



European Regional Implementation Committee

Professor Graham B. Shimmiel (Chairperson)

Scottish Association for Marine Science, Dunstaffnage Marine Laboratory, Oban,
Argyll, PA37 1QA, Scotland, UK

Phone: +44 (0)1631 559270 FAX: +44 (0)1631 559008 E-mail: gbs@sams.ac.uk

Dr Bhavani E. Narayanaswamy (Project Manager and E&O Network Liaison)

Scottish Association for Marine Science, Dunstaffnage Marine Laboratory, Oban,
Argyll, PA37 1QA, Scotland, UK

Phone: +44 (0)1631 559305 FAX: +44 (0)1631 559001 E-mail: bn-t@sams.ac.uk

<http://www.eurocoml.org>

<http://www.noc.soton.ac.uk/chess/home.html>

<http://www.mar-eco.no/>

<http://www.cedamar.org/>

<http://www.ifremer.fr/comarge/en/index.html>

<http://www.cmarz.org/>

<http://www.marbef.org/data/eurobis.php>

1. 2006 ACCOMPLISHMENTS & SCIENTIFIC HIGHLIGHTS

This should be a summary of significant work, results, and conclusions. Please describe the activities completed in the past year (for example, cruises, data, workshops, major reports, program development and sponsorship). What were the meaningful scientific, political or administrative results of these activities, and how do they contribute to (1) our overall understanding of marine biodiversity and its role in ocean ecosystems (for scientific activities) or (2) recognition for marine biodiversity research leading to funding or political support (for administrative or program development activities)?

The European Census of Marine Life has developed in the past year with attendance at numerous meetings, workshops being funded and Education and Outreach work being undertaken. Links with a number of CoML Ocean Realm projects and HMAP have been initiated and strengthened, as well as links to other scientific programmes and organisations, primarily within Europe.

National and pan-European funding organisations have contributed very large sums of money in order for marine research to be undertaken in European waters. Much of the funded research currently being undertaken in Europe is based on the reputation and publication of the many excellent scientists within Europe and as a result this has contributed in numerous ways to the success of the Census of Marine Life so far. Programmes such as Hotspot Ecosystem Research on the Margins of European Seas (HERMES) will benefit the CoML programme on Continental Margins, Marine Genomics to the Barcode of Life programme and MARBEF to many of the CoML programmes including NaGISA. Many other programmes have and continue to be funded by the European Union and European Science Foundation. National funding agencies such as the Natural Environment Research Council (UK) have also contributed extensive sums of money both in the past and currently which have had great impacts on programmes such as ChEss and CoMargE. The

numbers of research scientists taking part in these European as well as national funded programmes comprise a huge amount of expertise and will add great value to CoML's aims and objectives.

The call for the EUROCORES programme, Ecosystem Functioning and Biodiversity in the Deep Sea, EuroDEEP, was fully supported by EuroCoML with a letter being written by the Chairman and distributed to all the European National Funding Agencies. Nine countries have offered support to this initiative. Proposals that are funded through EuroDEEP can apply to EuroCoML to become an affiliated project. One proposal submitted has already highlighted their intention of doing so.

The EU Framework 5 and 6 research activities have both funded programmes ensuring that there is a coordinated approach to national/regional research undertaken. Through Framework 6 a major theme of the ERA-NET is that it "exclusively addresses public bodies managing or financing national research and innovation programmes as opposed to research performing organisations." The ERA-NET scheme encourages consortia with the aim of implementing trans-national research activities through joint calls/programmes. MarinERA, coordinated by the Marine Board – ESF and IFREMER, is one of these successful programmes with the aim of coordinating national and regional activities of marine research. There is the hope that ERA-NET's will continue to be funded in Framework 7. The coordinated research undertake through MarinERA will also add value to research that can contribute to CoML's overall aims.

Workshops

One of the main outcomes so far to have arisen is that the workshops are seen as an opportunity for scientists to discuss research currently being undertaken as well as ideas and issues which are important within European waters. The outcome of these discussions and the overarching aim of the workshops that EuroCoML has funded is for pan-European research proposals to be written and submitted to different funding agencies e.g. the European Framework 7 programme. This in turn will lead to a greater understanding of marine biodiversity and its role in ocean ecosystems specifically within Europe.

- January 2006. The First Deep-Sea Education and Outreach (DESEO) workshop was held in Southampton, UK. The project officers of the four European deep-sea CoML projects attended the workshop as did the EuroCoML project officer (see below in E&O section for further details).
- March 2006. Invasive Species workshop held in Oostende, Belgium and coordinated by Professor Erkki Leppäkoski (Finland) and Dr Stephan Gollasch (Germany). The workshop brought together scientists from around Europe to discuss ways of "initiating studies of alien invasive species in relatively pristine parts of European seas" as well as to "plan a European-wide port-sampling programme." The specific objectives arising from the workshop which will form the basis of the research proposal are:
 - Quantify the extent of the risk of future human mediated aquatic alien species invasions with special focus on shipping and ports,
 - Provide tested tools for biosecurity assessment and management regarding aquatic alien species. This could include modelling approaches,
 - Assess and, where possible, quantify "bio-pollution" and the socio-economic impact of human mediated aquatic bioinvasions (with special focus on shipping and ports), and
 - Evaluate the suitability of eradication measures.

Currently a research proposal is being written by the elected co-coordinators Professor Sergej Olenin and Dr Stephan Gollasch.

- April 2006. Environmental Modulation of Biodiversity and Ecosystem Dynamics (EMBED) was held in Pisa, Italy by Professor Lisandro Benedetti-Cecchi (Italy). The workshop was generally considered to be very successful and good progress was made in developing an integrated group and programme of research.
The main aim of EMBED is to determine the causes of change in marine coastal biodiversity by identifying key ecological processes operating at different scales. By describing and experimentally changing patterns of biodiversity, the project aims to clarify these important ecological processes. A secondary aim is to expand the current activities of EuroNaGISA and it will also be strongly linked to the global NaGISA. A draft research proposal has been written and the workshop organisers, in conjunction with the EuroCoML Executive Committee, are currently investigating where best the proposal should be submitted.
- September 2006. European Tracking of Predators in the Atlantic (EUTOPIA) was held in London, UK by Drs David Sims and Julian Metcalfe (UK).
The main objective is to track marine vertebrate predators such as sharks, turtles and whales in the Atlantic and Mediterranean. More specifically, investigations will take place to determine how these animals utilise key habitats in the ocean, and to identify animal-environment interactions by studying changes in the environment e.g. plankton, sea level. Links will be made to existing CoML projects e.g. TOPP and MAR-ECO – Tagging of Pacific Pelagics as well as the European MARBEF programme on the role of marine top predators.
- September 2006. Human-environment interactions in the Mediterranean Sea since the Roman period until the 19th century: an historical and ecological perspective on fishing activities (HMAP-Med) was held in Chioggia, Italy by Professor Ruthy Gertwagen (Israel).
The main aims of the workshop were to display the fishing activities from the Roman period - 19th Century in order to determine what changes in Mediterranean ecosystems had already occurred in the past and to what extent, and if these changes can explain the Mediterranean ecosystem observed today.

Further workshops are planned – see below for more details.

Data incorporated into OBIS via EurOBIS has been immense. The team of analysts led by Edward Vanden Berghe have been exceptional in collecting databases generated by studies undertaken in European Waters. To date EurOBIS has 15,000 species and 3,400,000 distribution records all provided from 41 datasets/data providers. There is also an Antarctic portal of OBIS run by European scientists that has been funded by the Belgian government.

