Floods Directive in Denmark

Ministry of Environment of Denmark
Coastal Authority

oversvommelse.kyst.dk

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Oversvømmelsesdirektivets kort og godt

Extreme floods in Europe in 1998-2002

- 700 deceased
- 0,5 mio. evacuated
- Economic damages of € 25 billion.

EU's Floods Directive (2007)

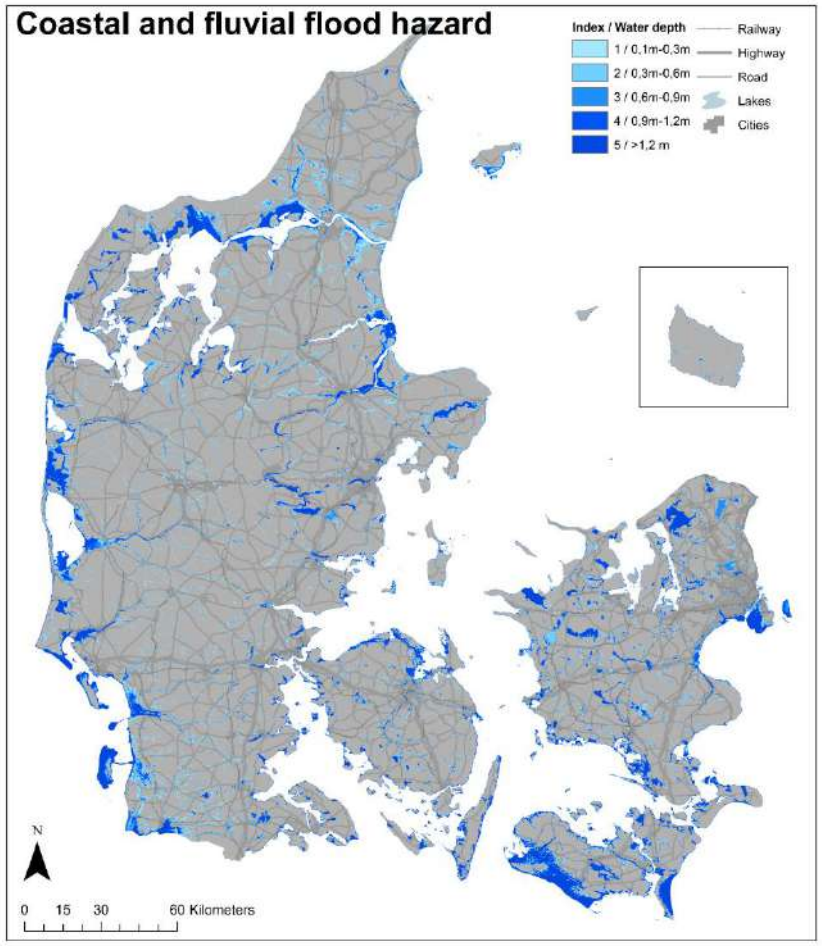
Purpose: " …establish a framework for the **assessment and management of flood risks**, aiming at the **reduction of the adverse consequences for human health, the environment, cultural heritage and economic activity associated with floods** in the Community."

