



**HAL**  
open science

## Marine Sciences Information Activity Report for Spain 2001/2002

Enrique Wulff-Barreiro

► **To cite this version:**

Enrique Wulff-Barreiro. Marine Sciences Information Activity Report for Spain 2001/2002. Bacheva, S.; Baron Varley, J.; Schmidt, B.; Varley, A. Smooth sailing: Crossing the boundaries in aquatic sciences information management. Proceedings of the 10th Biennial Meeting of EURASLIC, pp.129-138, 2003, 954-449-164-3. hal-01233615

**HAL Id: hal-01233615**

**<https://hal.science/hal-01233615>**

Submitted on 25 Nov 2015

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

**Tenth Biennial Meeting  
of the European Association  
of Aquatic Sciences  
Libraries and Information  
Centres (EURASLIC)  
7-9 May 2003**

**Institut fuer Meereskunde  
Kiel, Germany**

# **SMOOTH SAILING**

**Crossing the Boundaries  
in Aquatic Sciences  
Information Management**

**Institute of Oceanology  
Varna, Bulgaria**

**EURASLIC  
2003**



# Marine Sciences Information Activity Report for Spain 2001/2002

by

**Enrique Wulff-Barreiro**

Marine Sciences Institute of Andalusia, Spanish Council for Scientific Research, ICMAN  
(CSIC), Spain

## INTRODUCTION

Recent developments in Spanish marine science relate to a "big science" demand bounded between two large, abrupt changes in system behaviour. On April 25, 1998, the Aznalcollar (near Seville) mining spill, and on 13 November 2002 the Prestige Oil spill off the Galician coast. Consistently associated with desirable scientific outcomes a multi-faceted insight through the Spanish Presidency of the European Commission [1], January-June 2002, has been offered by the Innovation Directorate [2][3]. An amount of 3.530 million ? was provided from the Government to promote public and private research in 2001 [4].

What is the marine science information sector from Spain expected to offer during this period (2001-2002)? Without doubt, the concept of leadership has been challenged by the Spanish Presidency. The key action, sustainable marine ecosystems, in the energy, environment and sustainable development programme, of the EU 5th Framework Programme, has been analysed. Both the methodological approach, and the results obtained are included in this report.

Missing data has had substantial relevance for research policy in the area. Organizational competences of top managers facing scale situations, such as Prestige tanker spill, has resulted in knowledge versus opportunism situations. We include a case study of communication between data-providers and data-users.

The more relevant databases examples (elaborated from Spain) are given, marine sciences congresses and conferences in Spain (2001-2002) are detailed, the doctoral dissertations elaborated in Spanish campuses are followed-up, a revision of the Spanish scientific publications from the database ASFA is performed, and the ISI indexed journals *Scientia Marina* and *Ciencias Marinas*, are also browsed.

A specific high-level information need is covered: Natural products from the sea in Spain. (Acknowledging that one of the leaders in anti-tumour drugs from the sea is sited in Madrid).

An important metadata question is formulated, as to whether or not it is feasible to maintain the authenticity and integrity of digital objects over time. And so the life of a digital object in marine science for the period is considered through the prism of the metadata programme conducted by the National Antarctic Data Centre.

Special emphasis on the contents of the RedIRIS Virtual community in Marine Sciences, Marinet, is given.

A last point on intellectual property environments for scientific data in marine science, is examined by considering developing markets for the taxpayer, funded information treated by the government agencies as a commodity to be used to generate revenue in the short term (and by e-mailed list).

## **1. SPANISH LEADERSHIP OF THE FIFTH FRAMEWORK PROGRAMME SUSTAINABLE MARINE ECOSYSTEMS KEY ACTION**

### **Objectives**

The aim of this study is to furnish the basic figures on the Spanish R&D policy in marine science, observed through the EU Cordis database and elaborated under the Spanish Council Presidency (Jan.2002-Jun.2002).

