Valuation of marine systems: an application for the Faial-Pico Channel, Azores

Aquatic invasions: phantom aliens in the Mediterranean

Genetic diversity and ecosystem functioning: seagrasses as models

Biodiversity conservation: the role of a sustainable marine aquarium trade

End of an era: closure of Port Erin Marine Laboratory

MarBEF research, progress and events
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Cóilín MacLochlainn
EDITORIAL TEAM:
MarBEF Newsletter
Published biannually by MarBEF EU Network of Excellence
www.marbef.org

Dear Readers,
The MarBEF newsletter is evolving. This issue makes an interesting and useful read. It brings together a wide variety of perspectives from various disciplines in marine science, including ecology, taxonomy, history, socio-economics, policy, education and conservation. Viewing our marine resources from these many perspectives reflects a key aspect of MarBEF – the interaction of disciplines. Our readership is expanding rapidly and we are happy to include not only many of the MarBEF scientists, but many marine scientists outside of MarBEF, as well as those in marine policy, management, and communication. The content of this newsletter mirrors our varied readership.

As usual, the issue contains news on research, workshop activities within the MarBEF network with features from the wider marine science community, plus an overview of the progress of the project to date. With this issue, we hope that our efforts will be beneficial to the community of those involved in the project's success.

We encourage you to contribute to this newsletter by sending in comments and suggestions on this and other issues. Finally, many thanks to all contributors to this issue for your enthusiasm and excellent work.

Olive Helfman, Editor

MarBEF Research Phase II launched
The Responsive Mode Programme

By Herman Hummel & Pim van Avesaath

MarBEF has just launched the second phase of its research programme, known as the Responsive Mode Programme. The phase should enable European marine biodiversity research visible worldwide, covering topics from coastal to deep-sea biology and being truly pan-European in nature, with projects spanning Arctic to subtropical climes.

The RMP programme will cover topics from deep-sea to coastal ecology and will span Arctic to subtropical climes.

The MarBEF Network has adopted a phased approach to addressing identified research priorities. Within each research theme, there is a Core Strategic Programme (CSP) – the major top-down strategic joint activity for the theme – which engages a large proportion of MarBEF members in joint integration activities. The top-down programme approach to MarBEF research will focus on and devote major resources to meeting priority objectives. The CSP will be supplemented with Responsive Mode Projects (RMPs), following a bottom-up approach. In this RMP programme, outstanding smaller-scale projects will be implemented that are relevant to MarBEF’s objectives and that can fill any emerging gaps in its overall CSP programme.

During the project proposal preparation phase, approximately 100 RMPs were suggested. The number of proposed projects was too high, with many overlapping and showing possibilities for clustering. Therefore, during the MarBEF General Assembly meeting in Brugge, Belgium (March 2004), it was decided to launch a new internal call for RMP pre-proposals that would facilitate the introduction of new thoughts and ideas and enable the consortium to prepare larger, more integrated plans. During the last year, a major task of the Management Office was to guide the new submission and evaluation of the RMPs.

In the second call, 31 proposals were received. The projects were evaluated in the summer of 2004 on the basis of a set of criteria, including integration of science and scientists, scientific excellence of the plan and the consortium, and coverage of the key areas for responsive modes (see table 1). The quality of the proposals in...
MarBEF Newsletter Autumn 2005

MarBEF Theme 1: Global Patterns of Marine Biodiversity Across Ecosystems

Workshops and database

By John Gray & Annelise Fleddum

Workshops

Theme 1 has organised three workshops so far this year. The first, held in Banyuls, France (2-4 February) on the subject “How to Detect Changes in Biodiversity – Concept, Methods and Tools,” was arranged by Doris Schiedek, Antoine Gremare and Keith Cooper. The purpose was to get a broad overview of concepts and methodologies and their application for monitoring and tracking changes in biodiversity at different temporal and spatial scales in a European context. There were 26 participants in total. The main topics discussed were:

- how to gain an overview of concepts and strategies to track changes in biodiversity
- development of a database on manuals and protocols
- agreement on concepts and appropriate methods to be applied using information and data from selected locations.

The workshop consisted of presentations and sub-group discussions.

The second workshop took place in Helgoland (2-4 March) on the subject “Large-Scale and Long-term Monitoring of Global Change and its Impact on Marine Biodiversity (LargeNet).” The purpose was to establish a large-scale network of research locations along the European coast to assess long-term changes in biodiversity. There were 20 participants and the topics for discussion were:

- identification and presentation of suites of data sets (pelagic, soft and hard bottom);
- data policy;
- discussion of hypotheses to test and identify tools for comparison/evaluation of data sets;
- an action plan for the LargeNet (Large-scale and long-term networking on the observation of Global Change and its impact on Marine Biodiversity) MarBEF RMP (Responsive Mode Project).

All of these workshops sought to gain a better understanding of how marine biodiversity varies across spatial and temporal scales, which is the most important task within Theme 1. The Banyuls, Helgoland and Crete workshops will also be helpful in structuring the LargeNet RMP.

Marine Biodiversity Database

Anders Bjørgeøtt (part-time MarBEF research assistant) has spent much time developing a unique database that is probably the largest of its type in the world devoted to marine biodiversity. The Microsoft Access database includes quantitative data on soft-bottom benthic invertebrates ranging geographically from the Arctic to the North Atlantic, coastal Norway and the Irish, Mediterranean and Black Seas. All the species have been quality-checked against ERMOS. In summary, the database contains 3,636 taxa and 1,664,225 individuals, including 26,313 juveniles. Approximately 80% of the taxa are identified to species level. They are from a total of 1,243 sediment samples.

Presently, the database contains only soft-bottom benthic data, but will be enlarged over time to include datasets from other MarBEF participants. We urge all MarBEF participants working on other aspects of biodiversity to develop a similar data structure for their sphere of interest. We in Oslo do not have the expertise to do the necessary quality assurance to compile databases from other habitats. The database will be available for free download to all participants at the Crete workshop and will be open for download to all MarBEF participants thereafter. We encourage everyone within the MarBEF community to work on the data that are available and we welcome any comments on the user-friendliness or other aspects of the database.

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Research Themes

Table 1: SELECTION CRITERIA USED FOR THE RESPONSIVE MODE PROJECTS

<table>
<thead>
<tr>
<th>Selection criteria were:</th>
</tr>
</thead>
<tbody>
<tr>
<td>degree of innovation (none, moderate, strong) (max 3 points, weight 2x)</td>
</tr>
<tr>
<td>degree of matching the aims of the CSP (none, moderate, strong) (max 3 points, weight 3x)</td>
</tr>
<tr>
<td>degree of matching the aims of the key actions (none, moderate, strong) (max 3 points, weight 4x)</td>
</tr>
<tr>
<td>degree of accord with the aims of MarBEF (integration of themes, cross-cutting) (max 3 points, weight 3x)</td>
</tr>
<tr>
<td>integration of research disciplines (none, moderate, strong) (max 3 points, weight 3x)</td>
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<td>integration of institutional capacity (none, moderate, strong) (max 3 points, weight 1x)</td>
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<td>the request budget (outrageous, too high, reasonable) (max 3 points, weight 1x)</td>
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The proposals were divided as follows:

1. meets most criteria and belongs to the top priority projects
2. promising yet needs polishing and/or re-direction
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Table 2: SELECTED RESPONSIVE MODE PROJECTS

WP1: Data integration

- Bringing biogeographical data online.

WP3 Theme 1: Global patterns of marine biodiversity across ecosystems

- Causes and consequences of changing marine biodiversity – a fish and fisheries perspective
- Biodiversity and ecosystem function under changing climatic conditions – the Arctic as a model system (ArCTiC)
- Deep-sea & Extreme Environment Patterns of Species and Ecosystem Time Series (DEEPETS)
- Moored And Rerated biodiversity – Unravelling Ecological and Litudinal Aspects (MANUEL)
- Web-accessible Taxonomic Expertise in MarBEF: PROviding an e-Platform for the European Taxonomists (PROPE-taxons)
- Large-scale and long-term Networking on the observation of Global Change and its Impact on Marine Biodiversity (Largetek).
- Integration of different methods to study ocean patterns and changes along the Mid-Atlantic Ridge.
- European integration of marine micropланктон research (MARPLAN).
- Modelling key aspects of marine biodiversity.

WP4 Theme 2: Comparative analysis of marine biodiversity and ecosystem functionality

- Genetic Biodiversity (GBIRM)
- The role of native and invasive ecosystem engineers in explaining biodiversity
- Pan-European gradients in propagation and settlement events
- Effects of biodiversity on the functioning and stability of marine ecosystems – European-scale comparisons
- Functioning of FO O D W EBs across ecosystems of different BIDO diversity level (FO DWEWEB)
- Microbial diversity and ecosystem functions: concept, open questions and recommendations for integration of microbes into general ecological frameworks.
- Role of Secondary Metabolites in Ecosystem Biodiversity (RO SEMEB).

WP5 Theme 3: The socio-economic importance of marine biodiversity

- Development of decision support systems.

WP8: Outreach

- Pilot MarBEF CoH Watch network of students and amateurs in Europe.

The projects and research consortia in the RMP programme show an integrated mix of expertise and key areas and themes addressed. There are some very large cross-cutting projects that will address issues of relevance to the three (joint research themes (workpackages 3, 4, 5). In addition, there are two RMPs addressing other workpackages (RMP 1 and 2-1). Other somewhat smaller projects specifically address one key area. These more focused in-depth projects may appear to conflict with the interactive tasks of the NoE, but this is not the case. In such cases, the consortium consists of top specialists who will jointly address topics to be included in specific packages of the CSP and, in this way, add to the integration of research.