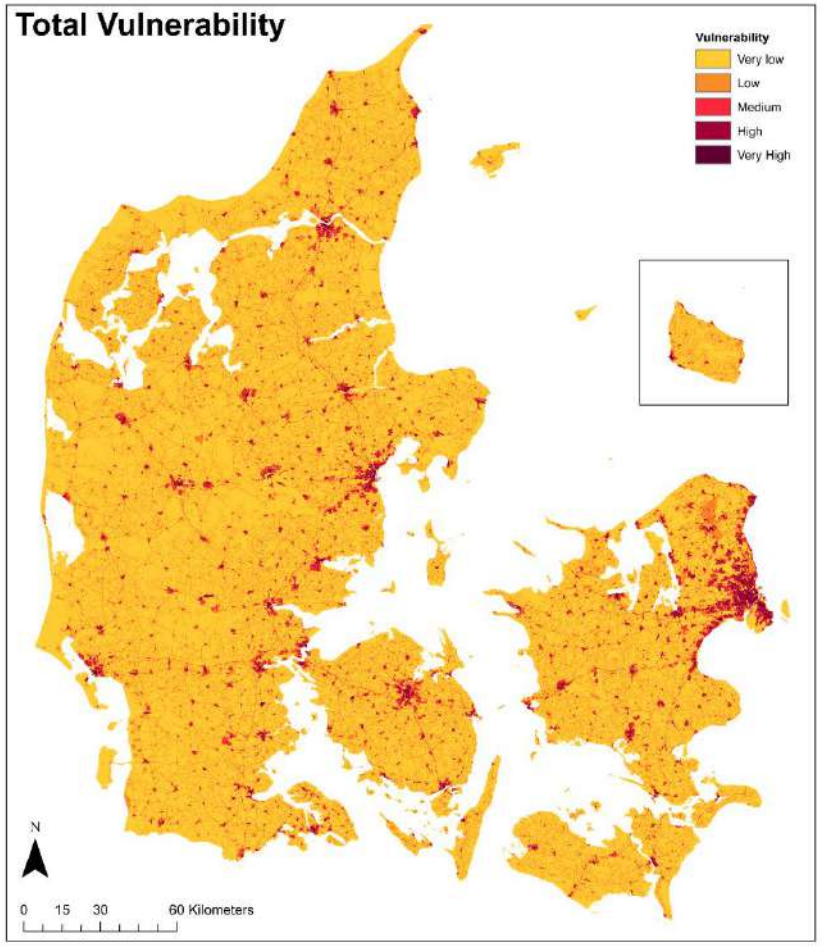
The Danish legislation

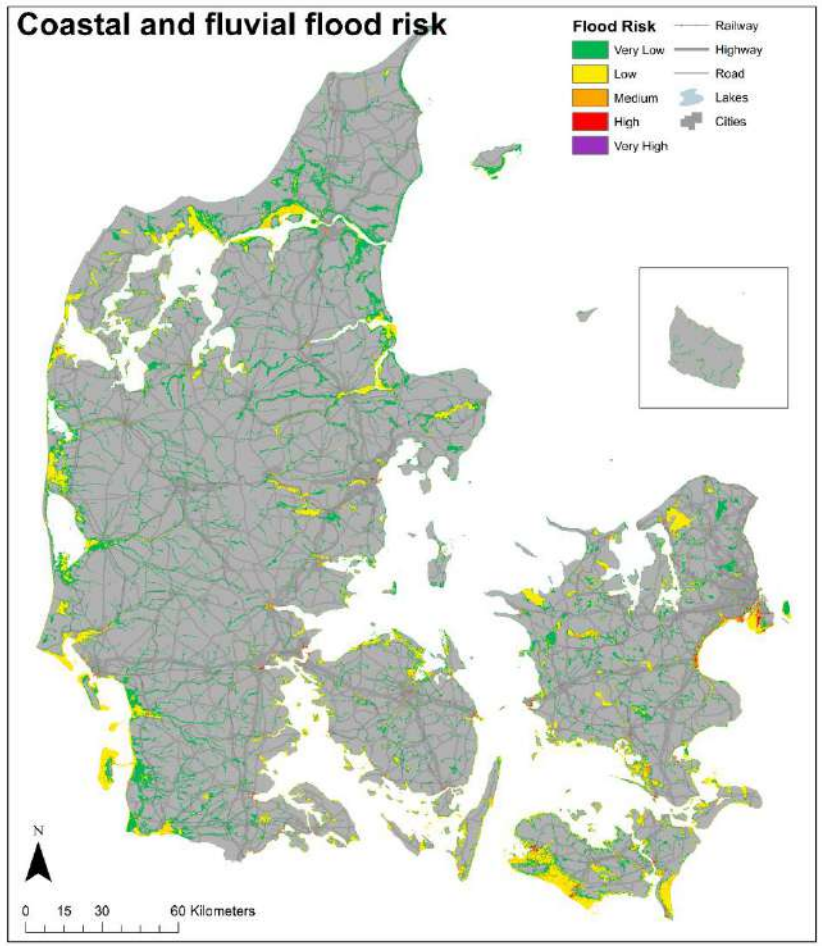
Implementes the FD in realtion to two sources of flooding: **Coastal and fluvial flooding**.

Process for 3rd cycle (2022-2027)

