the **Science Board of TUBITAK**, which is acting as the management board of the organisation.

Turkish National S&T Policies are formulated, and priority areas are set for 2003-2023, in order to create an innovative economy and society in 2023, which marks the 100th Anniversary of the foundation of the Turkish Republic. The Scientific and Technological Research Council of Turkey (TÜBİTAK) coordinated the project entitled "Vision 2023: Science and Technology Strategies" which involves the first-ever national foresight exercise of Turkey.

In Turkey, the research funding system, research infrastructure supports and R&D loans are mainly implemented in a bottom-up approach.

## PROGRAMMES

TUBITAK has many support programmes for basic research, industrial research, mobility and career development of researchers. All of these programmes are designed in a bottom up approach and funding decision is mainly dependent on the scientific excellence of the projects rather than thematic priority. Thus, TUBITAK does not have any specific programmes in any area. Marine and maritime research funding is provided through two programmes:

- **The Support Programme for Scientific and Technological Research Projects (1001)**
- **International Industrial Research and Development Projects Support Programme-1509**

## RESEARCH PERFORMING ORGANISATIONS

### List of RPO's

Dokuz Eylül University - Institute of marine Sciences and Technology - Izmir

General Directorate of Mineral Research and Exploration - Istanbul

Institute of Marine Sciences - Middle East Technical University, Erdemli

Istanbul Technical University, Eurasia Institute of Earth Sciences

Karadeniz Technical University, Faculty of Marine Sciences – Trabzon

Middle East Technical University Institute of Marine Sciences

Ministry of Agriculture and Rural Affairs, Central Fisheries Research Institute – Trabzon

Turkish Navy, Department of Hydrography, Oceanography and Navigation – Istanbul

University of Istanbul, Institute of Marine Sciences and Management<sup>4</sup>

## RESEARCH INFRASTRUCTURE

### - Middle East Technical University, Institute of Marine Sciences

The institute owns three research vessels: the 433 gross tons R/V Bilim-2, which is used for ocean research including fisheries, and two smaller vessels of 16m length: the Lamas-1 and the Erdemli for daily trips in near shore regions.

More information about research facilities from the Middle East Technical University can be found on the website:

<http://www.ims.metu.edu.tr/index.asp?doc=equipment/index.htm>

### - Dokuz Eylül University, Institute of marine Sciences and Technology - Izmir

- R/V K. Piri Reis
- Year of building: 1978
- Length: 36 m

### - MTA General Directorate (General Directorate of Mineral Research and Exploration) - Istanbul, Turkey

- R/V Sismik 1
- Date of building: 1942, rebuilt 1976
- Length: 55.75 m
- Draft: 3.96 m.
- Tonnage: 750.44 gross, 275 net tons

<sup>4</sup> Overview of research institutes in the Black Sea region enlisted in the presentation on the Marine Research Infrastructure Region, Nicolae Panin, National Institute of Geology and Geo-ecology – GeoEcoMar.



**- Karadeniz Technical University, Faculty of Marine Sciences - Trabzon**

- R/V Denar I
- Year of building: 1992
- Length: 24.50 m

**- Turkish Navy, Department of Hydrography, Oceanography and Navigation - Istanbul**

- R/V TCG ÇUBUKLU
- Year of building: 1986
- Length: 40.47 m
- Draft: 4.2 m
- Displacement: 650 tons
- R/V TCG ÇESME
- Year of building: 1965
- Length: 87 m
- Draft: 4.6 m
- Displacement: 2900 tons

**- Ministry of Agriculture and Rural Affairs, Central Fisheries Research Institute – Trabzon**

- R/V Surat Arastirma 1
- Year of building 1984
- Length 22.00 m

**- University of Istanbul, Institute of Marine Sciences and Management**

- R/V Arar
- Year of building: 1951
- Length: 31.27 m
- Draft: 3,20m
- Tonnage: 173,68 gross tons

## UNITED KINGDOM

**Quantitative mapping contribution: 188,59 M€/year**

### DESCRIPTION OF THE NATIONAL MARINE AND MARITIME RESEARCH AND INNOVATION POLICIES AND PRIORITIES

UK spends approximately £3.5 billion on science through the Department for Business, Innovation and Skills (BIS). Most of this money is allocated to the Research Councils, in the case of the marine sector this is mainly the Natural Environment Research Council which receives approximately £392 million per year, of which c. £62 million is spent on all aspects of marine science including ship operations and some aspects of Antarctic research. Reference MSCC UK Marine Science Strategy.

In addition the Scottish Government allocates approximately £79 million per year to Marine Scotland, and the UK Department for Environment, Food and Rural Affairs (Defra) allocates £38 million per year to the Centre for Environment, Fisheries and Aquaculture Science (CEFAS). Defra has a total science budget of £145 million per year of which £11 million is allocated to marine. In addition the Department for Energy and Climate Change (DECC) spends approximately £120 million per year on renewable and low carbon energy including marine sector work.

