COMRISK

Common strategies to reduce the risk of storm floods in coastal lowlands

Achievements

of a transnational project by public authorities

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Interreg North Sea Region

Introduction

Storm surges present a major natural hazard in the North Sea region, where coastal lowlands occupy an area of about 40,000 km^2. **More than 16 million people live in these lowlands**, and major economic activities take place. Without appropriate countermeasures, these lowlands may become flooded during severe storm surges. To prevent this, national and regional Governments spend several hundred million Euros per year on coastal risk management.

In order to achieve a share of knowledge and balanced solutions for a sustainable coastal risk management, the leading coastal defence authorities around the North Sea initiated in 2002 an international project: "**COMRISK – common strategies to reduce the risk of storm floods in coastal lowlands**". Co-financed by the European Union under its INTERREG IIIB program, the consortium investigated different aspects of coastal risk management.

What is coastal risk management?

Coastal risk management implies the handling of marine risks (flooding and erosion). It concerns, amongst others, the planning and building of sea dikes and other defences, flood forecasting and warning, evacuation in case of emergencies, and restoration after the event. Public authorities are responsible for many aspects of flood risk management. Individuals in flood-prone areas also have a role to play by being aware of the risk and knowing what do in the event of a flood.

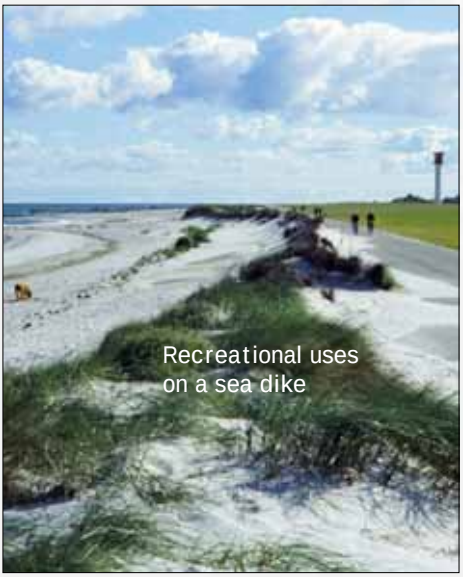
Halligen in the German Wadden Sea

In scientific terms, **risk** is measured by **probability** times **consequences**.

Probability refers to the event, in our case flooding from a coastal storm. How often can we expect a storm flood with a certain water level? Every one hundred years, on average, a storm water level of 5 to 6 meters above mean sea level is expected along the west coast of Schleswig-Holstein. Hence, the annual probability of this water level is 0.01. To assess **consequences**, the expected damages from flooding are calculated - often but not always in economic or financial terms. If we assume that the sea dike would breach during this once in a century storm flood, houses would be flooded, cars damaged, etc. In our example, the damages or, rather, consequences of flooding in a certain flood unit could amount to 5,000,000 Euros. The resulting (yearly) risk for this flood unit would be:

0.01 * 5,000,000 = 50,000 Euros.

It should be stressed here that this is a very simplified way to calculate the risks. One of the central aims of COMRISK was to test sophisticated methods to assess the risk. These can take many factors into account such as the height of the flood plain, the performance of flood defences, and the effects of flood warnings and changing climates.



Recreational uses on a sea dike

The COMRISK idea

The impact that COMRISK wants to achieve is ensuring a sustainable, harmonious and balanced development in the coastal lowlands of the North Sea region. Protection against flooding or, rather, appropriate coastal risk management is a prerequisite for almost every socio-economic activity in these lowlands and, in consequence, for social and economic progress.

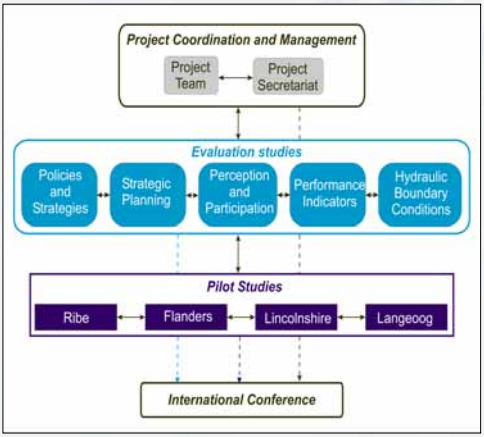
COMRISK aims at improved strategies to reduce coastal risk through a transfer and evaluation of knowledge and methods.

