

## PANEL REPORT BY THE MODERATOR

Ferdinando Boero

Università del Salento, Italy - boero@unile.it

*Keywords : Biodiversity, Gis, Eastern Mediterranean, Western Mediterranean.*

Information systems are the new powerful tool to collect, integrate and analyse data from different sources and to make them readily accessible to the scientific community worldwide. This panel focused on issues concerning the management of biodiversity databases on the internet (data integration, accessibility, quality control) and their scientific and educational applications.

The session started on time, all speakers were sharp in their presentations, leaving an hour for discussion with the audience. The first two contributions focused on patterns and trends in the introduction and distribution of alien species based on the analysis of datasets from the CIESM Atlases of Exotic Species. Daniel Golani showed the abrupt increase in exotic fish in the Mediterranean Sea in recent years, with 18 newly introduced species since 2002, mainly through the Suez Canal. Many established species extended considerably their range of distribution and for some species real population explosions occurred in just few years time. As the rate of invasion is likely to increase in the future, D. Golani discussed the need for more research on the impact of exotic fish on native assemblages. In particular, he stressed the importance of long-term monitoring of fish invasions and the need for comparative studies between exotic fish and ecologically similar native species for more reliable assessment of impacts on local diversity.

The rate of invasions in the Mediterranean Sea is steadily increasing also for other taxa, as was clearly shown in the communication by Bella Galil. To date, 66 exotic crustacean decapod and stomatopod species have been recorded in the Mediterranean Sea and the number of introductions increased in the last decade. The Eastern basin is the most affected by species introductions, which have been five times higher than in the Western basin. Marked differences between the two basins in the origin and way of introduction were also outlined. B. Galil finally examined potential determinants of the establishment success of tropical species in the Mediterranean Sea, with special reference to climatic changes.

Marc Verlaque introduced the forthcoming CIESM Atlas on Exotic Macrophytes, which is the first inventory of macroalgal species introduced in the Mediterranean Sea. The Atlas provides comprehensive, referenced information on the morphological features, ecology and biogeography of 110 exotic macroalgal species. The Atlas, soon accessible online, will be regularly updated, dynamically integrating records on new introduced species. Since the Mediterranean Sea harbours the greatest number of exotic macrophytes in the world, and since new species introductions are increasing exponentially mainly due to shellfish farming, this Atlas represents a unique benchmark to assess past and future changes on macroalgal diversity.

Giuseppe Notarbartolo di Sciarra presented the joint project between CIESM and ACCOBAMS to develop, in cooperation with the Pelagos Sanctuary, a database on cetacean sightings covering the Mediterranean and Black Seas. The database will integrate historic datasets collected and archived by the CIESM Marine Mammals Task Force with current and future records on the presence, distribution, abundance and habitat of cetaceans. The importance of building a scientifically rigorous cetacean sightings database was underlined by the author, who stressed the need for basin scale observations to further scientific understanding of marine mammals and improve conservation measures.

Key issues concerning data integration, accessibility and ownership in web-based information systems were presented by Christos Arvanitidis on behalf of the panellist Edward Van Berghe (excused). As he pointed out, one of the main problems related to integration of several datasets is the lack of a common taxonomic nomenclature. He then described the European Register of Marine Species, an initiative of the EU Network of Excellence MARBEF to provide a standard taxonomic list of European

marine species. This list is available online and should serve as a reference guide when integrating datasets using different terminology. A brief presentation of the MedOBIS database on Mediterranean and Black Sea species was given by her colleague Sarah Faulwetter.

Data integration, however, does not only imply the use of a common terminology. The need to adopt an ecosystem-based approach to study biodiversity has prompted the development of information systems which host datasets of numerous biological and environmental variables.

The new CIESM GIS-based application developed at CIESM Headquarters was presented in a joint paper authored by Paula Moschella and Kaveh Rassoulzadegan. It will integrate CIESM datasets on biodiversity, environmental variables and bibliographic resources into one single information system. The multilayer architecture of the application and the partitioning of the Mediterranean into subregional zones allows an at glance visualization of several datasets in a particular area of interest. P. Moschella also explained that the system was specially conceived to make it accessible and easy to use on both shores of the Mediterranean, and to provide scientific information that would equally serve scientists and non-specialist end users.

The last presentation was given by Stéphane Pesant, who highlighted the importance of integrating datasets that provide information on the different levels of biological diversity (e.g. taxonomy, genetics, ecology) to better understand the functioning of marine ecosystems and the biogeochemical fluxes. The problems of data aggregation, quality control, and metadata standardization were also addressed using examples from EurOcean, SESAME and MARBEF initiatives.

The following is a summary of the main questions, answers and comments raised during the general Panel debate.

*Comment:* Databases are too difficult to use, and not exactly user-friendly, with the exception of that of CIESM.

*Answer:* Databases are available through the internet, and so are accessible to all those who can take advantage of a connection with the world wide web. Most databases, however, are just for the scientific community and are often not even available without permission.

*Question:* Are there biological parameters that can be used to show long term changes, as it happens with oceanography?

*Answer:* It is possible with the fossil record over the long term. Then there are middle term information, like with alien species, where we can reconstruct the recent history of the Mediterranean in terms of arrival of new species from both Gibraltar and Suez. EurOceans and SESAME are working with this aim in mind, collecting past information and assembling it into a single temporal framework. Long term series have been set up at several places (Naples, Villefranche-Sur-Mer, Plymouth, Helgoland) but are being abandoned because they are costly and not scientifically rewarding over the short term (the term that determines scientific careers and funding availability). They should be fostered because they reconstruct the history of biota and are conducive to the understanding of present-day situations.

*Question:* There is not enough knowledge of the biodiversity of the south shore. No more taxonomists. What about the species living in the southern shore and that have never been recorded due to lack of observation? If they will widen their distribution range, they will be considered as aliens, and they are not. We have to convince the decision makers that taxonomy is important.

*Answer:* this is correct. We have information from the northern shore, and sometimes we produce floras and faunas, but they do not cover the situation of the southern shore. The exploration of the Mediterranean is far from having been accomplished. The problem does not reside with