

TMAP Evaluation Report

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**Trilateral Monitoring and Assessment Group
Common Wadden Sea Secretariat**

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1. Introduction

The report has been prepared by the TMAG following a decision of the Stade Conference in 1997 to evaluate the experiences with the TMAP Common Package at the Wadden Sea Conference in Esbjerg in October 2001. The report is an evaluation of the current implementation status of the Common Package as of February 2001 and of the experiences with the Common Package concerning requirements of the trilateral Targets and the EU Bird and Habitat Directives (NATURA 2000). It also entails an evaluation of the present organizational structure of the TMAP and proposals to further develop the TMAP to meet future demands and challenges.

2. Implementation Status of the TMAP Common Package

Until the beginning of 2001, the financial and organizational preconditions to implement major parts of the Common Package were established in all three countries. Considerable effort has been undertaken to adapt the national monitoring programs to the requirements of the TMAP. The large majority of the parameter groups could be implemented but gaps still exist for several parameter groups, which could not be implemented in one or two countries because of financial reasons. This concerns the following Common Package parameters:

- macroalgae surveys in the Netherlands,
- delivery of weather data to the TMAP data units in Germany,
- salt marsh and dune surveys in Denmark,
- monitoring of boats at sea in Lower Saxony.

The implementation of the associated TMAP data handling system is behind schedule for all parameter groups although the major technical parts of the data management has been successfully solved and is ready for use. The TMAP data units in Germany are accessible via the Internet and selected data sets can be downloaded, whereas in Denmark and the Netherlands the installation of the data units have not yet been finalized. The delay is mainly caused by the absence of a functioning long-term working structure for the implementation of the data handling system in the three countries. As a consequence, a fully operational data handling system will not be available until the end of 2001.

The necessary financial and personnel resources should be made available to implement the remaining parameters of the Common Package and to make the TMAP data handling fully operational as soon as possible in accordance with § 21 Stade Declaration. Because of the importance to establish an operational data handling on a long-term basis, this issue is further addressed under organizational aspects.

3. Information quality of the TMAP Common Package

Although most of the basic information for most of the Targets in the Wadden Sea Plan can be obtained by the Common Package, substantial gaps exist which hamper a more comprehensive Target assessment considerably. An extension of the Common Package is necessary in order to meet all requirements of the Targets and the EU Habitat Directive. The major information gaps concern fish communities, blue mussel species parameters, breeding success of birds, grey seal and harbour porpoise and tourism data. These gaps should be filled with priority. Table 1 provides an overview about the proposed priority projects and the estimated financial implications:

Proposal 1

To implement the five priority projects in order to meet the requirements of the Wadden Sea Plan Targets and the EU Habitat Directive.

In addition to the proposed five priority projects, activities are necessary to further develop and optimize the TMAP for requirements of the Targets and the Habitats Directive. These activities could be carried out by the TMAG as part of their regular work and can be implemented without any additional costs. This concerns mainly further investigations before a decision can be taken, e.g. a precise definition of the specific information needs (Target specification), development of an appropriate monitoring strategy, projects, costs and funding possibilities, as well as national preparation. The TMAG proposes to include this work into the annual work program:

Proposal 2

To instruct the TMAG to investigate possibilities to further improve the TMAP Common Package with regard to the Targets and the EU Habitat Directive on the basis of an annual work plan.

Table 1: TMAP priority projects and estimated financial implications (in Euro)

Priority project	Contents	Costs			
		NL	FRG	DK	Total
1. Fish monitoring	a. Inclusion of Demersal Young Fish Survey (DYFS), b. Investigate possibilities to include pelagic fish.	-	-	-	-
2. Blue mussels	Inclusion of blue mussel species parameters (running national programs).	-	-	-	-
3. Birds breeding success	Continuation of the trilateral pilot project of 1996-97; (yearly costs)	25,500	44,000	12,700	82,200
4. Marine Mammals	a. Implementation of a two-year pilot project on grey seals, b. Investigate possibilities to carry out a pilot survey for harbour porpoise.	22,000	16,600	-	38,600
5. Tourism	Preparation of a project proposal to develop a standard monitoring program (by Inter-Regional Wadden Sea Coop.).	-	-	-	-

4. Organizational Aspects

A functioning work structure is indispensable to achieve the aims of the TMAP, namely a scientific assessment of the ecosystem and an evaluation of the implementation status of the Targets. The existing TMAP work structure has been functioning well and should be continued with the TMAG as the main coordination body and the existing TMAP sub-groups:

Proposal 3

To maintain and continue the existing TMAP work structure.

The data handling is an essential part of the TMAP to carry out the given tasks properly. The current data handling work structure is not established on a long-term basis and therefore insufficient to guarantee a steady national TMAP data flow into the units, a reliable and constant availability of TMAP data on the trilateral level, and finally the desired information flow between monitoring, assessment and management.

Furthermore, a trilateral coordination is required for a harmonized implementation, maintenance and further development of the TMAP data handling system. These tasks concern the coordination of trilateral data handling operations, the implementation of structures for further parameter groups, the coordination of projects to update and extend the trilateral data handling tools and the support of the trilateral working groups concerning data handling aspects. Table 2 provides an overview of the estimated financial implication to maintain an operational TMAP data handling system:

Proposal 4

To employ data handling persons at each national database and a data handling coordinator at the CWSS on a long-term basis.

The TMAP assessment work such as the preparation of the QSR 1999 demonstrated that an efficient work is often hampered by an inadequate

product definition and working structure which results in a delayed publication of the monitoring results. Therefore, it is important to better define the products to be delivered, and to establish a structure for the assessment work and publication. This also includes appropriate technical tools (graphical and statistical tools) to visualize and analyze the data available from the TMAP data units. The assessment results could then be made easier and faster available to the relevant authorities, interest groups and local citizens than in the past in accordance with the Wadden Sea Plan (Chapter I, § 15). The publication of results in reports, brochures and newsletters, should be supplemented by modern presentation tools like Internet platforms or e-mail newsletters. The TMAG proposes to establish a TMAP information system entailing coordinated assessment and reporting procedures, as well as the publication and presentation of the results. Further investigations have to be carried out before an estimation of the possible financial implications can be given:

Proposal 5

To agree that it is necessary to develop a TMAP information system to make the TMAP results easier and faster available to relevant authorities, interest groups and local citizens and to instruct the TMAG to investigate the possibility to develop such a system entailing a comprehensive assessment and publication procedure.

Table 2: Estimation of the financial implications for the TMAP data handling at the 4 national data units and the CWSS (in Euro).

