



The Network of European Marine Stations

Newsletter, No. 3, Summer 1999.

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MESSAGE FROM THE PRESIDENT

This last year of the century (or is it?) will also be a crucial year for the development of MARS and the impact the network will have on marine biodiversity research. With the new executive board also a new start is made that, at least judging from the meeting we had at ICSU headquarters in Paris, must lead to the further growth and strength of our network. The fifth framework programme of the European Union at last provides room for our scientific priority and gives ample opportunity to strengthen exchange, also with our colleagues from non EU countries. So there is significant opportunity and the executive and, as we hope, our members will remain especially vigilant in the first months to come to fully exploit these opportunities.

MARS will also contribute to an important initiative coming from the DIVERSITAS programme, which is the International Biological Observation Year, IBOY. More about this in the newsletter. At the same time MARS has been asked by the DIVERSITAS Scientific Steering Committee to develop the marine networking worldwide. The two meetings we already had with our colleagues from the US will be followed up at a workshop in Yerseke in April where the strategy to develop the

worldwide network will be discussed.

MARS is planning to have its General Assembly in March or April 2000, probably in Venice. At the General Assembly the plans for what for the moment may be called a European Research Network on Marine Biodiversity, plans that are being prepared following the Yerseke workshop mentioned above, should be subscribed by the MARS member laboratories that are interested. These plans are based on the establishment of a network of Flagship Sites that hopefully will cover most significant marine habitats in Europe over as wide a geographical scale as possible. These sites must be the attractors for a whole series of research projects and at the same time be surveyed over a sufficient long time, ten to fifteen years at the minimum.

Finally, MARS will be actively looking to extend its membership and at the same time devise a system of associated partners, e.g. from universities or from countries with currency restrictions, that are interested in joining the activities but cannot become proper members. And for those laboratories who are not interested in biodiversity we are slowly but steadily evolving a series of activities that will be of more general interest. To start, we will offer a few grants for young scientists from MARS member laboratories to visit another MARS member laboratory.

Carlo Heip,
Yerseke, The Netherlands

EDITORIAL

The Newsletter will be an essential channel for realising the message from the President that you have just read. It will provide a principal channel of communication from the Executive to the Members, from Members to the Executive, and between Members, by conveying information regularly throughout the MARS Network in Europe – and beyond. At the moment, it is intended to publish the Newsletter twice a year, in summer and in winter

In order to do this effectively it needs to be supplied with all relevant information: items of news concerning or affecting Marine Stations, the science they carry out and their educational activities – interpret that as broadly as you like; notices of forthcoming events – conferences, symposia, training courses; suggestions for future activities – a forum for developing initiatives; practical descriptions of Marine Stations in the Network – telling others about yourself so that collaboration can develop wherever interests and facilities match; a correspondence column – comments from throughout the Network, not least on effective communication.

The purpose of the Newsletter will be to fill a real need, not to invent one, so I see my responsibility as editor to be responsive to what people have to offer and to what they wish to hear about. In this issue you'll find some bare headings. This is an invitation to all members to respond with letters for the Correspondence Column, an illustrated piece on your Laboratory, reports of events of trans-national interest, and notice of any meetings that you are aware of. The quality and content of the Newsletter will ultimately depend on the contributions I receive.

It's a year and a half since the previous Newsletter was published and much has happened in that time. This issue reports on some of the events that appear to me to be most relevant to the objectives and activities of MARS. Foremost among these are initiatives concerning marine biodiversity, which has been a priority interest of ours right from the start because so many of the pressing issues can only be tackled on a network basis. The expertise necessary to study them still resides to a large extent within the membership, but others are involved as well, particularly museums, conservation agencies and international scientific bodies. You will find reports on initiatives in which they are the prime movers and where there is a very important role for us, the MARS Network, to play. These reports are not just for information; with them all comes an invitation to respond, to take part in the ACTION! For this reason, each of the reports is quite detailed, longer than one might normally expect in a newsletter, and liberally peppered with acronyms, but, on this occasion at least, I trust that the need for completeness justifies the length. Last year the first training course officially supported by MARS since it was formally constituted in 1994 was held in Banyuls. Since training should be such an important part of MARS' activities, again quite a detailed report is included, to encourage other such courses and to provide some practical guidance.

Now, please give me some advice. First, does the Newsletter include the sort of topics that you would wish to read about as a member of MARS and does it provide the means to convey the information you wish to tell people about? In other words is its structure right? Secondly, how is it best to get all that information out? This Newsletter is intended to serve every scientist in the Laboratory, so it will be important that it can effectively be made available to each and every one. Is that best done by a number of copies to each member, say a requisite number to the Director for distribution to

section heads and a couple to the Library; or should it go entirely electronic, E-mail and on the Website; or both? Thirdly, this issue is not a sophisticated document and I shall be aiming to improve its design and layout in future. I would be happy to link up with any member Laboratory in order to do this effectively.

