

# Dynamic Coast

## A summary briefing

December 2022

DynamicCoast.com  
DynamicCoast@nature.scot  
@DynamicCoasts



Introduction



Context



Methods



Results



Implications



Next steps



*If you remember anything, I hope its on this slide...*

Coastal erosion is affecting more of our erodible shore than before, with the extent and rate of erosion anticipated to increase under all emission scenarios due to sea level rise.

So, whilst achieving NetZero quickly is essential, alone it is not enough.

To reduce the impact of the coastal erosion already under way due to sea level rise, our coast and its assets and communities need to be safeguarded by building resilience and adaptation planning.

Dynamic Coast delivers the mapping and data quickly to allow us to adapt to the challenges that climate change presents and to become "sea level wise".



# Introduction

The Scottish Government's Dynamic Coast project was funded by CREW, NatureScot and St Andrews Links Trust, with the research conducted by the University of Glasgow.

Dynamic Coast aims to:

- Improve the evidence on coastal change in Scotland;
- Improve the awareness of coastal change in Scotland;
- Support decision-makers to ensure Scotland's coast and assets can adapt to our future climate.



the home of golf®



## Our erosion 'problem'

Pre 2015 Limited awareness

2015 DC1 starts

Paris Agreement trajectory 4°C

2017 DC1 published

2018 DC2 starts

Pre COP26 trajectory 2.7°C

2021 DC2 published COP26

Post COP26 1.9°C

2022-25 CCAF £12m

Keep 1.5°C alive

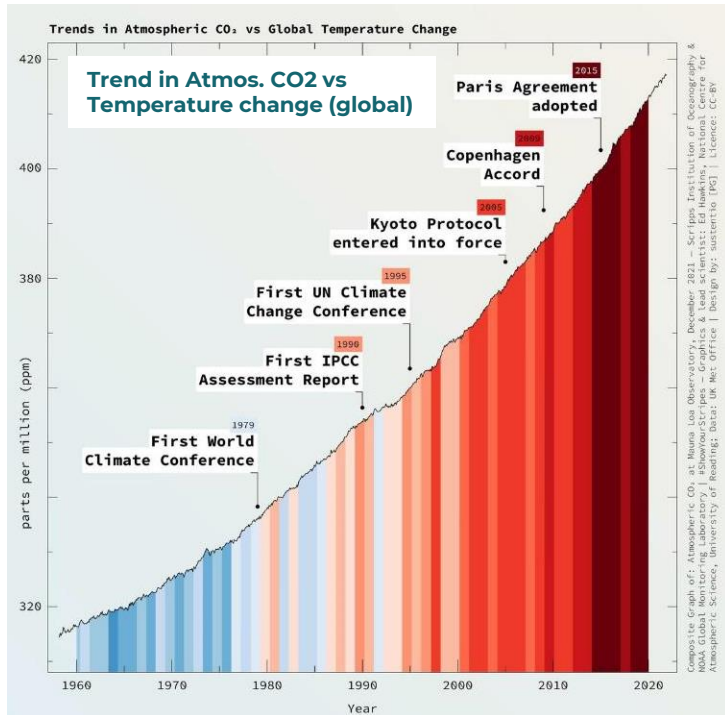
2050 + 0.44m sea level

2100 + 1.16m sea level



- Prior to 2015 Scotland's coastal erosion problem was devolved to local authorities, relying on inaccurate legacy data, with **limited national awareness of future implications.**
- Over the last 7 years Dynamic Coast has driven huge improvements in Science and Governance... **'Laggards to leaders.'**
- Like many countries we are appraising our risks, and realising past approaches aren't enough: **'In a changing world, business as usual will fail'**
- Dynamic Coast is a game-changer, delivering a step-change in awareness but improvements, delivery and action are now required to realise the benefits.

# Climate change: the scale of the challenge



Source:  
Joachim H. Spangenberg, 2022. Only Radical is Realistic Now: International Carbon Rationing in a Climate Emergency. Think Piece series, Hot or Cool Institute, Berlin.  
Image: Scripps Institution of Oceanography & NOAA Global Monitoring Laboratory. #ShowYourStripes - Graphics and lead scientist: Ed Hawkins, National Centre for Atmospheric Science, Uni of Reading. Data: UK Met Office. Design by sustenio (PG).



