



Flood Risk Management Setting the Scene

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RISK meets CRISIS Conference



What is Flood Risk?

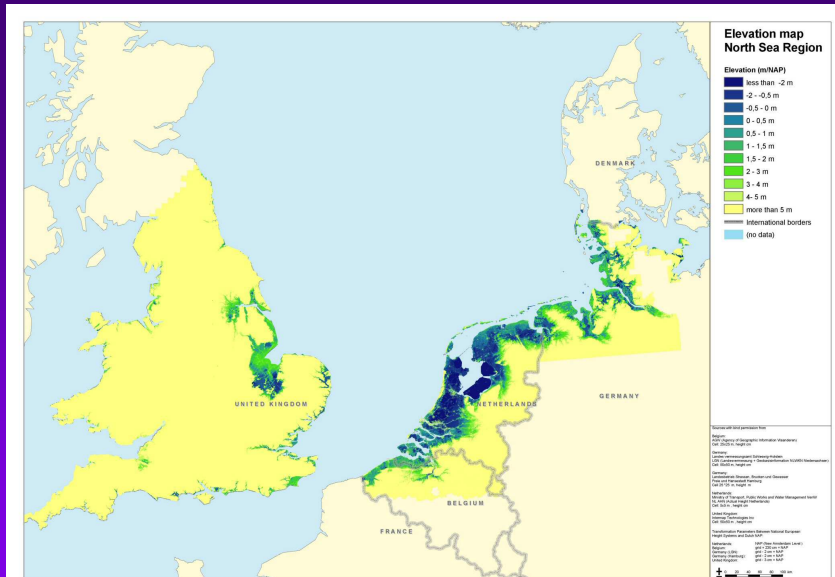
- Risk = probability x consequence
- Future Risk = probability under future scenarios x consequences under future scenarios
- Flood Risk Management = managing or reducing the probability and/or consequence
- Policy responses have normally followed the societal views on risk acceptability but have also been driven by major disaster events



	Denmark	Germany	Netherlands	Belgium	United Kingdom	Round off totals
Total coastline length ¹	4,605 km	3,524 km	1,276 km	98 km	17,381 km	~27,000 km
Developed 1 km coastal strip ²	9 %	11 %	12 %	48 %	-	-
Area below +5 mean sea level ³	1,500 km ²	9000 km ²	19,000 km ²	2,500 km ²	6,500 km ²	~38,000 km ²
Population below mean sea level ³	< 5,000	1,800,000	9,000,000	380,000	2,500,000	~14 million

Sources:

- 1) [Eurostat](#) (2005). The coastline is a fractal and can never be precisely determined. Eurostat has used a uniform method; however, note that the coastline length in this table includes all bordering seas.
- 2) [Eurostat](#) from Corine Land Cover 2000
- 3) Estimate and in constant debate.



Common Drivers/Pressures

- Climate Change
 - Inventory of Climate Change Scenarios in the NSR (Action 1a)
- Future developments
 - (including spatial and infrastructure development, Action 1b)
- Land levels
 - Elevation map (national and regional elevation data)
- Coastal erosion
 - protection measures map (hard and soft defences)



Climate Change Allowances

	Minimum (mm/yr)	Mean (mm/yr)	Maximum (mm/yr)
Belgium	-	5 Linear over period 2005-2055 Mean Sea Level	6 Linear over period 2005-2055 High Tide
Denmark	<i>pragmatic</i> No formal policy scenario on sea level rise, although a linear rise in water level of about 5 mm/yr was taken into account for the steps leading down to Metro stations during the planning of the new metropolitan district 'Orestad'.		
Netherlands	2 Semi-linear, short term design / nourishments (5 yrs)	6 Semi-linear, long-term design dikes, storm surge barriers (50-100yrs)	8,5 Semi-linear, spatial reservations (> 100/200 yrs)
Germany	-	5 / 6 Linear, 5 mm/yr for Schleswig Holstein roughly based on IPCC (2001) and 6 mm/yr for Niedersachsen (excluding land subsidence - 0,6 - 1mm/yr)	-
United Kingdom	2,5	ranging up to	15

