European Commission
Maritime Affairs
and Fisheries

Marine Knowledge 2020

MARINE DATA AND OBSERVATION FOR SMART AND SUSTAINABLE GROWTH

European Commission
Maritime Affairs
and Fisheries

More information on the European Union is available on the Internet (http://europa.eu).

Cataloguing data can be found at the end of this publication.

Cover picture: Seabed mapping using airborne lidar (Clew Bay), © Marine Institute, Ireland

Printed in Belgium

PRINTED ON WHITE CHLORINE-FREE PAPER

European Commission

Marine Knowledge 2020

Marine data and observation for smart and sustainable growth

Communication from the Commission
to the European Parliament and the Council

European Marine Observation and Data Network

Impact assessment
Executive summary

Commission staff working document

Directorate-General for Maritime Affairs and Fisheries

Foreword

Europe's 2020 strategy recognises that knowledge drives innovation, which in turn brings growth that is both sustainable and smart. For the maritime economy much of this knowledge depends on observations of the rhythms and cycles of the sea. However, the data collected through these observations can only generate knowledge and innovation if Europe's engineers and scientists are able to find, access, assemble and apply them efficiently and rapidly. At present this is often not the case.

The Commission's 'Marine Knowledge 2020' initiative aims to unlock and assemble marine data from different sources and facilitate their use for purposes other than those for which they were originally intended. This will have three major benefits.

First, it will improve the efficiency of all those private bodies, public authorities and researchers which presently use marine data. Less time and effort will be spent assembling and processing incompatible data from heterogeneous sources.

Second, it will open up new opportunities and drive innovation in the maritime economy. I am confident that universal and reliable access to accurate marine data will enable European business to offer products and services that nobody could have anticipated beforehand.

And third, it will reduce uncertainties in our knowledge of the behaviour of the seas and oceans. This will not only benefit those living and working on the seas and at the coast. Circulation in the oceans drives the terrestrial climate. Improved knowledge of the sea is not a sufficient condition for better forecasting of the future severity or mildness of Europe's seasons. But it is a necessary one. Thus better marine knowledge can contribute towards Europe's adaptation to climate change.

Consortia of European bodies are already setting up a prototype European Marine Observation and Data Network (EMODnet) to facilitate access to data in a limited number of sea basins for those public and private bodies that need them. Users can download not only the data, but also information as to the reliability of the measurements. Gaps in the observation networks are highlighted.

The further measures that we propose will help us realise the potential of a resource that covers 71% of the planet. Together they represent a coherent set of contributions from different EU policy areas and as such this initiative is a concrete example of the benefits of the EU's fledgling integrated maritime policy.

Maria Damanaki
European Commissioner
for Maritime Affairs and Fisheries

Marine Knowledge 2020

Marine data and observation for smart and sustainable growth

Communication from the Commission
to the European Parliament and the Council

Table of contents

1 | Context

Knowledge is an engine for sustainable growth in the interconnected global economy and therefore a key element to achieve smart growth in the European Union in line with the 'Europe 2020' strategy [1]. Improving knowledge of the seas and oceans that make up 71% of our planet's surface is one of the three cross-cutting tools of the EU's integrated maritime policy [2]. Indeed marine knowledge can also help achieve the other two tools – better spatial planning and integrated maritime surveillance. The magnitude of future changes in oceanic systems, their impact on human activity and the feedbacks on the ocean from these changes in human behaviour cannot be forecast without understanding the way the system works now and how it worked in the past. Knowledge is necessary to achieve good environmental status of marine waters, in accordance with the Marine Strategy Framework Directive, the environmental pillar of the integrated maritime policy. Knowledge is a key component of the EU's plan to integrate marine and maritime research [3] and a contribution to the Digital Agenda [4].

The creation of marine knowledge begins with observation of the sea and oceans. Data from these observations are assembled, then analysed to create information and knowledge. Subsequently the knowledge can be applied to deliver smart sustainable growth, to assess the health of the marine ecosystem or to protect coastal communities.

This Communication is largely concerned with the first two stages of the process chain – i.e. data collection and assembly – on the basis that public information is fundamentally a public good that can benefit a wide body of stakeholders whereas applications are more specialist and can be dealt with either through the market or through targeted policy initiatives. Data collection is mostly, for subsidiarity reasons, the responsibility of Member States. The EU has the potential to add value in the assembly phase because of the need to ensure coherence across borders and between different user communities.

The Council conclusions on integrated maritime policy of 16 November 2009 [5] encouraged the Commission to make proposals on improving the use of scientific knowledge. This Communication responds to this request by outlining the case for a more coordinated approach to marine data collection and assembly and describes an action plan whereby the different EU policy measures are contributing pieces to an overall jigsaw that will achieve this aim.

