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Open Waters - Open Sources

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Appendix

Polish Open Information Sources for All Interested in Fisheries and Aquatic Sciences

by

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Abstract

The short definition of the Internet as a "global computer net" is quite incomplete. The Internet could be called an "information ocean" – a definition that is at once concise, descriptive, and accurate. Searching the Internet is not easy despite such browsers as Google, AltaVista, Yahoo, and others. Users sometimes find only a little information and at others - too much. Although many sources of information are not open to all users, the idea of open sources for software exists with reference to open or free documentation or open content. The main aim of this survey was to determine to what extent Polish information sources are open to those interested in fisheries and aquatic sciences. Three key matters are considered: Internet access to Polish scientific journals dealing with fisheries and aquatic sciences; Polish fisheries and aquatic sciences institutions, and the international cooperation of these institutions. The publication of this information should make searching the Internet easier for those interested in Polish investigations of fish, fisheries, and the aquatic environment.

Keywords: Poland, information sources, fisheries, aquatic sciences

The Internet is treated as an ocean from which one can draw information for extended periods and still feel unsatiated – this is the informal definition. The official definition of the Internet of a computer network with global reach might be short, but it communicates its essence. Currently, human communication is happening through this network on a scale previously unimagined, a scale that is truly global. Among its other roles, the Internet can play an important role in the dissemination of knowledge. This form of disseminating information suggests that the old saying "publish or die" should be paraphrased and expressed as "be on Internet or die". In other words, if somebody does not exist in Internet, is sinking in oblivion.

Every Polish scientific institution has its own web site. As a rule, these sites appear in at least two languages – Polish and English. In addition to names, the majority of these sites contain the following information:

- status of the institution, its history, regulations;
- organizational structure;
- names and titles of the directorial scientific staff;
- members of the Scientific Committee;
- topics of scientific investigations;
- description of publishing department with details regarding new publications;

- description of library and scientific information center;

- access to data bases, available bibliography, list of staff publications;

- international cooperation, cooperative research programs;

- information regarding conferences, tenders, other pertinent information, e.g., on university sites there is recrutation information which often includes details for foreigners who wish to study in Poland.

Although these sites are updated at various frequencies, they are kept current on an ongoing basis. The graphics of the sites differ greatly, and they are enriched by the photographs they present. Esthetic graphics encourage the use of a given service, while unpleasant graphics discourage it. Changes to Internet sites that do not lead to improved usage are incomprehensible, and new sites are sometimes worse than their predecessors. Texts written in fonts that are too small are illegible, especially if they are against a dark background. Enriching sites with new information, photo galleries, and new links is recommended.

This survey presents the Internet information resources of chosen Polish scientific institutions. The choice of them was limited primarily to those that investigate the aquatic environment, inland and sea fisheries, hydrobiology, hydrology, oceanography, etc. In short, these are institutions that focus on the study of water.

The Stanislaw Sakowicz Inland Fisheries Institute in Olsztyn (www.infish.com.pl) conducts scientific research in the fields of new fish cultivation technologies and fisheries management in open waters (lakes, rivers, dam reservoirs), as well as hydrobiological investigations of inland waters. Current research topics include: the protection and rebuilding of valuable fish species such as salmon and sea trout; improving methods for rearing and cultivating cyprinid fishes, rainbow trout and sturgeon; prophylactics and treatments for fish diseases; monitoring aquatic pollution; the ichthyofauna of rivers and lakes; the production of stocking material of many valuable and endangered species; resources and protection of crayfish; ecological foundations for protecting and exploiting the fishes of heated basins; investigation the effectiveness of fisheries management.

In addition to describing the institute's research topics and services provided (including scientific evaluations and management operatives), the web site contains varied information regarding IFI's history, its patron Professor Stanislaw Sakowicz, and the organizational structure presented in a map. This institute is unusual in that it is comprised of numerous field stations, laboratories and hatcheries (in Gdansk, Rutki, Giżycko, Dgał, and Żabieniec) and two experimental departments (Żabieniec, Zator). Information is also available regarding current fisheries conferences in Poland and internationally under the auspices of the FAO.

Internet users will also find information regarding IFI publications and newly published monographs. The tables of contents and abstracts of the Archives of Polish Fisheries and Komunikaty Rybackie (Fisheries Communications), the institute's two most important publications, are available. There is also a section entitled "Express Informacja" (Express Information), which is an abstract publication. It contains a review of current records in the nation-wide information system SIGŻ (www.cbr.edu.pl/sigz/htm). Although these catalogues are not available on the Internet, they are available to readers on compact disc.

LOCATION OF POLISH SCIENTIFIC INSTITUTIONS WHICH CARRY OUT RESEARCHES CONCERNING FISHERIES AND SEA OR INLAND WATERS

1 Inland Fisheries Institute
2 Sea Fisheries Institute in Gdynia
3 Institute of Oceanology
4 Polish Scientific Committee on Oceanic Research
5 Institute of Freshwater Biology
6 Institute of Meteorology and Water Management
7 Maritime Institute
8 Polish Geological Institute
8a Marine Geology Branch
9 Institute of Environmental Protection
10 Institute of Ichtyoblology and Aquaculture
11 Institute of Hydroengineering
12 International Centre for Ecology
13 University of Wannla and Mazury
14 Agricultural University
15 University of Gdańsk
15a Hel Marine Station
16 Central Agricultural Library

The principal areas of research at The Sea Fisheries Institute in Gdynia (www.mir.gdynia.pl) include: fishery biology and oceanography, marine ecology, fish processing technologies and fishery economics.

The Scientific Information Centre, Library, and Publishing Department were consolidated in 1999 under the name of the Centre for Scientific Information and Publishing. The Bulletin of the Sea Fisheries Institute, which is abstracted and indexed in some bibliographic databases, is published by the center. Those interested in deepening their fisheries knowledge will find that the institute's web site provides the tables of contents, abstracts, and full articles of The Bulletin of the Sea Fisheries Institute for the 1997–2004 period.

The institute library catalogues will be accessible through the Internet as soon as they are fully computerized.

Since the SFI became a subscriber to the Elsevier Science Direct Consortium in January 2005, SFI staff and library patrons have access to the full, on-line texts of many journals.

A wealth of interesting information is available to all at the SFI web site. Visitors to it can learn about the topics of research conducted at the institute, how it is organized, what kinds of publications are available, and what services are offered (chemical analyses, plankton identification and sorting, technological training). They can also learn about interesting topics related to the seas, e.g., geomorphology; hydrology; flora and fauna; pollution and the protection of the Baltic Sea; the characteristics, fauna, and challenges of protecting coral reefs; the characteristics of the continent and waters of the Southern Ocean; and polar flora and fauna. The latest development is the on-line availability of the new SFI publication Wiadomości Rybackich (Fisheries News) (contents, abstracts and articles).

Visitors to the institute's web site can also obtain general information regarding research projects financed by European Union such as Silicate and Baltic Sea Ecosystem Response (SIBER), Polish Marine Fishery Science Centre (POLMARF), or European Lifestyles and Marine Ecosystems (ELME). Information regarding projects funded by the Ministry of Science and Information Society Technologies is also available.

One of the links at the institute web site is to the Gdynia Aquarium, a joint enterprise of the SFI and the City of Gdynia. The aquarium has numerous rooms with exhibits on the following topics: sharks, sea turtles, marine and freshwater aquaria, invertebrates, the Baltic Sea. The address for this site is www.akwarium.gdynia.pl .

The Institute of Oceanology of the Polish Academy of Sciences www.iopan.gda.pl in Sopot conducts scientific research in shelf seas and the coastal regions of temperate and Arctic zones. The library catalogue was computerized with the MICRO CDS ISIS package and is accessible to anyone interested in using these library resources. The institute library has access to ASFA IDS and to the Elsevier Science and Academic Press journal bases, but only for patrons who work on-site at the library.