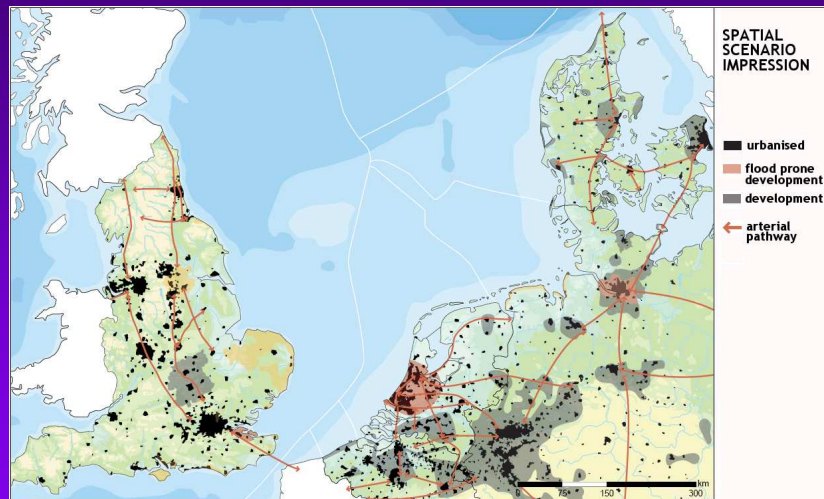


Future Development

	Population 2000	Population 2000 Aged 65+	Population 2050	Population 2050 Aged 65+
	Observed [mln people]	Observed [%]	Baseline variant [mln people]	Baseline variant [%]
Denmark	5,3	14,8	5,4	24,1
Germany	82,2	16,2	74,6	31,5
Netherlands	15,9	15,4	17,4	23,5
Belgium	10,2	16,8	10,9	27,7
United Kingdom	58,8	16,2	64,3	26,6



Future Development



Purpose of Risk Assessment

- Understanding the various mechanisms in quantifying coastal risks
- Identification of possible measures and strategies to reduce coastal risk
- Impact assessment (in terms of costs and benefits) and evaluation of possible measures and strategies



Differences in Risk Assessment

- Damage categories considered (direct versus indirect, monetary versus non-monetary)
- Types of objects and values considered within the direct damage assessment
- Procedures and levels of accuracy in data collection
- Impacts considered in damage and casualty functions

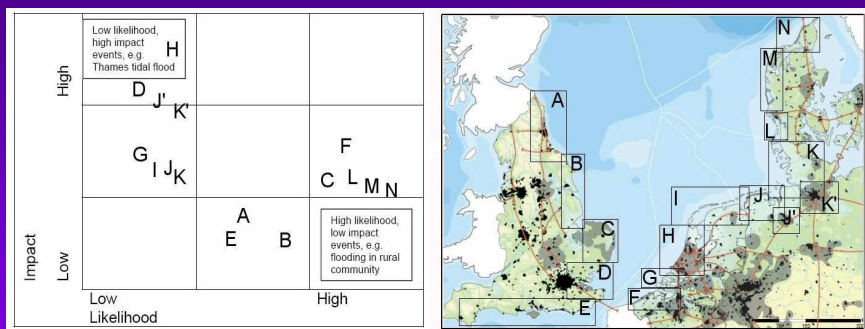


Integrated Risk Assessment

- Comparison of present and future coastal risks across coastal regions and countries
- Identification of most vulnerable areas for further analysis to reduce risks
- Identification of differences and similarities in coastal risk problem areas and possibilities for common approaches



Change in Risk over Time



Integrated Management

- Safety assessments
- Flood risk calculations
- Potential solutions and alternatives
- Cost-benefit analysis
- Environment Assessment
- Legal framework
- Risk management
- Communication



Current Issues

- Cliff Erosion (Happisburgh)
- Sea Level Rise – Dune Erosion – Sparsely Populated areas (Eccles to Winterton)
- Intensively Developed Coastal Area (Flanders)