The project was divided into an umbrella project and several evaluation and case studies.

The umbrella project had the following objectives:

- to bring together coastal risk experts from administration, science and private companies from around the North Sea,
- to exchange experiences and studies of good practice on coastal risk management,
- to evaluate and develop innovative integrated risk management strategies,
- to initiate and support transnational co-operation on integrated coastal risk management (networking),
- to integrate coastal risk management into strategies for a sustainable management of the coastal zones in the North Sea region.

Historic storm water levels



The COMRISK structure

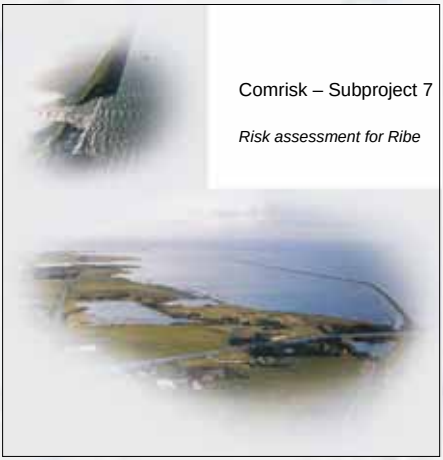
Eight coastal risk management authorities from Belgium, Denmark, Germany, The Netherlands and The United Kingdom performed the project. The lead partner came from Schleswig-Holstein (GER)

Management and co-ordination of the project was realized through a project secretariat together with a project team that consisted of the partner institutions.

Five evaluation studies focused on different aspects of coastal risk management, ranging from general aspects like policies and strategies to more technical questions like the hydraulic boundary conditions.

Further, in four case studies, state of the art risk assessments were carried out in Ribe, Flanders (Zeebrugge to Breskens), Lincolnshire and Langeoog.

For each of the studies, one partner institution was responsible.



As a final COMRISK activity, in April 2005 an international conference was organized in Kiel, Germany. Here, the findings of the evaluation and case studies were presented to an expert audience from public authorities and scientific institutes.

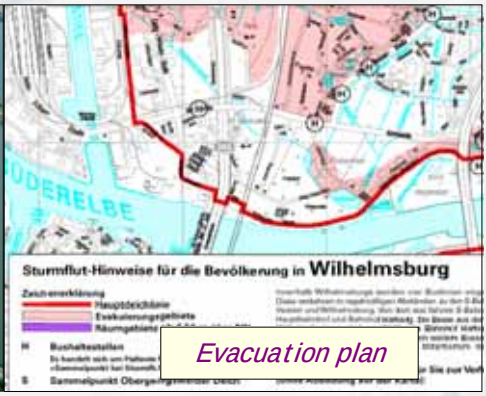
Key messages from the project

Variance in context and response options!

COMRISK showed that the national and regional settings in the North Sea countries, i.e., the physical, socio-economic, cultural and institutional context, are diverse. For example, the scale of flooding and the numbers of people affected varies substantially. These differences in context explain many of the differences in coastal risk management.

To make the policies more robust, we may consider a wider range of risk management options. Apart from focusing on technical solutions, non-structural options like flood warning systems, self-help, insurance/compensation, and control of development in flood-prone areas might be included into the policies and strategies as components of an integrated flood risk management approach.

Technical flood defence



Evacuation plan

One common coastal risk management strategy for the EU?

The COMRISK project has identified many areas of common interest to those developing coastal risk management strategies and policies in the partner countries. Continued co-operation and collaboration is needed to ensure that these common interests are fully exploited.

Harmonization on all aspects of coastal flood risk management seems not feasible due to the differences in the contexts and approaches in the five countries. Definition of a common strategy however does not have to mean harmonization of policies.

Although future harmonization of policies and strategies should not be avoided when desirable and feasible, at the moment it is more appropriate to focus on further mutual understanding and mutual learning.

