



Scotland's centre of expertise for waters

Dynamic Coast - National Coastal Change Assessment: Summary



DANGER
These dunes are
very unstable due
to coastal erosion
Keep away from
top and bottom





Published by CREW – Scotland's Centre of Expertise for Waters. CREW connects research and policy, delivering objective and robust research and expert opinion to support the development and implementation of water policy in Scotland. CREW is a partnership between the James Hutton Institute and all Scottish Higher Education Institutes supported by MASTS. The Centre is funded by the Scottish Government.

Please reference this report as follows: Hansom, J.D., Fitton, J.M., and Rennie, A.F. (2017) Dynamic Coast - National Coastal Change Assessment: Summary, CRW2014/2.

Dissemination status: Unrestricted

All rights reserved. No part of this publication may be reproduced, modified or stored in a retrieval system without the prior written permission of CREW management. While every effort is made to ensure that the information given here is accurate, no legal responsibility is accepted for any errors, omissions or misleading statements. All statements, views and opinions expressed in this paper are attributable to the author(s) who contribute to the activities of CREW and do not necessarily represent those of the host institutions or funders.



Scottish
Government
gov.scot

National Coastal Change Assessment Steering Committee



Summary

Dynamic Coast – Scotland's National Coastal Change Assessment

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 over time?
- Where are the vulnerable areas of coast?
- What social, economic and cultural heritage assets lie within these vulnerable areas of coast?

Key Findings

- The soft coastline (coasts with the potential to erode) makes up 19% (3,802 km) of the Scottish coast. However, around half to a third of the 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.

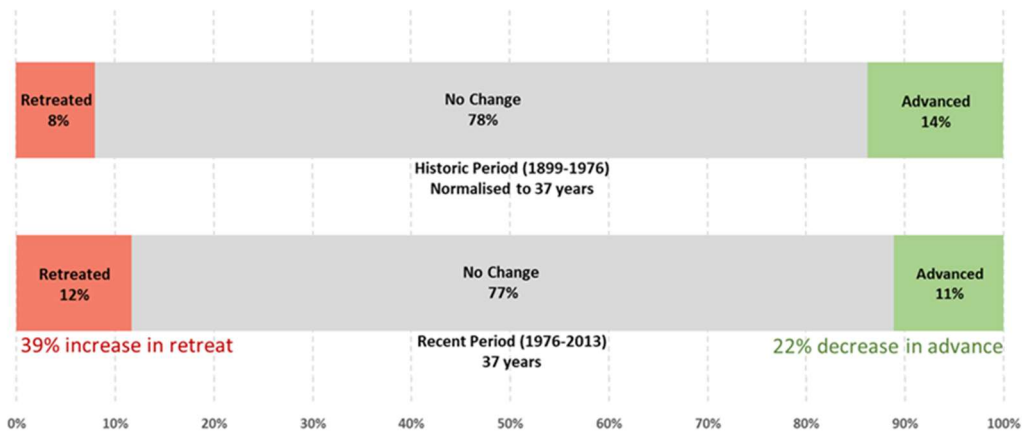


Figure 1: The proportion of soft coast that has advanced, retreated, or not changed in the historical (1890-1970) and modern (1970-Modern) time periods (historical data normalised to 37yrs).

