DEVOTES-EUROMARINE Summer School

`Integrative assessment of marine systems: the Ecosystem Approach in practice´

9th to 11th June 2015 - Aquarium of Donostia- San Sebastián (Spain)

This FP7 DEVOTES project course falls into the first scientific priority and emerging fields identified by the FP7 EuroMarine programme (Understanding marine ecosystems for healthy oceans). Additionally, it could be considered one of the six 'emerging fields' identified: "Complex interactions including tipping points, regime shifts and shifting assemblages in marine ecosystems", since the management of marine ecosystems require a deep understanding of: (i) the complex interactions between human pressures and ecosystem responses; (ii) the interactions between the multiple ecosystem components, often non-linear by nature; (iii) the shifting baselines of the targets used to assess environmental status, underlying different components of global change; (iv) the pluridisciplinary dimension of ecosystem management (including the scientific diversity among managers and scientists) and (v) the need to address both socio-economic and environmental issues.

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Directors:

Dr Angel Borja, AZTI-Tecnalia (Spain)

www.researchgate.net/profile/Angel_Borja/?ev=hdr_xprf
Coordinator of the European 7th FP DEVOTES project (Development of innovative tools for understanding marine biodiversity and assessing good environmental status: www.devotes-project.eu).

Dr Samuli Korpinen and Dr Anna-Stiina Heiskanen, SYKE (Finland)

Context and Objectives:

This is the 12th AZTI's Marine Research Division Summer School and the third one organized within the European FP7 project "DEVOTES" (Development of innovative tools for understanding marine biodiversity and assessing good environmental status: www.devotes-project.eu), in which most of the teachers of this Summer School are involved.

This FP7 DEVOTES project course falls into the first scientific priority and emerging fields identified by the FP7 EuroMarine programme (Understanding marine ecosystems for healthy oceans). Additionally, it could be considered one of the six 'emerging fields' identified: "Complex interactions including tipping points, regime shifts and shifting assemblages in marine ecosystems", since the management of marine ecosystems require a deep understanding of: (i) the complex interactions between human pressures and ecosystem responses; (ii) the interactions between the multiple ecosystem components, often non-linear by nature; (iii) the shifting baselines of the targets used to assess environmental status, underlying different components of global change; (iv) the pluridisciplinary dimension of ecosystem management (including the scientific diversity among managers and scientists) and (v) the need to address both socio-economic and environmental issues.

This course also addresses technical developments or methodological issues, such as those linked to the different methods needed to assess the marine ecosystem status in an integrative way (under an ecosystem-based approach), approaches needed to aggregate information at multiple scales (spatial, temporal, across ecosystem and biodiversity components, etc.) or new monitoring methods needed to get cost-effective tools to assess the status of marine ecosystems (e.g. using genomic tools, acoustic devices, etc.). This way, the course build across the 3 primary communities included in Euromarine: EUR-OCEANS (because of the strong management and scientific background of the course), Marine Genomics Europe (because of the important development in DEVOTES linked to genomics at different biodiversity levels, that will be included in the course) and MARBEF (because of the importance of biological components in assessing the status of marine waters, as highlighted in this course). This represents a positive networking role of the summer school, bringing together different members of those communities with a common objective.

The attendees (PhD students, post-docs and researchers aimed to look at new tools on integrative assessment) will acquire new knowledge on recent trends in marine research, related to management of our oceans. This course will explore the potential and recent advances in the integrative assessment of marine systems (based upon strong new monitoring tools, such as genomics), including the various ecosystem components (from plankton to marine mammals), at different scales (from water bodies to regional seas), in management applications (e.g. to the European Marine Strategy Framework Directive (MSFD), the Water Framework Directive (WFD), etc.). Hence, the main objective of the school is to give an overview on the integrative assessment to ocean and coastal management using an ecosystem approach view.

Dates: 9th to 11th June 2015, coinciding with the week of the Oceans' Day on 8th June

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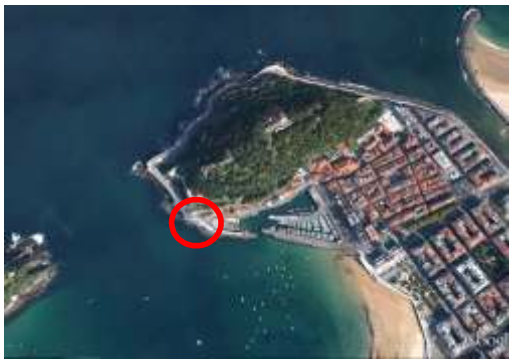
Venue: Aquarium of San Sebastián (Spain)



