Climate Change: Adaptation or Mitigation and Perspectives in relation to Public Awareness

Karen Edelvang

DHI

WATER • ENVIRONMENT • HEALTH


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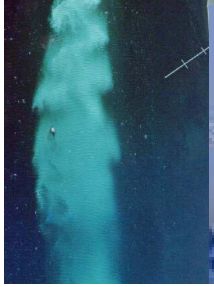
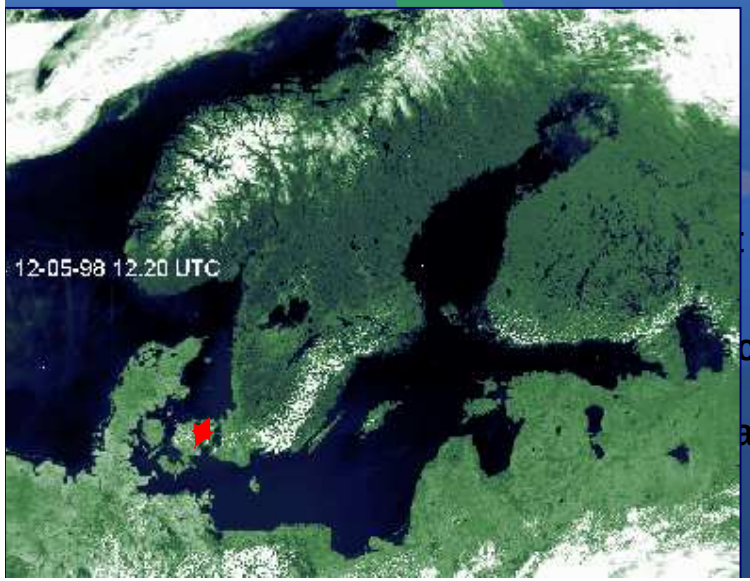



DHI representations world wide



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Project offices in:
- Brazil
- Japan
- Thailand
- Vietnam

DHI offices in:
- Australia
- Bulgaria
- China
- Czech Republic
- Dubai
- Denmark
- France
- Germany
- India
- Italy
- Malaysia
- New Zealand
- Norway
- Poland
- Singapore
- Slovakia
- Spain
- Sweden
- USA

DHI's strategy

Knowledge og water to value and welfare:

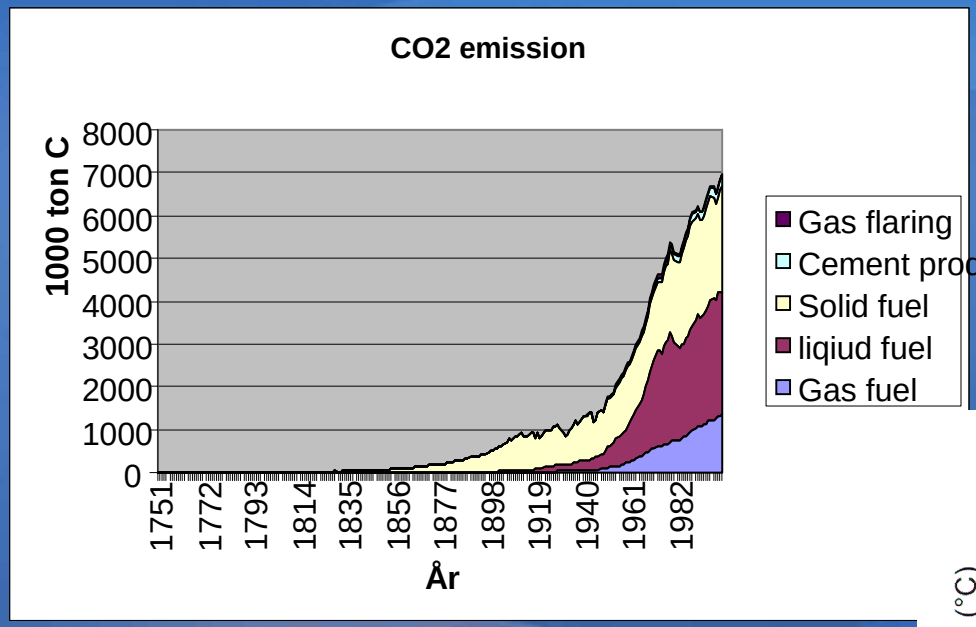
We transform knowledge of water into value for clients and welfare of people and environment

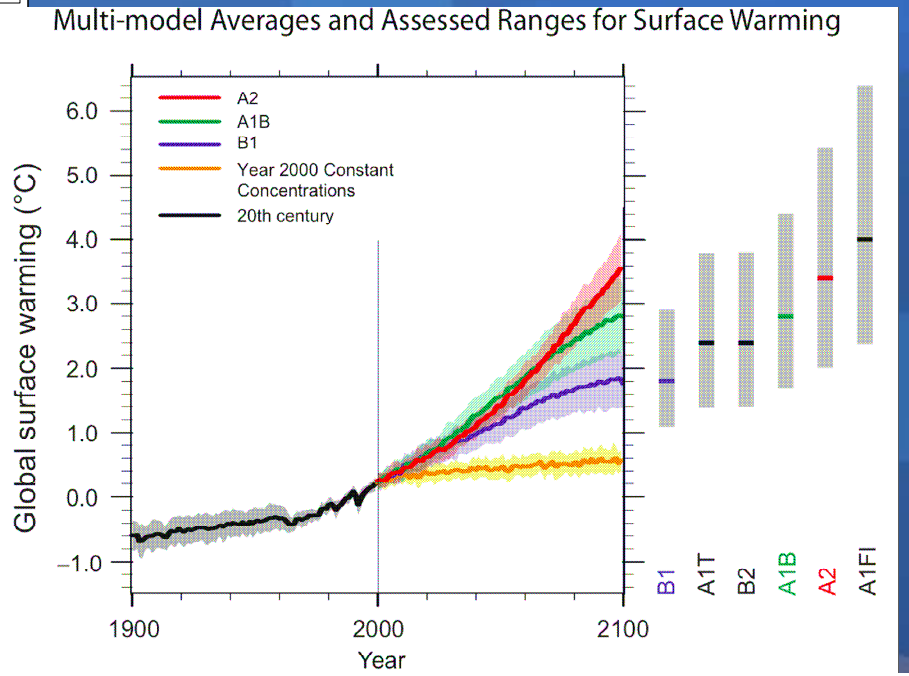
We provide solutions to the global community by applying and integrating our core competencies within a managerial and societal context