Key messages from the project

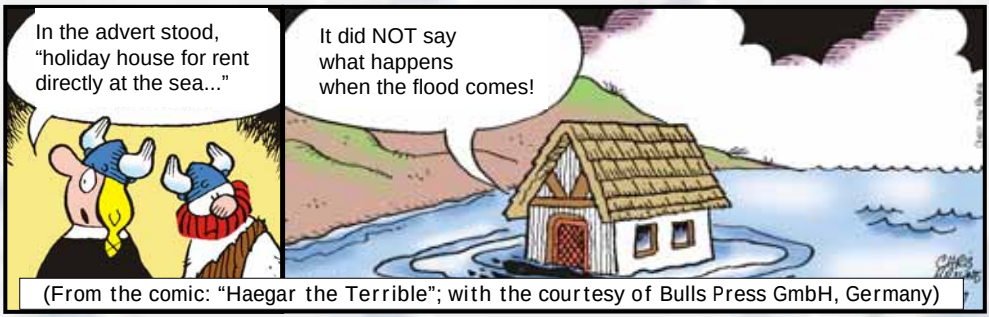
Do people tend to ignore or disclaim the coastal risks?

Research shows that, in significant parts of the affected population in the North Sea region, the awareness of coastal risks is underdeveloped. This indicates that the information flow from administration towards population is either insufficient, does not reach the inhabitants or is not taken seriously. There, still, is potential for improvements in risk communication.

One of the reasons for the deficit may be the different definitions that experts and society apply; the quantifiable technical risk used by administration (e.g. probability of breaching), and the subjectively perceived risk in the population (will my house be flooded).

It is recommended that coastal risk should be translated into the language of society. Instead of communicating safety standards (which may even give a false impression of absolute safety), more reference should be made to personal living surroundings and to personal circumstances and experiences.

Further, it is concluded that sustainable promotion of coastal risk awareness should start in school. COMRISK demonstrated that students are highly receptive to clearly taught messages about flood risk. Coastal authorities and education authorities should work together to ensure the right resources are available to teachers.



(From the comic: “Haegar the Terrible”; with the courtesy of Bulls Press GmbH, Germany)

Key messages from the project

Assessing the risks

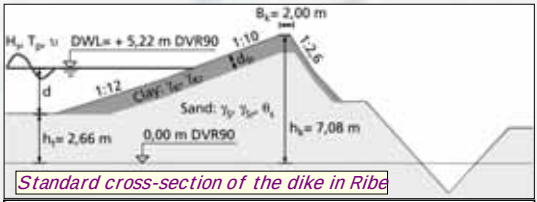
Uncertainties in calculating risk numbers may be large. We cannot, for example, predict exactly when and how a dike will breach. Neither do we know how the breach will develop (e.g., one breach or several breaches, final breach width). These factors help to determine the timing, extent and severity of flooding. As a final example, in some cases little is known about the actual damage that occurs. This is often dependent on the depth and duration of the flooding. If summed up, these uncertainties can produce risk estimates that vary widely, depending upon the assumptions that were made.

From a technical point of view, more advanced techniques may be used to address and consider many types of uncertainty. Further research and guidance is needed to assess and reduce uncertainty, and to make sure that decision-making are fully aware of uncertainties in data, information and knowledge.

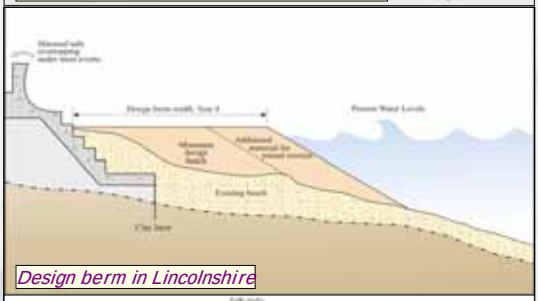
At the same time, the risk assessments as applied in the project brought a number of significant improvements.