National flood risk assessment







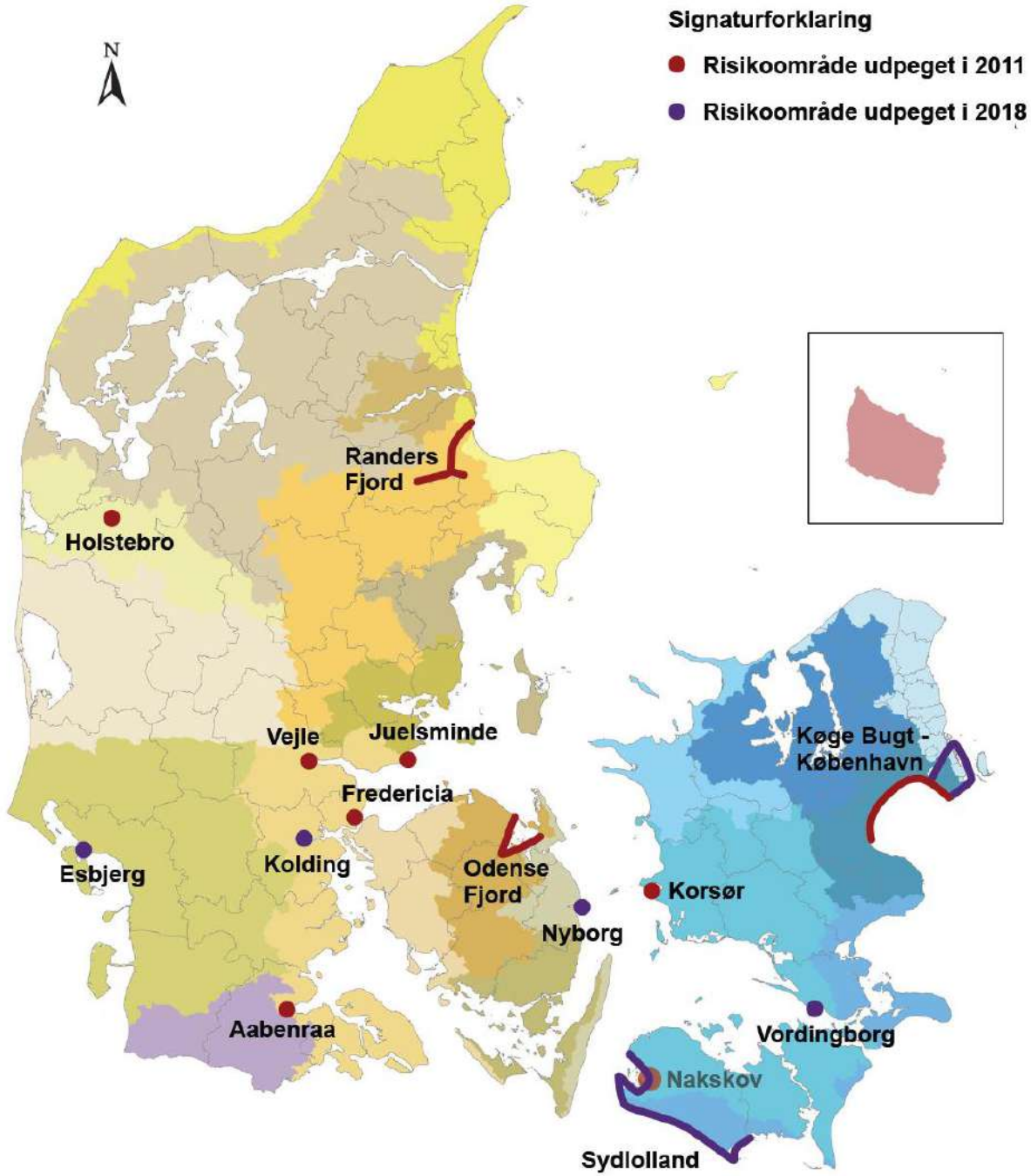
Risk Areas in Denmark

1st cycle (2010-2015)

