



COINS - An operational Indicator system for Integrated Coastal Zone Management

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Setting the Frame



- The coastal zones are of strategic importance being home to a large percentage of European citizens
- Exposure of the coastal zones to the possible impacts of climate change
- The vulnerability of human and natural systems on the coasts has increased due to the continuing development and built-up in the immediate vicinity of the shoreline

Effects of climate change



Flooding



Soil erosion and leaching



Coastal erosion

Mitigation and adaptation

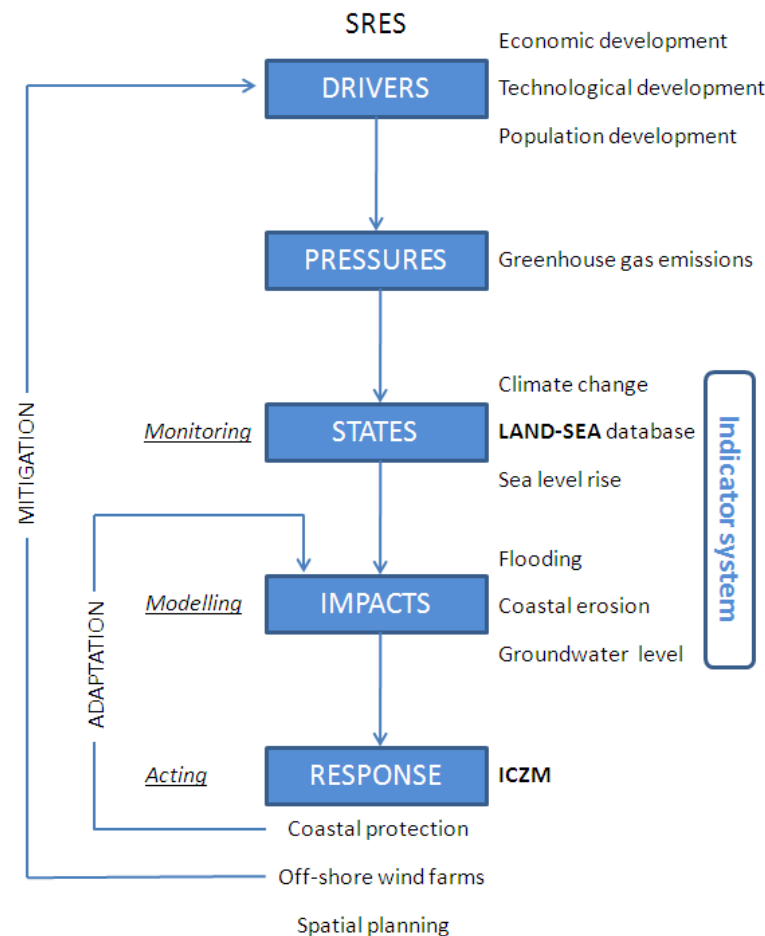
Mitigation is defined as the technological change and substitution that reduce resource inputs and emissions per unit of output



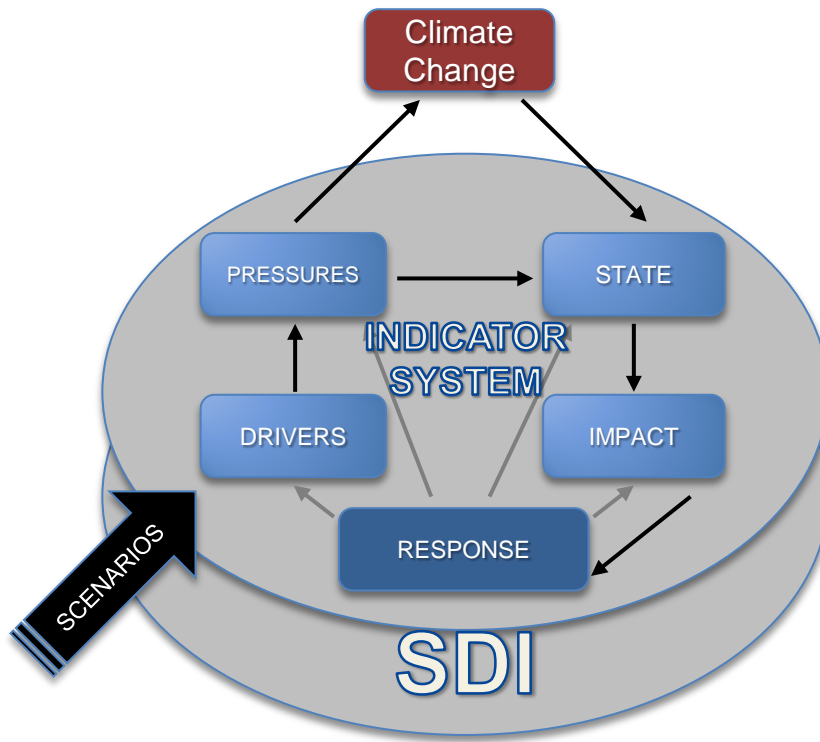
Adaptation to climate change consists of initiatives and measures to reduce the vulnerability of natural and human systems against climate change effects



