
Contract EVK3-CT-2001-00065
Characterisation of the Baltic Sea Ecosystem (CHARM)

**Final Report including 3rd Periodic Report,
Management Report and Final T.I.P. from the CHARM Project**

Annex C - Agenda and minutes from project meetings

Meeting of the
CHARM WP2 Phytoplankton partners
 1-3 September 2002

Ispra (Italy), Meeting room Bibliotheca, bldg. 29A

Local organizer: EC- Joint Reseach Centre/ Institute of Environment and Sustainability

Draft Agenda:

Monday, 2 September 2002

8:30	Transport from hotel to JRC
9.00 – 9.20	Welcome, Meeting agenda, objectives & issues, etc.
9.20 – 10.00	Present status of the deliverables & Metadata summary (Anna-Stiina)
10.00 - 10.30	Compilation of species list and database template (Hendrik & Norbert)
10:30 – 10.45	Coffee Break
10.45-12.30	Status of phytoplankton data sheet compilation by all partners. Discussion: How to quality assure phytoplankton data?
12.30 – 14:00	Lunch
14:00 – 15.30	Discussion of analyses & database requirements (all partners)
15.30-16.00	Coffee Break
16.00-	Discussion of analyses continued, links to other CHARM WPs
17.30	Close the first day; Transport to hotel

Tuesday 3 Sept., 2002

8:30	Transport from hotels to JRC
9.00 – 9.30	Near-future dead-lines & deliverables (Anna-Stiina)
9.30– 10:00	Inventory of problem species in the species list (all partners)
10.00-10.30	Agreement of the next steps and task distribution
10:30 -11:00	Coffee Break
11:00 – 11.15	Links to EC WFD CIS activities (Anna-Stiina)
11.15 - 12.00	<i>Links to other on-going national WFD activities (all partners)</i>
12:30 – 14:00	Lunch
14:00 -14:30	Other issues?
14.30-15.00	Summing up & closing of the meeting
15.00	Departure, Transport to the airport

Time schedule is subject to changes (except transports, lunches/dinner & coffee breaks).

**Minutes of the CHARM Phytoplankton Work Package (2) meeting
September 2-3, 2002,
at the Institute of Environment and Sustainability, JRC, Ispra, Italy.**

Participants (initials / institute):

Peter Henriksen (PH/ NERI), Pirkko Kauppila (PK/ SYKE), Hendrik Schubert (HS/ EMAUG), Norbert Wasmund (NW/ IOW), Ingrida Purina (IP/ IAE), Renata Pilkaityte (RP/ KU-CORPI), Slavomira Gromisz (SG/ MIR), Anna-Stiina Heiskanen (ASH/ JRC), Celine Duhamel (CD/ JRC), Wouter van de Bund (WvdB/ JRC)

Objectives of the meeting:

- 1) to get an overview of the situation with the data quality analysis
- 2) discuss & decide on the further work and analyses
- 3) agree on the need of a possible joint data base
- 4) agree on deliverables & task distribution
- 5) discuss linkages with other CHARM WPs, & other national & EU WFD implementation activities.

Presentations

1. ASH made a presentation of the objectives and tasks of WP phytoplankton (presentation attached).
2. HS made a short presentation on the problems related to ecological quality classification of coastal waters (assessment of 'ecosystem health' requires ultimately integrated indices due to coupling of ecosystem components; e.g. alternative stable states between phytoplankton vs. macrophyte dominated systems; it will be difficult to assess trophic status since productivity data is lacking; sub-sets of existing data should be used to develop hypothesis (bottom-up approach); and other sub- set to test hypothesis, indices developed elsewhere might not be applicable (top-down approach), but some selected could be tested with CHARM phytoplankton data. Data quality problems still persists (e.g. species identification, etc.); common database is needed to develop hypothesis & carry out statistical testing using multivariate analyses).
3. ASH made a summary presentation of metadata analysis (same figs & tables as in the document; available upon request)
4. ASH made presentation of Timetable & Deliverables of WP2 (attached)
5. ASH made presentation of WFD Common Implementation Strategy coordinated by EC DG ENV. (available upon request from ASH, if you wish to have a look)
6. HS explained German administration & research organizations related to WFD implementation.

Overview of the status of phytoplankton datasheet compilation

Partner	Data is already in electronic form?	Coded?	Checked for mistakes etc?	Abiotics included	if not yet, when ready?	Approx. number of datasets	comments
NW (IOW)	Y	Y	Y	N	Oct.	1500	only the German part of the HELCOM-data, some of them sampled also by DK and PL
HS (HRO)	Y	Y	Y	(Y)	Oct	6000	
PH (NERI)	Y	N	N	N	4,5MM needed	3000	only frequent sampled - long term stations - starting with Limfjord/Kattegat
PK (SYKE)	Y	(Y)	(Y)	(Y)	Nov.	2000	same person analyzing since 80's
SG (MIR)	Y	Y	N	Y	Oct	300	
SG (MIR; HELCOM data)	Y	N	N	N	Oct	300	only dominant species are counted; only the subset from 1984 onwards For comparison between dominant and total species counting
IP (IAS)	Y	(Y)	(Y)	N	Nov.	1500	same person analyzing since 70's - still active
RP (KU-	Y	N	(Y)	N	Nov	2500	same person analyzing since

CORPI)						81 - still active
AJ (EMI) ?	?	?	?	?	?	Anna-Stiina will contact Andris
Sweden? (SEPA, SU)	?	?	?	?	?	Anna-Stiina will ask for cooperation in a following small-scale project

Summary of the Discussion of indices

What to select for testing variability of phytoplankton
 Across scales of Climate (N-S), Temporal, Salinity, Stratification, Trophic state (eutrophy)

Diversity indices

There are plenty of different diversity indices (e.g. Shannon-Weaver, PIE, Margalef's, etc.). However, Div. Indices may not be applicable to phytoplankton communities, since generation times are very short. Some diversity indices have been found to have a good correlation with climatological variability. It could be considered if it would be possible to pool species in higher taxonomic groups and use diversity indices to check variability of on higher taxonomic (genera or class level).

More discussion with with experts is needed.

WP 2 will start an email discussion of biodiversity indices in November (HS will initiate this).

How to define blooms?

- Frequency of biomasses within different intervals of CHL values (manuscript in prep)
- Anything more than one SD over mean value (of normal distribution) = bloom
- Requires data & knowledge of different area

- Peter prepares instruction/manual how to do this analysis by the end of November
- Also other references should be checked (all partners)

Definition of spring and summer periods

We need to define window where spring and summer blooms occur using data sub-sets for testing hypothesis using existing data.