7

---

1   Europe 2020, A European Strategy for smart, sustainable and inclusive growth, 3.3.2010, COM(2010) 2020.
2   An Integrated Maritime Policy for the European Union Brussels, 10.10.2007, COM(2007) 575 final.
3   A European Strategy for Marine and Maritime Research, A coherent European Research Area framework in support of a sustainable use of oceans and seas Brussels, 3.9.2008, COM(2008) 534 final.
4   A Digital Agenda for Europe 19.5.2010, COM(2010) 245 final.
5   Council conclusions on integrated maritime policy, 2973rd General Affairs Council meeting, Brussels, 16 November 2009.

2| Current challenges

At present the majority of marine data collected by public institutions in EU Member States, individually or collectively, at a cost of more than EUR1 billion annually [6], are largely collected with a specific purpose in mind – for instance to exploit marine resources, to ensure safe navigation, to monitor compliance with regulations or to test a scientific hypothesis. However, as was confirmed in a public consultation [7], those processing or applying these data face a number of obstacles. Users find it hard to discover what data already exists. There are restrictions on access, use and re-use. Fragmented standards, formats and nomenclature, lack of information on precision and accuracy, the pricing policy of some providers and insufficient temporal or spatial resolution are further barriers. The opportunity to develop innovative new products and services based on these data is therefore lost [8].

3| Objectives

In the context of this Communication, three objectives to improve marine knowledge are established:

1. reducing operational costs and delays for those who use marine data and therefore:

- helping private industry compete in the global economy and meet the challenge of sustainability;

- improving the quality of public decision-making at all levels;

- strengthening marine scientific research.

2. increasing competition and innovation amongst users and re-users of marine data by providing wider access to quality-checked, rapidly-available coherent marine data;

3. reducing uncertainty in knowledge of the oceans and the seas and so providing a sounder basis for managing future changes.

These objectives contribute directly to some of the flagship initiatives announced in the Europe 2020 strategy such as an 'Innovation Union', a 'Resource efficient Europe' and 'an industrial policy for the globalisation era'.

A conservative estimate of the benefits of creating an integrated network to replace the present fragmented marine observation system suggests a figure of EUR 300 million per annum [9]. Beyond this, a more rational use of marine data will not only improve the efficiency of existing users of marine data but will also open up new opportunities for innovation and growth.

---

6   Estimate made in the impact assessment for this Communication.

7   Commission Staff Working Document, 'Marine Data Infrastructure Outcome of Public Consultation', 22.1.2010, SEC(2010) 73 final.

8   For instance bioprospecting for new products in medicine or the process industry would benefit from better knowledge of sea-bed habitats.

9   The impact assessment estimates approximately EUR 100 million for science, EUR 56 million for public authorities and EUR 150 million for the private sector.

4 | Developing existing EU instruments

Member States already collect much data and in some cases are legally obliged to do so. Furthermore various EU instruments and actions endeavour to further the availability of a coherent set of data and observations within the EU.

These actions include both obligations and enabling measures. The distinction between the two is not always clear-cut but in general obligations are those where EU legislation obliges Member States to collect, assemble or grant access to data and enabling measures are those where the EU provides some support.

4.1. EU Directives

The Marine Strategy Framework Directive ([10]) obliges Member States to *'establish and implement coordinated monitoring programmes for the ongoing assessment of the environmental status of their marine waters.'* Assembling sea-basin and pan-European-sea pictures requires collaboration across borders and across disciplines. Experience so far demonstrates that the sharing of data across sectors and across Member States does not take place uniformly, adequately, efficiently or rapidly. Unless the European Union takes or facilitates actions in this field it is unlikely to happen.

The INSPIRE Directive ([11]) obliges Member States to adopt measures for the sharing of data sets and services between public authorities for the purposes of public tasks and the Environmental Information Directive ([12]) requires them to release the data when asked. The Directive on the re-use of public sector information ([13]) facilitates the re-use of public data by establishing a common legislative framework regulating how public sector bodies should make their information available for re-use in order to remove barriers such as discriminatory practices, monopoly markets and a lack of transparency.

These Directives provide the necessary legal foundations for a better use of marine data and, in the case of INSPIRE, for common standards. But they are not in themselves sufficient. They do not necessarily apply to those bodies not exercising public authority that hold much marine data – for instance

---

10   Directive 2008/56/EC.
11   Directive 2007/2/EC establishing an Infrastructure for Spatial Information in the European Community.
12   Directive 2003/4/EC.
13   Directive 2003/98/EC.

scientific and academic institutions – and they do not override intellectual property rights. They do not deal with near-real time observations or historic archives of data.

In a review of the Public Sector Information Directive ([14]), Re-users in the geographical and meteorological sectors signalled high prices, restrictive licensing conditions and discrimination as barriers to fully unlock the potential of PSI re-use. Access to foreground data from EU Framework Programme marine research projects is only mandatory for Community Institutions and Bodies who intend to use the data for developing, implementing and monitoring environmental policies.