Conceptual model for Decision Support Tool



The Coastal Indicator System - COINS



Several attempts have been made to define an indicator systems supporting ICZM

Currently we have taken outset in the 27 indicators agreed upon by the EU ICZM Expert Group

A subset of the indicators related to climate change was chosen

Besides we have added a few more indicators

The indicators are put into the DPSIR Framework

Ex-ante and Ex-post indicators

Layers

-
- ☒ Base Layer (IP match may be needed)
- ☐ Belgium Topographic map
 - ☐ Denmark Topographic map
 - ☐ Norway Topographic map
 - ☐ ENC cells
 - ☒ World Topographic map
- ☒ Belgium
- ☒ Denmark
- ☒ Norway
- ☒ Land Cover Corine
- ☒ Auxiliary data
- ☒ Nature 2000
- ☒ All Layers

Legend

World Topographic map



Indicators

- | | |
|---------------------|--------------------|
| Built-up Land | Flood Hazard Cover |
| Development Rate | Flood Hazard Depth |
| Demand For Property | Traffic |
| Impact | Tourism |
| Erosion Prediction | Energy |

Zoom Level

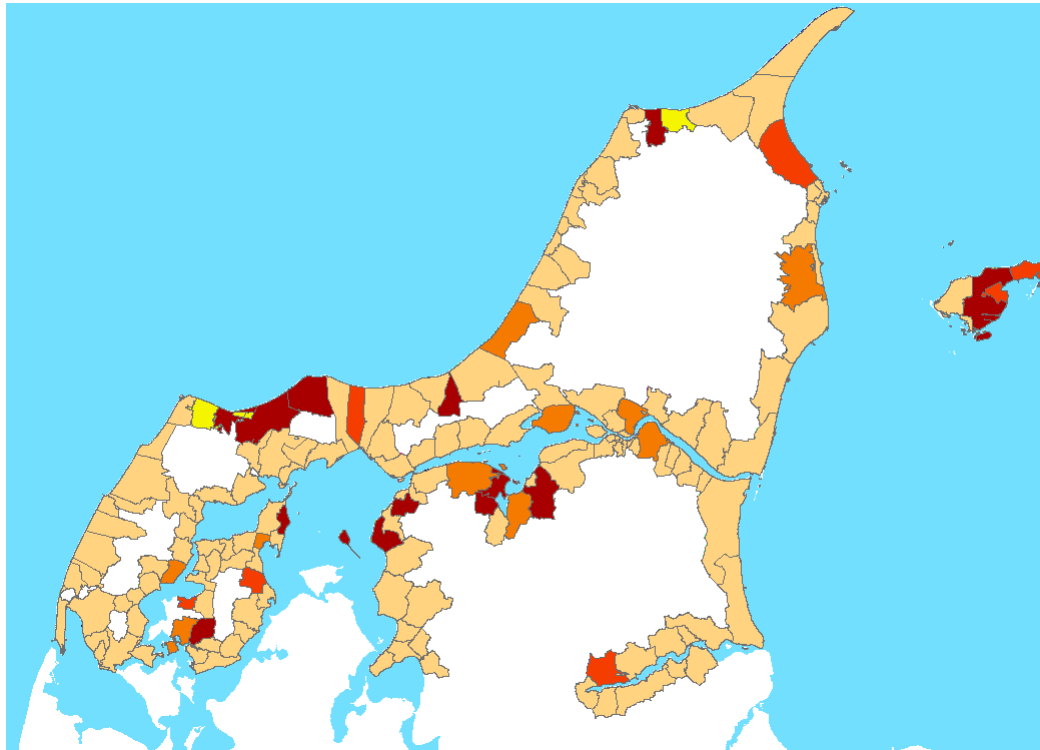
Select Country

About

Indicators for sustainable development

- 1 Demand for property on the coast
- 2 Area of built-up land
- 3 Rate of development of previously undeveloped land
- 4 Demand for road travel on the coast
- 14 Intensity of tourism
- 25 Sea level rise
- 26 Coastal erosion
- 27 Natural, human and economic assets at risk
- 28 Potential for renewable energy in the coastal zone

