18-month report covering the period 1 December 2002 – 31 May 2003

Characterisation of the Baltic Sea Ecosystem (CHARM)

Contract EVK3-CT-2001-00065

Introduction

This report is divided into an administrative part and a technical part. The administrative part includes status and progress from the project Characterisation of the Baltic Sea Ecosystem (CHARM) – Contract EVK3-CT-2001-00065, covering the period 1 December 2002 to 31 May 2003. The technical part includes details on the progress of work carried out in the work packages.

Administrative part

Generally, there has been a good activity over the past 6-month period in the project. A major milestone was the second CHARM workshop, which was held at the Isle of Vilm, Germany. The workshop was organised by EMAUG, partner no. 11. It was my clear impression that the workshop was a success not only because accommodation and the content of programme created a useful frame for the many presentations, group meetings, etc, but there were clear signals of a growing optimism among the partners suggesting that the project as a whole can and will meet the objectives despite their complicated nature. A brief status on current events includes:

- The delayed deliverables are now on schedule and progress for the work is on time.
- The third annual workshop has been announced on the homepage. The workshop will be held during 23-25 August 2004 in Tallin, Estonia and will be organised by The Estonian Marine Institute, partner no. 7.
- In addition to the activities described in the DoW, a workshop was carried out in Finland during March 2003 on zoobenthos. The workshop was organised by partner no. 2, and minutes from the workshop are presented on the CHARM homepage. In addition to this, another more informal discussion meeting will take place in August 2003 during the Baltic Sea Science Congress in Helsinki, Finland.
- In addition to the activities described in the DoW, a small workshop on phytoplankton will be held during July in Klaipeda. The workshop will be organised by partner no. 5. Another small workshop is planned in October 2003 and will be held in Italy organised by partner no. 4.

1. Objectives

The overall objective of CHARM is to develop, test and validate a methodological approach to characterise type areas of the Baltic Sea coastal ecosystems and study the dynamics and function of these areas in relation to anthropogenic pressures. This study has been developed to provide a scientific foundation for fulfilling the requirements of the EC Water Framework Directive (WFD). The following key issues are addressed:

- Development of a common methodology for establishing coastal types in the Baltic Sea
- Identification of the key factors triggering ecosystem alteration and their relative importance

- Identification of the key indicators for ecosystem functioning in relation to alteration of the coastal ecosystems
- Development of quantitative ecological relationships and empirical models that describe the relationship between anthropogenic pressure and key indicators in the coastal zone
- Derive ecological reference conditions for Baltic coastal water bodies
- Development of recommendations for new monitoring strategies for Baltic Sea coastal ecosystems based on the developed typology, reference conditions and key indicators

2. Status for delayed deliverables

A draft of the state-of-the-art monitoring report is now on the homepage (deliverable no. 8)

3. Status for deliverables

Below is inserted a section of the "Description of Work" document from CHARM (page 28) now including the status of the first 13 deliverables with deadlines at or before month 18. In addition to this, deliverable 15, scheduled deadline month 20, and deliverable 23, scheduled deadline month 24, are now completed and the results are presented on the Web page.

Out of the 13 deliverables planned for the first 18-month period, 11 are done. There are minor parts of deliverables 11 and 12, which are delayed.

Deliver-able no.	Deliverable title	Delivery date	WP no.	Dissemination level	Status
1	Workshop 1	Month 1	7	PU	done
2	Compilation of mailing list of authorities	Month 1	1	PU	done
3	Quality controlled data sets for surface sediments, phytoplankton, macrophytes, benthic fauna and water chemistry	Month 6	1-5	PU	done
4	Morphometrical inventory of the Baltic	Month 6	1	PU	done
5	Project web site	Month 6	7	PU	done
6	Report to the Commission	Month 6	1-7	PU	done
7	Draft of scientific paper on benthic monitoring data	Month 12	4	PU	done
8	Report on state-of-the-art monitoring	Month 12	6	PU	delayed
9	Map of sediment characteristics of the Baltic coastal zone	Month 12	1	Da	done
10	Report to the Commission	Month 12	1-7	PU	done
11	Analysis of benthos vs. environmental gradients	Month 18	4	PU	delayed
12	Forcing data for hydrodynamical modelling	Month 18	1	PU	delayed
13	Report to the Commission	Month 18	1-7	PU	done

4. Comments on delayed deliverables and progress for the work to be carried out

The missing details on deliverables no. 11 and 12 will be collected during the autumn 2003.