There are 'expert opinions' of definition of seasons for different areas areas of the Baltic Sea (see below table of the definitions of seasons used by HELCOM experts), which can be used for preliminary definition.

HELCOM seasons

Sea area	Period possible for the spring bloom	Definition of seasons
Kattegat	mid of January – mid of April	Spring: February-April
Sound	mid of February – end of March	Summer: May-August
Belt Sea	end of February – beginning of April	Autumn: Sept-November
Arkona Sea	beginning of March – end of April	Spring: March-May
Bornholm Sea	mid of March – mid of May	Summer: June- September
Eastern Gotland Sea	end of March – end of May	Autumn: October-December
Western Gotland Sea	end of March – end of May	
Northern Baltic proper	mid of March – end of May	
Gulf of Riga	mid of March – mid of May	

Definitions of seasons should be carried out from the combined data set after November by finding the frequency distribution of blooms during each season.

Potential Indices to be tested

a) Key species approach?

- produce a list of most common **10 species** throughout the data sets? (Expert opinion HELCOM list of most important/dominant species already existing (this could be of help))
- produce a list of key-species
- Ratios of commonly occurring species during a bloom events

b) Temporal shifts of blooms

- possible temporal shifts of blooms should be defined using long term data series?

c) Proposals for ratios to be tested

- Ratios of larger taxonomic groups (eg. cyanos, diatoms greens etc....),
- Diatom:Dinoflagellate-ratio (Decrease in spring diatom, increase in dinoflagellates)
- Diatom to total phytoplankton biomass/biovolume-ratio (esp. Kattegat & S-Baltic)
- Ratio of cyanobacteria to total biomass during summer
 - N-fixing species?
- Seasonal bloom-ratio: Cumulative/average Spring bloom dinos & diatom biomass during the spring bloom period (after spring bloom period is defined) vs. cumulative filamentous cyanobacteria (or N-fixing) biomass during summer. Hypothesis behind: in more pristine conditions the spring bloom should exhaust most nutrients (N&P) leaving none for summer blooms to develop, while in eutrophic situation summer blooms develop due to N supply from air (cyanos) and combined N&P supply from upwelling/mixing/sediment release.
- Ratios of functional groups (size classes, filamentous, coccal, colony-forming, flagellates...)
- Coding of size, morphological and functional groups gives a good opportunity to test several potential combinations of those
- Functional groups (codes) for phytoplankton have to be tested during analysis, since they are selected/ determined using expert opinion.

Timetable of WP2 deliveries:

<i>Deliverable</i>	Deadline	Responsible	Contribution
Draft paper (or <i>Report?</i>) on phytoplankton indices in relation to physico-chemical environment (D 14: <i>Map of distribution??</i>)	July – 2003	JRC, KU-CORPI, EMAUG , SYKE	NERI, SYKE, IOW, IAE, MIR
Report on phytoplankton indices applicable as quality elements for ecological classification (D17: <i>Method / Report??; D17=14??</i>)	November - 2003	JRC, KUCORPI, and MIR	NERI, SYKE, IOW, IAE, EMAUG
Draft paper: Linking phytoplankton indices with typology and macrophytes (D21)	November - 2003	EMAUG	NERI, SYKE, JRC and KUCORPI
Draft paper: Linking phytoplankton indices with typology and benthos (D22)	November - 2003	JRC	IOW, IAE, and MIR
Reference conditions of phytoplankton (Including <i>guidance for methods to select type specific reference conditions for phytoplankton in the Baltic Sea</i>) (D20 & D32; Reports; maps)	November – (draft) 2003 & (final) 2004	NERI, SYKE, KUCORPI, IOW, IAE, MIR, EMAUG (<i>select local type specific RC</i>)	ALL
Recommendations for phytoplankton monitoring strategy (D34; Report)	November - 2004	NERI, JRC, KUCORPI, and MIR	SYKE, IOW, IAE, and EMAUG

Near future task and deadlines (Sept. 2002 - June 2003)

Task	Deliverable/ Action	Deadline	Who
1. Complete final data sheets	Quality controlled data sheets	30/11/02	ALL
2. Support for DK Data compilation	Letter to Riemann	ASAP	ASH
3. Clarify what methods of dissolved silicate analysis are comparable	NW sends info to ASH	ASAP	NW
4. Update missing phytoplankton groups/species to datasheets (all send additions, changes to NW)	Updated phytoplankton datasheets / NW sends updated sheets to ASH	ASAP	NW/ ALL
5. Update data sheet template	Updated data-sheet distributed to everybody through email & web-page	ASAP	ASH
6. Update linkages to other WP's	Letter asking for clarification what they/ we need	ASAP	ASH
7. Send relevant phyto-references to JRC (celine.duhamel@jrc.it)	Reference/ bibliography available in web-page	Sept.-Nov.-02	ALL
8. End-note library of relevant phytoplankton indicator papers	Reference bibliography available in web-page	October-02	CD (JRC)
9. Establishment of data base - meeting in Klaipeda	Agreement of data base location & structure	ASAP or October-02	ASH, HS, RP, AR, ZG
10. Produce plan of procedures	Plan how to deliver data to database & carry out analysis	October -02	ASH, HS, RP, AR, ZG
11. Commenting plan of procedures	plan of procedures	November -02	ALL
12. Discuss applicability of biodiversity indices	Start an email discussion of the applicability BD indices	November-02	ALL (HS/ EMAUG will initiate this)
13. Develop a method to define 'bloom' using monitoring data	Statistical method for definition what is a bloom	November -02	PH (NERI) & colleagues
14. Compile a list of easily identified ('no-problem') species	Send a template to everybody, compile & put a list of species in web-page	November-02	ASH/ ALL
15. Collecting notes of possible problem phytoplankton species	Updated list of problem species for analysis	Continuous – January-03	ALL (Sigi/ EMAUG will compile this)
16. First pilot statistical analyses	Results of multivariate analysis	February-03	KU-CORPI, (SYKE, JRC, EMAUG)
17. Commenting results of pilot statistical analyses	Advice & proposals for the next phase	March-03	ALL
18. Revised statistical analysis	Results of multivariate analysis	April-03	KU-CORPI, (SYKE, JRC, EMAUG)
19. Present results in CHARM workshop (8-11/4)	Comments from all partners	April-03	
20. preparing manuscript of variability of Indices	draft paper on natural variability of phytopl. Indices	May-03	KU-CORPI, (SYKE, JRC, EMAUG)
21. comments from others	compilation of commented draft paper	June-03	ALL
22. Revise draft paper	Revised paper = deliverable 14	July-03	KU-CORPI, SYKE, JRC, EMAUG
23. Find local/ national old literature references for definition of phytoplankton reference conditions	Reference conditions. Bibliography, web page	June-03	JRC/ ALL

Agenda of the meeting "analysis of phytoplankton data" on 25/26 September 2002 in Klaipeda / Lithuania

Issues to discuss:

Who will be responsible for

- uploading data into database renata & zita
- carrying out & assessing results of the analysis RENATE, KESTAS DUCINSKAS

How to upload data?