In February 2010 the UK Government published its first UK Marine Science Strategy for 2010-2015 which sets out the shaping, support, co-ordinating and enabling of the delivery of world class marine science for the UK. The Strategy will be delivered by

the Marine Science Coordination Committee which is comprised of representatives of the Government Departments, Devolved Administrations and main delivery bodies involved in UK marine science.

The passage of the Marine and Coastal Access Act 2009 and Scottish Marine Act 2010 has set in place the beginnings of a comprehensive marine spatial management system for all UK waters. In England marine spatial planning is managed by the new Marine Management Organisation, in Scotland by Marine Scotland, and by the devolved administrations in Wales and Northern Ireland.

The new planning systems are closely allied to the objectives of the European Marine Strategy Framework Directive. A UK-wide marine Policy Statement is currently under consultation, along with the establishment of the initial tranche of marine protected areas and the development of secondary legislation for marine licensing.

All UK budgets are currently under review pending the detailed outcome of the Government's Comprehensive Spending Review October 2010.

## RESEARCH PERFORMING ORGANISATIONS

<b>List of RPO's</b>
ABPmer
Association of Marine Scientific Instrument manufacturers
Atlantic Salmon Trust
BMT
British Antarctic Survey Marine activities
British Geological Survey
British Ocean Sediment Core Research Facility
British Oceanographic Data Centre
Canterbury Christ Church University
Cardiff University
Cass Business School
Centre for Environment, Fisheries and Aquaculture Science (CEFAS)
Challenger Society for Marine Science
Chamber of Shipping
Chelonia
Dunstaffnage Marine Lab
EA
Fisheries Research Services Aberdeen (part of Marine Scotland)
Halcrow Group
HR Wallingford
INLECOM
Institute of Marine Engineering, Science and Technology (IMarEST)
Joint Nature Conservation Committee
L A B Coastal
London (various universities)
MacAlister Elliott and Partners
Marine Biological Association
Marine science-relevant departments include at the following universities:

Met Office
National Marine Equipment Pool
National Marine Library
National Oceanography Centre, Southampton & Liverpool
Nautilus Consultants
Oil and Gas UK
Plymouth Marine Laboratory
Poseidon Aquatic Resource Management
Proudman Oceanographic Laboratory
Qinetiq
Queen's University Belfast
Renewable UK
Scottish Association for Marine Science
Sea Mammal Research Unit
SeaVision
Sir Alister Hardy Foundation for Ocean Sciences
Society for Underwater Technology
Southampton Solent University
Stirling University
Subsea UK
Sustainable Fishing Solutions
The Natural History Museum
The Royal Society
United Kingdom Hydrographic Office
University Marine Biological Station Millport
University of Bangor
University of Cambridge
University of East Anglia
University of Edinburgh
University of Essex
University of Hull
University of Liverpool
University of Newcastle
University of Plymouth
University of Portsmouth
University of Southampton
University of St Andrews
University of Ulster
University of York
Zoological Society of London