The institute web site provides the full texts of articles from both current and past issues of Oceanologia, the IO PAS journal. Anybody interested in oceanography has free access to the Regional Oceanographic Database containing the Atlas of the Arctic, the Marine Ecology Database, Physics Database, Hydrochemical Database, and the Numerical Model Database, all of which present the results of the scientific research undertaken at the institute.

The mission of the Polish Scientific Committee on Oceanic Research (Polish SCOR) in Sopot (www.water.iopan.gda.pl) is to promote the integration of the scientific community in the fields of oceanology and other marine sciences. The organization's web site presents information on the committee itself, its role in the creation of fora for the presentation and exchange of scientific thought, and the fulfillment of its function as the National Coordinator for Cooperation with the international Scientific Committee on Oceanic Research (SCOR). The web site also presents descriptions of the five sections which realize Polish SCOR activities: Polish Scientific Committee on Oceanic Research (Polish SCOR) Marine Biology and Ecology, Marine Chemistry and Biochemistry, Marine Geology, Marine Physics and Hydrology, Operational Oceanography

The Karol Starmach Institute of Freshwater Biology in Krakow (www.zbw.pan.krakow.pl) has been a part of the Institute of Nature Conservation PAS since 2004. Its research interests include complex limnological studies of streams, rivers, and reservoirs with special attention to the structure of biocenoses, relations between aquatic organisms and the physico-chemical factors of their habitats, and anthropogenic alterations in inland water ecosystems. Investigations are carried out mainly in southern Poland. The institute has published the journal Supplementa ad Acta Hydrobiologica since 2001.

Data bases such as Invasive Alien Species and the Polish Red Data Book of Animals are available to all on the institute's Internet site. Interesting information is also available on the site's theme pages, which describe the institute's areas of study. These include projects such as the Population Ecology of the Sedge Warbler in the Middle Nida Wetlands, the Natura 2000 network in Poland, and RIVFUNCTION. This last project is supported by the European Commission and its aim is to contribute to the implementation of the Key Action "Sustainable management and quality of water" within the scope of the Energy, Environment and Sustainable Development project. The aim is to develop methodology for assessing the functional component of ecological river quality status (functional ecosystem integrity).

The Institute of Meteorology and Water Management in Warsaw (www.imgw.p) continues its more than eighty years of efficient and reliable service to the state. The IMWM web site contains information on the structure and tasks of the institute, its history, the climate, and the hydrological state of rivers and the Baltic Sea. It also posts forecasts and warnings regarding meteorological and flood threats.

In addition to its headquarters in Warsaw, the IMWM has five branches located in Gdynia, Katowice, Krakow, Poznan, and Wroclaw. The Maritime Branch in Gdynia conducts research on the atmosphere and the Baltic, including meteorology, hydrology, and oceanography. It also forecasts weather for fishermen and sailors. No on-line access is provided to the institute's

library catalogues or journals. The institute's research results are not accessible to everyone either as they are sold to interested institutions.

The Maritime Institute in Gdansk (www.im.gdansk.pl) is a scientific institution devoted to maritime research in areas such as the protection and shaping of the environment, geoengineering and hydrography, operational oceanography, maritime law, marine electronics, transport management, and marine technologies.

In addition to information on the institute's history, mission, and structure, this web site provides open access to data bases that contain results of the institute's research. These include the Brzeg Data Bank, Oceanography Metabase, Petrobaltic Base, and Gulf of Gdansk Decision Assistance System, which was created in 1994-1995 as part of a joint Polish Dutch initiative. The bases regarding the Polish Exclusive Economic Zone of the Baltic Sea include information on oceanology, environmental protection, marine and submerged constructions, navigation, and the coastal zone.

The main page of the institute's web site also contains full information regarding Coast Base, or the European Virtual Data Base of Coastal and Marine Zones – Integrated Search and Access System for Dispersed Coastal and Marine Zones Data Bases. The incentive for the project was the lack of information on the data collected by institutes that monitor coastal and marine zones, and research institutes from Holland, Italy, Norway, Germany, France, Denmark, and Greece are participants. The Maritime Institute is fulfilling the role of the Polish national center for the Coast Base system and is responsible for introducing new users to the system and disseminating information to all system partners.

The primary mission of the Polish Geological Institute in Warsaw (www.pgi.gov.pl) is to conduct geological research in Poland. One of its six branches is the Marine Geology Branch (www.pgi.gda.pl/pl/) in Gdansk. Its fields of study include geological research on the Baltic Sea bed in the Polish Economic Zone, geological research on the Baltic coastal zone and on coastline changes, conducting and coordinating geological cartography, and cooperation with Baltic countries in Baltic Sea geology and environmental protection. Only patrons of the institute library have access to on-line journals through EBSCO.

The Marine Geology Branch maintains a computerized, regional data base that is available on-line to the institute and which includes information on the geological structure of the sea bed and coastal zone and of breccia mineral resources and ground waters. These include:

NEPTUN – Record System of Geological Data from the Polish Exclusive Economic Zone of the Baltic Sea. Access to this information is unlimited.

MIDAS – Management and Protection System for Mineral Resources. This base contains information regarding deposits of common regional raw materials, resources of them, exploitation, and management status. Portions of this information are available on the institute's web site.

SOH – Hydrogeological Observation System. Data from stationary observations of groundwaters from the administrative districts of Pomorska, Kujawsko-Pomorska, and Warminsko-Mazurska are collected in and disseminated through this data base. Some of the information is available on the institute's web site.

The primary goals of the Institute of Environmental Protection (www.ios.edu.pl) in Warsaw are to analyze the scientific and technical foundations for environmental protection and to shape national policy in this field. This includes protecting and rebuilding aquatic resources and protecting the Baltic and its coastal zone.

The IEP Scientific Library is a member of the Polish Elsevier Consortium which provides access to approximately seven hundred journals through the on-line electronic base ScienceDirect. This is only available through the institute's network. However, the institute's web site provides

unlimited access to bases such as the IPCS INCHEM (reports written under the auspices of the International Programme on Chemical Safety (UNEP, ILO, and WHO) published by the WHO, CIS Chemical Information (ILO/CIS), or the Concise International Chemical Assessment Document (CICADS).

Institute of Ichthyobiology and Aquaculture PAS in Gołysz (www.fish.com.pl) is a research institution of the Polish Academy of Sciences. The main directions of present research include the study of the biological foundations of fish breeding, the development of breeding methods in ponds and under controlled conditions, the introduction of new fish species, and the optimization of links between fish farming and water management. The institute's web site contains interesting information on the range of the institute's research, a listing of staff publications, and international research projects such as "PARITY - An integrated approach to the teleost immune response to parasites: A European Community funded research training network".

The investigations conducted by the Institute of Hydroengineering of the Polish Academy of Sciences in Gdansk (www.ibwpan.gda.pl) are focused on maritime and inland hydraulics and soil mechanics. Research projects are conducted on topics in the following earth-related sciences: oceanology, hydrology, water resource management, and geology. The institute has also cooperated closely with foreign scientific institutes in a number of international projects. This web site provides visitors with plentiful information regarding the institute's history and the directions of its research including maritime hydraulics and coastal engineering; the hydraulics of rivers, reservoirs, and estuaries; and geomechanics and geotechnics. It also presents the tables of contents and abstracts of papers published in its journal Archives of Hydro-Engineering and Environmental Mechanics (AHEM).

The International Centre for Ecology of the Polish Academy of Sciences in Łódź (www.mcepan.lodz.pl) was created to promote ecological research and the development of scientific co-operation in border regions. After the Johannesburg World Summit on Sustainable Development (2002), the mission of the center was changed to address the concerns and challenges of the global community regarding the quality and development of water resources. Since Polish accession to the European Union, the center has contributed to the implementation of EU Directives related to water, the environment, and sustainable development. Areas of research include hydrology, hydrobiology, environmental chemistry, phytotechnology, environmental toxicology and genetics, population studies, and mathematical modeling. One of the main projects is to develop a fish-based assessment method to determine the ecological status of European rivers.