Registration Fees:

Early-bird registration (until 30th April)	80 €
Early-bird student registration (until 30th April)	65 €
Standard registration (from 1st May to 3rd June)	110 €
Standard student registration (from 1st May to 3rd June)	90 €

Registration from 20th January to 3th June

Programme and contents of the lectures

Monday 8th June:

- **18:00-21:00 Registration and Ice-breaking** (drinks and snacks, with a guided visit to the Aquarium on the Oceans Day)

Tuesday 9th June: Introduction to the topic

- **9:00-10:00 The need of assessing the status of oceans and seas** (*Angel Borja, AZTI, Spain*).

  Oceans and seas are impacted by multiple human pressures, produced by different marine activities (shipping, fishing, mining, discharges, etc.). Different legislation worldwide tries to fight against these impacts, changing the paradigms of management towards an ecosystem-based approach. This requires an adequate assessment of the environmental status, to determine the health of marine ecosystems in an integrative way.

- **10:00-11:00 Understanding the response of marine systems to human pressures** (*Mike Elliott, University of Hull, UK*).

  Using examples and the underlying theory, this will show the links from societal drivers to activities to pressures to state changes on the natural system and then to impacts on the welfare of society. It will show the trajectories of degradation and then trajectories of recovery and will reflect on the adequacy of our understanding of these for marine management.

- **11:00-11:30 Coffee Break** (attendees posters displayed in the coffee room)

- **11:30-12:30 Designing cost-effective environmental monitoring for adequate ecosystem assessment** (*Sabine Cochrane, Akvaplan-NIVA, Norway*).

  The need for monitoring of marine ecosystem status is clear, but deciding on exactly what to monitor, where to monitor it, how much and how often is not always so obvious. During this part of the course we will look at the various aims of monitoring in different environments and outline the various theoretical and practical options available. We will then work through the decision processes required to build a tailored monitoring programme, and address cost-efficiency. The question of "how good is good enough" applies to both the rigour of the monitoring programme and the environmental status. We will finish by understanding the issues of temporal and spatial scales that influence the setting of environmental targets and implementation of management measures.

- **12:30-13:30 Monitoring different ecosystem components using innovative genomic approaches** (*Naiara Rodríguez-Ezpeleta, AZTI, Spain*).

  Genomic based monitoring tools are promising as they can provide fast, cost-effective and accurate measures of biodiversity and of organismal adaptation to changing environments. Yet, due to the novelty of this approach, the integration of genomics in regular monitoring programs is still to come. During this talk, I will provide an overview of the genomic methods relevant to monitoring biodiversity and review successful case studies covering a broad range of taxonomic groups and environments.

- **Break for lunch**

- **17:00-20:00 Interactive session with the participants:** Workshop on 'what do we mean by marine environmental health, how do we measure that a system is healthy and how do we communicate this to a non-specialised audience'. Chaired by Mike Elliott (UK), and assisted by the remainder professors. This will enable discussion of the similarities in philosophy between human and environmental health and pathologies, and then consider the reduction to health at all levels of biological organisation from the cell to the ecosystem. Following this, participants will consider the best available techniques and approaches for determining marine individual, population, community and ecosystem quality. Finally, participants will be challenged to show how they can communicate these ideas to non-specialists (e.g. politicians, managers).

Wednesday 10th June: Methods to assess the status in marine waters

- **9:00-10:00 The Ocean Health Index at global and regional scale** (*Benjamin Halpern, University of California, Santa Barbara, USA*).

  Sustainable management aimed at maintaining the flow of a broad range of benefits from the ocean requires a comprehensive and quantitative method to measure and monitor the health of coupled human–ocean systems. We created an index comprising ten diverse public goals for a healthy coupled human–ocean system and calculated the index for every coastal country or region. The index presented here provides a powerful tool to raise public awareness, direct resource management, improve policy and prioritize scientific research.

- **10:00-11:00 Having a look behind the Ocean Health Index curtains** *(Melanie Frazier, University of California, Santa Barbara, USA).*

  We will explore the toolbox to calculate the Ocean Health Index, with examples of applications in different regions of the world.

- **11:00-11:30 Coffee Break** (attendees posters displayed in the coffee room)

- **11:30-12:15 Ecosystem health of the Baltic Sea: converging tools for eutrophication, biodiversity and chemical status to an integrative assessment of the Environmental Status** *(Jesper H. Andersen, NIVA-Denmark, Denmark)*.