	National data units	Trilateral coordinator	Total
The Netherlands	33,000*	22,000	55,000
Germany: (2 Units)	66,000*	22,000	88,000
Denmark	33,000*	22,000	55,000
	132,000*	66,000	198,000

* The personnel effort depends on the individual preconditions at the individual data unit. As a minimum, one part-time position is estimated for the maintenance of the TMAP data unit (TMAG 1997).

1. Introduction

The Trilateral Monitoring and Assessment Program (TMAP) is the common monitoring program for the Wadden Sea carried out by the Netherlands, Germany and Denmark in the framework of the Trilateral Wadden Sea Cooperation. It is coordinated by the Trilateral Monitoring and Assessment Group (TMAG). Until 2001, a common set of monitoring parameters and a common data handling system has been established, as agreed at the last Trilateral Governmental Conference in Stade in 1997.

The TMAP was developed following a decision of the 6th Trilateral Governmental Conference in Esbjerg in 1991, where the ministers decided "to cooperate in scientific research and monitoring" and to further implement a Common Wadden Sea Monitoring Program pursuant to decisions of the 1988 Governmental Conference 'to continuously evaluate the ecological state of the Wadden Sea as a whole, in order to be able to decide on relevant trilateral policy measures'.

A basic concept for an integrated Trilateral Monitoring and Assessment Program (TMAP) for the entire Wadden Sea had been elaborated by the Trilateral Monitoring Expert Group (TMEG) in the period 1992 – 1993 (TMEG 1993). In 1993, the concept was adopted by the Senior Officials and the first phase was implemented with a subset of parameters based on the existing and not yet harmonized national monitoring programs in January 1994. Joint monitoring programs for breeding and migratory birds and seals had already been trilaterally implemented in 1989 and 1992, respectively, and are part of the TMAP.

In 1994, the TMAG was established as a permanent working group under the Trilateral Working Group (TWG) to further elaborate the basic concept and to coordinate the TMAP. The TMAG is also responsible for the coordination of ecological research, the development of a trilateral data handling system and the preparation of assessment reports of the Wadden Sea ecosystem at regular intervals.

During 1995 – 1998, the TMAG developed common guidelines for the TMAP parameters, a trilateral data management and a proposal on the implementation of the different parts of the TMAP. Priority parameter groups were defined and different implementation scenarios were developed taking into account technical and financial implications. The work was carried out with financial support of the national monitoring institutes and the LIFE program of the Euro-

pean Commission (DEMOWAD Project) (TMAG 1998).

Based on the implementation plan by the TMAG, the ministers decided at the Stade Conference in 1997 to implement a Common Package of parameters including the associated data management. These priority parameters have been selected from the TMAP based on the information requirements of the Targets and Issues of Concern, as well as on practical considerations (TMAG 1997).

At the Stade Conference, it was also decided to evaluate the experiences with the TMAP Common Package at the next Wadden Sea Conference in Esbjerg in October 2001 (SD §§ 20-22). The Trilateral Working Group (TWG) instructed the TMAG to prepare an evaluation report until March 2001, according to an outline as endorsed by the TWG 00/1.

There were several reasons for this evaluation. Firstly, the Common Package is only a part of the full program developed by the TMEG 1992/93 and later elaborated by national experts in 1996/97. Secondly, the preparation of the Quality Status Report 1999 (QSR) and the capacity of the monitoring program to provide sufficient information to meet the objectives of the QSR were thought to be good criteria to evaluate the Common Package. Lastly, the ability of the Common Package to meet requirements of future monitoring obligations will be major challenges to the TMAP.

The report is a technical evaluation of the current implementation status of the Common Package and of the experiences with the Common Package concerning requirements of the Issues of Concern, the trilateral Targets and the EU Bird and Habitat Directives (NATURA 2000). It also entails an evaluation of the present organizational structure of the TMAP and proposals to further develop the TMAP to meet future demands and challenges.

2. Implementation Status

Implementation Status of the TMAP Common Package

The TMAP Common Package entails a set of chemical, biological, habitat and human use parameters, which have been selected to provide the chief information necessary for the evaluation of the Targets and the TMAP hypotheses.

Table 3 provides an overview of the implementation status of the Common Package adopted at the Stade Conference in 1997 (Annex 2 of the Stade Declaration, 1997).

Table 3: Implementation status of the TMAP Common Package (February 2001)

Category		Parameter Group	Status Monitoring	Status Data Handling		
				NL	FRG	DK
Contaminants	1	TBT in water and sediment ¹⁾	Implemented			
	2	Metals in sediment	Implemented			
Nutrients	3	Inorganic nutrients in water	Implemented			
Salt Marshes	4	Spatial extension	Not yet implemented in Denmark			
	5	Agricultural utilization: grazing	Implemented			
Benthos	6	Macroalgae	Not yet implemented in the Netherlands			
	7	Eelgrass	Implemented			
	8	Macrozoobenthos communities	Implemented			
	9	Blue Mussel beds	Implemented			
	10	Contaminants in Blue Mussel	Implemented			
Plankton	11	Phytoplankton	Implemented		X ⁶⁾	
Fish	12	Contaminants in Flounder	Implemented			
	13	Mussel/Cockle/Shrimp fishery	Implemented			
Beaches and Dunes	14	Spatial extension	Not yet implemented in Denmark			
Birds	15	Breeding birds: numbers and distribution	Implemented ²⁾		X ⁶⁾	
	16	Breeding birds: contaminants in bird eggs	Implemented		X ⁵⁾	
	17	Migratory birds: numbers of waterbirds in counting units	Implemented ³⁾		X ⁶⁾	
	18	Beached Bird Survey (BBS)	Implemented		X	
Seals	19	Population parameters by aerial survey	Implemented ⁴⁾		X	
Recreational Activities	20	Boats at sea	Currently not implemented in Lower Saxony			
	21	No. of guided tours	Implemented			
	22	Air traffic	Implemented			
General Parameters	23	Coastal protection measures	Implemented			
	24	Geomorphology	Implemented			
	25	Flooding	Implemented			
	26	Land use	Implemented			
	27	Weather conditions	Not yet implemented in Germany			
	28	Hydrology	Implemented			

1) Trend monitoring of TBT is carried out in sediment, no trend monitoring in water (according JAMP). TBT in water is measured only in hot spots (e.g. marinas).

2) Trilateral program since 1989.

3) Trilateral program since 1992.

4) Trilateral program within the Seal Management Plan since 1989.

5) only in Lower Saxony

6) only in Schleswig-Holstein

Implementation Status of the Monitoring Program

Until February 2001, the financial and organizational preconditions to implement major parts of the Common Package were established in all three countries.