### **Methodology**

To measure the Spanish contribution in Marine Science EU R&D and Innovation, a ProCite© database was designed with all the Spanish participants in 34 records found in the 5th Framework Programme Projects Database. Project acronym, Duration, Affiliation of Coordinator or Participant, and Keywords (manually introduced) are the basic fields employed in the database.

### **Results**

Spanish participation in the specific programme key action for Marine Science reflects an amount of 91% (34 of 37 projects). The percentage of projects coordinated by Spanish based organisations over the total number of projects is 21%, and over the projects with at least one Spanish participant reached 23%. The trends for the estimation of the marine science reference data (work programme sub-area), in the total context of the specific programme (EESD), are respectively 31%, 6% and 19%.

Only one URL has been specifically designed for the EU FP5 key action oriented to marine science: <http://www.pizzicato.es/humor/>, at the University of Granada.

Spain's leadership (8 of 37 projects) concentrates on these thematic areas: Bacteriology, Ocean forecasting, Coastal management and Microalgae. Characterising the general subject participation of Spain into the key action Coastal management (10 participants), Pollution (7 participants), and Data analysis (6 participants).

Screening the organisation type involved in the key action resulted in: 18 research labs, 15 educational centres, and 4 other sectors (harbour authority, ship-yard, industrial park, town council). The CSIC, Institute of Marine Sciences (Barcelona) is the primary institution leading EU projects in the field. CSIC is also individually leading Europe through the Mediterranean Institute for Advanced Studies (Palma de Mallorca). Other lead institutes are the University of Granada Dept. of Civil Engineering, and the University of Elche (Miguel Hernandez University) Dept of Vegetal Production Microbiology. Spain's involvement as leader of the EU marine science research averages 36 months at the 85% level, with 42 months and 3 months as superior and inferior temporal levels of the project.

### **Discussion**

After a comparison between the in-house database and the FP5 Projects Database, Spain scores higher in Marine Science than in the total Energy, Environment and Sustainable Development (EESD) Programme. The target comparison here (key action sustainable marine ecosystems work programme subarea Spanish results versus EESD specific programme Spanish based organisations



commitment) seems largely attributable to the thematic leadership of the Spanish marine science labs, along this period, of a quarter of the total available EU projects in this area.

As to whether "the powers of the EU can do anything?" to assist in the field of Marine Science, the question examined by the conference EurOcean 2000 [11], seems relevant.

## 2. MISSING DATA

In the post-Aznalcollar and post-Prestige world, details about missing data are of interest. While all the scientific publications registered in the ASFA database on pollution after the toxic spill of the Aznalcollar mine (Coto de Donana, see [http://www.esf.org/esf\\_pressarea\\_page.php?section=6&language=0&newsrelease=25](http://www.esf.org/esf_pressarea_page.php?section=6&language=0&newsrelease=25)) come from Spain (and between 2001 and 2002, half of the data production was from the Cadiz Campus (CSIC and University) labs). The Prestige Oil Spill (see <http://rcmarinas.ens.uabc.mx/%7Ecmarinas/Europa-Editor/notas/editorialfinal.pdf>) opened a crisis between data-providers and data-users similar to the one faced by the British authority in the case of the mad cow disease (foot and mouth disease, see: Anderson ref. in, <http://www.jrc.es/pages/iptsreport/vol72/english/EDI1E726.htm>). In the case of the Prestige, this communication gap resulted in the CSIC top manager's resignation, and the letter to the journal Science, authored by a Spanish marine scientist, on the lack of coordination (available at: <http://cvu.rediris.es/pub/bscw.cgi/0/347121>). The requirement of data quality is general to the Spanish scientific community. [12]

## 3. DATABASES, CONGRESSES AND CONFERENCES, DOCTORAL DISSERTATIONS, SCIENTIFIC PUBLICATIONS (ASFA), ISI JOURNALS SCIENTIA MARINA AND CIENCIAS MARINAS