4.2. Data Collection Framework for fisheries (DCF)

The new Data Collection Framework adopted in 2008 ([15]) obliges Member States to collect, manage and provide high quality fisheries data for the purpose of scientific advice, mainly for appropriate fisheries management decisions. These activities are executed in the framework of multi-annual national programmes which are co-financed by the Union. The new framework obliges Member States to provide access to these data for fisheries management advice, scientific publication, public debate and stakeholder participation in policy development. Beyond these purposes, access to data, their assembly on a sea-basin level and re-use of assembled data currently requires the consent of all data owners concerned.

4.3. Global Monitoring for Environment and Security Initiative (GMES)

GMES is a broad programme, covering land and the atmosphere as well as the marine environment. It aims to deliver services in the environmental and security fields and is largely focused on measurements from

satellites and on products based on these measurements. Options for the marine core service of GMES are being tested through the MyOcean project. Products are available for any kind of use, including commercial (downstream activities) but excluding 'uncontrolled redistribution (dissemination, e.g. broadcasting, web posting…)'.

4.4. Shared Environmental Information System SEIS and WISE-marine

The Shared Environmental Information System SEIS ([16]), an approach being encouraged by the European Commission and the European Environment Agency (EEA), aims to modernise and simplify the availability, exchange and use of the data and information required for the design and implementation of environmental policy, according to which the current, mostly centralised systems for reporting are progressively replaced by systems based on access, sharing and interoperability.

WISE-marine is the marine environmental component of SEIS intended to fulfil the requirements of implementation of the reporting obligations of the Marine Strategy Framework Directive 2008/56/EC and to inform the European public on implementation of marine strategies. It will be an extension of the current Water Information System for Europe (WISE) system, which covers near coastal waters, towards the marine environment.

4.5. ur-EMODnet

The 'ur-EMODnet' financed through maritime policy preparatory actions ([17]) is a prototype EMODnet ([18]) that should itself be useful to marine and maritime professionals but which is primarily designed to test the design concept and promote feedback. Thematic groups ([19]) are assembling existing data from different sources, measuring their quality,

14 Re-use of Public Sector Information – Review of Directive 2003/98/EC, Brussels, 7.5.2009, COM(2009) 212 final.
15 Council Regulation (EC) No 199/2008 of 25 February 2008.
16 Towards a Shared Environmental Information System (SEIS), COM(2008) 46 final, Brussels, 1 February 2008.
17 A financial mechanism designed to prepare proposals with a view to the adoption of future actions.
18 European Marine Observation and Data Network.
19 Thematic groups are consortia of laboratories that have taken on the responsibility of assembling data of a particular type and making them available through single gateways. There are currently four groups – for hydrography/bathymetry, for geology, for biology and for chemistry (see table 1). One for physical data is in the pipeline.

© Mick Mackey

parameters and sea-basins covered are fewer than would be needed to satisfy the needs of the marine and maritime community. The resolution is too coarse. It would be too great a jump and too risky a venture to move directly from the preparatory-action-based ur-EMODnet to a full-blown EMOD-net of the scale that current estimates indicate will be necessary[21]. A Regulation will be proposed to finance the further development of an Integrated Maritime Policy in the period 2011-2013. Enrichment of EMODnet will be amongst the actions to be financed under this Regulation.

4.6. EU and national agencies

In addition to the activities of the European Environment Agency, the Community Fisheries Control Agency and the European Maritime Safety Agency are mandated to assist the European Commission and the Member States in the application of EU relevant legislation. In the course of their duties they collect relevant data[22] which could have a wider use for other purposes. Provided that suitable safeguards regarding confidentiality were observed, these data might, in an appropriate aggregated form, be disseminated more widely.

A wide range of Member States government bodies are also involved in collecting data.

4.7. Coastal data

Coastal authorities need to gather, use and share information to underpin decision-making and public engagement. The framework for coastal information systems is provided by the EU integrated coastal zone management recommendation[23].

Coastal regions have been defined by Eurostat as standard statistical regions (NUTS[24] level 3), which have at least half of their population within

ensuring that they are complete with descriptors (metadata) such as time and place of measurement and making them available through thematic portals. Many of the insights and technologies used by these groups were developed under EU research programmes[20]. The themes assembled so far are summarised in Table 1. Their interoperability is strengthened through identical standards and six-monthly coordination meetings. Data layers produced through ur-EMODnet are available without restriction. It is intended to launch an interim evaluation of the results in 2011 and a final evaluation in 2013 that will guide further action.

However the current ur-EMODnet will not in itself provide sufficient information for a full evaluation in 2013. The sample is too small. The number of

20   Decision 1982/2006/EC on the 7th Research Framework Programme is the latest in a series of programmes funding the production and use of marine data.
21   Impact Assessment for EMODnet.
22   Such as oil-spills, ship movements and fishing activity.
23   Recommendation 2002/413/EC.
24   For description of statistical regions see http://ec.europa.eu/eurostat/ramon/nuts/basicnuts_regions_en.html

50 km of the coast ([25]). This represents 446 regions, 372 of which have a coastline. Socio economic parameters such as population indicators or GDP are freely available through the Eurostat web-site for the majority of these regions. For some countries, such as Poland, Sweden or UK, these regions are so large that they also cover populations living far inland and so cannot capture the particular features that characterise coastal communities. Attempts to collect finer resolution data have not been successful because of prohibitive charges from some national statistical offices, because some national statistical offices do not have a systematic way of dealing with requests for data and because, for confidentiality reasons, data cannot be provided for regions with only one or two enterprises in a particular sector.