Demand for property on the coast



Annual urban growth 1990 - 2006

Area of Built-up land

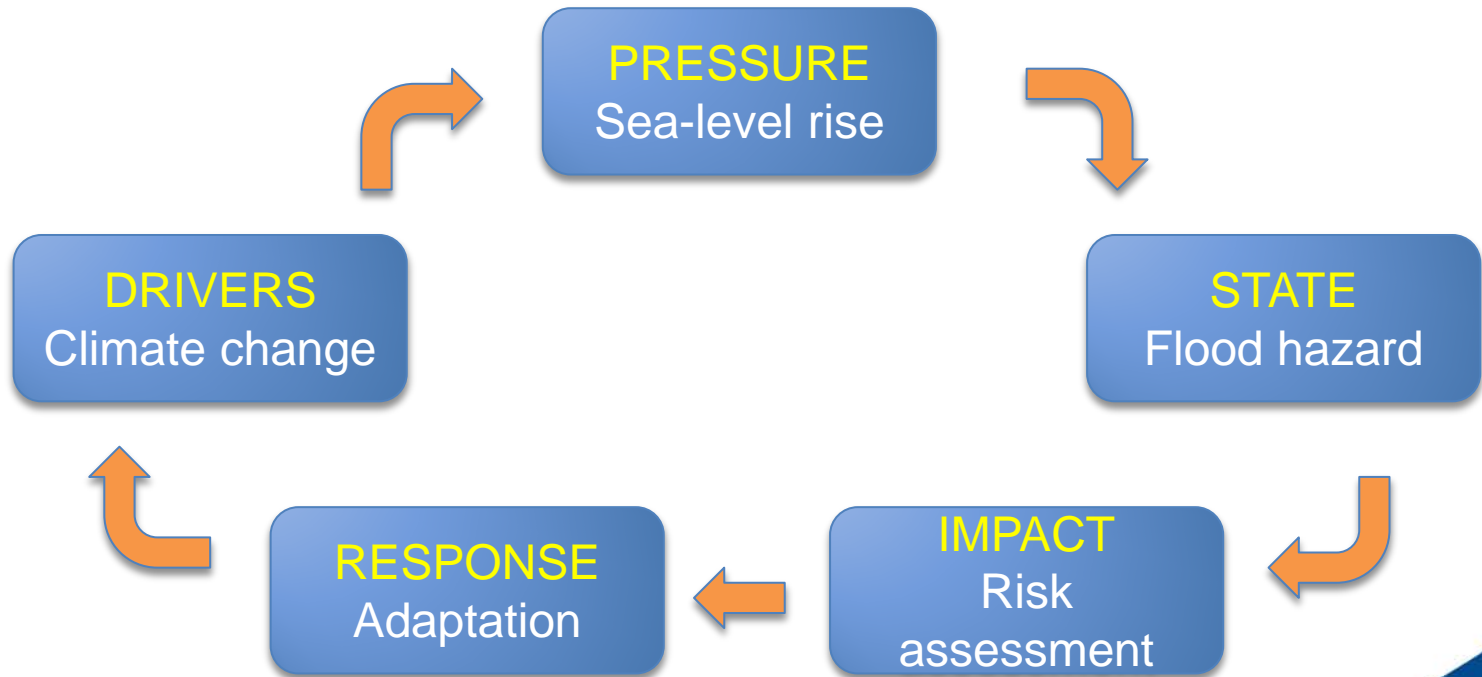


1990



2006

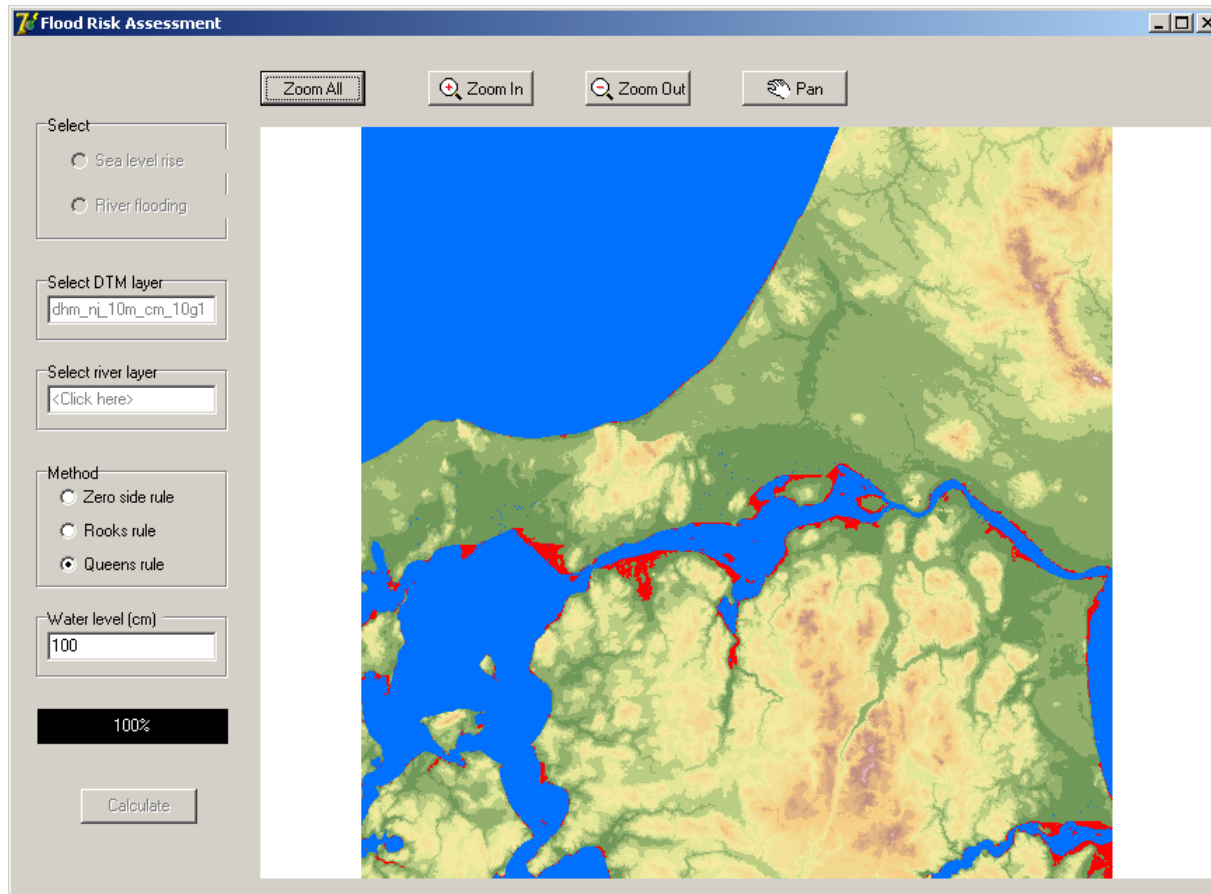
Impact Assessment

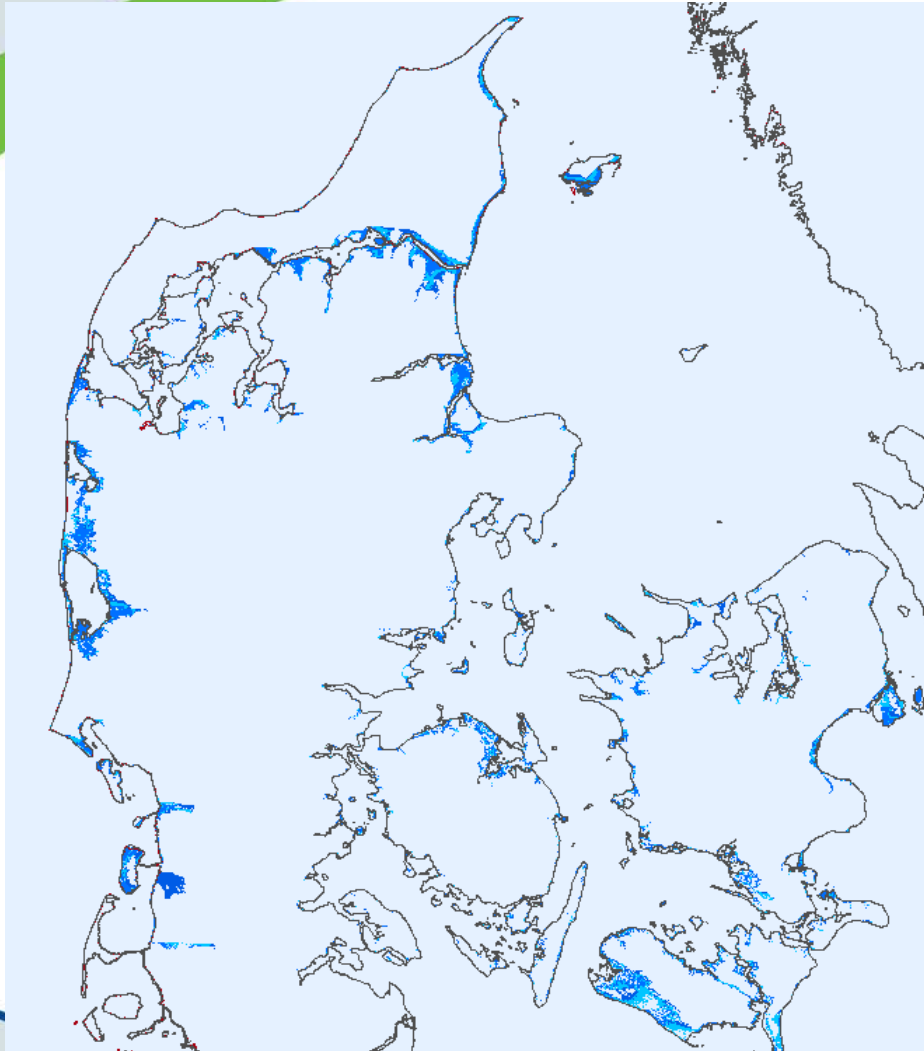


Sea level rise

- The most obvious impact on the coastal zone of the current global warming is sea-level rise
- A general rise in sea level of 0.15–0.75 m is anticipated on the west coast and in Danish coastal waters
- Global warming is likely to mean more storminess leading to coastal erosion and with greater storm surges enhancing the flooding risk
- In extreme storm surge situations an increase in the maximum water level is expected of between 0.45–1.05 m on the west coast under the A2 scenario

Flooding Hazard due to Sea Level Rise - 1





Flooding Hazard due to Sea Level Rise - 2

LUCIA

LUCIA - Land-use Change Impact Analysis / version 4
Files Scenarios Data Simulation Analysis Maps Models About

Projects:

- C:\LUCIA\Susaa
- C:\LUCIA\NorthernJutland
- C:\LUCIA\Denmark

Scenarios:

- Scenario_001 (
- Scenario_002 (
- Scenario_003 (
- Scenario_004 (
- Scenario_005 (
- Scenario_006 (
- Scenario_007 (
- Scenario_008 (

