Through examples of CBA applications conducted on drought and flood risk management in rural Uttar Pradesh in India and urban flood risk management in the Lei basin in Pakistan, CBA methodologies are discussed and critiqued regarding their applicability for guiding investment decisions on disaster risk management, particularly for development assistance.

Two different approaches are introduced for measuring the net benefits of disaster risk management as applied to the case studies. Ideally in a forward-looking, risk-based assessment, risk can be estimated by combining information on hazard, exposure and vulnerability. Such a time and data-intensive approach requiring key risk-analytic knowledge may be more applicable for a full project appraisal and smaller-scale risk management measures.

On the other hand, an impact-based, backward-looking approach relying on information on past damages can be pursued. The backward looking approach leads to rougher estimates, but is often more realistic and practical for a developing country context. It may be more applicable for large scale risk management measures like flood protection for river basins with a variety of exposed elements. Less time and effort is required for this approach, which may be input to pre-project appraisal or more general overview assessments. It is also more readily employed by field practitioners.

Finally, a discussion on introducing climate change into CBAs of disaster risk management investments will take place. Recent evidence suggests that as the climate is anthropogenically modified, hazards are likely to significantly change in terms of means and variability. Yet, existing climate models capture mean changes only leading to important constraints for risk-based CBAs.

Regional Climate Offices as Link between Climate Research and Decision Makers

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Why do we need regional climate offices?
In order to adjust sensible infrastructures to a changing climate, many politicians and decision makers have already realized the need for developing adaptations strategies. Especially during the last year (2007) there has been much discussion on climate change issues in the public. This public alertness was mainly associated to the new IPCC reports. But, also before, independent from this alertness, we have sensed a broad information demand in the public on how climate change might affect certain regions of the globe. Even if some stake holders knew already something about possible climate changes in their particular region, most of them knew only little about the limitations of future climate change scenarios or about the type of uncertainty associated with this scientific knowledge. This knowledge, however, is essential for developing adaptation strategies in order to avoid misinvestments. In turn, from the science point of view there is insufficient insight in the type of information needed

in the public. This lack of information often leads scientists to carry out analyses of the climate scenarios only in a very general manner meeting not stakeholder's demands.
These circumstances imply three main tasks of a regional climate office:

- Regional climate offices need to explore the range of views, questions, and knowledge in the public about regional climate change.
- Regional climate offices need to convey the content of scientific knowledge into the public. This includes communicating also the limitations of such knowledge.
- At the same time regional climate offices need to integrate public information demands on regional climate into the research agendas.

Our platforms
For these tasks we have several platforms: Besides talks we are interview partner for newspapers, radio and TV. Also, we join round table discussions, we consult exhibitions with focus on climate change regarding the scientific basis, and we answer requests from the general public. So far, 65 talks were requested at the North German Climate Office. Most of them had a focus on regional climate change in Northern Germany. These requests mainly came from climate sensitive sectors (25%) but also from education centres (22%) and several organisations (17%). Other requesting groups were politicians (15%), neighbouring disciplines in science (12%) and authorities (9%) (see Fig.1).

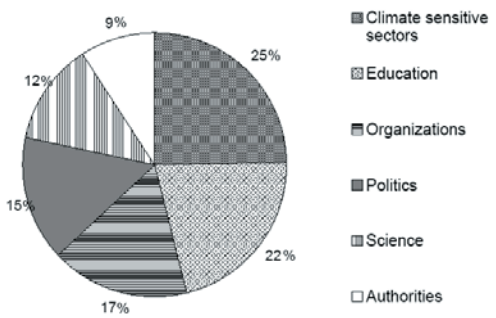

Fig.1: Requests at the North German Climate Office

Integrating regional climate change information in the public
To meet the demand of increased communication of regional climate change issues we presently built up a suitable communication strategy (see v. Storch and Meinke, 2008). Up to now three different instruments are part of this communication strategy:

- Nationwide network of regional climate offices,
- Regional climate data bases,
- Regional climate assessment reports.

