

**Title: Challenges and uncertainties in estimating damage costs of extreme flooding events illustrated by Danish case studies**

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Flooding hazards currently impose high damage costs in coastal areas, and damages are expected to increase in the future due to climate change because of rises in sea level and storms, and due to our long coast line Denmark which is very exposed to flooding risks. The municipalities are responsible for managing coastal flood risks and adaptation options in Denmark and very extensive activities are currently undertaken to address these challenges including in the relation to so-called DK2020 municipal adaptation plans. The technical and data requirements developing high quality and accurate coastal adaptation plans are however very high, and the current state of the art within technical analysis within the field suffer from limitations which make it difficult to address our societal preferences for avoiding extreme climate events and for supporting decision making on adaptation.

The paper is addressing methodological issues and critical assumptions involved in the evaluation of societal climate hazard risks recognizing that despite the inherently low probabilities of extreme events like coastal flooding, the welfare implications to society can be very high due to risk aversion attitudes, and non-substitutable values at risk.

Illustrated by case studies on coastal flooding in the Danish municipalities of Odense and Aabenraa the paper presents the results of a conventional cost benefit analysis of flooding risks based on a flood damage cost model developed by DTU compared with an assessment with adjustments reflecting specific uncertainties and risks of extreme coastal flooding events. It is concluded, that based on a conventional cost benefit analysis of the expected benefits of investing in climate change adaptation in the two case studies it is only suggested to protect against relatively small flooding events, despite the consequences of extreme events could be very large, and it is discussed whether such results appropriately reflect the risk preferences of society and individuals.