### Research vessels

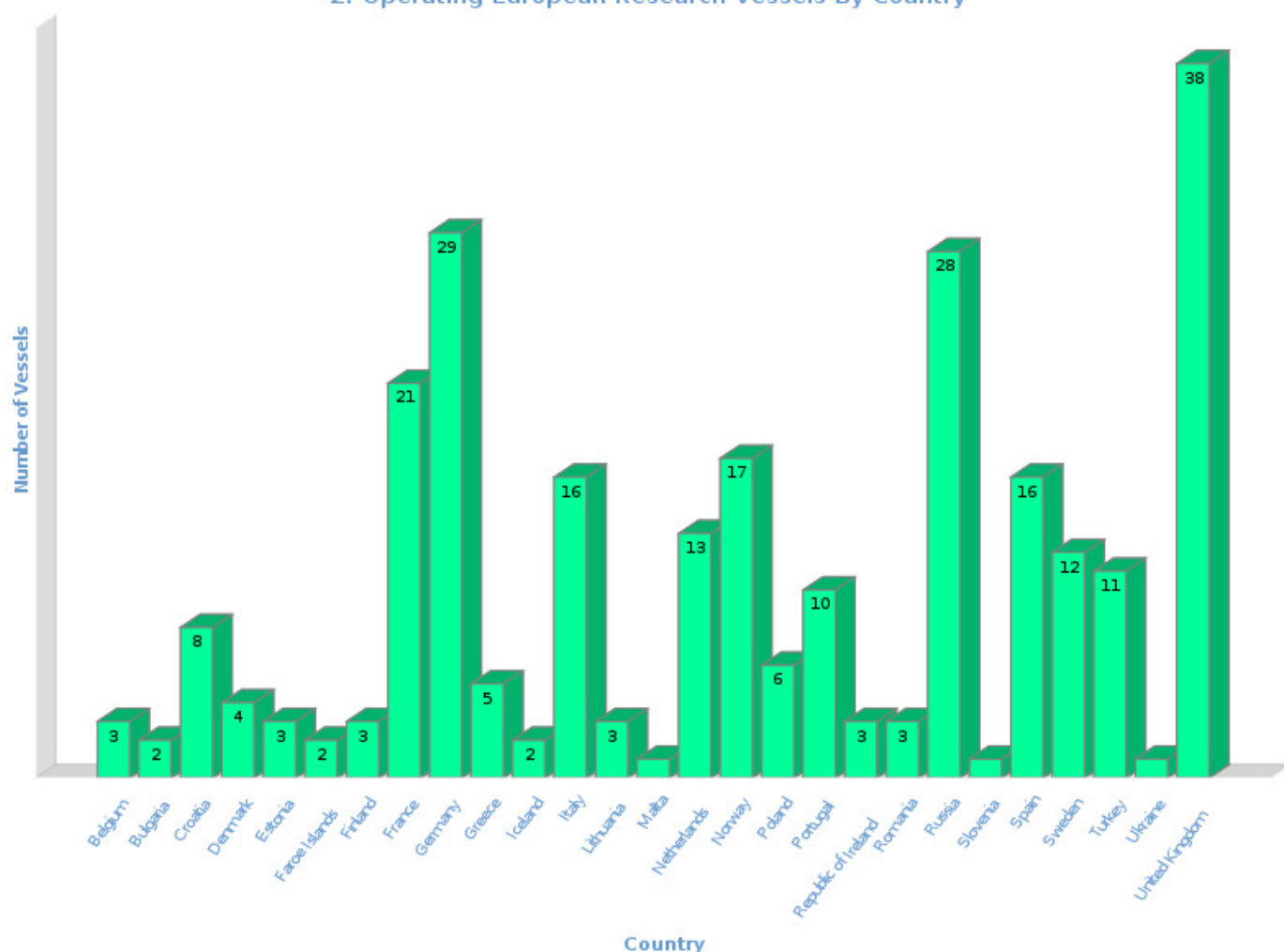
- Royal Research Ships *Discovery*, *James Clark Ross*, *Shackelton* and *James Cook*
- Fisheries Research Vessels *Scotia* and *Cefas Endeavour*
- Coastal Research Vessels *Prince Madog*, *Calanus* etc.

- 1) Research vessels
- 2) Aquaculture research facilities
- 3) ROVs
- 4) Other equipment

## 1) RESEARCH VESSELS IN EUROPE

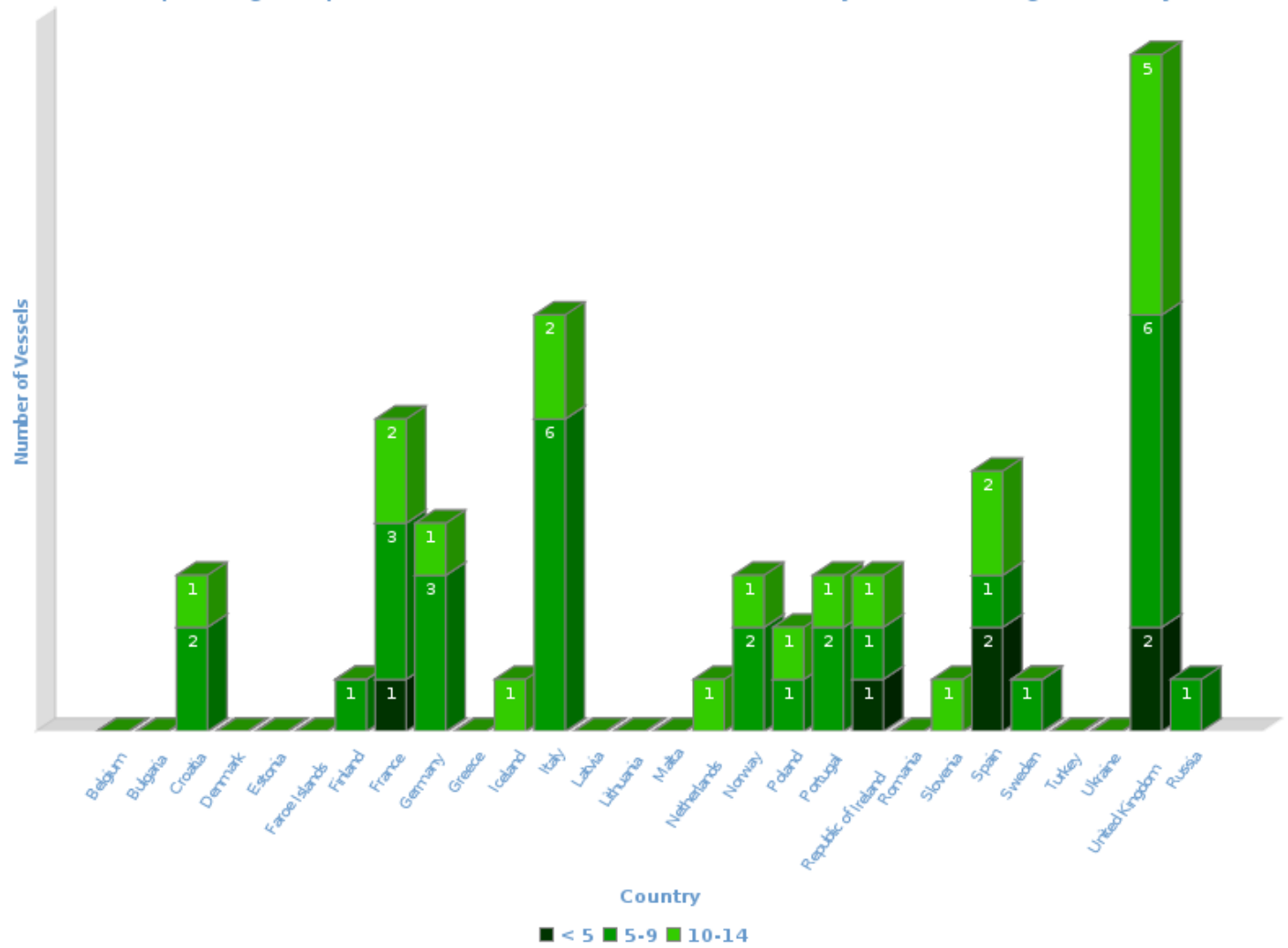
The figures reveal major differences in the availability of research vessels across Europe. Synergies can be created through programs such as Eurofleet