The basis for all RMP projects will be integration of knowledge, data, science and scientists, not only within projects but also between projects. All activities within MarBEF remain accessible and open to the science community. Training activities, exchange and outreach are important aspects, and the Scientific Steering Committee will guard that sufficient attention be given to the stakeholders, the end-users and the public at large. This is important in its own right, and it is also imperative, with the onset of the 7th Framework Programme, to let the European community know what we are doing and what we consider to be important marine biodiversity issues.

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Tavira Workshop and RMPs

By Iris Hendriks

A GROUP OF 44 MarBEF participants assembled under the Algarve sun in Portugal in mid-March 2005 to discuss the role of biodiversity in ecosystem stability. The location was an old tuna factory in Tavira converted into a hotel after the last tuna swam through the entrance to be trapped in the ancient almadraba (an ancient fishing method, meaning ‘death place’).

The increasing rate at which species are lost from natural habitats has renewed interest in one of the most classical paradigms of ecology: the relationship between biodiversity and the stability of ecosystems and ecological processes. Recent empirical and theoretical studies have generated contrasting evidence about the direction, strength and pervasiveness of this relationship, with most of our current understanding limited to specific habitats. This workshop united scientists working in different areas of marine ecology, from plankton to benthos, to address issues at three levels of scientific inquiry: (1) patterns in space and time, (2) experimental analysis of cause-effect linkages and (3) modelling. Although the discussion focused primarily on marine habitats, it also integrated insights from terrestrial studies.

After the welcoming words by Theme 2 task leader Carlos Duarte and, on behalf of the local organiser Filipe Alberto, Nando Boero opened the workshop with an introductory lecture. The rest of the workshop was roughly divided into four parts, three thematic sessions and a discussion on the Responsive Mode Projects (RMPs) addressing Theme 2 key areas.

The first thematic session, chaired by Lisandro Benedetti-Cecchi, addressed ‘Biodiversity-Stability (B-S) relationships: patterns in space and time.’ The general discussion focused on the need for a reference when measuring resistance and resilience within systems. Regarding temporal scale, the point was raised that it is difficult to address issues of stability on a time-scale less than that of the shortest living organism in the ecosystem. MarBEF seems to be a good opportunity to make this point clear to policy-makers and to stress the need for proper funding tools to study these longer-lived systems.

On the second day of the workshop, Taissan Crowe chaired the thematic session on ‘B-S relationships: experimental analysis and causality.’ The focal point here was observational versus descriptive studies. It was acknowledged that scaling up the results of experimental studies is a difficult task that requires integration of comparative, experimental and modelling approaches.

The thematic session 3, ‘B-S relationships: modelling and empirical evidence,’ chaired by Carlos Duarte, opened the third day of the workshop. A follow-up discussion on strengthening the dialogue between empirical and modellers attended to the analysis of B-S relationships, moderated by Mark Emmerson, again stressed that the short-term cycle of the funding structure (three years) barely allows for long-term studies necessary to be of relevance to conservation purposes (5-10 years). Further topics of discussion included the existing imperity between empirical ecologists and modellers, the need for more attention to be focused on the basal part of food-web and the necessity of including life-history processes in food-webs.

Potential collaboration between RMPs under various Themes.

1. An emerging consensus on (operational) definition of ecosystem stability and components of stability.
2. A better appreciation for issues of scale, temporal and historical (organisational) definition of ecosystem stability.
3. Experimental approaches: a plethora of plans to assess this question experimentally through RMPs and top-down actions (Emerging-area and Meta-analysis workshops).
4. Emerging links between participants using observational, experimental, and modelling approaches (a culture media for research collaborations).
5. Input to the Core Strategic Plan for the next 18 months.
6. A position paper in the making.

Programme outputs and participants lists are available on the MarBEF website under the document section.

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Universitat de les Illes Balears
Instituto Mediterraneo de Estudios Avanzados
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Table 1: Theme 2 RMPs

<table>
<thead>
<tr>
<th>RMP code</th>
<th>Title</th>
<th>Principal Investigator</th>
</tr>
</thead>
<tbody>
<tr>
<td>RMP 4-1</td>
<td>RMP on Genetic Biodiversity (GBRMR)</td>
<td>J-P. Ferral</td>
</tr>
<tr>
<td>RMP 4-2</td>
<td>The role of native and/or invasive ecosystem engineers explaining biodiversity</td>
<td>T. Bouma, P. Herman</td>
</tr>
<tr>
<td>RMP 4-3</td>
<td>Pan-European GPs in Propagation and Settlement Events</td>
<td>K. Philippat</td>
</tr>
<tr>
<td>RMP 4-4</td>
<td>Effects of biodiversity on the functioning and stability of marine ecosystems - European scale comparisons</td>
<td>T. Crowe, L. Benedetti-Cecchi</td>
</tr>
<tr>
<td>RMP 4-5</td>
<td>Functioning of FOOD Webs across ecosystems of different Biodiversity levels (FOOD BHO)</td>
<td>A. Sokolowski</td>
</tr>
<tr>
<td>RMP 4-6</td>
<td>Microbial diversity and ecosystem functions: concepts, open questions and recommendations for integration of microbes into general ecological frameworks</td>
<td>K. Jürgens, J.M.</td>
</tr>
<tr>
<td>RMP 4-7</td>
<td>Role of Secondary Metabolites in Ecosystem Biodiversity (ROSEMBE)</td>
<td>A. Iojana</td>
</tr>
</tbody>
</table>
Exchange rate between scientific currencies – an application to the marine environment

By Tomaz Dentinho, Samanta Vizinho, Vasco Silva, Fernando Tempera, Frederico Cardigos & Ricardo Santos

Methodology

In every point of a regulation boundary (f) that limits alternative uses of the environment, the total value for one use (Vfb) must be exactly the same as the total value for a different use (Vfa).

1. Vfa = Vfb

On the other hand, each total value (Vfa, Vfb) results from adding together the economic (Vfba,Vfbb), the ecological values (Vfba,Vfbb) and the socio-cultural values (Vfca,Vfcb), each one of them multiplied by an Exchange Rate Function. The Exchange Rate Function (ρ) relates the economic values to the ecological values. The Exchange Rate Function (ε) relates the economic values to the socio-cultural values.

2. Vfa = Vfb + Vfca x ρ + Vfcb x ε

Notice that the boundary line has many points. Assuming that (a,b) are equal. Therefore:

3. Vfb = Vfa x ρ = Vfbb x ε

In the boundary (f), the value associated with alternative uses (a,b) are equal. Therefore:

4. (Vfba-Vfbb) = (Vfbb-Vfba) x p + (Vfca-Vfcb) x σ

Notice that the boundary line has many points. Assuming that it is possible to obtain the economic, ecological and cultural values for different alternatives (a,b). Then it is also possible to estimate the functions (p) and (σ). If these functions are just simple parameters, then they can be considered as “exchange rates between disciplinary valuations”: between economists and ecologists (p), between economists and historians (σ), and between ecologists and historians (σ). Note that if there is no difference between socio-cultural values for alternative uses then (Vfa-Vfb) = 0 and:

5. p = (Vfba - Vfbb) / (Vfbb-Vfba)

Fig 1. Environmental values for the actual use in Faial-Pico Channel.

Application to Faial-Pico Channel, Azores

The application of an exchange rate between disciplinary valuations for the Faial-Pico Channel is based on a Geographical Information System (GIS). The study area was divided into square parcels of 100m x 100m. Each one of these small areas was valued in environmental terms, based on the bottom type and the bathymetry and taking into account their relevance for the ecosystem (Figure 1). Shallow areas were given a higher value than deeper areas, as they concentrate higher biomass and biodiversity. Rocky bottoms were considered more valuable than soft bottoms, as they concentrate most of the conspicuous biodiversity and fishery resources. Areas designated for conservation and harvest refugia (namely bottoms within designated areas being assigned the highest value).

Fig 2. Economic values for the actual use in Faial-Pico Channel.

Regulatory boundaries are the result of discussions between experts, stakeholders and politicians. In each parcel belonging to these boundaries it can be expected that the environmental and economic value associated with inclusion inside the regulatory restriction is exactly the same as the value of being outside of that rule. Therefore, taking account of the use of the sea allowed or forbidden in the different parcels of regulatory boundaries, and based on the environmental and economic values of being inside or outside of those limits, it is possible to have estimates for (p) in expression (5).

Having (p), it is then possible to generate various interesting outcomes. First, it is possible to obtain the best marine regulatory map (Figure 3), by choosing, for each parcel, the rule that leads to the maximum Total Value among all the other regulatory alternatives (1 = maintain the rule; 2 = more conservationist rule; 3 = more intensive use rule). Looking at Figure 3, it is clear that, for all the estimated exchange rates (p = 0.023; p = 0.053; p = 0.087), the optimisation of regulation will lead to a consistent regulatory map that represents a more conservationist solution than the present one. In this conservationist scenario, all of the channel with the exception of Horta Port, Madalena Port and Porto Pim Bay would be a natural park (as previously proposed by Tempera et al (2001) and Tempera & Santos (2003)).