Sponsorship

Telekom Italia agreed to sponsor the European Census of Marine Life €5000 after Executive Committee member, Professor Roberto Danovaro, was approached to help organise a CoML dissemination event. The event was held in Venice, Italy, 14 – 15 June 2006 and the guest speaker was Jesse Ausubel. The event was a huge success with the interviews with Jesse Ausubel being shown on Italian TV as well as being published in many newspapers and magazines. Further discussions are underway to organise a similar event in Italy next year.

Biogeography of Deep-Water Chemosynthetic Ecosystems – ChEss

ChEss has been extremely productive and made some exciting discoveries in the past year. A number of successful cruises have been undertaken in the past year. Nicole Dubilier (EuroCoML SSC) was part of the research team which located a new vent site which was un-colonised by vent specific fauna, as well as discovering the hottest hydrothermal vent to date in 3000m of water on the southern Mid-Atlantic Ridge. Proposals have also been submitted by Nicole Dubilier including two to re-visit both the North and South MAR in 2008, building on the cruises that will take place in 2007.

Census of the Diversity of Abyssal Marine Life – CeDAMar

CeDAMar has had a productive year with samples being sorted and specimens being identified from their big cruises of 2005. Workshops have been held on the taxonomy of different faunal groups with another on nematodes proposed for the beginning of January 2007 at the University of Ghent. The German research vessel *Polarstern* will be used in the ANDEEP-SYSTCO programme taking place in the Antarctic 2007/2008 as part of the International Polar Year.

Continental Margin Ecosystems on a worldwide scale – CoMargE

In 2006, CoMargE refined its major scientific questions, strengthened its network internationally and set up its action plan. A call for contributions entitled “CoML/ CoMargE: Towards a globalization of the project” was widely distributed to the international community. The document was intended to

- foster discussion on the questions addressed by CoMargE
- provide a census of existing and planned projects on continental margins
- encourage contributions and participations in CoMargE. Approximately 50 scientists answered the call for contributions.

Following this, all contributions and reactions to this document were summarised, providing the first map of the known and unknown regarding the ecology of deep benthic habitats on continental slopes. The feedback provided information relating to approximately 300 cruises and 350 dives; most of them located in the North Atlantic and Northeastern Pacific.

A workshop, held at the Institut Océanographique in Paris, was organized the 6 - 7 July 2006. The aim of the workshop was to introduce CoMargE objectives to a large audience of invited scientists (36) from 18 countries that had expertise in margin studies in terms of taxonomy and ecology. The workshop allowed the workshop attendees in conjunction with the SSC to

- define the four scientific themes that should be addressed by CoMargE in the future
- planning actions for years 2006-2008 in order to progress on each of these themes
- identifying leaders for each action.

Meanwhile, scientists belonging to the CoMargE network have also spent time at sea this year. During the 10 cruises that CoMargE scientists participated in, data were gathered on cold water corals, canyons and methane seeps, their associated fauna, interactions with surrounding sediments and their overall contributions to regional diversity patterns. Two-thirds of these cruises were undertaken in European waters, through the EU Framework VI programme Hermes. The results highlighted unknown living forms even on the well known Northeastern Atlantic margins.

Mid-Atlantic Ridge Ecosystems – MAR-ECO

MAR-ECO has been very productive in the past year. It is now entering its main synthesis phase. However, further research will be undertaken as both the UK and USA have allocated ship time to the project, in the case of the UK research will continue until 2009.

Census of Marine Zooplankton – CMarZ

CMarZ in 2006 has hit the headlines with its groundbreaking expeditions and sequencing of zooplankton DNA whilst at sea. Of the thousands of zooplankton specimens collected, over 200 had their DNA sequenced at sea which resulted in a number of new species being discovered.

Census of the Diversity of Abyssal Marine Life – CeDAMar

CeDAMar has had a productive year with samples being sorted and specimens being identified from their big cruises of 2005. Workshops have been held on the taxonomy of different faunal groups with another on nematodes proposed for the beginning of January 2007 at the University of Ghent. The German research vessel *Polarstern* will be used in the ANDEEP-SYSTCO programme taking place in the Antarctic 2007/2008 as part of the International Polar Year.

A number of meetings have been attended by the EuroCoML Executive Committee, where biodiversity has been the main theme of the meeting.

2. SOCIETAL BENEFITS, IMPACT & APPLICATIONS

Please describe examples of how the work of CoML – both within your committee's activities and the findings of the international projects – has been (or potentially could be) applied in marine policy, management, operational monitoring and observations or marine industries in your country or region. What national or multi-national research needs are (or can be) met by CoML?

All work undertaken by EuroCoML's planned programmes could be used by external sources in terms of providing information for marine policy, management etc. The proposed work to be undertaken through the Alien Invasive Species project will have a direct impact on biodiversity and ecosystem information for applied resource management in waters where European nations hold major influence.

Through the work undertaken by researchers in ChEss, the Portuguese government have approved two sites in Portuguese national waters on the Mid-Atlantic Ridge as MPAs.

3. WORK PLANNED FOR 2007

Please describe your work plans for the upcoming year. Include upcoming dates and locations in the field, at sea, or of workshops and meetings. Please indicate what you expect to accomplish or learn/discover and when (if applicable).

EuroCoML has offered funding for another workshop: "Colonialism and Historic patterns in the Arctic and sub-arctic regions (HMAP-Arctic)." We anticipate that this workshop will take place in early 2007 in Roskilde, Denmark.

EuroCoML has also offered funds to the Arctic Ocean Diversity Programme to help with an ArcOD-IPY PI cluster meeting and in particular to encourage synergies and collaborations between projects. It is anticipated that this workshop will be held in late 2006 early 2007 prior to the start of the 2007 field season.

HERMES – A number of cruises are planned for next year to investigate Hotspot Ecosystems on the European Continental Margin.

ChEss South MAR - A German cruise to revisit the South MAR vent sites will take place in November 2007 using the new German ROV from Geomar (Kiel) (Nicole Dubilier PI).

ChEss North MAR - Two German cruises to Logatchev will take place a) in Jan-Feb. 2007 (proposal pending to use Jason II -Woods Hole), and b) in Oct. 2007 on the RV *Meteor* (Nicole Dubilier will be a PI on both cruises).

MAR-ECO - The UK has made a substantial commitment to the programme by funding a programme called ECO-MAR extending the field work phase to 2009. The cruises will be used for focused studies in and near the Charlie-Gibbs Fracture Zone. A particular focus is given to studies in association with the Sub-polar Front. Planning for the 2007 cruise will take place in Aberdeen, UK in January 2007.

4. EDUCATION & OUTREACH

Please describe Education & Outreach activities associated with your committee for the previous 12 months. Indicate the target audience for each, as well as the level of success of each effort.

A Deep-Sea Education and Outreach (DESEO) workshop was funded by EuroCoML for the project officers of CeDAMar, ChEss, CoMarge and MAR-ECO. In conjunction with the four projects above, EuroCoML is planning to publicise deep-sea communities to the general public through the following mechanisms:

- A Travelling exhibition (undertaken by MAR-ECO) and an associated book (description of environments from the 4 deep-sea realms covered above).
- A school network – the aim is to get the deep sea on to the national curriculum in a number of different European countries
- A comic book, proposed by the project officers of ChEss
- School day on the web, initially instigated by MAR-ECO, will be undertaken again this time in greater collaboration with the other deep-water CoML projects.
- Art competition – to invite students from art colleges situated near to the marine laboratories to paint/draw specimens collected from the deep-sea for a piece of major coursework. The aim is that at the final CoML meeting in 2010, the best pieces will be displayed at the meeting.

As the objectives of DESEO develop, the fifth deep-water CoML project CenSeam will also be included.