Jack Matthews,
SAMS, Scotland

REPORT OF THE BANYULS COURSE, 1998: CONCEPTS AND METHODS FOR STUDYING MARINE BIODIVERSITY, FROM GENE TO ECOSYSTEM. A JOINT TMR / CNRS PRACTICAL TRAINING COURSE

This was a two-week practical training course on the concepts and methods of studying marine biodiversity, going from the gene to the ecosystem level. It was held in the "Observatoire Océanologique de Banyuls-sur-mer" in southern France, in March 1998. It reviewed the principal methodologies available for the acquisition, treatment and management of biodiversity data, and was directed by Jean-Pierre Féral (Directeur de Recherche au CNRS).

Biodiversity is quite a new term with broad significance because it rests on various concepts of science, society, economics and even politics. Species diversity was first considered as a consequence of the historical accumulation of species. More recently, ecologists have begun to consider spatial and temporal dimensions, recognising that connections exist between local habitats and global biogeography and between short time scales and geological time. It is now considered that diversity patterns are the result of many ecological and evolutionary processes, historical accidents and geographical circumstances. New concepts and analyses must therefore be developed to match the scales of the processes involved. Foreseeable changes, particularly those caused by human activities, explain the present concern for the preservation of biodiversity (*cf.* the Rio Conference and a wide range of national, European and international regulations). A scientific understanding of all aspects of biodiversity is a major objective for effectively supporting conservation and management of marine systems and their living resources.

New techniques and methods (including molecular tools and computer support) make ecology a rapidly evolving science. New hypotheses and comparative analyses of organisms in coastal ecosystems and at regional level provide the information necessary to develop ecological theory and predictive ecology, on which integrated environmental management policies can be founded. Operational regulations should be based on the results of interdisciplinary studies.

The main objective of the course was to explore different topics concerning the assessment and management of marine biodiversity. It aimed to bring together research scientists from various European countries, who are using different theories and research tools to address

problems of biodiversity, and then to generate new collaboration and co-operation in order to build up interdisciplinary programmes. The aim was to highlight important issues that would enable population ecologists on the one hand and ecosystem ecologists on the other to understand how others pose the questions and answer them. It also aimed to show that insight into marine biodiversity and its mechanisms relates to public concerns about fisheries, aquaculture, the invasion of alien species, management of the seashore, nature conservation, oil drilling, mining, dumping, etc., and that it was essential that the results reached should reach environmental managers and policy makers. The course was designed to bridge the gap between training programmes and consultancy work, and to encourage industry to use trustworthy consultants and to respect regulations.

The course received funding from the European TMR Programme, le Centre National de la Recherche Scientifique and the National Programme on Biodiversity (PNDBE) in France. It was also supported by the MARS Network of European Marine Research Stations and by the other European Laboratories associated with the course. It was organized under the auspices of the international DIVERSITAS Programme.

The topics dealt with on the course included:

- The legal framework for marine biodiversity
- Practical implications of the Rio Conference and other regulatory instruments
- The point of view of industry
- The dimensions of biodiversity (size / space (local, regional, global) / time)
- Life history traits of organisms and biodiversity
- Ecological approach: functional aspects of marine diversity
- Populational approach: intraspecific biodiversity
- Data acquisition (molecular tools, computer-assisted morphometry)
- Uni- and multivariate data-set analyses (new software: BioDiversity, ADE-4)
- Man's impact on marine biodiversity (impacts of fisheries, aquaculture)
- Data management
- Conveying biodiversity data and advice to environmental decision makers.

The schedule and other details are available on the web site of the Observatoire Océanologique, Banyuls-sur-Mer (<http://www.obs-banyuls.fr>) and on the TMR' web site (<http://www.cordis.lu/tmr/src/talking.htm#reports>).

Most of the publicity was through the Internet (web site and e-mail) with some advertising in scientific journals, by mailing to targeted institutes, and by pamphlets and public posters. The Web page was much visited. 47 proposals were received for the 20 available places. Selection was done on the basis of qualifications (doctoral students, post-doctoral or research scientists) and on their present or foreseeable involvement in marine biodiversity. Priority was given to young scientists less than 36 years of age (18 among the 20) who could receive 100% support from the European

Commission. Participants came from 12 countries. One of the novelties was to bring together biologists with a population approach and others with an ecosystem approach to biodiversity. This was true of the 34 teaching staff from 6 European countries as well as the students.

The course was successful in:

- Pooling a huge range of experience concerning marine biodiversity,
- Examining the concepts that relate to each type of approach, e.g. genetics and evolution for ecologists and oceanographers, functional and systemic aspects for the geneticists,
- Learning the tools, in particular recent molecular techniques and software,
- Becoming acquainted with the legislation concerning biodiversity and the need to convey scientific information to decision makers and society
- Studying the relationships between biodiversity, life sciences, environmental sciences and social sciences

The results of a questionnaire endorsed the view that comparative and complementary studies at different levels of biodiversity are important. The participants were very appreciative of the organisation and the content of the course which had met their expectations. Most of the participants valued the multidisciplinary nature of the course, though a few found the theoretical and practical sessions in their own special field were less useful. Nevertheless, gaining specialist knowledge in the range of disciplines at first hand came top of the list of credits, closely followed by the synthesis of research themes and what many expressed as the "acquisition of new concepts". Time was allowed for discussion, but the schedule was tight and the participants often had to be divided into two groups, one for discussion, the other for practical sessions; in general they would have preferred not to have been divided in this way. The students performed well during the presentations that they gave early in the course.