Second, it is possible to design the maps of Total Sea Use Values for each one of the exchange rates and their respective plans. When the exchange rate is[p = 0.087], the Total Value of the Channel is equivalent to 3770 employments (Figure 4).

Conclusions

The challenge was to combine the different disciplinary perspectives in a consistent decision support methodology. The results seem quite interesting. First, there is a method to monetarise non-monetary values. Second, this method is also suitable to value non-use values without the expensive adoption of the Contingency Valuation. Finally, the exchange rate between disciplines can also be used to assess the internal consistency of regulatory plans or to design different plans according to various exchange rates.

Acknowledgments

Projects MARE, OGAMP and MARMAC. All staff involved in the research projects, particularly Ricardo Medeiros, the GIS operator.

Table 1. Exchange rates between ecological and economic values in regulatory boundaries of Faial-Pico Channel.

<table>
<thead>
<tr>
<th>Economic Value</th>
<th>Ecological Value</th>
<th>Exchange Rate</th>
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<tr>
<td>Fish In</td>
<td>Fish Out</td>
<td>Tour In</td>
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<tr>
<td>0.0100</td>
<td>0.0160</td>
<td>0.0340</td>
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<tr>
<td>0.0000</td>
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<tr>
<td>0.1322</td>
<td>0.1983</td>
<td>0.0510</td>
</tr>
</tbody>
</table>

References

The MarBEF exhibition booth at the ASLO Summer Meeting in Spain.

The event: a full programme of festival events can be found on www.the-ba.net.

While the roadshow opens at the BA festival, it will then travel around Europe. It will run from 3-10 September, 2005, at the National College of Ireland (www.ncri.ie), which is located within the Irish Financial Services Centre in the heart of Dublin.

A key task that needs urgent attention in reaching out to the public is the inclusion of marine biodiversity in formal education. Research has shown time and time again that instilling an interest in the environment at an early age is crucial, but education needs to continue throughout the formative years (see article by Nanda Boreo and colleagues in the magazine in Lecce). The next ten years will be pivotal if, as a society, we are to address issues of global change and biodiversity with any efficacy, but we also need to impart these goals and values to the next generation.

That is why we are endeavouring, as part of our outreach programme, to review the current inclusion of marine biodiversity issues at primary and secondary school level throughout Europe. We need to know what is being taught if we are to fill in the gaps. At the MarBEF GA in Porto, we addressed the need for school curriculum to be translated for each partner country in MarBEF and since then have had great help from some members in the network. However, we still need to complete the review for many countries including the Netherlands, Italy, Norway, and France. Belgium, Ireland, and the UK. We need MarBEF members to co-ordinate this task within their own countries as we simply do not have the resources or multilingual capabilities to manage this task on our own. MarBEF partners can use their outreach budget for this purpose or can apply for funding from the central MarBEF budget where necessary. Further details can be obtained from the MarBEF Communications & Outreach Team at outreach@marbef.org.

For those MarBEF partners leading or involved in a Responsive Mode Project with a dedicated outreach component, the MarBEF Communications & Outreach Team will help to direct and advise on activities and materials where needed. Please contact us to receive guidelines and recommendations and to help devise an outreach strategy specific to your research programme.

A prominent activity in the near future is the set-up of the MarBEF Press Office. This will see all news items and releases being co-ordinated through the Press Office at EcoServe, Dublin, and distributed through a central news distribution service throughout Europe and internationally in the meantime, all news items and releases will be posted on the main page of the MarBEF website. Please send details of all news items, events and forthcoming publications to outreach@marbef.org for our attention.

Updates to our programme and events are posted regularly on the MarBEF website. Or contact us directly at outreach@marbef.org.

By Edward Vanden Bergh

Most of the data systems that were planned for MarBEF are operational, and have been reported on in the last newsletter. Progress in providing content for these databases can be followed by monitoring the data directory on the MarBEF website. In this issue of the newsletter, we want to highlight some important developments.

Contact details for all institutes and scientists involved in the MarBEF network have been recorded in our ‘Register of Resources’ - an information system meant to facilitate communication between the partners, containing details of literature, projects and datasets. Keeping this register up to date is a very important task and cannot be done without input from all network partners. We will be reviewing this information very shortly, in collaboration with the Communications and Outreach Team, and will contact all those currently registered, to see if an update is necessary.

Last late year, we had an e-discussion on the MarBEF website in preparation for the data policy; some very relevant documents were provided by Peter Herman and Rainer Foer to set the discussion: a balancing act between the need to protect intellectual property and the rights of the individual data collector. The resulting data policy was discussed and approved at the MarBEF GA. Visitors to the MarBEF data page are now requested to click a button to indicate that they agree with data policy. A cookie is stored on the user computer to avoid asking people the same agreement at each visit to the site.

Much effort has gone into the European Register of Marine Species (ERMS). Most of the taxonomic editors have now been identified, and apart from some groups of the Protosticha and some smaller groups of Crustacea, the whole taxonomic tree is covered. Several of the taxonomic editors have now begun to upload the previous version of ERMS; some make use of the online editing facility, others prefer to provide their input to the data management team, to be entered in the VLIZ offices. Taxonomic groups that have now been revised are Pisces, Halamaracidae, Phoronida, Oligochaeta and Rotifera. We are in communication with several other editors, and hope that the revision of the whole taxonomic tree will be finalised in the not-too-distant future.

The content of ERMS has been matched against several other datasets: this brought to light some of the weaknesses of our European register - weaknesses that were, to a large extent, already known. The Protosticha (except the macrozoic) were not included in the scope of the original ERMS EU project and haven’t been dealt with as thoroughly as the other major taxa. Some major groups were even not included at all, like Monera, diatoms and some of the fungal major taxa. Some areas, like the Baltic, harbour a very specific fauna, which hasn’t always been covered in ERMS. Several new taxonomic editors have been identified, and we hope this will even the gaps in the existing taxonomic coverage. But, as with any database or reference list, ERMS has to be used: only if ERMS is used, more gaps and errors will become apparent; feedback from the users will be the best long-term guarantee for continuous improvement of the content.

Several other datasets will be stored together with the ERMS information in a single database. The other databases can either be global lists on a particular taxon, or regional lists. Global lists that are being worked on right now are Porifera, planktonic ostracods and Nematoda - all by European taxonomists and taxonomic editors of ERMS. One non-European regional list has been included so far, the North West Atlantic Register of Marine Species (NWARMOS); together with NWARMOS this will provide one consistent register for the whole of the Northern Atlantic. NWARMOS was assembled by the GBIF node of the largest taxon, and is now being taken further by Lou van Guelphen of the Houtman Marine Science Centre in Canada.

EuroBBS, the European node of the Ocean Biogeographic Information System, is growing slowly but steadily. Several new datasets have been made available online since the last issue of the newsletter, and several more are expected for the near future - for some we are trying to solve some technical problems, for others we are in the initial stages of discussion. While there still is some potential to improve the biogeographic database, progress isn’t as fast or as easy as hoped. So, again we appeal to MarBEF partners to make their biogeographical records available to the community – either fully open through EuroBBS, or in the context of a specific work-shop analysis.

It was decided by the MarBEF Management Office that it would be possible to spend up to €1,000 from the institutional MarBEF funds on mobilising biodiversity data. It is hoped that a small sum like this might be instrumental in providing some funds for student labour, to make sure that information is transcribed in an electronic format. Please contact the author and/or Herman Hummel if you would want to make use of this opportunity.

The value of any data system should be measured in terms of its use, not in terms of kilobytes. We do have a good idea of the number of visitors, and their provenance, through analysis of our web server logs. But we would be even more interested in hearing from our users directly - how to improve the databases or the interfaces, what new applications to build, how to serve our user community better. Please write if you have comments on the MarBEF website in general, or on the data interfaces.

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**MarBEF Progress**

**MarBEF training**

By Jens Harder

**SCIENTIFIC EXCELLENCE REQUIRES lifelong training. The MarBEF joint training programme for marine biodiversity aims at an efficient and effective use of the experience within the MarBEF network to foster biodiversity research in Europe.**

Training and knowledge exchange is supported by MarBEF on several levels:

- **Short-term sabbaticals** - Researchers from one MarBEF partner institute can work for up to three months at a second MarBEF partner institute. Although it is hoped that mainly students and postdoctoral researchers will use this tool to exchange active knowledge, the short-term sabbatical is also a means to facilitate the writing of international grant applications.

- **Training courses** - in marine laboratory (phytoplankton, poriferan, copepod), and molecular techniques (flow cytometry, software for the taxonomy of microalgae) to meet the network's immediate training requirements. Some future training courses have been scheduled within MarBEF, including those from developing countries.

- **Workshops** - in all themes, international workshops are a centre for future development and the spreading of scientific excellence within and outside of the network. Workshops will, in an essential manner, contribute to the key research themes and will integrate national expertise on a European level.

MarBEF as a Network of Excellence hopes to facilitate better integration towards a European Research Area by means of these various instruments that allow the support of many persons across disappearing European borders.

**New MarBEF scientific publications**

By Ward Appletans

Since the last newsletter, ten new peer-reviewed papers have been added to the MarBEF Publication Series (MPS). The MPS holds scientific articles and reports that have been or will be published under the MarBEF banner. The executive and scientific steering committees have developed guidelines to acknowledge MarBEF articles, as outlined in Appendix 6 of the guidelines and rules document (http://www.marbef.org/documents/network/rules&guidelines.doc). Congratulations, all, and please inform us of your papers before they are printed by emailing info@marbef.org.