The implementation process focused on the development of common guidelines making the results of the different programs comparable for trilateral assessment. These guidelines have been elaborated by trilateral expert workshops during the Demowad project and were refined and updated during their implementation into the national monitoring programs (Marencic et al. 1996, TMAG 1998, Workshop Blue mussel 2000, Workshop salt marshes 2000, TMAP Manual 1997 update 2001).

Most of the parameter groups of the Common Package could be implemented in all three countries until February 2001 (see Table 1). Because major parts of the Common Package were already part of ongoing national monitoring programs in at least two of the three countries, this concerned mainly the modification of these programs to meet the requirement of the common TMAP guidelines. If parameter groups were not part of existing monitoring programs, they were implemented into the national program. Because of financial reasons, some could not be implemented in all countries and additional effort is therefore necessary to complete the implementation of the Common Package as soon as possible and before the Esbjerg Conference in October 2001.

Considerable effort has been undertaken to adapt national monitoring programs to the requirements of the TMAP. The existing programs were modified or extended and new parameters were implemented. Compared to the monitoring programs at the beginning of the implementation process in the mid 1990s, the TMAP has been a catalyst for considerable progress. The common TMAP guidelines improved the comparability of the monitoring results obtained by different methods and monitoring programs. Furthermore, monitoring projects were introduced, for example the Blue mussel monitoring in Germany and partly in Denmark.

The monitoring of contaminants in bird eggs could be implemented as a completely new parameter group in the regular Wadden Sea monitoring based on the experience from a trilateral pilot study in 1996 and 1997 (Becker et

al, 1998). In all three countries, sample preparation, analysis and reporting are carried out by the German Institute for Avian Research. This "one-lab approach" is unique in international monitoring and works efficiently.

As a major achievement of the TMAP implementation process, comparable monitoring methods are now applied to the Common Package parameters in all three countries. This enables a delivery of harmonized and comprehensive information and improves reporting and assessment procedures on the national and trilateral level considerably.

Implementation Status of the Data Handling

The TMAP data handling has to ensure the data flow from the monitoring programs via the TMAP data units to national and trilateral scientists and user groups for national and trilateral assessment. Based on the Demowad project results (TMAG 1997) and further developments in a German project (1998-1999), a modern decentral data management system with the so-called TMAP data units has been developed and is available. The units are assigned to the Wadden Sea areas of the Netherlands, Lower Saxony, Schleswig-Holstein/Hamburg and Denmark, they are connected to the Internet, are identically structured and organized and differ only in terms of the stored data. The developments, so far, have been made under the supervision of the Trilateral Data Handling Group (TDG) and carried out and organized by the trilateral data handling coordinator at the Common Wadden Sea Secretariat.

The software for installing the data units is available and the national TMAP data sources have been identified. For 11 of 28 parameter groups, data (biological and chemical) can be filled in. Further six parameter groups need only little effort to fulfill the preconditions for filling in data. The work on the remaining 11 parameter groups have been postponed for several reasons, mainly because of time constraints and delayed specification of the TMAP guidelines.

The German project installed two data units, and filled in a subset of TMAP data until 1999. No permanent employment has, however, been made for further development or maintenance of the German units. The national data flow to the units has partly been organized. In Denmark, the unit has not yet been installed, but a person

working part-time has been employed until the end of 2001 to implement the data unit. In the Netherlands, no TMAP data unit is available. It lasted until October 2000 that two persons were employed which are now working part-time on the national data flow and the installation of the unit until the end of 2001.

The installation of two TMAP data units in Germany has demonstrated the feasibility and benefit of harmonized data handling. However, the TMAP data handling system is behind schedule for all parameter groups although the technical preconditions have been developed and are available. It is however doubtful that an operational TMAP data handling system will be available in all countries until the end of 2001, for reasons indicated above. Sufficient personnel resources are necessary to guarantee a steady national TMAP data flow into the units, a reliable and constant availability of TMAP data on the trilateral level, and, finally, the desired information flow between monitoring, assessment and management. The TMAG estimated in the Implementation Report in 1997 that at least one part-time position for each unit (depending on the institutional background) and a trilateral data handling coordinator are necessary to run the data handling system (TMAG 1997).

3. Information Quality

Evaluation of the Information Quality of the TMAP Common Package

The overall aim of the TMAP is to provide a scientific assessment of the status of the ecosystem and to assess the status of the implementation of the Targets as entailed in the Wadden Sea Plan. Because the Targets are the central elements of the trilateral management, monitoring parameters have to be selected according to their validity for the Target assessment.

The TMAP Common Package consists of selected parameter groups, which are monitored in the three countries in a comparable way on the basis of common guidelines. The parameters of the Common Package were selected considering the technical effort needed for the implementation, their importance for the Targets, the cost-benefit relation, and whether the parameters were already part of a national monitoring program (TMAG 1997). Therefore, all parameter groups of the TMAP Common Package are necessary to evaluate the Targets. This concerns the assessment of the quality of water and sediment with regard to eutrophication and contaminants and the evaluation of the implementation status of the Targets on species and habitats like benthic communities (e.g. mussel beds, eelgrass), beaches and dunes, salt marshes, birds and seals.

The TMAG already stressed in its Implementation Report in 1997 that the Common Package would not in all cases provide sufficient information for the Targets. Therefore, the monitoring has to be evaluated against the requirements of the Targets based on the experiences with the Common Package. If necessary, additional steps would have to be undertaken to optimize and further develop the TMAP to meet the needs of the Targets.

The requirements of the EU Directives (Bird, Habitat, Water Framework) have also to be considered in the TMAP. The Habitat Directive is the key directive for nature conservation in the European Union in conjunction with the Bird Directive. The new Water Framework Directive aims to an integrated management of entire catchment areas including the coastal waters.

The TMAP also depends on other international developments, namely the monitoring program of OSPAR (JAMP) and the monitoring recommendations of several ICES working

groups.

Furthermore, in the framework of the Convention of Biological Diversity (Rio, 1992), criteria for an "ecosystem approach" were developed and should be also implemented for the TMAP.

A major challenge of the TMAP is also the fine tuning between the national monitoring programs, the requirements of the Trilateral Cooperation and the EU Directives and other international developments. This concerns a consistency in the selected parameters and monitoring methods, as well as assessment procedures and reporting conditions.

In the following chapters, the information quality of the Common Package is evaluated concerning the requirements of the Wadden Sea Plan and the EU Directives aiming at further optimizing and bringing the monitoring up-to-date for future needs.

3.1 Wadden Sea Plan Requirements

The Targets, as entailed in the Wadden Sea Plan, are the central element of trilateral management and policy. Therefore, reliable and sound information about the quality of water and sediment as well as species and habitats is necessary to evaluate the status reached in the implementation of the Targets. The main task of the TMAP is to deliver the required information to carry out such an assessment in the framework of a Quality Status Report (QSR) or the preparation of a Ministerial Conference.