Carlo Heip – Open Lecture on “Marine Biodiversity: the Exploration and Understanding of the Blue Planet” at the International Council for the Exploration of the Sea (Maastricht, Netherlands, 19 – 23 September 2006). *Target audience – scientists, politicians.*

EuroCoML poster presented at the International Council for the Exploration of the Sea (Maastricht, Netherlands, 19 – 23 September 2006). *Target audience – scientists.*

EuroCoML poster presented at the UK Challenger Marine Science Conference (Oban, Scotland UK, 11-14 September 2006). *Target audience – scientists.*

Carlo Heip - Keynote speaker “Global Climate Change and Marine Ecosystems” at the European Marine Biology Symposium (Cork, Ireland, 4 -8 September 2006). *Target audience – scientists.*

EuroCoML poster presented at the European Marine Biology Symposium (Cork, Ireland, 4 -8 September 2006). *Target audience – scientists.*

Deep-Sea Education and Outreach poster presented at the 11th Deep-Sea Symposium, Southampton UK (July 2006) *Target audience – scientists, funding agencies, teachers and administrators.*

EPBRS Steering Committee Meeting (Porto, Portugal, May 2006). *Target audience – scientists.*

IASON Programme - International Action for Sustainability of the Mediterranean and Black Sea environment Conference (Istanbul, Turkey 10-11 May 2006). *Target audience – other scientists*

ICES Benthos Working Group (Crete, 1-5 May 2006). *Target audience – other scientists.*

EU-funded ASEM Meeting - Asia-Europe Meeting for the cooperation between EU partners and the Far East countries (Athens, Greece, 22-24 March 2006). *Target audience – other scientists.*

2nd HELCOM/Baltic Sea Regional Project (BSRP) Thematic Workshop on the risks related to the ballast water mediated introductions of non-indigenous species in the Baltic Sea (Helsinki, Finland, 20-22 March 2006). *Target audience – scientists and administrators.*

EU FP6 NoE EUR-OCEANS meeting: 1st EUR-OCEANS WORKSHOP on developing an integrated view on the Baltic Sea ecosystem: Challenges for modelling (Tvärminne, Finland, 31 January - 3 February 2006). *Target audience – other scientists.*

3rd International Meeting – Acting together for the future of the Blue Planet (Boulogne-sur-Mer, France, 29 January – 1 February 2006). *Target audience – other scientists.*

EuroCoML poster (2005) given to the Estonian National Science Foundation to raise awareness of CoML and EuroCoML. *Target audience – scientists, funding agencies and administrators.*

EuroCoML poster presented at the Frankfurt All Programme Meeting to raise awareness of EuroCoML (Frankfurt, Germany 2005). *Target audience – scientists, funding agencies and administrators.*

Several school and open days at the Scottish Association for Marine Science where the aims of EuroCoML and CoML were highlighted, plus some of the projects. *Target audience – children >5yrs and adults.* The talks were extremely well received.

CoML and EuroCoML flyers/information distributed to HELCOM and awareness raised with the general secretary and one of the professional secretaries of HELCOM.

Developing a link between EuroCoML and Ireland's AQUATT (Blue Planet project) in which we have assisted with educational programmes.

5. GEOGRAPHIC EXPANSION

Describe how your committee has helped increase the geographic scope of CoML's future findings. This includes (1) new participation by local scientists in the ongoing CoML projects; (2) "spin off" projects initiated by your committee using or based on CoML project methodologies or approaches; and (3) Affiliated Projects endorsed or approved by your committee. Please list both ongoing and planned activities. Is there anything that the SSC or Secretariat can do to facilitate these activities?

To date researchers in 22 countries within Europe have either participated in EuroCoML funded workshops or are participating in CoML programmes. Researchers from Turkey, Morocco and

Israel have also taken part in EuroCoML workshops or are on the EuroCoML Scientific Steering Committee. Please see Appendix IV for list of workshop participants and country where they are undertaking research.

All workshops funded by EuroCoML have been endorsed and approved by the Executive Committee. The planned programmes of research stemming from these workshops will automatically be affiliated to EuroCoML.

6. PARTNERSHIPS & COLLABORATION

a. Partnerships

Please identify any organizations, government agencies, science programs, and non-CoML projects with which your CoML committee has an affiliation or collaboration and briefly describe the nature of each relationship.

Organization Name	Point-of-Contact (Name)	Nature of Relationship
SCOR: Scientific Committee on Oceanographic Research Working Group	Graham Shimmiel & Carlo Heip	Chairman of EuroCOML, EuroCoML Executive committee
European Federation of Marine Science and Technology Societies	Graham Shimmiel & Roberto Danovaro	Chairman of EuroCoML, EuroCoML Executive committee
CISEM (Task force on Deep Sea Research)	Roberto Danovaro	EuroCoML Executive committee
International Council for the Scientific Exploration of the Baltic Sea	Henn Ojaveer	EuroCoML Executive committee
INCOFISH (Integrating Multiple Demands on Coastal Zones with Emphasis on Aquatic Ecosystems and Fisheries) – EU FW6 STREP	Henn Ojaveer	EuroCoML Executive committee
Mesozooplankton dynamics and its implications to the higher trophic levels of the Gulf of Riga, Baltic Sea	Henn Ojaveer	EuroCoML Executive committee
MARBEF	Carlo Heip	EuroCoML Executive committee
DIVERSITAS	Carlo Heip	EuroCoML Executive committee
International Council for the Scientific Exploration of the Mediterranean Sea	Anastasios Eleftheriou	EuroCoML Executive committee
IUCN Commission on Ecology	Alasdair McIntyre	EuroCoML Executive committee
Atlantic Frontier Environmental Forum	Alasdair McIntyre	EuroCoML Executive committee
BIODIVERSA – Research for the understanding of European	Isabel Sousa-Pinto	EuroCoML Executive committee

and Overseas Biodiversity		
MARBENA – Creating a long term infrastructure for MARine Biodiversity research in the European economic area and the Newly Associated states	Isabel Sousa-Pinto	EuroCoML Executive committee
SeaweedAFRICA	Isabel Sousa-Pinto	EuroCoML Executive committee
European Platform for Biodiversity Research Strategy	Isabel Sousa-Pinto	EuroCoML Executive committee
DFG (Germany)	Nicole Dubilier	Collaborations in North and South MAR research
MomarNet (EC)	Nicole Dubilier	Research training network on hydrothermal vents in the Momar region.
DiWood: sunken wood and associated organisms (CNRS and MPI Bremen)	Nicole Dubilier	Chemosynthetic fauna on sunken wood (2006-2009)
Marine Board - European Science Foundation	Niamh Connolly	EuroCoML Scientific Steering Committee
HERMES	Myriam Sibuet	Research on cold seeps and anoxic microbial systems (2005-2009)

b. Links to CoML Ocean Realm Projects

Please identify the CoML Realm Projects with which your committee participates (or wishes to participate). Identify any crossover personnel or liaisons.

Project Name	Liaison or Cross-over personnel	Nature of Relationship
CeDAMar ArcOD	Pedro Martinez-Arbizu	EuroCoML SSC member
MAR-ECO ArcOD	Andrey Gebruk	EuroCoML SSC member
ChEss	Nicole Dubilier	EuroCoML SSC member
CMarZ	Ahmet Kideys Annelies Pierrot-Bults	EuroCoML SSC member Invited EuroCoML observer
ICoMM	Jan de Leeuw	Invited EuroCoML observer
CoMargeE	Myriam Sibuet	Invited EuroCoML observer
NaGISA	Carlo Heip Isabel Sousa-Pinto	EuroCoML Exec member EuroCoML Exec member
CenSeam	Bhavani Narayanaswamy	EuroCoML Project Officer

c. Links to other CoML National and Regional Implementation Committees (NRICs)

Please identify any other CoML NRICS with which your project has collaborated or wishes to collaborate because of regional overlap or increased benefit from joint activities or proposals. Identify any liaisons or crossover personnel.