**List of new MPS papers**


Rottländer, L., Normann, M., 2005. The first record of parasites in Gammarellus signatus (Santon, 1939) - a recent newcomer to the Gulf of Gddes (Oceadica 472): 283-287


Ward Appletans, MarBEF Data Management Team Flanders Marine Institute (VLIZ) Ostende, Belgium Email: info@marbef.org

**MarBEF Progress**

**Publish wisely or perish?**

- an Open Archive for MarBEF

By Ward Appletans, Jan Haspeslagh & Edward Vanden Berge

**WHILE SCIENTISTS ARE publishing around two million papers annually (Odlyzko, 1998), it is surprising to notice that this growing resource of information is seldom easily accessible, even to those scientists. Basically, it is the community at large that funds almost all research, so all information resulting from this research should in principle be publicly available. However, in reality too many barriers (mostly installed by the publisher) are blocking free and open access to scientific information.**

To support a fundamental change in this ultimately self-destructive way of publishing, the European Research Area (ERA) (https://www.rea-ea.eu) is an example which gives importance to this cause. Open access to research literature has never been more timely.

**The benefits of open access**

- **access to research articles**
  - The researcher gets a central archive for all his/her publications, for all to see. As a consequence, articles that are stored in open archives are cited at least three times more than articles that are not freely available (Lawrence, 2001). The quality of a paper is often measured by the number of citations, so direct access of the results to potential users and readers is important for the scientists to get the recognition they desire. Another reason, Gattuso et al. (2005) showed that in a timespan of 32 years, 20% of the articles on marine biogeochemistry have never been cited. It is not clear whether this is actually a general situation.
  - We claim that lack of open access is a considerable impediment for the dissemination of knowledge and can partly explain the lack of citations. This is strengthened by the fact that the highest-impact journals in their research field prosecute open access in contrast. More and more publishers are joining the initiative and, through more citations, experience an increase in the benefits it would offer, we feel that it is also time to undertake the journey within MarBEF.

- **Joining open access initiatives** is actually nothing more than self-archiving your papers (pre- and post- print articles) in an open domain without any copyright restrictions. It does not alter the existing system of submitting papers to peer-reviewed journals, however it asks for a small amendment in the copyright agreement signed before publishing. Currently, 91% of the commercial publishers already support the initiative and have amended their copyright rules (see http://roemer.eprints.org/1340/). Open archives are usually managed by a community or an appropriate institution (often a library or a data center). These digital repositories contain - besides peer-reviewed articles - grey literature, reports, dissertations, proceedings, abstracts, theses, conference proceedings, books, datasets etc. and thus serve as a long-term storage of any scientific output in a legal and freely accessible way. Internet and ICT technology allow us to increase the dissemination of research literature that is important for the researchers, for non-target species.

- **European biodiversity action plan for fisheries: issues and challenges** (Lawrence, 2001). The quality of a paper is often measured by the number of citations, so direct access of the results to potential users and readers is important for the scientists to get the recognition they desire. Another reason, Gattuso et al. (2005) showed that in a timespan of 32 years, 20% of the articles on marine biogeochemistry have never been cited. It is not clear whether this is actually a general situation.

Other than costs related to the internet, the cost to get access to an open archive article drops to zero. Today, there is not a single institution or library that can purchase access to all the information of all its researchers or users require, and only the wealthiest and most powerful institutions can still pay for a reasonable bit of the literature pie. In addition, the cost to access peer-reviewed publications (mainly through subscriptions, online access and site licenses) increases by about 10 to 15% annually (Edlin & Rubinfeld, 2004; Van Ord & Born, 2004). This largely exceeds any inflation or increases in library budgets. Furthermore, open access enables reviewers to view all of the research literature that is important to them, and not just the latest work. It is clear that the open access evaluation has a critical role in quality control more effective. In addition, the institution or region or specific scientific domain gains better visibility and the community gets easy, free and permanent access to publications and scientific output, which in return enhances research performance and decision-making. At the end, we win if the communication channels are optimal.

MarBEF would be able to initiate the open archive on marine biodiversity information in Europe if it got the support of the entire community.

- For further information and definition of terms relating to open access issues, please see the following resources:

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**References**


**New Species**

**Cryptomonad flagellates**

By Gianfranco Novarino

FREELY-LIVING FLAGELLATE PROTISTS (flagellates for short) are arguably the most abundant and widespread eukaryotic microorganisms in the biophere. As a group, flagellates are highly polyphyletic — they are defined simply by the possession of one or more flagella used for locomotion or feeding, or both. This flagellate condition" has been a huge evolutionary success as shown by the presence of flagellate cells in the great majority of protistan, protozoological and algal phyla, as well as in many multicellular organisms — including ourselves.

**Free-living flagellates**

By Gianfranco Novarino

**Cryptomonad flagellates**

FREE-LIVING FLAGELLATE PROTISTS (flagellates for short) are arguably the most abundant and widespread eukaryotic microorganisms in the biophere. As a group, flagellates are highly polyphyletic — they are defined simply by the possession of one or more flagella used for locomotion or feeding, or both. This flagellate condition" has been a huge evolutionary success as shown by the presence of flagellate cells in the great majority of protistan, protozoological and algal phyla, as well as in many multicellular organisms — including ourselves.

**Cryptomonad flagellates**

By Gianfranco Novarino

**NEW SPECIES**

**flagellate condition** has been a huge evolutionary success as shown by the presence of flagellate cells in the great majority of protistan, protozoological and algal phyla, as well as in many multicellular organisms — including ourselves.

**Plagioselmis** species inedita Novarino 2005 from the Mediterranean Sea.

Marine planktonic flagellates, especially the nanoplankton-sized (1-20µm) fraction, contribute significantly to marine primary production or carbon consumption, or both, and therefore play pivotal and intricate roles in the functioning of the marine ecosystem. Their diversity is far from having been described at both morphological and molecular levels. Improving our knowledge of marine planktonic diversity is a scientific imperative if we are to address such questions as the relationships between morphological, molecular, physio-ecological and geographical diversity, the occurrence of cryptic speciation, and ultimately the very nature and mechanisms of speciation and evolution in these organisms. These and other questions are being addressed within the MARPLAN Responsive Mode Project.

**Genetic Diversity**

**Macrophytes as models**

The emerging role of genetic diversity for ecosystem functioning

By Thorsten B.H. Reusch

DURING THE PAST decade, manipulative experiments have provided convincing evidence of the importance of biological diversity for ecosystem functioning and stability. Diversity at the species and functional-group level begets productivity, resilience and resistance in the face of disturbance and stability with respect to temporal fluctuations (overview in Loreau et al, 2002).

However, the emerging consensus is still incomplete. The majority of these studies have been performed in grassland communities or experimental micro- and mesocosms, while marine systems are clearly understudied. Moreover, a number of aquatic communities seem not to fall under the species diversity is "good" consensus. What could be more uniform than endless meadows of reed, saltmarshes or seagrasses that are locally dominated by a canoply of a single species? Yet these macrophyte-based communities represent some of the most productive and stable shallow-water and estuarine ecosystems. Seagrasses in particular, a phylogenetically diverse group of 60 or so marine angiosperms, often form meadows that consist of only a few or even one species. Their low taxonomic diversity is in striking contrast to their ecological importance (Duarte, 2002). As foundation or ecosystem engineering species, seagrasses allow a rich invertebrate and fish community to thrive on otherwise barren sedimentary coastlines. Moreover, seagrass beds fix nutrients, stabilise the sediment and prevent coastal erosion. It has been estimated that the ecosystem services provided by macrophyte stands are among the highest per unit area for all ecosystems combined (Cod Din et al, 1997).

The apparent uniformity of a seagrass canopy disappears when viewed through the eyes of molecular genetics. Modern molecular markers, in particular DNA microsatellites (see Box 1), tell a completely different tale, revealing hidden genetic diversity resulting from the complex pattern of clonal reproduction of these plants (Reusch et al, 2002). In many aquatic plants, including seagrasses, genetically identical shoots of a genotype proliferate in space and form clones of various sizes and spatial arrangement. The so-called ‘clones’ (cloned) may comprise several thousands of morphologically individuals, or they could be assembled from several different genets. Given striking differences in clonal diversity between seagrass populations on one hand, and the experimental evidence on the importance of species diversity on the other, marine ecologists have begun to address the role of genetic diversity for ecosystem functioning. Recent experiments using the widespread seagrass species Zostera marina (eelgrass) indicate that genotypic (or clonal) diversity may replace the function of species diversity in ecosystems with few or a single foundation species. In an experiment in California by Hughes and Stachowicz (2004), mixtures of 1, 2, 4 and 8 eelgrass genotypes were planted into the intertidal zone of Bodega Bay. Different treatments colonised the area more rapidly, and recovered significantly faster, than monoculture plots after nearly destructive grazing by migrating Brant Geese (Branta bernica). This effect, however, disappeared a few months after disturbance. In the southwestern Baltic (Germany), Reusch and colleagues combined seven genotypes into diversity treatments of 1, 3 and 6 genotypes (Reusch et al, 2005). Their experiment coincided with a period of extreme water temperatures caused by the unparalleled heatwave that hit Europe in 2003 (Schar et al, 2004). These conditions are considered to be a precursor for the predicted global warming in the coming decades. Water temperatures attained 25°C in the southwestern Baltic, leading to mortality among cold-temperate plant and animal species, including eelgrass. Similar to the response in the Californian experiment, the more diverse assemblages of seagrass genotypes showed faster recovery after the summer mortality. Moreover, there were more shoots, shoots and ecologically relevant invertebrates in diverse plots at the end of the experiment. These findings should provide an additional motivation for conservation and restoration biology to protect and maintain genetic diversity within and across species and functional groups.