### Databases

The FAO COPEMED project to directly support the work that the GFCM's (General Fisheries Commission of the Mediterranean) Advisory Scientific Committee is to carry out, has been electronically sited on the University of Alicante server (<http://www.ua.es/copemed/redirect.htm>), these last two years. Ecocen, a visual census software for managing fish counts, output files with prepared data ready for statistical analysis, has been created at the Marine Biology Lab. (University of Alicante), and is part of the COPEMED information system. This database application creates a standard facilitating the exchange of data sets. The universities of Perpignan, La Laguna (Canary Islands), Las Palmas de Gran Canaria, Barcelona, the CSIC (Blanes) and the Spanish Institute of Oceanography (Palma de Mallorca) have been collaborating to this project. It went online early in 2002. <http://www.ua.es/ecoCEN/index.htm>.

The requirements for developing a useful database on socio-economic indicators for Mediterranean fisheries, have been the subject of a feasibility study involving the Economy of the Sea Cabinet of the University of Barcelona, and the Spanish Institute of Oceanography (Malaga Lab.), (and the Nador (Morocco) Regional Centre, of the Institut National de Recherche Halieutique). FAO, through COPEMED, has been financially involved. [13]

Spanish participation in the Mater database EU research project (<http://www.ifremer.fr/sismer/program/mater>) completes the existing range of Spain and Marine Sciences databases. The Mater database is a software tool for managing oceanographic data collected in the Mediterranean Sea during 1996-2000. Along with metadata, data relevant to the project is made available to the user community. The Spanish partners come from the University of Malaga, Autonomous University of Barcelona, Polytechnic of Barcelona, University of the Balearic Islands, and ICM (CSIC, Barcelona).

## Congresses and conferences

The following list is a RedIRIS (the Spanish academic Internet network) printout of the congresses and conferences offered in 2001/2002  
([http://tierra.rediris.es/marinet/index\\_english.html](http://tierra.rediris.es/marinet/index_english.html)).

2001

Feria de Medio Ambiente ECOMED-POLLUTEC. Barcelona, 7-10 February, 2001. Internet address: e-mail: [in.nova@retemail.es](mailto:in.nova@retemail.es)

ICES Working Group on Environmental Interactions of Mariculture. Tenerife, March 12-16. Internet address: <http://www.ices.dk/reports/general/2001/2001gen6.htm>

ICES Working Group on Pathology and Diseases of Marine Organisms. Santiago de Compostela, March 13-17. Internet address: <http://www.ices.dk/reports/general/2001/2001gen6.htm>

ICES/IOC/IMO Study Group on Ballast and Other Ship Vectors. Barcelona, March 19-20. Internet address: <http://www.ices.dk/reports/general/2001/2001gen6.htm>

ICES Working Group on Introductions and Transfers of Marine Organisms. Barcelona, March 21-23. Internet address: <http://www.ices.dk/reports/general/2001/2001gen6.htm>

I International Congress on Science Marine and Technology, Oceanology and Human Development on the Continental Platform and Margin. Pontevedra, 24-27 April, 2001. Internet address: <http://wwwA040.infonegocio.com/6/Congreso.html>

VII Reunión Ibérica sobre Fitoplancton Tóxico y Biotoxinas. Alicante, 16-18, May, 2001. Internet address: e-mail: [asuncion.real@ua.es](mailto:asuncion.real@ua.es)

6<sup>th</sup> International Workshop on "Physical Processes in Natural Waters", Universidad de Girona, 27-29 June 2001  
Internet address: <http://copernic.udg.es/gfa/6thIWONA.htm>

I International Workshop on Investigation, Management and Remediation of Contaminated Aquifers. Alicante, 17-19 October 2001. Internet address: <http://www.igme.es/internet/alicante/default.htm> [An event not reported from Marinet.]