NRIC	Liaison or Cross-over personnel	Nature of Relationship
Australia		
Canada		
Caribbean		
China		
Europe		
Indian Ocean		
Japan		
South America		
Sub-Saharan Africa		
USA		

d. Liaisons to CoML Cross-Cutting Groups

If applicable, please identify the person within your committee who is designated as the liaison to the following CoML cross-cutting projects and groups.

Project Name	Liaison Name & Institution	Nature of the Relationship
OBIS	Edward Vanden Berghe, Flanders Marine Data and Information Centre, Belgium	EuroCoML SSC member
HMAP	David Starkey, University of Hull, UK Henn Ojaveer, Estonian Marine Institute, Estonia	EuroCoML SSC member/HMAP coordinator EuroCoML Exec member/PI of Baltic HMAP
FMAP	Nobody at present	
SCOR Tech Panel	Stratis Georgakarakos, University of the Aegean	Newly invited EuroCoML Exec member
E&O	Bhavani Narayanaswamy, SAMS, Oban, UK	EuroCoML Project Officer
Barcoding	Annelies Pierrot-Bults, University of Amsterdam, The Netherlands	Invited EuroCoML Observer

e. Effectiveness of the Partnerships and collaborations

Please identify any issues with the effectiveness of your committee's relationship to CoML Cross-Cutting Groups, other NRICs and/or CoML Ocean Realm Projects.

It may be useful if there was greater general communication between the NRIC offices. By working together ideas for different projects that could be undertaken in other areas of the world could be highlighted e.g. alien invasive species, education and outreach could be increased and enhanced. At present there is none or very little communication between EuroCoML and the HMAP cross-cutting group. It would probably be beneficial for both parties to engage and discuss ways in which they could help one another. In particular the information held by EurOBIS may be extremely useful. It would be useful to investigate ways in increasing European Scientific participation in HMAP.

Alien species and their contribution to biodiversity in pristine parts vs. anthropogenically impacted ports of European seas

Report of a EuroCoML Workshop held in Oostende, Belgium, 10-11 March 2006

prepared by

Erkki Leppäkoski (Abo Akademi University, Turku, Finland),

Stephan Gollasch (GoConsult, Hamburg, Germany), and

Sergej Olenin (University of Klaipeda, Klaipeda, Lithuania)

The Workshop was hosted by the Institute of Marine Research, Oostende, Belgium with Francis Kerckhof as host. In total 17 participants from Belgium, Estonia, Finland, France, Germany, Greece, Israel, Italy, Lithuania, the Netherlands, Norway, Poland, Sweden and the United Kingdom attended the meeting (Appendix 1). The meeting and travel costs for the participants were funded from EuroCoML sources; attendees from the countries (Estonia, Lithuania, Poland) involved in the Baltic Sea Regional (GEF) Project were sponsored from that project.

The meeting was opened at 9 am on Friday March 10th 2006 with Erkki Leppäkoski, Stephan Gollasch and Francis Kerckhof welcoming participants. Erkki Leppäkoski and Stephan Gollasch as co-chairs highlighted the objectives of the workshop.

The meeting took the form of plenary sessions with round table discussions and drafting sessions following each session. On day 2 the participants were split into two groups for more comprehensive discussions. In the end of day 2 all participants considered the outcome of the round table discussions and drafting sessions and final recommendations were jointly prepared.

Day 1, Friday, March 10th

Opening remarks and brief introduction of participants

The co-conveners (Erkki Leppäkoski and Stephan Gollasch) welcomed to the meeting and initiated a round of presentations.

Review of the Agenda

The Agenda was reviewed and last minute adjustments were discussed. Thereafter the Agenda was adopted.

Presentation of CoML and EuroCoML; background for the workshop

Henn Ojaveer (Estonia) as executive member of the Committee for EuroCoML gave the background information needed to structure the workshop and focus the work on EuroCoML aims. He underlined the main goals for EuroCoML (rousing interest within the European scientific and sponsorship community, organising workshops, providing advice and supporting fundraising efforts, and improving awareness of CoML activities with national funding agencies and the wider public). EuroCoML is one of the regional bodies that contribute to the Ocean Biogeographic Information System (OBIS, www.iobis.org, the information component of the Census of Marine Life, to assess and explain the diversity, distribution, and abundance of life in the oceans - past, present, and future).

This Workshop was number 2 sponsored by EuroCoML and was given highest priority by the executive committee.

Objectives of the workshop

The immediate objectives of the workshop with some of the identified follow-up activities were

1. Initiate studies of alien invasive species in relative pristine parts of European seas:

- Initiate a compilation of the list Aquatic Invasive Species (AIS) permanently established in relatively pristine parts of European coastal seas;
- Start to assess the share of AIS of total number of selected fauna and flora in specified areas from which relevant basic data are available;
- Evaluate the structural-functional ecosystem response of these areas to AIS.

2. Plan a European-wide port-sampling programme. The first steps may include:

- Evaluation of existing port sampling protocols (e.g. in Australian, USA and demonstration sites of the GloBallast Programme);
- Selection of ports in Europe to carry out such a study.

The Workshop focused specifically on improving biodiversity and ecosystem information for applied resource management in European coastal waters. The workshop also addressed outreach questions (e.g. joint publications) and importantly, how to make the existing and developing invasive species data (databases, including records of aquatic bioinvaders in ports/port regions) available through the OBIS database.

Status reports on ongoing studies of European seas and ports/port regions

Presentations were given by:

Stephan Gollasch (Germany) summarized of the recent HELCOM risk assessment report¹ with emphasis on the lack of data enabling route- and species-specific risk assessments.

Bella Galil (Israel) reported on similar efforts recently initiated for the Mediterranean area.

¹ Leppäkoski E, Gollasch S 2006. Risk Assessment of Ballast Water Mediated Species Introductions – a Baltic Sea Approach, 112 pp. (Submitted to HELCOM Jan. 2006)

Erkki Leppäkoski (Finland) provided an update on the port sampling and risk assessment approach in the Gulf of Finland.

Helge Botnen (Norway) introduced the pilot studies undertaken in three Norwegian ports.

Inger Wallentinus (Sweden) provided details on pilot studies on macroalgae in marinas on the Swedish Skagerrak coast.

Argyro Zenetos (Greece), Anna Occhipinti-Ambrogi (Italy) and Bella Galil (Israel) updated the group with summaries on Mediterranean and Adriatic port sampling programmes, PORTAL Port survey in the Mediterranean for ship-borne alien organisms and on studies performed in Venice harbour.

In the following round table discussions all participants expressed their views and gave brief status reports on European databases and other Internet services (see Table 1). It is obvious that there are several (in part) overlapping Internet resources available or under development meaning that doubling of work and waste of time and other resources cannot completely be avoided.

Tab. 1 Selected European, regional and national initiatives relevant to the workshop objectives.