### 2. Operating European Research Vessels By Country



<sup>5</sup> <http://www.eurocean.org/np4/41>

## 6. Operating European Research Vessels built in the last 14 years, according to Country



## 2) EUROPEAN AQUACULTURE FACILITIES BY COUNTRY

The table below shows that most of the aquaculture facilities are on the Atlantic coast. Next to this large differences in facilities exist across the European Sea basins. Synergies can be created, taking into account the specificities of each species requires specific adaptation to develop the biological prototype.

Country	Landbased facility	Seabased facility	Land and Sea	Total
UK	5		1	6
Croatia				2
Cyprus	1			1
Denmark	2			2
Finland	1			1
France	2	1 testbase		3
Greece	1			1
Iceland	2			2
Ireland	3 (1 hatchery)			3
Italy	1			1
Netherland	2			2
Norway	3	9+1	3	16
Portugal	2+1			3
Romania	1			1
Spain	6	1	1	8
Sweden	2			2
Turkey	1	1		2
<b>Total</b>	<b>38</b>	<b>13</b>	<b>5</b>	<b>56</b>

### Croatia

Facility/Name	Owner	Country	Main Category
Laboratory for Aquaculture	Institute of Oceanography and Fisheries	Croatia	
Fish Culture Unit	University of Dubrovnik, Department of Aquaculture	Croatia	

### Cyprus

Facility/Name	Owner	Country	Main Category
Aquaculture research station	Department of Fisheries and Marine Research (DFMR)	Cyprus	Land based facilities

### Denmark

Facility/Name	Owner	Country	Main Category
Experimental facilities	Danish Institute for Fisheries Research (DIFRES)	Denmark	Land based facilities
Experimental facility	SINTEF	Denmark	Land based facilities

### Finland

Facility/Name	Owner	Country	Main Category
Experimental sea cages and fish rearing	Finnish Game and Fisheries Research Institute	Finland	Land based

facilities	(FGFRI)		facilities
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## France

Facility/Name	Owner	Country	Main Category
Station Expérimentale d'Aquaculture	IFREMER	France	Land based facilities
Laboratoire ARN	IFREMER	France	Land based facilities
Marine technological testing facilities	IFREMER	France	

## Greece

Facility/Name	Owner	Country	Main Category
Faros field station	Hellenic Centre for Marine Research (HCMR), Institute of Aquaculture	Greece	Land based facilities

## Iceland

Facility/Name	Owner	Country	Main Category
Experimental Facilities	Holar University College	Iceland	Land based facilities
Rearing facilities	Marine Research Institute	Iceland	Land based facilities

## Ireland

Facility/Name	Owner	Country	Main Category
Freshwater hatchery	Marine Institute	Ireland	
Martin Ryan Institute Carna	National University of Ireland	Ireland	Land based facilities
Daithi O'Murchu Marine Research Station	University College Cork	Ireland	Land based facilities

## Italy

Facility/Name	Owner	Country	Main Category
Rearing installations	Istituto Sperimentale Talassografico	Italy	Land based facilities

## The Netherlands

Facility/Name	Owner	Country	Main Category
Aquarium facilities	Royal Netherlands Institute for Sea Research	Netherlands	Land based facilities
Aquarium facilities	Wageningen IMARES	Netherlands	Land based facilities