I Symposium GLOBEC Espana. El Puerto de Santa Maria (Cadiz), November 28-30, 2001. Internet address: [http://www.uca.es/symposium\\_globec/](http://www.uca.es/symposium_globec/)

2002

3<sup>a</sup> Asamblea Hispano-Portuguesa de Geodesia y Geofísica. Valencia, 4-8 February 2002. Internet address: <http://www.top.upv.es/3asambleagg/3asamHPGG.htm>

IX International Conference in Applied Algology, Roquetas de Mar, Almería, 26-30 May 2002.  
<http://www.ual.es/Congresos/ISAP02/content.htm>

4<sup>th</sup> International Conference on Molluscan Shellfish Safety. Santiago de Compostela, 4-8 June 2002. Internet address: <http://www.atlanticocongresos.com/moluscos/index.html> [In English]

NAFO/CSIRO Symposium on Elasmobranch Fisheries: managing for sustainable use and biodiversity conservation. Santiago de Compostela, 11-13 September 2002. Internet address: <http://www.nafo.ca/publications/red-book/2002/index.htm>

FAO. General Fisheries Commission for the Mediterranean. Third Session of the Committee on Aquaculture. Zaragoza, 25-27 September 2002. Internet address: <http://www.fao.org/DOCREP/MEETING/005/Y7445E.HTM> [An event not reported from Marinet.]

Jornadas de Cetáceos y Tortugas Marinas en Almería. Almería, 25-27 October 2002. Internet address: <http://www.nodo50.org/ecoloand/cetaceos.pdf>



## Doctoral dissertations

The results, for the period 2001-2002, have been retrieved from the TESEO database, the official database designed by the Ministry of Education and Culture

(<http://www.mcu.es/TESEO/teseo.html>). Limited criteria for the retrieval of items were adopted, and oceanography is the only scientific area diagnosed. 48 dissertations appear to have been presented from the Spanish campuses relevant to oceanography. A database was built using ProCite, and the fields employed were: Author, Title, University, Date and Keywords. This academic database allows limited access to the dissertations produced in 2002.

The national account statistics database shows that the Cadiz campus achieved the best results in terms of dissertations produced. 27% of the growth and development of Spanish performed research in oceanography as measured by dissertations come from Cadiz. Other campuses: the Polytechnic University of Catalonia ([http://www.upc.es/english/hp\\_e.htm](http://www.upc.es/english/hp_e.htm)) 20%, the University of Vigo 14%, the University of Las Palmas de Gran Canaria 10%, the University of the Basque Country ([http://www.ehu.es/ingles/paginas/prin\\_i.htm](http://www.ehu.es/ingles/paginas/prin_i.htm)) 6% and the University of Seville (<http://www-en.us.es/>) 6%, the University of Oviedo 4% and the University of Santiago de Compostela (<http://www.usc.es/intro/benvidai.htm>) 4%, the Polytechnic University of Valencia (<http://www.upv.es/menui.html>) 2%, the University of Gerona 2%, and the Complutense University of Madrid (<http://www.ucm.es/info/vicrint/indexe.htm>) 2%.

The conceptual discussions included in this general picture of oceanography research on Spanish campuses, as approached through the keywords employed by "Teseo" to index the dissertations (mainly produced in 2001), consider, by decreasing order of importance: Physical oceanography (12 diss.), Biological oceanography (11), Littoral and sub-littoral processes (11), Chemical oceanography (7), Renewable marine resources (6), Marine aquaculture (5), Botanical oceanography (4), Descriptive oceanography (4), Oceanographic zoology (4), Air-Ocean interaction (3) and Marine geology (2).

## Marine Science in Spain: 2001-2002. A bibliometric profile of the ASFA database

### Objectives

Examining the descriptive and behavioural features of the marine science corpus, produced in Spain between 2001-2002, and recorded in the ASFA database. 822 bibliographic units were analysed. The application of the bibliometric method is descriptive, with a slight information overtone.

### Methodology

A ProCite database was designed with all Spanish participants in Marine Science, 2001-2002. The number of contributions have been generated from the ASFA database using the Author Affiliation field (with the value: Spain). The measurements depict purely descriptive characteristics like: number of articles and year distribution, maximum usages per journal title, and percentage value for parts of corpus, and sub-thematic distribution of the articles. Manifestations of social phenomena, as the productivity of the authors (papers according to number of authors), and the dissemination of the scientific results on Marine Science produced from Spain (journal titles according to the number of the published titles), are also considered.