EUROPEAN INITIATIVES	
European Register of Marine Species (ERMS)	www.marbef.org/data/ermssearch.php
DAISIE - European Alien Species Expertise Registry ¹⁾	daisie.ckff.si
Aquatic Invasions on-line journal ²⁾	www.aquaticinvasions.ru/
ERNAIS Experts Database ³⁾	www.zin.ru/rbic/projects/ernais/searchform.asp
REGIONAL TOOLS	
CIESM Atlas of Exotic Species in the Mediterranean	www.ciesm.org/online/atlas/index.htm
Baltic Sea Alien Species Database	www.ku.lt/nemo/mainnemo.html
NOBANIS North European and Baltic Network on Invasive Alien Species	www.artportalen.se/nobanis/
NATIONAL SOURCES	
ESTONIA Marine Alien Species of Estonia ⁴⁾	www.sea.ee/Sektorid/merebioloogia/eesti/Marine_Alien_Species_of_Estonia.htm

FINLAND Alien species in the Baltic Sea	www.fimr.fi/en/itamerikanta/tietoa/eliot/tulokaslajit.html
LITHUANIA Lithuanian Invasive Species Database	www.ku.lt/lisd/species.html
POLAND Alien Species of Poland	www.iop.krakow.pl/ias
RUSSIA (NW) Alien Species of North-West Russia	www.zin.ru/rbic/projects/iasnwruussia/
SWEDEN Alien Species in Swedish Seas	www.frammandearter.se/index.html

- ¹⁾ presentation given by Sergej Olenin, who encouraged participants to register in the database.
- ²⁾ Stephan Gollasch presented the first issue of the new European journal of applied research on biological invasions in aquatic ecosystems. The journal was launched in January 2006. The goals of the journal are to release at least 2 issues per year with the aim to timely publish new findings of introduced species, technical manuscripts and also to serve as an early warning instrument. Gollasch invited the participants to submit manuscripts to the editors (Stephan Gollasch is responsible for coastal and marine, Vadim Panov for freshwater habitats)
- ^{3 & 4)} presentation given by Henn Ojaveer

Closing of day 1

In the end of day 1 the group findings were summarised. The objectives and workplan for day 2 were discussed.

Day 2, Saturday, March 11th

The following presentations were given in the morning session:

Piotr Gruszka (Poland): Developments of and studies on the Szczecin/ Swinoujście harbour complex.

Sergej Olenin (Lithuania): EU Programme Delivering Alien Invasive Species Inventories for Europe (DAISIE) - its structure and development.

Sergej Olenin (Lithuania): Vulnerability of different habitats based on data from the Curonian Lagoon, Lithuania, and the open SE Baltic Sea.

Development of the proposal

The participants were split into two subgroups to run discussions on the items identified under the Objectives section above with the aim to draft work packages for the suggested research proposal.

Responsibilities for the next steps

The attendees discussed the outcome of group work and agreed upon a preliminary structure of the proposal and the objectives.

Overall objectives

The overall project objectives include

- Quantify the extent of the risk of future human mediated aquatic alien species invasions with special focus on shipping and ports,
- Provide tested tools for biosecurity assessment and management regarding aquatic alien species. This could include modeling approaches,
- Assess and, where possible, quantify “bio-pollution” and the socio-economic impact of human mediated aquatic bioinvasions (with special focus on shipping and ports), and
- Evaluate the suitability of eradication measures.

The following section describes the headings of the work packages (WP) planned at the Workshop, with suggested work package leaders in brackets. The work package details have been removed from this version of the Report. A full report (not to be shared) was made available for all the participants.

Review of the current scope of the project in context of EuroCoML activities as well as in the context of relevant national and commissioned research projects

Various project are currently underway in Europe addressing biological invasions. However, no comprehensive port sampling programme is ongoing or planned in all European Seas. A harmonized port sampling approach is also lacking which does not permit the comparison of sampling results.

Identification of the long-term goals of the proposal

The overall long-term objectives include the development of a European Biosecurity Strategy to minimize future species introductions.

Duration of the project

The workshop attendees suggest that the duration of such comprehensive research programme should in minimum be three years.

Workshops during the lifetime of the project

Various workshops are planned during the entire programme duration starting with a kick-off meeting in the very first project month. It is further planned to held semi-annual

workshops to ensure a proper project development and possibly to adjust the planned work programme.

Training elements within the project

All port sampling teams will be trained to ensure that all samples are taken in a comparable manner to support the ranking of ports according to the "invasability" and also to assess the risk individual ports are exposed to.

Education and outreach

During the project a comprehensive network of taxonomists will be created to allow for verification of species analysis. This network is also supposed to be one tool in the outreach approach, which also may include

- project Internet homepage
- production of project flyer outlining the project objectives
- (Internet based) database on port sampling results
- implementation of an early warning instrument to announce new introduced species and to generate rapid response measures, such as eradication programmes.

Conclusions

The results of both sub-group discussions were discussed and merged in a round table discussion. As a result the core concept of the proposal was agreed by all participants.

The participants believe that the structure of the planned project and its key objectives are well defined. The proposal should be developed further once suitable funding sources are available. Those may include the European Union Framework 7.

Closing of the meeting

The meeting was closed on Saturday, March 11 at 6.00 pm. There was consensus that the workshop was extremely fruitful and productive. It was also agreed that there is an ongoing demand to develop this planned project proposal further.

Both co-chairs thanked the host Francis Kerckhof and the hosting organizations the Fisheries Institute and the Management Unit of the North Sea Mathematical Models, Oostende, Belgium. They also thanked all presenters and facilitators of round table discussions.

APPENDIX

Participants and expertise of the EuroCoML invasive alien species workshop.

Name	Expertise to organism groups	Expertise in bioinvasions	Links to international organisations	Sub-region in Europe
Francis Kerckhof Belgium	Invertebrates, Cirripedia, mollusks	Invasion history	ICES, OSPAR	Atlantic
Henn Ojaveer Estonia	Zooplankton, fish	Ecological impact	ICES, BMB	Baltic Sea
Erkki Leppäkoski Finland	Zoobenthos, all groups of invaders in brackish waters	Ecological impact, invasion history, biogeography	BMB, HELCOM, Nordic bodies	Baltic Sea, European brackish seas
Philippe Gouletquer France	Shellfish	Ecological impact, invasion history, mariculture vs biodiversity	ICES, CBD, EAS	Atlantic coastline & English Channel
Stephan Gollasch Germany	Zooplankton Zoobenthos	Ballast water, treatment systems, risk assessment, ballast water pmanagement, impact of invaders, invasion vectors & vector management, public awareness	ICES, IMO, HELCOM, BMB, IOC, PICES	North and Baltic Seas
Tracy McCollin	Phytoplankton	Ballast water, treatment methods	ICES, IMO	North Sea
Elizabeth Cook	Phyto- and Zoo-benthos	Ecological impact, biogeography, genetic identification of invasion routes, secondary vectors		NE Atlantic
Argyro Zenetos Greece	All marine groups	Biogeography, vectors, impacts, trends	CIESM UNEP-MAP ICES-IMO EEA SEBI2010	Mediterranean, all European seas
Anna Occhipinti	Marine and brackish	Ecological impacts, invasion history,	CIESM ICES	Mediterranean

Italy	water benthos	vectors	RAC-SPA IUCN ISSG	
Bella Galil Israel	Decapod crustaceans	Inventory, biology and impact of alien species, vector studies	CIESM RAC-SPA IUCN ISSG	Mediterranean
Sergej Olenin Lithuania	All marine and brackish water groups	Biogeography, vectors, functional impacts, information system	BMB, IUCN ISSG	Baltic Sea, European brackish seas
Cato ten Hallers- Tjabbes The Netherlands	Molluscs	Invasion-enhancing factors and associated additive and synergistic effects, ballastwater treatment	IUCN-IMO IUCN- Globalast	North Sea, N-E Atlantic
Marcel Veldhuis The Netherlands	Phytoplankton	Ballast water treatment methods	ICES, IMO	Western Europe
Helge Botnen Norway		Ballast water Port surveys Ballast water treatment		Norwegian waters
Piotr Gruszka Poland	Zoobenthos Zooplankton	Vectors, ecological impact	BMB, HELCOM, CCB	Baltic Sea basin
Inger Wallentinus Sweden	Macroalgae & higher plants; phytoplankton in general	Ecological impact, risks, dispersal mechanisms	ICES, BMB	Northern Europe & Baltic Sea; overall distribution in Europe



Discovering the Worlds Near Shore



Environmental Modulation of Biodiversity and Ecosystem Dynamics (EMBED)

Pisa, Italy
April 27-29 2006

Workshop report

Compiled by I. Bertocci, L. Tamburello and L. Benedetti-Cecchi

The workshop was generally considered to be very successful and good progress was made in developing an integrated group and programme of research. The workshop programme (Annex 1) was totally followed. The workshop was well attended, with a total of 27 participants as representative of 13 institutions (contact details listed in Annex 2).