## Norway

Facility/Name	Owner	Country	Main Category
Breeding facilities	Aqua Gen AS	Norway	
Skretting, Marine Harvest	Center for Aquaculture Competence AS	Norway	Sea based facilities
Trial farms	Ewos Innovation AS	Norway	Sea based facilities
Comercial sea based facilities	Fjord Forsøksstasjon Helgeland AS	Norway	Sea based facilities
Grow out sea based facilities	GIFAS - Gildeskål Forskningsstasjon AS	Norway	Sea based facilities



Cod Breeding Centre	Nofima Marin	Norway	
Grow out sea based facilities	Norwegian Institute for Water Research (NIVA)	Norway	Sea based facilities
SEALAB	SINTEF	Norway	Land based facilities
Aquaculture research station	Havbruksstasjonen	Norway	Land based facilities
Grow out unit	Val Akva	Norway	
Grow out sea based facilities	VESO Viken Akvavet	Norway	Sea based facilities
Cod Farm and Miljølaks	Villa AS	Norway	Sea based facilities
IMR - Flødevigen Research Station	Institute of Marine Research	Norway	Sea based facilities and land based facilities.
IMR - Matre Research Station	Institute of Marine Research	Norway	Sea based facilities and land based facilities.
CodTech laboratory	NTNU	Norway	Land based facilities
IMR - Austevoll Research Station	Institute of Marine Research	Norway	Sea based facilities and land based facilities

### Portugal

Facility/Name	Owner	Country	Main Category
Experimental Research Facilities	CIIMAR	Portugal	Land based facilities
Specialised Laboratories	IPIMAR	Portugal	
Marine aquaculture station of Ramalhete	University of Algarve	Portugal	Land based facilities

### Romania

Facility/Name	Owner	Country	Main Category
Long-line systems	National Institute for Marine Research and Development Grigore Antipa	Romania	Land based facilities

### Spain

Facility/Name	Owner	Country	Main Category
Specialised Laboratories	Centro de Investigacion y Formacion Pesquera y Acuicola (CIFPA)	Spain	Land based facilities
Aquaculture Pilot Plant	Centro tecnologico Gallego de Acuicultura	Spain	Land based facilities
Specialised Laboratories	Instituto Español de Oceanografía	Spain	Land based facilities
Specialised Laboratories	Consejo Superior de Investigaciones Científicas	Spain	Land based facilities
Experimental Research Facilities	Instituto Canario de Ciencias Marinas	Spain	Sea based facilities and land based facilities.
Experimental Sea Based Facilities	Instituto Galego de Formación en Acuicultura. Xunta de Galicia	Spain	Sea based facilities
Experimental Facilities	Instituto Murciano de Investigación y Desarrollo Agrario y Alimentario	Spain	Land based facilities
Experimental Facilities	Instituto Murciano de Investigación y Desarrollo Agrario y Alimentario	Spain	Land based facilities

## Sweden

Facility/Name	Owner	Country	Main Category
Specialised Laboratories	Swedish University of Agricultural Sciences	Sweden	Land based facilities
Salmon and trout experimental lab/Norrfors lab	Dept. Wildlife, Fish and Environmental Studies	Sweden	Land based facilities

## Turkey

Facility/Name	Owner	Country	Main Category
Experimental Facilities	Dokuz Eylül University	Turkey	Sea based facilities
Marine and freshwater hatchery	Ministry of Agriculture and Rural Affairs	Turkey	

## United Kingdom

Facility/Name	Owner	Country	Main Category
Specialised Laboratories	CEFAS	United Kingdom	Land based facilities
Rearing facilities	Fisheries Research Services	United Kingdom	Land based facilities
Marine hatchery	North Atlantic Fisheries College	United Kingdom	Sea based facilities and land based facilities.
Specialised Laboratories	Scottish Association for Marine Science (SAMS)	United Kingdom	Land based facilities
Specialised Laboratories	University of Stirling	United Kingdom	Land based facilities
Institute of Aquaculture External Facilities	University of Stirling	United Kingdom	Land based facilities

### 3) EUROPEAN UNDERWATER VEHICLES

Again we see major difference across the European seabasins, as for instance in the Black sea there are no vehicles to go to low depths. The expenses of these infrastructure explains why the large European Countries have most capacities below 1000 m, which should also argue the case why having a European dimension to this could be beneficial.