The institute's web site, which is in English exclusively, introduces visitors to the institute's organization, publications, research interests, and international cooperation. A separate web site is dedicated to publishing and this where the journal International Journal of Ecohydrology and Hydrobiology can be found. Tables of contents and abstracts are accessible on-line.

In addition to the preceding institutions, some of the faculties, departments, and laboratories of Polish universities conduct research on topics related to the sea, fisheries, water etc. The web sites maintained by these groups are full of interesting information that is accessible to all those interested in aquatic sciences. They also offer educational opportunities for foreign students. The three following academic institutions deserve special mention:

- Warmia and Mazury University in Olsztyn, Faculty of Environmental Sciences and Fisheries (www.uwm.edu.pl/wosir);

Agricultural University in Szczecin, Faculty of Marine Fisheries and Food Technology (www.fish.ar.szczecin.pl).

The scientific libraries of these universities are equipped with full Internet access to facilitate usage, on-line card catalogues, and many data bases. The addresses of these libraries are, respectively: www.bart.uwm.edu.pl and www.libra.ar.szczecin.pl.

University of Gdansk, Faculty of Biology, Geography and Oceanology (www.bgo.ug.gdansk.pl).

This library is also modern and well-equipped (www.bg.univ.gda.pl).

One of the most interesting field stations of the University of Gdansk is the Marine Station on the Hel Peninsula.

The Marine Station of the University of Gdansk in Hel (www.hel.hel.univ.gda.pl) is the most interesting station of its kind in Poland. Its central location in the Gulf of Gdansk permits conducting research on both the open sea and coastal zones. Long-term series of biological observations of the Puck and Gdansk bays allow for changes in the biodiversity of these basins to be tracked. This is why, in March 1994, the Marine Station in Hel was incorporated into the European Marine Research Station Network (MARS) and is participating in a cycle of projects that are studying these structures. The station's web site also contains information on its history, personnel, and the directions of its research, wide-ranging international cooperation, and publications. The pages dedicated to the creation of the seal breeding facility and Baltic life forms are especially interesting and rich with illustrations. This site also provides information about educational activities sponsored by the station and its program to save the harbor porpoise.

The address to the Central Agricultural Library in Warsaw (www.cbr.edu.pl) should also be given as it provides access to many data bases including SIBROL (www.cbr.edu.pl/agrin_eng/dbindex.html), which contains descriptions of scientific research conducted in Poland from the field of agriculture including topics from fisheries and hydrology. This site also has special page called AgroWeb Poland – Fishery (www.cbr.edu.pl/agroweb/fishery.html) that is dedicated to fisheries and oceanography. It is also worthwhile to access the CBR catalogue available on-line.

Among the many activities of scientific institutions, publishing is the primary source of information regarding the research conducted. Although the growth of journals has been observed for the past several decades, the real breakthrough came with the new ways of communicating and sharing information that were made available by the creation of the Internet. Polish journals have undergone significant modification over the past decade. The decided majority of them are now published in English, but naturally there are still some scientific journals published in Polish. Some titles have been discontinued, (e.g., Acta Hydrobiologia, Polish Archives of Hydrobiology), some have had their titles changed (e.g., Oceanological Studies is currently published as Oceanological and Hydrobiological Studies), and completely new journals have appeared, some of which have been created especially with the Internet in mind, such as the Electronic Journal of Polish Agricultural Universities, which is published as fifteen series as follows: Agricultural Engineering, Agronomy, Animal Husbandry, Biology, Biotechnology, Civil Engineering, Economics, Environmental Development, Fisheries, Food Science and Technology, Forestry, Geodesy and Cartography, Horticulture, Wood Technology, Veterinary Medicine. Some of these focus on issues related to the aquatic environment and the full texts of all of them are available.

The Polish Scientific Journal Contents (PSJC), a data base that is available without restriction at www.psjc.icm.edu.pl/, was created to provide information through the Internet regarding Polish journals published in the fields of biology, nature, agriculture, etc. The content of all the journals listed appears in abstract form. Although this data base is incomplete and does not contain all Polish journals, it can be helpful in the verification of bibliographic data and in learning about the content of scientific papers.

The titles of Polish scientific journals on fish, fisheries, and inland or marine aquatic environments are listed separately in two tables. All of the journals listed are published in English. Table 1 presents the titles of scientific publications that are fully devoted to aquatic sciences, while Table 2 lists publications of an interdisciplinary character. Of the listed journals,

the zoological titles regularly contain papers that address topics related to fish or aquatic invertebrates. Among the veterinarian journals, there are always articles dedicated to the topic of fish diseases, while environmental protection journals address issues of the aquatic environment. Although articles about fish and the aquatic environment appear in a number of other publications, the titles included here are those in which these topics alrnost always occur. On the Internet, it is best to search for information about a given publication at the address provided by the publisher. If this is unavailable, then Internet search engines such as Google, AltaVista, Yahoo or others, should be used. Having the address permits quick and sure access, neither of which are guaranteed with search engines.

Nearly all Polish scientific institutions have publishing departments, and the web sites of these institutions provide information regarding the publishing services they offer. However, determining the Internet address of a given journal can be difficult, this is why, for the sake of simplifying searches, addresses are provided. The majority of Polish scientific journals present their publications in the form of abstracts, although some provide access to the full texts. It is rare for only the table of contents to be available or for there not to be Internet access to the journal. In short, the prevailing attitude is an open one. Over 20% of Polish biological journals provide open access (of the forty-eight titles presented, ten provide access to the full texts of articles). Until the advent of the Internet such openness was not possible, this is why volumes published prior to 1990 are not often available.

Polish scientific publications are available through the Directory of Open Access Journals (DOAJ – www.doaj.org/findjournals). This is a listing of 1514 journals, and there is full access at the article level to 383 of them. Forty-three new titles were added to this data base in the past month alone. This occurs when the publisher is a scientific institution, association or educational facility where the attitude to open access is positive. However, it is difficult to expect commercial publishers to take such an open stance.

Polish scientific journals are also included in many bibliographic data bases, including national (SIGŻ, PSJC) and international (AGRIS, BIOSIS, FISHLIT, ASFIS) information systems. One of the more important systems with global reach is ASFIS, whose documentation centers are located in individual countries. The Polish ASFIS documentation center was created at the Sea Fisheries Institute in Gdynia in 1995.

The following five institutions comprise the center: - SFI, Gdynia; (www.mir.gdynia.pl);

- IFI, Olsztyn; (www.infish.com.pl);

- Institute Oceanology PAS, Sopot; (www.iopan.gda.pl);

- University of Gdansk (www.uni.gda.pl);

- Pomeranian Pedagogical Academy in Słupsk (www.pap.edu.pl).

The Polish ASFIS Center acquired access to ASFA IDS in 2002. The new www-ISIS-ASFA program was developed in Poland by Professor Henryk Rybiński, who is organizing the fourth training program in Warsaw to be held in late June and early July. More information is available at www.icie.com.pl/course-2005 .

The Internet plays many roles in the sphere of scientific development. It has become a platform for wide-ranging co-operation and information exchange. It can be utilized to impact the education of society. However, it is increasingly difficult to find concrete answers due to the sheer volume of information. We should reflect jointly on the search for tools to simplify taking advantage of the Internet. Referring to the Internet as an ocean of information sparks the idea of developing a navigational resource since sailing through unknown waters in the dark can lead one astray.

Tab. 1 Internet access to some Polish Scientific journals with papers about fish, fisheries and aquatic sciences; to full text – F, to abstracts – A, to contents – C, lack – L.