5. Other plans

In general, progress for the coming deliverables seems to be on schedule. I have noticed that a number of activities have already started, and I expect that both the two delayed deliverables and the coming deliverables no. 14 to 24 will be fulfilled in the next annual report.

Technical part

Work package 1

Task 1.0: Forcing data for hydrodynamical modelling – deliverable no. 12

First it was agreed that Surfer should be the program used to display data and modelling results on maps. A base map with a high-resolution coastline (1 x 1 km and 100 x 100 m) for the entire Baltic Sea was available at the Baltic Sea Research Institute Warnemuende (IOW). A depth model (with a resolution of 2 x 1 nautical mile) which is needed for modelling could also be provided by the IOW.

The data used for hydrodynamical modelling was supplied by the Department of Systems Ecology, Stockholm University, Sweden. It was stored in the Baltic Environmental Database (BED). Different research institutes contributed to BED by providing data from several monitoring programs. They all had to be contacted and requested for permission to use their data.

The following institutes gave permission:

1. Atlantic Scientific Research Institute of Marine Fisheries and Oceanography (AtlantNIRO)
2. Danmarks Miljøundersøgelser (National Environmental Research Institute)
3. Estonian Marine Institute in Tallinn
4. Finnish Environmental Institute (SYKE)
5. Swedish Meteorological and Hydrological Institute (SMHI)
6. Institute of Meteorology and Water Management, Gdynia
7. Marine Monitoring Centre of Institute of Aquatic Ecology, University of Latvia
8. Morski Instytut Rybacki, Sea Fisheries Institute
9. Stockholms Marina Forskningscenter (Stockholm Marine Research Centre)
10. Stockholms Vatten (Stockholm Water)
11. Baltic Sea Research Institute (IOW)

The delivered data set needed to be calculated and sorted in order to be displayed on Surfer maps. A spatial distribution of salinity classes in the Baltic Sea could be achieved by interpolation whereas only surface waters were regarded.

The Finnish Environment Institute (SYKE) supplied ice cover data in the form of a map. The ice cover data contain information about the ice conditions for the winters 1963/64 - 1979/80, totally 17 winters. Due to the fact that the map could not be transferred into Surfer, it needed to be drawn on a Surfer map.

The reference of the ice map is:
- Finnish Institute of Marine Research 1988. Phases of the ice season in the Baltic Sea (North of latitude 57^{o} N). Finnish Marine Research No. 254, Supplement 2. 83 pp.

Task 1.1: Computation of retention times and stratification - deliverable no. 18

Residence time and stratification became important parameters in the CHARM typology. Both parameters were calculated by Björn Sjöberg, Department of Systems Ecology, Stockholm University, Sweden (SUSE). For this purpose, the IOW supplied a Surfer landbase map and a depth model.

Task 1.2: First draft typology including map of spatial distribution of type areas - deliverable no. 19

A first draft for a Baltic CHARM typology was designed in April 2003. It was derived from all existing national typologies (Germany, Denmark, Latvia, Finland and Sweden) as well as from the EU guidelines (Guidance on typology, reference conditions and classification systems for transitional and coastal waters; produced by CIS working group 2.4 (coast); final draft). Obligatory and optional factors were considered, whereas the optional factors had to be checked whether they are suitable for the Baltic Sea and CHARM demands, realisable or if the required data exist. The typology is based on a hierarchical system and although the range for each factors is pre-defined in the guidelines it is justified to aggregate or split ranges. The aim was to finally design a typology that meets the requirements of all CHARM partners. This first draft and maps showing the spatial distribution of each parameter in its class range was presented at the 2nd CHARM Workshop on Isle of Vilm, Germany, 8-11 April 2003. After a discussion in the work package 1 group, the draft was modified. It was finally agreed on the parameters (ice cover, salinity, residence time and stratification) and ranges.