#### European Underwater vehicles – total of 87 vessels

Country	Up to -1000 m.	Below incl. -1000 m	Total
Belgium	2	1	3
Bulgaria	3		3
Croatia	1		1
France	4	5	9
Germany		8	8
Greece	2	3	5
Iceland		1	1
Ireland	1	2	3

Italy	2	1	3
Netherlands	1		1
Norway	2	2	4
Poland	2		2
Portugal	15	1	16
Romania		1	1
Russia	2	4	6
Spain	3		3
Sweden	2		2
Turkey	2		2
UK	9	3	14
<b>Total</b>			<b>87</b>

<b>Name</b>	<b>Type of vehicle</b>	<b>Country</b>	<b>Depth</b>
ABYSS	AUV	Germany	6000
Aglantha	ROV	Norway	2000
Argus	Manned Submersible	Russia	600
ASTERx	AUV	France	3000
Autosub	AUV	United Kingdom	1600
Autosub6000	AUV	United Kingdom	6000
AUV ISR	AUV	Portugal	100
AUV Light	AUV	Portugal	150
Bathysaurus	ROV	Norway	6000
Benthos	ROV	Greece	304
Bluefin 21	AUV	Germany	3000
Carolyn	Manned Submersible	Turkey	60
C-Explorer	Manned Submersible	Netherlands	100
Cherokee	ROV	Germany	1000
COMSUB	Manned Submersible	United Kingdom	200
Curiousus-Sub	Manned Submersible	United Kingdom	180
Deep Ocean Eng. Phantom S2	ROV	Portugal	500
DIABOLO II	ROV	Bulgaria	500
Ecomapper AUV	AUV	Spain	200
Falcon	ROV	Italy	500
Falcon1256	ROV	United Kingdom	350
Gavia	AUV	Iceland	2000
H300	ROV	Ireland	300
Hammerhead	AUV	United Kingdom	100
Holland 1	ROV	Ireland	3000

Hyball	ROV	Poland	300
Infante	AUV	Portugal	500
Isis	ROV	United Kingdom	6500
ISURUS	AUV	Portugal	200
Jago	Manned Submersible	Germany	400
Kiel 6000	ROV	Germany	6000
Lula	Manned Submersible	Portugal	500
Luso	ROV	Portugal	6000
Marius	AUV	Portugal	600
Mauve	ROV	Belgium	300
Max Rover	ROV	Greece	2000
Minerva	ROV	Norway	700
MIR 1	Manned Submersible	Russia	6000
MIR 2	Manned Submersible	Russia	6000
Mitos	ROV	Greece	2000
Nautile	Manned Submersible	France	6000
Open Diving Bell	Others	Bulgaria	100
Osmotr	Manned Submersible	Russia	200
PC - 8	Manned Submersible	Bulgaria	250
Perry	Manned Submersible	United Kingdom	300
Phantom 300 ROV	ROV	France	61
Phantom 500	ROV	Belgium	150
Phantom S4	ROV	Sweden	300
Phantom XTL	ROV	Sweden	150
Pisces	Manned Submersible	United Kingdom	600
Pisces IX	Manned Submersible	Russia	2000
Pisces VII	Manned Submersible	Russia	2000
Quest 5	ROV	Germany	4000
Rauver Mk II	AUV	United Kingdom	50
Remora 2000	Manned Submersible	France	610
ROAZ	Others	Portugal	
ROAZ_II	Others	Portugal	
Romeo	ROV	United Kingdom	500
Romeu	ROV	Italy	500
ROV Hyball 400	ROV	Portugal	400
ROV I	ROV	Portugal	300
ROV II	ROV	Portugal	200

ROVlatis	ROV	Ireland	1000
ROV PHOCA	ROV	Germany	3000
ROV Swordfish	ROV	Spain	650
ROV Vector M5	ROV	Romania	1000
SARA	AUV	Italy	1000
Seabotix LBV	ROV	Portugal	150
Seabotix LBV300S-6	ROV	Portugal	300
Seaeye 600 DT	ROV	Poland	200
SEAL	AUV	Germany	5000
Shallow Water AUV	AUV	Spain	200
Sinka	ROV	United Kingdom	10
Sub Atlantic Cherokee	ROV	Belgium	2000
SubFigher 7500	ROV	Norway	500
Super Achille 1000	ROV	France	1000
Super Achilles	ROV	Greece	1000
Super Achilles 2000	ROV	France	2000
Taipan 2	AUV	France	160
Taurus	Manned Submersible	United Kingdom	400
Thetis	Manned Submersible	Greece	610
ULISAR (National Autonomous Underwater Vehicle)	AUV	Turkey	200
Victor 6000	ROV	France	6000
Videoray	ROV	Portugal	150
Video Ray	ROV	Croatia	150
Vortex	ROV	France	50
Wrex	ROV	United Kingdom	300

#### 4) EUROCEAN DATABASE PROVIDES A LOT OF INFORMATION ON OTHER MARINE AND MARITIME RESEARCH INFRASTRUCTURES<sup>6</sup>

- 2D seismic equipment
- 3D seismic equipment
- Aerial systems
- Autonomous surface craft
- Autonomous underwater vehicle
- Bottom seismic instruments
- Container labs
- Corers

<sup>6</sup> EurOcean database: <http://www.eurocean.org/>

- Corer systems
- Current meters
- Manned submersibles
- Multibeam sonar
- Multichannel Seismic System
- Plankton sampling equipment
- Portable winches
- Remote Operated Vehicles
- Sea bed observatories
- Seismic gun compressor containers
- Towed camera systems
- Towed chirp sonars
- Towed Combined Chirp/Sidescan Sonar Systems
- Towed magnetometers
- Towed side scan sonars
- Towed vehicles with payload
- Undulating systems
- Video grabs

Next to this several initiatives are on-going to create databases and information products at Pan-European level (EMODNET, SeaDataNet, etc.)