☐ Log file ☒ SUMTAB

	Y2000	Y2001	Y2002	Y2003	Y2004	Y2005	Y2006	Y2007	Y2008	Y2009	Y2
1100	28129	28165	28201	28237	28273	28308	28343	28378	28413	28451	28
1211	4286	4299	4312	4325	4338	4351	4364	4377	4390	4403	44
1212	3071	3081	3091	3101	3111	3121	3131	3141	3151	3160	31
1213	9915	9915	9915	9915	9915	9915	9915	9915	9915	9915	9915
1230	498	498	498	498	498	498	498	498	498	498	498
1240	1117	1117	1117	1117	1117	1117	1117	1117	1117	1117	1117
1300	1078	1078	1078	1078	1078	1078	1078	1078	1078	1078	1078
1410	312	310	305	299	295	289	282	272	262	251	241
1420	1488	1477	1474	1469	1463	1458	1457	1456	1455	1454	1453
1430	4298	4331	4361	4392	4424	4454	4483	4517	4546	4575	4604
2100	415393	415355	415318	415277	415237	415199	415156	415116	415076	415036	414996
2200	35	35	35	35	35	35	35	35	35	35	35
2300	16389	16389	16389	16389	16389	16389	16389	16389	16389	16389	16389
2400	164921	164911	164897	164888	164878	164867	164859	164851	164842	164833	164824

Calculate land-use projection

Select base year: 1995, 1996, 1997, 1998, 1999, 2000

Select end year: 2038, 2039, 2040, 2041, 2042, 2043, 2044

Remarks for log file: This is a baseline scenario for afforestation

Constraints:

- ☒ Constraint 1: zone1
- ☒ Constraint 2: ZONE2
- ☐ Constraint 3:

Additional factors:

- ☒ Factor 4: LAND_VALUES
- ☒ Factor 5: ACC_MOTORWAY_JU
- ☐ Random test

Factor weights:

LU_CODE	SUITABIL	ACCESSIB	PROXIMIT	FACTOR4	FACTOR5	R_FACTOR
1100	1	1	1	1	0	1
1211	0.25	0.5	0.75	0.5	0.5	1
1212	0.25	0.5	0.5	1	0.5	1
1430	0.25	0.25	0.5	1	0	1
3100	1	1	1	0	0	1

Calculate 0%

Compare scenarios

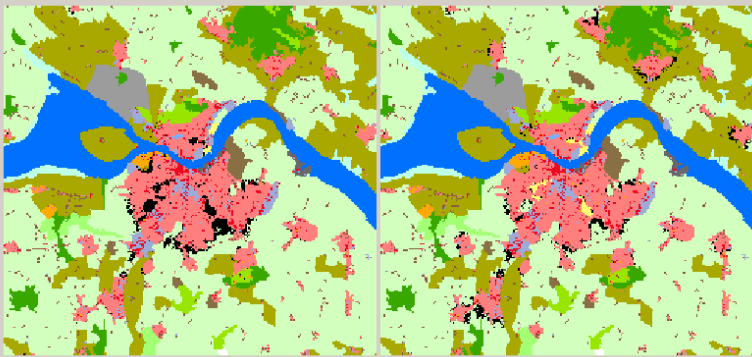
Select 2 scenarios:

- Scenario_002 (Rand
- Scenario_003 (B2)
- Scenario_004 (A1)
- Scenario_005 (A1 zo