The QSR 1999 was the first attempt to carry out a comprehensive assessment of the present status of the Targets based on the results of a scientific analysis. In addition to the parameters of the Common Package also data from other sources were used. However, because the TMAP was still in its implementation phase, the interpretation of monitoring data was severely hampered by different national monitoring methodologies and insufficient suitable data. Despite the inadequate data basis, the QSR 1999 could draw some important conclusions about the status of the Targets, which constituted a considerable step forward in the common trilateral management.

With regard to monitoring the QSR 1999 demonstrated that

- the existing long-term monitoring (TMAP common package) is an appropriate basis for the evaluation of the Wadden Sea Plan Targets,
- research and specific projects concomitant to routine monitoring are necessary for a scientific evaluation of the status of the ecosystem,
- shortcomings occur with regard to the parameter selection of the TMAP Common Package and the availability of suitable data.

The QSR 1999 has been prepared by an independent group of experts in their various fields, and the recommendations concerning monitoring and research can therefore be taken as directions for the future improvement of the TMAP.

The QSR 1999 also revealed that, beside the lack of suitable data, a scientific evaluation of the Targets has its limitations. In most cases the Targets are of general nature and do not provide a desired end-situation. They indicate the policy direction to be followed by the Wadden Sea states. For example, a "natural dynamic situation" is a Target for the tidal area but it is not specified in detail which information is required and which features should be monitored. Therefore, it is essential for future monitoring that the Targets are specified as much as possible and as desirable. It will guide the further development of the monitoring program and concomitant research and will improve the overall assessment of the implementation of the Targets.

Based on the results of the Target assessment by the QSR group, the TMAG evaluated whether the present Common Package is sufficient to meet the requirements of the Targets and whether gaps exist with regard to monitoring and research.

The TMAG defined, as far as possible, the information needs for each Target and evaluated if the available information from the Common Package is sufficient for the Target assessment. If limitations have been observed, additional steps are proposed how the information quality of the Common Package can be enhanced to meet the requirement of the Wadden Sea Plan Targets. The complete analysis has been attached in Annex 3.

On the basis of the analysis it can be concluded that

- most of the basic information concerning the requirement of the Targets can be obtained from the Common Package,
- additional information from programs concomitant to the monitoring like specific national monitoring programs, research or pilot projects are necessary to complete the Target assessment and supplement the long-term monitoring of the Common Package.
- technical modifications of the ongoing monitoring are necessary to enhance the efficiency of the program, e.g. development of new monitoring strategies, modification of monitoring frequencies and number of sampling sites,
- important parameter groups are not included in the TMAP common package and subsequently only limited information is available for the Target assessment, e.g. fish communities, breeding success of birds and marine mammals.

Although most of the basic information for the assessment of the Targets can be obtained by the Common Package, substantial gaps exist which hamper the Target assessment considerably. Table 4 provides an overview of the major gaps as a result of the analysis given in Annex 3. An extension of the Common Package is therefore necessary in order to meet all requirements of the Targets.

Table 4: Major information deficits with regard to the Target assessment.

<p>Target on Water and Sediment:</p> <ul style="list-style-type: none"> • Limited information about aspects and processes influencing the eutrophication status (distribution and fluxes of nutrients, production and decomposition processes, role of zooplankton), • No specific assessment criteria concerning background values of micropollutants • Limited information about the status and fate of potentially dangerous substances
<p>Target Tidal Area:</p> <ul style="list-style-type: none"> • No or limited information about pelagic and demersal fish including migratory fish species, • No or limited information about morphological and biological characteristics of the tidal area especially for subtidal areas, • Available information of Blue mussel species parameters and characterization of Blue mussel bed types are not harmonized, • No recent information about status of Sabellaria reefs,
<p>Target Offshore Zone:</p> <ul style="list-style-type: none"> • Lack of information about the significance of the offshore zone (primary production, benthos, fish, birds, marine mammals)
<p>Target Birds:</p> <ul style="list-style-type: none"> • Limited information concerning favorable food availability, natural breeding success, natural flight distances and sufficiently large undisturbed roosting and moulting sites,
<p>Target Marine Mammals:</p> <ul style="list-style-type: none"> • Lack of information concerning a viable stock and a natural reproduction capacity of Grey seals and Harbour porpoise,
<p>Targets on Species and Habitats:</p> <ul style="list-style-type: none"> • No or limited information about the influence of recreational activities on species and habitats.

3.2 EU Directives

3.2.1 Habitat Directive

The Habitat Directive is the key directive for nature conservation in the European Union in conjunction with the Bird Directive. Regular surveillance of the conservation status of habitats and species is requested, in particular, with regard to priority natural habitat types and priority species (Article 11 of the Habitat Directive, Annex I and II of the Habitat Directive, Annex I of the Bird Directive). The Habitat Directive requires that member states provide a report on the conservation status of habitats and species every six years.

The development of an appropriate monitoring strategy requires a definition of a desired conservation status and an identification of measurable characteristics that indicate the conservation status. Experiences with the implementation of a monitoring strategy for marine sites have been gained in the United Kingdom (JNCC 2000). However, a common strategy for marine sites has not yet been developed on the European level. It is highly desirable that such a common approach is developed especially

with regard to tidal areas like the Wadden Sea.

Taking into account that specific monitoring requirements for the Habitat Directive have not yet been defined in detail, it can be stated that the Common Package provides consistent information for the Wadden Sea concerning most of the habitats listed in Annex I of the Habitat Directive (see Annex 4, Table 1).

Monitoring of salt marshes, beaches and dunes in the TMAP is carried out according to the habitat classification of the Directive. Concerning reefs (subtidal mussel beds and Sabellaria reefs) sandbanks, mudflats and bays, only limited information can be obtained from the Common Package.

Regarding the monitoring of Annex II-species, the TMAP provides sufficient information only for the harbour seal (*Phoca vitulina*) because other marine mammals (grey seal, harbour porpoise) are not included in the TMAP (see Annex 4, Table 2). No information is available from the Common Package concerning the development of fish communities, especially the status of priority species such as the houting (*Coregonus oxyrhynchus*). This is a major shortcoming in the TMAP and has to be considered

during the further development of the TMAP.

Table 5: Major information deficits concerning the Habitat Directive Annex I and II.

Annex I Habitats
<ul style="list-style-type: none"> • No or limited information about reefs (subtidal mussel beds, Sabellaria reefs), • Limited information concerning sandbanks, mudflats, bays.
Annex II Species
<ul style="list-style-type: none"> • No or limited information about fish species, • Lack of information about grey seal, harbour porpoise.