Lp.	Title of Polish scientific journals/ www	ISSN	Internet access to F,A,C,L	Publisher
1.	Acta Hydrobiologica * www.zbw.pan.krakow.pl/iop/	0065-132X	A o	Inst.Freshwater Biology PAS, Krakow
2.	Acta Ichthyologica et Piscatoria www.aiep.pl/contents.htm	0137-1592	F o	Agricultural University, Szczecin
3.	Acta Scientiarum Polonorum-Piscaria/ www.acta.media.pl	1644-0706	C	Agric.University, Szczecin
4.	Acta Universitatis Nicolai Copernici – Lymnological Papers	0208-5348	L	Nicolai Cpernici Univ., Toruń
5.	Archives of Polish Fisheries www.infish.com.pl/Archiwum20% Rybactwa20%Polskiego.html	1230-6428	A o	Inland Fisheries Institute, Olsztyn
6.	Baltic Coastal Zone www.pap.edu.pl/bcz/	1643-0115	A	Pomeranian Pedagogical Univ. Słupsk
7.	Bulletin of the Sea Fisheries Institute www.sfi.gdynia.pl/info/biuletyn.htm	1429-2335	F	Sea Fisheries Institute, Gdynia
8.	Electronic Journal of Polish Agricultural Universities – Fisheries www.ejpau.media.pl/series/whole/fisheries	1505-0297	F	Agricultural University, Szczecin
9.	Folia Universitatis Agriculturae Stetinensis – Piscaria	1506-168X	L	Agric. University, Szczecin
10.	International Journal of Ecohydrology and Hydrobiology www.ecohydro.pl	1642-3593	A o	Int. Centre of Ecology PAS Łódź
11.	Limnological Review Vol.1 in: www.ksiegarnia.uni.torun.pl	1642-5952	C	Different places
12.	Oceanologia www.iopan.gda.pl/oceanologia	0078-3234	F o	Institute of Oceanology, PAS, Sopot
13.	Oceanological Studies * www.ocean.univ.gda.pl/oceanological/	0208-421X	A o	University of Gdańsk
14	Oceanological and Hydrobiological Studies www.ocean.univ.gda.pl/oceanological/	1505-232X	A o	Universuity of Gdańsk
15.	Polish Archives of Hydrobiology *	0032-3764	o	Inst.of Ecology, PAS, Dziekanów
16.	Supplementa ad Acta Hydrobiologica www.zbw.pan.krakow.pl/iop/	1643-3157	C	Inst.of. Nature Cononservation Krakow

* journals which are not published presently
o abstract in data base PSJC (www.psjc.icm.edu.pl/find_document.html)

Tab. 2 Internet access to some Polish scientific journals with papers about fish, fisheries and aquatic environment among papers on the different subjects. F – full text; A – to abstracts; C – to contents; o – to abstracts in data base PSJC.

Lp.	Title of Polish scientific journal www	ISSN	Internet access F A C o	Publisher
01	Acta Agrophysica www.ipan.lublin.pl/index.php?curr_sub=4&sub_op=true&lang=pl&minor_sub=2&panel=0	1234-4125	A o	Institute of Agrphysics, PAS, Lublin
02	Acta Biochimica Polonica www.actabp.pl	0001-527X	F o	Pol. Biochemical Soc., and PAS
03	Acta Parasitologica www.actaparasitologica.pan.pl/acta.html	1230-2821	A o	Inst. of Parasitology, PAS Warszawa
04.	Acta Protozoologica www.nencki.gov.pl/ap.htm	0065-1583	F o	Inst. of Exp.Biology, PAS Warszawa
05	Acta Scientiarum Polonorum-Different series www.acta.media.pl	1644-xxxx	A	Each series one of Agricultural Univ.
06	Acta Toxicologica www.ump.lodz.pl/nowy_pttox/dzialalnosc	1731-6383	A	Pol. Toxicolological Society, Warszawa
07	Acta Zoologica Cracoviensia www.isez.pan.krakow.pl	0065-1710	A o	Inst.of Systematics & Evol.of Animals PAS, Krakow
08	Annales Zoologici www.miiz.waw.pl/periodicals/	0003-4541	A o	Museum & Inst. of Zoology PAS, Warszawa
09	Archives of Environmetal Protection www.ipis.zabrze.pl/wydawnictwa.html	0324-8461	C	Inst. of Env. Engin. PAS, Zabrze
10	Archives of Hydro-Engineering and Environmetal Protection www.ibwpan.gda.pl/ahem/index.php	1231-3726	A	Inst. of Hydroengi-neering PAS, Gdańsk
11	Bulletin of the PAS. Biological sciences www.pan.pl/bulletin/BIOL/bullbiol.htm	0867-1656	A o	Center for Science Advancement PAS, Warszawa
12	Bulletin of the Veterinary Research Institute in Pulawy www.piwet.pulawy.pl/bulletin.html	0042-4872	F o	National Veterinary Institute, Puławy
13	Ecological Questions www.ksiegarnia.uni.torun.pl/	1644-7298	C	Nicolai Copernici Univ., Torun
14	Electronic Journal of Polish Agricultural Universities – different series www.ejpau.media.pl/issues.html	1505-0297	F	All Polish Agricultural Univ.
15	Environment Protection Engineering www.epe.pwr.wroc.pl/	0324-8828	C	Technical Univ., Wroclaw
16	Folia Biologica www.isez.pan.krakow.pl/	0015-5497	A	Inst. of Systematics and Evolution of

				Animals, Krakow
17	Folia Malacologica www.staff.amu.edu.pl/~polmal/folia	0860-6307	A	Institue of Zoology, Krakow
18	Fragmenta Faunistica www.miiz.waw.pl/periodicals/fragmenta-faunistica	0015-9301	A o	Museum & Inst. of Zoology., PAS Warszawa
19	Fragmenta Floristica et Geobotanica www.bobas.ib-pan.krakow.pl/cgi-bin/press	1233-0132	C o	Inst. of Botany, PAS, Krakow
20	Hydroacoustics, Gdynia	1642-1817		Polish Acoustical Society, Gdynia
21	Journal of Water and Land Development www.imuz.edu.pl/wydaw/ofertawyd/journal	1429-7426	A o	Committee of Land Reclamation, PAS Falenty
22	Nature Conservation www.zbw.pan.krakow.pl/iop/iop.asp?0401	0078-3250	C	Nat. Protection Inst. PAS, Krakow
23	Polish Ecological Studies*	0324-8763	o	Inst. of Ecology, PAS, Dziekanów
24	Polish Journal of Ecology www.cbe-pan.pl/pje/pje.htm	1505-2249	A o	Centre of Ecol. Res. PAS, Dziekanów
25	Polish Journal of Environmental Studies www.pan.olsztyn.pl/pjoes	1230-1485	A	Ed. Office HARD, Olsztyn
26	Polish Journal of Food and Nutrition Sciences www.journal.pan.olsztyn.pl/	1230-0322	A o	Commit. on Food Chemistry & Tech. PAS, Olsztyn
27	Polish Journal of Natural Sciences	1643-9953	lack	Warmia & Mazury Univ., Olsztyn
28	Polish Journal of Veterinary Sciences www.edu.pl/pjvsci/	1505-1773	A	Committee of Vet. Sci. PAS, Olsztyn
29	Polish Polar Research www.polish.polar.pan.pl/	0138-0338	F o	Committee of Polar Res., PAS Warszawa
30	Scientific Papers of Agricultural University – Animal Science	1508-9185	lack	Agricultural University, Poznań
31	Water-Environment-Rural Areas www.imuz.edu.pl/wydaw/ofertawyd/woda	1642-8145	A o	Inst.of Land Recl.& Grassland .Farming, Falenty
32	Zoological Poloniae www.biol.uni.wroc.pl/zoolog/	0044-510X	F	Pol. Zoological Soc., Wrocław

* journals which are not published presently
PAS = Polish Academy of Sciences

MEDAS Database – Oceanographic Research Activities Supporting Tools

by
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Abstract

Marine Environmental Database of the Adriatic Sea (MEDAS) has been developed as web oriented geo-relational database using ORACLE RDBMS, ArcInfo/ArcView GIS and Java tools. It consists of referral database and more thematic sub-databases. Referral database includes various information related oceanographic research activities as research projects, persons, institutions, vessels, parameters, referral information about cruises and measurements, published papers, etc. Thematic sub-databases consist data collected by on-line measuring systems and classical oceanographic measurements by vessels related different oceanographic research activities (physics, chemistry, biology, ecology, fisheries, aquaculture, etc). A special thematic sub-database consists information about papers published in various publications (International Journal of Marine Sciences - Acta Adriatica, manuscripts, projects' reports, outside journals, etc).