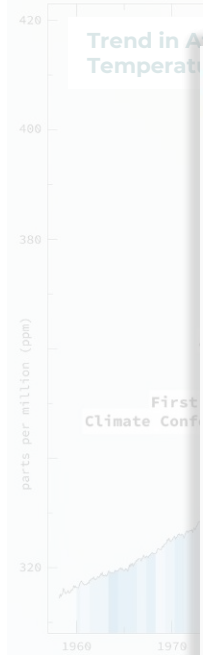
- **Our current approach is not enough**
- **We can not mitigate our way out of this**
- **If you think adaptation is expensive, wait till you see the cost of inaction....**





# Climate change: the scale of the challenge

Trends in Atmospheric CO<sub>2</sub> vs Global Temperature Change



**Dr Alistair Rennie** @RennieAlistair · Nov 21  
"Keeping 1.5 alive...is key to preventing greater loss & damage in the future. Alongside loss & damage we needed to see progress on adaptation & mitigation, on the submission of new national contributions, a pathway to 2030 & a strengthening of the language of the Glasgow Pact."

**Scottish Government** @scotgov · Nov 20

Official

First Minister @NicolaSturgeon has commented on the conclusion of #COP27 in Egypt.

Read the full statement [bit.ly/SGCOP27Comments](https://bit.ly/SGCOP27Comments)

"COP27 has finally seen an acknowledgement by developed countries that the people least responsible for global warming are the ones suffering its worst consequences."