**Mapping of EU activities**

	Overall research budget - EU contribution FP6 (2002-2006)	Overall research budget - EU contribution FP7 (2007-2013)	Description of domains covered
<b>Ocean of Tomorrow (cross cutting topics)</b>		Ocean of tomorrow 120M€ (2007-2012) (20 M€/year)	
<b>Marine environment</b>	154 M€ (31 M€/year)	214 M€ (2007-2010) (54 M€/year) + BONUS: 50 M€ (2007-2013) - (7M€/year)	
<b>Marine bio-economy (biotech, fisheries, aquaculture)</b>	120 M€ (24 M€/year)	280 M€ (40 M€/year)	
<b>Maritime Transport</b>	170M€ (34 M€/year)	182 M€ (2007-2010) 224 M€ (32 M€/year)	
<b>Marine renewable energy</b>	37 M€ (7.5 M€/year)	95 M€ (13.5 M€/year) This includes the large 32 M€ DG ENER project TWENTIES dealing with integration of RES in the electricity network)	Offshore Wind and ocean energies converters
<b>Research Infrastructure</b>	18 M€ (4.5 M€/year)	85 M€ <sup>7</sup> (2007-2011) (17 M€/year)	
<b>SMEs</b>		53 M€ (2007-2010) (10 M€/year)	
<b>Marine ERANETs</b>	Martec Transport (5 M€)	Transport II + Martec II (5 M€)	
<b>Human resources</b>		76 M€ (2007-2010) (15 M€/year)	
<b>TOTAL</b>	<b>106 M€/year</b>	<b>213.5 M€/year</b>	

- **Cross-cutting activities – "The ocean of tomorrow"**

One of the key initiatives in recent years was the launch of cross-thematic calls for proposals on major sea-related challenges. Whereas the main part of FP7 is organised along thematic priorities, 'The ocean of tomorrow' initiative seeks to foster multi-disciplinary research and promote a cross-sectoral approach between themes such as food, energy, environment, and transport. "The ocean of tomorrow" cross-thematic calls have been launched within the context of the 'European Strategy for Marine and Maritime Research' (COM 2008 534 final) So far, two cross-thematic calls have been launched FP7-OCEAN 2010 and FP7-OCEAN-2011 for a total EU contribution of 79M€. About 7-8 large projects should be funded under this umbrella. The budget allocated to these calls in 2010 and 2011 represents however only as small proportion of the annual budget allocated in marine and maritime research in the different themes.

<sup>7</sup> Including estimation of 2011 call, under evaluation.

- **Marine environment Unit I3 Management of Natural Resources**

The Environment Directorate has long worked on initiatives that have contributed to strengthen European leadership and structuring the European Research Area in the marine research domain - initially through the Marine Science and Technology programmes, the MAST programmes, launched in 1989, and subsequently within the context of the Fifth, Sixth and Seventh Research Framework Programmes.

In FP6 the environment priority has funded 30 marine research projects receiving an EU contribution of approximately 154.26 M€ (2002-2006).

Under the FP7 Environment (including climate change) Programme, the EU is supporting 46 marine research projects receiving a total EC contribution of approximately 214 M€ (2007-2010 calls) in addition to an EC contribution of 50M€ to the Joint Baltic Sea Research and Development Programme BONUS. The overall budget representing the total projects' costs is estimated at 288 M€.

The projects address major issues and challenges in marine environmental research, such as the role of the oceans in the climate system, the overexploitation of marine living resources, pressures in coastal zones, the loss of marine biodiversity etc. Besides, these projects provide tools and techniques necessary to allow us to better monitor, understand, protect and manage our oceans and seas. The main purpose is to develop knowledge that will improve our scientific and technical competencies and contribute to the further consolidation of the European Research Area in the marine research domain.

- **KBBE and Marine Bio-economy**

#### **FP6:**

For FP6, the EC invested a total of about €137.4 M for 67 projects in the SSP (Scientific Support to Policy), Food Quality and Safety and ERA-NET projects related to fisheries and aquaculture (Source: Impact Assessment). For SSP the investment was €65.2 M (48% of the total), it was €69.1 M (50% of total) for Food Quality and Safety and €3.0 M (2% of total) for ERA-NET activities.

