

---

## Preface

Climate change impacts show wide regional variability; their strength, nature and evolution depending on the principal features of the area in which they are occurring. To cope responsibly with its impacts, decision-makers and authorities need sound information on the specifics of climate change in their region. The science community would also benefit from a comprehensive analysis of the state-of-knowledge on regional climate change and its effects.

The North Sea region is a precious natural and cultural environment and a major economic entity within Europe. The North Sea is one of the world's richest fishing grounds as well as being one of the busiest seas with respect to marine traffic and its related infrastructure, oil and gas extraction is also of high economic value. More recently the area has become a major site for wind energy, with many large offshore wind farms. Climate change impacts are expected to have profound effects on North Sea ecosystems and economic development. Despite its importance, until now a comprehensive analysis of climate change and its impacts for the region as a whole had not been attempted. Some nationally-focused studies with an emphasis on climate change projections have been published in recent years, such as the UK Climate Projections—Marine and Coastal Projections and the KNMI'14 Climate Scenarios for The Netherlands to name but two examples,<sup>1</sup> and these have all been considered in the present study.

A few years ago, inspired by our colleague Hans von Storch, we initiated an international climate change assessment of the North Sea region. We adopted a similar approach to that successfully employed for reviews of knowledge on climate change in the Baltic Sea basin, published in 2008 and 2015.<sup>2</sup> This activity was named the North Sea Region Climate Change Assessment—NOSCCA—and has involved around 200 climate scientists in different research areas from all countries around the North Sea, as well as a few from more distant localities. NOSCCA developed into an independent international initiative, with all scientists involved contributing their time and effort on a voluntary basis as there was no extra funding available.

Present knowledge of climate change in the North Sea region has been evaluated mainly using peer-reviewed publications on climate change in the physical systems and its effects on land and marine systems. Two types of impact studies were envisaged: those concerning specific ecosystems and those related to specific human activities causing degradation of the environment.

After an introductory chapter on the North Sea region and its characteristics in terms of geography, geology, hydrography, present-day climate and ecology, Part I describes the climate change experienced over the past 200 years, described separately in each of three chapters on the atmosphere, the North Sea and river flow. Part II examines projections of

---

<sup>1</sup>Lowe, JA, Howard TP, Pardaens A, Tinker J, Holt J, Wakelin S, Milne G, Leake J, Wol J, Horsburgh K, Reeder T, Jenkins G, Ridley J, Dye S, Bradley S. (2009) UK Climate Projections science report: Marine and coastal projections. Met Office Hadley Centre, Exeter, UK; KNMI (2015): KNMI'14 climate scenarios for the Netherlands; A guide for professionals in climate adaptation, KNMI, De Bilt, The Netherlands, 34 pp.

<sup>2</sup>The BACC Author Team (2008), Assessment of Climate Change for the Baltic Sea Basin. Regional Climate Studies, Springer-Verlag, 473pp; The BACC II Author Team (2015) Second Assessment of Climate Change for the Baltic Sea Basin, Regional Climate Studies, Springer, 501pp.

future climate with separate chapters on the atmosphere, the North Sea, and river flow and urban drainage. The impacts of recent and future climate change on marine, coastal, lake and terrestrial ecosystems are presented in Part III. The report concludes with a consideration of climate change impacts on socio-economic sectors, Part IV contains chapters on fisheries, agricultural systems, offshore activities related to the energy sector, urban climate, air quality, recreation, coastal protection and finally coastal management and governance. Important background information is presented in five annexes to the report. An overall summary containing key statements from the different chapters precedes the main body of the book.

Climate change and its impacts on ecosystems has received much attention for many years. However, assessing the impacts of climate change on natural systems is far from straightforward. Environmental impacts resulting from non-climate drivers often make it very difficult to clearly establish the specific effects of climate change, which are already hard to attribute due to the difficulties of discriminating between natural variability and human interventions and their potential interactions. As a result, for many of the topics addressed in this assessment, other drivers have also been discussed, especially those that may mask potential climate change signals. Strict detection and attribution has not been undertaken here, mainly due to the lack of relevant published work. This could be the subject of a follow-up activity.

This assessment is a joint effort of 35 Lead Authors and a large group of contributing authors, who were willing to share their knowledge on many different aspects of the North Sea region and to contribute to compiling the different chapters. The process has been overseen by an international Scientific Steering Committee; the members are listed in the section 'About NOSCCA'. A review phase involving a sovereign review editor and more than 60 external reviewers was crucial to establishing an independent and scientifically sound product. All authors worked without financial support for this book and were supported by their respective institutions. We are extremely grateful for their contributions. Authors and reviewers are acknowledged and listed by name on the following pages. The open access publication of this report was made possible by funds provided by various institutions, which are listed in the acknowledgements section.

We consider this assessment to be the most comprehensive study of climate change in the North Sea region to date. It is hoped that NOSCCA will be of use to decision-makers in the many countries surrounding the North Sea as well as to those who are responsible for planning and implementing climate change adaptation in the region. We hope this assessment will stimulate further monitoring and topical studies on climate change in this ecologically and economically important region of Europe and as a result will increase the effectiveness of decision-making at the local level.

Geesthacht, Germany

Markus Quante  
Franciscus Colijn

North Sea Region Climate Change Assessment

Quante, M.; Colijn, F. (Eds.)

2016, XLV, 528 p. 277 illus., 215 illus. in color.,

Hardcover

ISBN: 978-3-319-39743-6