Economic data – income, costs, employment – from fisheries, aquaculture and fish processing are also collected as part of the Data Collection Framework. Economic data of European fishing fleets are summarised in an annual economic report ([26]) at the national level and increasingly at a sea basin level ([27]).

A number of regional authorities are building coastal information systems in order to manage and plan activities. The INSPIRE Directive and different Interreg ([28]) projects are beginning to ensure some interoperability between these systems.

Table 1 How EU initiatives contribute to a marine data infrastructure Research projects and national initiatives are not included. Neither are 'obligations' such as INSPIRE. The table only covers 'enabling measures' financed in part by the EU budget

Parameters	collection	assembling	application
Bathymetry		ur-EMODnet	WISE marine
Geology		ur-EMODnet	
Physics	GMES (space)	GMES (except near coast), ur-EMODnet ([29])	GMES
Fisheries (including fisheries economy)	Data Collection Framework ([30])	Joint Research Centre (and other users)	ICES ([31]) , STECF ([32]), GFCM ([33])
Chemistry		ur-EMODnet	WISE-Marine
Biology		ur-EMODnet, GMES ([34])	WISE-Marine
Human activity (other than fisheries) ([35])		ur-EMODnet ([36])	WISE Marine
Coastal data		Eurostat	

25 Hamburg was added to the list even though it does not satisfy the above criteria.

26 Scientific, Technical and Economic Committee for Fisheries (STECF), The 2009 annual economic report on the European fishing fleet, EUR 24069 – ISBN 978-92-79-13867-6.

27 The sea-basin being the basin where the fishing takes place. This is not always the one on whose coast the fish are landed or where the home port of the vessels concerned is sited.

28 A Community initiative which aims to stimulate interregional cooperation in the European Union. It started in 1989, and is financed under the European Regional Development Fund (ERDF).

29 Not including measurements from space so GMES does not feed ur-EMODnet.

30 Council Regulation (EC) No 199/2008 of 25 February 2008.

31 International Council for Exploration of the Sea.

32 Scientific Technical and Economic Committee for Fisheries set up under Article 33 of Council Regulation (EC) No 2371/2002 of 20 December 2002.

33 General Fisheries Commission for the Mediterranean.

34 Chlorophyll measurements from space as a proxy for phytoplankton.

35 Offshore energy, shipping routes, gravel extraction etc.

36 Financed through the proposed financial regulation for integrated maritime policy.

4.8. Proposals to improve existing instruments

In order to enhance the effects of the above instruments and actions the Commission proposes a number of improvements:

- The Commission will take the necessary steps to ensure that data from EU-supported regional development and marine and maritime research programmes are more available for re-use.

- The Commission will examine what further measures are needed to promote coastal information systems in its follow-up to the EU Recommendation on Integrated Coastal Zone Management [37].

- Demonstrations of GMES marine services will be supported through the space theme of the Seventh Framework Programme until 2014. Follow-ups are being considered.

- In the short-term the Commission will make sure that the new access rules for fisheries data are fully enforced by Member States. In the mid- and long-term, ways to widen the scope for accessing data will be explored.

- To optimize use of resources WISE-Marine and EMODnet will be coupled in the context of the implementation of the Marine Strategy Framework Directive. WISE-Marine is scheduled to be set up by mid 2012 and will collect and visualize Member States data on the marine environment and human activities. As well as EMODnet, WISE-marine will build on WISE, the existing reporting system already used by Member States to report their assessments for the Water Framework Directive.

- The Commission intends to launch a further set of actions to improve the coverage [38] of data, resolution and range of assembled parameters [39].

- The Commission will ensure that its Agencies regularly release data.

- The Commission encourages Member States in the same spirit to release data gathered for a specific purpose, if necessary aggregated in time and space.

- Eurostat will study detailed population and area parameters in order to provide better parameterization of the coastal influence in territorial regions for statistics.

Initiatives to remedy deficiencies in Europe's marine data system will thus progress along a number of avenues. The principal purposes of these initiatives are similar but not identical. Further action is therefore required to create synergies between the various developments.

---

37   The PEGASO project, supported by the 7th Framework Programme is examining options.

38   Such as: extending the geology map to the Mediterranean and Iberian Atlantic Coast; resolution of bathymetry from a quarter of a minute to at least a tenth of a minute; include further pesticides.

