



Scottish Natural Heritage
Dualchas Nàdair na h-Alba

All of nature for all of Scotland
Nàdair air fad airson Alba air fad





Climate change and roll-back in Scottish coastal habitats

The need for a holistic
approach

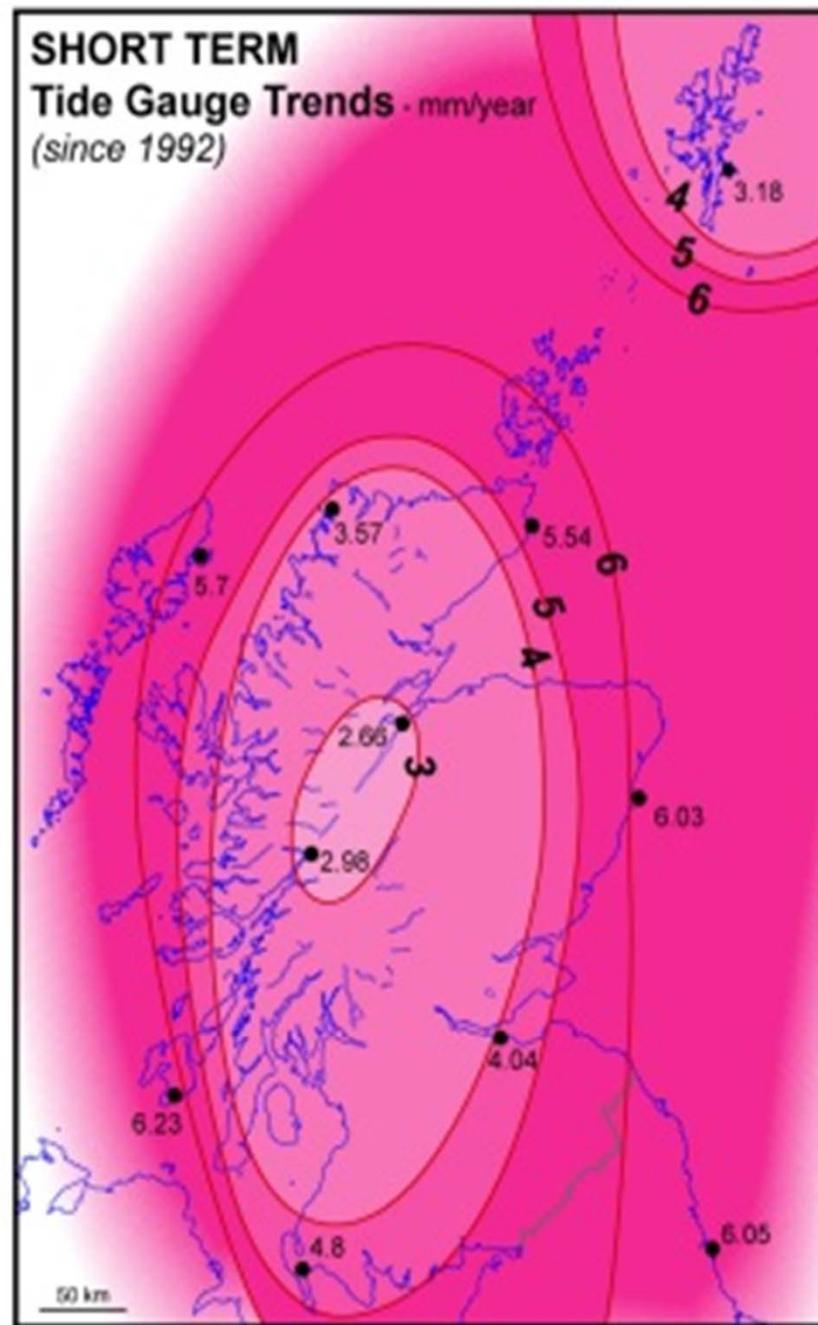
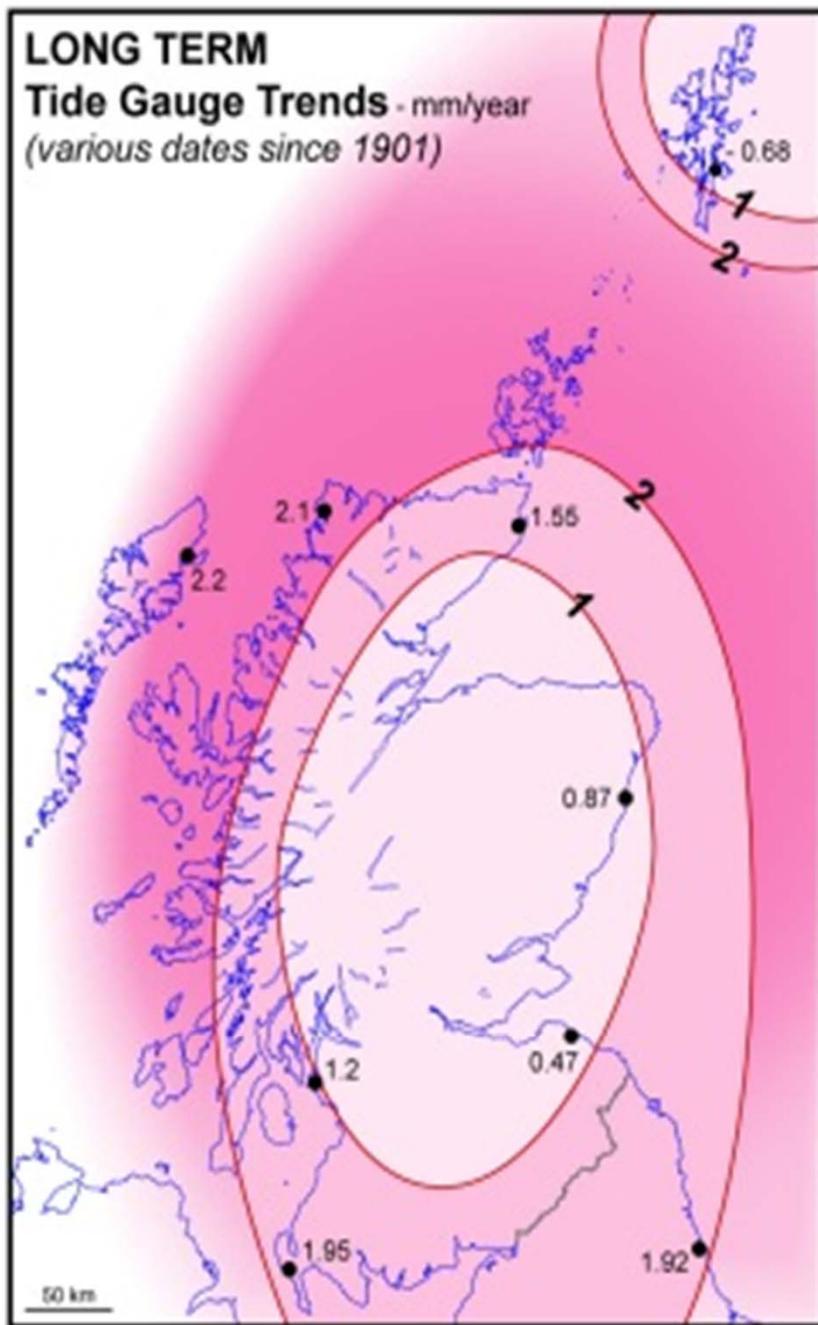
4 September 2014