- ftp file exchange system will be created by KU-CORPI
- one big data file? COMBINED IN MS ACCESS

What hardware/ software is needed?

Are these available in CORPI-KU?

Supervisor group?

Meetings required?

TIME SCHEDULE

Data sets sent in in November

Complete data sets ready in December

Development of algorithm for time series analysis, start already in January

End of January salinity clusters

GIS coverage of data points in March

Report of the meeting "analysis of phytoplankton data" Held on 25/26 September 2002 in Klaipeda / Lithuania

The meeting was organized by A. Razinkovas / R. Pilkataityte from the CORPI

Participants:

Zita Gasiunaite, CORPI

Renata Pilkataityte, CORPI

Irina Olenina, CORPI/MRC

Sigrid Sagert, UNI-ROSTOCK

Anna-Stiina Heiskanen JRC

Arturas Razinkovas, CORPI

Kestas Ducinkas, CORPI

Hendrik Schubert, UNI-ROSTOCK

Ibrahim Joha, CORPI

The meeting started at the September, 25 with a short informational meeting, dealing mainly with aspects of the time schedule and exchange of basic information.

The following main topics were defined:

1. Compilation of the databases
2. Quality control of the compiled database
3. Strategy for analysis

all regarding both points, deadline and responsibility.

At the Sept. 26 the official part of the meeting was opened by A. Razinkovas, followed by presentations of H. Schubert: "Possible strategies for analysis of large data sets" and by A. Razinkovas: "Hard- and software abilities and experiences of CORPI in data analysis".

After the speeches, discussion about the first two topics started.

The participants agreed about:

§0. All qualitative controlled data should be sent to the server by the end of November

§1. Arturas Razinkovas is delivering FTP-server access for all members of WP2 for transfer of the national data-subsets to CORPI.

§2. Arturas provides the members of WP2 with login and password until October 31.

§3. The national data-subsets have to be downloaded in the form of the final template, provided by Sigrid Sagert to all members at the 2nd of October 2002. Please remind that there are no changes in the structure of this template acceptable!

§4. Renata Pilkaityte responds soon as possible, but latest until 15th of December to every contributor of downloaded subsets of data about integrity of their data. Quality control in that case means structural integrity of the files, correct use of codes and that the structure given in the template (§3) has been applied. In cases of problems with their databases the contributor will be responsible for reworking them until the structure corresponds with the template mentioned in §3.

§5. Zita Gasiunaite will transfer the subsets into a common Access-database until 31st of December 2002.

§6. Zita Gasiunaite will provide the individual contributors with CD's, containing the Access-database as well as the original, quality-controlled, Excel-files (comp. §4). These CD's are for "private use" only, the contributors provided with them are not allowed to make them, available for any third party or to publish / report data obtained by analysis of subsets of other contributors without declared permission of the individual contributor.

According to the time schedule agreed on, analysis of data will start at January 2003. The second part of the workshop was dealing with strategy of analysis mainly. For Analysis procedure, the following pre-requirements were identified:

A) Analysis should be made in a way which excludes salinity-effects, but consider possible difference between average salinity and amplitude of salinity changes (see Annex 1).

B) Analysis must consider seasonality of phytoplankton-parameters, because former (limnological) studies have shown that yearly-averages might be not sensitive enough (see Annex 2).

C) Analysis itself will be done as a holistic, multivariate statistics approach, which results will be underpinned by further analysis with restricted numbers of variables (see Annex 3).

After discussion with Kestas Ducinskas, dealing with the details of step A and B mainly, the following milestones were agreed on:

§7. The compiled dataset ("CODA") will be analysed under the auspices of Kestas Ducinskas for homogenous salinity groups according to A) until January 31st 2003. Responsible: A. Razinkovas. At the deadline, the several clustering protocols (after additional discussions with Kestas Ducinskas we agreed that there will be several classification schemes) will be interpreted and groups are defined. For this, Arturas will distribute the clustering protocols in the WP2 group with a preliminary grouping attempt – discussion will be guided by Anna-Stiina and agreement about salinity groups should be reached until 15th of February 2003.

§8. CODA will be analysed for definition of seasons the auspices of Kestas Ducinskas until 28th of February 2003. Responsible: A. Razinkovas. At the 7th of March, season definitions of the individual regions are distributed by A. Razinkovas and will be checked for reasonability by every contributor. Discussion about this topic will be guided by Anna-Stiina and should be finished until 21st of March 2003.

§9. The members of WP2 who agreed to be directly involved in database analysis procedure will possibly meet directly in Klaipeda at around 24.-27. March in Klaipeda to:

1. prepare presentation of the above mentioned results on the Vilm-meeting
2. prepare a proposal about further steps of holistic analysis, regarding the results of grouping, which has to be presented to and discussed by the whole group during the Vilm meeting
3. try to solve detail-problems of the data-analysis
4. define milestones and responsibilities for the coming period of analysis, which must be agreed on during the Vilm-workshop

§10. First approach of holistic analysis of CODA will start in April and be continued in May 2003 under the auspices of Kestas Ducinskas. The results will be distributed by A. Razinkovas, including

comments prepared by the "analysis core group" (which should be re-elected, expanded or changed during the Vilm-workshop) to all members of WP2 until 6th of June 2003.

§11. At the end of June, the commented results in an agreed form will be finished by Anna-Stiina circulating a final version and a definition for further analysis. Anna-Stiina might call for assistance in preparing this final version for direct meeting or Email-conference if needed.

§12. Zita Gasiunaite is responsible for organisation of information distribution about the progress of the data analysis. He will report about the state of the analysis (what has been started, what is going on, what is delayed, problems) in a four-weekly interval to the members of WP2.

Annex 1:

Main problems of grouping for salinity

1. salinity is known as a phytoplankton-composition determining factor
2. therefore, the database has to be grouped into salinity-clusters, reflecting equal conditions for phytoplankton growth
3. salinity is changing in the Baltic in different extent and ranges, depending on water exchange characteristics between, e.g. lagoons and preceding open Baltic water as well as Baltic and North Sea water
4. therefore grouping must take into account both, average salinity as well as variance and, if possible, frequency of salinity changes for the individual sub-systems probed
5. analysis therefore must first characterize the individual locations probed for average salinity and their variability characteristics before analysing individual data points
6. for this, cluster analysis with respect to average salinity and variability of salinity, followed by an analysis combining both factors should be performed and compared with one another for final definition of "salinity groups"
7. regarding the fact that both, average salinity as well as maximum amplitude of salinity changes in the Baltic exhibit a pronounced south (west)-north (east) gradient, the results must be checked for superimposing effects of latitudinal differences – may be by constructing a homogenous sub-dataset consisting equal numbers of points from northern and southern oligohaline stations – point to be discussed on.