39   Financed through the proposed financial regulation for integrated maritime policy.

The Commission will take the necessary measure to bring these initiatives together in order to ensure a smooth and seamless provision of marine data and at the same time to avoid redundancies in data collection efforts. This will involve:

- **ensuring common standards ([40]);**

- **progressive alignment of data policies. The ultimate aim is to provide free access without restriction of use;**

- **ensuring that the data assembled in initiatives such as ur-EMODnet or the Data Collection Framework are appropriate for the needs of the Marine Strategy Framework Directive;**

- **specific ur-EMODnet action in 2010 ([41]) to assemble physical in-situ data as input for GMES, to validate GMES model results and to cover the near-coast waters ([42]) not dealt with by GMES;**

- **in 2012-2013, once results from ur-EMODnet and prototype GMES marine core service actions become available, to assess gaps in the monitoring network;**

- **beginning a dialogue with partner countries and international organisations in order to ensure that the EU's effort contributes towards an interoperable global marine knowledge system.**

5 | Towards an operational Marine Data Architecture

While the instruments and action mentioned above have their merit, the integration of marine knowledge requires a more robust step. A coherent set of data, crossing Member States' borders needs a targeted operational architecture. The final shape will depend on operational experience gained in projects and initiatives such as ur-EMODnet and MyOcean. It is however appropriate already at this stage to signal some of the elements that should be incorporated:

1. Europe's marine data are presently collected for a specific purpose – for instance safe navigation or fisheries management – but the aim is to move towards a paradigm where, from the outset, a multi-purpose use is envisaged.

2. Data should be maintained as close to the sources as possible. These data should be under proper guardianship in accredited data centres. Any processing of data which constitute personal data as defined in the Data Protection Directive ([43]) must comply with the provisions of the Directive.

3. An effective European marine data infrastructure should include a number of thematic assembly groups ([44]) entrusted with 'assembling' data.

---

40 Including nomenclature, formats and units This will ensure that data flowing from the different initiatives can be compared and combined. INSPIRE provides the basic framework. INSPIRE is itself fully consistent with international standards.

41 Financed through the proposed financial regulation for integrated maritime policy.

42 Near-coast waters is a scientific term used to define those waters where shallow water, complex coastal topography and tidal streams mean that physical modelling requires a much more detailed approach than is presently envisaged within the GMES marine core service.

43 Directive 95/46/EC.

44 This covers (1) access to all raw observations held at data centres of a certain type (2) production and dissemination of data layers indicating density of observation, quality of data, (3) seamless (gridded or polygon) data layers over and across whole sea basins.

A thematic assembly group is a consortium of organizations that assembles data on a specific theme such as geological layers or chemical contaminants.

4. In order to achieve sustainable operation of marine observations systems and identification of critical gaps in these systems an integrated viewpoint at sea-basin level is needed. Existing organisations with a sea-basin mandate such as the Regional Sea Conventions ([45]), Regional Advisory Councils for fisheries and Euro-GOOS ([46]) would be expected to contribute.

5. In a limited number of cases it may be appropriate that the EU support to the marine data and observation infrastructure move beyond the assembly of data to the analysis and application of these data; for instance to support the provision of indicators for the state of the marine environment.

6. The knowledge architecture requires a decision making process that decides what data is going to be collected and how it should be assembled. It also requires a secretariat to administer the process.

In order to work towards such an infrastructure the Commission proposes that:

- **Knowledge is not only the responsibility of Government. European industry should dedicate adequate resources to ensure adequate safeguarding of knowledge and, when it is no longer commercially valuable, its wider dissemination.**

- **The Commission will encourage communication amongst national data centres through regular discussions in its marine observation and data expert groups and its maritime internet forum in order to promote good practice in data curation and dissemination.**

- **To ensure an integrated view of monitoring needs, the Commission will explore how a sea-basin checkpoint ([47]) might work by setting up pilots ([48]) in the period 2011-2013.**

- **The Commission, on the basis of advice from Member States, from sea-basin checkpoints and its own experts will continue to define priorities for assembling data in ur-EMODnet but in the period 2011-2013 will develop a proposal for more permanent governance.**

- **The Commission will set up a prototype secretariat ([48]) to manage the ur-EMODnet process – preparing meetings, assessing the output of thematic assembly groups and sea-basin checkpoints, ensuring deadlines are met and preparing an annual report of activity.**

15

---

45 OSPAR, HELCOM, Barcelona, Bucharest Conventions.
46 EuroGOOS is an association of national governmental agencies and research organisations, committed to European-scale operational oceanography.
47 Checkpoints would independently check data layers from each thematic assembly group, ensure that the data from different groups are mutually compatible and define priorities for further observations based on interaction with local stakeholders. These checkpoints should act on behalf of all users of marine data within that sea-basin and cover all EU initiatives on marine data – EMODnet, GMES, Data Collection Framework etc.
48 Financed through the proposed financial regulation for integrated maritime policy.