By the end, the participants felt that they belonged to a network, or wished that one could be created, so that they could continue to communicate and collaborate. For some, the legal aspects relating to conservation and protection, in which they were particularly interested, could have been dealt with in greater depth. The industrial element (Elf-Aquitaine) was considered to have been too short. The relationships between science, economics, society and politics were said to be well understood. There was general agreement that such courses, on various themes but run along similar lines, should be continued. There was also a suggestion of an annual conference.

The teaching staff also appreciated the course and recommended that others be organised, building on the experience gained in this, the first MARS/TMR course.

The organisation of the course was greatly assisted by the Laboratory, and by CNRS - DR13. I thank everyone

involved, particularly Elie Poulin, Sigurd von Boletzky, Nicole Clara and Claire Biron (Observatoire Océanologique) and Gilbert Bounaud (CNRS Montpellier).

Jean-Pierre Féral,
Banyuls-sur-Mer, France

**INTERNATIONAL MARINE BIODIVERSITY NETWORK (IMBIN).
DIVERSITAS MARINE PLANNING GROUP,
IMBC'97, ITALY***

The situation and the problem

Marine environments are estimated to provide nearly two thirds of the ecosystem services needed to maintain our society (1), yet we are unable to characterize and to detect many of the changes in the diverse assemblages of organisms in the ocean that could affect these services. Biological characteristics of the oceans fluctuate naturally, but inadequate coastal management and increasing coastal population growth may result in irreversible local losses of biodiversity and consequent changes in ecosystem function. Major fisheries are in decline; coastal wetlands have been lost or are being modified; native species have been displaced by introduced, exotic species; harmful algal blooms occur more frequently; coral reefs and mangroves are among the ecosystems showing adverse effects of overfishing, disease, unregulated mariculture practices, and runoff from land; the ability of ocean life to cope with wastes is seen to be limited; and there is widespread speculation concerning the global effects of climate change such as increased temperature, ultraviolet radiation, dissolved CO₂, and sea-level rise. Biological censuses are infrequent and, even in the case of macroscopic animals, many species with important ecological functions are missed. Animal and plant life of most of the vast areas of highly productive coastal habitats have not been inventoried and the largest biotope on the planet, the deep sea, remains largely unexplored. Groups of microorganisms such as fungi, protists, bacteria and Archea are even less well known. Most phyla evolved in the ocean, yet the origins and maintenance of oceanic genomic, species, and habitat diversity are poorly understood. Only recently was it discovered that free-living photosynthetic bacteria may contribute as much to oceanic primary production as all previously known primary producers (2). Such recent advances underline how much remains to be discovered in the marine environment.

Understanding the processes causing a decline in species numbers or changes in species distributions will require an integrated approach at all biological levels of organization. Individually, marine laboratories have supported important research on local marine populations, habitats, and ecosystems. Nevertheless, the scope for understanding the effects of larger-scale migrations, transport of dispersal stages, plankton blooms, and infrequent events such as storms

and heavy rainfall has been limited. Future research needs to predict environmental variability and change, and develop ecological theories to elucidate relationships between the structure and function of systems and the transfer of variability between small and large scales of organization.

Patterns of variability at each level of biological organization will inform relationships observed, a) between local, regional and global scales of variability, b) between genetic and environmental variability, and c) between biodiversity and ecosystem function.

Environmental problems are related to human activities at local (e.g. point-source discharge into an embayment), regional (e.g. diffuse inputs from an entire watershed and atmospheric deposition into an estuary), and global (e.g. climate change) scales. It has become clear that the major scientific challenges to developing predictive models of environmental changes and their consequences are:

- How changes in land-use patterns, and in the atmosphere, affect coastal habitats and estuarine/marine biodiversity;
- How changes in biodiversity are related to changes in plant and animal populations and in ecosystem processes such as nutrient cycling, carbon storage and export, and water quality;
- How global climate change is expressed locally and regionally as changes in biodiversity and biogeography, ecosystem processes, and the sustainability of living marine resources.

Understanding these interdisciplinary, multiscale problems and resolving and predicting the effects of human activities can only come through:

- Time-series measurements on appropriate scales of species distributions and environmental parameters that are sufficiently frequent and sustained to resolve short-term variability, episodic events, and trends;
- Comparative analyses of a variety of ecosystems subjected to varying degrees of human impact over a range of temporal and spatial scales;
- More rapid exchanges of data and more effective use of the collective expertise of environmental scientists worldwide.