Since Reusch and co-workers also transplanted all genotypes tested in mixtures as monocultures, the underlying mechanism of the positive biodiversity effect may be hundreds of years old. (Reusch et al, 2005). Surprisingly, the enhancement of recovery and biomass at the end of the experiment were not due to a few dominant genotypes that happened to be the most resistant given the extraordinary conditions during the 2003 heatwave (the
Decomposition of biodiversity effects into complementarity and selection

Positive biodiversity effects may arise from two different processes. A statistically-significant consequence of biodiversity, moreover, will be evident when the total response at termination (\(W\)) of diversity is greater than zero or that of the diversity treatment (\(A\)). The latter finding supports a true positive biodiversity effect. In the present study, the diversity treatment (\(A\)) and the diversity x temperature interaction (\(B\)) were both statistically significant (\(P < 0.05\)).

As a first step, the above experiments only addressed the level of genotypic (or clonal) diversity as a subset of the total genetic diversity. The comparison of unique genotypes, for example in clonally reproducing organisms, is an open and much-debated question in conservation ecology and population genetics. It is clear that the diversity displayed by neutral markers, the focal of the overwhelming number of studies conducted thus far, is only weakly linked to selectively-sensitive genetic diversity. What is needed is a novel generation of genetic markers that measure diversity directly at selectively relevant traits (van Tienderen et al. 2002). Probably an important decision would have been made as to which traits are relevant under a given ecological challenge that should be assessed and manipulated.

In conclusion, recent experiments allow for a generalization of ecological theory because the effects of genotypic and species diversity on ecosystem functioning appear analogous. The further development of molecular tools will soon allow an integrative experimental approach to address the consequences of biological diversity at the genotypic, genetic (sus scrofa) and species level.

References


Loss of functional diversity of fish due to intense fishing causing ecosystem-wide effects in Mediterranean sublittoral rocky reefs

By Paolo Guidetti

MARINE ECOSYSTEMS MAY undergo dramatic changes (for example, shifts between alternative community states, changes in ecosystem functioning and food-web disruption) because of the wide array of anthropic impacts they are usually subjected to (Pauly et al., 1998; Jackson et al., 2001).

The sea urchin Ovoidopora sargus sargus, predator of adult and juvenile sea urchins in Mediterranean sublittoral rocky reefs.

This is especially true in regions like the Mediterranean basin, where human populations tend to concentrate in coastal areas and where extractive activities (especially fishing) are historical and intense. Assessing direct and indirect impacts of fishing on natural communities (and the spatial and temporal scales at which they act) is one of the major challenges marine ecologists have to tackle worldwide in order to refine appropriate policies for an ecosystem-based management of fishery (Pikitch et al., 2004).

As in many other temperate regions, there is increasing evidence that sublittoral rocky reefs in many sectors of the Mediterranean Sea are shifting from macroalgae beds to barren areas or without vegetation, usually caused by excessive grazing. This transition has often been attributed to changes in the rate herbivores (especially sea urchins) feed upon erect macroalgae as an indirect consequence of human activities (Sala et al., 1998, Guidetti et al., 2003). In coastal waters, erect macroalgae (together with seagrasses) exert paramount ecological roles: they are among the most effective sea urchin predators (Guidetti, S. & Sala, E., unpublished data), may thus decrease the functional diversity of the fish predator assemblage in subtidal rocky reefs. This, consequently, may have cascading effects on the entire community and ecosystem functioning, as macroalgae beds and coraline barnacles are structurally and functionally very different.

Scientific evidence of the trophic cascade resulting from sea urchin predation on sublittoral erect macroalgae has been restricted to a few areas of the Mediterranean basin. Trophic interactions, however, may vary depending on the density of species (or trophic groups) involved, and may be context-dependent (O’Connor & Crowe, 2005). Both assemblage biodiversity and environmental contexts, from this perspective, may change in space (e.g. with latitude) and time (e.g. seasonally or on a multi-annual basis).

Further experiments, correlative and/or historical analyses, therefore, are more than welcome with the aim of depicting scenarios that may help understand possible thresholds in the density of high-level fish predators. The MarBEF RMP “Causes and consequences of changing marine biodiversity: a holistic approach” (Sala et al., 2004), which may be reflected as lower predation impact on sea urchins (Guidetti, 2004a). When released from predator control, sea urchins increase in abundance and overgraze erect macroalgae, thus causing the transition to barren. Fishing, by strongly and selectively removing sea urchins (Harmelin-Vivien et al., 1995; Guidetti & Sala, 2003), may thus decrease the functional diversity of the fish predator assemblage in subtidal rocky reefs. This, consequently, may have cascading effects on the entire community and ecosystem functioning, as macroalgae beds and coraline barnacles are structurally and functionally very different.

References


Marine Aquarium Council (MAC) certification

Many aquarium-fish collectors and industry members use practices that prove it is possible to harvest marine ornamentals in a responsible, environmentally-sound manner. However, in some areas collection methods are used that destroy coral reefs. For example, some collectors use sodium cyanide to stun fish for easy capture, at the same time harming target and non-target species, including the reef-building corals themselves. Some collectors, exporters, importers and retailers also use poor post-harvest handling and transport practices resulting in unnecessary mortality of harvested animals. The Marine Aquarium Council (MAC) is an international, not-for-profit organisation that brings together the marine aquarium industry and hobbyists, public aquariums and conservation groups as well as government agencies and international organisations to support reef conservation and a sustainable marine aquarium trade. MAC certification was launched in late 2001, following years of input and review through an international, multi-stakeholder process to develop standards of best practice for quality and environmental sustainability. The certification provides third-party verification and labelling to identify responsible operators and their products that comply with MAC standards, allowing consumers to choose and support responsible operators and sustainable products.

MAC certification is designed to transform the existing marine ornamentals trade and does not promote the trade where it does not exist. For example, only non-destructive methods are allowed, and catch limits must remain within the limits of sustainability as proved by Independent scientific assessment and monitoring. MAC certification also requires that reef management plan developed through multi-stakeholder involvement at the community level, including establishing a marine protected area, such as a “no-take” sanctuary for reef fish. Reef, fish and fisheries monitoring/management

It is critical to have a sound scientific understanding of the status of marine aquarium organisms and their coral reefs so that an informed decision can be made about sustainable-use levels and reef management. MAC requested the Global Coral Reef Monitoring Network (GCRMN) to develop methods to assess the status and condition of reefs and fish stocks in collection areas and evaluate the effectiveness of management by monitoring coral reefs and populations of exploited organisms and ‘control areas’ to determine if marine ornamentals collection has ecologically significant effects on overall reef ecosystem health or target species populations.

Reef Check (a GCRMN member) developed the Marine Aquarium Trade Coral Reef
of MAC certification. To do this, MAC has focused on local efforts, working with marine ornamentals collectors and their communities in important source countries such as the Philippines, Indonesia and Fiji. MAC is also acting locally with the rest of the industry by working with those exporters, importers and retailers that are making active efforts to become certified.

Conservation in Europe through sustainable trade
MAC-certified marine ornamentals are now moving through certified chains of custody, from reef to retail, enabling consumers to identify and reward responsible businesses through their purchase of MAC-certified marine aquarium organisms, i.e., those that were collected, handled and transported in a sustainable manner. Europe is a key player in this transformation. For example, the Netherlands is a major importer of ornamental reef fish and corals for home aquariums, with several large wholesalers, approximately 40 retailers and 12,000 to 17,000 marine aquarium hobbyists. Studies supported by WWF, the global conservation organisation, have shown that Dutch marine aquarium hobbyists have an exceptionally high rate of willingness to do something to support certification (e.g., buying eco-fish) and are willing to pay an extra 10 per cent to 25 per cent for certified fish.

Europe could be a world leader in transforming the ecological footprint of the marine aquarium trade from a negative one to a positive one that helps conserve marine biodiversity, reduce poverty and achieve sustainable development in hundreds of coastal villages in high biodiversity developing countries such as Indonesia.

MAC certification label

Paul Holthus Executive Director Marine Aquarium Council
Email: www.aquariumcouncil.org

Collectors prepare for work, Marcilla, The Philippines.

Features

Aquatic Invasions

Phantom aliens in Mediterranean waters

By Ferdinando Boero, Cristina Di Camillo & Cinzia Gravili

ALIEN SPECIES ARE detected for two main reasons: they suddenly become very abundant and obvious, or there is somebody able to detect their presence.

Sometimes, very abundant and obvious species are not recognised as aliens, simply because the scientific community fails to realise what they are or the history of their presence. Here, we present two cases of possible invasions of the Mediterranean by species of great (presumed) ecological importance. One has been overlooked (as an alien) for half a century, whereas the other was first recorded and immediately recognised as an alien) less than ten years ago but was not of much concern as its potential impact is not that obvious. Both records regard hydrorids of the genus Clytia, family Campanulariidae. Species of this genus are represented by a benthic polyp stage and a planktonic medusa stage.

