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A Introduction

ComCoast (Combined Functions in Coastal Defence Zones) is an INTERREG IIIB project funded by the EU. ComCoast aims to develop and demonstrate innovative solutions for flood protection in coastal areas. In ComCoast, five countries from the North Sea Region are involved: Belgium, Denmark, The Netherlands, Germany, and the UK. In total, ten partners constitute the project consortium.

Climate change cause already increasing physical load on coastal defence along the North Sea. Over the next decades, problems will arise through the need of adapting the existing coastal defence structures to modified conditions of coastal development, e.g. nature conservation areas, limited budgets, or changing social pretensions.

New approaches emphasizing a gradual transition from sea to land are being explored in order to incorporate land use management with regard to the increasing pressure from population growth. These transitional areas will offer new opportunities both to the environment and to the people. In the ComCoast project, the need to develop new sustainable flood management strategies will be recognised in order to influence planners to anticipate future developments.

Work Package 1 is one of the six Work Packages of the ComCoast project. Work Package 1 aims to identify feasible ComCoast areas along the southern North Sea. Work Package 2 explores new socio-economic evaluation methods for the ComCoast concept. The design and development of alternative embankments and strategies for coastal defence zones are worked out in Work Package 3. Work Package 4 deals with new and innovative participation strategies to involve stakeholders in the development process of ComCoast concepts.

This technical report gives a short overview about the activities of Work Package 1 from Mai 2004 until Mai 2005.

B Aims and Goals of Work Package 1

The aims of Work Package 1 are:

- Developing a GIS module for visualisation and planning purposes,
- Generating maps of feasible ComCoast areas along the southern North Sea Region,
- Defining specific scenarios for ComCoast alternatives,
- Developing a catalogue with criteria that can be used to guide a supervised identification of feasible ComCoast areas under defined alternatives.
Besides that, Work Package 1 supplies the other Work Packages with visualisation material like maps or artist impressions.

### Work Plan and Schedule of Work Package 1

The work plan of Work Package 1 has been developed as framework for trans-national co-operation within the ComCoast project. The work plan comprises goals and sub-goals only. During the tuning-phase of the work plan, it has been emphasized that it is suitable to focus on the goals and sub-goals rather than on the way to achieve the goals.

Within the first phase of the work plan, a “quick scan” of the Dutch and the German North Sea coast will be carried out. The quick scan gives an impression which areas, under certain criteria, are feasible in the sense of ComCoast. This determination of the criteria to achieve the quick scan will be discussed below. After having scanned the Dutch and the German coast with basic criteria, a discussion starts about the alternatives ComCoast wants to promote as solutions for innovative coastal defence strategies for the future. The discussion should end with different scenarios/alternatives which should be considered and worked out by all project parts of ComCoast.

For the alternatives defined by ComCoast it is necessary to develop detailed criteria or indicators. This phase (first criteria development phase) results in a broad discussion about the determined criteria for the scenarios. The discussion should be carried out both internally in the ComCoast context and externally with experts. These sessions in turn shall help to refine the criteria catalogue. Afterwards, the revision phase of the criteria catalogue will be started. Besides that, the other Work Packages of ComCoast are invited to give their input via meetings or reports.

After reworking of the criteria catalogue, follows a new scan of the southern North Sea coast. This scan (spatial sensing) can be scenario specific and Work Package 1 will deliver maps with feasible areas for certain alternatives and planning options.

However, during the project time there will be different Work Package meetings to evaluate and tune the progress of our work and to discuss the results in each partner institution, experts and representatives of public groups.

The main results Work Package 1 has to and will deliver are a catalogue of criteria for defined ComCoast alternatives and maps where the feasible areas are shown.

The draft schedule for Work Package 1 is shown on the next side.
Table 1: Working Plan and Time Schedule of Work Package 1

D Development of Criteria

To determine feasible areas in the sense of ComCoast, it is necessary to develop a catalogue of criteria. In multifunctional coastal defence zones it is possible to combine different functions like recreation activities, nature conservation, or industrial activities and coastal defence. These criteria can be used to investigate areas around the southern North Sea coast in an objective way. They must reflect the full spectrum of functions and uses of the different coasts of the southern North Sea.

The following parts explain the approach of Work Package 1 to achieve these criteria.

**Different Approaches**

Three different approaches exist in order to identify feasible ComCoast areas:

1. The problem oriented approach (safety)
2. The development oriented approach (driven by aims of regional development)
3. The open minded approach (safety, regional development, or both)

The problem oriented approach implies that the Work Package team members focus on problems concerning their coastal defence system or spatial planning alternatives. Problems with coastal defence arise e.g. when the coastal defence system guarantees no sufficient level of safety.
The evaluation is done together with local or regional authorities and institutions. ComCoast will provide alternatives to solve the problems in a sustainable manner. These solutions could be a combination of various functions in the coastal zone together with the pretension to guarantee the safety of the coastal zone.

The development oriented approach needs defined scenarios of the spatial development of a certain coastal area. Two ways are possible: ComCoast defines several alternatives of sustainable and multifunctional concepts for coastal defence zones - or regional / local stakeholders define desired solutions / development alternatives. In the first case, the ComCoast Work Packages have to develop criteria to identify feasible areas. In the second case, the Work Packages have to generalise the given specific solutions.