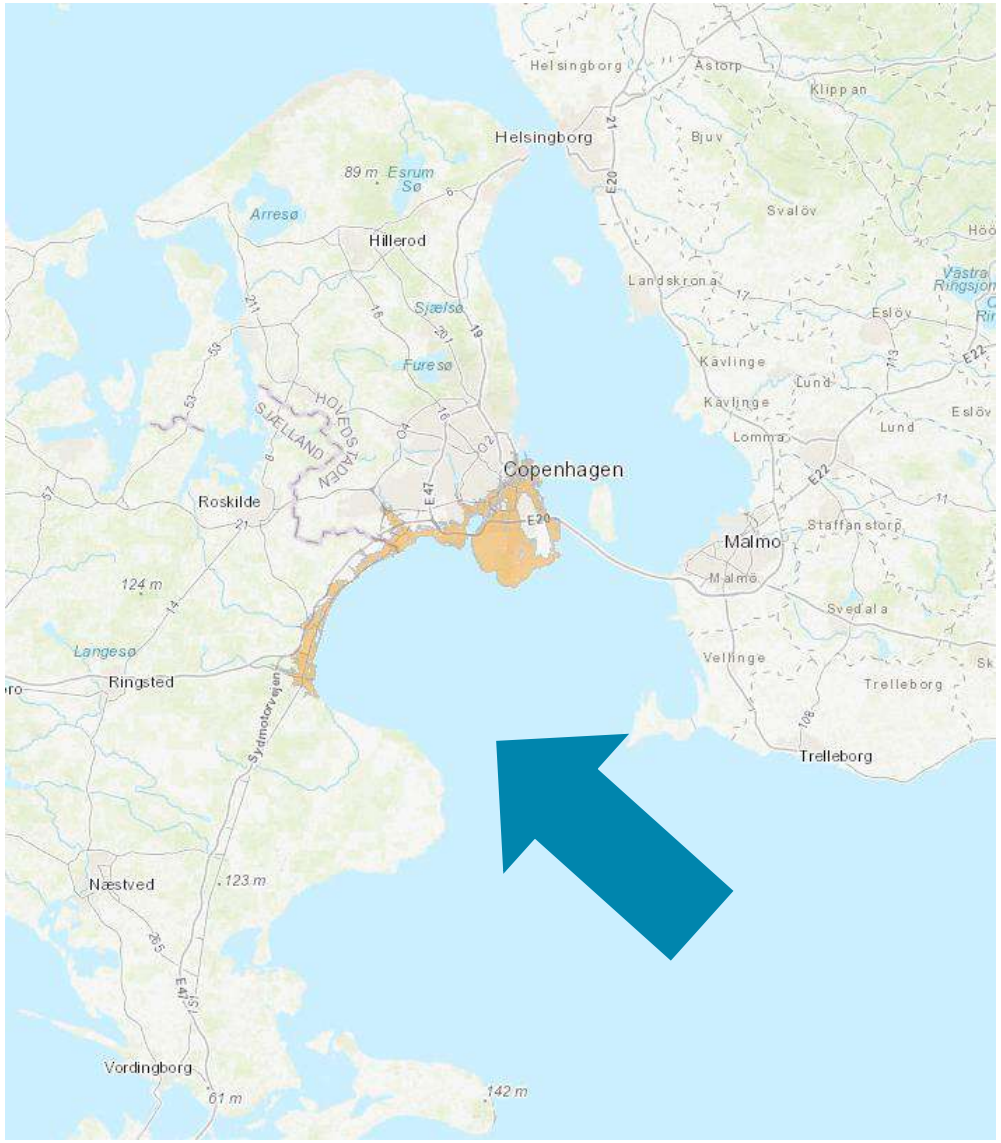
- 10 risk areas
  - 6 coastal
  - 3 coastal and fluvial
  - 1 fluvial
- 22 municipalies affected

2nd cycle (2016-2021)

- 14 risk areas
  - 9 coastal
  - 4 coastal and fluvial
  - 1 fluvial
- 27 municipalies affected



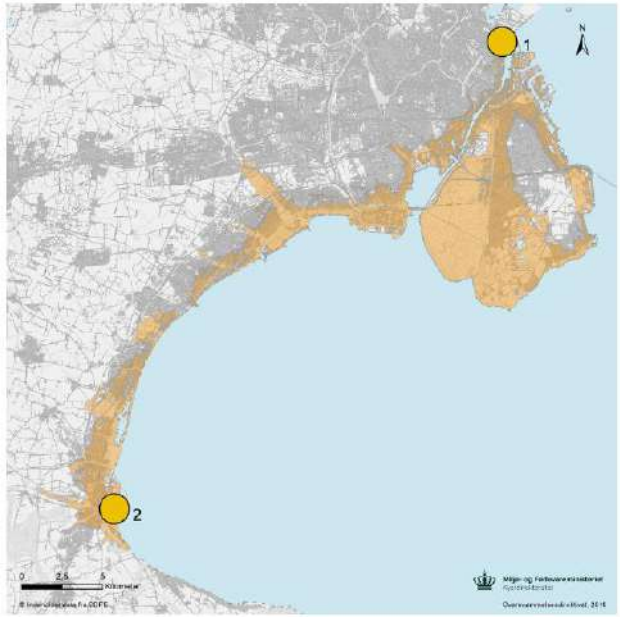
Example on flood hazard mapping in an APSFR



Fakta om datagrundlaget

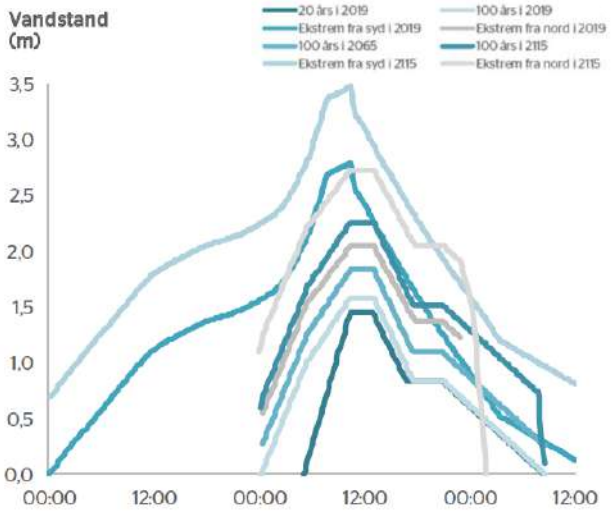
Stormflodskurverne er bestemt på baggrund af data fra følgende målere.