www.dhigroup.com




Resume of expected climate change effects from global climate models





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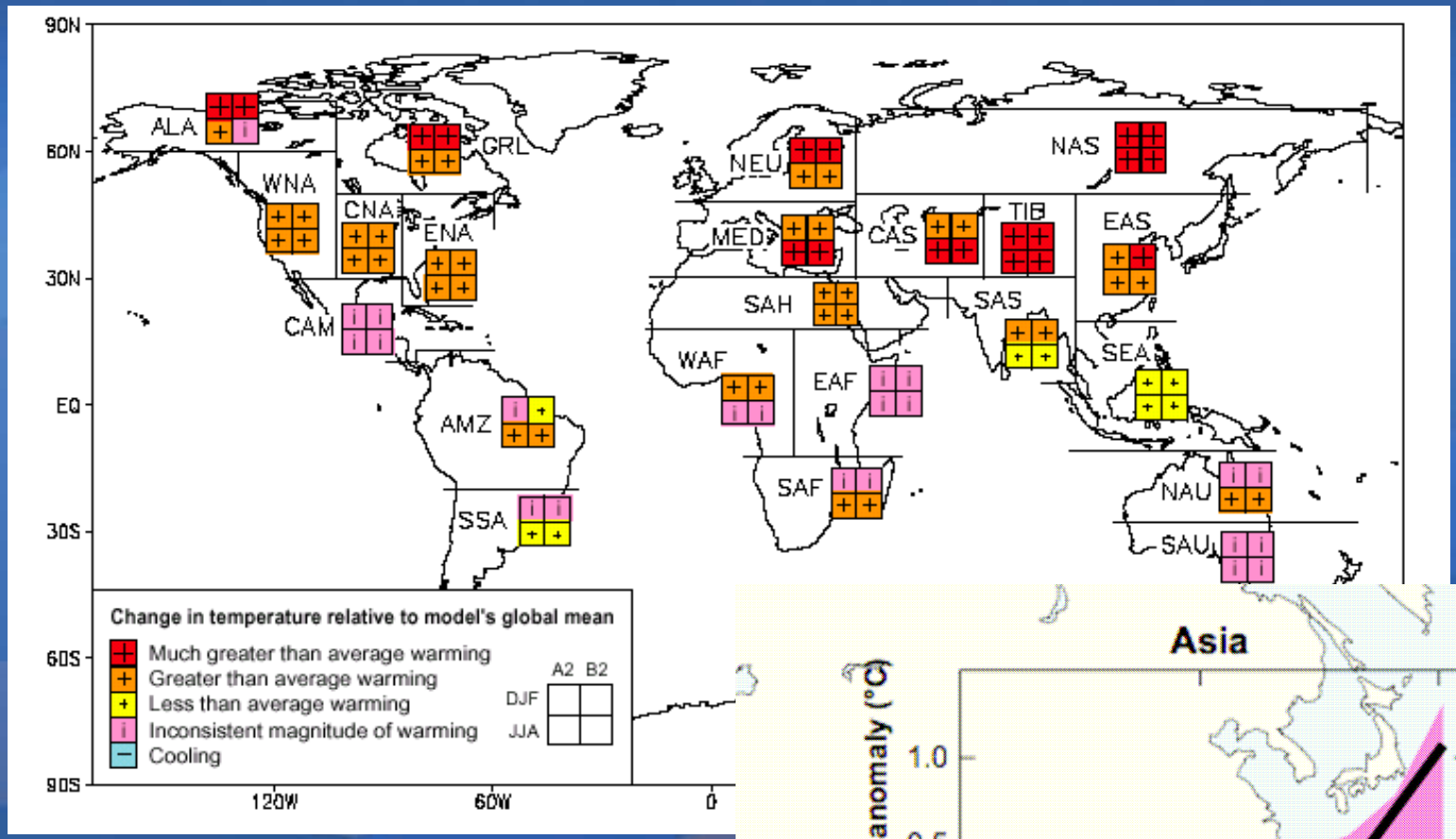
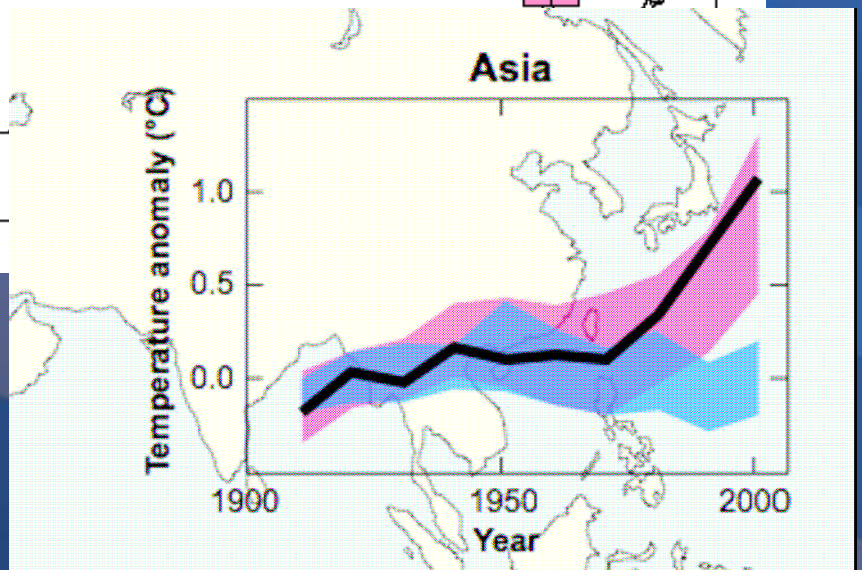
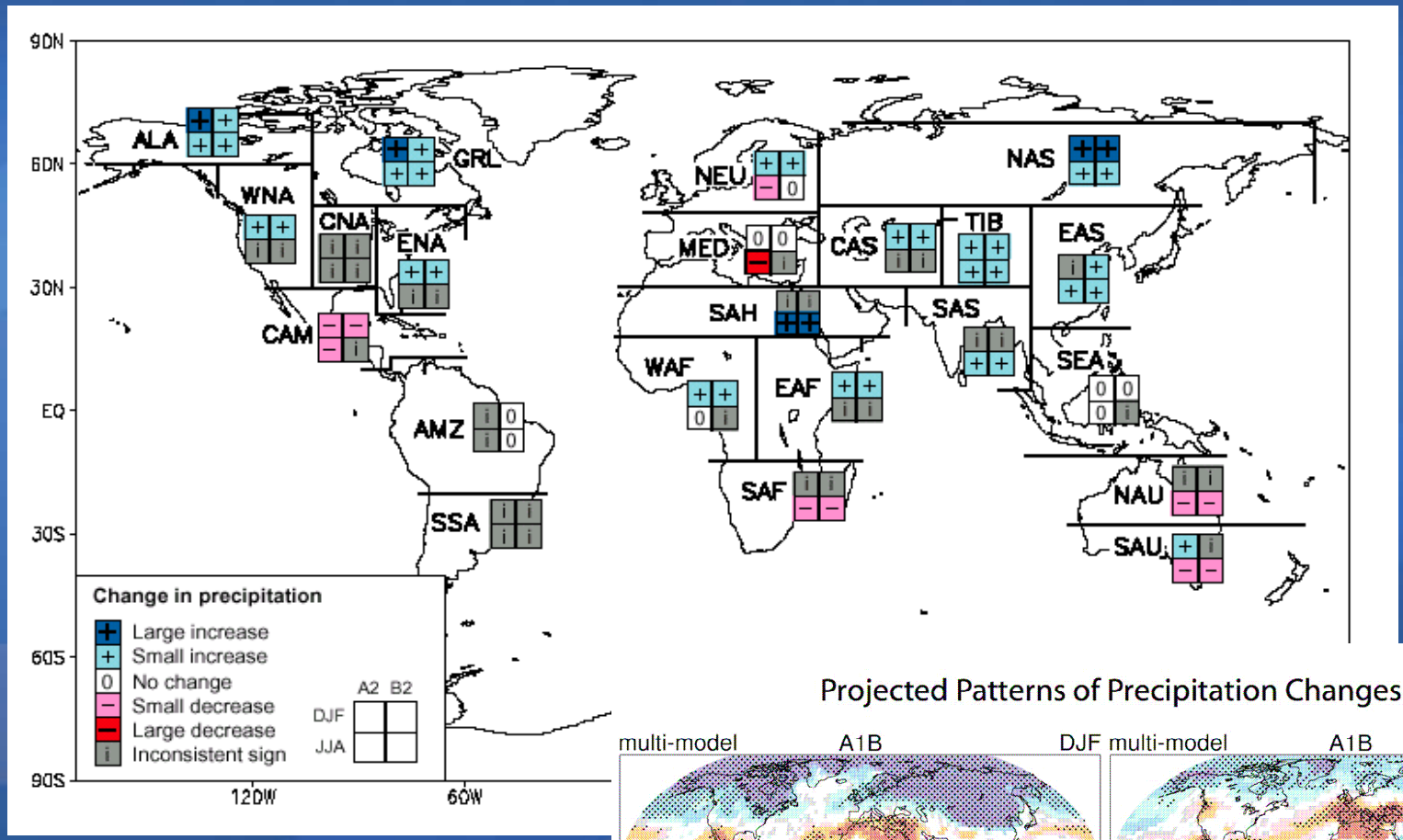
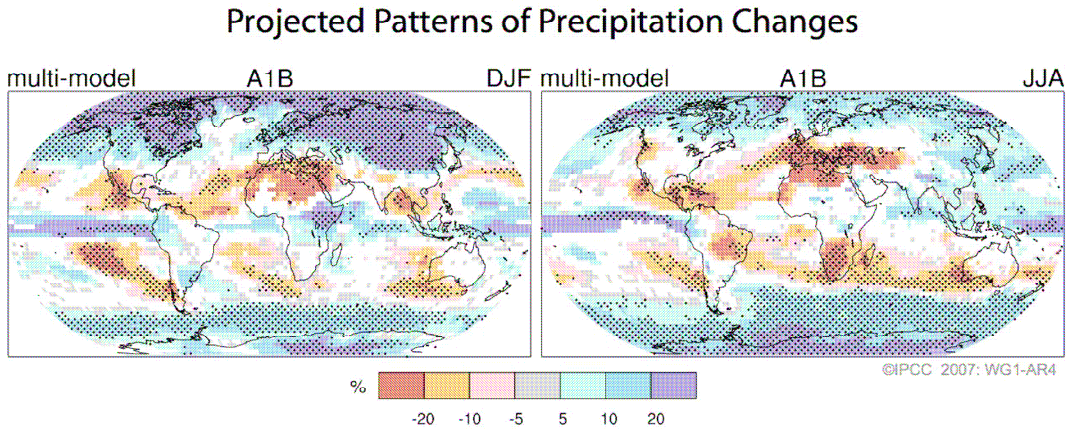