Marine Laboratory Networks: A mechanism for tackling the problem

A meeting on Marine Biodiversity was held during the 4th International Marine Biotechnology Conference in Sorrento, Italy, in September 1997, to discuss the use of marine laboratory networks in furthering the objectives and research components of the international **Diversitas** Marine Biodiversity program. Participants included representatives of the MARS Network of European Marine Stations, Man and the Biosphere (MAB), the International Network for Diversitas Western Pacific (DIWPA), national networks such as the U.S. National Association of Marine Laboratories (NAML & LABNET), the French Diversitas Marine Biodiversity Network (Réseau Diversité Marine: RDM),

the Japanese Association of National Marine and Inland Water Biological Laboratories (JAMIW), the International Association for Biological Oceanography (IABO), the Coastal Global Ocean Observing System (GOOS), and Diversitas.

It was agreed that there is a growing international consensus that networks of marine research stations should form the backbone of sustained research and observation of marine biodiversity, and its origin, maintenance, and function (2, 3, 4, 5, 6, 7, 8, 9, 10). Marine laboratory networks together can provide the necessary long-term and large-scale coverage of processes and changes at population and community levels. Processes controlling the origins, magnitude, and maintenance of marine biodiversity at the genomic, species, and ecosystem level require study at many spatial and temporal scales within entire biogeographical units. Well-established local institutions have the interest and commitment needed to make the long-term observations essential to understand the impact of infrequent events or shifts in communities, and to distinguish natural from anthropogenic variability.

Marine laboratory networks can make better use of existing data and information, document and compare local changes in biodiversity, and relate ecological processes in the broader context of regional and global patterns of environmental change and human activity. In addition, laboratory networks provide an important means for developing new hypotheses, identifying common problems, defining goals, standardizing and intercalibrating methods, and developing a consensus on interpretation. Network activities should involve regional and global transfer of expertise and investment, access to expensive research instrumentation and facilities, and mechanisms for taxonomic analysis and training. This will result in more cost-effective research and more timely implementation of economically and ecologically sound environmental policies. Although national priorities may differ, regional and global networks will allow investigators to learn from the mistakes and successes of others. Networks will foster better mapping of biogeographical distribution patterns, expedite communication, and increase co-operation and sharing of data, thus increasing biological knowledge. Marine stations are often strategically positioned to provide access to habitats of particular interest (species-rich environments and natural biogeographical boundaries) and have distinguished records of biodiversity research. Working together they can establish regional approaches to sampling and experimental designs, coordinate and standardize long-term measurements, and develop robust management criteria for conservation and wise use of marine resources.

Timeliness

Through new technologies, marine stations can more effectively and efficiently fulfil their traditional roles. Continuous spatial and temporal coverage of physical processes and patterns of marine productivity are becoming available through use of satellite technology. There is a need for biological, chemical and physical measurements of sufficient density to ground-truth these

satellite observations and bring them into ecologically meaningful geographic scales in the coastal ocean. A similar revolution is taking place in the production of high-resolution bathymetric and habitat maps. Multibeam sonar bathymetric survey coverage is available in many areas and is now being complemented with other techniques (LIDAR, laser line scan, and high resolution side-scan sonar) to provide spatial characteristics necessary to map biological habitats. Better information from the ocean surface and bottom will provide a framework for more efficient sampling and design of experiments. Through use of satellite navigation and Geographical Information Systems (GIS), information on individual animals and plants can be mapped in the context of relevant physical, chemical, and geological processes; in other words, the study of large-scale regional processes in precise biological terms is now possible. A similar revolution is taking place in the development of acoustical and optical methods for observing animals and plants in the natural environment, either from ships or various underwater platforms.

Capabilities for rapid sequencing of the genes of marine species are becoming more available at marine laboratories, so increasing the possibilities for studying the origins and maintenance of biodiversity at the genomic level. One can now look to a new generation of integrative biologists with the broad range of skills needed to assess complex biological processes. The intersection of objectives of international programmes such as Diversitas, the Global Ocean Observing System (GOOS), and the International Geosphere, Biosphere Programme (IGBP), emphasizes the need for co-operative research on regional and global scales. The Diversitas Meeting concluded that the infrastructure and institutional commitment to address crucial regional and global marine environmental issues already exist in the world-wide system of marine stations and in the further establishment of networks. Common attributes of a marine biodiversity research agenda include the need for experimental approaches to address basic issues in the ecology and evolution of marine biodiversity, long-term commitment, strong involvement of systematists and taxonomists, and new approaches to setting priorities for sampling and design of experiments.

*The following individuals constituted an *ad-hoc* Marine Diversitas Planning Group to draft this manuscript: Colleen Adam, Friedrich Bucholz, Eurico de Oliveira, Jean-Paul Ducrottoy, Jean-Pierre Féral, Frederick Grassle, Carlo Heip, Ahmet Erkan Kideys, Pierre Lasserre, Thomas Malone, Jack Matthews, John Ogden, Yoshihisa Shirayama, Kenneth Tenore. This group includes representatives of CARICOMP, Coastal GOOS, DIVERSITAS, DIWPA, IABO, JAMIW, MAB, MARS, NAML, RDM and UNESCO. We thank other participants in the IMBC'97 Diversitas Workshop for their contributions.

