DTU Library

Hazard and Risk Maps for the EU Floods Directive in Denmark

Piontkowitz, Thorsten; Sørensen, Carlo Sass; Jebens, Martin; Schürenkamp, David; Burzel, Andreas; Kortenhaus, Andreas

Published in:
Clima change adaptation adapting to change: from research to decision-making : Abstracts

Publication date:
2014

Document Version
Publisher's PDF, also known as Version of record

Hazard and Risk Maps for the EU Floods Directive in Denmark

Piontkowitz, Thorsten; Danish Coastal Authority, Ministry of the Environment (DK)
Sørensen, Carlo; Danish Coastal Authority, Ministry of the Environment (DK)
Jebens, Martin; Danish Coastal Authority, Ministry of the Environment (DK)
Schürenkamp, David; Technische Universität Braunschweig (DE)
Burzel, Andreas; Deltares, Department Water Risk Analysis (NL)
Kortenhaus, Andreas; Ghent University, Department Civil Engineering (BE)

Flooding hazard and risk mapping have been carried out for 10 risk areas involving 22 municipalities. From a 7-step integrated risk analysis method hazard and risk maps are presented and discussed in relation to the usefulness at municipality level in decision- making for risk reduction, risk communication, and climate change adaptation. The purpose of the EU Floods Directive [1] is to identify flood risks and improve preparedness for future flood events and flood risk management. The first step of implementation appointed 10 Danish risk areas and the second step, presented here, deals with the mapping to be used at the municipality level for risk reduction etc. in the third step (2014- 2015). The risk areas in Denmark are appointed due to river flooding (1 area), coastal flooding (4 areas), or a combination of both (5 areas). For the hazard and risk maps an overall integrated risk analysis method based on the German XtremRisK project [2] has been developed that follows a 7-step approach for each risk area: - Step 1: A database including topographical and bathymetrical data, river discharges, and relevant spatial data for different cost categories such as housing, infrastructures etc. - Step 2: The hydraulic boundary conditions are defined for six scenarios; three scenarios in accordance with the Directive and three climate change scenarios. - Step 3: The hydraulic boundary conditions for the six scenarios are used for a reliability analysis of existing flood defences. - Step 4: Numerical inundation modelling using MIKE 21 HD FM is carried out for each scenario. - Step 5: The inundation maps serve as input to calculate the tangible losses due to flooding for each of the scenarios. A Cell-based Risk Assessment (CRA) [3] approach is used for the spatial modelling in the integrated risk analysis. Each flood prone area is divided into uniform polygons (grid cells) at resolutions of 500m, 200m, 100m, 50m, and 25m, respectively. - Step 6: Intangible losses such as cultural heritage, environmental values, and number of affected inhabitants are estimated using the CRA approach. - Step 7: Results from steps 3 to 6 are brought together to obtain the hazard maps and risk maps for each of the six aforementioned scenarios. The hazard and risk maps [4] were published in December 2013 and serve as a robust basis for plans and decisions about risk reduction and risk management that are to be carried out at the municipality level. By applying a detailed and coherent method to the evaluation of flooding hazard and risk mapping in Danish risk areas, the resulting map overlays serve as a robust and dynamic tool for risk management at the municipality level. Looking ahead, however, there still is plenty of room for advances within e.g. damage functions, the assessment and evaluation of intangible losses, and the evaluation of concurrent hazards. Also, the transformation of results into more intuitive tools for decision-making about risk management, risk communication and climate change adaptation needs further work.

[1] European Commission (2007): Directive 2007/60/EC of the European Parliament and of the Council on the As- sessment and Management of Flood Risks (No. 2455). [2] Oumeraci, H. et al. (2012): Integrated flood risk analysis for extreme storm surges at open coasts and in estuaries: background, methodology, key results and lessons learned - results of the XtremRisK project. Proceedings FLOODrisk2012, Rotterdam, The Netherlands. [3] Burzel, A. & Oumeraci, H. (2012): Development of a Framework for the Spatial Modelling of Extreme Risks and the Consideration of Risk Acceptance: Progress Report 1: Cellbased Risk Assessment (CRA) Approach. Braunschweig. [4] http://miljoegis.mim.dk/? profile=oversvoem2