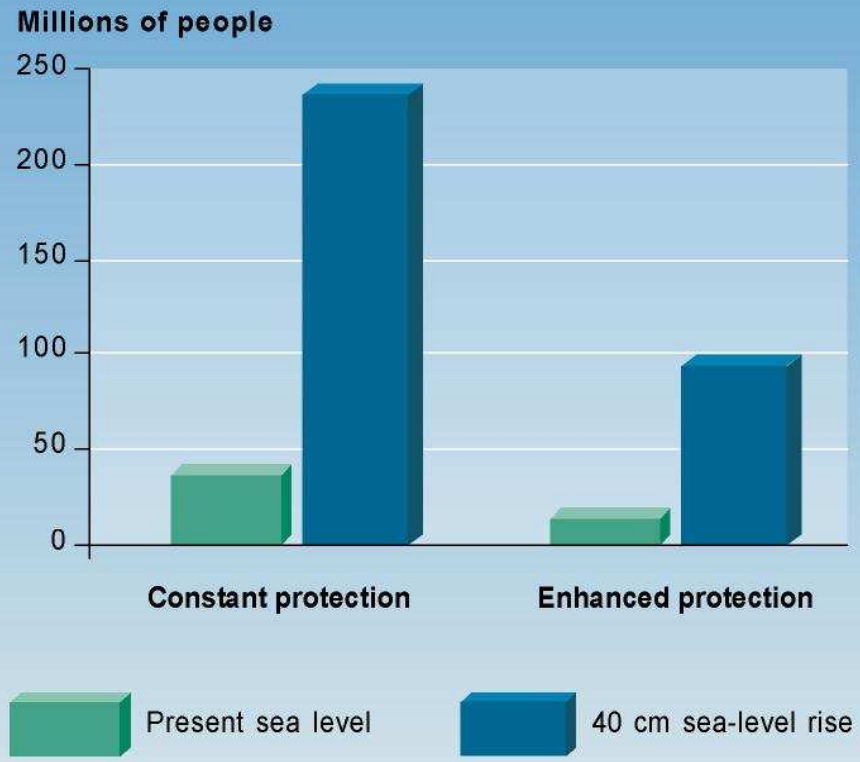
Resume of expected precipitation change effects from global climate models