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Fred Grassle,
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REPORT OF THE BIODIVERSITY SESSION AT THE THIRD MAST CONFERENCE IN LISBON, 23-27 MAY 1998 "INFRASTRUCTURE FOR RESEARCH ON BIODIVERSITY: WHAT DO WE NEED?"

Following an introduction by the chairman, Carlo Heip, in which he provided a definition of biodiversity, its hierarchical structure and the formal context for research, a keynote address was delivered by Dr. Jeanine Olsen, to which the provocateur, Edna Graneli, replied. Lively discussions followed each of the speakers. The presentations and the discussion provided a clear consensus on the main priorities for research and on the necessary infrastructure, as summarised below.

A serious loss of marine biodiversity was acknowledged, by the scientific community and by society in general, to threaten the sustainability of the oceans. Given the threat of climate change and increased human pressure on marine ecosystems, the present and future state of marine biodiversity is of great concern; FAO estimates that the deficit between demand and supply of marine food will be 10 - 40 million tons by the year 2010. This perception has led to different priorities for action between those identified by the scientific community and those perceived by society. Moreover, even within the scientific community there is controversy over priorities for research. The result is that research remains fragmented, and the scientific community at the European level has not yet been successfully mobilised to address the grand challenges of research. The main bottlenecks hindering progress were identified as:

- The absence of a truly interdisciplinary approach to

the study of marine biodiversity. This should extend beyond the bounds of the various disciplines within biology (molecular biology, taxonomy, systematics, ecology) to encompass all aspects of marine sciences (geology, geochemistry, physics, chemistry, etc.). Instead of co-operation, there has been disagreement between scientists with different backgrounds.

- The lack of a clearly defined question that would allow the design of effective research strategies. There is now a gap between the interests of scientists and those of society, resulting in poor mobilisation of resources. The absence of a clear fundamental question has also resulted in many small-scale research efforts and a fragmented approach, instead of the European "synergy" required to address the key issues effectively.
- The absence of prioritised research agendas, which have been formulated too broadly, resulting in vast requirements for resources, and thus rendered impossible to implement.
- A poor knowledge basis on which appropriate research can be built. This arises from the fact that scientists have only been able to sample marine biodiversity directly for a single generation, and expertise is often lacking in key fields; in consequence, the paradigms and basic patterns remain largely undescribed.
- The absence of a coherent research programme to address the main challenges for sustainability, although it is clearly recognized that the scale of the problem is such as to require co-ordination at the European level.

It was felt that these problems could be largely overcome if the central question were clearly defined, so providing the foundation for mobilising resources and efforts towards tackling the heart of the problem. The question was defined as follows:

To predict the role of marine biodiversity in the regulation of marine functions and the services that these functions provide to society, including regulation of climate and atmosphere, abatement of pollution, nutrient cycling, prevention of coastal erosion, provision of food and raw materials, etc.).

The research needed to address this question would require:

- The development of interdisciplinary, multiscale science,
- Description of the large-scale pattern of marine biodiversity in Europe,
- An experimental approach to test predictive models and hypotheses.

This would enable concepts and models of regulation of marine biodiversity to be tested and, given an emphasis on predictive capability, would provide a basis for discussion by society and decisions by the responsible authorities.

An action and implementation plan is essential. The European Commission and the European Science Foundation should take the lead in formulating the

agenda. In fact, the European Science Foundation, through its European Marine and Polar Science Board, has published a document, A European Science Plan on Marine Biodiversity (EMaPS Position Paper No 2, Luxembourg., 1998), that outlines the European marine biodiversity issue and the key priorities.

Several barriers to progress have already emerged which can only be resolved by action on infrastructure:

1. Marine biodiversity can only be addressed by an interdisciplinary community, contributing the full spectrum of disciplines involved.

Infrastructure required:

- Support for taxonomic knowledge as a basic requirement for research in biodiversity. This support should include training, calibration, networks and electronic data bases, accessible to all scientists concerned with marine biodiversity;
- The development of curricula at undergraduate and postgraduate level, tailored to endow the students with the skills required to study marine biodiversity (molecular tools, taxonomy, systematics, ecology, geology, etc.);
- The organisation of Euro-Conferences designed to bring together scientists studying marine biodiversity from different perspectives in order to generate the needed synergy;
- The provision of interdisciplinary experimental workshops, where scientists from different backgrounds come together to exchange practical experience using contrasting approaches. These workshops will be most useful if sited by biodiversity "hot spots" (e.g. the Alboran Sea where Mediterranean and Atlantic communities meet, Greek hydrothermal habitats, and between the eastern and western Mediterranean, and by contrast also in the species-poor Baltic).