The story of Clytia linearis

At present, Clytia linearis is one of the most common Mediterranean hydroid species in rocky shallow waters (Boulion et al., 2004). The first record of this species from the Mediterranean is that of Billard, in 1938, from the Suez Canal! Billard called it Clytia graevi, considering it new to science, but then this nominal species was recognised as being identical to Clytia linearis, described by Thomassin in 1899 from the Indo-Pacific. Clytia linearis is different from all other Clytia species from the Mediterranean because, instead of being colonial, it is branched. Stolonial species have a single polyp on each stem, whereas branched species have more than one polyp on each stem, a character too obvious to permit mis-identification!

The Mediterranean is one of the most studied seas in the world: it is highly improbable that C. linearis had been present but passed unnoticed. Clytia linearis is possibly the first successful Lessepsian migrant. And, if so, it is possibly the most successful of them all. Picard (1953) found it for the second time in the Mediterranean and, since then, the species has been recorded invariably as abundant at almost every investigated Mediterranean location, from shallow waters to shaded rocky bottoms.

The species is so successful that it is now going north. Altuna Prados (1995) recorded it along the Atlantic coast of Spain and remarked that this was the northernmost record of the species from the Atlantic coast of Europe, stressing that it was very abundant at this study site, whereas it had been left uncited by all authors who previously studied hydroids in the area. At present, Clytia linearis is a circumtropical species that is expanding its distribution along the Atlantic coast of the Iberian peninsula. It is probable that it has arrived at other areas, such as the Atlantic coast of France and the British Isles. Unfortunately, these countries have no more hydroid specialists (the last French hydroid specialist works at La Reunion) and it is very probable that its presence is passing unnoticed (even if the species is abundant). The species is unreported from the Atlantic coast of Northern Africa (but this proves nothing, since the fauna of that region is poorly known). The Spanish Atlantic record, then, might represent the expansion of a species from the Mediterranean to the Atlantic Clytia linearis probably colonised the Mediterranean from the Suez Canal (the first “Mediterranean” record, belonging from the Suez Canal, is very suggestive of this pattern of colonisation), and, then, from Gibraltar, expanded its distribution to the Atlantic coast of Spain. Gibraltar, thus, is not only a way for Atlantic species to come into the Mediterranean, it is also a way for Mediterranean species to go into the Atlantic!
This species produces typical Clyta medusae (at least at release; the adult is still unknown) but the hydroid is distinct from all other records described, having a subhydrothecal sphenoid, a feature typical of the genus Campanularia (a genus with pseudoparenchyma medusae). Lepot described it from the West Indies in 1935. Other records are from South Africa, and Boero (unpublished) found it in Papua New Guinea. The species was recorded for the first time from the Mediterranean (Ionian coasts of Calabria and Apulia) by Boero et al. in 1997 and, since then, from both the Adriatic and the Tyrrhenian seas (albeit unpublished). The species is expanding rapidly, it forms dense carpets at 1-2m depth, in full light, on rocks covered by encrusting coralline algae, especially those intensively grazed by sea urchins. The species is present in the summer, but the whole cycle is still unknown. Being present both in the Atlantic and in the Pacific, it is not clear if it entered the Mediterranean either from Suez: Can or from Gibraltar. The rapid expansion of this species of hydroid witnesses a great success of the medusa stage, since dispersal is mainly obtained by displacement with currents. Usually, Clyta medusae is similar in each other and are invariably identified as Clyta hummelinki by plankton ecologists, so the diversity of species is underestimated.

Biodiversity (at species level) and ecosystem functioning

The ecological importance of these species, also for human purposes, resides in the feeding habits of medusae in general. Medusae feed on other plankters, from copepods to fish eggs and larvae. If killer whales, toxic dinoflagellates, ctenophores or frondose algae become suddenly abundant where they were previously absent or rare, their presence is immediately recognised. We do not need taxonomists to perceive such new commensals; they (or their effects) are so obvious! But nature is subtler than this. Tiny creatures of apparently no importance can have strong ecological impacts and drive ecosystem functioning in “strange” directions. We are ready to face the obvious and/or the expected, and our “predictions” work when the expected occurs, but we are less ready to perceive subtle changes in biodiversity. Their subtlety, however, might be the prelude to changes that are not subtle at all, and make our “predictions” very weak. Knowing the effects without knowing the causes is not a good strategy if we want to provide knowledge that leads to better management. We cannot dream of being able to manage jellyfish blooms, but at least we can detect their impact and realise that some changes in ecosystem functioning are linked to them, and not to other causes. The much-invoked ecosystem approach should lead to understanding of how ecosystems function and thus allow their goods and services to be managed. Unfortunately, there are no automatic ways to recognise species, there are no machines in which to throw a sample and produce a nice species list (and their relative abundances), having pressed a button. But this is not a good reason to disregard this information. Such things require highly specialised human expertise... and continuous monitoring, especially in periods of great change, like... this one.

Loss of expertise

This species has been intensively studied in the West Indies by Loeb, but there are no recent records from the northwestern tropical Atlantic, where the species has been reported. The lack of recent records from the tropical Atlantic is a matter of concern, as this species is known to be highly mobile, even over long distances. The absence of recent records from the tropical Atlantic suggests that this species may be declining in that region, and further investigations are needed to determine the status of this species in the tropical Atlantic.

References


Features

Aquatic Invasions

Dog whelks in Dutch coastal waters

By Johan Craeymeersch & Mieke Rietveld

THE CENTRE FOR Shellfish Research of the Netherlands Institute for Fisheries Research (RIVO) carries out yearly surveys for distribution mapping and stock assessment of the most commercially important species: mussels (Mytilus edulis), cockles (Cerastoderma edule) and rough shells (Spisula subtruncata).

Since 1995, 800-1,000 stations in the coastal area (up to 12km offshore) have been sampled, using a trawl or modified dredge, annually in spring. These surveys provide information on spatio-temporal variations in density, biomass and stocks of commercial species, but also result in a time-series of abundance and biomass data of about 20 infaunal and epifaunal species.

One of these species is the dog whelk, Nassarius. In the period 1995-2000 only a single specimen was found, near the harbour of Rotterdam. Since then the number of observations of dog whelk has increased, and the species is extending its distribution northwards (see figure).

Until recently all specimens were recorded as N. reticulatus, the netted dog whelk. In the southwestern part of the Netherlands, it was recorded from the Oosterschelde and in Grevelingen-Lange (see the EUROBIS site at www.anemoon.org). In the first decades of the last century the species was common in eelgrass beds in the Wadden Sea, but disappeared with the disappearance of eelgrass in the 1980s. In that period, there were few reports of beached live specimens (Dekker, 2004). Dekker also mentions a recent record on the Dutch coast (March 2004). Several authors consider N. reticulatus as a complex. Following reports on the morphological, genetic and ecological differences between N. reticulatus s.s., N. incrassatus and N. nitidus (Patzner et al. 1998), it seems that the species is not a single entity, but a complex of at least three species. Additionally, many authors consider the species as a complex of at least three species. The uncertainty about taxonomic identifications concerning this species has been a matter of concern for biologists and ecologists. In the first two decades of the last century, reported records of N. reticulatus have been restricted to a few reports of beached animals.

In the last six months, we collected specimens from Grevelingen Lake and from coastal waters. Following Rolan and Luppe (1994), we identified specimens collected in Grevelingen as N. nitidus. On the southwest coast there is apparently a mixed population of N. nitidus and N. reticulatus. All specimens from the central and northern coast were identified as N. nitidus. All dog whelks in Belgian coastal waters were identified as N. nitidus with the exception of a shallow dock in Oostende (Kerkhof, pers. comm.). In the UK, Ireland and Germany, N. reticulatus and N. incrassatus, the thick-lipped dog whelk, have been reported. According to most authors, the distribution of N. reticulatus ranges northwards to northern Norway. Others consider N. reticulatus as a complex of at least three species. The uncertainty about taxonomic identifications concerning this species has been a matter of concern for biologists and ecologists. In the first two decades of the last century, reported records of N. reticulatus have been restricted to a few reports of beached animals.

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For N. reticulatus, the colonisation of coastal waters could be explained as one typical for southern species spreading northwards as climate change warms coastal waters. In Belgium, the nettled dog whelk has been quite common since 1993. The winters of 1999-2000 and 1996-97 diminished the Belgian population but recovery has been reported since 1998 (Rappé, 2003). For N. nitidus, the change in distribution is not simply a northerly spreading. The species could have spread initially from the Grevelingen or the Oosterschelde and further distribution could be due to warmer water in the last couple of years. For both species, profit from changes in climatic conditions might be indirect, e.g. through decreased predation pressure on larvae. Higher water temperatures advance reproduction and hatching of many marine species while shortening the - risky - planktonic stage. Decreased predation on larvae might also be due to a decrease in large carnivorous zooplankton, as has been suggested for Grevelingen Lake (Lambek, 1982). Whether this is the case in the southern North Sea, we don't know, but the zooplankton species composition has certainly been altered by climate change (Beaugrand et al., 2002).

In 4-5 years, the dog whelk has spread from the Belgian border about 200km northwards. It is strange that N. reticulatus was common in Belgian coastal waters for about 10 years before it was first recorded in Dutch coastal waters. Furthermore, the nettled dog whelk prefers certain seaweeds, but in the absence of weed or when weed is scarce, capsules are deposited on rocks and other available hard substrates (Barnet et al., 1980). In the Dutch coastal zone, empty shells of razor clams might be a good substratum, as supported by recent observations. Since its introduction in 1979, Ensis directus has rapidly spread along the European coast. In Dutch waters it is nowadays one of the most common shells. It is likely that a combination of availability of empty razor-clam shells and higher temperatures has facilitated the spread of nassarids along the Dutch coast.

