

Assessment of Climate Change for the Baltic Sea Basin

by

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1. Introduction

On two intensive days, May 22–23, 2006, an international conference took place in Göteborg addressing what is happening to the climate of the Baltic Sea Basin. The conference was organized by BACC (<http://dvsun3.gkss.de/BACC/>) and HELCOM (<http://www.helcom.fi/>). The BACC Project is part of the BALTEX program, and its aim is ultimately to publish a book that will provide the scientific community and public with an assessment of ongoing and future climate change in the Baltic Sea region. The work is being done on a voluntary basis, free of any political or special interests. Eighty scientists from 12 countries have come together on their own initiative to review and discuss what is happening to the climate of the Baltic Sea Basin. The BACC Project integrates available knowledge concerning historical, current, and expected future climate change. The unique feature of the BACC Project is how it combines evidence of climate change and related impacts on marine, freshwater, and terrestrial ecosystems in the Baltic Sea Basin (including both catchment and water body). This is the first systematic scientific effort to assess climate change in the Baltic Sea region. During the Göteborg meeting, more than 120 participants, representing the scientific community and interested stakeholders, and including policy makers and journalists, discussed the preliminary outcome of the assessment. The first day of the conference was devoted to scientific discussions, and the lead authors of individual chapters presented the BACC results both orally and via posters. On the second day, there were discussions – including a panel discussion – linking science, policy, and public debate. The BACC Project is closely linked to the activities of HELCOM.

2. Outcome

The key points from the Conference can be summarized as follows:

2.1 Climate change

- Air temperature in the Baltic Basin has increased by 0.7°C per 100 years since the late 19th century – a stronger trend than the global trend.
- The most pronounced warming is evident in spring.

- Related changes have been observed in winter runoff, ice duration, and snow thickness.
- There has been more precipitation in the second half of the 20th century, though with major regional variations.
- No systematic change in wind intensity has been found.
- There are no clear long-term trends in Baltic Sea salinity.

2.2 Ongoing changes in regional ecosystems

- Associated changes in terrestrial ecosystems include
 - earlier spring phenological phase,
 - northward species shift, and
 - increased growth and vigour of vegetation.
- Robust assessments of climate-change-related alterations of marine ecosystems are barely possible at this time. Further research is needed to discriminate between climate change and other anthropogenic drivers, such as over-fishing, eutrophication, air pollution, and land-use changes.

2.3 Projections of future regional climate change

- Air temperatures are very likely to increase throughout the 21st century, but the projected strength of the trend depends greatly on the model used.
- Projected degree of warming is greater than that projected for the entire globe.
- Mean precipitation is projected to increase; the largest increase will likely occur in winter throughout the basin, while precipitation will likely decrease in summer in the southern part of the basin.
- There are no clear projections for wind speed or storms.

2.4 Projections of future climate impacts on terrestrial ecosystems

- The expected future warming is associated with a possibly accelerated continuation of current trends toward the earlier onset of spring and phenological phases, northward spread of species, and shifts and increased growth and vigour of vegetation.

2.5 Projections of future climate impacts on marine ecosystems

- No detailed, comprehensive analysis is available, so projections are more ad hoc and uncertain.
- Effects of other changing influences are barely predictable.

- A possible decrease in Baltic Sea salinity may have a major effect on marine fauna.
- Expected changes in precipitation and river runoff may exacerbate the problem of eutrophication.

2.6 Research needs

- A link to rising greenhouse gas concentrations is plausible, but no robust attribution has been established on a Baltic Basin scale (on a global scale, this link has been established).
- Many conclusions relate to the different time periods studied, as different changes occur at different time scales: i.e., the variability versus trend problem.
- Only a few observational records span the entirety of the past 150–200 years.
- Changing observational techniques influence data homogeneity.
- “Detection and attribution” studies at a regional scale are urgently needed to determine the influence of anthropogenic factors in changing the regional climate.

3. Summary

In brief, general warming is currently underway in the Baltic Sea region. BACC considers it plausible that this warming is at least partly related to anthropogenic factors, and that it will accelerate in coming decades. So far, and over the next few decades, the signal is limited to temperature and directly related variables, such as ice conditions. Later on, changes in the water cycle will become obvious. This regional warming will have a variety of effects on terrestrial and marine ecosystems, some predictable, such as the changes in phenology, and others so far barely predictable.

The Conference marked an important step in improving climatic assessments and supporting interdisciplinary understanding. The next step is to incorporate the Conference proceedings into the book and to prepare the various chapters for publication. At the beginning of 2007, Springer Verlag is expected to publish the BACC book. Concurrently, the results presented in the BACC book will comprise the basis of future work under the auspices of HELCOM.



Participants in the BACC and HELCOM First International Conference on Climate Change for the Baltic Sea Basin, Göteborg, Sweden, May 22–23, 2006. Photo: BALTEX Secretariat/Ocean Climate Group.