Annex 2:

Main problems of defining seasons

1. Seasonality with respect to growth of autotrophs cannot be defined by dates (north-south gradient, year-to-year variability of weather conditions at a single station etc. pp.)
2. On the other hand, definition of "seasonal aspects" of the phytoplankton community seems to be heavily needed to overcome problems by the use of e.g. "ecological" and "community" variates.
3. An attempt discussed already at the Ispra-meeting could be to define seasons for each year by means of regular events of the yearly phytoplankton-succession
4. For this, such events must first be identified in a way, that a sufficient number of frequently probed stations spread over the whole Baltic can be made available for the analysis
5. As a first point, a procedure to detect "events" must be developed – because we agreed on Ispra to try to use the following events:
 - a) spring bloom of diatoms
 - b) summer maximum of cyanobacteria
 - c) summer maximum of N-fixing species
 - d) autumn bloom of diatoms
 - e) winter maximum of cryptophytes
 the first step of all therefore must be a definition of "bloom" – a topic on which Peter is already working and will inform the group as soon as the ms. will be ready. To be able to start with the work almost immediately, the CORPI-group will try to adopt his procedure and take the deviation between average BV and sample BV of individual species or groups of genera or function etc.pp. as an indicator for "seasons".
6. If a regular pattern of season-indicator succession can be found, reliability of the indicators will be proofed by comparing them with abiotic parameters being influenced by the radiation regime as well (temperature and temperature difference to the preceding data point at this station etc.pp.)
7. Then the duration of the time-window within a given sample can be regarded as falling into a given "season" must be defined – season might be of different length and will be located definitely at different periods of the year from year to year. For this, the "seasons" length of frequently-probed station (long-term series) along the Baltic's climatic gradient will be analysed and a minimum duration

of the seasons are defined or, alternatively, the dependency of the "season duration" from start of the season is defined.

8. Because only a few stations might fit the requirements to serve as a "season indicator station" these stations have to be identified and their ranges of validity, i.e. the stations for which they define the "seasons" as well, have to be defined. This will be done by a GIS-procedure (Inverse distance weighted interpolation method IDW) and then counterchecked by "expert opinion" of the individual contributors for reliability (e.g. there might be some problems if the indicator station is open Sea and shall provide data for a close-by located estuarine station etc. pp.)

9. We must cope with the fact that some of the indicators might work at restricted numbers of stations only, because of differences in the limitation regime.....therefore, analysis must be performed on a station-by station level, and we must define in forehand which stations might provide data enabling such analysis – so if someone knows already stations with a high and reliable taxonomic identification level and approx. monthly sampling for a period of at least 8 years please indicate them by mailing to Renata at the time of download the database

Annex 3

Holistic analysis of the compiled dataset

The main problem of analysing the compiled dataset is to avoid the danger of seeing only things which we know already because we are targeting the analysis on the points described already.....unfortunately, also the monitoring has been customized according to the knowledge available, so we cannot avoid this point completely, but may be reduce a bit by analysing the dataset as a whole – delivering a ranking of the dependencies / correlations between factors and variables etc.pp. – which must be interpreted afterwards – but that's a later-on job – don't worry.

Further points to take care on are:

1. We have to report about the "state of the ecosystem" – but we have no measure for this in our dataset to be analysed – even not primary productivity data which might serve as an ecosystem linked proxy
 2. The following parameters we have in the dataset might be able to serve as a proxy (at least for the proxy "PP capacity"):
 - a) BV of counted units (maximum)
 - b) BV of analysed units (maximum)
 - c) Chla-content (maximum)
 - d) winter maximum of DIN and DIP
 - e) TP and TN
 - f) ratios of N / P parameters mentioned in d and e
 - g) regarding the yearly variability of our latitudes, there might be also a yearly change of useful indicators because of limitation changes.....see definition of seasons in Annex 2
 3. for statistics reasons we have to take care for dividing the dataset in subsets for developing hypothesis and a second, independent one set to validate the approach – unfortunately we have not discussed about this at the Klaipeda-meeting – but it should be done soon and before starting analysis....
 4. We should include biodiversity indices, because they have been shown to be useful for some applications – even in non-season sorted approaches. For this we have to distinguish between sample diversity, season diversity and station diversity (yearly diversity). The main problem, different level of taxonomic identification, must be solved prior to analysis by a sensitivity analysis performed on a dataset with high taxonomic identification level, being reduced step by step down to the "10 dominant species" level – the same held true for analysis of sensitivity for sampling frequency.....Sensitivity analysis (via discriminant analysis: Kestas suggestion) shall deliver a list of sensitivity of the individual indices to both, identification level and sampling frequency level differences and will be done under the auspices of Kestas Ducinkas until end of 2002. Responsible: A. Razinkovas.
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Vilms, CHARM workshop 9-10 April, 2003

Minutes of the meeting of Group III: Plan of procedures for Deliverable 22: Draft of a scientific paper relating phytoplankton and benthic infauna to typology

Participants: Anna-Stina Heiskanen(JRC/EI), Magdalena Wielgat (IOW), Jens Perus (AAU),
Björn Sjöberg (GU), Alf Josefson (NERI), Vadims Jermakovs (IAE), Arno Pöllumäe
(EMI)

The conceptual idea behind this deliverable is that increase phytoplankton production will lead to exponentially increasing sedimentation (depending on composition of the phytoplankton blooms/ communities). In areas where such blooms appear frequently/ regularly, also benthic assemblages should be impacted due to increased supply of organic matter to the sediments. In extreme cases this can lead to hypoxic or anoxic situations (also hydrography/ deep water exchange is determining factor). Therefore it should be possible to link appropriate phytoplankton and benthic indices for coastal types where impacts are observed.

Aim will be to link these indices statistically to enable classification based on combined indicator values, and to develop a procedure for calculation of EQR (ecological quality ratio) based on combined indicator values (instead of calculating EQR for each quality element/ indicator separately).