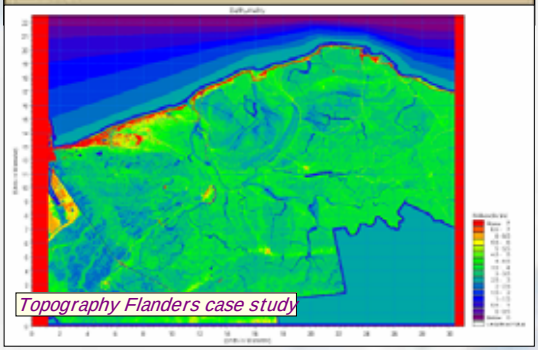
The sensitivity analyses of the causes for dike breaches gave new insights in the relevance of each cause as well as about the development of the breach, i.e. “weak spots” could be detected. Further, the vulnerability analyses (assessing what is protected) strongly increased the information and knowledge about the flood-prone areas, as “hazard areas” could be identified.

This type of data and information may be used as a decision supporting tool, delivering arguments for appropriate defence schemes. Further, they may be used for informing the public and as a basis for contingency plans.



Standard cross-section of the dike in Ribe

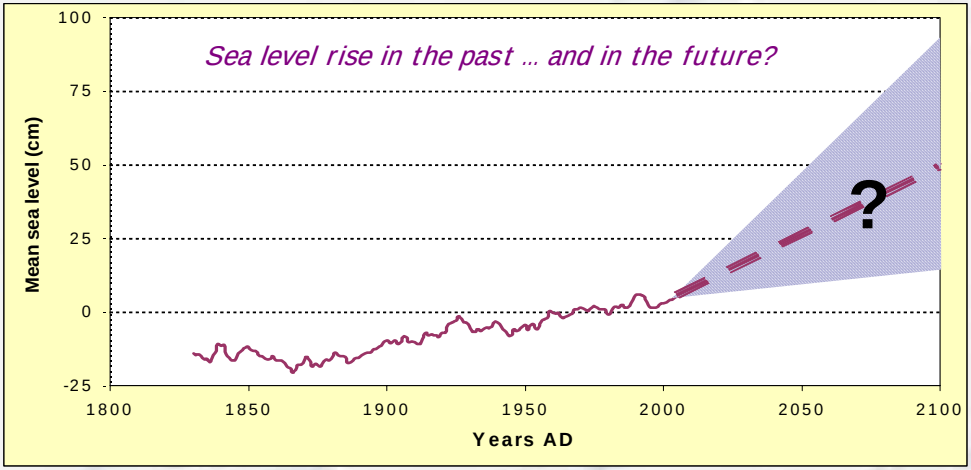

Design berm in Lincolnshire


Topography Flanders case study

Outlook

More than 16 million Europeans who live in the about 40,000 km^2 of coastal lowlands in the North Sea region depend upon a sustainable coastal risk management. In future, coastal risks will increase substantially. Both the protected values and the natural hazards in the coastal lowlands will rise due to increasing utilization pressures and climate change.

This challenge will be addressed in a follow-up project **SAFECOAST** that started in July 2005 with an extended partnership. The INTERREG IIIB project is based upon scenarios for the year 2050. Key issues for SAFECOAST, building on COMRISK, are a more integrated approach to assess and manage the coastal risks, and establishing coastal risk management plans for specific case study areas.



Some final remarks

With COMRISK, for the first time, an interregional project of national and regional coastal risk management authorities in the North Sea region has looked for trans-national improvements. In this study, almost 200 individuals and about 30 public and private institutions that work on coastal risk management in the North Sea region co-operated. They will actually benefit in their daily work from this transnational sharing of information and knowledge. In the end, all the inhabitants of the coastal flood-prone areas will be beneficiaries of the quality improvement and harmonization of coastal risk management in the North Sea region.

COMRISK

COMRISK partnership

Ministerium für Landwirtschaft, Umwelt und ländliche Räume des Landes Schleswig-Holstein (GER, lead partner)

Ministerie van Verkeer en Waterstaat, Rijkswaterstaat, Rijksinstituut voor Kust en Zee (NL)

Ministerie van Verkeer en Waterstaat, Rijkswaterstaat, Dienst Weg en Waterbouwkunde (NL)

Environment Agency; Centre for Risk and Forecasting (UK)

Environment Agency; Anglian Region (UK)

Ministerie van de Vlaamse Gemeenschap, Administratie Waterwegen en Zeewezen, Afdeling Kust (B)

Transport- og Energiministeriet, Kystdirektoratet, (DK)

Niedersächsischer Landesbetrieb für Wasserwirtschaft, Küsten- und Naturschutz (GER)

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