Workshop objectives

The workshop was aimed at achieving the following tasks:

- Clarification of general objectives and sampling protocol of NaGISA project, in order to assure comparability of data from the next sampling activities.
- Development of a research proposal on drivers of change in marine coastal biodiversity

This report will summarise progress made on each of those objectives.

Presentation of NaGISA Sampling Protocol (Brenda Konar)

Brenda gave a presentation of NaGISA Sampling Protocol (available on <http://www.nagisa.coml.org/Protocol.htm>). The discussion following this presentation was devoted at standardising procedures to ensure comparability of data from next sampling activities.

Lisandro indicated that the shape of the sampling units can be adapted to local habitat characteristics. It was acknowledged that in a system characterized by very narrow tidal excursions, such as the Mediterranean, the original 1 m x 1 m (to be used for visual sampling) and 50 cm x 50 cm (to be used for destructive sampling of macroalgae) quadrates would cause sampling to be applied across different habitats. To avoid this problem, it was suggested to use 25 cm (height) x 100 cm (length) units repeated 4 times edge-to-edge and 25 cm (height) x 50 cm (length) units repeated 2 times edge-to-edge in place of the original units. This would maintain the original sampling areas of 1 m² and 2500 cm², respectively.

Some concern was expressed about sorting of samples, an activity extremely time-demanding. Brenda indicated that according to the NaGISA sampling protocol, samples should be sorted directly in the field and that amateurs and students can be involved in this process. Identification of organisms could benefit from the institution of groups of collaboration on taxonomic determination and from participation to taxonomy workshops. Literature and information available from OBIS and MARBEF could also assist. If necessary, samples can be preserved for future determination.

Finally, in consideration of the interest of various European centres in taking part to EuroNaGISA, it was suggested to expand the sampling design in Europe. A larger number of sites can be included, in order to encompass latitudinal as well as tidal gradients (e.g. macrotidal vs. microtidal systems).

Drivers of change in marine coastal biodiversity (John Steele)

John defined the concept of noise colour and presented current knowledge on its ecological applications.

Environmental colour was introduced as a way to describe and distinguish terrestrial and marine environment, where the literature has emphasized physical forces or biological mechanisms as drivers of change, respectively. By analogy with light spectra, John elucidated how different processes show different spectral colour. For instance, data from correlative studies on marine systems, documenting increases of variance of physical variables with increasing spatial or temporal scales, show typical “red” spectra. In contrast, terrestrial studies documented “white” spectra, where the variance of physical variables was independent of their frequency. This could be paralleled by general trends in trophic chains in both environments. Terrestrial systems present long-living primary producers as a potential response to processes characterized by white noise, while the open sea present the longest-living organisms at the highest trophic levels. Switching between ‘red’ and ‘white’ noise (or vice versa) may therefore depend on changes in the relative importance of physical and biological factors. A more complex situation is represented by coastal areas, as they are transitional regions. A number of studies conducted in intertidal habitats or coastal areas to investigate “regime shift” and “alternative stable states” showed both the importance of biological variability and of physical forces in determining the state of the system. Moreover, the observed patterns were functions of the spatial scales investigated.

In conclusion, John indicated environmental colour as a way to quantify terrestrial and marine patterns, and a descriptor of the relationship between physical and biological forcing. In terms of analysing patterns of biodiversity, that means a new definition of the relationship between bottom-up and top-down control.

After the presentation, Lisandro underlined that natural patterns might be considered as the net result of different processes characterized by different spectra of variance. Previous findings indicated that biological variability is larger at small and large spatial scales, in comparison with intermediate scales. This observation might be explained in terms of responses to concomitant processes characterized by different spectral colour, as indicated in detail later (*Structure and rationale of project proposal*). The sampling protocols necessary to address these issues would require the integration of hierarchical and continuous designs, in order to cover large spatial and temporal scales.

Brenda noted that NaGISA activities are intended to sample at large (global) scale, so they could provide useful data to investigate spectra of environmental variance at regional scales. Thus, the possibility arises to build on the NaGISA protocol, by integrating those activities with new data collected continuously at smaller scales. Lisandro noted that this prospect of integration creates a momentum of great implementation for our abilities to describe and interpret patterns of biodiversity. This is in line with what discussed in the last NaGISA meeting in Germany, where the

use of physical covariates to explain variability in biological data was indicated as a possible way to implement future NaGISA activities.

Scaling-up from local to regional patterns (Michael Burrows)

Mike showed the application of noise colour models to scaling-up issues. Starting from the idea that ecological processes include a mix of white or red noise, it becomes necessary to individuate these processes and their scale of action. Mike reviewed studies which were carried out in intertidal habitats to investigate spatial synchrony (correlation at different spatial scales) of temporal fluctuations of different species. Synchrony appeared an exclusive trait of those species whose success depends on processes acting at large spatial scales, while species mainly influenced by local processes do not show spatial correlation. Such patterns can be detected only with appropriate sampling scales.

Jumping to processes operating at the level of population, a relationship between population growth and productivity was detected through hierarchical sampling designs in coastal areas. This analysis suggested that different processes operated at different spatial scales. In addition, the specific processes and their scale of influence that appeared important depended on the response variables chosen to describe population growth.

At the level of assemblages, Mike started from the observation that some exposed rocky shores are characterized by morphologically complex macroalgae, while the same algae are absent on analogously exposed shores. These patterns are likely driven by interactions between physical factors (wave fetch) and biological processes (density of grazers and population structure of macroalgae) operating at different spatial scales.

The best method to detect noise colour would be the statistical analysis of temporal series replicated in space. Then, on the basis of previous knowledge of biotic interactions and of different patterns of dominance at small spatial scales, Mike introduced statistical models aimed at estimating patterns of distribution of the same populations at larger spatial scales. The outcomes of these models await for direct test in the field. However, it was underlined that the models themselves are scale-dependent and they can relate only pairs of spatial scales that need to be chosen *a priori*.

After the presentation, Lisandro underlined the potential use of models to scale-up from local to regional scales. The first point is to investigate the extent to which small-scale processes are repeatable at larger scales. A related issue is to model large-scale patterns as a function of the interaction between small-scale and large-scale processes.

Presentation of EuroCoML (Isabel Sousa-Pinto)

Isabel described the general structure and goals of EuroCoML. Her main focus was on the possibility of submitting requests for funding aimed at organizing workshops and research activities about new ecological issues.

Structure and rationale of project proposal (Lisandro Benedetti-Cecchi)

Lisandro summarized the aims of the workshop and traced the basis of the proposal. Several studies have indicated that variability of rocky shore intertidal organisms is larger at small- (10s-100s cm) and large- (10s-100s km) than at intermediate spatial scales. These patterns could be the result of ecological processes with different “colour”, acting simultaneously and interactively at different scales in space and time. It was proposed that small-scale processes operating with white or blue “spectra” (independent or negatively autocorrelated in space/time) may be *embedded* within

large-scale processes characterized by “red spectra” (positively autocorrelated in space/time). This proposition leads to the prediction that spatial (temporal) heterogeneity in abundance of species can be generated at various scales in space (time) by exposing natural assemblages to processes characterised by different spectra of variability. Heterogeneity in abundance of species is expected to arise over background levels of variability regardless of the specific spatial (temporal) extents at which causal processes are manipulated.