This draft was implemented by designing maps in Surfer. Four individual maps were created showing each parameter. A salinity map was calculated by the IOW, an ice cover map was supplied by the Finnish Environment Institute, and the Department of Systems Ecology, Stockholm University, provided maps on water residence time and stratification. All these maps were overlayed and combined thematically. On this base, a new map was designed showing the distribution of all types while each type considers all four parameters. Finally, the map was slightly corrected and modified by expert opinion. It turned out that not all types mentioned in the drafted CHARM typology occur in the Baltic Sea in reality. So the draft had to be adjusted. The map and the adjusted typology draft were distributed to all other CHARM partners to be open for a discussion to get comments.

Coastal waters are the main focus in CHARM. To divide the Baltic Sea in open and coastal waters, all waters within one nautical mile regarded from the baseline of each country are considered to be coastal waters. Maps with this one nautical mile line were requested by all CHARM partners. They were provided by Germany, Denmark, Finland, Sweden, Poland and Latvia. Due to the lack of data it had to be drafted for Estonia and Lithuania. The one nautical mile lines were submitted on maps, which had different file formats. Due to the fact that these formats were not compatible to Surfer and to have all one nautical mile lines uniform they were drawn by hand in one Surfer map.

Activities

Schernewski, G. (Presentation): Umsetzung der Wasserrahmenrichtlinie in der Ostsee (Implementation of the Water Framework Directive in the Baltic Sea). EG-Wasserrahmenrichtlinie und Meeresschutz. Tagung der Grünen Liga und Aktionskonferenz Nordsee, Bremen, 17. Mai 2003.

Schernewski, G & T. Neumann (submitted paper): The trophic state of the Baltic Sea a century ago? A model simulation study. J. Marine Systems.

Work package 2

Status for work package

Transfer of the national phytoplankton data-subsets to the CORPI FTP-server continued in December 2002 and January 2003. After that the compilation of the data sets into a combined Access database was started. This stage required more time and resources than anticipated, and the joint phytoplankton database was not ready before early April.

The database was demonstrated at the CHARM workshop in the Isle of Vilm on 8-10 April, where the WP 2 partners agreed on the further steps in the data analysis, and an attempt to overcome the delay in the timetable.

The approach and intermediate results of the WP 2 were presented at the First CHARM DIALOG meeting in Stockholm on 31 March - 1 April.

Progress for work package

Since the 2nd CHARM Workshop, the following steps have been agreed to be carried out:

- All WP 2 partners will check their data in the combined data files, and report errors to CORPI who will correct all errata in the data files in May 2003.
- The WP 2 partners will carry out a statistical analysis for the definition of bloom situations and check local variability of selected diversity indices (Evenness, Bray-Curtis Similarity Index, Shannon-Weaver, Menhinic's, Kothe's & Simpson's indexes) in June-July 2003 using their national data. NERI/ P. Henriksen has sent a detailed description of the procedure statistical definition of bloom situations for all partners.
- After error checking of the joint phytoplankton database, CORPI will carry out statistical analyses. The following analyses are planned:
  1. Multivariate analysis to correct for the impact of salinity in data
  2. Multivariate analysis to correct for the impact of nutrients
  3. Statistical analysis of seasonal bloom windows based on of the whole dataset
  4. Statistical analysis of the natural variability of the data
- CORPI will send draft results of the analyses to all partners and at a small meeting in Klaipeda (9-10 July) the group responsible (JRC, KU-CORPI, EMAUG, SYKE) for deliverable 14 (Map of distribution and description of regulation of phytoplankton community indices (due July 2003)) will discuss the results and the continuation of the analyses.
- For the preparation of deliverable 20 - Draft reference conditions (due November 2003), each partner will carry out a review of old literature whether historical data for phytoplankton species composition and biomass would be available. They will check what palaeoecological data or publications are available from their area, and report their finding to WP leader (JRC) by the end of September 2003.