3.2.2 Bird Directive

Monitoring of birds in the TMAP is carried out by the Joint Monitoring Groups of Breeding and Migratory Birds according to the requirement of the Bird Directive. The Annex I-species of the Bird Directive are covered by the ongoing monitoring.

3.2.3 Water Framework Directive

The Water Framework Directive was enacted in December 2000. The possible implications of the Directive could not yet be examined in detail for the TMAP, especially from the perspective of integrating nature conservation and water quality and quantity aspects. It seems that most of the relevant water quality parameters (e.g. nutrients, phytoplankton, benthos) are already monitored in the Common Package (Annex 4, Table 3). However, an evaluation of the TMAP Common Package regarding the requirements of the EU Water Framework Directive should be carried out after the implications of the Directive on the national level have been worked out.

3.3 Convention on Biological Diversity

The Guiding Principle of the Wadden Sea policy "to achieve, as far as possible, a natural and sustainable ecosystem in which natural processes proceed in an undisturbed way", meets the aims of the 'ecosystem approach' as it is laid down in the '12 Malawi Principles' (UNEP, 1998) which were formulated as follow up activity in the frame of the Convention of Biological Diversity (Rio, 1992).

The 'ecosystem approach' includes the con-

servation of ecosystem structure and functioning as a key feature: "Ecosystem functioning and resilience depends on a dynamic relationship within species, among species and between species and their abiotic environment as well as physical and chemical interactions within the environment. The conservation of these interactions and processes is of greater significance for the long-term maintenance of biological diversity than simple protection of species" (Malawi Principle 5).

In accordance to the guiding principle and the 'ecosystem approach' the TMAP has been developed as an integrated ecosystem monitoring program. The current parameter set of the 'Common Package' focuses mostly on selected structural elements and provides no information about the basic ecosystem processes.

3.4 Other Conventions

The Wadden Sea states have committed themselves to monitoring birds in the Wadden Sea as contracting parties to a number of international agreements, conventions and treaties. In particular, the Ramsar, Bonn and Bern Convention and the African-Eurasian Waterbird Agreement specifically include surveillance/monitoring activities, and the Memoranda of Intent between the Wadden Sea and the Wash, respectively, Guinea-Bissau are also important for breeding and migratory birds.

The Seal Agreement was enacted on October 1, 1991 as the first agreement under the Convention on the Conservation of Migratory Species of Wild Animals (CMS, Bonn Convention). The Seal Agreement contains provisions, amongst others, on research and monitoring, taking, and protection of habitats, which have been implemented in the Seal Management Plan (SMP). Numbers of counted seals are included in the TMAP common package. The SMP specifies a number of other monitoring topics, e.g. seal population parameters (diseases, survival, age structure, sex ratio) and contaminants in seals which are not part of the Common Package.

Furthermore, requirements from the OSPAR Convention have to be taken into consideration. The recently adopted OSPAR monitoring program JAMP and the Annex V of the Convention on "The Protection and Conservation of the Ecosystem and Biological Diversity of the Maritime Area" have also to be taken into consideration.

3.5 Improvement of the Information Quality of the Common Package

The evaluation of the TMAP Common Package demonstrated that there is a need to adapt and extend, as appropriate, the Common Package to meet the requirements of the Wadden Sea Plan Targets and the Habitat Directive. This can be achieved by:

- inclusion of ongoing national monitoring programs in the Common Package,
- refinement of existing programs (e.g. by implementing new monitoring strategies or by modification of frequencies, techniques or assessment procedures),
- inclusion of new parameter groups in the Common Package.

The available resources to amend the Common Package are assumed limited. Therefore, it has to be considered whether the costs of the existing monitoring could be reduced without weakening the information quality of the program. Different options can be followed. Costs could be reduced by following a one-lab approach, as has been done for monitoring of contaminants in bird eggs. A better cooperation in border areas (Ems estuary, Sylt-Rømø area) would also save costs, e.g. by avoiding double work with regard to water chemistry monitoring in the Ems estuary or by establishing cross-border aerial surveys for macroalgae and eelgrass (combined surveys in Denmark/Schleswig-Holstein and the Netherlands/Lower Saxony). Furthermore, as part of an ongoing evaluation of the effectiveness of existing programs, the existing monitoring strategy as well as monitoring frequencies and number of stations should be evaluated regularly and optimized if necessary.

The TMAP Common Package can also be improved by inclusion of existing national monitoring programs. Several programs carried out in the Wadden Sea on a regular basis are not part of the TMAP Common Package but could deliver important information for the Targets. This concerns for example Blue mussel field surveys and the demersal young fish survey (DYFS) carried out in all three countries, and pelagic fish monitoring in Schleswig-Holstein. Furthermore, information about recreational activities and socio-economic parameters can be derived from all three countries or has been established as a regular program as in Schleswig-Holstein ("SÖM-Monitoring").

3.5.1 Project Proposals

In view of the above conclusions, the TMAG has considered all possibilities to optimize the current Common Package taking into account the given technical and financial conditions. The TMAG proposed to focus on five projects and to implement them with priority in order to fill major gaps concerning the requirement of the Wadden Sea Plan Targets and the Habitat Directive and complement existing programs with important information:

- Fish monitoring,
- Blue mussels (species parameters),
- Bird breeding success,
- Marine mammals,
- Tourism monitoring.

The following projects are technically feasible and can be implemented with reasonable costs in the period 2001 - 2005:

Project 1: Fish monitoring

From the Common Package, no information is available about the development of fish communities (demersal and pelagic fish). Therefore, the Target of "an increased area of undisturbed tidal flats and subtidal areas" cannot be assessed to an appropriate extent. This gap occurs also with regard to the Habitat Directive (conservation status of fish species, e.g. houting).

Proposal:

The existing Demersal Young Fish Surveys (DYFS) in the Netherlands, Germany and Denmark should be included in the TMAP. A harmonization of these surveys needs to be updated before results can be considered comparable.

An inquiry for monitoring of pelagic fish will be made to prepare a proposal on how appropriate information can be obtained. Monitoring of pelagic fish should be included to comply with the Habitat Directive (NATURA 2000) requirements (houting, shad). Furthermore, migratory fish which has been listed as threatened species (see Red List Wadden Sea) should be considered for monitoring.

Costs:

No additional costs are expected to include the existing DYFS in the TMAP. Expert consultations and a workshop on pelagic fish can be carried out within the available budgets.

Project 2: Blue mussels

The Common Package entails only information about size and location of mussel beds. Other important parameters necessary for the evaluation of the Target "natural mussel beds" (e.g. species parameters) are not included in the TMAP.

Proposal:

The existing national blue mussel monitoring programs should be included in the TMAP.