### Results and Discussion

The results show that 519 papers were collected by ASFA from 2001, and 297 from 2002, for the marine science scientific literature accessible from Spain. According to this corpus there are 249 available scientific journals for the dissemination of Spanish results. The first ten journal titles (4%) published 188 articles (26% of the total articles), whereas the first 20 journal titles

(8%) published 316 articles (38% of the total articles). Between these journals the first three, publishing best Spanish participants data, are: Aquaculture (34 articles published), Marine Ecology Progress Series (28), and Hydrobiologia (26). Out of the 822 items published, 794 were articles in journals (96%), the percentage published for conference proceedings contributions was 2.7%, for the books 0.3% and for the reports 0.24%. The structure of the corpus regarding the sub-thematic distribution of the articles is: Physiology, biochemistry, biophysics (15%), Algae (12%), Fish culture (10%), Ecology Community Studies (10%), Taxonomy (8%), Phytoplankton (8%), Reproduction and development (7%) and Animal morphology (6%).

The behaviour of the corpus towards the productivity of the 2025 authors, shows that: 39% of the authorship comes from authors with more than 10 articles (13.6% of the total production), 26.5% as regarding authors with between 2 and 9 contributions, 73% of the authors are concerned with minimum productivity (1 article). The International Commission for the Conservation of Atlantic Tuna, the Università degli Studi del Molise (Campobasso, Italy), the Institut für Palaeontologie (Würzburg, Germany), and the University of Stirling (Stirling, UK) are involved in co-authorship with Spanish labs. AZTI ([www.azti.es](http://www.azti.es)), from the Basque Country, is represented through an article published by the journal "Nature", with labs from UK, South Africa, Canada, USA, Italy, and The Netherlands. Certainly we do not present citation data, it seems nevertheless important to accept a most internationalised research to achieve a particular correct citation rate.

Further results on the structure of the corpus refer to the identification of the main area of informative density. 200 articles seem placed in a comparatively more dense zone, they are published in the journals: Aquaculture (33), Marine Ecology Progress Series (28), Hydrobiologia (26), Journal of Fish Biology (26), Deep-Sea Research (Part II, Topical Studies in Oceanography) (21), Journal of Plankton Research (16), Journal of the Marine Biological Association of the United Kingdom (16), Journal of Experimental Marine Biology and Ecology (15), Limnology and Oceanography (14), Diseases of Aquatic Organisms (13), Journal of Agricultural and Food Chemistry (13), Waterbirds (13). These 12 journals result from the application of Bradford's law.

In forecasting development trends of marine science in Spain, two ISI journals must also be considered, Scientia Marina ([www.icm.csic.es/scimar/sci\\_index.html](http://www.icm.csic.es/scimar/sci_index.html)) and Ciencias Marinas (<http://rcmarinas.ens.uabc.mx/>). The first one has not been included in the ASFA database for the past two years (it is why we stress the necessity of careful utilisation of the data supplied), Scientia Marina (ISSN 0214-8358, produced at Barcelona), amounts to some 161 scientific articles. Ciencias marinas (ISSN 0185-3880) is a Mexican journal (fully bilingual: English-Spanish) with a European associate editor, sited at the University of Cadiz. Five articles from this journal have been included in ASFA for Spain in the period 2001-2002, two documents entered under Cadiz geographical heading, one each for the campuses of Alicante, Las Palmas de Gran Canaria and Sevilla.

#### 4. NATURAL PRODUCTS FROM THE SEA

The area of data exploitation for marine-derived natural products, in recent years 2001-2002, recounts the activities of the Natural Products and Agrobiology Institute

(<http://www.ipna.csic.es/english/index.htm>, CSIC), Instituto de Productos Naturales y Agrobiología (La Laguna, Tenerife). An emphasis must be made, also, on the web page that permits access to the firm PharmaMar; a Spanish producer of anti-tumour compounds from marine organisms (<http://www.pharmamar.es/en/about/index.cfm>).