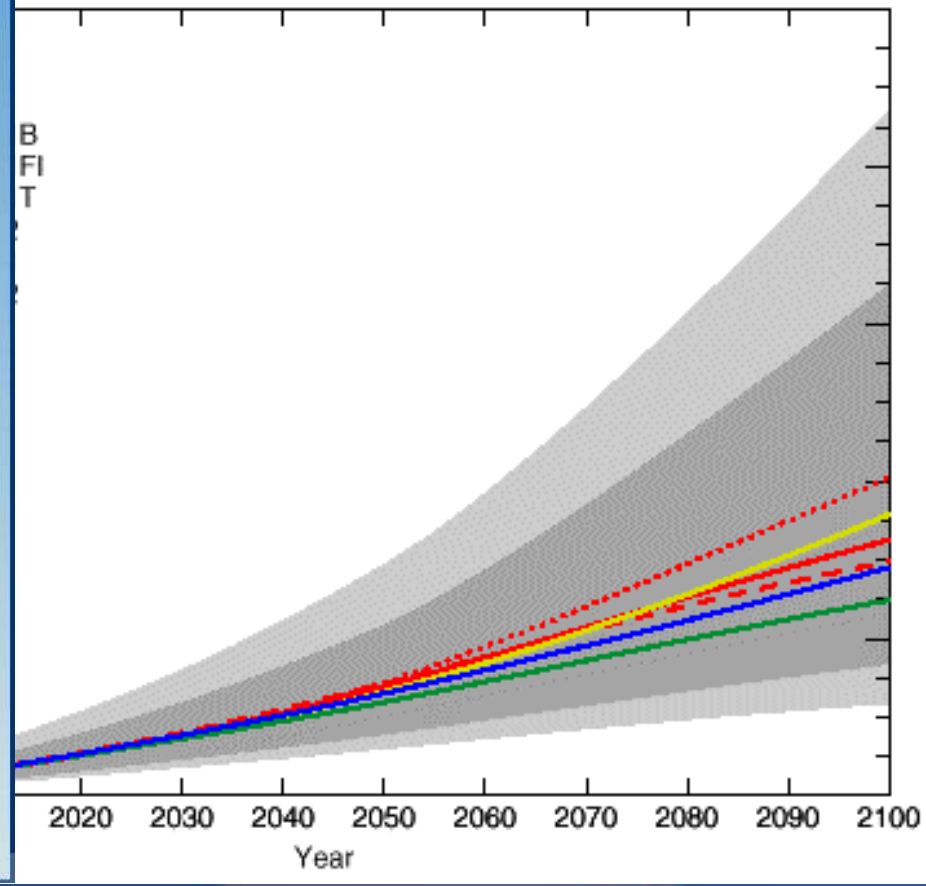


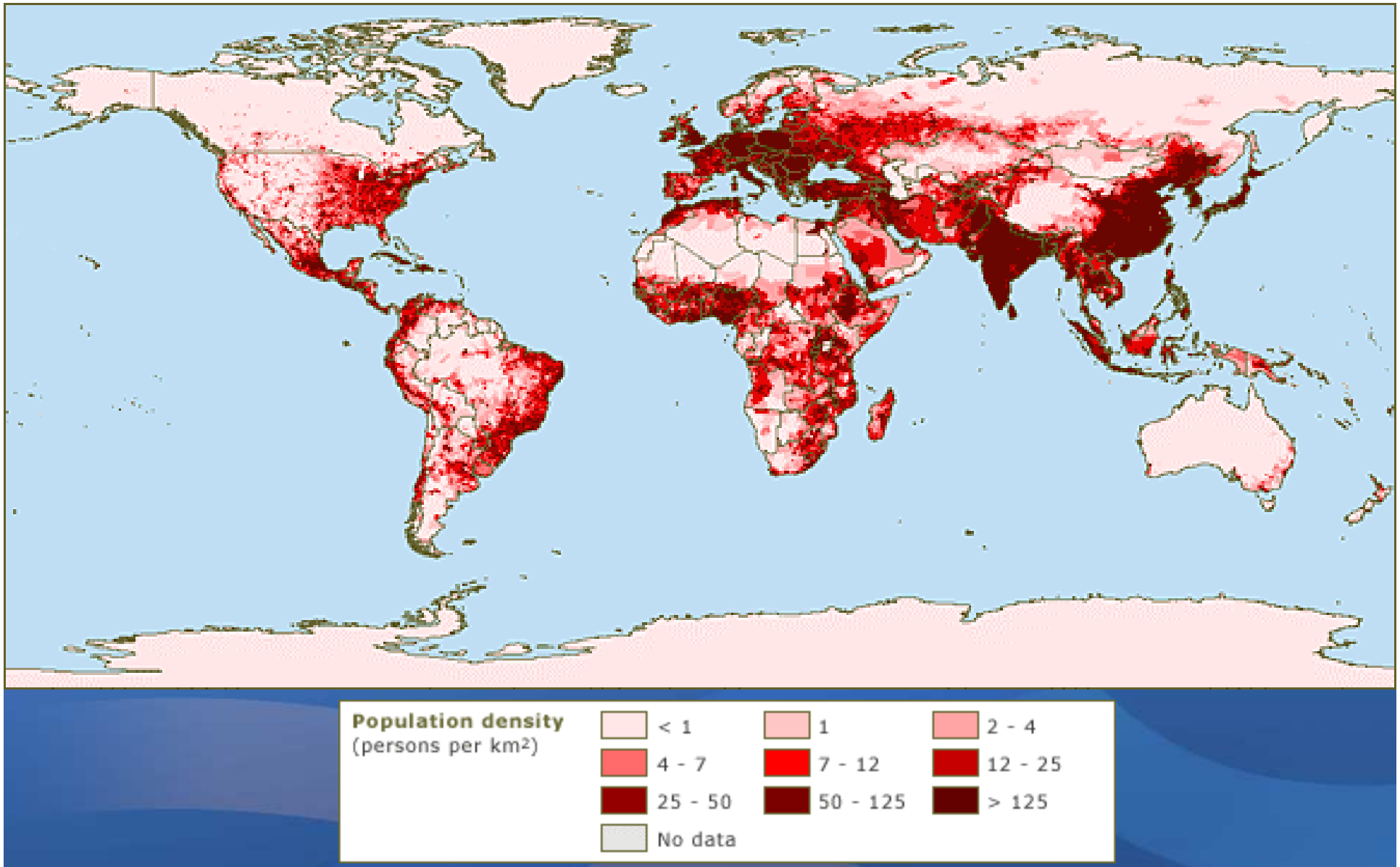


Changes in sea level

Adaptation and average annual number of people flooded by coastal storm surges, projection for 2080s



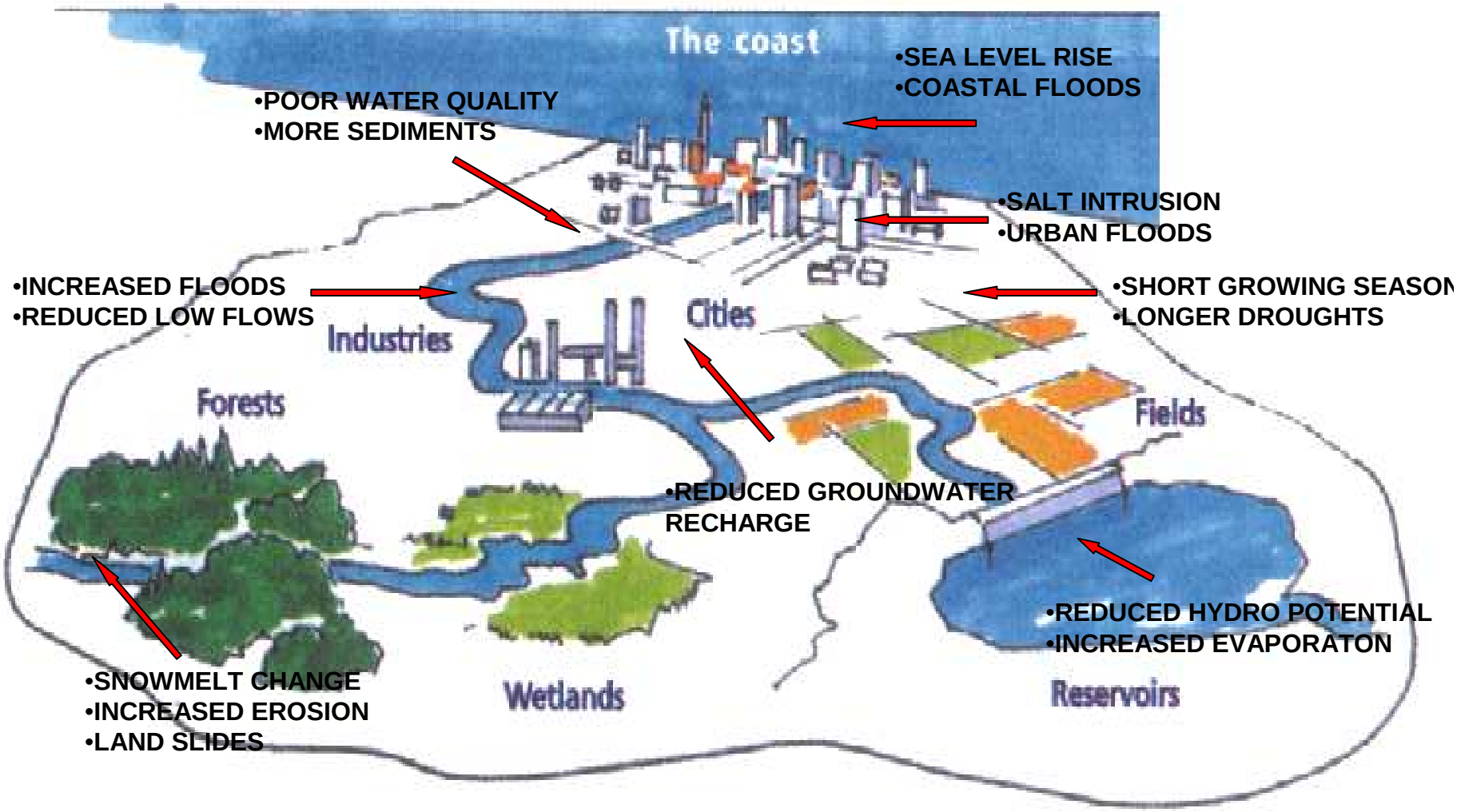




Sources:

1. Center for International Earth Science Information Network (CIESIN); Columbia University; International Food Policy and Research Institute; and World Resources Institute. 2000, *Gridded Population of the World, Version 2*. Palisades, NY: CIESIN, Columbia University.

Possible effects of water and climate change



Integrated Water Resources Management being implemented

Different approaches and forms:

AUTONOMOUS adaptation :

Not deliberately designed to climate change

- e.g. demand management, beach nourishment …

PLANNED adaptation:

The way forward though few examples

- e.g. design standards for dikes, coastal retreat etc.