Stewart Angus

Global climate change

- Scotland has exemplary record in mitigation
- Even at peak emissions, Scotland will have negligible impact on global climate change
- Global climate change will have dramatic impact on Scotland

Source: Rennie & Hansom 2011



Threshold

Such modern RSL rates also exceed the 3-4 mm/year thresholds identified as points beyond which widespread re-organisation of coastal landforms begins to be forced

Rennie & Hansom (2011, citing Carter et al. 1989, Pethick 1999, Orford & Pethick 2006)

What might this mean?

widespread re-organisation of coastal landforms begins to be forced:

Township of Hussabost, North Uist,
recorded in 1389 (Charter of Inchaffrey)



Roll back or rollover

- May apply to shingle & sand only
- Something different happening on saltmarshes
- Interplay of two different processes in estuaries and firths





15/09/2019 19:27:11 (19.9 km) Lat: 54.9264 Lon: 2.51219 WGS 1984



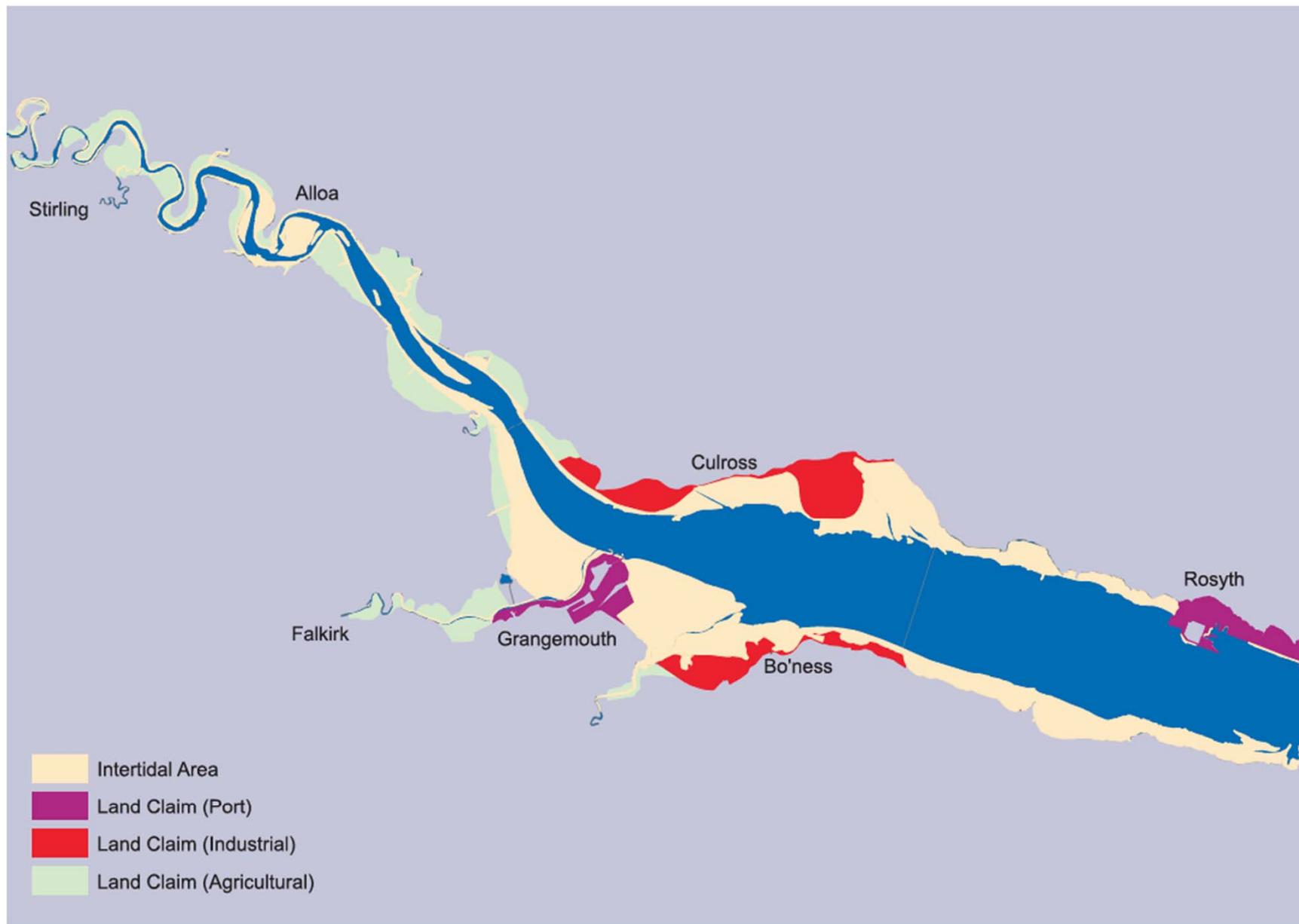
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Dynamism or trend?

- “widespread re-organisation” of Rennie & Hansom (2011)?
- Being addressed by MASTS PhD at Glasgow University: **Assessing Saltmarsh Resilience in a Changing Climate**

Estuaries and firths

- Dunes and shingle rolling back
- Saltmarshes accreting at base
- Vegetation feedback effect on any sediment movements
- Coastal squeeze – will it actually affect saltmarshes in Scotland?



Map of the Forth estuary and intertidal area claimed for agriculture (■), industry (■) and port and harbour development (■).