Nationwide network of regional climate offices in the helmholtz association
After the launch of North German Climate Office at GKSS in 2006, three other regional climate offices started their work within the Helmholtz Association: The Southern German Climate Office at the Forschungszentrum Karlsruhe (FZK), the Middle German Climate Office at the Centre for Environmental Research (UFZ) and the regional climate office for Polar Regions and sea level rise at the Alfred Wegener Institute (AWI). Another regional climate office in Western Germany is planned. Besides their geographical focus on certain regions (Northern, Southern, Middle Germany and Polar Regions) each regional climate office has a focus on a certain research field. While the North German Climate Office has its focus on coastal climate (storms, storm surges, ocean waves), the South German Climate Office is focussing on small scale extreme events (small scale storms and heavy precipitation events). The Middle German Climate Office has its focus on land use and climate change adaptation, whereas the regional climate office of the Alfred Wegener Institute is focussing on sea level rise and sea-ice-ocean interaction.

All regional climate offices bundle latest results of regional climate research activities and communicate them in their particular region. The four regional climate offices in the Helmholtz Association work closely together and collaborate with several universities. Thus, a nationwide network of scientifically based regional climate change communication is now established.

Regional climate databases - CoastDat
The climate offices focus mainly on in-house research. For example, the North German Climate Office focuses in particular on the impact of global climate change on coastal climate in North Germany. At the GKSS Institute for Coastal Research, regional climate of coastal systems is analyzed for different time scales, namely recent past (50-100 years ago) and historical past (200 and more years ago). Our research of future climate change is based on numerical scenarios. In this context we mainly focus on storms, storm surges and ocean waves. Further analyses are also due to the energy- and water cycle components within coastal systems. Most of the data created in this context are stored in a regional climate database at the Institute for Coastal Research, named CoastDat. This data is based on model runs and, thus, combines several advantages:

- It has good spatial and temporal representativeness.
- There are no problems with inaccurate measurement instruments and changing neighbourhood of the measurement instruments.
- Time spans of data availability are long enough for statistical analyses.

CoastDat contains information on coastal climate variables, such as storms, wave heights and water levels for future, present and past time periods. The data base receives an ongoing actualization and is open to the public for scientific purposes.

Regional climate assessment reports
The idea of regional climate change assessment reports is to assess the scientific knowledge of climate change in particular regions of the world. The structure of these reports is similar to the global IPCC reports, except their spatial focus considering regional characteristics. Regional climate assessment reports bundle scientific information of climate change in historical past, recent past and possible futures. Also, the impact of climate change in that particular region is taken into account. A first regional climate assessment report for the Baltic Sea Basin has been assembled by about 80 scientists from 13 countries. This “BALTEX Assessment of Climate

Change for the Baltic Sea Basin" (BACC) was published in January 2008. (see: The BACC Author Team (2008)). A second regional climate assessment report has been launched for the extended metropolitan region of Hamburg, directed by KlimaCampus Hamburg and GKSS and coordinated by the North German Climate Office. It is expected to be published in 2010.

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Modeling Sovereign Catastrophe Risk

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Keywords: Catastrophe models, loss reduction, risk management.

Introduction

As natural disasters continue to affect developing economies, mitigating their economic and social impact is increasingly important. With the advancement of catastrophe risk modeling ("cat modeling"), detailed information is available to understand the drivers and distribution of catastrophe risk. The private sector has embraced cat modeling as a regular tool in its ongoing risk management. In recent years, governments and multi-lateral organizations have utilized models to understand and manage their risk profile. Transactions in the market such as Cat-Mex and the Caribbean Catastrophe Risk Insurance Facility (CCRIF) are examples of governments and donors proactively implementing catastrophe risk modeling. There is a continued role for governments and donors to play in maximizing the benefits of catastrophe risk modeling for ex ante loss reduction and for the ex post provision of relief funds.

The case study

Standard actuarial techniques rely on data from past events to project future losses. The scarcity of historical loss data resulting from the infrequency of catastrophic events makes standard actuarial techniques of loss estimation inappropriate for catastrophe losses. Furthermore, the usefulness of the historical loss data that is limited due to the constantly changing nature of property values, location of assets, building materials, designs and vulnerability. Catastrophe models account for these factors to present a probabilistic estimate of future losses. In recent years, governments and donors have applied catastrophe models to derive estimates of risk and secure post-disaster funds. This is one application of modeling. Models can also be used to guide mitigation measures and ex ante loss reduction. Working jointly there are several steps governments, donors and modelers can enact to maximize the benefits of modeling for loss reduction.

Opportunities for governments and donors

As catastrophe risk models become more sophisticated governments and donors have more information about their risk profile than in years past. The task confronting governments and