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Marine sciences information activity report for Spain 2001/2002

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SPAIN

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Marine sciences information activity report for Spain 2001/2002.

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Introduction.-

Recent developments in Spanish performed marine science refer to a “big science” demand bounded between two large, abrupt changes in system behaviour. On April 25, 1998, the Aznalcóllar (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]. And an amount of 3.530 million € was provided from the Government to promote public and private research in 2001 [4].

What is marine science information, from Spain, expected to offer in this period (2001-2002)? With no doubt, the concept of leadership has been challenged by the Spanish presidency. The key action sustainable marine ecosystems, kept into the energy, environment and sustainable development program, of the 5th Framework Programme, has been analysed. Both the methodological approach, and the results obtained will be facilitated along 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 into knowledge versus opportunism situations. We afford with this case study of communication between data-providers and data-users.

The more relevant databases examples (elaborated from Spain) are exposed, marine sciences congresses and conferences in Spain (2001-2002) have been detailed, the doctoral dissertations elaborated in the 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.

An specific high-level information need is treated: Natural products from the sea in Spain. (Affording with one of the leaders in anti-tumor drugs from the sea, sited at Madrid.)

The important metadata question is formulated here as 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 program conducted by the national Antarctic data centre.

Special emphasis on the contents of the redIRIS Virtual community in Marine Sciences, Marinet, is entailed.

A last point on intellectual property environments for scientific data in marine science, is afforded with 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 Program 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 european Cordis database web resource elaborated under the spanish council presidency (Jan.2002-Jun.2002).

Methodology.

To measure Spain contribution in Marine Science EU R&D and Innovation, a ProCite © database has been designed with all the spanish participants into 34 records found in the 5th Framework Programme Projects Database. Project acronym, Duration, Affiliation of Coordinator or Participant, and Keywords (hands-on 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 over 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 participation reached 23%. The trends for the estimation of the marine science reference data (workprogramme subarea), in the total context of the specific programme (EESD), are respectively 31%, 6% and 19%.

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

Spain's leadership (8 over 37 projects) concentrates on these thematic areas: Bacteriology, Ocean forecasting, Coastal management, and Microalgae. As 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, into the key action, resulted in: 18 are research labs, 15 educational centres and 4 other sectors (harbour authority, ship-yard, industrial park, and a town council). The CSIC, Institute of Marine Sciences (Barcelona), profiles the first institution leading European projects in the field. CSIC is also individually leading Europe through the Mediterranean Institute for Advanced Studies (Palma de Mallorca). Also leading are the University of Granada Dpt. of Civil Engineering, and the University of Elche (Miguel Hernández University) Dpt of Vegetal Production Microbiology. Spain's involvement as leader of the EU marine science research average 36 months at the 85% level, with 42 months and 3 months as superior and inferior temporal bound of the project.

Discussion.

After a comparison between the in-house built database and the FP5 Projects Database, Spain scores higher in Marine Science than in significance of the total specific programme Energy, Environment and Sustainable Development (EESD) programme. The target comparison here (key action sustainable marine ecosystems workprogramme subarea Spanish results versus EESD specific programme Spanish based organisations commitment) seems largely assigned to the thematic leadership of the Spanish marine science labs, along this period, a quarter of the total available European projects in this area.

Raised 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 EuroOCEAN 2000 [11], seems then relevant.

2. Missing Data.-

In the post-Aznalcóllar 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 Doñana, see 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 Cádiz 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 CSIC Top manager's resignation, and the letter to the journal Science, authored by 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 into 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 Commission of Mediterranean Fisheries) Advisory Scientific Committee is to carry out, has been electronically sited at the University of Alicante server (<http://www.ua.es/copemed/redir.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 interchange of data sets. The universities of Perpignan, La Laguna (Canary Island), Las Palmas de Gran Canaria, Barcelona, the CSIC (Blanes) and the Spanish Institute of Oceanography (Palma de Mallorca) have been providing collaboration to this project. It was 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 (Málaga Lab.) (and a Nador (Morocco) Regional Centre, of the Institut National de Recherche Halieutique). FAO, through COPEMED, has been financially involved. [13]

The spanish participation into the Mater database EU research project (<http://www.ifremer.fr/sismer/program/mater>) completes the existing range on Spain and Marine Sciences, for 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 information, is made available to the user community. The spanish partners come from the University of Málaga, Autonomous University of Barcelona, Polytechnic of Barcelona, University of the Balearian Islands, and ICM (CSIC, Barcelona).