The group agreed on following steps for compilation of the D22:

- Cross-checking metadatabases compiled in the CHARM-WP:s (2&4) to find 10-15 investigation sites with high frequency sampling both for phytoplankton and zoobenthos (Possibly requests of data from non-CHARM partners if good long-term datasets will be found outside the CHARM concertia (requires collaboration agreements).
- Phytoplankton- and zoobenthos study sites don't need to overlap 100% since physics of hydrography may make adjacent sea areas's phytoplankton quality and quantity of more importance for the zoobenthic community, but they should be near vicinity, or clearly demonstrated that there is a lateral transport between sampling sites. For this purpose hydrological model should be used.
- Björn Sjöberg's "Fjord catalogue" of sites where hydrodynamics are well investigated should be used to identify appropriate sites with usable data.
- The temporal and spatial scales need to be defined for grouping/ averaging data. It has to be agreed whether seasonal vs. annual means and cumulative vs. averages should be used.
- Different approaches of linking the elements together were proposed and e.g. nutrient load-benthic biomass (shown by A. Josefson in talk earlier in the day) or functional group approach.
- Preliminary statistics proposed to be used were regression analyses looking for correlations and then trying to relate them to typologies proposed by WP1.
- Phytoplankton and benthos analyses, for the sites selected for combined analyses, need to be carried out separately in WP 2 & 4. Until this has been completed, it will be difficult to plan more detailed hypothesis for testing.

A working meeting was proposed for October-2003 at JRC/Ispra. Initiative/call to arrange this meeting will be upon Anna-Stiina.

Tasks before the meeting:

- Björn sends Fjord Catalogue to Anna-Stiina (WP2) and Jens (WP4) ASAP. They identify appropriate sites where phytoplankton and benthos sampling occur, and sufficient data would be available (before the end of September 2003)
- Phytoplankton and zoobenthos data analysis will continue as planned in WP2 and 4.
- These sites will be cross-checked with the typology proposed by WP1.

Outside the meeting in discussions with MIR (Witek & Warzocha) they also expressed to be willing to participate in the drafting group and analysis of data.

Outcome of the WP2 Phytoplankton group meeting at Vilms, CHARM workshop 9-10 April, 2003

Present: AS Heiskanen (JRC/ASH), S Sagert (UR/EMAUG), P Kauppila (SYKE), Z Witek (MIR), P Henriksen (NERI), N Wasmund (IOW), A Janus (EMI), R Pilkaityte (CORPI), Z Gasiunaite (CORPI), I Purina (AEI), (A Razinkovas, CORPI)

DRAFT Plan of procedures/ actions/ deliverables for 2003

ERROR CHECKING OF COMBINED DATA SETS (CHARM phytoplankton Access Database)

Every partner will check their data in the combined datafiles (CODA) by **15 May**.

- every partner will send a list of errata (referring to file, row, column (and possibly station and species)) to CORPI (ibrahim) by 15 May 2003-04-11
- CORPI will correct data files ASAP, and will include a further search field for search in taxonomical group code.

LOCAL ANALYSES OF PHYTOPLANKTON

Due to the delay in the planned analyses of phytoplankton data, Anna-Stiina stressed that all partners should start analysing their national data. This can be done ASAP using original data files or the combined data sets (CODA) after checking for errors. Following analyses were agreed, and each partner should carry those out using their own data:

1. Statistical analysis/ definition of bloom situations **end of July 2003**

- Follow the attached example from Danish data based on manuscript by *Jacob Carstensen, Daniel Conley, Peter Henriksen "Summer algal blooms in a shallow coastal ecosystem, the Kattegat. 1. Frequency and composition of phytoplankton blooms"* (NERI/ PH will send a detailed description of the procedure ASAP to all partners).
- Peter has sent a SAS-code for categorising blooms versus non-blooms for all partners on 25 April. Please, forward any questions concerning this to Peter! If you don't have this ask Peter (PET@DMU.dk)
- Compile a short report of your analysis.
- Send this to NERI (PH) by the **end of July 2003**.
- NERI (PH) will summarise results in a short report (original contributions attached), and send this to JRC/ ASH by the end of August 2003.

2. Checking local variability of diversity indices **20 June 2003**

- It was agreed to check variability and range of diversity using local data material, in order to have a picture how different diversity indices reflect variability of phytoplankton communities in different areas of the Baltic.
- Select 2-3 stations which have different trophic status (oligotrophic-eutrophic)
- Select 2-3 stations that are morphologically and physically different (enclosed/ stratified vs. open/ mixed, if those different stations are present in the national monitoring program)
- Rank phytoplankton species in each samples according to their biomass (you can use a variable number of dominant species according to the station and perhaps under consideration of the season (spring bloom etc.), since there is not always 10 species present in every sample)
- Include a) 10 most dominant, b) 20 most dominant species in the analysis (2 alternative approaches)
- Check the list of species for undefined mixed groups ("others", "unidentified" etc) which should be excluded from the calculations (even if dominant)
- Species identified to 'sp' level can be included in the analyses (etc. *Chaetoceros* sp; meaning that this has been identified as a single species, but species name was uncertain)
- Species pooled under one genus 'spp' should NOT be included in the analysis (etc. *Chaetoceros* spp.; meaning that several species have been potentially identified and pooled under the same genus)

- Calculate following diversity values for each sample:
 - Evenness
 - Bray-Curtis Similarity Index
 - Shannon-Weaver
 - Menhinic's
 - Kothe's
 - based on first experiences with the German phytoplankton data, the SIMPSON-index seems to be useful, because the index is heavily weighted towards the most abundant species in the sample while being less sensitive to species richness and seems robust for missing data in a long-term measurement (mainly for data sets with inhomogenous taxonomical levels).
- plot seasonal variability of diversity and total phytoplankton biomass at each station
- calculate same diversity indices for same material using 'class' of a) 10 and b) 20 most abundant species
- plot class diversity vs. species diversity of each station.
- Compile a short report of your analysis
- Send this to **MIR (Slawka/ Witek) by 20 June 2003.**
- MIR will compile a short summary (original contributions as attachment) and send this to JRC/ASH by the 5 July 2003.

Holistic statistical analyses of CODA

After error checking of CODA, CORPI will carry out statistical analyses ASAP (May-June). 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 of the whole data
- 4) Statistical analysis of the natural variability of the data

- CORPI will send draft results of the analyses to all partners by 20 June
- meeting in Klaipeda (suggested week 9-10 July) to discuss of the results and the continuation of the analyses

PLAN OF PROCEDURE: DELIVERABLE 14: Map of distribution and description of regulation of phytoplankton community indices (due July 2003)

- JRC, KU-CORPI, EMAUG, SYKE are responsible for this deliverable (with contributions from NERI, IOW, IAE, MIR).
- Based on outcome of the local analyses and the holistic statistical analyses, the status of this deliverable has to be analysed in Klaipeda meeting.

