



# ICES Training programme

The International Council for the Exploration of the Sea (ICES) offers courses led by high-profile scientists and instructors. Visit the Training web page: [www.ices.dk/iceswork/training/training.asp](http://www.ices.dk/iceswork/training/training.asp).

## Approaches to the Integrated Assessment of Status and Trends in Marine Ecosystems

### Context and level

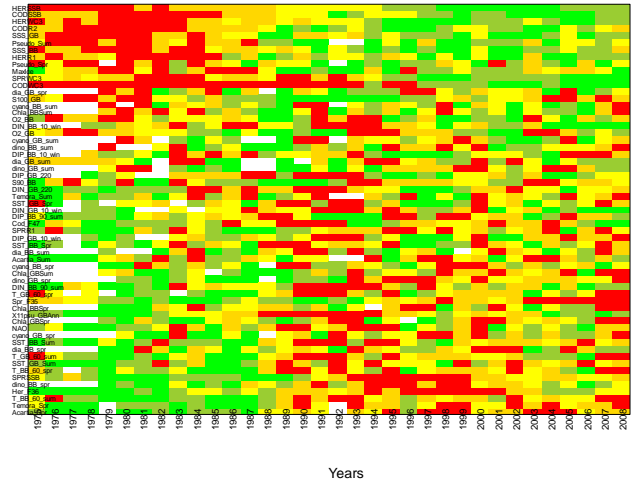
Key elements in supporting the Ecosystem Approach to Management (EAM) of marine resources are assessment, monitoring and scientific research, which provide a sound basis for identifying ecological and associated operational objectives, selecting indicators, and identifying reference points. Furthermore, "Evaluating the Ecosystem Status" is one of the pre requisites for management within the EAM and requires the description of the ecosystem, based upon knowledge of ecosystem structure, functioning and environmental quality.

This course will give an introduction to integrated ecosystem analyses, ranging from ecological theories, data collection needs and handling, to the application of descriptive and inferential statistical techniques describing the temporal dynamics of the ecosystem state. Furthermore, possibilities to identify important environmental and anthropogenic drivers from multivariate data and complex ecosystems will be elaborated. The course will finally provide easy-to-use guidelines how to approach ecosystem analyses across multiple trophic levels.

### Objective

The course has two major goals: 1) Participants will get the necessary ecological background to perform a sound integrated ecosystem analysis. They should be able to make a reasonable data selection based on a number of criteria, prepare (i.e. transform or standardize) the data appropriately, and use various statistical techniques to describe the ecosystem. Here a number of multivariate and time-series tools will be applied (e.g. direct and indirect gradient analyses (PCA, RDA etc.), STARS, Chronological Clustering, MAFA); 2) Participants will be familiar with interpreting multivariate ecosystem analyses correctly and with performing analyses to identify the potential driving forces. Based on this knowledge and the evaluation of potential indicators and

Variables (sorted by their loading or



threshold levels, participants should be able to give recommendations on the EAM.

### Course dates

17-19 October 2011

### Venue

International Council for the Exploration of the Sea  
 H. C. Andersens Boulevard 44-46  
 DK-1553 Copenhagen V  
 Denmark  
 Tel: +45 3338 6700  
 Fax: +45 3393 4215  
[info@ices.dk](mailto:info@ices.dk)

You can find more information about:  
 ICES HQ [here](#), Hotels close to ICES [here](#)  
 The hostel next to ICES [here](#)

### Fee

The fee for the course is €300. This covers only tuition fee.

### Organization

The course is organized by the ICES Secretariat as part of the ICES Training programme.

The course and course materials are provided by Dr. Rabea Diekmann (University of Hamburg) and Professor Christian Möllmann (University of Hamburg). The course includes applied examples, case studies and hands-on exercises.

Participants are required to bring their own laptops (Mac with virtualization is OK) to connect to the ICES network, and also to have R (freely downloadable from <http://www.r-project.org/>) installed prior to arrival.

All documentation will be available on a SharePoint site.

### Admission and registration

The course is designed for a maximum of 25 participants. The working language is English.

Exercises will be performed in MS Excel and the open-source software R, which means that participants must have a basic understanding how to make calculations and scientific graphs in R. In order to be able to follow the condensed course material participants should be on the PhD student level or above and should have a good numerical background. Admission to the course will be given in the order of registrations. However, scientists, who are able to show that they plan to apply the methods directly, can get priority.

Please register online:

[www.ices.dk/iceswork/training/registration/](http://www.ices.dk/iceswork/training/registration/)

The deadline for the submission of applications is

3 September 2011.

### Programme

The three-day course is organized as a combination of lectures and exercises. In the beginning lecturers will give background information about the Ecosystem Approach to Management and the role of integrated ecosystem analyses within the framework. Furthermore, theoretical ecological concepts about ecosystem functioning, resilience and regime shifts will be introduced. In a second step the methodological approaches and statistical background will be explained. This will be followed by exercises evaluating the ecosystem status of a theoretical example. Finally this example will be used to perform an integrated ecosystem assessment at various levels of complexity and give a concluding evaluation about observed ecosystem dynamics, sudden changes and trophic interactions.

#### Day 1:

1. Lecture (1.5h): Introduction to different approaches of ecosystem-based management and the role of integrated ecosystem analyses of status and trends

2. Lecture (1h): How to apply Integrated Ecosystem Analyses in EAM → A perspective from the Baltic Sea
3. Lecture (1h): Requirements for performing Integrated Ecosystem Analyses
4. Exercise: Data selection and handling, exploration, preparations for multivariate analyses, first steps in order to perform time-series analyses of single variables

#### Day 2:

5. Lecture (1.5h): Ecological theories about ecosystem dynamics, trophic interactions, regime shifts and resilience
6. Lecture (2h): Direct and indirect gradient analyses and their use in IEAs: Statistical background
7. Lecture (0.5h): How to perform gradient analyses in R
8. Exercise: Application of gradient analyses on virtual or (if requested) real datasets

#### Day 3:

9. Lecture (2.5h): Time series analyses to investigate (1) sudden changes, (2) common trends, and (3) the effects of explanatory variables on multivariate data: Statistical background
10. Exercise: Perform time series analyses on virtual or (if requested) real datasets
11. Presentations: How did marine ecosystems develop: A summary of the results and interpretations given by participants
12. Discussion: How to implement the outcome of integrated ecosystem analyses in the EAM

### Instructors

Dr. Rabea Diekmann, Institute for Hydrobiology and Fisheries Science, University of Hamburg, Germany, Email: [rabea.diekmann@uni-hamburg.de](mailto:rabea.diekmann@uni-hamburg.de)

Professor Christian Möllmann, Institute for Hydrobiology and Fisheries Science, University of Hamburg, Germany, Email: [christian.moellmann@uni-hamburg.de](mailto:christian.moellmann@uni-hamburg.de)

### Contact ICES Secretariat for more information

Coordinator for Training

Tel: (45) 33 38 67 52

Email: [mailto:training@ices.dk](mailto:mailto:training@ices.dk)