Other plans

- Plan to compile deliverable 21 (Draft paper linking phytoplankton indices with typology and macrophytes (due November 2003)) was produced at the Vilm meeting. EMAUG (UR) is responsible for co-ordination of the compilation of this deliverable with the leader of WP 3.
- Plan to compile deliverable 22 (Draft paper linking phytoplankton indices with typology and benthos (due November 2003)) was produced at the Vilm meeting. JRC is responsible for co-ordination of the compilation of this deliverable with the leader of WP 4. JRC will host a meeting of the drafting group in October 2003.

Work package 3

Status for WP 3

Participation in meetings:

- Dialogue meeting, Stockholm, March 2003
- Data workshop, Isle of Vilm, April 2003

Deliverables

Overview

WP 3 is involved in the deliverables shown in Table 1. The table shows the status of the deliverables. Details on the contents of each deliverable are available in the updated detailed workplan located on the home page (file: Workplan_WP3_rev).

Table 1. Deadlines and status of contributions of WP 3 to deliverables. Reports to the commission are not shown.

	Internal deadline	PL-deadline	EU-deadline	Status
Deliverable 3 - Data compilation & QA - Meta data	15 Apr-02	15 May-02	01 June-02	Completed
Deliverable 15 - Small scale veg. models - Actual and historic state	01 July-03	15 July-03	01 Aug-03	Completed
Deliverable 20 - Reference conditions	01 Nov-03	15 Nov-03	01 Dec-03	Initiated
Deliverable 21 - Draft of paper	01 Nov-03	15 Nov-03	01 Dec-03	Initiated
Deliverable 25 - Large-scale veg. models	01 May-04	15 May-04	01 June-04	Not started
Deliverable 26 - Draft of paper	01 May-04	15 May-04	01 June-04	Not started
Deliverable 29 - Draft of paper	01 Nov-04	15 Nov-04	01 Dec-04	Not started
Deliverable 30 - Id. of veg. indicators	01 Nov-04	15 Nov-04	01 Dec-04	Not started
Deliverable 31 - Verified typology	01 Nov-04	15 Nov-04	01 Dec-04	Not started
Deliverable 32 - Verified reference con.	01 Nov-04	15 Nov-04	01 Dec-04	Not started
Deliverable 34 - Recommendations	01 Nov-04	15 Nov-04	01 Dec-04	Not started

Deliverable 15, “Small-scale vegetation models”. (EU-deadline: 1 August 2003)

Most of our work this year has concentrated on deliverable 15 which involves 5 tasks:

Task 1: Selection of potential quality elements
Task 2: Templates for compilation & compilation of data representing each quality element
Task 3: Evaluation of actual and historic conditions for each quality element
Task 4: Evaluation of long-term changes for each quality element
Task 5: Small scale models

Tasks 1-2 are done and are already available on the homepage. The data compilation took longer than planned and supplementary data may still arrive.

Tasks 3-5 are in progress. Details were discussed at the workshop on Isle of Vilm and all partners are working on inputs to be ready for the deadline.

Progress of WP 3 – plans for the next 6 months

For the next 6 months, we have planned to complete the following deliverables in addition to the report to the commission:

Deliverable 20: Reference conditions for benthic vegetation
For the quality elements defined in deliverable 15, we will attempt to identify reference conditions based on historical records and empirical models.

Deliverable 21: Draft of scientific paper relating phytoplankton and macrovegetation to typology (WP 1-3)
At the data workshop in Vilm we agreed that this paper should focus on chlorophyll levels and eelgrass depth limits in type areas.

Other plans

No comments from WP 3.

Work package 4

WP 4 (Macrozoobenthos) is following the schedule, involving data analysis of data collected during the first phase of CHARM (all partners responded to sources and quality of accessible zoobenthos data for respective coastal waters), parameters to be included have been circulated and approved, and alternative strategies for defining reference conditions for zoobenthos are being considered by the partners. This work is partly harmonised with national efforts (Sweden, Finland) at both scientific (Academy of Finland-project IMAGINE under the BIREME-program) and applied (e.g. Finnish Environment Institute wg on coastal typology and ecological classification; Swedish EPA wg on zoobenthos and ecological quality criteria).