MAL-adaptation: moving the problem

- e.g. coast protection harming downstream users

Hard and soft solutions:

HARD solutions (infrastructure):

- dikes, levees
- sewer networks, drainage canals

SOFT solutions:

- demand management, pricing!
- efficiency , reuse
- ecotourism, sustainable solutions
- beach nourishment
- storm prediction, insurance etc.
  (ex. retreat from areas prone to erosion)

=> Integrated Coastal Zone Management (ICZM)

Actors and scales

ACTORS (who)

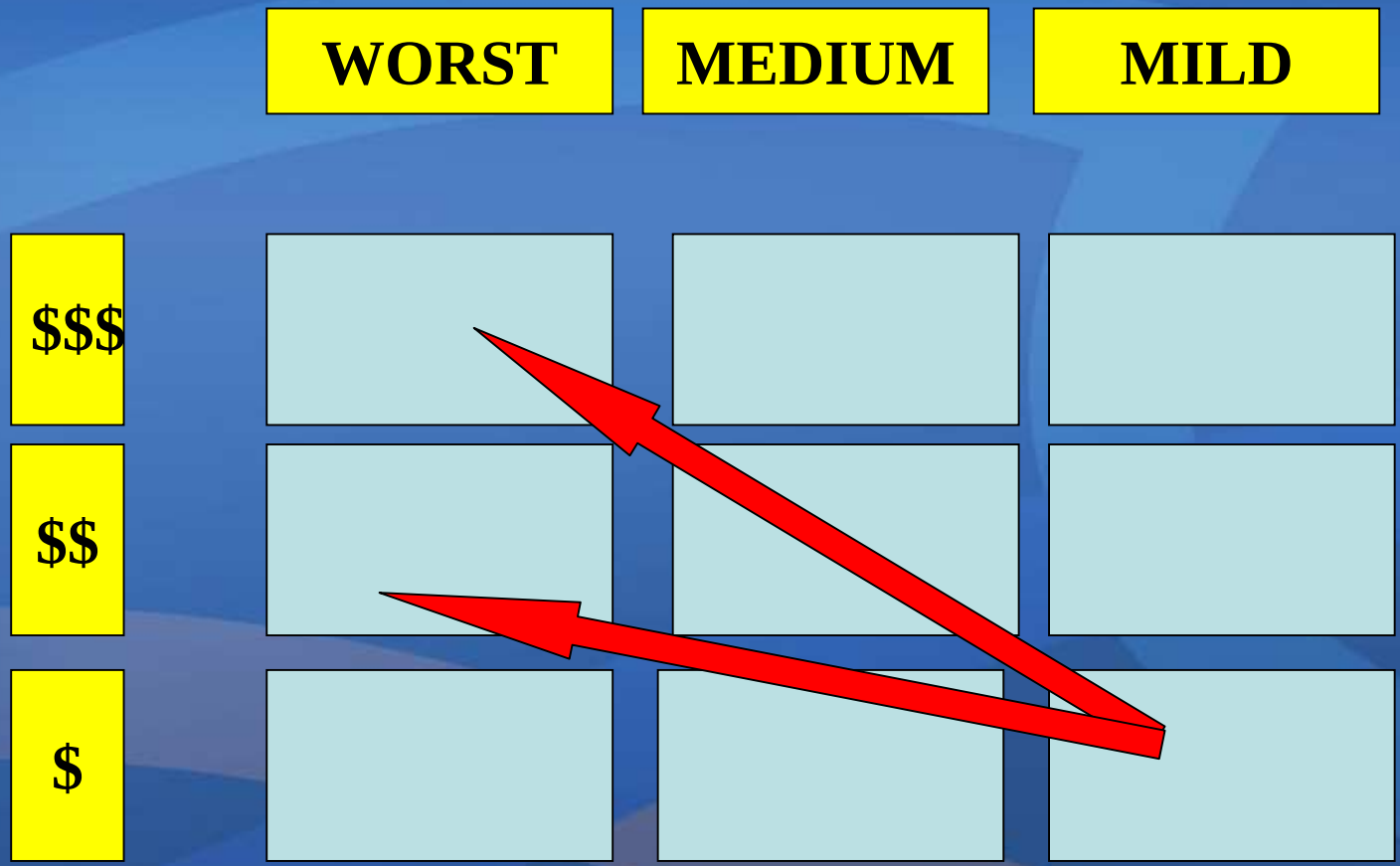
Public, private, civil society
=> a multi-stakeholder challenge

SCALES (how much)

Community ⇔ national ⇔ regional ⇔ global

=> A multi dimensional challenge

National Adaptation Program of Action (NAPA) framework



Uncertainty aspects of adaptation

The value of historical records

- *traditional structures relevant?*

From global and large-scale trends to local circumstances

- *global sea level rise does not translate to local coasts*

-> need for local modeling/assessment!

=> Scenario-based approaches

- *but how to judge big differences?*

=> Adaptive management approach

- *building robustness to uncertainty*

MITIGATION affecting the coast

***Coastal footprints*, positive and negative**

- *sea level rise => flooding*
- *changes in wind/waves => erosion/deposition*
- *change in coastline => change in use*

DEVELOPMENT affecting mitigation

- *recreation => increasing demand on beach/water*
- *ecotourism => increasing awareness*
- *water demand => energy use*

Quick Scan Climate Adaptation
A comparison of policies in five North Sea countries

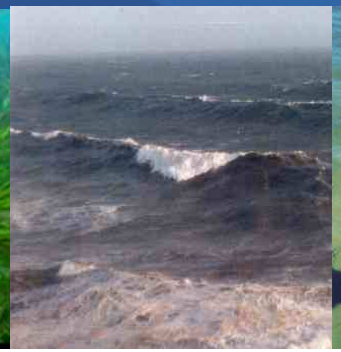
Key findings of the quick scan

- Limited discussions about adaptive measures against coastal flooding on the long term
- The focus of policies is more on prevention of climate change rather than adaptation to its long term effects.
- Conscious decisions mostly still have to be made with the possible exception of Denmark.