Red (*Plocamium cartilagineum*, *Laurencia obtusa*) and green (*Cymopolia barbata*) algae are the source of bioactive compounds from the Tenerife Lab. La Coruna (studying Indonesian Coral) and Cadiz (with the gorgonian *Plexaurella grisea* from Punta Cana, Dominican Republic) Chemistry Departments display complementary perspectives.



Working in the Spanish pharmaceutical industry from 1986, PharmaMar (<http://www.pharmamar.es/en/about/index.cfm>) has offered, over the period 2001-2002, some 30 papers in journals such as Nature Medicine, European Journal of Cancer, The Lancet Oncology, Oncogene, British Journal of Cancer and The Journal of Biological Chemistry. The information is displayed in seven categories (ET-743, Aplidine, Kahalalide F, Phase I/Phase II, Soft tissue sarcoma, Anti-tumour, Mechanism of action) (<http://www.pharmamar.es/en/prosci/publications.cfm>).

Specific advice on clinical trials is available from a fact sheets service (<http://www.pharmamar.es/en/prosci/facts.cfm>); and a reportable capability

(<http://www.pharmamar.es/en/congress/>) strengthen the overall resource with information on the Congresses PharmaMar expected to assist: namely, clinical oncology and cancer research American associations, and European organisations for the treatment of cancer and medical oncology. This Spanish biotechnology company has adopted a data management policy, offering a Virtual library of videos in interoperable formats, a Virtual Press Office, and an online survey (<http://www.pharmamar.es/en/prosci/survey.cfm>) and feedback device refining its cookies and copyright policy (<http://www.pharmamar.es/en/terms.cfm>). A search device, with 'Search Tips' instructions (including commentaries on boolean operators) is also in use.

Through its research to date, PharmaMar has compiled a library of more than 40,000 marine organisms with potential therapeutic benefits. The scientific and professional business information activities of this firm result in its Ibex-35 stock market index listing.

## 5. METADATA

The National Antarctic Data Centre's new web page has increased the quick and relevant retrieval of marine science information in Spain, with the highest integrity concerns for authenticity in this period (2001-2002). This Internet system is sited at the Spanish Geological and Mining Institute (Madrid) <http://www.igme.es/internet/cnda/formulario.htm>.

The Antarctic Data Management (<http://www.jcadm.scar.org/>), in relation to metadata, will assist the Spanish Polar Committee (<http://www.mcyt.es/cpe/comitepolar.htm>, from the SCAR (ICSU, International Council for Scientific Unions) (SCAR has received the Prince of Asturias Award for International Cooperation 2002, [http://www.scar.org/Ast%20Award/prince\\_of\\_asturias\\_award.htm](http://www.scar.org/Ast%20Award/prince_of_asturias_award.htm)), for reducing duplication of effort, maximizing usage of data, and facilitating better planning by national programmes. The generation of metadata for the Antarctic data adheres to the Directory Interchange Format (DIF); the standard chosen by the Antarctic Data Directory System. The form designed for the data introduction allows the fields: general directory data (required fields), temporal and spatial coverage of the data, personal data of the code aggregator, the typology of the measures represented by the data set (or parameters, a required field), the name of the project, its geographic location and source of the data, the Data Centre as by the identification of the metadata along the expedition (required field), the name of the instrument or hardware used to acquire the data (sensor) and the keywords, a summary (required field) and a description of the URL (into Spanish and English), to what is added a set of 20 examples coming from the expeditions of the research vessel Hesperides.