Costs:

No additional costs are expected. Funding may be necessary to carry out expert workshops (intercalibration and data analysis) but could be done within the available budgets.

Project 3: Birds breeding success

The joint monitoring program of breeding and migratory birds allows for an analysis of the population developments of important bird species. However, with regard to the Target "a natural breeding success", the Common Package does not provide the necessary information. Therefore, monitoring of breeding success should be carried out regularly to check the environmental conditions relevant for coastal birds. It can be used as an "early warning system" for negative changes in bird population sizes. The practical applicability has been demonstrated during a trilateral pilot project in 1996 – 1997 (Thyen et al., 1998).

Proposal:

Monitoring of breeding success in continuation of the trilateral pilot project.

Costs: (in Euro)

	No. of sites	Yearly costs
Denmark	2 sites	12,700
Germany:		
Schleswig-Holstein	4 sites	25,500
Lower Saxony	3 sites	18,500
the Netherlands	4 sites	25,500
Total		82,200

Project 4 Marine mammals

Objective:

Monitoring of Grey seal and Harbour porpoise populations are not part of the Common Package. Therefore, sufficient information is not available with regard to the Targets on marine mammals and the Habitat Directive.

Proposal:

Implementation of a two-year pilot survey for Grey seals. Inquiries of possibilities to carry out a

pilot survey to record the spatial and temporal pattern of harbour porpoises. Regular monitoring of grey seals and harbour porpoises after the finalization of the proposed pilot projects.

Costs:

a. Grey seals: Two-year pilot survey (in Euro)

	Per year	Total
Germany:		
Schleswig-Holstein	8,300	16,600
the Netherlands	11,000	22,000
Total	19,300	38,600

b. Harbour porpoise:

Further inquiries are necessary before an estimation can be made.

Project 5 Tourism monitoring

Information about the development of tourism is necessary to assess possible effects on species and habitats with regard to the Targets, e.g. on birds or marine mammals. The parameters presently included in the Common Package do not adequately cover the full range of human activities. Therefore, additional parameters should be monitored.

Proposal:

A standard monitoring program should be developed for tourism data. A project proposal is under preparation by the Inter-regional Cooperation. The results should be incorporated in the TMAP as far as possible.

Costs:

Estimation not yet possible.

3.5.2 TMAG Work Program

In addition to the proposed five priority projects, activities are necessary to further develop and optimize the TMAP for requirements of the Wadden Sea Plan Targets and the Habitat Directive. These activities will be carried out by the TMAG as part of their regular work and can be implemented without any additional costs. This concerns mainly further investigations before a decision can be taken, e.g. development of an appropriate monitoring strategy, definition of information needs, projects, costs and funding possibilities. The TMAG proposes to include this work into the annual work program (Table 6).

Table 6 : Follow up activities to be carried out by the TMAG as part of its regular work

No.	Topic	Proposal	Remarks
Targets Water and Sediment			
1	Background values	Development of specific background values for the Wadden Sea.	Based on OSPAR background values.
2	Hazardous substances	Evaluation of status and fate of potentially dangerous substances.	In close cooperation with OSPAR.
3	Nutrients	Investigate the possibility to increase monitoring frequency (in February/March) and coverage of entire salinity and/or geographical gradient.	Long-term task; financial implications to be investigated; tuning with OSPAR and EU Water Directive necessary.
4	Production and decomposition.	Initiation of a trilateral project to define a monitoring concept.	Concerns also nutrient fluxes.
5	Zooplankton	Investigate the current status of zooplankton monitoring at trilateral level.	Zooplankton is already sampled regularly at selected sites but data cannot be compared directly.
Targets Tidal Area			
6	Sabellaria	Pilot study for monitoring Sabellaria.	No recent information about the status of Sabellaria available.
7	Zostera	Initiate project about causes of failure of return to prepare proposal to improve the situation..	
8	Oyster	Investigate the present situation.	The development of the introduced oyster should be followed.
9	Subtidal habitats	Investigate the current status of subtidal monitoring.	Lack of information regarding subtidal mussel beds, effects of Spisula fishery.
Target Offshore zone			
10	Offshore Zone	Inventory of information needs for a proper management. Development of an offshore monitoring proposal.	Significance of the offshore zone (primary production, benthos, fish, birds, mammals).
Targets Birds			
11	Birds	Investigate the possibility of a research projects on food availability for selected species and the situation on roosting sites. Investigation of flight distances.	Continuation of monitoring of moulting sites and abundance of sea ducks in the TMAP.

4. Organizational Structure

4.1 TMAG

The Trilateral Monitoring and Assessment Group (TMAG) is the main coordination body of the TMAP and was installed under the TWG in 1994. The main tasks of the TMAG are the implementation of the Common Package (including data management), the collection and assessment of monitoring data and the preparation of assessment reports. The Terms of Reference of the TMAG are given in Annex 5.

The implementation of the common package was the main activity of the TMAG during the last three years. A high effort was required to coordinate the implementation process on the national and trilateral level. During the implementation, several guidelines had to be modified or improved for different reasons and monitoring experts were consulted. In the case of Blue mussel and salt marsh monitoring trilateral workshops had to be organized in order to solve technical details. Adaptations of TMAP guidelines will also be a running task in the future.

The task to develop a trilateral data handling system was delegated to the Trilateral Data Handling Group (TDG). The TDG supervised the Demowad Project (1995 – 1998) and accompanied the work of the German data-handling project (1998-1999) which developed and implemented an up-to-date version of the TMAP data unit. The preparation of the Wadden Sea Quality Status Report was delegated to an ad-hoc group, the QSR group (1995 – 1999). The QSR was published in December 1999 and will be evaluated by the TWG in the preparation of the next Ministerial Conference.

The experiences from the last years clearly demonstrated that a central coordination body like the TMAG is necessary to carry out the monitoring and assessment work. This concerns harmonized implementation of the Common Package and the associated data handling system, the collection of monitoring data, the preparation of assessment reports, as well as the day-to-day work like information exchange, preparation of workshops or evaluation of project proposals.

In some cases, the TMAG had difficulties to carry out its task sufficiently resulting in a delayed implementation of the TMAP Common Package especially the data handling. The main reasons were the lack of financial and personnel resources to implement the TMAP guidelines and the data units on the national level. This unsatis-

fying situation should be improved by giving the TMAP implementation a higher priority on the national level and safeguarding appropriate financial and personnel resources on a more long-term basis.

4.2 TMAP Work Structure

The following ad-hoc expert groups have been installed under the responsibility of the TMAG:

- Trilateral Data Handling Group (TDG): Coordination and implementation of the trilateral data handling,
- Joint Monitoring Groups of Breeding and Migratory Birds (JMBB and JMMB): Coordination, implementation, assessment and documentation of the monitoring programs of breeding and migratory birds.