Existing datasets could be used to estimate the spectral exponent of biotic and abiotic variables of interest. It was emphasized that databases like OBIS are central to the development and success of the proposed project and that OBIS in turn might benefit from the provision of new data generated by this proposal. The challenge is to define appropriate methods of sampling to quantify variation of “spectral patterns”. Lisandro underlined the need of adopting a compromise between a hierarchical design, involving analysis of data through ANOVA or generalized models, and a continuous (over time or space) sampling, which could be investigated through spectral analysis.

Discussion about the project proposal

Fred emphasized the need to stick on the NaGISA general design and concept. Lisandro noted that the descriptive part of the present research could benefit from data collected within NaGISA, with spatial patterns examined in terms of variances instead of averages of abundance of organisms. Mike and Stuart suggested to complement these data with new measurements of variability at intermediate scales. This could be done by sampling physical variables continuously, whereas biological variables could be sampled with fast and less detailed methods (i.e. digital photographs), having the potential to be extended to larger spatial scales.

Laura Airoidi noted that correlative data could be affected by the resolution of sampling. The possibility to detect patterns at large spatial scales could be limited by choosing an *a priori* size for the sampling unit. Specifically, the noise colour ascribed to a process may depend on the particular scale at which it is investigated. Lisandro emphasised that the variance spectra of predictive variables should be characterized in advance. Laura replied that identifying variables as large-scale varying and as potentially characterized by red noise could be the effect of an “historical mistake”. For variables that have always been investigated at large spatial scales, small-scale patterns of variability may remain unknown. Brenda suggested to choose plots of the same dimensions of NaGISA sampling units. This would allow to maintain the same resolution of previous studies, so that existing data could be used.

After discussion, it was agreed to subdivide the project into three interlinked approaches:

- 1) *Correlative analysis*, aimed at relating large-scale and small-scale biological variability with environmental variables characterised by different spectra of variability
- 2) *Experimental studies*, aimed at examining the proposition that processes with red spectra of variance (red noise) are the cause of the large-scale variability in abundance of species detected in observational studies, while processes with white spectra (white noise) are responsible for small-scale variability
- 3) *Modelling*, aimed at integrating the other approaches in order to make predictions to be compared with experimental results.

Three issues were identified within these sub-targets, respectively:

- 1) Definition of predictor and response variables, sampling scales and sampling design.
- 2) Choice of systems where hypotheses could be tested.
- 3) Construction of predictions on variables to be tested through experimental studies.

Laura A. suggested that artificial structures could be considered as low physical variability systems, sources of homogeneous assemblages, where hypotheses could be tested by adding complexity. Mike pointed out that this would imply the risk of observing the effects of biological noise more than those of physical noise. Lisandro underlined the importance of undertaking the investigation in different systems in order to assess the generality (or lack thereof) of the proposed

mechanisms. Fabio B. suggested that modelling should represent the linkage between correlative and experimental studies. Subsequent discussion led to lists of forcing functions and biological response variables, as summarized below.

Forcing functions	
physical disturbance	sedimentation
wave energy	turbidity
Temperature	tidal amplitude
Chlorophyll	climate (rainfall, solar radiation, photoperiod)
Nutrients	salinity
topographic complexity	propagule supply
chemical nature of the substratum	pollution

The point consisted in defining which of these processes are characterized by red spectra of variance and at what scales, considering also that some of them (e.g. temperature) vary both at large and small scales. Laura A. underlined that forcing functions with red spectra may not be limited to abiotic variables, but may also include biological processes (i.e. propagule supply). Christos pointed out the importance of establishing a temporal sequence among correlative analyses, modelling and experimental studies. Correlative studies would allow to select red spectra variables, then modelling would generate predictions to be tested through experimental studies. It was also suggested that sampling could be repeated at different times to detect variance of spatial effects across time.

Response variables	
abundance (presence/absence)	resilience
number of species or taxa	biomass
size/growth of selected organisms	mortality of selected organisms
settlement/recruitment	productivity
morphological/functional groups	genetics
β -diversity	

The selection of specific forcing functions and response variables was discussed within sub-groups.

The correlative sub-group was involved in selecting predictor variables capable of explaining variability in abundance and diversity of species at large and small scales in space or time. Due to the availability of existing data and ease of collection of new data, changes in patterns of temperature, concentration of chl-a, availability of nutrients, chemical nature of the substratum, water turbidity, salinity, tidal amplitude and currents were selected among variables changing at large scales, while wave energy and topographic complexity were selected within those varying at smaller scales. Measures of abundance, presence/absence of individual taxa, number of taxa, size and reproductive status of selected organisms were included among the response variables whose patterns of variation could be correlated to the predictor variables listed above. It was emphasized that these correlative analyses would make extensive use of existing databases like OBIS, also contributing to their expansion.

The experimental sub-group started from the general prediction that spatial (temporal) heterogeneity in response variables can be generated at various scales in space (time) by exposing natural habitats to processes characterised by different spectra of variability. The general experimental design proposed consisted in the manipulation of red and white spectra of variability in factorial combinations. These will be treated as fixed effects and will be applied to replicated patches of substratum. Whether white and red noise will be manipulated in space or time and the specific processes used to generate noise will depend on the specific habitat considered. Large-scale processes characterized by red spectra of variability amenable to experimental manipulation include removal of dominant species on exposed rocky shores and in seagrass beds, addition of nutrients, manipulation of boulders and of the regime of grazing in rockpools, manipulation of sedimentation in subtidal habitats. Small-scale processes characterized by white spectra of variability include mechanical disturbance by waves in intertidal habitats, other disturbances in seagrass beds, changes of the topography of the substratum on artificial structures.

Modelling sub-group stated that this activity should follow the other two components of the study, with the primary goals of filling any gaps due to spatial (temporal) scales not investigated by correlative and experimental studies and of making predictions on responses of organisms to specific combinations of red and white spectra of variability of ecological processes. These will be compared with experimental findings.

A formal research proposal on the above issues is under preparation and will be submitted to local and international funding agencies.

Conclusion

The proposed research will expand current activities of EuroNaGISA and EuroCoML by their implementation with tests of new hypotheses on drivers of change in coastal biodiversity. More generally, it will contribute to overall CoML objectives in that its ultimate goal is that of increasing our ability to assess and explain the diversity, distribution and abundance of marine life in the oceans. These activities are strongly linked to the general NaGISA project and would contribute to the use and implementation of the OBIS database.

The workshop generated good integration among participants, with intriguing discussions. Organization of work into sub-group discussions and general summarizing moments guaranteed stimulating participation and high level of integration. This was strengthened by social events enjoyed by all. At the end, there was general consensus and optimism on EMBED to be a successful and productive workshop.

List of Participants:

