

# Towards policies and adaptation strategies to climate change in the Baltic Sea region — outputs of the ASTRA project

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As presented at the 5th BALTEX Conference in 2007, this paper introduces the main outcomes of the project “Developing Policies & Adaptation Strategies to Climate Change in the Baltic Sea Region” (ASTRA) and discusses the results obtained from the project especially in respect of the role of policies in fostering mitigation and adaptation strategies to climate change in the Baltic Sea Region.

## Introduction

The problems caused by climate change are becoming clearer and clearer every year. The 2007 Report produced by the Intergovernmental Panel on Climate Change (IPCC) states that evidences of climate change cannot be ignored (IPCC 2007). In addition to even hotter summers, winters with little snow and increases in storms and floods, there are concrete signs that the world’s climate is changing and that science needs to react.

The assessment of the vulnerability in sectors such as agriculture to climate change is strongly dependent on concurrent changes in socio-economic development pathways (Abildtrup *et al.* 2006). Although climate change is a problem with strong economic routes (Stern 2007) and global dimensions, solutions also need to be sought at regional and local levels in order to be realistically implemented. The Baltic Sea region, an area encompassing industrialised and semi-industrialised countries, is especially sensitive

to problems posed by climate change. Be it in respect to increase in rainfall and storms as result of mild winters and hot summers, or in terms of ecological phenomena, such as eutrophication and changes in phenology, the region is highly vulnerable to climate change and regional solutions need to be found in order to address the problem in a holistic way.

The main objective of the project “Developing Policies & Adaptation Strategies to Climate Change in the Baltic Sea Region” (ASTRA), which was funded by the Interreg IIB Programme (Baltic Sea) of the European Commission, was to assess regional impacts of the ongoing global change in the climate in the Baltic Sea region and to develop strategies and policies for regional climate change adaptation. The project introduced three main features:

1. It used scientific knowledge from climate modelling and climate impact research, as well as geomorphologic and geological investigations to assess the effects of climate

change impacts on both natural and socio-economic systems. This provides a basis upon which governments can handle threats arising from climate change in the Baltic Sea region (BSR), such as extreme temperatures, droughts, forest fires, storm surges, winter storms and floods. As a first step, a major winter storm on 8–9 January 2005 and subsequent events, as well as related national, regional and local effects and responses, were studied as examples of the various challenges climate change poses to the region.

2. Adaptation strategies for regional planning purposes were developed. In work package 1 of the project (WP 1), for example, climate change impacts and vulnerability of regions were studied in several regional and local case studies focusing on single effects as well as on socio-economic sectors. Entry points and integration to existing planning processes and methods were to be identified.
3. A special attention to risk awareness was paid, addressed by means of intensive dissemination exercises, such as regional conferences and workshops in the countries around the BSR (WP 2: Dissemination). Transferring the impact results from WP 1 into adaptation strategies and policies was the main objective of WP3.

Finally, policy recommendations for climate change adaptation were delivered for different spatial scales from local to national and BSR levels. The ASTRA project further developed the successful results of the BSR Interreg IIB SEAREG project which assessed the impacts of future sea level rise in several case study areas in the BSR.

## Methods

There have been various projects dealing with climate change in Europe and schemes such as AIR-CLIM, a project on the integrated assessment of regional air pollution and climate change in Europe (Posch 2002) have provided much data. Yet, there is still a need for projects which look at climate change in an integrated way. The main objective of ASTRA was therefore

to develop a dynamic trans-national approach to mitigate climate change effects within spatial planning mechanisms, which can be implemented by the partners in the Baltic. Awareness-raising, a matter considered as being of prime concern (Leal Filho *et al.* 2007) was also a very important issue, because even though climate change is mentioned frequently in the media, the awareness among local stakeholders and decision makers in many regions is still rather low, at least in respect of taking the problem seriously enough in order to engage in concrete action.

As far as the methodology is concerned, the project first of all looked at the winter storm in January 2005 and related national, regional and local effects and responses. This was done in order to offer an illustrative example of the possible impacts and the various challenges climate change poses to the region. In addition, initiatives aimed at raising awareness of climate change and about the need for adaptation to its effects is raised among different stakeholders in the countries around the Baltic Sea, such as conferences and workshops, were organised. The purpose of this approach was not only to provide a forum for the exchange of technical information, but also offer a chance to scientists, planners and decision makers to interact with each other.

A further, important factor in the methodological approach used in the project was an analysis of climate change impacts and vulnerability in the various regions taking part in the project (Fig. 1). This work was performed by the project partners and specific features were pointed out in several regional and local case studies where, among other things, the socio-economic impacts of climate change were considered.

Finally, the case study areas were also discussed in seminars and conferences to create a transparent view on how different regions in different countries are affected by climate change and how they can adapt to it or mitigate the impacts.

## Results and discussion

ASTRA focused on the development of policy recommendations and guidelines for adaptation to

climate change in the Baltic Sea Region. Its main results are summarised and discussed below.

### Preparation of a policy document

As a first step in order to address the problems related to climate change was the preparation of a policy document, which provides basic information on the matter of policy-making and in which way it can enhance adequate action in the field of climate change. The document was also aimed at creating a common understanding of ASTRA partners on the role of policy-making in addressing issues related to climate change. It describes, therefore, the challenges, decision-makers and planners are confronted with, when addressing climate change impacts and developing adaptation strategies.