An ad hoc working group was installed in 1995 – 1999 to prepare the Quality Status Report 1999. Additionally, the establishment of a trilateral expert pool is under preparation consisting of monitoring experts in charge of the national monitoring. These experts will support the TMAG in the refinement of guidelines and of database requirements but will also be involved in the preparation of assessment reports. It is estimated that such activities would not require substantial additional costs but would mostly be covered by existing activities.

Monitoring of seals is carried out by the Trilateral Seal Expert Group (TSEG) which is in charge of the implementation of the Seal Management Plan under the responsibility of the TWG.

The existing work structure has been functioning well and should be continued with the TMAG as the central coordination body and the existing TMAP working groups. However, the main bottleneck is to find the necessary financial and personnel resources to carry out all given tasks sufficiently and on time.

4.2.1 Trilateral Data Handling Group (TDG)

The TDG has the task to organize and coordinate the trilateral data management, which means mainly the implementation of the TMAP data units and the filling in of national monitoring data. The Terms of Reference of the TDG are given in Annex 5.

The TDG developed a concept of a trilateral data handling system and supervised the techni-

cal implementation in the three countries. Because of missing resources for development, implementation and entering TMAP data into the data units, the work of the TDG was delayed in the years 1997–2000.

This implementation delay mainly relates to the insufficient personnel support on the expert level. The unsatisfying lack of TMAP data in the Data Units can only be solved by employing persons in charge of maintaining the data unit and filling in monitoring data on a long-term basis. The TMAG estimated that, depending on the institutional background, at least one part-time position for each unit is necessary to run the data handling on the national level (TMAG 1997).

The work of the TDG is coordinated by the trilateral data handling coordinator, who is located at the Common Wadden Sea Secretariat. The trilateral coordinator also directly advised the national data handling projects carried out in Germany (1998–1999) and the Netherlands (2000–2001) and provided technical support in order to safeguard common standards at all four data units. Furthermore, he developed proposals for improvement of the TMAP data unit based on results from national data development activities.

A sustained trilateral coordination of the data unit installation process during the last 3 years has been proven necessary to ensure compliance with trilateral standards. This work has to be continued because the implementation of the data units has not yet been finished. Furthermore, a trilateral coordination is required for a harmonized maintenance and further development of the data units. Therefore, a trilateral data handling coordinator has to be employed on a long-term basis at the secretariat in charge of the tasks described in the TMAG report in 1997. This concerns the coordination of trilateral data handling operations, the implementation of structures for further parameter groups, the coordination of projects to update and extend the trilateral data handling tools and the support of the trilateral working groups concerning data handling aspects.

4.2.2 Joint Monitoring Groups of Breeding and Migratory Birds

The Joint Monitoring Groups of Breeding Birds (JMBB) and Migratory Birds (JMMB) are working groups under the TMAG and were al-

ready established in 1989 and in 1992, respectively. They are responsible for the coordination, implementation, assessment and documentation of the monitoring programs of breeding and migratory birds. The results of the monitoring programs of breeding and migratory birds have been assessed and published in a number of reports in the Wadden Sea Ecosystem series (references to be included).

The coordination groups of bird monitoring have been working efficiently for over 10 years. Specific expertise is necessary to coordinate the different programs and organize the counts in cooperation with a number of scientific institutes, private organizations and volunteers. Therefore, both groups should be continued in order to safeguard the continuation of the monitoring programs.

4.3 TMAP Assessment Work

The overall objective of the TMAP is a comprehensive scientific assessment of the status of the ecosystem and of the implementation of the Targets as entailed in the Wadden Sea Plan. The data obtained from monitoring, which are stored and exchanged via the TMAP data units, have to be compiled, assessed and published regularly in order to deliver sufficient information for management decisions. This assessment procedure requires input from a number of scientists from different disciplines and with broad knowledge about the Wadden Sea ecosystem.

Several assessment reports have been prepared in the framework of the TMAP during the last years. The trilateral bird groups have already established a well-functioning assessment procedure and regularly publish the results of the monitoring programs of breeding and migratory birds in the TMAP publication series "Wadden Sea Ecosystem" (see list of publications).

The Quality Status Report 1999 was prepared by the QSR group. The group was established in 1995 as a sub-group of the TMAG and finished its tasks in 1999. Over 60 scientist contributed to the report which analyzed the ecological status of the Wadden Sea and the status of the Target implementation (De Jong et al., 1999). Several difficulties were identified in the preparation of the QSR which took about 4 years instead of the anticipated 2 years. The main problems causing this delay were that more time was needed to establish the organizational precondition such as the authors' network, and that the necessary resources had not or not specifi-

cally enough been described. Furthermore, the delivery of articles was dependent of voluntary contributions because a structure for delivery of expert information was lacking and data exchange was problematic and therefore too time consuming. To improve this situation the preparation of assessment reports like the QSR should be organized as a project in which products, time schedule, responsibilities and required resources are clearly spelled out.

The establishing of a coordinated structure for the assessment work is therefore an important future work topic of the TMAG. A coordinated assessment procedure would safeguard that the available TMAP monitoring data are assessed and published regularly and the necessary information about the different topics can be made available without delay. The assessment work requires appropriate technical tools (mapping, graphical and statistical tools) to visualize and analyze the data.

The assessment results could then be made easier and faster available to the relevant authorities, interest groups and local citizens than in the past in accordance with the Wadden Sea Plan (Chapter I, § 15).

The traditional publication ways like reports, brochures and newsletters should therefore be supplemented by modern presentation tools like Internet platforms or e-mail newsletters.

The TMAG proposes to establish a TMAP information system entailing coordinated assessment and reporting procedures, as well as publication and presentation of the results (Fig. 1).

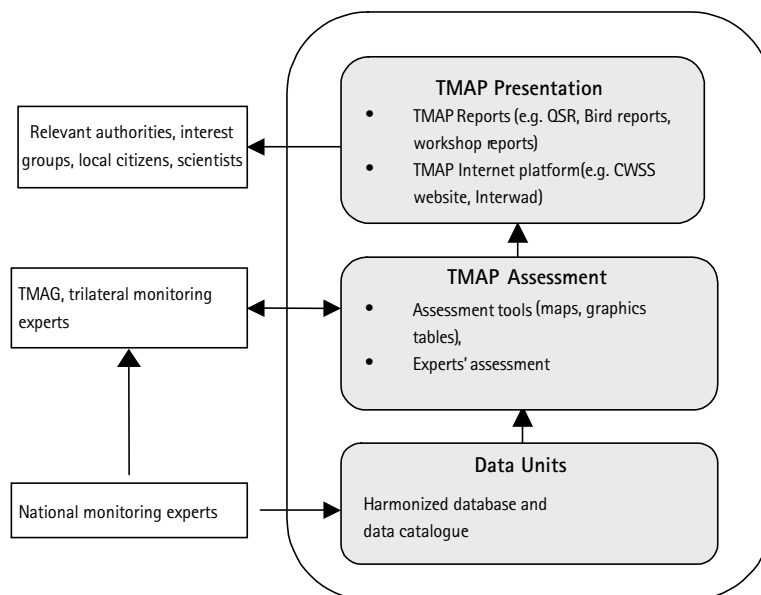


Figure 1: TMAP assessment and reporting procedure.

