

Research Summary

Research Questions

- What is the extent and location of eroding and potentially erodible coastline in Scotland?
- What is the extent and rate of coastal change in Scotland over time?
- Where are the vulnerable areas of Scottish coast?
- What social, economic and cultural heritage assets lie within these vulnerable areas of Scottish coast?

Main Results

- The soft coastline (coasts with the potential to erode) makes up 19% (3,802 km) of the Scottish coast. However, between a half and a third of all coastal buildings, roads, rail and water network lie in these erodible sections.
- Since the 1970s, 865 km of the soft coastline has moved position: 11% (423 km) has advanced (accreted); 12% (442 km) has retreated (eroded); and the remaining 77% (2,936 km) has remained approximately stable.
- Compared with the historic period (1890 to 1970 and adjusted for time period), the proportion of advancing coast has fallen by 22%, since the 1970s. The proportion of retreating coast has increased by 39%. Larger shifts in the balance of erosion and accretion are found particularly on the east coast and Solway Firth.
- Where coastal changes occur, they are faster than before. Nationally, average erosion rates since the 1970s have doubled from before to 1.0 m/yr whilst accretion rates have almost doubled to 1.5 m/yr.
- The observed changes since the 1970s are consistent with our expectations of climate change.
- If recent erosion rates were to continue in the future, by 2050 at least 50 residential and non-residential buildings, 1.6 km of railway, 5.2 km of road and 2.4 km of clean water network as well as significant areas of runways, cultural and natural heritage sites are expected to be affected by coastal erosion. These numbers are likely to be underestimates.
- If erosion rates increase in the future, as expected with climate change, the NCCA and National Flood Risk Assessment are likely to underestimate the extent of assets at risk from future coastal erosion and associated coastal flooding. Large numbers of assets are sited close to potentially erodible coasts (including 30,000 buildings, 1,300 km of roads and 100 km of railway lines).

- Given the observed changes and future expectations under climate change, a window of opportunity now exists to plan, mitigate and adapt in advance to avoid widespread harm and cost. This requires cross sector and integrated adaptation and mitigation planning.

Background

Climate Change (Scotland) Act 2009 requires development of an Adaptation Programme to address risks identified in the UK's Climate Change Risk Assessment (UK-CCRA).

No organisation has an overview of recent coastal changes or the implications these have on society's adjacent assets.

Some Local Authorities have a clear understanding of their coastline but a lack of a national overview hinders strategic assessments and implementation of national and regional policies by Scottish Government and its public bodies.

The NCCA addresses a gap in the national understanding of the resilience and vulnerability of Scotland's coastal assets.

It has the potential to inform strategic planning via Shoreline Management Plans, Flood Risk Management Planning, Strategic and Local Plans, National and Regional Marine Planning.

Research Undertaken

- The NCCA used 2,300 maps and data to analyse all 21,000 km of the Scottish shoreline to a level of detail never achieved before. It mapped the position and type of the soft coastline in 1890, 1970 and today, assessing the likelihood of its present and future erosion.
- Areas of erosion were projected to 2050, to provide indicative figures of the natural and built assets at increased risk if past changes and rates continue.
- The NCCA took no account of future management (improving resilience) or accelerating erosion due to climate change (increasing risk). Managing these assumptions, NCCA mapped the proximity of assets along the whole coastline to understand coastal erosion resilience and exposure to hazard.
- Several web-maps allow public access to the underlying data and evidence base (dynamiccoast.com).
- NCCA source data is available to public sector organisations to support delivery of statutory duties, particularly flood risk management and climate change adaptation planning. It allows a step-change to occur in public sector adaptation planning.