



## **Towards a Regional Assessment of Coastal Flood Risk: A review of Methods Applied in Norway, Sweden, Finland, Denmark, and Germany**

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**Towards a Regional Assessment of Coastal Flood Risk – A Review of Methods  
Applied in Norway, Sweden, Finland, Denmark, and Germany**

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The coasts of Norway, Sweden, Finland, Denmark, and Germany face hazards from storm surges governed by eastward propagating atmospheric lows. Surge and tide levels, as well as their corresponding impacts, vary between storms and location. The exposure and physical vulnerability of the coastline in these countries are also unevenly distributed, and demands location specific flood-risk analysis. National methodologies for assessing extreme sea-level events generally differ in some way, e.g., the statistical methods applied in extreme value analysis, projections of future changes in extremes, and/or approaches for dealing with coastal flood risks. This includes local to regional climate change projections for the future mean sea level change and extremes, and, for instance, variations due to location, morphodynamic change, and glacio-isostatic adjustment. Next, the transformation of this knowledge to concrete coastal impact and design measures and its use in national and local governance adaptation schemes in the five countries is discussed. Here, national approaches to deal with risk, risk acceptance and uncertainty vary, among other factors, as a result of the different assessments of extreme events. In hazard and vulnerability assessments, where results are highly dependent on the availability and quality of the underlying observational data and statistical methods in use, it is necessary to gain a deeper understanding of the physical processes (i.e., the atmospheric and oceanographic genesis of storms and other contributing factors) in order to make robust strategies for adaptation and risk reduction. Inasmuch as the countries bordering the northeast Atlantic Ocean, the North Sea, and the Baltic Sea deal with similar coastal hazards and climate change challenges, the development of enhanced scientific transnational collaboration to share the existing knowledge and perspectives regarding future impact of extreme sea levels is suggested. This will provide more comprehensive and robust measures of mitigation and adaptation and it will secure a wider dissemination of results across the scientific community and levels of governance, between the northern European countries.

**Keywords:** Storm surges, sea level rise, extreme value analysis, flood risk, method comparison