  Ecosystem health of the Baltic Sea has been assessed for the period 2003-2007 based on a wide range of indicators. The HELCOM Ecosystem Health Assessment Tool (HOLAS), which based on simple and transparent assessment principles, aggregates indicators leading to an integrated assessment of environmental status. The integrated assessment builds upon indicators and assessment tools developed for thematic assessments of 'eutrophication status', 'chemical status' and 'biodiversity status'. This presentation will highlight the development of tools with special emphasis on the assessment principles and the current status of the Baltic Sea.

- **12:15-13:00 Understanding and using web based tool to assess status of marine biodiversity according to the Marine Strategy Framework Directive developed by MARMONI project** *(Georg Martin, University of Tartu, Estonia).*

  Indicator based Tool for assessment of status of marine biodiversity following the requirements of MSFD was developed to utilize the number of indicators developed by MARMONI project alongside with existing operational indicators available from national monitoring programs. Tool has capacity to perform single indicator assessment and further aggregation of the assessment result to the other hierarchical levels prescribed by MSFD utilizing very different types of indicators. During the lecture the basic principles of the Tool will be described and tested on the four datasets from the MARMONI project pilot areas. Recommendations on interpretation of the assessment results will be discussed using practical examples and assessment requirements coming from different policy instruments (MSFD, HD, HELCOM BSAP).

- **13:00-13:45 Assessing cumulative anthropogenic impacts on the marine ecosystem: progress in Europe and interesting challenges** *(Samuli Korpinen, SYKE, Finland).*

  Awareness on the pressures caused by human activities is important for planning cost-effective measures to achieve good environmental status of the seas. Increasing use of the sea area for shipping, tourism, energy production and exploitation of biotic and abiotic resources has exerted more pressures on the well-being of the ecosystem and maintenance of the ecosystem goods and services. Quantitative estimates of the pressures and, particularly, their impacts on species and habitats are difficult to produce, but methods and good practices have been recently published and there are a few independent approaches in Europe which have now been reviewed and their synergies analysed.
- **Break for lunch**

- **16:00-17:00 Presentation of posters and discussion in the coffee room**

- **17:00-20:00 Round-Table with the professors on assessment tools. Open discussion with the attendees**

- **20:00-23:00 Social dinner** (to be paid separately)

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Thursday 11th June: Assessing the status and measuring uncertainty

- **9:00-10:00 The DEVOTES tool to assess the biodiversity status within the European seas** *(Torsten Berg, Marilim, Germany).*

  The DEVOTES tool for biodiversity assessment embeds indicators into a conceptual ecosystem model. This supports a meaningful selection of indicators and a gap analysis with respect to completeness of the set of indicators. It also eases finding the appropriate way of synthesizing indicators into the overall biodiversity assessment and helps assessing uncertainty. A question-driven approach of the tool allows to focus on the relevant biodiversity components.

- **10:00-11:00 Investigating the uncertainty of assessment methods: from indicators to overall assessments** *(Jacob Carstensen, Aarhus University, Denmark).*

  Uncertainty is an inherent component of assessing environmental status and it is important to quantify the confidence in an assessment. Indicators, derived from statistical analyses and models of monitoring data, include multiple sources of uncertainty. This presentation gives a framework for relevant uncertainty components at the indicator level, exemplifies how they can be quantified and demonstrates their propagation at multiple steps towards the overall integrated assessment.

- **11:00-11:30 Coffee Break**

- **11:30-12:30 The interest of assessment tools for stakeholders and managers: the perspective of regional seas** *(Anna-Stiina Heiskanen, SYKE, Finland).*

  How are the assessment tools used by managers and stakeholders? Managers need to know if the measures to improve the status on marine environment have desired impacts and how much more effort would be needed to reach the 'good environmental status'. What is the level of detail, precision, and simplicity needed? Depending on the stakeholders and their questions, there can be many information needs where different assessment tools could be used. These questions will be discussed using some examples from the regional seas.

- **12:30-13:30 Integrating information to assess the status under an ecosystem approach management** (*Angel Borja, AZTI, Spain*).

  Taking into account the ecosystem components to be addressed when assessing the status (e.g., biological, chemical, physical), the numerous biodiversity elements to be assessed (e.g., from microbes to sea mammals), the different indicators needed to be studied, and the different assessment scales to be undertaken (e.g., from local to regional sea scale), some criteria to define spatial scales and some guidance on aggregating and integrating information is needed.

- **End of the course**