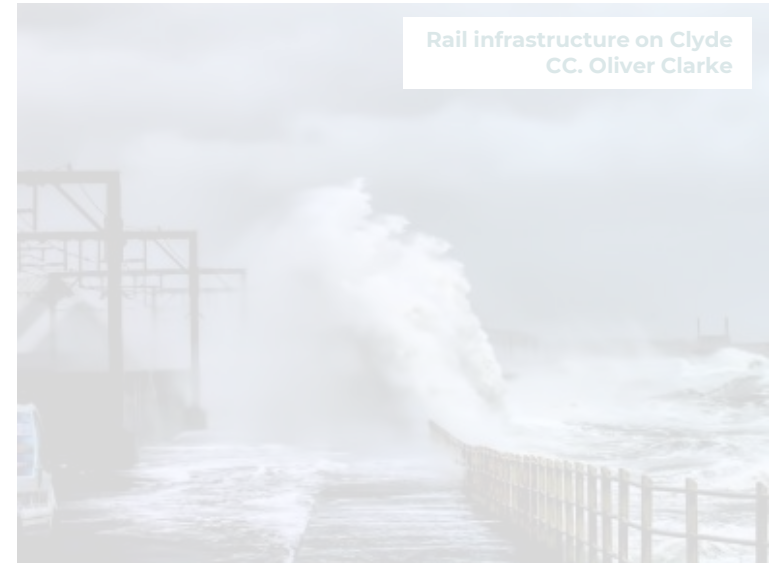
Nicola Sturgeon  
First Minister



Tesla chargers at Woking  
@megbaynes



Rail infrastructure on Clyde  
CC. Oliver Clarke



Luig



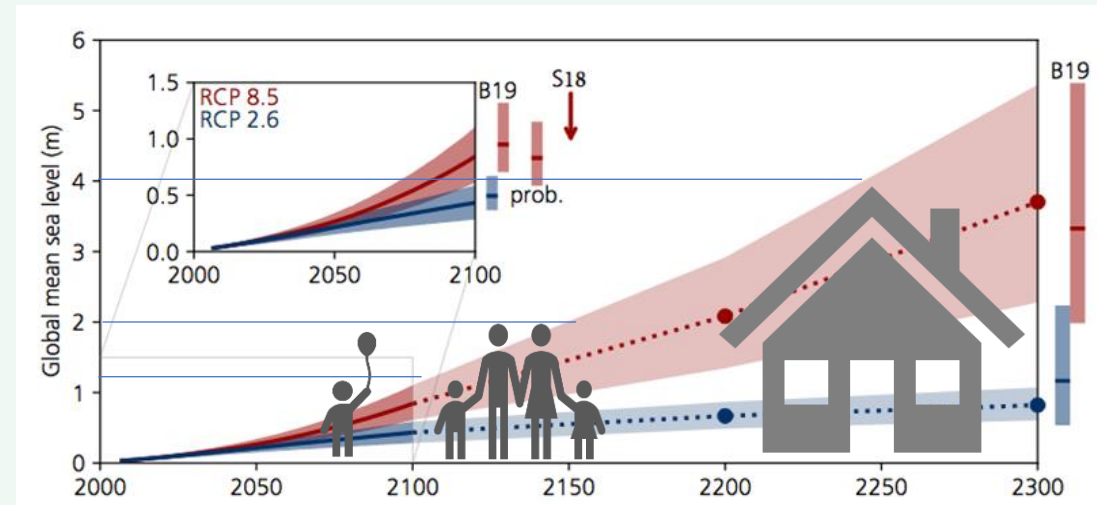