2. The predictive power of marine biodiversity knowledge remains small (qualitative at best), and is of limited use as a basis for decision making.

Infrastructure required:

- The development of experimental ecosystems, where hypotheses and models can be tested at the appropriate ecosystem scale. Because decisions concerning marine biodiversity impinge on species and ecosystems in the sea, any models or rules to be applied must be tested to satisfaction under controlled conditions before use. There must be due replication and control, bearing in mind the need to include human actions as factors in the functioning of marine ecosystems.
- The development of "Ecotrons" (i.e. large-scale experimental facilities where full artificial ecosystems can be set up, e.g. Montreal's Biodome, Lisbon's Oceanary) for experimentation on marine biodiversity under scenarios of future climates, and conditions.

There are very few such facilities in Europe at the present time.

3. The basic large-scale patterns of marine biodiversity in Europe are not known, because their study requires co-ordinated use of resources.

Infrastructure required:

- A network of marine research stations to enable synoptic, standardised sampling of marine biodiversity to be undertaken over large geographic areas and a set of sites to be carefully chosen for long-term study of marine biodiversity.
- The use of research vessels to run large-scale meridional and zonal transects to provide basic descriptions of large-scale patterns of marine biodiversity in European waters.
- Better use of instruments or development of new ones for synoptic sampling and observation using remote-sensing techniques for the upper water column and the sea floor.
- The development of standard protocols and methods through workshops.

4. A wide gap exists between the priorities perceived by politicians and managers, on the one hand, and scientists, on the other, which has been an obstacle to progress in marine biodiversity research.

Infrastructure actions required:

- Raising awareness of marine biodiversity and the consequences of change through formal and informal education, in school and university, of managers and politicians, and of the general public. Sustaining marine biodiversity ultimately depends on public awareness, which can only be built up with the help of scientists. The dissemination of results from EU projects to the general educated public should be a standard requirement for projects.
- Demonstration projects, where the link between marine biodiversity and the sustainability of marine ecosystems is made explicit.
- Electronic open conferences on marine biodiversity, such as current activities.
- The involvement of industry and the private sector in research on marine biodiversity. This is essential, for the private sector is expected to be amongst the main beneficiaries of the research, and because many marine business activities are directly dependent on sustaining marine biodiversity.

Carlos Duarte,
Blanes, Spain

THE LATEST ON DIVERSITAS AND ABOUT IBOY,

DIVERSITAS, the International Programme on Biodiversity Science, constitutes one of the major international global change research programmes. It is a partnership of UNESCO with ICSU, IUBS and SCOPE which promotes, facilitates and catalyses scientific research on biological diversity. DIVERSITAS is proposing for the year 2001 an initiative entitled **The International Biodiversity Observation Year**

(IBOY).

The goals of IBOY are to bring biodiversity science to the forefront of the scientific agendas of nations and international organizations interested in this subject, and to educate the general public.

A Workshop on Biodiversity Monitoring for IBOY has been organized in Santa Barbara, California (8-10 April 1999) with the primary objective of identifying opportunities for biodiversity monitoring programmes that would be the most appropriate contribution to IBOY.

In designing IBOY it has become evident that there are a large number of international biodiversity efforts. IBOY could bring focused attention to the monitoring agenda but we need to identify what particular aspects should be highlighted for maximum effect.

A by-product of planning effort, for this important international initiative, is to examine the various international monitoring programmes and to evaluate if, overall, any important aspects are being ignored, as well as where there might be duplication of effort. Some of the issues that IBOY will address are:

- What are some of the overriding questions related to monitoring?
- How do answers to these questions relate to different spatial and temporal scales?
- What is the value of standardized methods for inter-site comparisons in relation to the first two questions?
- How can we link data sets and approaches (a lot of thought has gone into this already for certain types of measurements)?
- How can we move forward in biodiversity monitoring, considering the multiplicity of efforts, the lack of resources and often the lack of political will?

UNESCO is in a position to take the lead, in line with the decision of the last Conference of the Parties (COP-IV) of the Convention on Biological Diversity (CBD), on a global initiative on Education, Training and Public Awareness of Biological Diversity, in co-operation with the Secretariat of the CBD.

An international panel of experts drawn from researchers working in the DIVERSITAS programme met in Paris in February 1999 to start discussions on a strategic plan for IBOY. Among the projects submitted were some concerning marine biodiversity which have been well received by the panel and accepted as DIVERSITAS/IBOY initiatives, for example the project submitted by J.-P. Féral entitled "Biological diversity at sea, a set of sustainable indicators: a first step for long-term monitoring".

In order to help on the marine dimension of IBOY, I am in a position to encourage the creation of a Task Force on "Marine IBOY" as a joint effort of the UNESCO Venice Office and IUBS/IABO, in close co-operation with the MARS Network and the US National Association of Marine Laboratories.

Networks of seaside Marine Stations and other Marine Laboratories, in co-operation with inland Institutions, Museums and Universities are in an excellent position to develop an important contribution to IBOY.