#### **FP7**

Research on marine bio-economy is mainly addressed in Theme 2 - KBBE (Activities 2.1, 2.2, 2.3) of the specific programme "Cooperation". It comprises projects related to fisheries and aquaculture, seafood safety and quality as well as projects on marine biotechnology. The total budget allocated to marine bio-economy projects could reach approximately 265 M€ over the whole FP7 period (2007-2013). To date (2007-2010), about 125 M€ have been awarded to over 48 marine bio-economy projects including "The ocean of tomorrow" 2010 marine and maritime cross-thematic call (9M€).

Several European Technology Platforms are also active in the field of marine bio-economy such as the European Aquaculture and Innovation Technology Platform (EATIP) and the European Fisheries Technology Platform (EFTP).

Two ERANETS are also planned on marine biotechnology and on total seafood chain. There will be both connected to the SEASERA marine overarching ERANET and the Joint Programming initiative on "Healthy and productive seas and oceans".

- **FP7 – Sustainable Surface Transport – Waterborne**

Research on maritime transport is addressed in Theme 7 – Sustainable Surface Transport (SST) of the specific programme "Cooperation".

The maritime transport projects selected should contribute to the greening of Surface Transport/ the promotion of the cleanest use of transportation modes and elimination extra pollution caused by traffic congestion/the improvement of safety and security/ the Competitiveness of the EU/cross cutting activities.



From 2007-2010 (there was no Transport call in 2009) about 58 projects have been funded with a EC contribution of 181.5 M€. In the framework of the Ocean of Tomorrow joint call 2010, a 11 M€ project was funded.

Two ERANETS TRANSPORT II (3 M€) and MARTECII (2 M€) are funded under the FP7 (they already got funded under the FP6).

In the framework of FP6, around 170 M€ were allocated to research on maritime transport.

The WATERBORNE Technology Platform provides useful inputs to the activities of the Transport theme.

- **Marine renewable energy**

For wind energy, turbine technologies, support structures both ground-based of floating, grid connection systems, wind power forecasting.

The TPWind Technology platform has been key to the preparation of the European Industrial Initiative on Wind Energy (EWI) as part of the implementation actions required for the Strategic Energy Technology Plan (SET-Plan). The EWI has a strong focus on off-shore wind energy and addresses resource assessment and spatial planning. Public acceptance is part of the EWI implementation plan.

In addition to the EWI, a European Energy Research Alliance on Wind Energy is already operational within the SET-Plan activities. Here again, one of the EERA-Wind sub-group is dealing with off-shore aspects.

For Ocean energy, the EU-funded activities cover mostly research and demonstration of innovative ocean energy. The topic ERA-NET Ocean 2011 received no proposal. Ocean energy is modestly mentioned in the SET-Plan and no industrial initiative is yet planned. However, an EERA-Ocean is under preparation and could be launched before the end of 2011.

In the ESFRI programme, the project MARINET has recently started to provide support for the testing of marine renewables (wind and ocean).

- **Research Infrastructure actions**

FP6 18 M€ / +85 M€ FP7 – incl. estimation 2011 / **Total ~100 M€** (excl. LIFEWATCH and SIOS-PP ESFRI preparatory phase projects)

The overall objective of the 'Research infrastructures' part of the FP7 Capacities programme is to optimise the use and development of the best research infrastructures existing in Europe (Integrating Activities, e-Infrastructures). Furthermore, it aims to help to create new research infrastructures of pan-European interest in all fields of science and technology (Design Studies and Preparatory Phase of ESFRI<sup>8</sup> projects).

Some FP7 projects are managed by DG INFSO for instance **GEO-SEAS** - Pan-European infrastructure for management of marine and ocean geological and geophysical data (5 M€).

The research infrastructures are essential to the European scientific community to remain at the forefront of the advancement of research, and they help industry to strengthen its base of knowledge and technological know how.

Domains covered relevant to the JPI: most of research infrastructures actions are strongly multidisciplinary in particular those related to research vessels (EUROFLEETS), deep sea (EMSO) or coastal observatories (JERICO), biological laboratories (EMBRC), marine data centres (SeaDataNet); some research infrastructures are more specialised such as those supporting research for aquaculture, marine renewable energy and mesocosms facilities.

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<sup>8</sup> European Strategy Forum on Research Infrastructures

- **SMEs:**

In 2007-2010, about 40 marine related SME projects have been selected for about 53M€ with an average funding of about 1,5M€. In terms of scientific fields, a detailed analysis reveals that aquaculture and fisheries, transport as well as energy are the most represented sectors in marine related SME projects.

- **Human resources**

In 2007-2010, about 188 marine related projects have been selected for about 76M€. Grants dealing with life-long training and career development as well as activities with an international dimension have generated most interest.

## ANNEX 3: MARINE AND MARITIME RESEARCH EUROPE– USA

<b>Marine and Maritime Research</b> <b>Europe – USA</b> (estimates based on input and data analysis)	
Europe (mapped activity, estimated 80%)	United States
<b>Total</b> <b>1897,5 M€/year</b>	<b>Total</b> <b>1916 M€/year</b>