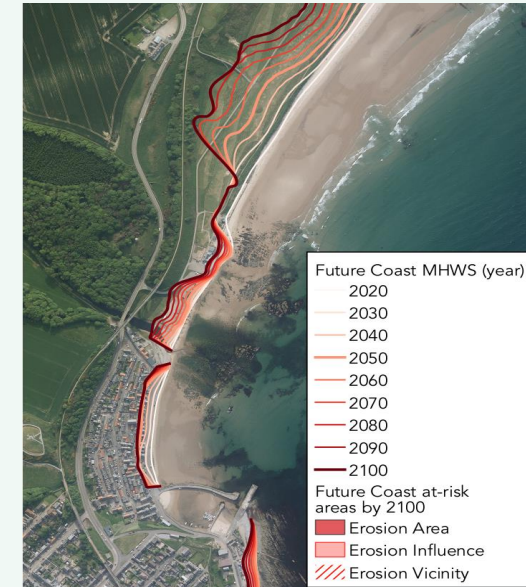
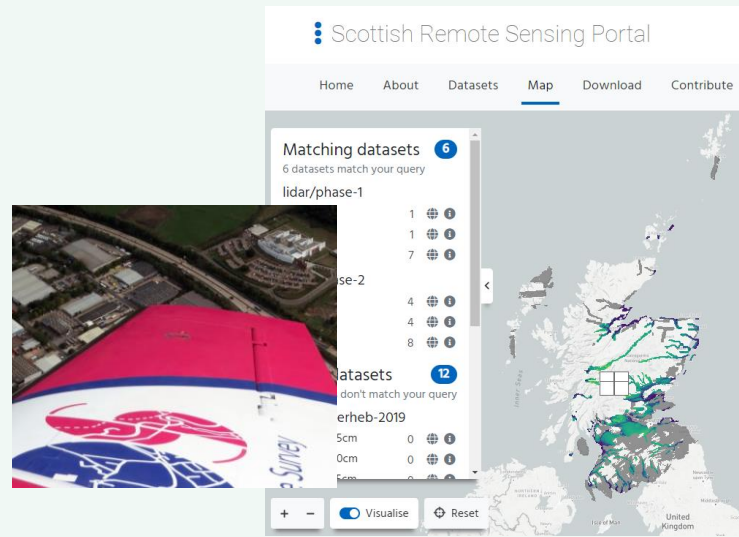
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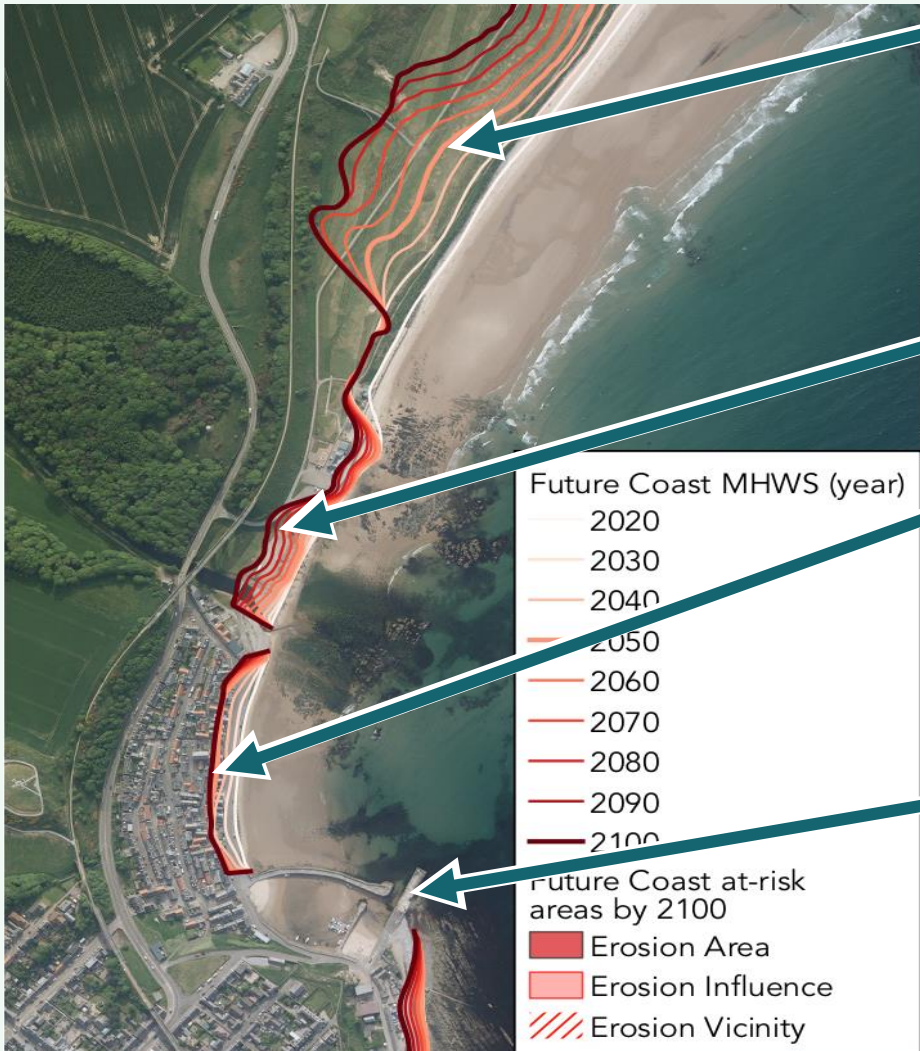
# Methods