Københavns Havn (måler 1)	128 års data
Køge Havn (måler 2)	57 års data



20 års stormflod i 2019	146 cm
100 års stormflod i 2019	159 cm
Ekstrem stormflod fra syd i 2019 (Stormfloden 1872)	280 cm
Ekstrem stormflod fra nord i 2019 (1000 års stormflod)	205 cm
100 års stormflod i 2065	184 cm
100 års stormflod i 2115	226 cm
Ekstrem stormflod fra syd i 2115	348 cm
Ekstrem stormflod fra nord i 2115	273 cm

Køge Bugt - København



Data til fremskrivning af vandstand

Klima

Der anvendes klimascenarie RCP8.5 fremskrevet til år 2065 og 2115 til modelleringen (DMI 2014 og 2015).

Havstigning 2065	33 cm
Havstigning 2115	83 cm

Landhævning

Landhævningens bidrag til fremtidig stormflodsvandstand er bestemt af DTU.

Landhævningen for Køge Bugt - København er 0.15 cm/år.

Landhævning i 2065	7,2 cm
Landhævning i 2115	14,7 cm

Vulnerabilities and damage calculations

Tangible vulnerabilities





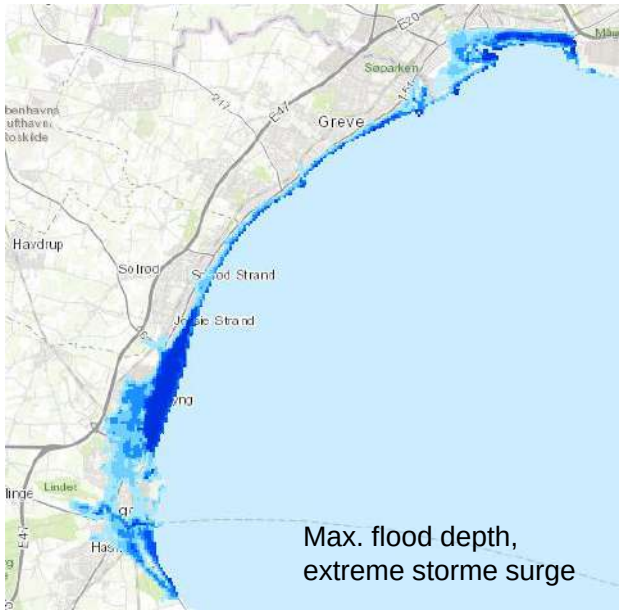


Intangible vulnerabilities

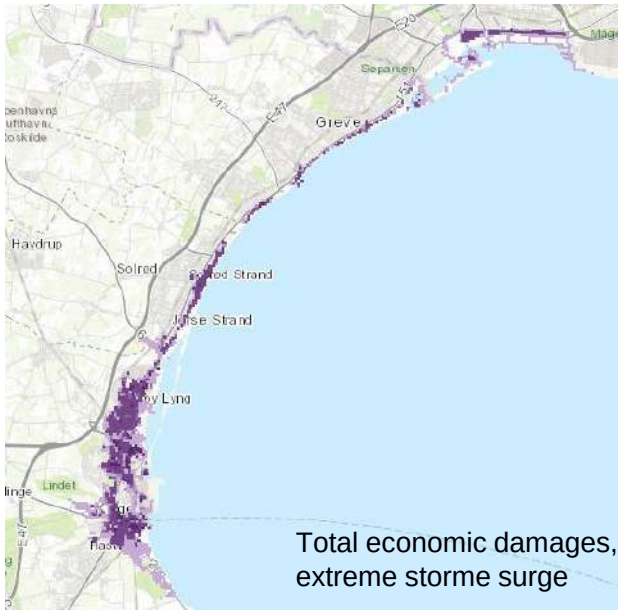




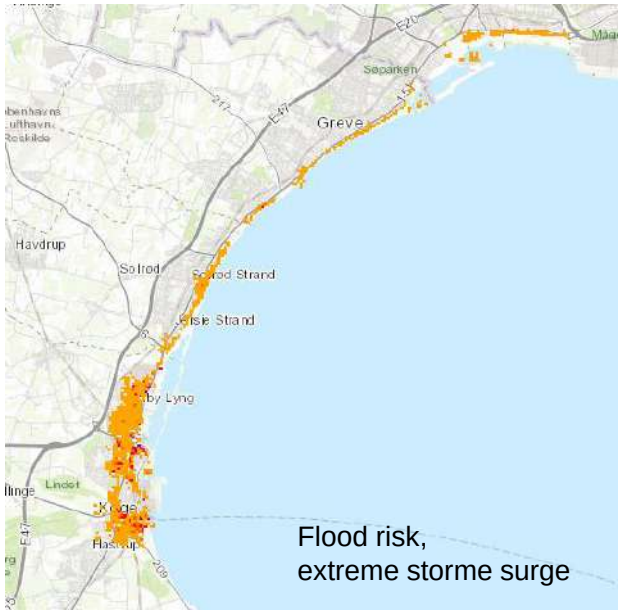

Example on flood hazard and flood risk maps in an APSFR



Max. flood depth, extreme storme surge

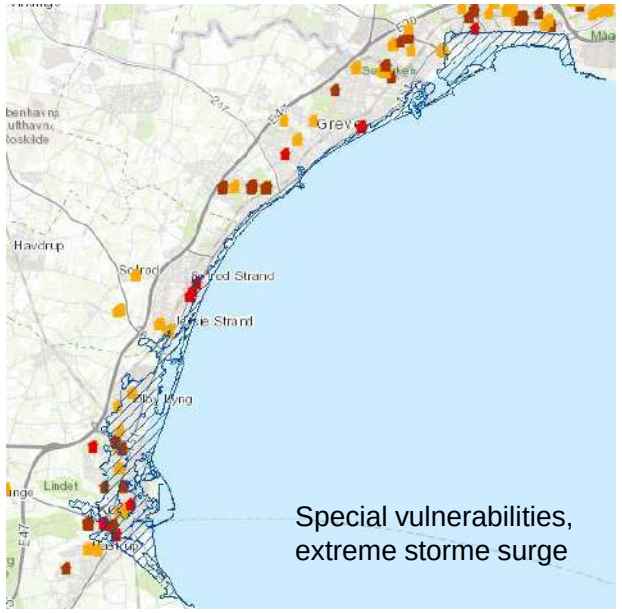


Total economic damages, extreme storme surge

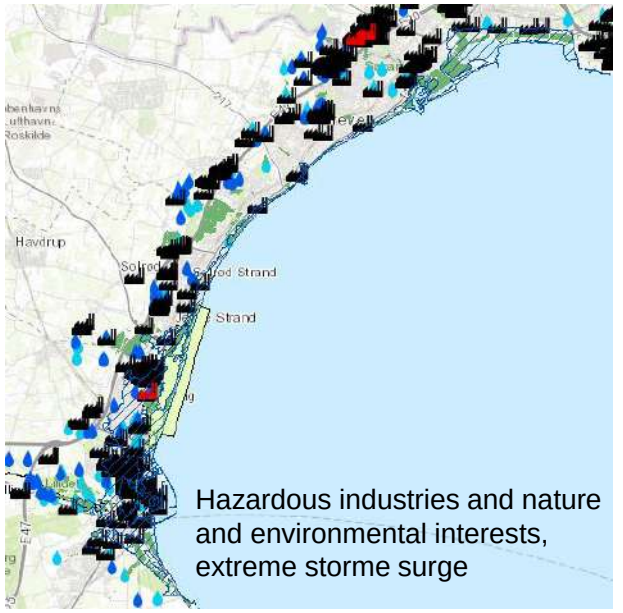


Flood risk, extreme storme surge

Critical infrastructure and flood extent, extreme storme surge



Special vulnerabilities, extreme storme surge



Hazardous industries and nature and environmental interests, extreme storme surge

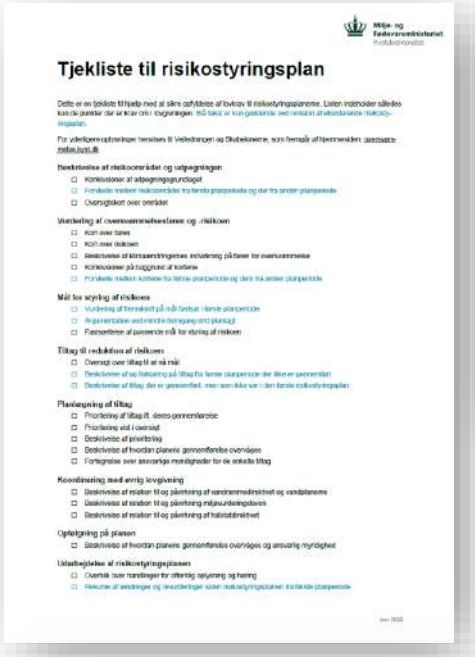
Guidance material for the Flood Risk Management Plans

