

Coastal erosion

What is the issue?

Sea-level rise and changes to storms caused by climate change have the potential to change coastal erosion and accretion. This may cause changes in the remobilisation of sediments or lead to loss of habitat at the coast. A plausible extreme scenario for some places is the complete loss of coastal margin.

“Living with coastal erosion in Europe: Sediment and Space for Sustainability” (Doody *et al.*, 2004) was published by the EU EUROSION research programme in 2004 which considered impacts of climate change, and is the primary source of information.

What has happened and how confident?

EUROSION (Doody *et al.*, 2004) reported that the combined effect of coastal erosion, infrastructure development and the building of defences to protect them have led to, in many areas, a narrow coastal zone. Constructing barriers such as roads, dykes, and other coastal developments leads to ‘coastal squeeze’ through reduced scope for low-lying and inter-tidal areas to naturally adjust to changes in sea level, storms and tides. This causes a direct loss of natural habitats. In areas where relative sea level is rising or where sediment availability is reduced, there is a further coastal squeeze evident as a steepened beach profile.

What might happen?

The degree of coastal erosion that may result from sea-level rise is very uncertain (Cooper and Pilkey, 2004). Models of coastal sediment flux under climate warming scenarios show some ‘soft’ coasts retreating by more than 40 m per century whilst others show accretion of about 10 m per century (Walkden and Hall, 2005; Dickson *et al.*, 2007).

Some current areas of salt-marsh, coastal dunes and wetlands will decrease and possibly disappear and with them natural vegetation and species, affecting the ecosystem services that these areas supply. The natural ability of wetlands to absorb nitrogen and metals discharged by rivers could be changed with the risk of accelerating eutrophication of coastal waters.

Are there any OSPAR regional differences?

Although a large proportion of the coastline of the OSPAR area is robust to SLR (Stone and Orford, 2004), there are extensive subsiding, geologically ‘soft’, low-lying coasts, such as in the southern North Sea.

The (IPCC, 2007b) reported that, SLR projections under some SRES scenarios indicate an increased risk of flooding and coastal erosion on Arctic and Baltic coasts after 2050 (Johansson *et al.*, 2004; Meier *et al.*, 2004, 2006; Kont *et al.*, 2008).

➔ [Go to the full QSR assessment report on impacts of climate change \(publication number 463/2009\)](#)

References

- Cooper, J.A.G and Pilkey, O.H., 2004. Sea-level rise and shoreline retreat: time to abandon the Bruun Rule. *Global and Planetary Change* 43: 157-171.
- Dickson, M., Walkden, M. and Hall, J., 2007. Systemic Impacts of Climate Change on an Eroding Coastal Region over the 21st Century. *Climatic Change*, 84, 141-166.

- Doody, P., Ferreira, M., Lombardo, S., Lucius, I., Misdorp, R., Niesing, H., Salman, A., Smallegange, M., 2004. Living with coastal erosion in Europe: sediment and space for sustainability: Results from the EUROSION study. European Commission: Luxembourg. ISBN 92-894-7496-3. 38 pp.
- IPCC, 2007b. Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, [Parry, M.L., Canziani, O.F., Palutikof, J.P., van der Linden, P.J., Hanson, C.E. (eds.)], Cambridge University Press, Cambridge, UK, 976pp
- Johansson, M.M., Kahma, K.K. and Bowman, H., 2004. Scenarios for sea level on the Finnish coast. *Boreal Environment Research* 9: 153–166.
- Kont, A., Jaagus, J., Aunap, R., Ratas, U., Ravis, R., 2008, Implications of Sea-Level Rise for Estonia, *J. Coastal Res.* 24, 423-431
- Meier, H.E.M., Broman, B. and Kjellström, E. (2004). Simulated sea level in past and future climates of the Baltic Sea. *Climate Research* 27: 59–75.
- Meier, H.E.M., Broman, B., Kallio, H. and Kjellström, E., 2006. Projections of future surface winds, sea levels, and wind waves in the late 21st Century and their application for impact studies of flood prone areas in the Baltic Sea region. In: Schmidt-Thomé, P. (ed): *Sea level change affecting the spatial development of the Baltic Sea region*, Geological Survey of Finland, Special Paper 41: 23–43.
- Stone, G.W. and Orford, J.D., 2004. Storms and their significance in coastal morpho-sedimentary dynamics. *Marine Geology*, 210, 1-5. doi:10.1016/j.margeo.2004.05.003
- Walkden, M.J.A. and Hall, J.W., 2005. A predictive meso-scale model of the erosion and profile development of soft rock shores. *Coastal Engineering* 52:535-563.