Uist roll back

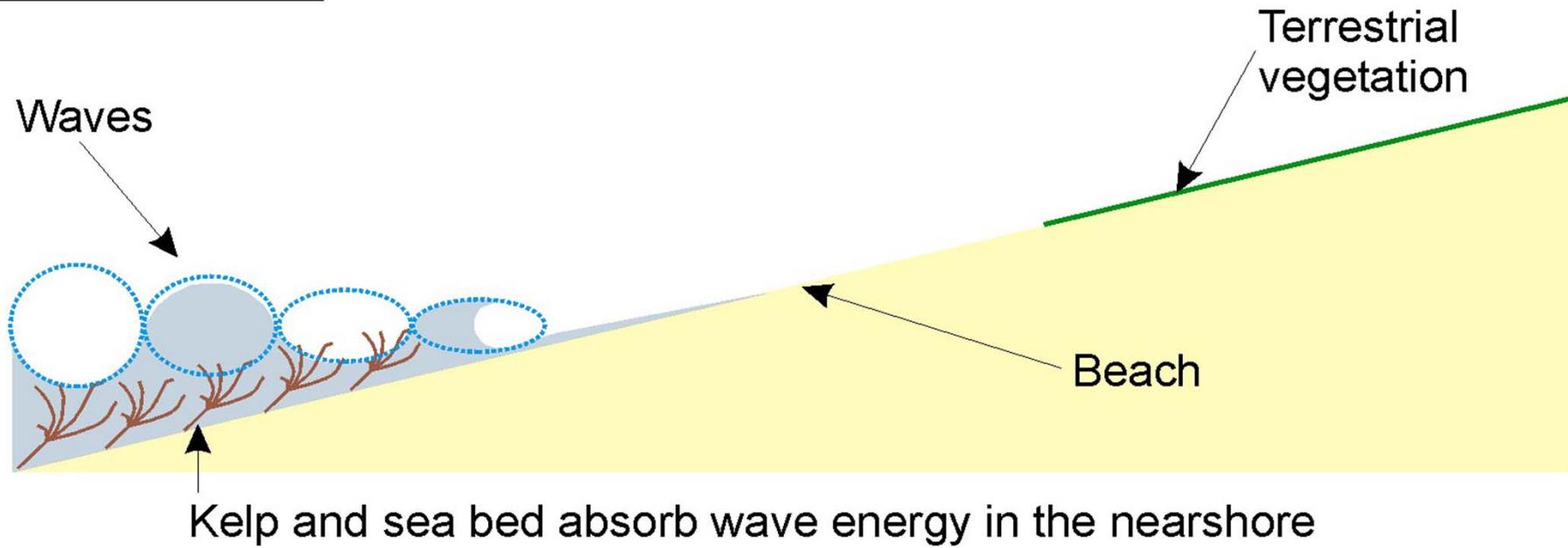
- Roll back of dune ridge on to machair
- Roll back of water?
- Roll back of salinity?
- Machair becomes saltmarsh?
- Lochs become lagoons?
- Lagoons become saline inlets?
- Can biota roll back?
- No roll back of crofts

Uist connectivity 1

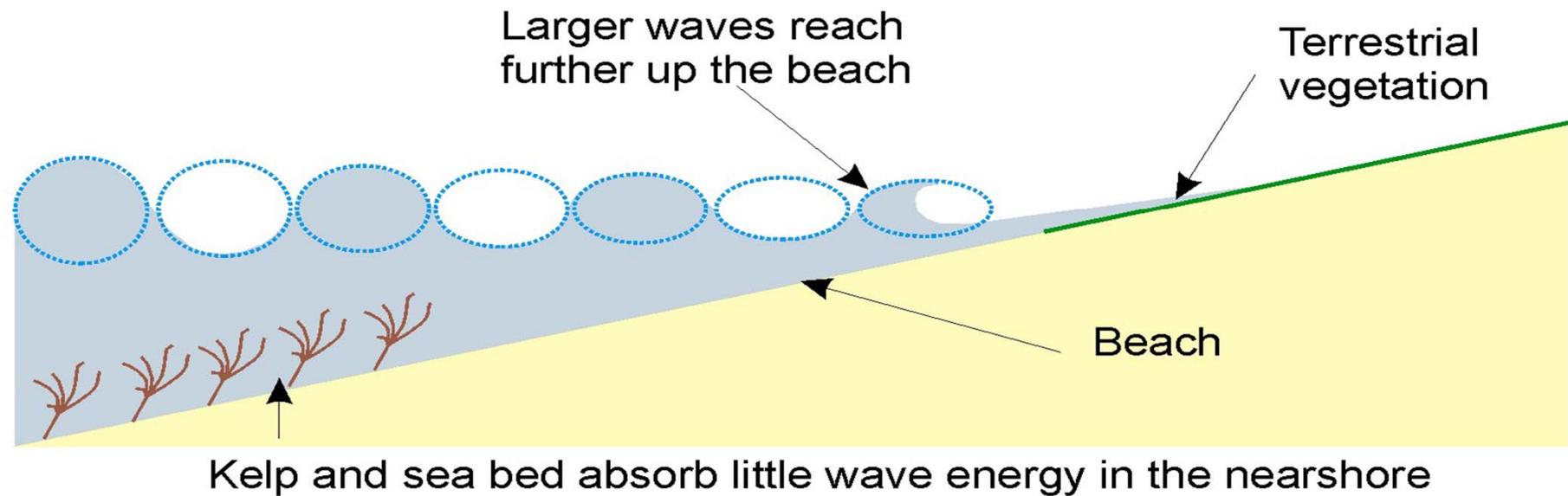
- RSLR c. 6mm/yr
- Low-lying & exposed
- Very high aquatic connectivity – lochs connected to each other and to sea
- Drains (and older canals) enhance this connectivity
- Drain efficiency diminishing with RSLR