PLAN OF PROCEDURE: DELIVERABLE 20 - Draft reference conditions (due November 2003)

- Each partner should carry out a review of old literature whether historical data for phytoplankton species composition and biomass would be available.
- Each partner checks paleoecological data or publications are available from their area.
- Each partner tabulates their findings, checks how these fit with the proposed typology (from WP1) for their area, and writes a short summary (including list of references) and evaluation of the usability of historical data for definition of reference conditions for phytoplankton in the Baltic.
- **Each partner sends this report to JRC/ ASH by the end of September 2003.**
- ASH will compile all reports into one document and summarize the outcome.
- CORPI (Arturas, Zita, and Renata) crosschecks the report results with results of statistical analysis using CODA.
- IOW (Norbert) cross-checks the report results with the IOW model outcome (from Gerald)
- Draft reference conditions for phytoplankton for each type will be tabulated (JRC/ ASH)
- This draft report will be sent for comments to all partners by the end of October 2003.

- Each partners send their comments back to ASH by 15 November
- ASH compiles report for deliverable 20: draft reference conditions, and submits it to the coordinator by the end of November 2003.
- Note that final reference conditions are required by the end of the project in 2004.

PLAN OF PROCEDURES: DELIVERABLE 17: Report on phytoplankton indices applicable as quality elements for ecological classification (due November 2003)

- JRC, KUCORPI, and MIR are responsible for compiling D17 report (with contributions from NERI, SYKE, IOW, IAE, EMAUG/ RU)
- Status of this deliverable has to be agreed after Klaipeda meeting.

PLAN OF PROCEDURES: DELIVERABLE 21: Draft paper: Linking phytoplankton indices with typology and macrophytes (due November 2003)

- EMAUG (UR) is responsible for coordination of the compilation of this deliverable with the leader of WP3 (Dorte).
- NERI, JRC and KUCORPI contribute.
- [LINK TO DETAILED MINUTES](#)

PLAN OF PROCEDURES: DELIVERABLE 22: Draft paper: Linking phytoplankton indices with typology and benthos (due November 2003)

- JRC is responsible for coordination of the compilation of this deliverable with the leader of WP4 (benthic Infauna)
 - AAU, IOW, IAE, MIR, NERI, SU(GU), SYKE, and EMI will contribute.
 - Cross-checking metadatabases compiled in the CHARM-WPs (2&4) to find 10-15 investigation sites with high frequency sampling both for phytoplankton and zoobenthos
 - Björn Sjöberg's "Fjord catalogue" of sites where hydrodynamics are well investigated, should be used to identify appropriate sites with usable data.
 - Phytoplankton and benthos analyses, for the sites selected for combined analyses, need to be carried out separately in WP 2 & 4. Until this has been completed, it will be difficult to plan more detailed hypothesis for testing
 - Meeting of the drafting group is foreseen in October at JRC/ Ispra (this will be called by Anna-Stiina).
 - [LINK TO DETAILED MINUTES](#)
-

CHARM WP2 Phytoplankton partners' meeting in Klaipeda, Lithuania, July 9-10, 2003

Participants: A. Razinkovas, Z. Gasiunaite, R. Pilkaityte, I. Olenina, I. Juha, I. Kanoshina, H. Schubert, S. Sagert, P. Kauppila, A.C. Cardoso, AS Heiskanen, K. Samuelsson, L. Edler

Objective of the meeting was to have a discussion of the results of the holistic analysis of the combined phytoplankton data and of the continuation of the analyses, in order to fulfill the plan for the deliverables

July 9, 2003

A) PROGRESS IN THE LOCAL ANALYSES OF THE PHYTOPLANKTON DATA:

2. Checking local variability of diversity indices (data compilation by S. Gromisz & Z. Vitek)

- ASH presented some results from the two first tasks run on the local data sets for testing phytoplankton indices for a WFD compliant classification, which had been compiled by Slawka & Zbigniew (see local_diversity.ppt).
- The data was targeted in particular to the assessment of discriminative power of several diversity indices in relation to trophic status in a regional scale. There are some important handicaps for use of the current data in such analysis. Problem is that an important fraction of the biomass corresponded to cells is not identified to species. Those have been eliminated from the analysis, which may have an important impact on the results.
- In order to reduce the impact of the elimination of the non-identified individuals, it was suggested to carry out the analysis at class level. Also, only a small number of data sets fulfil the criteria for temporal and seasonal coverage to be included in the analysis.
- It was suggested to continue the analysis targeting it - not only the discriminatory response of the diversity indices in relation to trophic status - but also discriminatory analysis in relation to the hydromorphological conditions of the sampling stations.
- For the first analysis, thresholds for time coverage and percentage of species identified should be followed for the selection of the datasets for analysis.
- For the second analysis, the sampling stations significantly different in hydromorphological characteristics, but similar for other characteristics should be identified.

Action:

It was proposed that a small a paper should be prepared of these analyses. Those who have already started to work on indices by local data (EMAUG, IOW, FEI, IAE, MIR; others should not bother anymore) should finish their analysis as soon as possible and report those to Slawka, who should proceed with writing a small publication of the applicability of the diversity indices. **SLAWKA: remind those partners by email!**

1) Statistical analysis/ definition of bloom situations:

- Sigrid presented the German results on 'definition of bloom'. She showed a figure on the probability of bloom occurrences in each month (three years averages) from hypertrophic to mesotrophic stations.

Action:

Sigrid could distribute a graph of her analyses to all WP2 partners as an example, how the data could be visualized. All WP2 partners should send their results ASAP to **Peter Henriksen** (NERI), who should compile a summary of the analyses by the end of August.

B) PROGRESS IN THE HOLISTIC STATISTICAL ANALYSES OF CODA

5) Multivariate analysis to correct for the impact of salinity in data

- I. Juha presented the results of the salinity cluster analysis. The aim was to exclude the salinity effect taking into account the seasonality.
- Seven classes for salinity could be distinguished in the Baltic Sea area.

6) Multivariate analysis to correct for the impact of nutrients

- H. Schubert presented a paper (in prep.) on applicability of phytoplankton in classification by using the German phytoplankton data, with 10 years data from stations characterised by hyper-eutrophic, eutrophic and mesotrophic conditions.
- The data was aggregated into the main phytoplankton groups (cyanobacteria, bacillariophyta, cryptophyta, and chlorophyta), the percentage of each group of the total biomass of all major groups were used as indices and tested in relation to nutrient conditions. The results were not valid in areas affected by river waters.

Action:

ASH will send the presentation by HS to everybody, *but the it is not allowed to be distributed further!!* A similar approach will be tested by the CORPI team using the combined CHARM phytoplankton data according to ecoregions.