Congresses and conferences.-

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

In 2001:

Feria de Medio Ambiente ECOMED-POLLUTEC.

Barcelona, 7-10, February, 2001. Internet address: e-mail: 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

6th 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 España. El Puerto de Santa María (Cádiz), November 28-30, 2001. Internet address: http://www.uca.es/symposium_globec/

In 2002:

3ª 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, Almeria, 26-30 May 2002.

<http://www.ual.es/Congresos/ISAP02/content.htm>

4th 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/redbook/2002/index.htm>

FAO. General Fisheries Comisión 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>). A limited criteria, for the retrieval of items have been adopted. And only Oceanography is the scientific area diagnosed. 48 dissertations appear to have been presented from the Spanish campuses, relevant for the oceanographic scientific community. A database was built, making use of 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 Cádiz 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 Cádiz. Other campuses: the Polytechnic University of Catalonia (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) 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 sublittoral 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 for the ASFA © database.-

Objectives.

Fathoming the descriptive and behavioural features of the Marine Science corpus, produced in Spain between 2001-2002, and recorded at 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 has been designed with all the Spanish participants in Marine Science, 2001-2002. The number of contributions have been generated after 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 subthematic 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 twenty 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 subthematic distribution of the articles would be: 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: 0.39% 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), from the Basque Country, has been involved, 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 refers to the identification of the main area of informative density. 200 articles seem placed in a comparatively more dense zone, they are published into 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 the Bradford's law.

In forecasting development trends of marine science in Spain, two ISI © journals must be also considered, Scientia Marina (www.icm.csic.es/scimar/sci_index.html) and Ciencias Marinas (<http://rcmarinas.ens.uabc.mx/>). The first one has not been included into 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 Europe associated editor, sited at the University of Cádiz; five articles from this journal have been included into ASFA © for Spain in the period 2001-2002, two documents entered under Cádiz geographical heading, one each for the campuses of Alicante, Las Palmas de Gran Canaria and Sevilla.

4. Natural Products from the Sea.-

The problem 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 Coruña (studying Indonesian Coral) and Cádiz (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 this 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 through out 7 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 are available from a fact sheets service (<http://www.pharmamar.es/en/prosci/facts.cfm>); and a reportable capability (<http://www.pharmamar.es/en/congress/>) strength the overall resource with information on the Congresses PharmaMar is 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 a noticeable 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 at 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 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 device 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), for reducing duplication of effort, maximize usage of data, and to facilitate better planning by national programs. 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 tipology of the measures represented by the data set (or parameters, a required field), the name of the project, its geographical localization and source of the data, the Data Center as by the identification of the metadata along the campaign (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 campaigns of the research vessel Hespérides.

6. Virtual Communities.-

Embodied into 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). Tierra is a community that started on March 25 1999, supporting some 3.270.209 accesses (hits for webalizer), what means 217.056 visits (1.800 seconds, time's 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 is thought through its functions for communications: negotiating grants, working at a committee, electronical manuscripts submission, learning on 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, coauthors, 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 favorite criteria on maintenance of ownership over data seems 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 iberoamerican marine scientists. Keeping a directorate 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 & temperatures, Ozone hole in South
Hemisphere,

Maritime weather forecast, On-line swell and sea level data from bouys, 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 Free access area for interchanging of marine science papers and
publications (english/spanish, managed by the CSIC librarian at Puerto Real, Cádiz.)
http://tierra.rediris.es/marinet/biblioteca_electronica.html

News: With the last news on marine science in the Iberoamerican countries (2002,
and 2003. Also available an 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 Iberoamerican Countries (with an Add to
the Webdirectory help tool).

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

Schedules of marine congresses in the Iberoamerican countries.

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

A Marine Environmental Alert Service (Noticing on Ecological Impacts affecting
coastal and oceanic environments), specifically designed for the VC.

<http://tierra.rediris.es/marinet/alertmar.html>

Many other links to Marine Science Institutes and Research Programs and
Institutions all over Iberoamerica 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

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

Books and Publications and Educational resources (Programmes of marine science
studies in iberoamerican universities) on the Net, complete the overview Marinnet has
offered, all along 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 than 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 leap 2001-2002. And the results of the MSStudy projections for 2003, based on 1997/98 figures, seem worthwhile the consult for the end of this year (<http://www.asedie.es/msstudy/msstudyeng.htm>).

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