Progress for WP 4

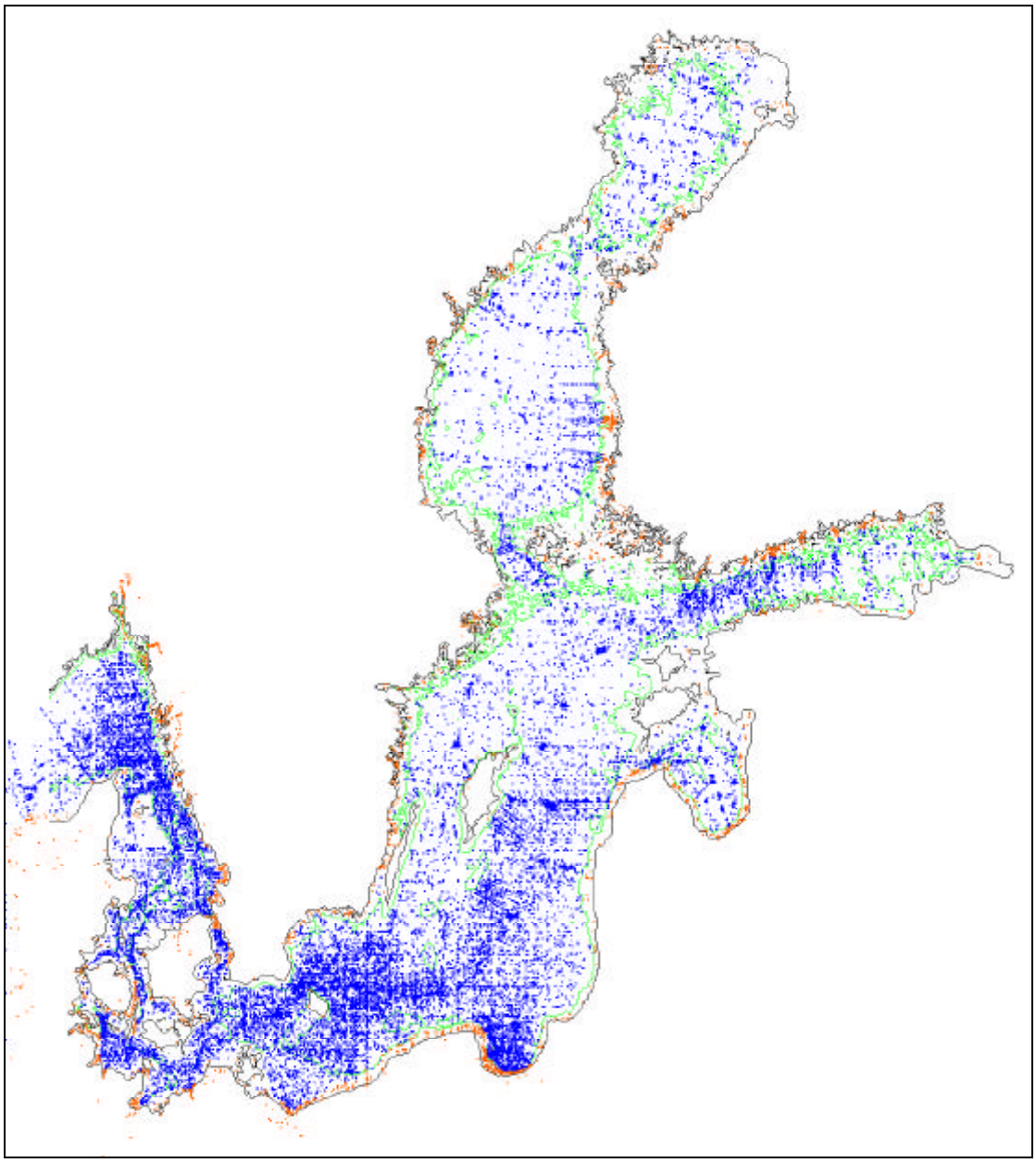
Work is progressing according to the approved plan, with slight deviations (workshop held in Finland in March 2003, continued discussions during CHARM-meeting in April 2003, and a planned discussion meeting to be held during the Baltic Sea Science Congress in Helsinki in August 2003). For Danish and Finnish coastal waters efforts are made to test typology with data on zoobenthos, and clear clusters appear along the costs, however not necessarily confirming typology. Good progress is being made for deliverable 12 (input ready from partners in DK, EST & FI; others to deliver pieces for joint analytical cross-region comparative paper).