PLAN OF PROCEDURE: **DELIVERABLE 14**: Map of distribution and description of regulation of phytoplankton community indices and a **Draft paper** (or *Report?*) on phytoplankton indices in relation to physico-chemical environment

- Hendrik's presentation on 4 main dominant groups should be a basis for the analysis
- Relevant groups & potential indices to be included in the analyses of CODA across the Baltic Sea were discussed and proposed (see table below)

Possible phytoplankton taxa/ group indicators for different regions that can be tested – as % of the sum of biomass of the major groups

Group/indicator

Bothnian Bay

Bothnian Sea

Archipelago sea

Gulf of Finland

Western Baltic Proper

Eastern Baltic Proper

Gulf of Riga

Southern Baltic

Danish Straits

Kattegat coastal areas

Bacillariophyceae

- X
- X
- X
- X
- X
- X
- X
- X
- X
- X
- X

Cyanophytes

- X
- X
- X
- X
- X
- X
- X
- X
- X

Chlorophyta

- X
- X
- X
- X
- X
- ?
- X
- X
- X

Cryptophyceae

- X
- X
- X
- X
- X
- X
- X
- X
- X
- X
- X

Dinoflagellates

- X
- X
- X
- X
- X
- ?
- X
- X

- X
- X

Prymnesiophytes

X
X

Raphidophytes

X
X

Plan for the sample by sample analyses:

- indicators species for total biomass should be tested in the whole dataset and within salinity clusters
- seasonal Indicator species, and their seasonal occurrence frequencies should be tested
- abiotic parameters to be tested: chlorophyll, totP, totN, DIN:DIP, TN:TP, Si

Plan for the Station-wise analysis:

- Indicator species (for total biomass) seasonal (defined by experts) averages
- winter values (December – January)
- abiotic parameters to be tested: TN,TP, DIN, DIP; N:P ratios, Si

Actions:

Deliverable 14 (Map of distribution and description of regulation of phytoplankton community indices) will be delayed and cannot be completed by the end of July.

- Arturas & CORPI team: start CODA analysis August 4, onwards
- Graphs available for other partners to evaluate in mid-September (?)
- Hendrik & Sigi: evaluate results from september on-wards, provide output for CORPI team
- Pirkko: testing on Finnish local dataset (sample by samples) & evaluate results
- A-S & Ana Cristina: evaluate results September onwards, provide output for CORPI team
- Deliverable finalized September- October
- Arturas visits ASH/ JRC in 4-7 November to draft together the final deliverable 14 (etc.)
- Comments from other partners by mid-November (17 Nov.?)
- Submitted : by the end of November 2003

July 10, 2003

Discussions on the Holistic statistical analyses of CODA continued

- ASH presented a manuscript by Hobæk *et al.* (2003) 'Develop a common approach for typology and classification of inland waters in the Nordic region'. The aim of the study was to evaluate types according to applicability and possible usefulness in intercalibration. The paper included the criteria of the types (e.g. mean depth) and the analyses for the water body type validation (Correspondence analyses and ANOVA).

Action: ASH will send the manuscript to everybody.

- The manuscript on the applicability of eelgrass for ecological classification by Dorte Krause-Jensen was circulated.

Action: ASH will send it to everybody.

7) Statistical analysis of seasonal bloom windows of the whole data

- Arturas gave an example of ARIMA analysis of time series for identification of trends.
- ARIMA contains three components: seasonal, trend and noise. Seasonality needs to be eliminated for the trend identification and the noise gives an indication of the goodness of fit of the trend.
- He also presented the temporal coverage of the sites in the phytoplankton database of the CHARM project. Long-term and seasonally monitored data can be included into the analyses. Sampling frequencies should be the same in each year (e.g. the months 5, 8 and 10 included in each year).
- The possible sites filling the data requirements of the analyses were shortly presented.
- The professor on mathematics in the Klaipeda University will reply the all questions concerning the analyses after the completion of the preliminary result with the whole data.

Action:

AR & CORPI team will start the holistic analyses of CODA. They include the ARIMA analyses with time series and testing applicability of phytoplankton (species, functional groups etc.) according to ecoregions. The preliminary results of the analyses should be ready **by mid-September (?)**.

Deliverables 17, 20, 21 and 22 and their deadlines were shortly discussed.

PLAN OF PROCEDURES: DELIVERABLE 17: Report on phytoplankton indices applicable as quality elements for ecological classification (due November 2003)

- This deliverable should be based on the paper compiled by Slawka, and analyses following the approach of Hendrik & Sigi for applicability of phytoplankton for classification of coastal waters, after being tested using the combined phytoplankton data
- Slawka (MIR) will compile the diversity analysis with contributions from others,
- ASH & AR will finalize the whole report in early November (when AR visits JRC).
- Comments from all others by mid-November.
- Deliv. Submitted by the end of November.

PLAN OF PROCEDURE: DELIVERABLE 20 - Draft reference conditions (due November 2003)

- Each partner sends report on local analyses to JRC/ ASH by **the end of September 2003**.

- ASH will compile all reports into one document and summarize the outcome.
- CORPI (Arturas, Zita, and Renata) crosschecks the report results with results of statistical analysis using CODA.
- IOW (Norbert) cross-checks the report results with the IOW model outcome (from Gerald)
- Draft reference conditions for phytoplankton for each type will be tabulated (JRC/ ASH)
- This draft report will be sent for comments to all partners by the end of October 2003.
- Each partners send their comments back to ASH by 17 November

PLAN OF PROCEDURES: DELIVERABLE 21: Draft paper: Linking phytoplankton indices with typology and macrophytes (due November 2003)

- EMAUG (UR; HS& SS) is responsible for coordination of the compilation of this deliverable with the leader of WP3 (Dorte).

PLAN OF PROCEDURES: DELIVERABLE 22: Draft paper: Linking phytoplankton indices with typology and benthos (due November 2003)

- JRC (ASH) will call a meeting for the drafting group (persons were identified both from WP2 & WP4 in the Vilm workshop) in October to draft the manuscript.

THANKS FOR ARTURAS, ZITA, RENATA AND IBRAHIM FOR A VERY NICE ORGANIZATION OF THE MEETING!!!