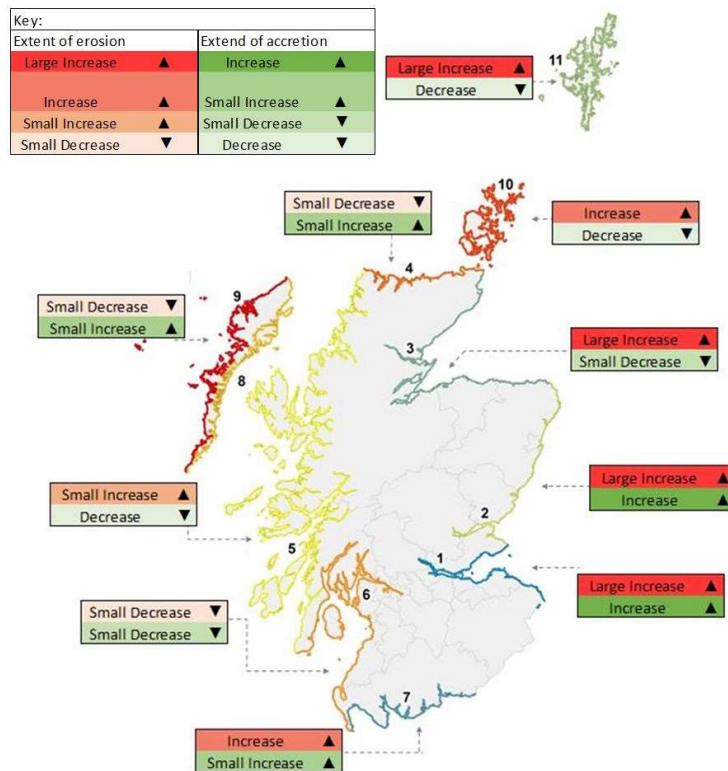


Figure 2: Map showing the distribution of changing extent of erosion and accretion between historical period (1890s to 1970s) and recent period (1970s to Modern).

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 good understanding of their coastline but 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 informs strategic planning via Shoreline Management Plans, Flood Risk Management Planning, Strategic and Local Plans, National and Regional Marine Planning.

Research Undertaken

The NCCA has mapped the position of the soft (mobile) shoreline over two time periods: 1890 to 1970 and 1970 to Modern. The coastal type has been mapped and the inherent erodibility of the coastal zone evaluated. Areas of erosion have been projected forward to 2050, to provide indicative figures of those natural and built assets at increased risk if the trends of coastal change continue. This assessment does not take account any future management choices (improving resilience) or accelerating erosion due to climate change (increasing vulnerability). To manage this assumption, NCCA also mapped the proximity of assets along the whole coastline, supporting a broader understanding of resilience and vulnerability to coastal erosion.

In a review of the policy context, the risks posed by coastal erosion (and enhanced flooding) are acknowledged within numerous existing national policies. However, whilst an adaptation response to erosion is encouraged, few are as explicit in their expectations for adaptation as Scottish Climate Change Adaptation Programme and the National Marine Plan. The availability of the evidence base via NCCA now makes it increasingly clear the potential problems society will face if adaptation fails to become a more commonplace strategy.

The NCCA is summarised in 20 reports which join bespoke web-maps developed to allow public access to the evidence base (dynamiccoast.com). These allow the user to inspect the underlying data and get a sense of the direction and confidence of the trends. The source data is available to public sector organisations and should be used to support the delivery of relevant statutory duties, particularly for flood risk management and climate change adaptation planning.

Recommendations/Forward Look

Attention now turns to implementing the findings and using the indicative analysis of the NCCA to focus attention on local areas to identify detailed risks and develop mitigation and adaptation plans for society's key assets. The Scottish Government has demonstrated leadership with its Climate Change Act and Adaptation Programme. Similar leadership is now required across the public and private sectors, together with coastal communities, to address the risks posed by current and future coastal erosion and flooding.

Publication of the NCCA web maps and analysis marks the start of the next part of the risk cycle. The initial national risk assessment has been carried out and now these can be assessed locally, risks communicated, and plans developed to mitigate and adapt, prior to further cycles of identification of residual and new risks. Such an approach is recommended by the NCCA but is also consistent with the second UK Climate Change Risk Assessment exercise for Scotland (2016).

The NCCA analysis provides opportunities for efficiencies across the public sector to integrate research and develop long-term plans (e.g. via targeted Shoreline Management Plans) to manage those coastal assets likely to be at increased risk through climate change. It highlights the important role that natural coastal defences play (such as beaches and dunes) but also the coincident interests which need to be considered as part of an integrated approach. Together the NCCA allows aspects of the affordability of current approaches to be targeted and improvements to be achieved in current policies aimed at moving toward adaptation and enhanced resilience at the coast.



Scotland's centre of expertise for waters

CREW Facilitation Team

James Hutton Institute

Craigiebuckler

Aberdeen AB15 8QH

Scotland UK

Tel: +44 (0)1224 395 395

Email: enquiries@crew.ac.uk

www.crew.ac.uk



The James
Hutton
Institute



Scottish
Government
gov.scot

CREW is a Scottish Government funded partnership between
the James Hutton Institute and Scottish Universities.