Happisburgh

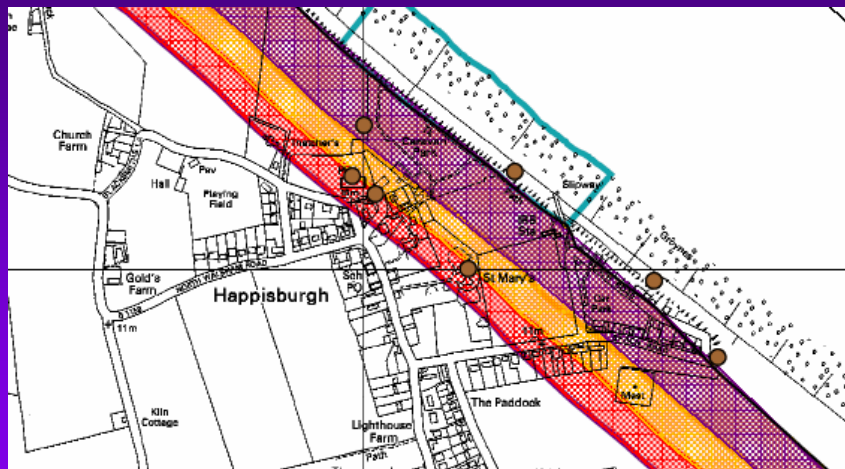


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Weybourne to Eccles

Category	EPOCH 1 (to 2025)	EPOCH 2 (to 2055)	EPOCH 3 (to 2105)
Residential property	51	283	655
Commercial property / land use	4	6	19
Hotels and guest houses	0	1	5



Happisburgh

- Over 1000 properties will be lost by 2105
- No compensation
- Loss of community
- Loss of land
- Is there a case for intervention? – social responsibility



Eccles to Winterton



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Eccles to Winterton



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Eccles to Winterton - Options

By 2025	HOLD THE LINE (with beach recharge)	No loss of property or land
By 2055	HOLD THE LINE (with beach recharge)	No loss of property or land
By 2105	HOLD THE LINE OR MANAGED REALIGNMENT - subject to further studies	Possible long term loss of up to 1,020 properties and 5,200 hectares of land



Eccles to Winterton

- 6 villages at risk
- SAC and SPA (and National Park) at risk
- How do we decide what to do?
- Who will decide?
- When do we need to decide?



Master Plan for Flanders



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CHAIN OF SAFETY
covering the whole north sea region

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Master Plan for Flanders



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Master Plan for Flanders

- Safety assessment
- Flood risk calculations
- Solutions and alternatives
- Social cost benefit analysis
- EIA
- Legal framework

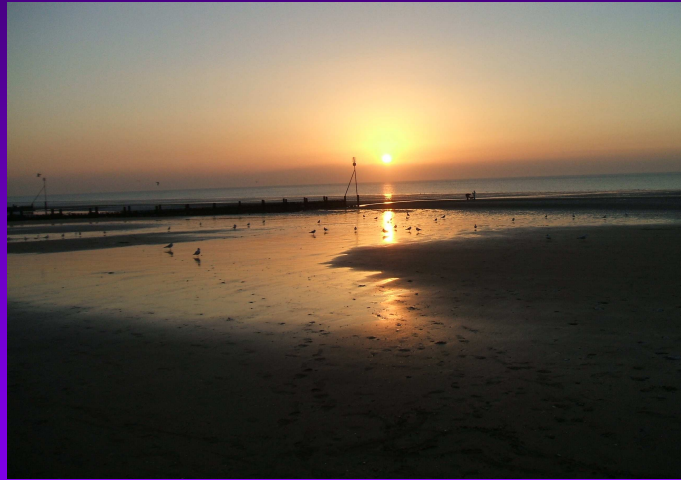


Master Plan for Flanders

- Policy document
- Long term vision (2050)
- Within framework of ICZM
- Budget considerations
- Communication



Where do we go next?



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