Zoom All Zoom In Zoom Out Pan

☒ Changed cells

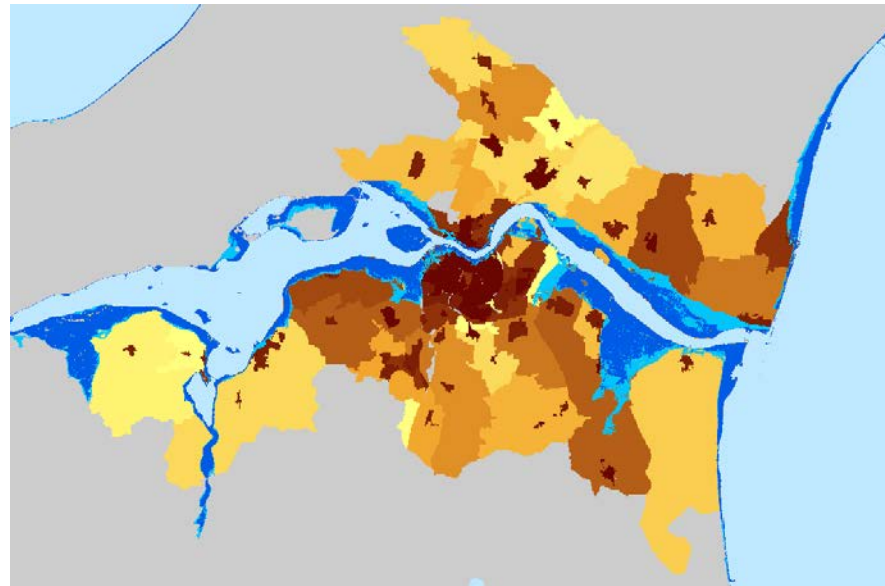
Select year: 2037, 2038, 2039, 2040



Scenario_003 Scenario_005

Indicator 27-1 Flood risk - population in Aalborg

100 cm SLR
+
150 storm surge



Number of people in Aalborg at risk under various flooding hazards.