NAME	INSTITUTION	ADDRESS	e-mail
Airoldi Laura	Università di Bologna	Via S. Alberto 163, Ravenna, Italy	laura.airoldi@unibo.it
Arvanitidis Christos	Hellenic Centre for Marine Research	Former American Base of Gournes, Heraklion, Greece	arvanitidis@her.hcmr.gr
Balata David	Università di Pisa	Via A. Volta 6, 56126 Pisa, Italy	balata@discat.unipi.it
Balestri Elena	Università di Pisa	Via A. Volta 6, 56126 Pisa, Italy	balestri@discat.unipi.it
Bertocci Iacopo	Università di Pisa	Via A. Volta 6, 56126 Pisa, Italy	iacbertocci@discau.unipi.it
Benedetti-Cecchi Lisandro	University of Pisa	Via A. Volta 6, 56126 Pisa, Italy	bencecc@discat.unipi.it
Buchholz Fred	AWI - BAH	27498 Helgoland, Germany	fbuchholz@awi-bremenhaven.de
Bulleri Fabio	Università di Pisa	Via A. Volta 6, 56126 Pisa, Italy	fbulleri@discau.unipi.it
Burrows Mike	SAMS	Dunstaffnage Marine Lab., Oban, Argyll, PA37 1QA, Scotland	mtb@sams.ac.uk
Castelli Alberto	Università di Pisa	Via A. Volta 6, 56126 Pisa, Italy	castelli@discat.unipi.it
Fraschetti Simonetta	Università di Lecce	Strada provinciale Monteroni, 73100 Lecce, Italy	simona.fraschetti@unile.it
Incera Monica	Università di Pisa	Via A. Volta 6, 56126 Pisa, Italy	mincera@discau.unipi.it
Jenkins Stuart	MBA	MBA, Plymouth, PLI2PB, UK	sjen@mba.ac.uk
Konar Brenda	University of Alaska, Fairbanks	PO757220 VAF Fairbanks AK USA 99775	bkonar@guru.naf.edu
Kotta Jonne	Estonian Marine Insitute	Mäealuse 10a, Tallinn, Estonia	jonne@sea.ee
Lardicci Claudio	Università di Pisa	Via A. Volta 6, 56126 Pisa, Italy	lardic@discat.unipi.it
Maltagliati Ferruccio	Università di Pisa	Via A. Volta 6, 56126 Pisa, Italy	maltagli@discat.unipi.it
Martin Georg	Estonian Marine Insitute	Mäealuse 10a, Tallinn, Estonia	georg.martin@ut.ee
Maggi Elena	Università di Pisa	Via A. Volta 6, 56126 Pisa, Italy	maggie@discau.unipi.it
Rindi Fabio	University of Alabama	P.O. Box 870345, 500 Hackberry Lane, 425 Scientific Coll. Bldg, Tuscaloosa, AL 35487-0345, USA	fabio.rindi@NUIGALWAY.IE
Ronowicz Marta	Insitute of Oceanology, PAS	Powstancow Warszawy 55, 81-712, Sopot, Poland	martigor1@o2.pl
Sousa Pinto Isabel	CIMAR	Rua Dos Bragas, 289 Porto, Portugal	ispinto@cimar.org
Steele John	Woods Hole Oceanographic Institution	Woods Hole MA 02543 USA	jsteele@whui.edu
Tamburello Laura	Università di Pisa	Via A. Volta 6, 56126 Pisa, Italy	laura.tamburello@discau.unipi.it
Vallerini Flavia	Università di Pisa	Via A. Volta 6, 56126 Pisa, Italy	vallerini@discat.unipi.it
Vasileiadou Katerina	Hellenic Centre for Marine Research	Former American Base of Gournes, Heraklion, Greece	k.vasileiad@gmail.com

Role of participants in the workshop

NAME	CONTRIBUTION
Laura Airolidi	Writing of Tasks 2 & 3 in WP3
Christos Arvanitidis	General discussion on the structure of the project and support to NAGISA sampling
David Balata	General discussion on the structure of the project
Elena Balestri	Writing of Tasks 3 in WP3
Iacopo Bertocci	Local organizer; contribution to WP 1
Lisandro Benedetti-Cecchi	Local organizer and coordinator; writing of general introduction and WP 3
Fred Buchholz	General discussion on the structure of the proposal and support to NAGISA sampling
Fabio Bulleri	Leader of WP 1
Mike Burrows	Leader of WP 2
Alberto Castelli	General discussion on the structure of the project
Simonetta Frascchetti	Writing of Task 1 in WP 3
Monica Incera	General discussion on the structure of the project
Stuart Jenkins	Leader of WP 3; writing of Task 4 in WP 3
Brenda Konar	Presentation of NAGISA
Jonne Kotta	General discussion on the structure of the project
Claudio Lardicci	General discussion on the structure of the project
Ferruccio Maltagliati	General discussion on the structure of the project
Georg Martin	General discussion on the structure of the project
Elena Maggi	Local organizer and writing of WP 1
Fabio Rindi	General discussion on the structure of the project
Marta Ronowicz	Writing of Task 1 in WP 3 and contribution to NAGISA sampling
Isabel Sousa Pinto	Presentation of Euro-CoML and contribution to NAGISA sampling
John Steele	Presentation of concepts of environmental noise; writing part of the background of the proposal
Laura Tamburello	Local organizer; general discussion on the structure of the project
Flavia Vallerini	General discussion on the structure of the project
Katerina Vasileiadou	General discussion on the structure of the project

Some pictures taken during the workshop.







Appendix III

The people listed below have participated in one of the following workshops: Alien Invasive Species, Environmental Modulation of Biodiversity and Ecosystem Dynamics, European Tracking of Predators in the Atlantic and Human-environment interactions in the Mediterranean Sea since the Roman period until the 19th century most prior to this were not involved in CoML.

Francis Kerckhof, Belgium
Erkki Leppäkoski, Finland
Philippe Gouletquer, France
Stephan Gollasch, Germany
Tracy McCollin, UK
Elizabeth Cook, UK
Argyro Zenetos, Greece
Anna Occhipinti, Italy
Bella Galil, Israel
Sergej Olenin, Lithuania
Cato ten Hallers-Tjabbes
Marcel Veldhuis, The Netherlands
Helge Botnen, Norway
Piotr Gruszka, Poland
Inger Wallentinus, Sweden
Laura Airoidi, Italy
Christos Arvanitidis, Greece
David Balata, Italy
Elena Balestri, Italy
Iacopo Bertocci, Italy
Lisandro Benedetti-Cecchi, Italy
Fred Buchholz, Germany
Fabio Bulleri, Italy
Mike Burrows, UK
Alberto Castelli, Italy
Simonetta Frascchetti, Italy
Monica Incera, Italy
Stuart Jenkins, UK
Brenda Konar, USA
Jonne Kotta, Estonia
Claudio Lardicci, Italy
Ferruccio Maltagliati, Italy
Georg Martin, Estonia
Elena Maggi, Italy
Fabio Rindi, USA
Marta Ronowicz, Poland
Isabel Sousa-Pinto, EuroCoML Executive Committee; Portugal
John Steele, USA
Laura Tamburello, Italy
Flavia Vallerini, Italy
Katerina Vasileiadou, Greece

David Sims, UK
Julian Metcalfe, UK
Bernie McConnell, UK
Ken Has Andersen, Denmark
Francis Daunt, UK
Pedro dos Santos, Azores – Portugal
Jean-Marc Fromentin, France
David Gremillet, France
Steve Groom, UK
Graeme Hays, UK
Paolo Luschi, Italy
Bhavani Narayanaswamy, EuroCoML Project Officer, UK
Stefan Neuenfeldt, Denmark
Leif Nottestad, Norway
Richard Phillips, UK
David Righton, UK
Ricardo Serrao Santos, Azores – Portugal
Sarah Wanless, UK
Rory Wilson, UK
Poul Holm, Denmark
Ruthy Gertwagen Israel (Ws Organizer)
Andea Ballock, France
Tønnes Bekker-Nielsen, Denmark
Lisa Botter, Italy
Marta Coll, Spain
Jose-Luis.Cortes, France
Stefan Claesson, USA
Oliver Craig, Italy
Maria Lucia De Nicolò, Italy
Dimitris Dimitropoulou, Greece
Sabine Florence Fabijanec, Croatia
Katia Fragoudes, France
Alfons Garrido Escobar, Spain
Otello Giovanardi, Chioggia, Italy (Local Organizer)
Simone Libralato, Italy
Fabio Massa, Italy
Henn Ojaveer, EuroCoML Executive Committee; Estonia
Evdokia Olympitou, Greece
Fabio Pranovi, Italy
Saša Raicevich, Italy (Local Organizer).
Cosimo Solidoro, Italy
Kostas Stergiou, Greece
Athena Trakadas, UK.
Karl Ernst von Baer (University of Natural Sciences, Estonia) working with HMAP.