Status of tasks April, 2003

19. Put all data subsets into a common Access-database	Access datafile of all data	DONE Mar-03	CORPI
20. Presentation of results in Vilm-meeting	Intermediate Results presented	DONE Apr-09	ASH
21. Define milestones and responsibilities for continuation	Plan for continuation of work	April 24	ASH/ ALL
22. Checking of the CODA	Corrected CODA	May 15	ALL
23. Send a list of errata to Klaipeda	Corrected CODA	May 15	ALL
24. Prepare instructions for statistical analysis of bloom situation		May 15	NERI (PH)
25. Correction of CODA	Final CODA	May 30	CORPI
26. Statistical analysis of bloom situations (using CODA)	Bloom definitions for different local areas	May 30	ALL
27. Test diversity indices for local data (using CODA)	Applicability of Diversity indices for phytoplankton	June 20	ALL
28. Cluster/ multiple regression Analysis of CODA for salinity groups	Phytoplankton response to salinity	June 20	CORPI
29. Clustering protocols distributed to WP2	Agreement of salinity groups	June 20	CORPI/ ALL
30. Analysis of CODA for definition of seasons/ blooms	Seasonality of phytoplankton	June 20	CORPI

31. Season definitions distributed to WP2.	Agreement of seasons	June 20	CORPI/ ALL
32. Meeting in Klaipeda	Analysis of results	July/ Aug???	ALL (?)
33. Results agreed and definition for further analysis	Draft report	July	CORPI, JRC, EMAUG
34. LOCAL ANALYSES OF PHYTOPLANKTON		May-July	ALL
1. Statistical analysis/ definition of bloom situations	Bloom windows for various regions	July-03	NERI summarizes
2. Checking local variability of diversity indices	Diversity indices for various regions	June 20	MIR summarizes
35. Holistic analysis of CODA	Functional relations btw phytoplankton variability and abiotic factors	July-03	CORPI/ ALL contribute
DELIVERABLE 14: Map of distribution and description of regulation of phytoplankton community indices	Status checked in June Klaipeda meeting	July 2003	JRC, KU-CORPI, EMAUG, SYKE
DELIVERABLE 20 - Draft reference conditions	Send local report to JRC by the end of September	November 2003	ALL, JRC summarizes
DELIVERABLE 17: Report on phytoplankton indices applicable as quality elements for ecological classification		November 2003	JRC, KUCORPI, and MIR are responsible, SYKE contributes
DELIVERABLE 21: Draft paper: Linking phytoplankton indices with typology and macrophytes		November 2003	EMAUG (UR) is responsible - NERI, SYKE, JRC and KUCORPI contribute
DELIVERABLE 22: Draft paper: Linking phytoplankton indices with typology and benthos		November 2003	JRC is responsible - AAU, IOW, IAE, MIR, NERI, SU(GU) and EMI contribute

Comments to tasks-table

1. The present / agreed order & structure of datasheets MUST be kept. Do not delete columns, do not reorganise columns when filling the data sheets. If you have to change order while filling data in, organise those in original order before submitting datasheets to database. Do not use ZERO (0), do not use letters.
3. Silicate Analyses acc. to Koroleff (see Grasshoff et al. 1983) are comparable. Norbert will clarify what is the earlier (blue?) method that may not be comparable with Koroleff's method, and provide further instructions. New column (AB) will be added for Silicate concentration.
4. All proposal for taxonomic additions/ changes to phytoplankton datasheets should be send to Norbert. Only Norbert can add columns to phytoplankton biomass tables. Norbert sends all final changes to ASH who will compile & distribute final datasheets to all partners (& CHARM www-page).
5. Samples where only 10 dominant species have been counted should be marked by setting one (1) to column AC of NEW abiotic data sheet, if all species counted leave empty.

9. A plan of the database structure and for the work to be carried out for statistical analyses will be compiled during visit to Klaipeda in October.

14. ASH send a template with a column for each partners' comments. Everybody send their list & comments to ASH.

15. Sigi collects files & notes where all comments concerning possible problem species are listed. This list can be updated continuously. Sigi will summarize received information in January 2003 to be used for analysis & evaluation of results of statistical analysis. Sigi & Hendrik keep master-file of all problem species. Send all problems with species names & identification to them. Agreed data sheets should not be changed by any partners

16-20. It was proposed that first KU-CORPI would be responsible for setting up the database and facilities to carry out statistical analyses of the data. Other partners would assist and supervise KU-CORPI in this task. The analyses should be carried out during small working meetings with 2 – 4 partners, carrying out analyses and testing the data in Klaipeda during December 2002 -February 2003. HS (HRO/EMAUG), PK (SYKE), & ASH (JRC) are willing to participate such meetings. Possibly also other partners. Travel funding may be required to enable some partner to travel to Klaipeda.

19. Date of the CHARM 2. Workshop has been changed. First results should be ready in early April 2003. We should foresee a presentation of the results of statistical analyses and WP2 specific meeting and discussion in connection to CHARM workshop, thus no separate meeting for WP2 partners is needed in 2003.

23. Old literature & references should be collected for evaluation of possibility to identify qualitative data for establishment of REFERENCE CONDITIONS. All partners should carry out this, since much of old references are not available widely (also old literature in Russian should be checked, Renata will do this).

Other issues & comments

- HS (HRO/EMAUG) would appreciate any voluntary to join to be responsible with him to compile Deliverable: **Draft paper:** Linking phytoplankton indices with typology and macrophytes (D21) before November 2003.
- there might be a problem if the heterotrophic *Leucocryptus* spp. is included in the biomass of **Cryptophytes** in earlier data. This should be checked when filling in data. [QUESTION: Should we mark such samples where Leucocryptus is not identified separately?]
- how is the biovolumes of *Ceratium* spp. Generally counted? Norbert will find Ceratium biovolume reference and distribute this reference and include it in the reference database (task: 7)
- information from CHARM WP nutrients could be used to establish nutrient Ref. Conditions. Also at BSSC there was an interesting presentation concerning how to set ref. cond. for coastal waters (HS will send this reference to others).
- Celine is preparing bibliography/ review of phytoplankton indices to her university (ready in October). This will be in French, but can be distributed for those who wish. Also possibility to translate relevant parts to English.
- Reminder of the data sheets completion should be sent to all WP2 partners one month before Nov. 30.

WP3

The meetings/workshops held in the CHARM WP3 group are listed below. Agenda and minutes of the meetings/workshops are available on the homepage [<http://charm.dmu.dk>]:

1. Meeting in the CHARM vegetation group, 3-4 September 2002
Place: Copenhagen
Agenda (PDF-file)
Minutes (PDF-file)

Other papers related to the meeting:
Revised detailed work plan for work package 3 (dated 1 October 2002) (PDF-file)
2. In connection with the 2nd workshop – 8-11 April 2003, Isle of Vilm, Germany, we had two meetings/workshops on macrophytes:
 - WP-meetings: WP 3 Macrophyten (detailed minutes)
 - Discussion group: Macrophytes – phytoplankton – typology with reference to deliverable 21 (detailed minutes)

Minutes of these meetings/workshops are available together with the overall minutes of the 2nd CHARM workshop.