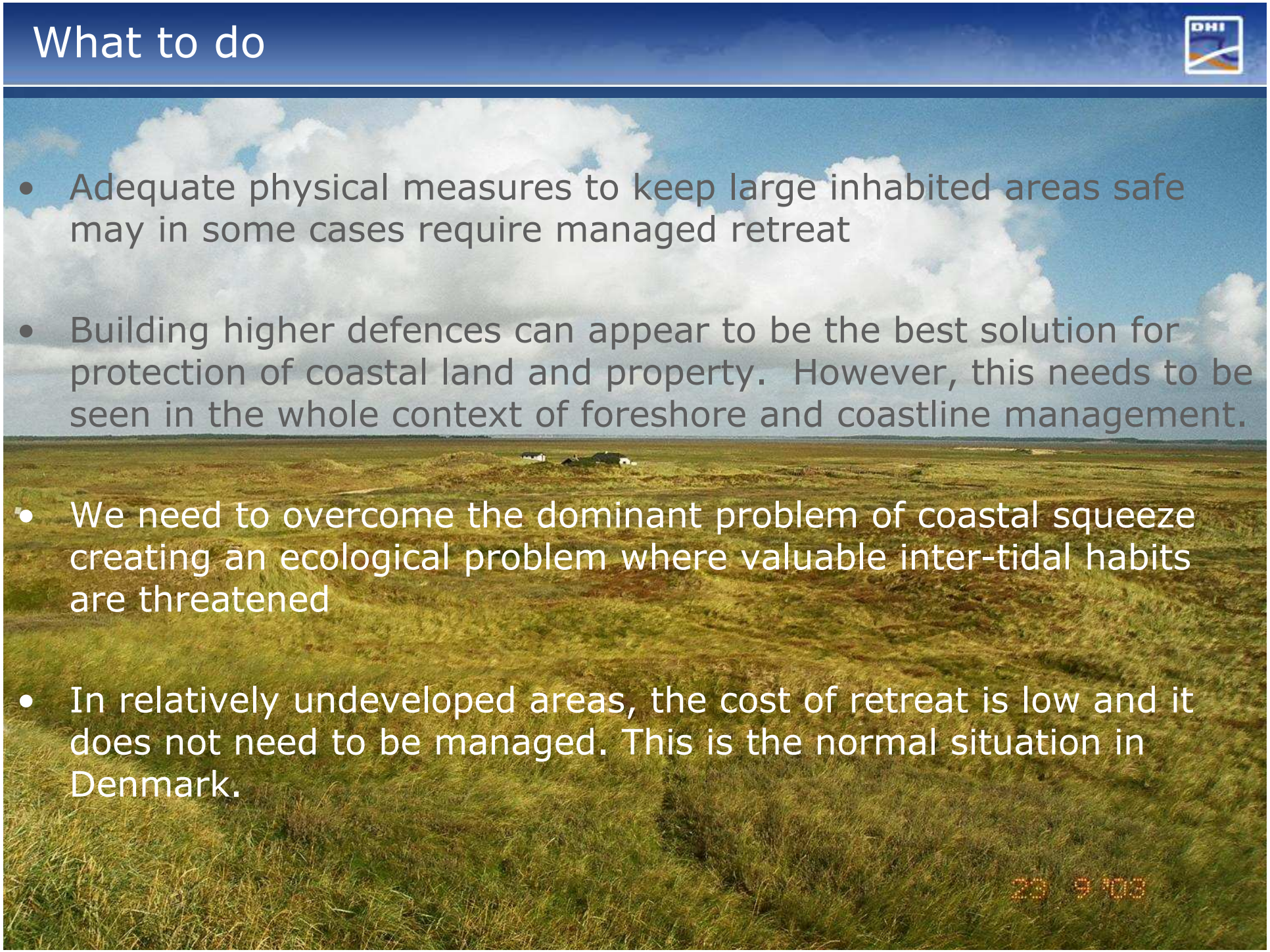
Overview of national debates about adaptation

- Coastal safety under current management practices
- Coastal safety management practices and envisaged adaptations to it, as shown through official documents of the government
- National debates about required adaptations, as shown in documents from several stakeholders and experts, and as indicated by national experts




What to do



- Adequate physical measures to keep large inhabited areas safe may in some cases require managed retreat
- Building higher defences can appear to be the best solution for protection of coastal land and property. However, this needs to be seen in the whole context of foreshore and coastline management.
- We need to overcome the dominant problem of coastal squeeze creating an ecological problem where valuable inter-tidal habits are threatened
- In relatively undeveloped areas, the cost of retreat is low and it does not need to be managed. This is the normal situation in Denmark.

Suggestions

- Governments should communicate more openly about potential risk in low-lying areas to increase the general sense of urgency
- The implementation of the EU flood management directive will probably help to follow up this suggestion.
- Those responsible should organize debate as to who should carry the cost for coastal safety
- Baltic Sea countries should try to learn from each other (region)

Workshops by the Danish Board of Technology

- Site: Ho Bugt near Esbjerg
- Participants: 20 local politicians and technicians, farmers, people from house owners' associations, and nature organisations
- Facilitators: experts and researchers representing universities and other research institutions.
- Process:
  1. Critic leading to priorities
  2. Vision leading to planning
  3. Implementation through specific projects