Pierre Lasserre,
UNESCO, Paris

EMaPS BIODIVERSITY WORKSHOP "ESTABLISHING A FRAMEWORK FOR THE IMPLEMENTATION OF MARINE BIODIVERSITY RESEARCH IN EUROPE", 22 TO 24 APRIL 1999 AT YERSEKE, THE NETHERLANDS.

The implementation and further development of marine biodiversity research in Europe has been discussed at several meetings organized by the EC and ESF in recent years. From these meetings a consensus has grown in the scientific community in Europe (and elsewhere) that, in order to achieve the long-term and large-scale research that is needed to answer some of the most important questions in biodiversity (notably the existence of latitudinal gradients and the distinction between natural and man-made change in ecosystems), much concerted action and co-ordination is required. The European Network of Marine Stations MARS may serve as the backbone for such an effort since its 40-odd member institutes cover most of Europe's coasts. However this can only work provided it achieves the commitment of a significant number of institutes (MARS members and other interested organizations).

The purpose of the workshop which had been initiated by EMaPS/ESF and was sponsored by EC-DGXII, MARS and Unesco-Diversitas, was to prepare the ground for a major European or joint European/US meeting hosted by UNESCO at the end of 1999 or early 2000.. A series of flagship sites would be sought in Europe from Spitsbergen in the north to the Canary Islands and Madeira in the south, and to Greece and Turkey in the east. The criteria used to define a flagship site and the parameters, species and perhaps the processes that need long-term monitoring (at least 10-15 years) at these sites need to be decided. The form of the commitment needs to be determined and the existing infrastructure in Europe for experimental biodiversity studies needs to be taken into account.

The objectives of the meeting were to:

- Identify a network of flagship sites and the basic protocol for long-term and large-scale marine biodiversity research in Europe.
- Prepare an updated inventory of national research programmes and existing large infrastructure in the field of marine biodiversity research
- Prepare jointly with EU and EMaPS (ESF) a European Conference on Marine Biodiversity to be held in 2001.

Concerted action at the European level is urgent because many European and national programmes are about to

start. Most of these are concerned with local questions and are designed to last for 3-4 years – the short-term time scale of most research funding. They cannot address such large-scale research topics as inventories of Europe's marine microbiota, flora and fauna, changes in biodiversity on large latitudinal and longitudinal gradients, and long-term changes in populations and biodiversity, which all require a network of institutes working together.

The European contribution to DIVERSITAS and to the International Biodiversity Observation Year IBOY urgently needs to be prepared. The Workshop provided the basis for developing a proposal which was submitted in June to the EU Fifth Framework Programme. This has already involved a number of members of the MARS Network and it is hoped that it will involve many more in due course. The outcome of the proposal will be reported in the next issue of this Newsletter, but in the meantime, all MARS members with an interest in marine biodiversity are urged to be in contact with the President and Secretary.

Herman Hummel,
Yerseke, The Netherlands

THE MARINE LIFE INFORMATION NETWORK – *MarLIN*

MarLIN is an exciting new initiative being developed by the Marine Biological Association at Plymouth in collaboration with the major holders and users of sea-bed data in Britain and Ireland. *MarLIN* will provide information for marine environmental management, protection and education. A brief description of *MarLIN* is given here. To find out more, look at <http://www.marlin.ac.uk>.

Five staff, soon to expand to seven, have started work on the programme. It is hoped that the data systems being developed by the *MarLIN* team and its partners can be extended to other partners in continental Europe, where much of the relevant expertise resides. Developing collaborative links soon is highly desirable.

Data Sources: developing a contextual information resource

Drawing together widely separated information describing benthic communities and species for a particular location requires much time and detective work. Even when the researcher or consultant discovers a meta-database such as EDMED (The European Directory of Marine Environmental Data - <http://www.nbi.ac.uk/bodc/edmed.html>), obtaining the data may be impossible, difficult or costly. *MarLIN* will access field survey data from a wide range of sources and use them to identify biotopes and species present at particular locations. This will provide contextual information to assess the distribution of biotopes and species, rarity and any unusual features. *MarLIN* will also access images and make these available, in collaboration with other image-based projects such as

ARKive (<http://www.arkive.org.uk>). From an educational and research point of view, this drawing together of information will vastly increase our knowledge of the distribution and abundance of species and the location of biotopes. One starting point is data from 31,000 stations brought together by the UK Joint Nature Conservation Committee during the Marine Nature Conservation Review and now transferred to MERMAID (Marine Environment Research Mapping And Information Database).

Biology and sensitivity key information

Adding value to records of occurrence and distribution is essential if the programme is to be useful for research, education and for environmental protection and management. Apart from information that describes the biology of species, criteria have been developed to assess sensitivity and recoverability of species and biotopes. Some of these approaches, for biotopes, have already been used in presenting information to the IMPACT working group of OSPAR. The approach is illustrated on the *MarLIN* web site.