6| Steering the process

The greater access to marine data and observation has been monitored by an independent group of experts in the collection, assembly and application of marine data. The support of this group has assisted the Commission in making its choices on thematic priorities and working methods. The group will assist in a formal mid-term assessment beginning in 2011 and reporting in early 2012. This assessment will include quantitative indicators that measure the uptake of data from the prototype ur-EMODnet by scientists, authorities and industry. It will report on progress made in achieving the objectives set out in this Communication.

The Commission will also establish a Member States Expert Group to ensure coherence with ongoing work in Member States.

7| Timing

16

The proposals set out in this Communication describe actions to be taken by the Commission in the period 2011-2013. At the end of this period a further impact assessment will be made to guide the next steps. The Commission invites reactions to this plan.

European Marine Observation and Data Network

Impact assessment
Executive summary

Commission staff working document

Table of contents

1▌ PROBLEM DEFINITION

1.1. Background

Improving marine knowledge has always been a primary objective of the EU's integrated maritime policy which is itself a strategic objective of the Commission's 2005-2009 workplan (^{1}). Preparatory actions have begun in order to assess the technical options and likely cost of setting up a European Marine Observation and Data Network (EMODnet).

With input from an Expert Group, a roadmap was issued in April 2009 setting out broad principles and a timetable. Simultaneously, a public consultation on EMODnet was launched (^{2}). 300 stakeholders replied: including private companies, public authorities, international organisations and the research community.

A Regulation to fund an underpinning of the integrated maritime policy in the years 2011-2013, to be proposed by the Commission in 2010, incorporates marine knowledge objectives.

1.2. Why marine data is collected and how much it costs

Private companies need marine data in order to exploit resources more efficiently. National and local authorities need them to protect their coastlines or to assess compliance with environmental standards. Scientists need them to increase knowledge of ocean circulation and marine ecosystems.

Accordingly all coastal states collect and process marine data. Europe's current annual spending on sea and ocean data gathering and monitoring is upwards of EUR 1 billion for public bodies and about EUR 3 billion (^{3}) for private ones.

1.3. Difficulties in assembling data

Applications of marine data cannot rely on data from one source collected for a single purpose. Frequently data from waters of more than one coastal state are required.

Assembling a coherent picture from the large number of organisations holding and owning marine data – more than 50 in each of the major coastal states (^{4}) – is hard work. From the user's point of view, there are seven major barriers: [1] discovery – not being able to find them [2] access – not having permission to access them [3] use – restrictions imposed on end-use [4] coherence – difficulty combining data [5] cost – beyond the budget of the user [6] quality – precision and accuracy unknown [7] quantity – spatial and temporal resolution not sufficient for the purpose. Nearly all stakeholders in the 2009 survey (^{2}) reported that each of these seven barriers constituted an impediment to their working efficiency.

A fragmented, as opposed to an integrated, observing system adds at least 25 % to the costs of those who deliver products and services (^{5}). This does not include the missed opportunities of those who, faced with an impenetrable data infrastructure, have simply not chosen to develop new services.

1.4. Lack of Competition and Innovation

A public or private body currently has difficulty delivering a product or service that is based on marine data unless it has itself collected the data or enjoys a strong relationship with the organisation that did. This reduces the number of bodies that are potentially able to deliver the product or service and reduces the scope for innovation.

19

---

1   Strategic Objectives 2005 – 2009 Europe 2010: A Partnership for European Renewal Prosperity, Solidarity and Security, 26.1.2005, COM(2005) 12 final.

2   Commission Staff Working Document Marine Data Infrastructure Outcome of Public Consultation Brussels, 22.1.2010, SEC(2010) 73 final.

3   This figure is justified in the full impact assessment.

4   Legal Aspects of Marine Environmental Data Framework Service Contract, No. FISH/2006/09 – LOT2, final report, October 2008.

5   The Business Case for Improving NOAA's Management and Integration of Ocean and Coastal Data, Zdenka Willis, Director, NOAA IOOS Program, January 2009.

1.5. Uncertainty

The lack of an effective marine data infrastructure and an over-sparse observation network compound uncertainty in the ocean's future behaviour. A study (^{6}) suggests that an expenditure of EUR 70 million on marine mapping in Irish waters would reduce uncertainty to industry and result in benefits of EUR 415 million to the fisheries, aquaculture, biodiversity, renewable energy, energy exploration and aggregate industries. A 25 % reduction in uncertainty in future sea-level-rise could reduce Europe's annual sea-protection costs by some EUR 100 million per year. Terrestrial climate depends on ocean circulation so even terrestrial industries would gain from better marine data; not a sufficient condition for better seasonal forecasts but a necessary one.

1.6. Drivers

Even though organisations want other organisations to make their data available, they can be reluctant to open up their own because they can derive a competitive advantage through preferential access to the data when delivering products derived from these data.

1.7. Efforts to resolve the situation

Legislative measures have been adopted by the EU that oblige administrations to make their data more available. Measures such as the INSPIRE Directive (^{7}), the Environmental Information Directive (^{8}), and the Public Sector Information Directive (^{9}) introduce obligations for public authorities.