Since the earliest historical records, man has harvested a variety of different animals from the oceans. The effects of this activity on marine populations have been of increasing interest over the last century. While ecologists have traditionally aimed to identify the current conditions of many of the animal populations affected both directly and indirectly by harvesting, much less focus has been given to the status of affected populations in earlier times. A historical reference point of marine populations against which modern populations can be compared is necessary in order to determine how ocean ecosystems are changing with respect to human impact and even climate change. HMAP addresses this issue - multidisciplinary studies integrating marine ecology, history and paleoecology - this innovative combination of research methods and analytical perspectives offers a unique approach to testing theories of the effects of man's activities on the natural environment and our living marine resources.

Features

Historical Perspectives

HMAP: History of Marine Animal Populations

An interdisciplinary research programme using historical and environmental archives to analyse marine population data before and after human impacts on the ocean became significant

By Anne Husum Marboe

THE HISTORY OF Marine Animal Populations (HMAP), the historical component of the Census of Marine Life (CoML), aims to regard with long-term changes in stock abundance, the ecological impact of large-scale harvesting by man, and the role of marine resources in the historical development of human society.

HMAP implements its global mission through a case-study approach. The case studies are generally regional in scope and focus on a few species of commercial importance or habitat and biodiversity. The studies are linked through a series of data, which on the basis the ecosystem has been subject to fishing and that there exists sufficient historical data on catches and harvesting effort. There are currently seven case studies around the world:

- Northwest Atlantic (Gulf of Maine, Newfoundland-Grand Banks, Greenland cod fisheries)
- Southwest Pacific (Southwest Australian Shelf and Slope fisheries, New Zealand Shelf fisheries)
- White and Barents Seas (Russian and Norwegian herring, salmon and cod fisheries, Atlantic walrus hunting)
- Norwegian, North and Baltic Seas (Multinational cod, herring and plaice fisheries)
- Southwest African Shelf (Clipped fisheries in a continental boundary current system)
- Worldwide Whaling (Historical whaling in all oceans)
- Caribbean communities (Impact of the removal of large predators).

Many HMAP projects are interpreting changes in marine populations over the past 500-2,000 years, which provides researchers of current and future conditions a baseline that extends back long before the advent of modern technology, or before significant human impact on the ecosystem.

HMAP will result in a better understanding of the role of marine resources in human history and of the factors controlling marine populations. The project will help improve ecological theory, which can be applied to predict the effects of human activities on marine and aquatic ecosystems.

Building a new discipline

Three HMAP centres for the Study of Environmental History have been established at the University of Southern Denmark, the University of New Hampshire (USA) and the University of Hull (UK). These institutions act jointly as central coordinators of the project, maintaining research focus, identifying and aiding the implementation of priority research areas, ensuring synchronisation among the individual studies, and serving as points of contact for the media and the public.

References

The role of natural history museums
The ‘Pietro Peranzan’ museum, Salenta peninsula, Italy – a case study

By Anna Miglietta & Ferdinando Boero

Present-day uses of the oceans: fishermen from the Azores. (Photo: @ Poul Holm, CMRS)

As this is a groundbreaking study, the centre also devised and run educational programmes to graduate students in the multidisciplinary methods of ecological, historical and paleo-ecological research. Each summer, one of the centre holds an intensive two-week international summer school. The University of Southern Denmark hosted the 2001 summer school, attended by 25 students from eight countries. In 2002, the participation of 33 students from 10 countries in the University of New Hampshire summer school showed the growing interest in this type of work.

The future
As it progresses, HMAP will expand its geographic scope through new case studies. Regions of particular interest and potential are Southeast Asia, the Wadden Sea and the Mediterranean. There will also be increased effort in the integration of the individual case studies with one another and with the other components of CoML. As is obligatory for all CoML projects, data collected through HMAP will form part of and be accessible through the Ocean Biogeographic Information System (OBIS), an online global atlas for accessing, modelling and mapping marine biological data in a multidimensional geographic context. Ecological models will then be applied to test hypotheses about the ecological and anthropogenic influences on the marine communities and to reconstruct historical pictures of global marine populations.

Project leaders:
Dr Poul Holm, Syddansk Universitet Centre for Maritim og Regional Historie, Edsberg, Denmark
Dr Andy Rosenberg, Dean, University of New Hampshire, College of Life Sciences and Agriculture, Durham, New Hampshire, USA
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Relevant web links:
Census of Marine Life - www.coml.org
HMAP - www.hmapcoml.org

For the students living in the Salento peninsula, the heel of Italy, the study of the coast and the sea should be a fundamental part of education within the programmes of natural sciences. Unfortunately, this is not the case. The University of Lecce, aware of this basic need scarcely met by traditional curricula, tries to fill this gap, with the Marine Biology Museum “Pietro Parenzan,” founded in 1966 by the marine biologist Pietro Parenzan, to whom the museum is dedicated. In the seventies, Parenzan donated his collections to the University of Lecce and, at present, the museum is managed through a convention among the University of Lecce, the Province of Lecce and the Municipality of Porto Cesareo, the coastal village where the museum is located. The museum is visited by more than 10,000 people per year. Half of these visitors are students, the rest are tourists. Many improvements have been made to the exhibits in an effort to involve the local fishing community in the Marine Protected Area that has since been instituted at Porto Cesareo.

Basking sharks ...and student curiosity
Two years ago, a fisherman accidentally caught a 7m-long specimen of basking shark (Cetorhinus maximus) and we decided to exhibit it in a special room, built just for the occasion. We also decided to make an inquiry among our visitors, in an attempt to understand their interests, their curiosities and their level of knowledge about a supposedly fascinating topic like a great shark feeding on plankton. We thus prepared a questionnaire that has been completed by 1,003 students between the ages of six and 18 years, thus covering the whole spectrum of education, from primary through to high school.

School students learn about basking sharks.

We found that, among the examples of filter-feeders, whales were chosen by a higher percentage of primary-school students (61.3%) than middle-school (44.4%) and high-school (50.7%) students. Interest in marine filter-feeders was very high among primary- and middle-school students (more than 90%), whereas it was much lower for high-school students, with scientific high school being the only exception. This shows a decrease of interest in such topics among older students, and suggests that only students of scientific high schools are driven towards such topics by their curricula (or by their inclination). Only 5% of answers demonstrated knowledge of plankton, describing it as the organisms that live in suspension in the water column, some being able to move by means other than swimming against currents. Primary-school children were also more informed on this topic than middle- and high-school students, again with the exception of the scientific high school. We discovered that, even in textbooks, plankton is defined incorrectly. In one case, it is defined as “microscopic algae such as diatoms, eggs, larvae, protozoans and medusae that are unable to swim and that are carried by waves and currents.”

A lesson from students
Our study provided useful information on how to organise the exhibit and showed that younger students have more information, interest, curiosity and enthusiasm for marine biology than older ones. Clearly, positive attitudes towards the environment decrease with age. The natural “biophilia” characterising young specimens of our species decreases with the proceeding of education and is replaced by something else.

The natural sciences have a low status in school curricula. Italian education privileging classical topics. Science is invariably identified with mathematics, and the natural sciences, when covered, are often illustrated using anecdotal examples dissociated from mathematics and identified with charismatic organisms, as happens on TV. It is indicative that the Ministry of Education proposed to remove evolution from middle-school programmes. A very influential scientist (the physicist Antonino Zichichi) wrote to the newspapers that evolution is not a science because there are no equations describing it, and there is no experimental evidence that species transform into other species. The scientific community raised its voice and the Minister appointed a commission that, after a year, advised reinvesting evolution into the programme. Now the Minister is pondering the answer, but has not decided yet.

The general indifference towards natural sciences in Italy stems from the philosophy of Benedetto Croce, who designed our school curricula a long time ago. For him, science and technology were more or less the same; only mathematics received a high status, with the rest being marginal. This is still the general philosophy permeating Italian education, as demonstrated by the example of evolution. There is no space for nature, not even for science.

In spite of this, we continue to work at our museum, and the number of visitors increases every year.

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Features
Ocean Education

The 'Pietro Peranzan' museum, Salenta peninsula, Italy – a case study

By Anna Miglietta & Ferdinando Boero

School students learn about basking sharks.

Display at the marine biology museum ‘Pietro Parenzan’.

The national museums and science education
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The indicators for the region must therefore solutions for biodiversity objectives and difficult to apply directly to the Baltic. Novel European biodiversity discourse are very Baltic Sea biodiversity is that many well-being of populations of all native species. As exceptionally sensitive to pollution, the effects the introduction of non-native species. The exceptionally sensitive to pollution, the effects parameter devised by scientists are very difficult to make operational with standard parameters devised by scientists are very difficult to make operational with standard monitoring.