Keywords: oceanographic database, historical and real-time data, data validation, and data assimilation by numerical model

Introduction

In the Institute of oceanography and fisheries Marine environmental database of the Adriatic Sea (MEDAS) has been developed. It is web oriented geo-relational database, which represents an efficient system for storing and retrieval of various oceanographic information and data, as well as presentation output results especially in graphical form via web pages through Internet. So, an application of this database plays an important role in oceanographic research activities and as decision support system in marine environment of the Adriatic Sea.

MEDAS database consists of referral database, which includes general information on oceanographic data, responsible institutions, persons, etc. and more thematic databases with measuring data related to physical and chemical oceanography, biology and fisheries.

A quite big volume of various oceanographic data has been stored in database (more than a million casts-profiles, more than two thousands time-series data and on-line data from few permanent oceanographic stations). As data have been collected during more than a century long period statistically they are randomly distributed in space (geographic position and layer in the water column) and time (year, season and month). Therefore, special procedures for data quality control and processing including calculation of climatological properties spatially distributed data had been developed.

Creating database, tools and technologies

The development of databases related to marine research is a specific task because of different scientific research and need to have easy and logic access to the data, its elaboration and practical application. As previously mentioned, the basic requirements regarding the creation of databases and secondary programs are as follows:

The majority of data have spatial and temporal components. Although the temporal component is simple to make query (query period from – to), but for the spatial component it is necessary to develop graphic display in order to separate data for analysis of particular area.

The possibilities of research into a particular area depend on quality of the data. To reach qualitative data, human and material resources are needed. Therefore data must be well protected from corruption and misuse, but without degrading effects for users.

While collecting data, it is possible to make different mistakes at various points. Thus, it is very important to develop constantly improved qualitative validation of data that will point to possible mistakes, leaving the possibility for final decision of user.

To elaborate collected data, different processes and procedures have been used. It is very important to store into a database these constantly improved procedures. That way the faster elaboration is obtained and also the conditions are created to use more than one model at a time,

To present the elaboration results it is necessary to develop the graphic presentation in order to show better the interdependence of more factors. The elaborated data have to be returned back into spatial area.

Database interface must be simple, accessible and, if is possible, platform independent and connection trough Internet presents big advantages, and at the present time become imperative.

For all the above-mentioned points, it is obvious that it is a complex task that requires a multidiscipline approach. A complete ending to the development is not possible, as it demands constant improvement. There is a possibility of not having satisfactory results due to too wide and theoretical approach. It is recommended an approach to tasks step by step that would constantly improve usability of the database.

Development of MEDAS database with web interface is based on ORACLE 9i RDBMS and Application server. Java applets are used as mapping tool and also for some data visualization. In C++ program language are developed special application for automatic inserting and processing of real time data. For data visualization are also used Oracle Graph and Matlab. These tools are used for following reasons:

ORACLE 9i: stability, security; easy installation and migration

ORACLE Application Server: no need for client side software (only browser), accessibility (different institutions, ship – GPRS), easy web publishing (default)

Java applet – mapping tool and data visualization: portability (cross platform), use of Client side resources (no need for powerful server).

These tools also have some disadvantages, as is software license cost, instability and bugs of some Java versions and sometimes need for manually JVM install.

In addition, interface for transcoding data to ArcGIS 8.1 input for spatial presentation of data was developed.

Database structure and capabilities

Database design is the one critical stage in the whole process of database development. This is because the future performance of the database depends upon its design. Thus, all required database objects should be planned and coordinated at the beginning of development. Of course, that is not possible and is opposite to the last statement from creating database. All the previous experience from that field is very welcome.

As it can be seen in the Fig. 1, the main entity is measurements: the chart contains the facts about time and depth, while the other facts are gained from other entities. The measurement results are aligned according to smaller entities, into sub-tables that are referred to the measurement table.

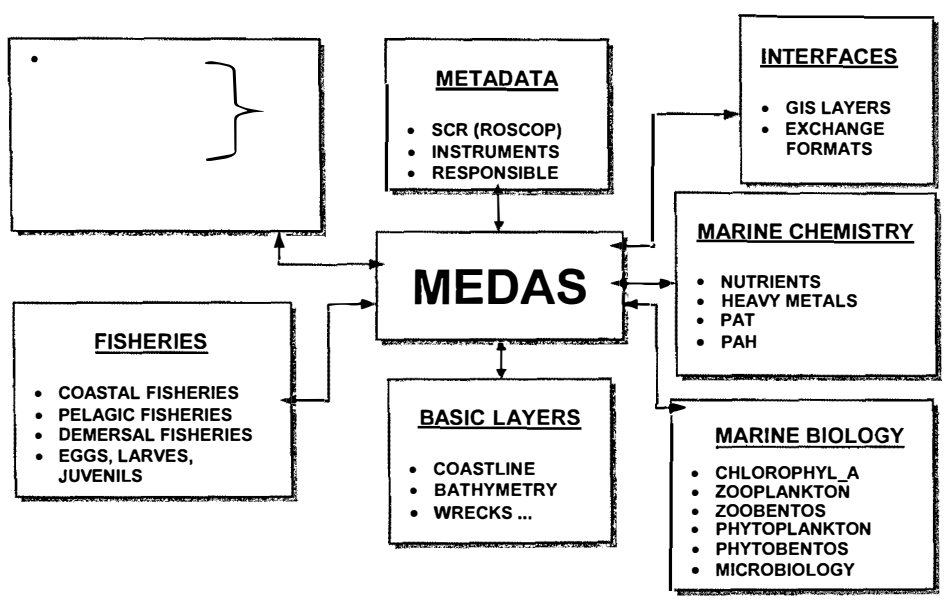

Fig. 1. Block scheme of main objects in MEDAS database

Retrieving of data from MEDAS database is simple, so user can reach any data in the two steps as follow:

Basic information about measured parameters (what, where, when, who, etc) can be obtained by searching the referral database,

User makes connections to the thematic databases getting referral database information through menus, which in turn, depending on permission, the user can access, insert or update of original measuring data.

In the database there is visualization and mapping tools, which are important parts of database for quality control and web presentation of data. Various types developed import and export formats are very useful for data sharing and processing. Fig. 2 shows main groups of database capabilities.