The EU provides financial support to the collection of fisheries data through the Data Collection Framework. The Global Monitoring for Environment and Security (GMES) (^{10}) aims to provide a marine core service based on satellite data. Marine data catalogues that help facilitate discovery of data and quality procedures for measurement laboratories have been developed through successive EU research programmes. Member States are beginning to put their marine data infrastructures in order.

2 | EU ADDED VALUE

Assembling sea-basin pictures requires collaboration across border and across disciplines. Fewer than 3 % of the 300 professionals consulted disagreed with the statement that 'without sustainable support from the EU it will be extremely difficult to build up a sustainable European infrastructure.'

3 | OBJECTIVES

We can distinguish three specific aims:

1. reduce operational costs and delays for those who use marine data and therefore:

(a) help private industry compete in the global economy;

(b) improve the quality of public decision-making at all levels and

(c) strengthen marine scientific research.

2. increase competition and innovation amongst users of marine data by widening and accelerating access to quality-checked coherent marine data;

3. reduce uncertainty in knowledge of the oceans and the seas and so provide a sounder basis for managing inevitable future changes.

20

---

6   Price Waterhouse Cooper, INFOMAR Marine Mapping Survey Options Appraisal Report, June 2008.

7   Directive 2007/2/EC establishing an Infrastructure for Spatial Information in the European Community.

8   Directive 2003/4/EC.

9   Directive 2003/98/EC.

10 Global Monitoring for Environment and Security (GMES): we care for a safer planet, Brussels, 12.11.2008, COM(2008) 748 final.

4| POLICY OPTIONS

4.1. Future Evolution –
The do-nothing option

Current rules regarding access and use of marine data are generally complied with ([11]). However they do not automatically apply to public bodies not enjoying a public authority such as universities. Neither do they override intellectual property rights or the obligation of some national agencies to charge cost-recovery prices. EU research or territorial cooperation projects are of a finite duration. When the projects stop, catalogues are no longer maintained and partnerships dissolve.

Without additional EU action the present infrastructure will continue to penalise users, discourage innovation and limit the EU's ability to prepare for a changing marine system.

4.2. Other Options

4.2.1. What should the EU do?

Processing marine data into knowledge and information requires three broad steps: (A) observation and collection (B) assembling the data to provide complete coherent, quality-checked data over marine basins (C) applying the data to provide services or indicators – for instance of coastal erosion, fish population or tsunami risk.

However it would be extremely hard to make a case for the EU to support data collection without knowing what is being collected already, where the gaps are and where the greatest user demand is. Neither would it be possible to develop indicators or added value products without assembling and processing the data that make up these indicators. Options for EU action are therefore:

1. ASSEMBLING the data to provide access to coherent, quality-checked, securely-maintained data over complete marine basins at marginal cost.

2. COLLECTION – the same as option 1 but also supporting observation systems and the collection of data – automatically through permanently moored or mobile instruments or through samples collected at sea and analysed in the laboratory.

3. APPLICATION – the same as option 1 but also applying the data to provide indicators – for instance of environmental quality, coastal erosion, fish population or tsunami risk.

The aim of EMODnet is to provide a basic infrastructure that benefits a variety of applications. Processing the data into customer-related applications products should, on the other hand, be a commercial and competitive business, where public and private bodies can obtain data from the best sources and merge and process them for specialist use. Option 3 'application' has therefore been discarded.

4.2.2. What is the most appropriate legal instrument?

The most important decision to be taken in choosing a legal instrument is the sharing of the burden between the EU and national level. This can be done through a Regulation, a Directive or a Recommendation.

4.2.3. How should this support be managed?

EMODnet should bind Europe's institutions together into a sustainable framework for the benefit of those who use the data. Any funding should flow to these institutions to enable them to do so. Whilst there are an almost infinite number of options for administering this, two broad options can be distinguished.

1. carry on as before in specific areas such as fisheries or space and through limited duration research projects or ad-hoc regulatory arrangements.

2. set up a secretariat – either an existing organisation or a new body – to administer the Network.

21

5| ASSESSMENT OF IMPACTS

5.1. What should EU do?

5.1.1. *Operational Costs*

Option 1, 'assembling', would reduce the labour involved in discovering and accessing data Where the cost of data is an issue, the adoption of marginal cost rather than cost recovery would also reduce costs. Option 2 'collection' might reduce the need for additional observations to meet the required precision.

5.1.2. *Competition*

Option 1, 'assembling', will increase competition since those who collect data will no longer occupy such a favoured position in delivering these products. It will allow the growth of innovative new services. Option 2 'collection' will not bring any significant competition benefits.

5.1.3. *Uncertainty*

A better measurement infrastructure will reduce uncertainty in the future behaviour of the oceans. This will allow more certainty by business and public authority in planning for the future.

Better access to existing data will reduce uncertainties. However more data is clearly needed. Option 2 'collection' will therefore have additional benefits over and above those of option 1 'assembling'. Since it is hard to adapt to an unknown future, and since

the oceans control the terrestrial climate, a better marine observation system is probably the most effective contribution that the EU can make in helping Europe adapt to climate change.