- +6,000km new coastal tide lines (OS & SG-Lidar),
- New methods accounting for relative sea level rise,
- High, Med & Low Emissions predictions & implications,
- Erosion enhanced flooding,
- Improved change detection,
- Super Site exemplars,
- Social Disadvantage &
- Novel satellite monitoring.



Global Mean Sea Level rises beyond 2100 in all emissions scenario (2019 IPCC SROCC Report)





- Erosion is anticipated in **erodible areas**, based on recent coastal change and future sea level rise. Anticipated position of MHWs in 2030, 2040 - 2100 is shown.
- Modelling takes account of **geology** (curtailing future erosion) where relevant.
- **Artificial defences** (with adjacent beaches) are mapped and nominal erosion is allowed. This can be turned on and off; and informs management strategies.
- **Artificial defences** (without beaches) haven't been modelled, but erosion risks remain in these areas. Something we may investigate next, alongside **cliff erosion**.

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Automatic veg edge detection on satellite & aerial imagery



Veg edge at St Cyrus (Montrose) mapped with GPS device



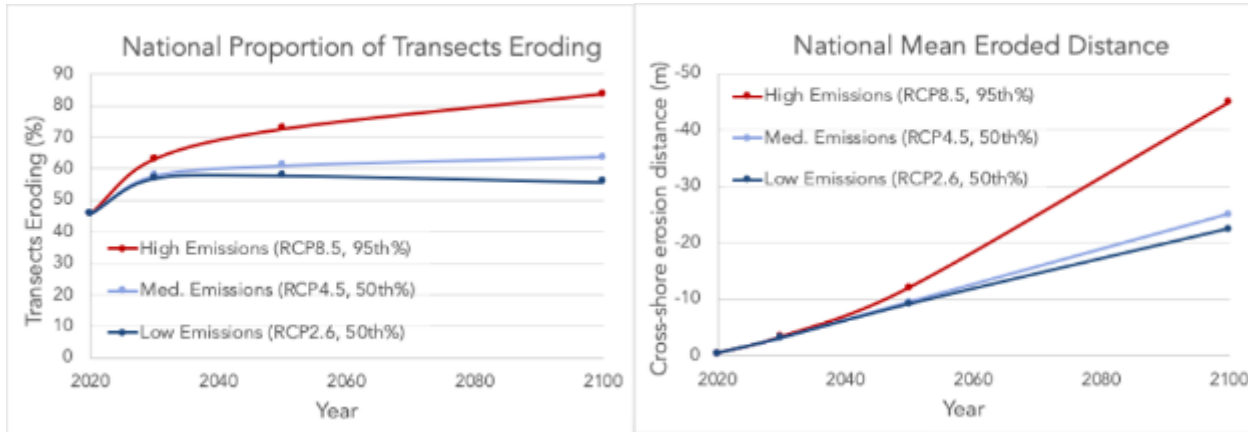
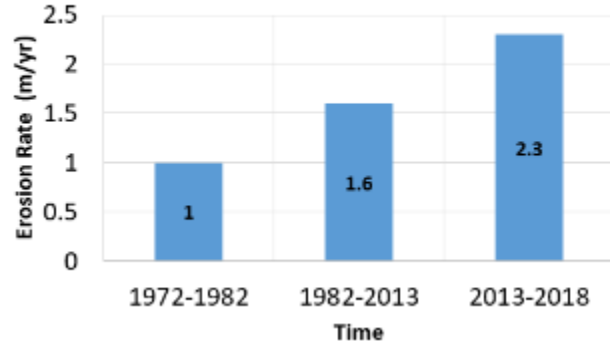
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# Results

Montrose Erosion Rate



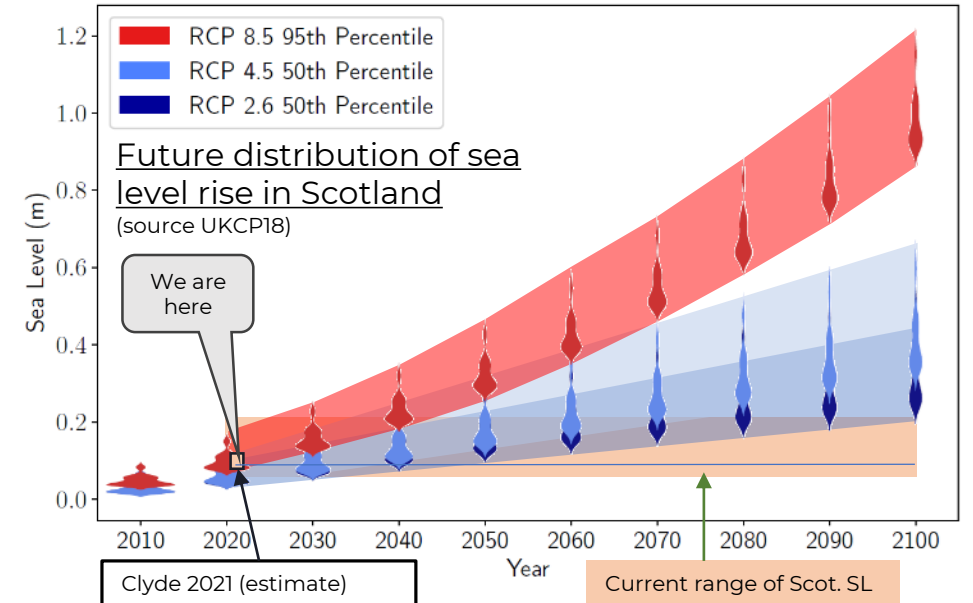
- Erosion affects more open erodible coast than historically and since 2017 (DC1 38% → DC2 46%)
- Rate & extent of erosion increases for both for Low & High Emissions futures (locked in due to past & current emissions)
- £20bn assets within 50m of coast (£14.5bn behind natural defences, £5bn behind artificial)
- £1.2bn at risk by 2050 (partial estimate 'do nothing management' & High Emissions (AKA current track))
- Low Emissions saves ca. £400m by 2050 (partial estimate: 'do nothing management' & Low Emissions)
- Coastal erosion social disadvantage is uneven, now estimated for the first time (more detailed assessment now needed)