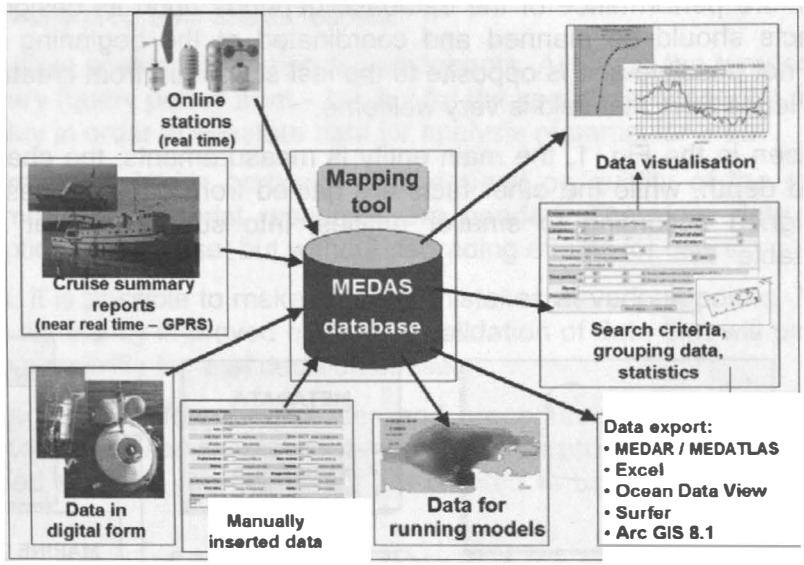

Fig. 2. Database capabilities

Referral database web interface includes forms for data input and also java applet as mapping tool. Intention is to develop fully web-based database interface. Advances of web-based database interface are platform, and software independent database access with only required Internet connection. With this facility we can assure inserting of referral data directly from research vessels (GPRS, satellite internet connection) and from various different institutions. Database contains procedures for automatic check of referral data (time-spatial crosscheck). All referral data are available online (http://www.izor.hr/roscop/eng/) with detailed information about time, station position, measured parameters, responsible persons, projects, institution and ship details. Cruise information of research vessels with mapping tool is frames organized with form – applet interaction. Referral data is linked with measured data, and same interface with authorization added are used for data quality control and processing.

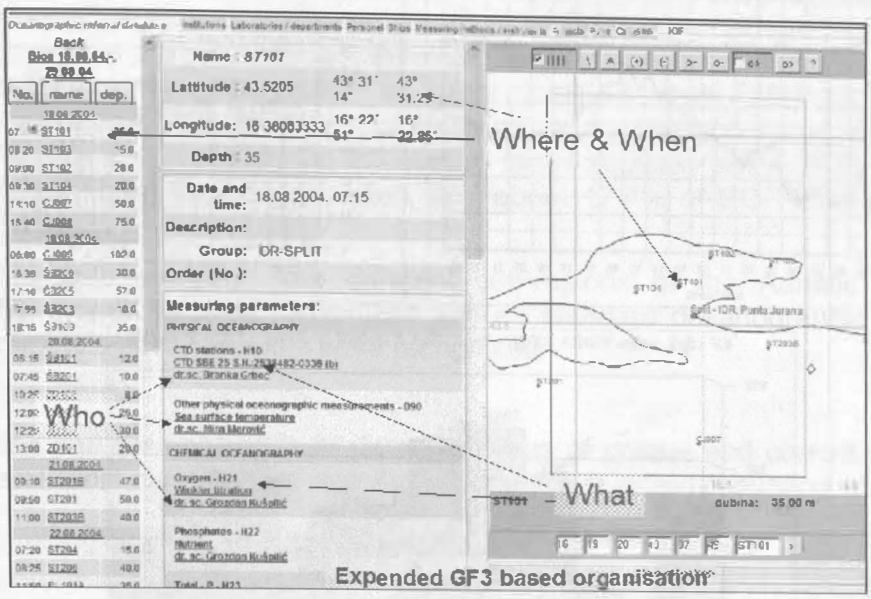

Fig. 3. Example of extended on-line referral database web browser

Real-time part of MEDAS database includes programs for automatic upload data from real-time meteo-ocean stations, and automatic visualization and Internet publication. On daily base model results are automatically calculated and published on Internet. Real-time part are also available online (http://www.izor.hr/eng/online/). Figs 4 to 5 show some web examples of real-time and aggregated data.

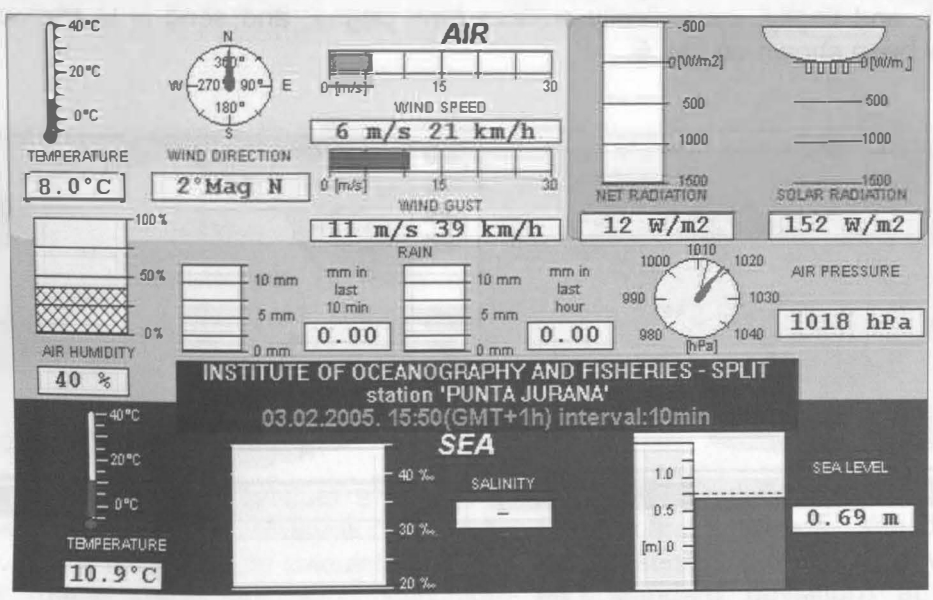

Fig. 4. Picture with actual (recent) data

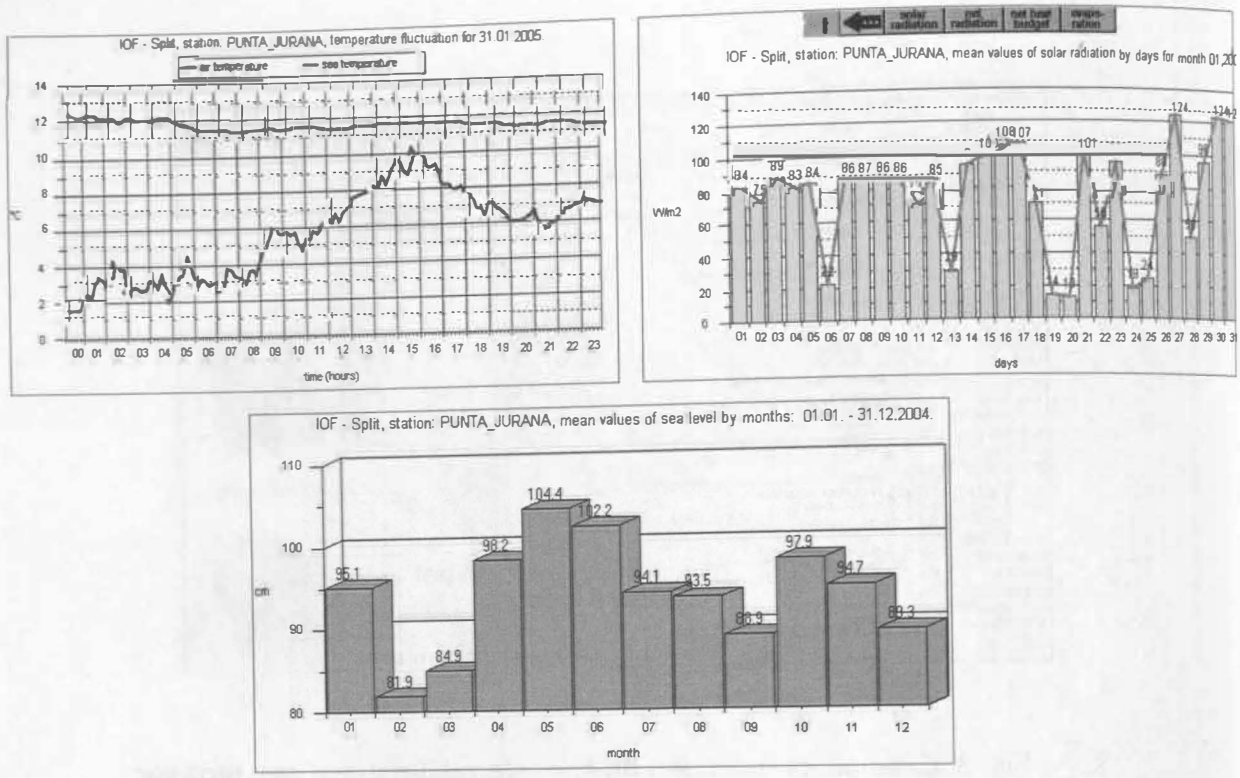

Fig. 5 The graphic survey of: 24 hrs air pressure and humidity fluctuation (a); monthly mean solar radiation per day (b); yearly mean air temperatures per month (c)