5.1.4. *Implementation costs*

Operating a new infrastructure will incur new costs that will need to be justified by the net benefits.

Initial estimates for option 1 'assembling' indicate a cost of EUR 20 million a year for ten years and EUR 11 million afterwards for maintenance and upgrading. The cost may be offset by a reduction in funding from the Community's research budget for projects aiming to show the feasibility of a marine data infrastructure ([12]).

The cost of option 2, 'collection', depends on the ambition. The output of monitoring programmes is often more of a longer term benefit to Europe than a solution to an immediate need for the Member State concerned. The Continuous Plankton Recorder, which has provided unrivalled observations of the ecology and biogeography of plankton in the Atlantic costs EUR 1.8 million per year. EUR 3 million per year would support the European component (EUR 8 million per year) of Euro-argo – a world wide in situ global ocean observing system, based on autonomous profiling floats. Other expenditure would be more expensive. Establishing a European Multidisciplinary Seafloor Observatory would cost about EUR 240 million with operational costs of EUR 32 million per year. It has been estimated that developing a complete multibeam sonar mapping of EU Member

Table 1 Estimates of annual costs and benefits of an operational European Marine Observation and Data Network

IMPACT	Cost or benefit	Option 1 support data processing and assembly (annual)	Option 2 support data collection (additional to option 1)
Reduced operational costs	benefit	EUR 300 million	
Increased competition	benefit	EUR 60 million – EUR 200 million	
Reduced uncertainty	benefit		EUR 220 million
Increased implementation costs	cost	EUR 20 million ([13])	EUR 10 million – EUR 90 million

---

12   SEADATANET etc.

13   Assuming a 10 year program to construct an EMODnet with resolution 10 times finer than the present ur-EMODnet.

States' waters would cost approximately EUR 50 million per year for the next 20 years. Thus the additional cost of option 2 compared to option 1 would be EUR 10 to EUR 90 million per year.

Before making a final decision as to which option to pursue, more information is needed, The Commission is proposing a new financial instrument for maritime policy of which EUR 7.5 million per annum would be earmarked for marine knowledge in the period 2011-2013. This will not only provide the basis for a more informed decision but will, in itself, contribute to the objectives of the marine knowledge initiative.

5.1.5. *Subsidiarity*

As indicated in section 2 the transnational nature of the issue provides a strong justification for action at an EU level. This is clearly valid for option 1 'assembly'.

For option 2 'collecting data' the issue is more complex. Any EU support should not discourage Member States from fulfilling their moral or legal obligations to collect data. However there are precedents. The EU already provides some EUR 40 million for the collection of fisheries data and an average EUR 44 million ([14]) per year for satellite data.

The subsidiarity case for option 2 is strongest when the additional monitoring is to take place outside Member States waters. However this is not a necessary condition. Marine observations do not only benefit the State in whose waters the observations are made.

5.1.6. *Proportionality*

For both options the EU actions would add value to what Member States are doing with additional resources of between 2 and 5 % of what Member States are spending already. These resources would enable the Member States to achieve their objectives more effectively and are thus commensurate. Data collected and not exploited are an opportunity lost.

5.2. What is the appropriate legal instrument?

Defining the appropriate roles for bodies of the Network will require the definition of mandatory roles. So recommendations and opinions are not appropriate. The transposition into national law required by Directives might result in greater administrative burden than for Regulations. Enabling measures defining expenditure programmes or participation by agencies at a European level require a Regulation.

5.3. How should this support be managed?

Carrying on as before would, by definition, have zero impact in solving the problems identified.

The public consultation identified a number of bodies capable of hosting a secretariat but no frontrunner. A call for tender would therefore be the most appropriate way of identifying the most appropriate solution.

6| MONITORING AND EVALUATION

Based on the principles that the indicators should be quantitative and not impose a heavy burden for collection of data, the following are proposed.

Resource indicators

The resources used to run the Network broken down into:

- cost of Commission staff;

- cost of secretariat;

- resources provided to assemble and process data.

Output indicators

- number of parameters where complete picture of European observation effort is available;

---

14 Through GMES and assuming that about 40 % is for sea and ocean observation (Entreprise and Industry DG private communication).

- number of parameters made available for downloading over complete sea-basins.

Impact indicators

(to measure improvement in operational efficiency)

- number of private companies downloading data through EMODnet;

- number of public administrations downloading data from EMODnet;

- number of papers on marine science published in 'Nature' and 'Science' led by European authors.

(to measure increased competition) average number of bidders for Commission service contracts requiring marine data.

(to measure reduction in uncertainty) range of values for sea-level rise in 50 years time used in assessment of UK and Netherlands sea-defence strategies.

The Marine Observation and Data Expert Group will continue to advise the Commission on the effectiveness of EMODnet and highlight any shortcomings that need to be addressed.

Publications Office