The open minded approach comprises two steps. Within the first step, a set of objective criteria for the search for feasible areas have to be defined. Objective criteria means that the investigation is not constricted or biased by any preselected alternatives or options. Within the second step, it is necessary to specify relevant criteria in consideration of a defined alternative. The scanning has to be done again only within the selected areas.

**ComCoast Alternatives**

Within Work Package 1, the first alternatives were explored:

- Building of overtopping dikes
- Sand nourishment / replenishment
- Foreland development (salt marsh, beach)
- Managed realignment
- Construction of foreshore wave breakers (natural, artificial)
- Controlled flooding

ComCoast strives for a combination of different functions like recreational activities or nature development with the above mentioned alternatives. The combination of the different strategies of coastal defence systems and other desired functions within these coastal defence zones correspond to the ComCoast concept.

**Visualisation within Work Package 1**

**First steps towards Visualisation**

Visualisation in Work Package 1 of ComCoast options at certain coastal locations is based on an inventory of available and relevant data and a quick scan of the coast. Information and data needed, consist in e.g. data about contour lines (elevation), soil-type, recreational activities, groundwater-body and housing. The quick scan shows the first areas
which are applicable for the ComCoast concept. The result of the quick scan depends on the applied approach mentioned in part D of this report.

**Visualisation by means of illustrations**

The Dutch partner of Work Package 1, the DWW, developed illustrations of the several ComCoast alternatives. Some of them are shown from Figure 1 to Figure 3.

**Figure 1: T0**

The initial status of the Dutch or German (without dunes) coast. Consisting of a main dike and the developed hinterland. H0 is adapted to the UK situation with a more elevated hinterland.

**Figure 2: S1**

Shows one foreshore (seaward) alternative of ComCoast concepts. In this case a foreshore embankment has been built in the front of the main dike.
**Appropriate Visualisation Tool: GIS**

An appropriate tool to carry out the visualisation of spatial data is a GIS (Geographical Information System). On the one hand, the team members of Work Package 1 will need this tool to investigate feasible areas around the North Sea region. On the other hand, they will need this tool to show the results in an appropriate way.

**Quick Scan of the German Coast**

To conduct the first quick scan of feasible areas along the Lower Saxonian coast Germany contracted a consultant. First, the consultant made an inventory of the available geo-data for the scan. Second, the consultant evaluated data quality under consideration of their application in the ComCoast context. And third, the consultant carries out a first scan under open-minded objective criteria. The result is documented in a short overview-report: “Data inventory and data quality test to identify feasible areas for innovative coastal strategies” (in German).

**Preparation for the Quick Scan – Boundary Conditions**

To achieve the quick scan, the boundary of the system both on the landside and seaside has to be defined. On the landside, a so called *Landside Border for Multifunctional Coastal Defence Zones* is needed. Within the European project EUROSION, the landside border is called *Radius of Influence of Coastal Erosion and Flooding (RICE)*. This border is defined as follows

- All areas located within 500m from the coast line
- Extending to areas lying under 5m
The first suggestions for the ComCoast project are to take the 2.5m contour line as the landside border for multifunctional coastal defence zones. If ComCoast considers only the areas lying within 500m from the coast line, ComCoast compromises possible alternatives to the development of multifunctional coastal defence zones. The seaside border in the first approach can be drawn (e.g. in Germany) at the “baseline”. The baseline is located between the East Frisian islands and on this basis the 3 sm and 12 sm zone are determined.

F Co-operation within ComCoast

Work Package 2
The above mentioned artists impressions can serve as visualisations of different scenarios Work Package 2 has to evaluate within the socio-economic Cost Benefit Analysis of the ComCoast concepts. On the other hand it will be, to some extend, possible to use the work within Work Package 1 as a tool for different planning options for a certain area.

Work Package 4
Later on, Work Package 1 will supply Work Package 4 with maps which can be used for participation activities and discussions about the ComCoast concept.

Work Package 5
Work Package 1 can offer/serve planning options for the pilot sites in the ComCoast project.

G Summary
Summarizing the activities mentioned in this report, the team members of Work Package 1 think that we are on a good and successful way. The project started in February 2004. There was some delay because of personal rotation within the partner institutions. However, since January 2005 Work Package 1 has been definitely established:

- Work Package Leader: Frank Ahlhorn
  Institute of Chemistry and Biology of the Marine Environment (ICBM), University of Oldenburg, Germany
- Team member: Wout Snijders
  Dienst Weg- en Waterbouwkunde (DWW), Division of Rijkswaterstaat, Delft, The Netherlands
- Team member: Karen Thomas
  Environment Agency, United Kingdom

The next technical report will describe the cooperation between the Work Packages of ComCoast in more detail. On the other hand there will be discussed the first results of the study that has been finished by DHV. A consultant who prepares the first quick scan for The Netherlands about feasible ComCoast areas.
Annex

Map of the German coastal region

Figure 4: The state of Lower Saxony, Germany. GIS-work: planGIS, data source: CORINE Landcover 2000.

The area shown in Figure 4 is a result of the combination of the open-minded criteria given by the German Work Package 1 members. These criterias are explained in the text above. The light yellow area is the area under the 5m contour line, the red dots are the housing/industrial infrastructure at the coast of Lower Saxony with a 500m buffer. This map shows the very first approach of applying basic criterias by a GIS tool.