Also real-time data are used as input for numerical circulation model. At this time model is setting up for wide area of Kastela Bay close to town of Split. Model assimilates data from Punta Jurana online station. On the beginning model starts from hydrostatical conditions, and after that, results from one day are start conditions for next day. Visualization of model results generates C++ application. First application generates dynamically "Mathlab" script, after that runs this script, and finally, dynamically creates html pages, and send is to the web. Some examples have been shown on Fig. 6.

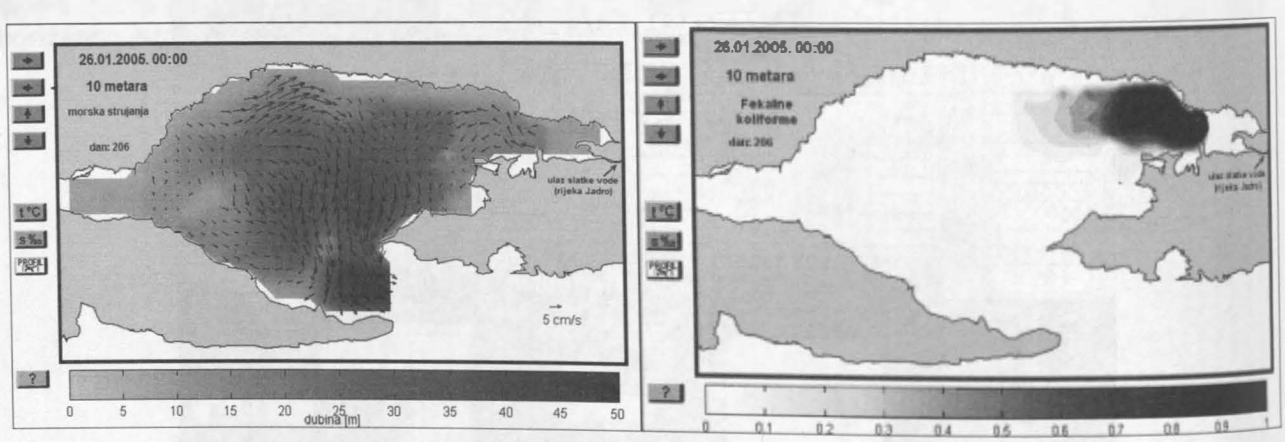

Fig. 6 Reconstruction of sea-currents (a) and feacal coliform (b) field in Kastela Bay obtained by Z-model with assimilation of various data from the station Punta Jurana

The most complex part of MEDAS database is one containing oceanographic data (physical, chemical, biological and fishery) collected during many cruises performed by many vessels from Croatia and abroad in the period longer than one century. Received data have passed complex validation and analysis. As result of data analysis from MEDAS database many duplications, uncertainty and erroneous of historical data were recognized. For example, about 49.7% of BOT data was duplicated, 3.2% outside climatologically range, 0.7% of oceanographic stations were attributed to wrong position, and about 17.4% of BOT data attributed as MBT data.

Based on the data analysis, four different sub-regions of the Adriatic Sea with similar oceanographic properties were recognized and 41 standard oceanographic levels defined as suitable for climatologically analysis were recognized.

After validation and harmonization of data numerous of unique and correct data profiles were included in statistical calculations, e.g. more than one hundred thousand of temperature data (Fig 7).

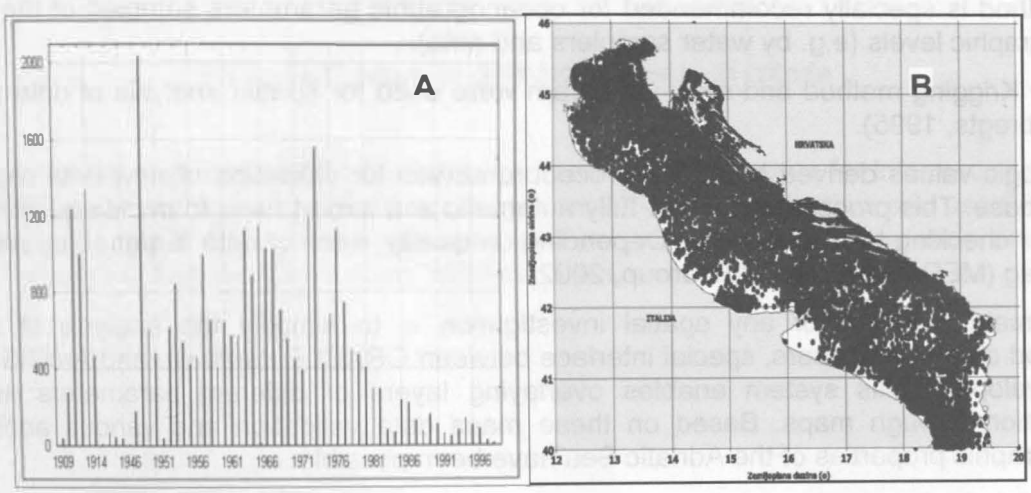

Fig. 7 Number of measured temperature profiles by year (A) and spatial distribution of station in the Adriatic Sea (B)

Based on climatology analyses of more oceanographic parameters (temperature, salinity, oxygen, nutrients chlorophyll) 41 standard levels and two maxima depth difference criteria (inner and outer) were defined for each standard level were defined in the Adriatic Sea (Dadic et al. 2002).

Program tools for data validation

As mentioned, oceanographic data stored in MEDAS database are randomly distribution in space (geographic position and layer in the water column) and time (year, season and month). Therefore, it was necessary to calculate monthly and seasonally climatological values of each parameter (mean value, minimum, maximum and standard deviation) at the standard oceanographic depths and specific marine areas, which the most often defined as square. As there is a big amount of data in database manual validation is practically impossible. Therefore, it was defined very powerful procedure, which includes comparison of different parameters and iterative method through the several steps, as follow:

Calculation of monthly and seasonally means and standard deviation from all data for each parameter at the same measuring level for entire marine area

Comparison value and standard deviation of each measuring data with calculated mean value and its exclusion from processing if difference exceeds predefined range (from 1σ to 5σ depending parameter and entire area)

Interpolation data from measuring levels on standard oceanographic levels

Comparison value and standard deviation of each interpolated data with calculated mean value and its exclusion from processing if difference exceeds predefined range (from 1σ to 3σ depending parameter and entire area)

Visual check of profiles based on interpolated data values at the standard levels

Estimating of interpolated data in square nodes of geographic grid

Presentation of output results in graphic form and check "bull ayes"

Repeating procedure if necessary.

Interpolation of data on standard oceanographic levels was done by third order Newton method of finite differences modified by referral curves (Reinger and Ross, 1968, Dadic et all, 2001). This method is specially recommended for oceanographic parameters sampled at the discrete oceanographic levels (e.g. by water samplers and nets).

Ordinary Krigging method and semi-variogram were used for spatial analysis of data (Journel, and Huijbregts, 1995).

