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## ***Climate change impacts: a scientific background***

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Climate change is seen as one of the most daunting contemporary challenges. In its summary for policy makers, the Intergovernmental Panel on Climate Change (IPCC) synthesizes the scientific background of climate change (IPCC 2007a). We want to highlight three of these findings:

“Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice and rising global average sea level.” (p. 30)

“There is very high confidence [at least 9 out of 10 studies] that the net effect of human activities since 1750 has been one of warming.” (p. 37)

“Most of the observed increase in global average temperatures since the mid-20th century is very likely [ $>90\%$ ] due to the observed increase in anthropogenic GHG concentrations.” (p. 39)

Hence, in the last decades, the linkage between anthropogenic greenhouse gas (GHG) changes and observed temperature changes has been scientifically established (ENSAMBLES, 2009). Observations show that the temperature in northern Europe has increased by 0.2-1.0 °C during 1970-2004 and 1.0-2.0 °C in many parts of central and southern Europe (IPCC 2007a, Figure TS.1.). Scientific observations have shown that climate change has impacts on natural- and human systems both regionally and globally (IPCC, 2007a). The climate system and the lifetime of the GHG emissions result in some of the future climate change impacts to be unavoidable. Climate change and the many effects it entails are therefore an important research area for development of climate change mitigation and adaptation strategies.

To cope with the challenges related to mitigation and adaptation it is necessary to have implementation strategies on local and regional scales. The local and regional levels lack support, resources, knowledge and experience in how to handle climate change in the context of sustainable development. Baltic Challenges and Chances for local and regional development generated by Climate Change (BalticClimate) is a project that intends to work with these issues, particularly with an emphasis of the ability to conduct local assessments.

In the fourth assessment report (AR4) of IPCC climate change impacts were identified. The majority of the climate change impacts on Europe were related to water, for example, increased annual runoff in northern Europe, an increase in population living in water-stressed watersheds, and an increased number of people affected by coastal flooding. Nevertheless, the IPCC (2007a) also pointed out climate change impacts for Europe that were not directly water-related, for example, northward expansion of crops, increased cereal yields in northern Europe and expansion of forested area in northern Europe.

Several methods are used and developed in order to obtain knowledge about climate change impacts, adaptation and vulnerability, to in turn to improve the basis for making decisions (IPCC, 2007a). The aim with this support material was to provide a compilation of the currently available knowledge concerning climate change impact scenarios of relevance for the Baltic Sea Region. Scenarios are intended to give an alternative image of how the future might turn out; they should not be recognized as predictions or forecasts (IPCC, 2000). In order to enable comparisons between impacts this survey focused on climate change impact assessments using scenario driven modeling approaches. All sectors and fields were matter of interest in this compilation of impact scenarios.

Studies on climate change impacts, only focusing on the BSR are not common; hence, the majority of the study-results for the BSR included in this report are interpreted from global-, European- or country-level studies.

## References

ENSEMBLES (2009). Climate change and its impacts at seasonal, decadal and centennial timescales. Met Office Hadley Centre. Exeter. Available at: <http://ensembles-eu.metoffice.com/> (2010-07-19)

IPCC (2007a). Parry, M.L., Canziani, O.F., Palutikof, J.P., and Co-authors: Technical Summary. *Climate Change 2007: Impacts, Adoption and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, Parry, M.L., Canziani, O.F., Palutikof, J.P., van der Linden P.J., and Hanson C.E., Eds., Cambridge University Press, Cambridge, UK, 23-78.

IPCC (2000). Special Report on Emission Scenarios (SRES). Summary for Policymakers. Nakicenovic, N. and Swart, R. (eds.). Geneva, Switzerland, 20 pp. Available at: [http://www.ipcc.ch/publications\\_and\\_data/publications\\_and\\_data\\_reports.shtml](http://www.ipcc.ch/publications_and_data/publications_and_data_reports.shtml) (2010-08-27).