Partners in WP 4 are actively publishing papers within the topic, and a complete list of publications will be added to the CHARM Web page after the WP-discussions in August 2003.

Work package 5

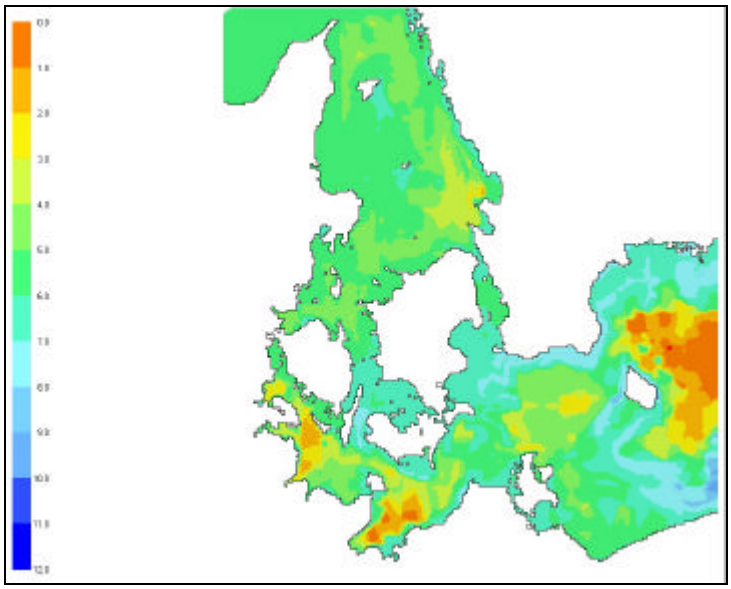
Progress report for WP 5 – Water Chemistry

The CHARM partners have now contributed with a very large number of coastal observations, usually not available beyond regional and national authorities. The work is following the work plan and on schedule. The positions of all these coastal stations are shown in this map as orange dots:

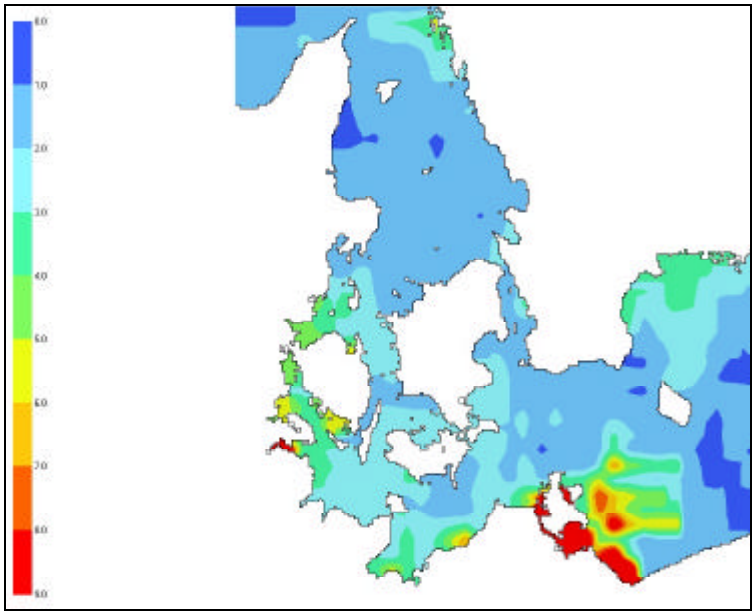


The Coastal CHARM database is described in detail at:
http://data.ecology.su.se/models/CHARM/ACCESS_BED.htm

The database has now been used to produce distribution maps of different variables that are used by the different WPs in CHART to evaluate marine environmental quality criteria. Examples are:



Oxygen concentrations (ml/l) at the bottom in the southern Baltic, average concentrations calculated from all observations between 1990-2001.



Surface chlorophyll concentration, average concentrations calculated from all observations between 1990-2001.

WP 5 has also provided data sets for the typology work, i.e. by providing maps on salinity distributions and on forcing functions (nutrients, hydrology) for the model used to calculate reference conditions (see WP 1).