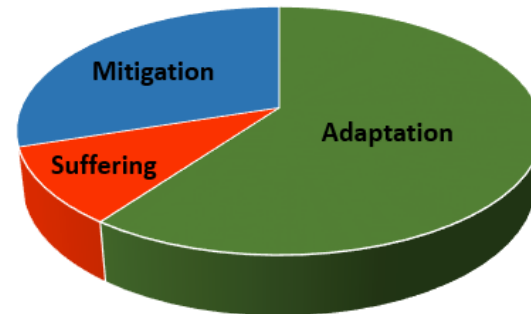
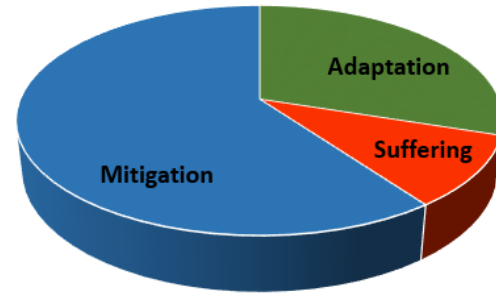
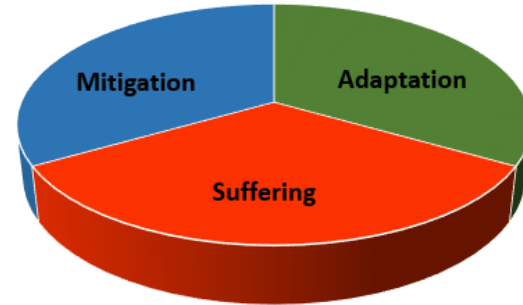


# Implications

- Achieving NetZero will save assets, management & repair costs, livelihoods and possibly lives. It is an act of self-interest.
- **But on its own it is not enough. Why?**
- Because of the time lag between GHG reductions and falling RSL. Even under Low Emissions, future sea levels will be higher than now, with more erosion & flooding.
- **This is why the Scottish Government is delivering both climate mitigation and adaptation actions.**



# Implications



- John Holdren, Obama's science advisor (2007) summed this up succinctly:

*"We basically have three choices: mitigation, adaptation and suffering."*

*We're going to do some of each. The question is what the mix is going to be."*



# Next Steps

- Increase awareness & support the use of Dynamic Coast (Working with Scottish Government, local authorities, public sector, business, communities and public)
- Maintain & improve evidence base (Scotland is the only home nation without a funded coastal monitoring program)
- Develop Coastal Change Adaptation Plans ('SMP+'. Guidance now underway, with roll-out based on DC2)
- Take forward resilience and adaptation actions flexibly (incl. case studies) (Improvements to adaptation planning, collaboration & funding all needed)
- This will help us to be "Sea Level Wise"



Dynamic Coast awareness workshops to key agencies and partners

## Sea level wise:

What sea level, coastal erosion and coastal flood frequency should we expect?  
What things that we care about are at risk?  
How can we better manage these risks?  
Short-term NBS resilience / long-term adapt  
How can we flexibly respond?

# Take-home thoughts

- Encourage your partners & members to have a think about climate change, coastal erosion and flooding.
- When you think of your activities and assets, are you 'Sea level wise'?
- Let's choose our future by design, not disaster.
- Have a look at the maps reports & videos at [DynamicCoast.com](https://www.dynamiccoast.com) & also see SEPA's flood maps.

## Sea level wise:

- What sea level, coastal erosion & flood frequency should we expect?
- What things that we care about are at risk?
- How can we better manage these risks?
- Short-term NBS resilience / long-term adapt
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Dynamic Coast

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Improving awareness of coastal change in Scotland

**About**  
Learn more about Scottish Government's Dynamic Coast project

**COP26**  
Explore new research & products in support of COP26

**Reports**  
Read and download the latest reports published in 2021

**Webmaps**  
Explore the coastal changes within a webmap

**Research Summary**  
The Dynamic Coast project undertook a wide range of analysis, from coastal change due to sea level rise to the social disadvantage of the population exposed to coastal erosion.

**CREW** CENTRE OF EXPERTISE FOR WATERS  
**Dynamic Coast Research Summary (2021)**  
Full report available at: [crew.ac.uk/publications](https://www.crew.ac.uk/publications)



## Our funders:



## Our partners:



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**Steve McFarland** (SEPA)  
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**Sandy Reid** (St Andrew's Links Trust)  
**Anna Beswick** (Adaptation Scotland)  
**Duncan Moss** (Ordnance Survey)  
**Magda Low** (Ordnance Survey)  
**John Adams** (Montrose)  
**Nicholas Williamson** (Fife Council)

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