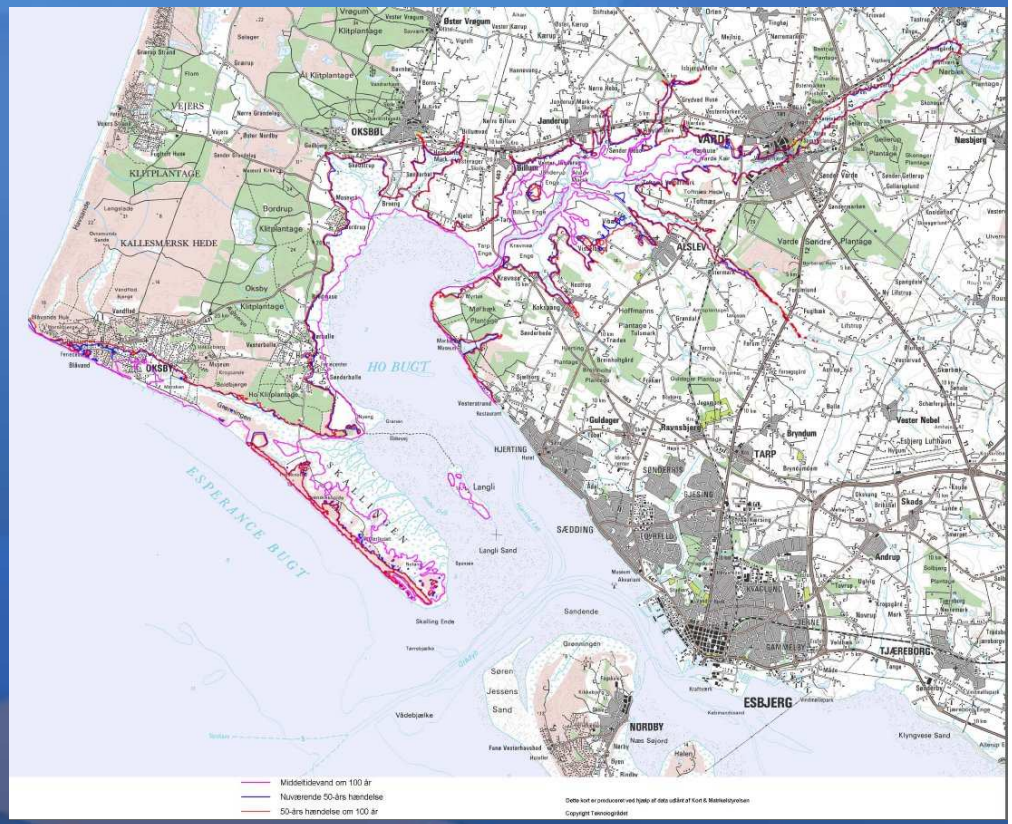
Recommendations

- We need to do something **as soon as possible.**

- We must incorporate the consequences of the sea level rise in the plans for the local, the municipal, and the regional plans

- We need to involve the citizens in the planning of the future of their own area taking into consideration: age – sex - background

- We must supply the local authorities with relevant information on the sea level rise

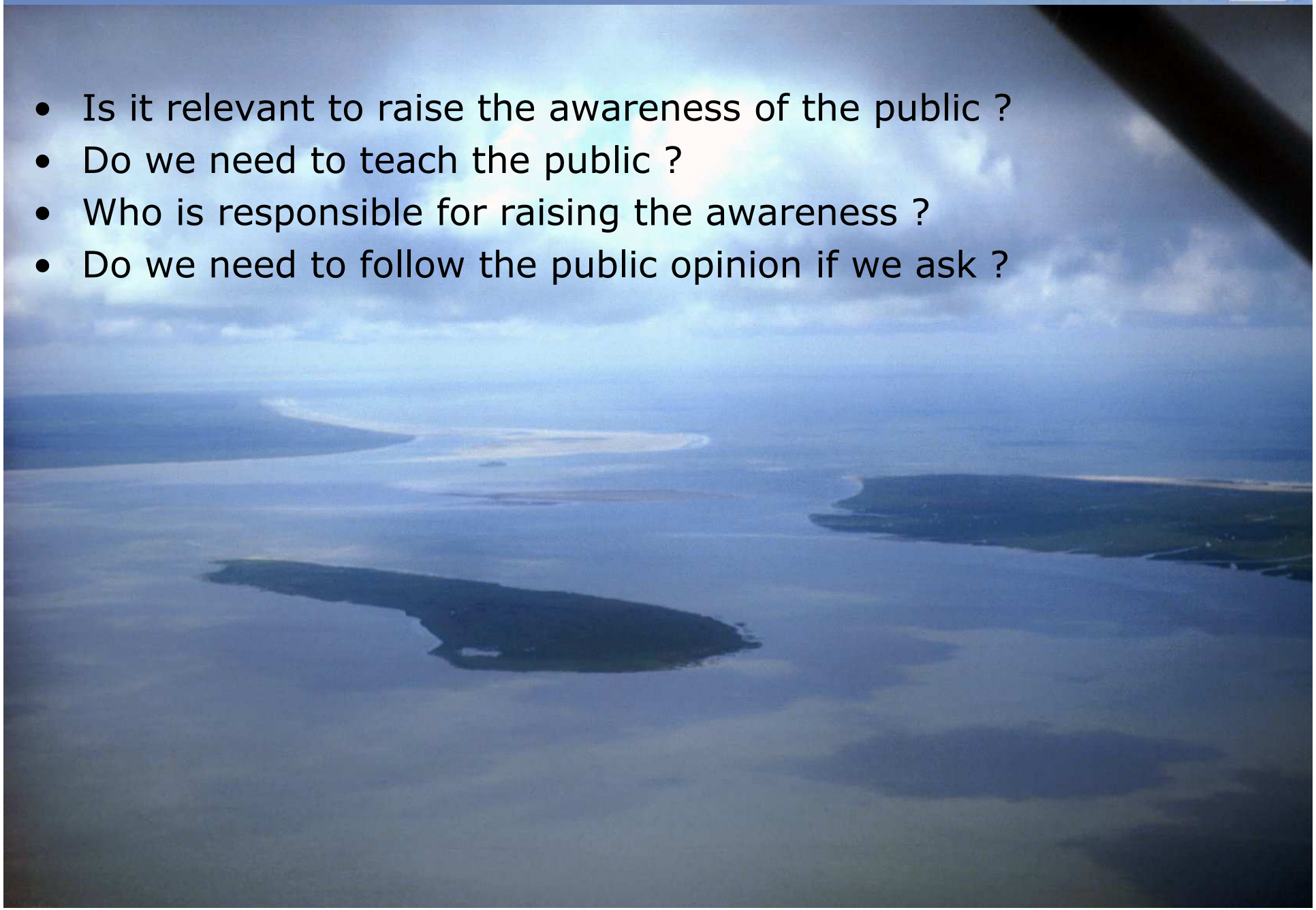


Conclusion

- Nature has high priority
- No interest in 'large-scale dike' solutions
- Both agricultural land and nature may be sacrificed
- A need to prioritize what infrastructure that needs protection
- Stepwise approach: close down – adaption - moving

STEPWISE ADAPTION

Questions for discussion



- Is it relevant to raise the awareness of the public ?
- Do we need to teach the public ?
- Who is responsible for raising the awareness ?
- Do we need to follow the public opinion if we ask ?