Furthermore, the policy document opens up first ideas how to integrate climate change adaptation into existing policies. Moreover, it points out exemplarily existing policies in the field of adaptation strategies in the Baltic Sea region. All the ASTRA project partners were invited to comment the paper and to extend the given examples by own views, specific examples and/or experiences. In this manner, the policy document provides an overview on the perception and handling of climate change impacts in the BSR.

### Sectoral assessment of climate change

Impacts of climate change affect a range of sectors in different ways (Table 1). It should be noted that some sectors are not only affected by climate change impacts, but are also responsible for causing climate change. Agriculture, for example, is affected by changes in growing seasons, plant productivity, occurrence of diseases and pests, water resources and new crops. At the same time the agricultural sector itself has an impact on climate through emissions of greenhouse gases (Carter and Kankaanpää 2004). Private households are affected by the increasing risk of storms or floods, and at the same time their daily life style (extensive car use, travelling by plane) has a significant impact on the concentration of greenhouse gas in the atmosphere.

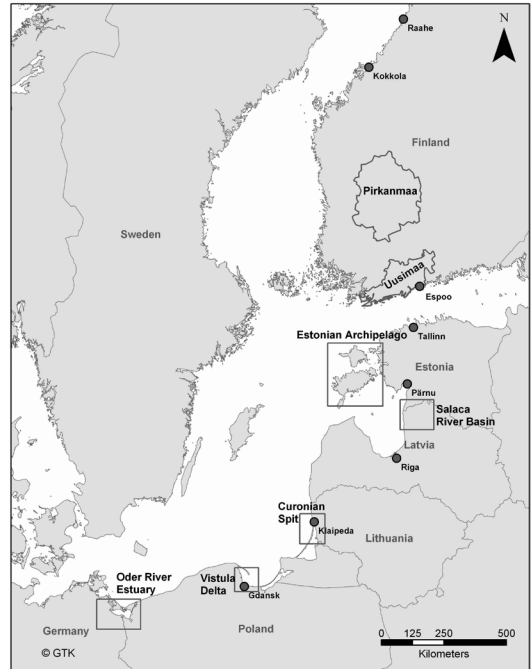


Fig. 1. ASTRA case study areas.

Therefore, there exists no simple polluter-pays principle when addressing climate change but a complex structure of causes and impacts. Mitigation and adaptation strategies have to be adjusted to the characteristics and needs of different sectors.

### Mitigation and adaptation strategies

A further output of the project was the preparation of a set of concrete mitigation and adaptation strategies. An interesting feature of this work is that the strategies were developed together with decision makers, hence addressing a long perceived need for integrative approaches towards climate change. In addition, adaptation strategies around the Baltic were reviewed and policy recommendations were presented, based on the experiences of a previous project, namely the SEAREG project (<http://www.gsf.fi/projects/seareg/>), which looked at sea level rise and the changing runoff patterns of rivers). Furthermore, much know-how has derived from the European Spatial Planning Observation Network (ESPON; <http://www.espon.eu/>), in particular

**Table 1.** Sectors affected by climate change impacts in the BSR. The information is based on the study by Carter and Kankaanpää (2004).

Sector	Increased average temperature	Increased precipitation	Extreme weather events (storms, droughts)
Health	Physiological and behavioural adaptation types may change — weaker protection against cold peaks of climate; increase of living organisms in natural waters. Health problems for elderly and weak people, increase of ozone concentration, increase of living organisms in natural waters, increased pollen in air	Potential cases of death.	Potential cases of death.
Forestry	Operability of forests reduced as a result of a shorter period of frozen ground positive aspects: lengthened growing season, increased productivity; negative effects: occurrence of diseases and pests, droughts	Deprivation of crop.	Deprivation of crop.
Agriculture		Increased danger of erosion and flood positive aspects: lengthened growing season, increased productivity; negative effects: occurrence of diseases and pests, droughts.	Deprivation of crop.
Water management	Water shortage, changes in the seasonal distribution of runoff.	Increase in precipitation, changes in the seasonal distribution of runoff.	Flooding of the sewage system, pollution of drinking water supply Flooding of the sewage system, pollution of drinking water supply.
Energy	Problems with the cooling down of nuclear power plant, droughts endanger biomass production.		power outages, broken electric power poles and lines; wind power production endangered by heavy storms, downed trees.
Tourism	Shorter season for skiing holidays, fewer winter sport areas.		

from the projects PRUDENCE (Prediction of Regional Scenarios and Uncertainties for Defining European Climate Change Risks and Effects; <http://prudence.dmi.dk/>) and PESETA (Impacts of climate change in Europe; <http://peseta.jrc.es/>), providing a basis for a joint Baltic adaptation strategy.

All in all, project ASTRA has provided a basis upon which Baltic Sea countries can now address the basic problems they need to consider in order to timely react to the ever-increasing challenges of climate change.

## Conclusions

The work performed within the framework of ASTRA was aimed at taking all effects of climate change that affect the spatial development into account in order to elaborate adaptation and mitigation strategies together with spatial planners and other stakeholders. This is important to many cities across the Baltic, especially the one near the coast, since they are also vulnerable to the effects of global warming such as storms and floods and at the same time depend on stable climate conditions for trade.

Finally the project was useful in ensuring a broad awareness and adaptation strategies among policy-makers and is certain to motivate

them to become more active in order to prevent the adverse effects of climate change in their countries and to ensure a stable development of cities across the Baltic Sea region.

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