HELCOM is developing a Baltic Sea Action Plan in accordance with the ecosystem approach, also envisaged to be applied in the future European Marine Strategy. The plan will be an integrated approach for the adaptive management of human activities impacting on the Baltic Sea marine environment. It shall distinguish between actions that can be implemented at regional or national levels and measures that can only be implemented at the regional or national levels and measures that can only be implemented at the regional or national levels. HELCOM invites the MarBEP network of excellence to provide input into HELCOM's objectives. One opportunity is to give feedback using HELCOM's eMeeting facilities on http://www.helcom.fi (Events & Meetings - Ecological Objectives). Hermanni Backer Project Assistant HELCOM Email: Hermanni.backer@helcom.fi

The Baltic unique conditions limit the diversity of life in the sea and make ecosystems exceptionally sensitive to pollution, the effects of industrial fisheries, offshore activities, and the introduction of non-native species. As there is very little functional redundancy in the Baltic Sea ecosystem, it can be argued that virtually all Baltic Sea species are ‘keystone species.’ Another implication of the unique Baltic Sea biodiversity is that many well-studied species of the international and European biodiversity discourse are very difficult to apply directly to the Baltic. Novel solutions for biodiversity objectives and indicators for the region must therefore be sought.

The Helsinki Convention (HELCOM), the inter-governmental organisation responsible for overseeing the protection of the Baltic marine environment, is presently working on an integrated assessment system including marine biodiversity. With the revised 1992 Helsinki Convention text, the Convention aims to reach “ecological balance” for “good ecological status,” using Water Framework Directive terminology in the Baltic Sea ecosystem. According to the approach applied, biological diversity – using the widest definition of the term – is actually the essence of this ecological balance. Consequently, some metrics for assessing Baltic Sea biodiversity must be agreed upon in order to make sound management decisions. Even if scientific publications on marine biodiversity are published continuously and our knowledge in the field is growing, this is not an easy task. Unfortunately, many of the indicators or parameters devised by scientists are very difficult to make operational with standard monitoring.

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Opinion & Commentary

The end of an era – is small no longer beautiful?

By Richard Hartnoll

IN SEPTEMBER 2006, LIVERPOOL University will close the Port Erin Marine Laboratory in the Isle of Man, bringing to an end over a century of investigation into the central regions of the Irish Sea.

The rationale is not simple, but it emphasises the current vulnerability of small off-campus research centres. They are falling victim to various pressures. One is the current ethos of interdisciplinary studies, where they have geographical problems of close integration. However, more important is the cost-driven evaluation of university facilities: small remote institutions are invariably expensive in unit costs, and their outgoings cannot easily be buried amidst central funding. The decision has been made. The Isle of Man government may have some reason to carry on on the site, but nothing has been settled.

The driving force behind the founding of the laboratory was Sir William Herdman, Professor of Natural History at Liverpool from 1881 to 1921. Initially the laboratory was privately funded (at one guinea, €1.5, per year) by the members of the Liverpool Marine Biological Committee, first on Puffin Island off the coast of Wales (1887-1892) and then in a small building on the north side of Port Erin Bay on the western coast of the island. The larger building on the present site on the south side of Port Erin Bay was opened in 1902 and was transferred to Liverpool University in 1919.

The work at Port Erin in the early part of the 20th century focused largely on commercial finfish and shellfish, especially on herring, which was a major local fishery. However, there were also basic scientific studies such as those on algae and taxonomy. There were, in addition, routine hydrographic measurements, of which more later. Throughout the period up to the 1940s the laboratory functioned with a small resident staff, with much of the research being driven by visiting scientists based in Liverpool, who were the local resource. They are now scattered throughout the marine biology community, many in positions of power and responsibility. We will welcome the last of their kind in September this year.

Marine biology will continue to be taught in Liverpool, but the ambience will perhaps not be the same. Have you ever tried to dive in the Mersey?

Nevertheless, this teaching role was not fulfilled at the expense of research. At the same time as the honours class grew, so did the number of research students, peaking at thirty or more in the eighties. Then slowly the staffing levels did begin to turn, as university funding in the UK became tighter. Research funding was harder to come by so research student numbers fell. The staffing levels at Port Erin presented a demographic time-bomb – we were largely an ageing population, and as retirements occurred replacements did not follow. Whole-animal biology was no longer sexy – employ another molecular biologist instead! In the early nineties the University was warned of the Port Erin predication – invest now or perish later. The latter option was evidently the one chosen.

There is no point in being morbid at the closure, though we are entitled to be sad. What are the positive achievements of 114 years of marine biological research in Port Erin? Firstly, there is a major body of scientific publication, covering many fields, where it would be invidious to highlight topics. Secondly, there are our many graduate students, from all corners of the world, who have taken the Port Erin experience home with them. No less important, the hundreds of undergraduates who have achieved a Liverpool marine biology degree. There are the ongoing data collections that we hope to hand on for posterity and continuation; the long-term fishery data for herring and scallop; and the hydrographic records, the longest continual records in the UK, some extending over 100 years. For many years seen simply as a background data set for biologists, these are now seen as seminal data in our understanding of global warming and marine eutrophication.

We hope that our inheritance will prove worthwhile.

Richard G Hartnoll
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A recent photograph of Port Erin Marine Laboratory, Isle of Man.

Research & Development
Complexity of biotic interactions – better expression of biodiversity importance?

By Monika Kędra & Jan Marcin Węsławski

THE FOLLOWING IS a short communication from MarBEF members on one of the key MarBEF issues – how to assess the role of biodiversity in ecosystem functioning – in which a novel approach is presented for potential future consideration in MarBEF Responsive Mode Proposals. This approach arose from a discussion on how to present biotic interactions in a quantitative way – and this was the outcome.

By Monika Kędra & Jan Marcin Węsławski

Baltic Sea site. North Sea site.

The common way of assessing the importance of biodiversity for the functioning of the ecosystem is to focus on functional groups (Bonsdorff et al., 2003). In the Baltic area, Bonsdorff & Blomqvist (1993) and Bonsdorff & Pearson (1999) presented exhaustive summaries of species functions, advocating the functional approach in biodiversity assessment, but did not answer how to quantitatively measure the biotic interactions necessary to address functionality.

We propose a new approach that allows the quantification of the impact of biodiversity for the functioning of the ecosystem. This approach arose from a discussion on how to present biotic interactions in a quantitative way – and this was the outcome.

Monika Kędra & Jan Marcin Węsławski

References


Fig 1. Cluster diagram showing closer biological relations in the North Sea samples as compared to Baltic samples.

MarBEF Gender Action Plan

By Simonetta Fraschetti

IN THE LAST issue of the MarBEF newsletter, I read with great interest the article by Olivia Helfer on “Women and Science.” I admit that my first impression was “The gender issue again?” because I thought that sexual discrimination was not a real problem in the university system of Europe. However, the article made me realise that the gender issue is still a source of hot debate.

The dean of Harvard University, for instance, few months ago proposed three hypotheses to explain the different performances of women and men in US universities: (1) Women are not genetically endowed for scientific research (with the exception of biology: MarBEF women are safe); (2) family affairs prevent them from working 80 hours per week, the time a person must invest to reach tenure in prestigious universities; and (3) women’s ambitions are not the same as men’s. Needless to say, the dean ended up in trouble. I hope to be misunderstood for what I’m going to say: I agree that the first hypothesis go on with (the dean of Harvard), postulating that mathematics and physics are not for women, is not supported by statistical evidence. The other two proposed explanations, pertaining to reproductive responsibilities and competitive attitudes, however, could be partially true, in spite of numerous exceptions.

Beside Summers’ debatable position, I think that, in our field, Sandra Knapp’s (2005) sentence, answering a questionnaire on women in science, reflects also my own experience: “Being a woman has had little negative impact on my life as a scientist, but being a scientist has had a serious detrimental effect on my life as a woman.” As for my department, for example, my impression is that there is no discrimination against women: sound arguments are accepted, whatever the sex of the speaker, and weak arguments are criticized in the same way. However, women prevail over men in basal positions (such as associated professors). Women are a scant minority as full professors. Why? My opinion is that one of the reasons there are fewer women in top positions is because their choices are more varied than those of men. Men just want to go on with their career, while women in some cases want to Career, in some others they simply want to take care of their children. However, they cannot discuss the enormous difficulties of managing both family and career; ways to solve this issue and the need for a greater involvement of men, are out of discussion and over the scope of this article (and partially explain points 2 and 3 of Summers’ intervention).

Damshen et al. (2005) are right when stressing that talking about the gender balance (even in textbooks) might lead women to “imitate” other women who gave relevant contributions to science. However, their request to give both name and surname of authors within textbooks, so to make more explicit the contribution of women to research, seems ridiculous to me. And, I’m sorry but my feeling is exactly the same when I see that a scientific project carries more weight and a stronger appeal component (regardless of its effective value) has been included, to overcome “necessity” of having 40% of women in European projects to have more chances of funding.

I do not know of any woman who would like to foster her career, or to be included in a project, just because of the fact that she was a woman. We deserve equal opportunities to reach excellence and to be ambitious (if we want it), so that this will not be just a male privilege, as suggested by Summers. We do not have to fight to reach a percentage of female involvement just because we are females. Being a woman in a network of excellence leads one to ask: am I here because I am an excellent, or because the 40% ratio has to be reached? And then, considering the sex ratio in our species, why 40% and not 50%?

Simonetta Fraschetti

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References


Errata, Issue 2

Page 2: Smitina corallium. No, not a new species, just an error! Should read Smitina, Corallium, representing Smitina sp. and Corallium rubrum.
Page 20: Dr Tony Rees should read Dr Tony Rees.

Letters to the Editor

We welcome opinion pieces and responses to letters previously published. Please address all correspondence to the editor at claire/oconnor@marjournals.co.uk.

Please note: provide your name and email address. Submitted letters may be edited or cut.
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