

## CLIMATE CHANGE AND COASTAL ZONES: PERCEPTION AND SCALE

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### CLIMATE CHANGE: THE WATER PERSPECTIVE

The effects of Climate Change on low-lying coastal zones traditionally are perceived as mainly a problem of *watermanagement*: increased *sea-level* rise, changes in *hydraulic* boundary conditions and in *river* discharges, *salt-water* intrusion etc. Consequently, principal adaptation strategies are aimed at tackling *waterproblems*: strengthening of flood defences, creation of retention areas and so on. The question arises whether the water perspective on climate change problems is conclusive.

### SEDIMENT PERSPECTIVE

Coastal management in The Netherlands since 1990 implicitly has defined climate-related problems for the coast not as a water-, but as a *sediment* problem. The *sediment* perspective is reflected in the policy objectives: in order to guarantee a sustainable safety level and sustainable functions of the coastal zone, the tactical objective is to maintain the total sand volume of the coastal foundation, which includes shoreface, beach and dunes. Defining quantitative indicators at different scales (dune rest strength, basal coast line and coastal foundation - see Mulder et al., 2007), the nourishment policy has successfully allowed the coastal foundation to grow with the sea level.

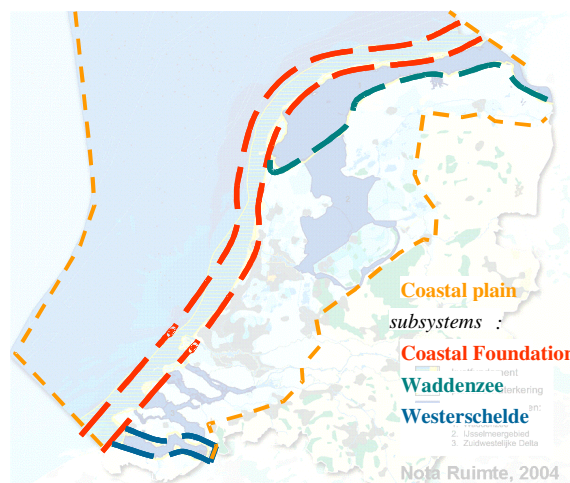


Figure 1 - Subdivision of the Dutch coastal system at different scales

### DEFINING THE COASTAL ZONE

However, considering that climate change is a phenomenon of geological scale, the question remains whether this policy covers all relevant scales yet. The Holocene history of The Netherlands indicates that the Dutch coastal plain - consisting of marine and estuarine deposits for over 90% - comprises half of the country. So, geologically the coastal zone is wider than the largest

space scale as considered in the present coastal policy; i.e. the coastal foundation (Fig. 1).

### SEDIMENT DEFICIT

Extending the sediment perspective to this wider coastal zone, Van der Meulen et al. (2007) conclude that the total sediment input to the Dutch coastal plain shows a gradual decline over the Holocene. At present there is no significant natural supply of sediment to the Dutch coast anymore. Furthermore, flood protection works during the last 1000 years have resulted in sediment starvation of the protected area, creating a total sediment deficit of approximately 13 km<sup>3</sup>. Thus, Van der Meulen et al. (2007) redefine (a number of) *water* management problems related to the flood protected area of the Netherlands, as basically a problem of *sediment* deficit. This approach opens a new perspective on potential adaptation strategies to climate change.

### LAND FILL AS ADAPTATION STRATEGY

The sediment deficit is growing yearly by about 140 million m<sup>3</sup>; 85% of which is the hypothetical amount to grow with sea level and 15% is due to peat oxidation and subsidence.

At present the total use of filling sand in the Netherlands is estimated at some 45 million m<sup>3</sup> per year, of which 23 million m<sup>3</sup> is imported into the Dutch lowlands from marine resources. The resources of filling sand in the North Sea are sheer unlimited. A tripling of the total yearly amount of filling sand might be able to compensate for the yearly increase of the sediment deficit. Thus, strategic landfill might provide a basis for sustainable habitation of the lowlands.

### REFERENCES

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