## 6. VIRTUAL COMMUNITIES

Embodied in Tierra, the thematic network of earth science in Spain, and mirror of various IGCP-UNESCO projects, MARINET is the Spanish Virtual Community in Marine Sciences ([http://tierra.rediris.es/marinet/index\\_english.html](http://tierra.rediris.es/marinet/index_english.html)). Tierra is a community that started on March 25 1999, supporting some 3.270.209 accesses (hits for webalizer), which means 217.056 visits (1.800 seconds, times windows), between April 2001 and March 2002). Marinet, operating also since 1999, assumed 12% of the total KBytes sent by the server in last February 2003.

Marinet has thought through its functions for communications: negotiating grants, working at a committee, electronic manuscripts submission, learning a new techniques and people, collaboration in groups and projects, and contacts with home while travelling [5].

From the point of view of the librarian, it is an audiovisual scenario, that has adopted a collaborative work tool, the Basic System for Collaborative Work (BSCW). It is an asynchronous (not simultaneous) and synchronous content management package, entirely Web based, and offering shared workspaces to store, manage, jointly edit and share documents [6][7].

Enforcing work relationships (committees, projects, co-authors, sponsorship), many research questions requiring coordinated data collection across long distances, reap returns from collaboration [8], more, serving as an 'anti brain-drain' device [7]. Although favourite criteria on maintenance of ownership over data seem not challenged (in this sense most oceanographic databases in Marinet are gateways to remote servers where the databases are located), Marinet is allowed to distribute professional data of Ibero-American marine scientists. Keeping a directory of scientists up-to-date shows a positive return associated with knowing more oceanographers and marine scientists, just through browsing. In terms of retrieval of data, observations and technical uncertainty surrounding the acquisition of data, is eventually consistent with Marinet News Service, Electronic Library and b-board. Marinet usage and professional recognition attached to it, lends credence to sending-receiving facilities as producing externalities when the traffic is distributed through the VC [9][10].

## **Scheme of Devices Associated to Marinet**

### **Apparatus:**

Expeditions plans and research vessels schedules (Spain, Peru, Colombia and gateways to any research ship information available in the web. <http://tierra.rediris.es/marinet/buques.htm#Buques>.

### **Databases:**

Marine datasets on: Coastal Monitoring, global digital bathymetry charts satellite imagery, oceanic currents and temperatures, ozone hole in the Southern Hemisphere, maritime weather forecasts, Online swell and sea level data from buoys, fisheries datasets, coastal hazards (hurricanes, tsunamis), and geophysical data (geoide, global gravimetry). <http://tierra.rediris.es/marinet/datos.htm>

Mostly links to other servers. Scanning the external environment, raw data, metadata and infrastructure data are available as component elements.

### **Services:**

Online Library: A fee access area for the exchange of marine science papers and publications (English/Spanish, managed by the CSIC librarian at Puerto Real, Cadiz.

[http://tierra.rediris.es/marinet/biblioteca\\_electronica.html](http://tierra.rediris.es/marinet/biblioteca_electronica.html)

News: With the latest news on marine science in the Ibero-American countries (2002, and 2003. Also available a special web page on the "Prestige" oil spill:

<http://tierra.rediris.es/marinet/prestige.html>)

<http://tierra.rediris.es/marinet/noticias.htm>

Webdirectory of Marine Researchers in the Ibero-American countries (with an Add to the Webdirectory help tool). <http://tierra.rediris.es/marinet/directorio.htm>

Schedules of marine congresses in the Ibero-American countries.

<http://tierra.rediris.es/marinet/congresos.htm>



A Marine Environmental Alert Service (Notices on ecological impacts affecting coastal and ocean environments) specifically designed for the VC. <http://tierra.rediris.es/marinet/alert-mar.html>

Many other links to Marine Science Institutes and Research Programmes and Institutions all over Ibero-America are available after the VC.

### **Bulletin Boards:**

The Electronic Mailing List: With a help tool on how to subscribe.

