

## Scientific tools for communicating needs and concerns about regional anthropogenic climate change

Anthropogenic climate change is a serious problem for modern societies with the need to decide on appropriate measures of internationally coordinated mitigation efforts and of regionally determined adaptation. For the former, the Intergovernmental Panel on Climate Change (IPCC) is providing an excellent knowledge base; for the latter, regional networks of scientific institutions need to construct such a knowledge bases.

Even if some natural scientist consider the task mainly a problem of teaching uneducated lay people the scientific truth, it has become obvious that the real problem is related to communication between different communities. Science is constrained by its limited focus on natural science issues, and is mostly unaware of its own conditioning by cultural constructs; societies are confronted with a plethora of problems, of very different severity, which compete for attention, and climate change is one of these. The result of this imbalance is that science hardly knows what the concerns of the public are, whereas societies hardly understand the scientific analyses, in particular with respect to uncertainties.

A severe problem is that there is no generally accepted role for science to play in such "post-normal" settings. Some consider science as a kind of moral authority, which has to push societies and policymakers towards culturally favored decisions, while others see science as a knowledge broker, who provides a rational basis for society to arrive at efficient and consistent normative decisions.

We claim that the former approach represents an unsustainable practice of science, as it erodes its very foundation of openness to adjust explanations, "knowledge", to new observations. Thus, we have developed a three-tiered approach to make our science useful for society. First, we have set up an "regional climate office", which is communicating scientific knowledge to stakeholders and the public at large; secondly, we review the published knowledge about regional climate change in "regional assessment reports"; and thirdly, we generate data sets about recent, ongoing and possible future climate change in regions of interest (in our case: Northern Europe, with special emphasis on North and Baltic Seas).

1. Our "regional climate office" (Norddeutsches Klimabüro; <http://www.norddeutsches-klimabuero.de/>) deals with Northern Germany and specifically with coastal defense. It provides stakeholders and the public at large about the available knowledge and tries to explain scientific concepts, such as natural variability, anthropogenic signals, and scenarios. Finally, the office attempts to find out which perceptions, concerns, views and ideas prevail in the public arena; which alternative knowledge claims compete with scientific explanations. The office attempts to deconstruct such competing socially and culturally constructed knowledge claims.

2. Climate change assessment reports in the spirit of the IPCC report are prepared for regional areas. They collect the available published scientific knowledge, and determines to what extent consensus prevails in the scientific community. This consensus may be an agreement or disagreement. A first report, on the Baltic Sea Region (including the catchment) has been completed with the publication of a detailed book in 2008 (BACC, 2008). This "Assessment of Climate Change for the Baltic Sea Basin" was compiled by about 80 scientists from most Baltic Sea countries; the process was logistically guided by the BALTEX international office (<http://www.baltex-research.eu/>) and supervised by a

Scientific Steering Group. No political or economic interests were allowed to enter the process. Prior to publication, the report was reviewed by interdependent experts. The report was accepted by the Helsinki Commission (HELCOM) as a basis for its discussions and design of political strategies. Two other similar exercises are presently prepared or have been launched: For the extended metropolitan region of Hamburg a report is expected to be published in 2010. For the North Sea and for the Laptev Sea reports, a Scientific Steering Committee is presently set up.

3. A core scientific activity at GKSS aims at the description of recent, ongoing and possible future regional climate change. This is done by postprocessing global reanalysis and global climate change scenarios with regional models, which provide spatial and temporal detail. Special emphasis is on storm surges and ocean waves. Most activities so far have dealt mostly with the North Sea, but now also the Baltic Sea, Polar Lows in the Northern North Atlantic, and typhoons East China Sea are covered.

The resulting data set CoastDat (<http://www.coastdat.de/>) is freely available. All results are documented in peer-reviewed scientific journals.