Assessing importance, another consideration within *MarLIN*, can be in relation to a wide range of activities and values. For marine environmental protection and management, importance needs to be assessed in relation to the conservation of biodiversity, recreation, fisheries and aquaculture. New criteria will be used to assess rarity and scarcity, and any species listed on statutes, directives and conventions will be identified.

Information and education: developing new recording initiatives

The Marine Biological Association through *MarLIN* provides a marine focus for the development of the National Biodiversity Network (NBN) (<http://www.nbn.org.uk>) in the UK. The work of the NBN will especially involve developing standards for and supporting volunteer-based recording schemes. These recording activities will require training which, in turn, will develop educational software linking to other *MarLIN* sub-programmes. The worker who can see his or her validated records being added to web pages describing the biology, distribution and status of species, habitats or communities gets a great sense of contributing. *MarLIN* also works especially with the National Marine Aquarium in Plymouth to develop educational software and displays.

Sharing approaches and getting feedback conference 19-21 July 1999

A Conference, Using Marine Biological Information in the Electronic Age, has just been held in Plymouth. The meeting will be reported in the next issue of the MARS Newsletter, but in the meantime you can find further details on the *MarLIN* website.

Keith Hiscock, Programme Director, Marine Life Information Network, Plymouth, UK
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MARINE ENVIRONMENTAL EDUCATION CONFERENCE, EDINBURGH, APRIL 1998

"*Learning for Life*", which was a seminal report on Environmental Education, commissioned by the Secretary of State for Scotland, was published in 1993. In response, the Secretary of State declared that he accepted the Report as the strategic base upon which he would draw when developing specific policies in which environmental education should have a role. In this way Scotland has achieved an eminent international position in the field of environmental education.

Nevertheless, and despite the crucial importance of the sea and its resources to Scotland, there is still a Environmental education - Learning for Life - should be a life-long experience, at all levels of education, formal and informal. Following an example of what is being done in collaboration between university and school in the United States, contributions on educational provision at various levels in Scotland and through various channels, including the media, formed the background for a discussion of why marine environmental education must be improved, and how to achieve this.

Professor John Smyth, who was responsible for the original report, *Learning for Life*, provided reflections on the Conference debate in the wider context of environmental education, nationally and internationally, drawing attention to the fact that this is the beginning of a process of improvement. The conclusions that follow in the report that has recently been published are a summary of the issues, problems, and possible solutions that the day produced and they in turn form the basis and the inspiration for the firm and practical recommendations with which the Report ends. A concerted effort is required to increase awareness of the importance of the sea to the lives of present and future generations.

Jack Matthews,
SAMS, Scotland

MARINE ASPECTS OF THE EU FIFTH FRAMEWORK PROGRAMME

As I am sure everyone is aware, the first call for proposals contained some of the most important scientific elements of interest to MARS, under the heading "Sustainability of Marine Ecosystems" (Key Action 3 of Part A of the Environment and Sustainable Development Programme). The deadline was 15 June and your Editor is among innumerable marine scientists eagerly awaiting the outcome. Rumour has it that upwards of a hundred marine proposals have been submitted, so competition will be intense. We'll report the outcome in the next issue of the Newsletter.

A second call is expected later this year with a deadline early in 2000. The priorities this time are:

- Transport pathways and impacts of pollutants, key elements and nutrients in the marine environment
- Technologies for safe, sustainable and economic

widespread lack of awareness and understanding of the marine environment. This Conference was designed to confront that anomaly. In opening the Conference, Lord Sewel, the Government Minister with responsibility for environmental matters, emphasised the holistic approach that is essential to wise management of the sea and the sustainable use of its resources. The need for understanding on the global scale and in relation to Scotland's own coasts and waters was addressed, before a panel of those who use the sea or are responsible for its management debated the whole issue of the need for information, education in the widest sense, and the support of official policy and public opinion.

- exploitation of marine resources
- Coastal zone changes,
- Coastal protection against flooding and erosion,
- Coastal processes monitoring,
- Operational forecasting of environmental constraints of offshore activities.

Jack Matthews,
SAMS, Scotland

NOTICE OF MEETINGS

It is intended that the Second General Assembly of the MARS Network will be held next year in Paris or in Venice, probably in the spring. Planning is still in an early stage, but you will have detected from the news items in this Newsletter a certain priority on Marine Biodiversity. Please send ideas and suggestions that you may have to the President or any member of the Executive, so that they can be considered

Information on all meetings relevant to MARS interests is solicited, preferably by E-mail and the sooner the better. If in doubt whether a meeting will be relevant, send the information anyway - the editor's decision will be final!

Editor

NOTICE OF COURSES

This is the first time of asking, so this is still an empty item. As in the case of meetings, please send me information on any relevant courses (or sources of information) that you may be aware of.

Editor

NEWS AND CORRESPONDENCE COLUMN

This heading is also a Notice of Intent. Please help me to put your name, news and ideas into print!

Editor

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