[http://tierra.rediris.es/marinet/marinet\\_english.htm](http://tierra.rediris.es/marinet/marinet_english.htm)

Jobs: Employment and fellowships opportunities (students and postgraduate offers searching for cruisers, projects). <http://tierra.rediris.es/marinet/ofertas.htm>

[http://tierra.rediris.es/marinet/demandas\\_contactos\\_voluntariado.html](http://tierra.rediris.es/marinet/demandas_contactos_voluntariado.html)

Books and publications and educational resources (Programmes of marine science studies in Ibero-American universities) on the Net, complete the information Marinet has offered during the period 2001-2002.

### **7. FINAL NOTE**

The efforts to develop markets of electronic information in Marine Science produced in Spain improve the absorption capacity of the users' community through segmentation. In this sense, other institutional initiatives do introduce into the market fitted products, this is the case for Fish Business e-mailed list: <http://www.fishroute.com/SPAN/SiteLISTes.htm>.

As a final note, a hard landing for data quality has interacted with Spanish marine science information area for the period 2001-2002. Also, the results of the MSSStudy projections for 2003, based on 1997/98 figures, seem worthwhile to consult for the end of this year (<http://www.asedie.es/msstudy/msstudyeng.htm>).

Acknowledgment: Teresa and Hector Herrera are profoundly recognised because of their interest in the particular "go" of this national report.

### **REFERENCES**

1. *Spanish Council Presidency Research and Innovation Information Service*. [<http://www.cordis.lu/spain/>].
2. *Spain tackles the European paradox*. [<ftp://ftp.cordis.lu/pub/euroabstracts/docs/archive2-02.pdf>]
3. *Innovation in Spain. Great leap forward*. [[ftp://ftp.cordis.lu/pub/itt/docs/itt02-3\\_en.pdf](ftp://ftp.cordis.lu/pub/itt/docs/itt02-3_en.pdf)].
4. *Ministry of Science and Technology. Science and Technology Indicators*. [<http://www6.mcyt.es/indicadores/i+d+i/creditos-presupuestarios.htm>] [This amount includes loans to the business sector in view of specific project developments].
5. Hesse, Bradford W.; Sproull, Lee S.; Kiesler, Sara B. and Walsh, John P. 1993. *Returns to science: computer networks in oceanography*. Communications of the ACM 36 (8): 90-101.
6. Martinez-Frias, J. and Somoza, L. 2002. TIERRA: *Thematic network on earth sciences. Contents and academic research and science diffusion resources*. Boletín de la red nacional de I+D, RedIRIS 60: 37-43. [<http://www.rediris.es/rediris/boletin/60/enfoque3.html>].
7. Canessa, E.; Fonda, C.; Radicella, S.M. 2002. *Virtual laboratory strategies for data sharing, communications and development*. Data Science Journal 1(2): 117-125 [[http://journals.eecs.qub.ac.uk/codatta/Journal/Contents/1\\_2/1\\_2pdfs/ds102f.pdf](http://journals.eecs.qub.ac.uk/codatta/Journal/Contents/1_2/1_2pdfs/ds102f.pdf)].
8. Wulf, Wm. A. 1993. *The collaboratory opportunity*. Science 261: 854-855.

9. Pau, L.-F. 2002. *The communications and information economy: issues, tariffs and economics research areas*. Journal of Economic Dynamics and Control 26: 1651-1675.
10. Van Alstyne, M. and Brynjolfsson, E. 1997. *Electronic communities: global village or cyberbalkans?* [<http://web.mit.edu/marshall/www/InfoAccess.html>].
11. *EurOCEAN 2000. The European Conference on Marine Science and Ocean Technology*. Hamburg, Germany. 29 August -2 September 2000. [<http://europa.eu.int/comm/research/envsc/eurocean9.html>].
12. Valcarcel, M. 2000. *Analytical information needs in the XXI century*. Fresenius J Anal Chem 367:677-678.
13. Franquesa, R.; Malouli Idrisi, M. and Alarcon, J.A. 2001. *Feasibility assessment for a database on socio-economic indicators for Mediterranean fisheries*. Studies and Reviews, N° 71. Rome, FAO. 55p.