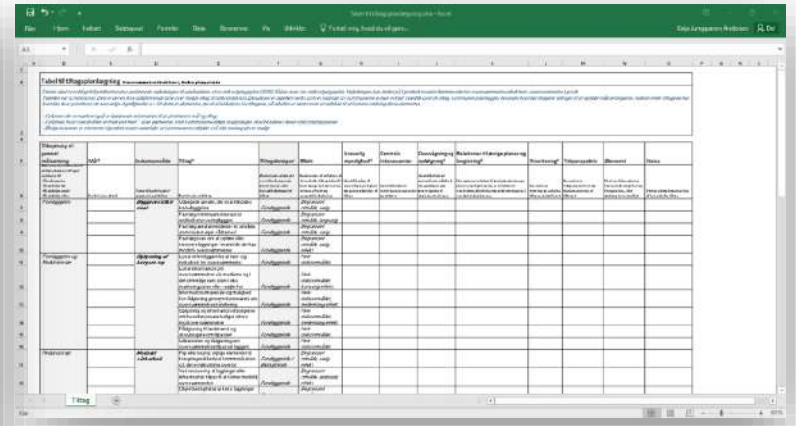
Experiences from 1st cycle

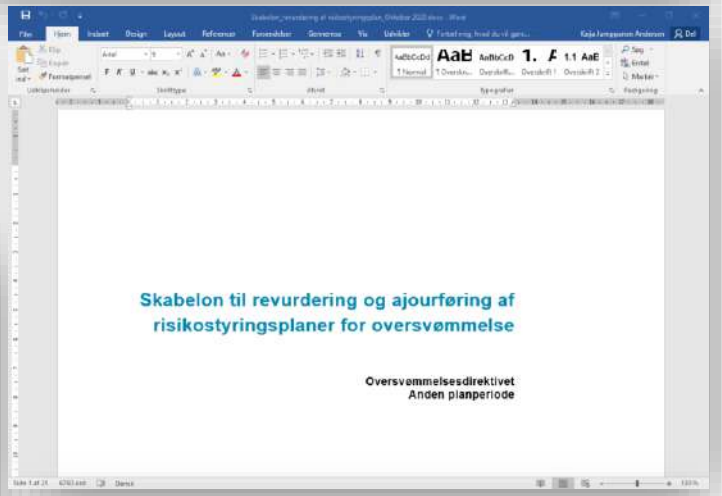
- FRMPs were very different in form, scope and content
- It was difficult to compare the FRMPs
- Several FRMPs were missing content from the FD Annex

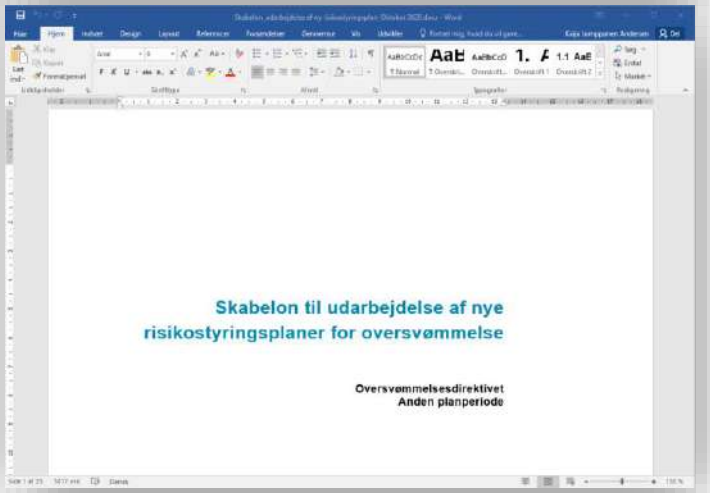
Developed several supporting documents

- New more detailed guide
- Check list
- Table for planning measures
- Template for new FRMPs
- Template for reviewing FRMPs
  - Templates based on the German template