5. Conclusions and Proposals

5.1 Implementation Status Common Package

Until the beginning of 2001, the financial and organizational preconditions to implement major parts of the Common Package were established in all three countries. Considerable effort has been undertaken to adapt national monitoring programs to the requirements of the TMAP. The large majority of the parameter groups could be implemented but gaps still exist for several parameter groups which could not be implemented in one or two countries because of financial reasons.

The implementation of the associated TMAP data handling system is behind schedule for all parameter groups although the major technical parts of the data management has been successfully solved and is ready for use. The TMAP data units in Germany are accessible via the Internet and selected data sets can be downloaded whereas in Denmark and the Netherlands the installation of the data units have not yet been finalized. The delay is mainly caused by the absence of a functioning long-term working structure for the implementation of the data handling system in the three countries. As a consequence, a fully operational data handling system will not be available until the end of 2001

The necessary financial and personnel resources should be made available to implement the remaining parameters of the Common Package and to make the TMAP data handling fully operational as soon as possible in accordance with § 21 State Declaration. Because of the importance to establish an operational data handling on a long-term basis, this issue is further addressed under organizational aspects.

5.2 Information Quality of the Common Package

Although most of the basic information for most of the Wadden Sea Plan Targets can be obtained by the Common Package, substantial gaps exist which hamper a more comprehensive Target assessment considerably. An extension of the Common Package is necessary in order to meet all requirements of the Targets and the EU Habitat Directive. The major information gaps concern fish communities, Blue mussel species parameters, breeding success of birds, grey seal and harbour porpoise and tourism data. These gaps should be filled with priority.

Proposal 1

To implement five priority projects to meet the requirements of the Wadden Sea Plan Targets and the EU Habitat Directive

The following Table 7 provides an overview of the proposed priority projects and the estimated financial implications:

Table 7: Priority projects and estimated financial implications (in Euro)

Priority project	Contents	Costs			
		NL	FRG	DK	Total
1. Fish monitoring	a. Inclusion of Demersal Young Fish Survey (DYFS), b. Investigate possibilities to include pelagic fish.	-	-	-	-
2. Blue mussels	Inclusion of Blue mussel species parameters (running national programs)	-	-	-	-
3. Birds breeding success	Continuation of the trilateral pilot project of 1996-97; yearly costs	25,500	44,000	12,700	82,200
4. Marine Mammals	a. Implementation of a two-year pilot project on grey seals,	22,000	16,600	-	38,600
	b. Investigate possibilities to carry out a pilot survey for harbour porpoise	-	-	-	-
5. Tourism	Preparation of a project proposal to develop a standard monitoring program (by Inter-Regional Wadden Sea Cooperation, IRWC)	-	-	-	-

In addition to the proposed five priority projects, activities are necessary to further develop and optimize the TMAP for requirements of the Targets and the Habitats Directive. These activities could be carried out by the TMAG as part of their regular work and can be implemented without any additional costs. This concerns mainly further investigations before a decision can be taken, e.g. a precise definition of the specific information needs (Target specification), development of an appropriate monitoring strategy, projects, costs and funding possibilities. The TMAG proposes to include this work into the annual work program:

Proposal 2

To instruct the TMAG to investigate possibilities to further improve the TMAP Common Package with regard to the Targets and the EU Habitat Directive on the basis of an annual work plan.

5.3 Organizational Aspects

A functioning work structure is indispensable to achieve the aims of the TMAP, namely a scientific assessment of the ecosystem and an evaluation of the implementation status of the Targets. The existing TMAP work structure has been functioning well and should be continued with the TMAG as the main coordination body and the existing TMAP sub-groups:

Proposal 3:

To maintain and continue the existing TMAP work structure.

The data handling is an essential part of the TMAP to carry out the given tasks properly. Sufficient personnel resources are necessary to guarantee a steady national TMAP data flow into the units, a reliable and constant availability of TMAP data on the trilateral level, and, finally, the desired information flow between monitoring, assessment and management.

Furthermore, a trilateral coordination is required for a harmonized implementation, maintenance and further development of the TMAP data handling system. These tasks concern the coordination of trilateral data handling operations, the implementation of structures for further parameter groups, the coordination of projects to update and extend the trilateral data handling tools and the support of the trilateral working groups concerning data handling aspects:

Proposal 4

To employ data handling persons at each na-

tional database (at least part-time, depending on the individual data unit) and a data handling coordinator at the CWSS (full-time) on a long-term basis.

Estimated financial implication to maintain an operational TMAP data handling system (in Euro):

	National data units	Data coordinator CWSS	Total
The Netherlands	33,000*	22,000	55,000
Germany 2 data units in Schleswig-Holstein and Lower Saxony	66,000*	22,000	88,000
Denmark	33,000*	22,000	55,000
	132,000*	66,000	198,000

* The personnel effort depends on the individual preconditions at the individual data unit. As a minimum, one part-time position (20 h/w) is estimated for the maintenance of the TMAP data unit (TMAG 1997).

The TMAP assessment work like the preparation of the QSR demonstrated that an efficient work is often hampered by an inadequate product definition and working structure which results in a delayed publication of the monitoring results. Therefore, it is important to define the product to be delivered and to establish a structure for the assessment work and publication. This includes also appropriate technical tools (graphical and statistical tools) to visualize and analyze the data from the TMAP data units.

The assessment results could then be made easier and faster available to the relevant authorities, interest groups and local citizens than in the past, in accordance with the Wadden Sea Plan (Chapter I, § 15). The publication of reports, brochures and newsletters should be supplemented by modern presentation tools like Internet platforms or e-mail newsletters.

The TMAG proposes to establish a TMAP information system entailing coordinated assessment and reporting procedures, as well as publication and presentation of the results. Further investigations have to be carried out before an estimation of the possible financial implications can be given:

Proposal 5

To agree that it is necessary to develop a TMAP information system to make the TMAP results easier and faster available to relevant authorities, interest groups and local citizens and to instruct the TMAG to investigate the possibility to develop such a system entailing a comprehensive assessment and publication procedure.

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