Climatologic values derived by above procedure serves for validation of new data received in the database. This process cannot be fully automatic and expert have to decide quality of each data after checking by visualization. Depending on quality, each of data is signed by predefined quality flag (MEDAR-MEDATLAS Group, 2002).

As the main objective of any spatial investigation is to simplify the analysis of spatially distributed data to end users, special interface between ORACLE database and ArcGIS 8.1 tool was developed. This system enables overlaying layers of different parameters and their presentation through maps. Based on these maps data validation and various analyses of oceanographic properties of the Adriatic Sea have been possible.

Web based search tool from MEDAS sub-database related library

Recently, as part of the MEDAS two sub-databases related published papers Acta Adriatica and international journals has been developed.

A special thematic sub-database called PUB consists information about papers by researchers employees in Institute published in various publications (International Journal of Marine Sciences - Acta Adriatica, manuscripts, projects' reports, outside journals, etc). Sub-database ACTA contains all papers published in the Institute journals Acta Adriatica and Notes. PUB and ACTA sub-databases consist of author's name, article title, key words as well as abstract and full text (available from 2004).

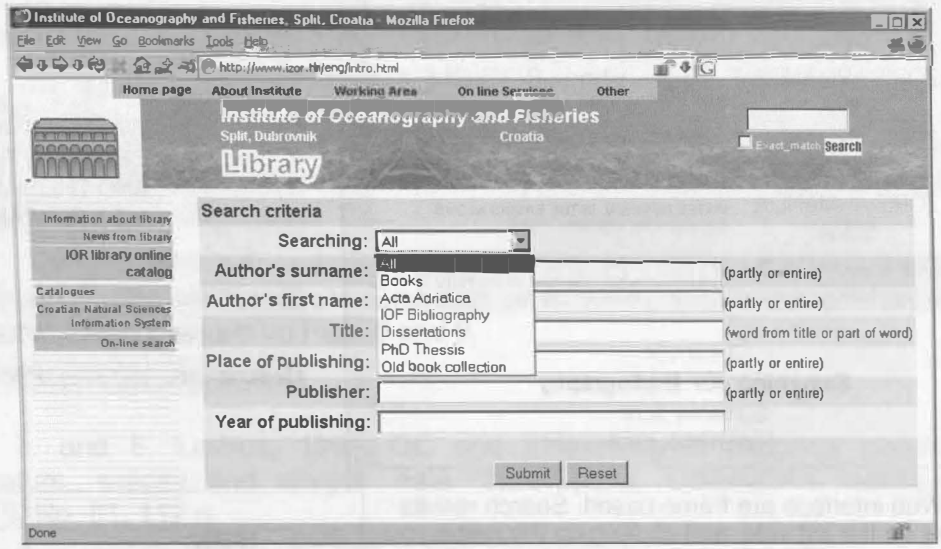

Fig 8. Start page for definitions of search criteria

All data are transcoded and to MEDAS database from «Crolist» system for information storage used in the library for long period. System is based on MS-DOS application, and use ORACLE 5.0 database. Application was for a single user, and single computer (PC) limitation, and it is not suitable for searching materials by many different users.

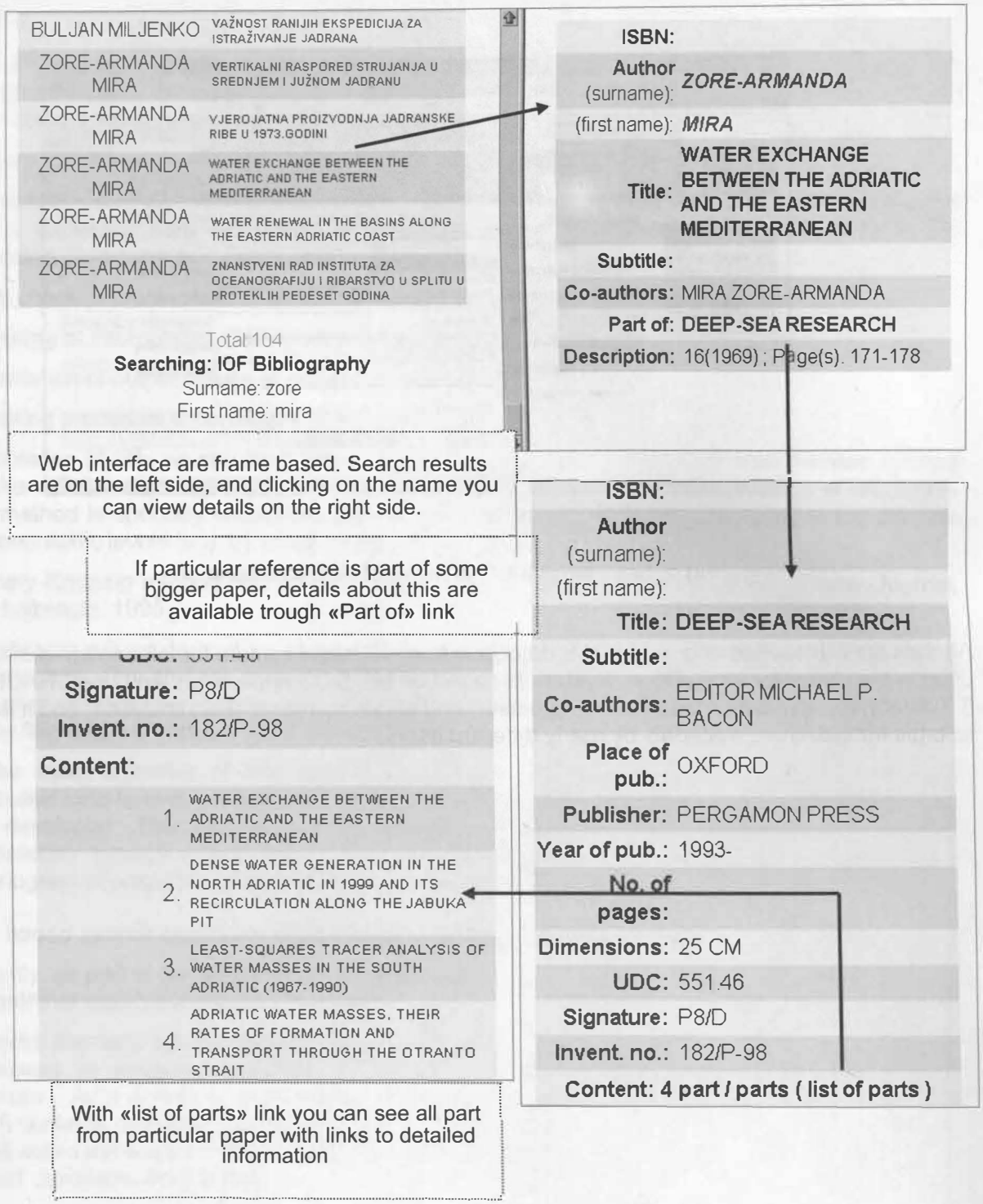

Fig. 9 Flowchart of logical of the retreiving of publications from the database

As "Crolist" have "export database" option for backup reasons, this exported data imported into ORACLE 9i database and build web interface for searching. For inserting new information, it is still possible to use old (already developed) "Crolist" forms, and periodically makes refresh (export from "Crolist" and import into 9i) of database. Hardest part of this task was adaptation of "Crolist" database structure for easy understandable, and user friendly querying. As "Crolist"

uses many record for storage of only one logical part of information, and to retrieve all relevant information it has to mate query from multiple instances of same table.

Also, special Croatian characters from old MS-DOS code page transcode to new ISO specification code page. All data from "Crolist" are stored into one particular database schema, and all additional code and web visualization procedures into another. This is done because were new data are imported (database refresh) all object from data schema are dropped and recreated, and all code stays the same.

All views related library matters from database are divided into six groups; and searching are possible into each group or all materials. Examples of retrieving of information from PUB and ACTA sub-databases have shown on Figs. 8 and 9.

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