Year	50 cm	100 cm	200 cm	250 cm
2040	151	947	11827	21287

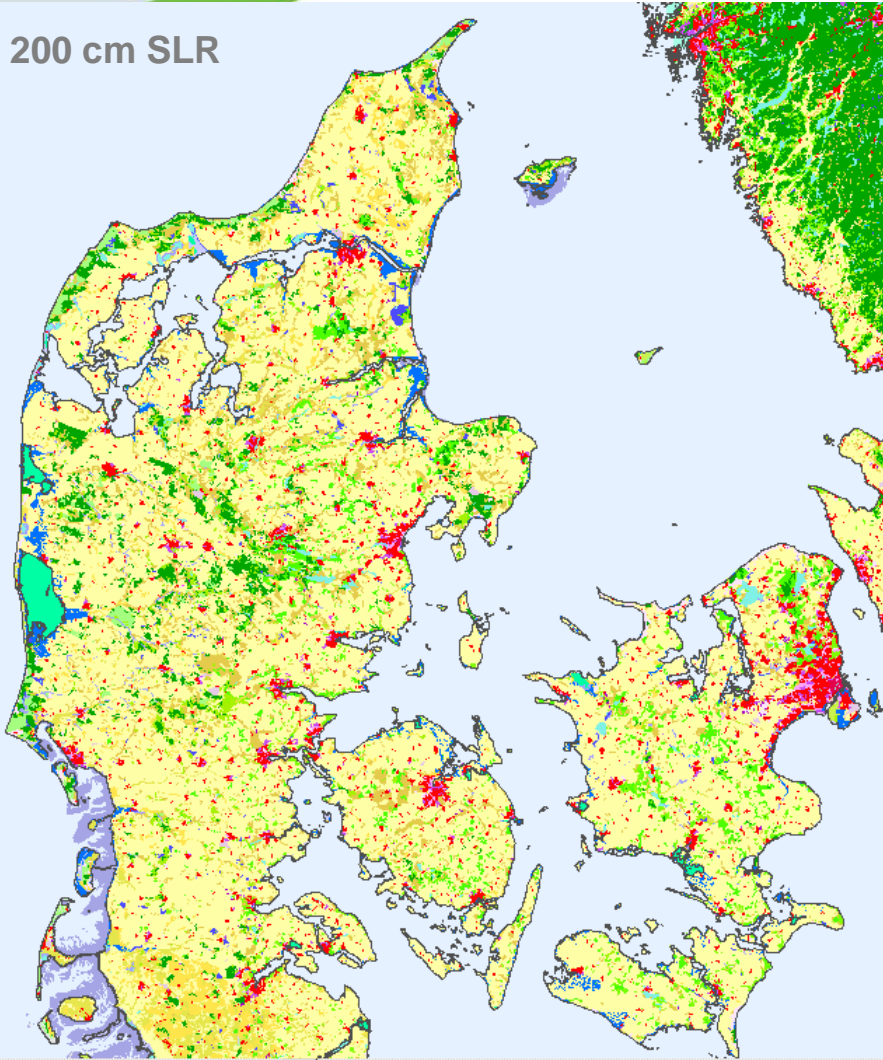


BLAST

Bringing Land and Sea Together

11/30/2012

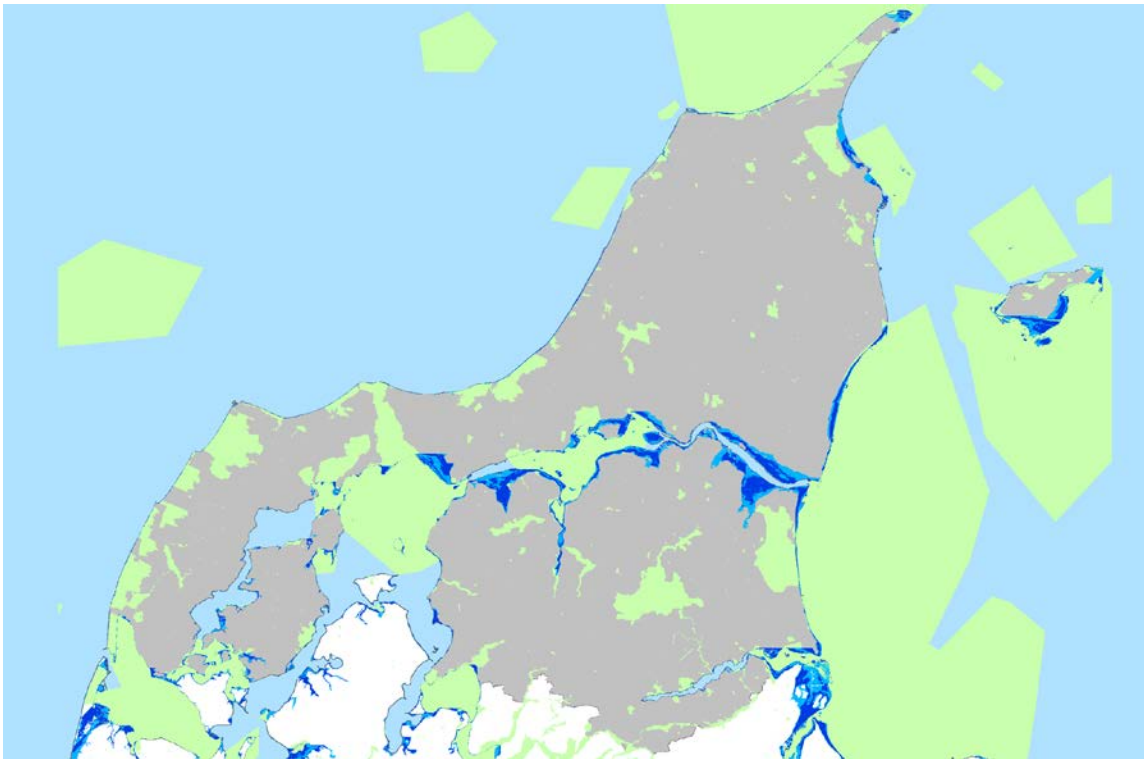
200 cm SLR



Flood risk Land Cover

Urban	6000 ha
Agriculture	87000 ha
Forest	14000 ha
Nature	26000 ha

Indicator 27-2 Flood risk Nature



Indicator 27-3 Flood risk - Urban

Municipality	A				B			
	50 cm ¹	100 cm ¹	200 cm ²	250 cm ²	50 cm ¹	100 cm ¹	200 cm ²	250 cm ²
Brønderslev	0	0	13	28	0	0	13	28
Frederikshavn	6	25	206	503	6	25	206	503
Hjørring	7	12	45	71	7	12	44	70
Jammerbugt	0	0	37	77	0	0	36	76
Læsø	0	2	12	19	0	12	12	19
Mariagerfjord	9	43	148	234	9	43	149	233
Morsø	1	18	96	138	1	19	97	138
Thisted	7	17	92	154	7	17	92	154
Vesthimmerland	3	11	79	143	3	11	78	142
Aalborg	7	78	943	1901	7	77	938	1898

Numbers are in hectares

Conclusion

- Integrated coastal zone management requires information about the current and future state of the coastal zone
- The COINS systems is a proto-type for an operational coastal indicator system
- Main challenges are lack of harmonised data for the European countries
- Full INSPIRE implementation may solve this problem

THANK YOU FOR YOUR ATTENTION !!!

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www.blast-project.eu