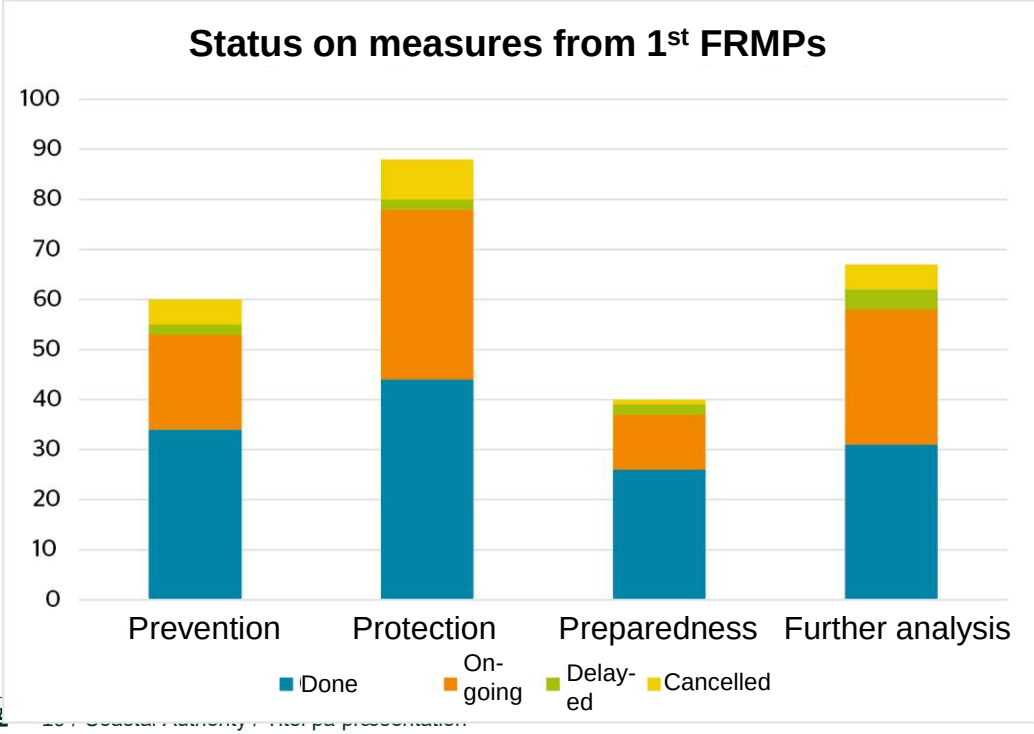


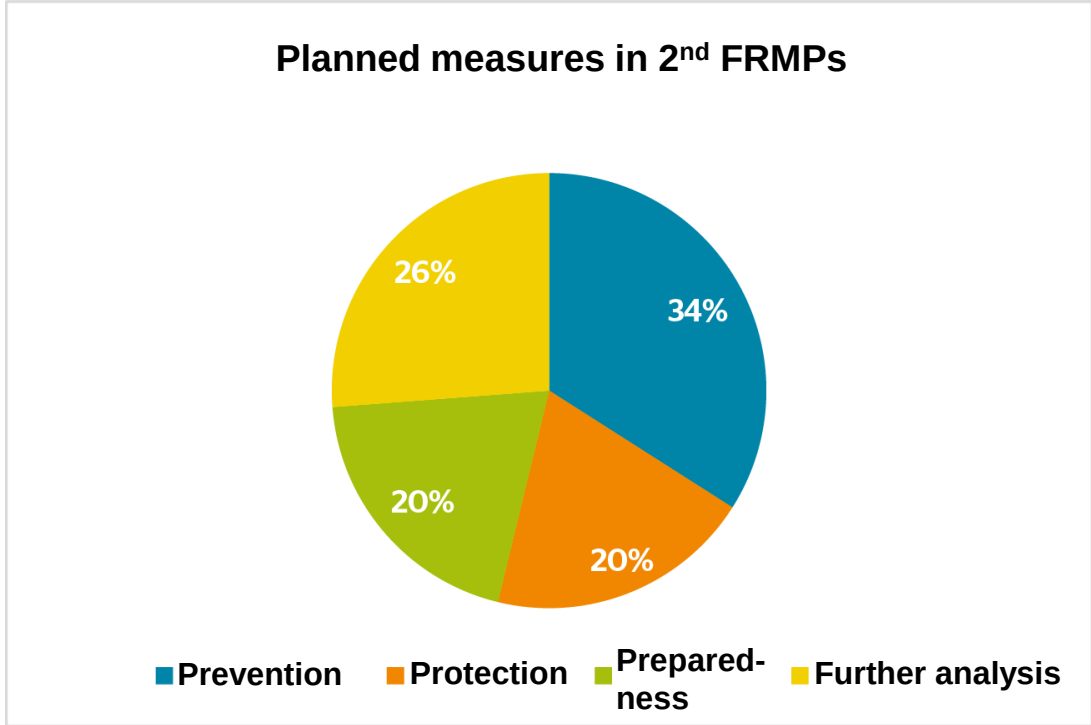




Floods Directive, 2nd cycle concluded

- 2nd cycle was concluded with local Flood Risk Management Plans (FRMPs) by the 27 appointed municipalities.
- DCA has made two summaries of the municipalities' FRMPs, one for Jutland and Funen, and one for Zealand.
- The 22 municipalities that were appointed as risk areas in 2011 gave a status on the measures planned in their first FRMP.





Floods Directive, 3rd cycle means new ideas (input fra Kaija)

- It is the plan to finalise the national risk assessment and appointment of risk areas in 2023 (one year ahead of schedule according to the legislation)
- Thus leaving two years for the flood hazard and flood risk mapping in the risk areas.

- Plans for the national risk assessment:
  - Improvement of the national coastal flood hazard analysis. Testing and implementing the tool SFINCS[1] developed by Deltares. SFINCS shows promising results.
  - Developing the vulnerability analysis, by including environmental and social consequences along with economic consequences of flooding.

- We are also looking into improving the fluvial flood hazard analysis, but that will happen in connection with the flood mapping in the risk areas (2023-2025)

[1] Super-Fast INundation of CoastS
https://sfincs.readthedocs.io/en/latest/