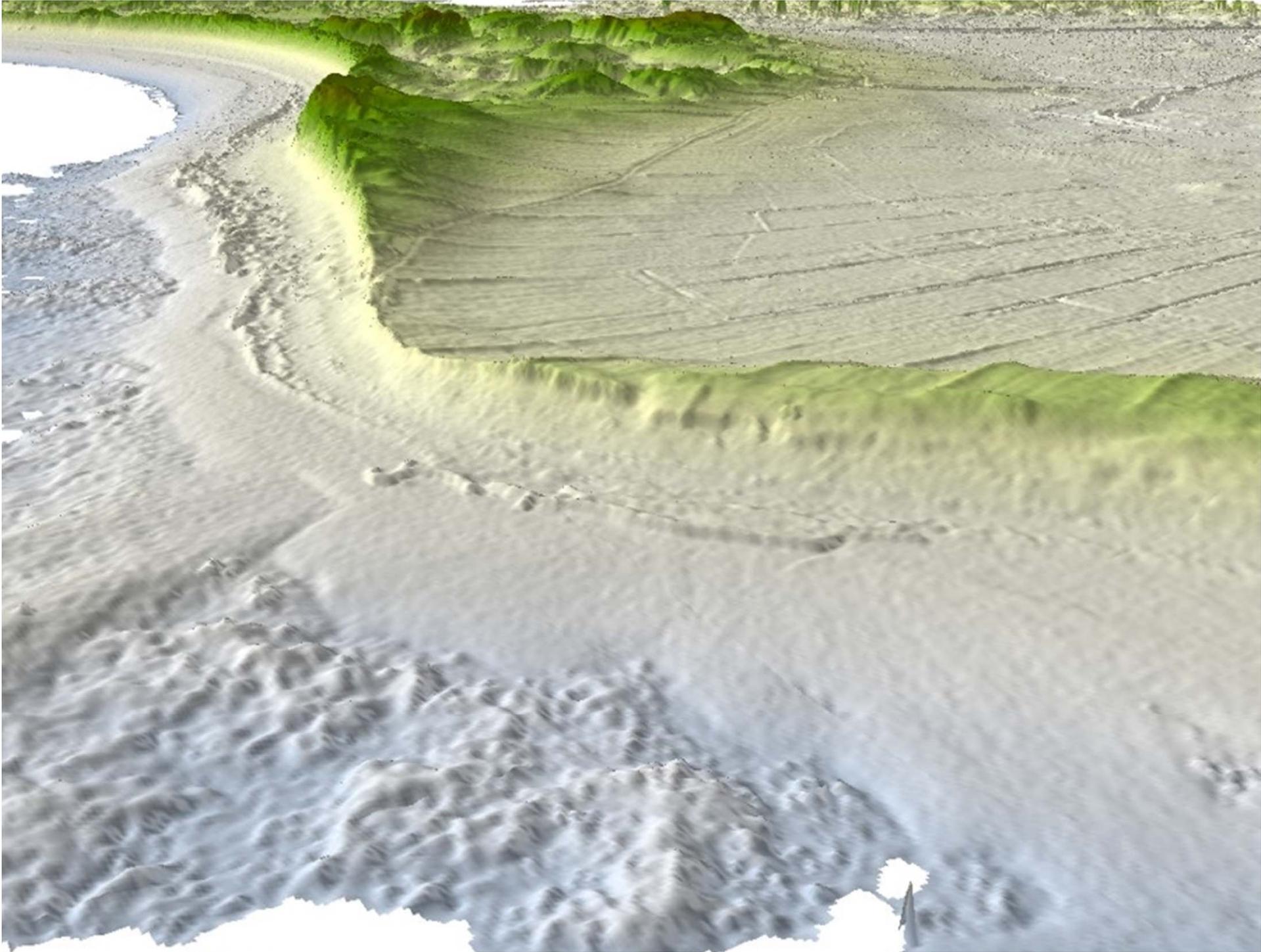


Normal conditions



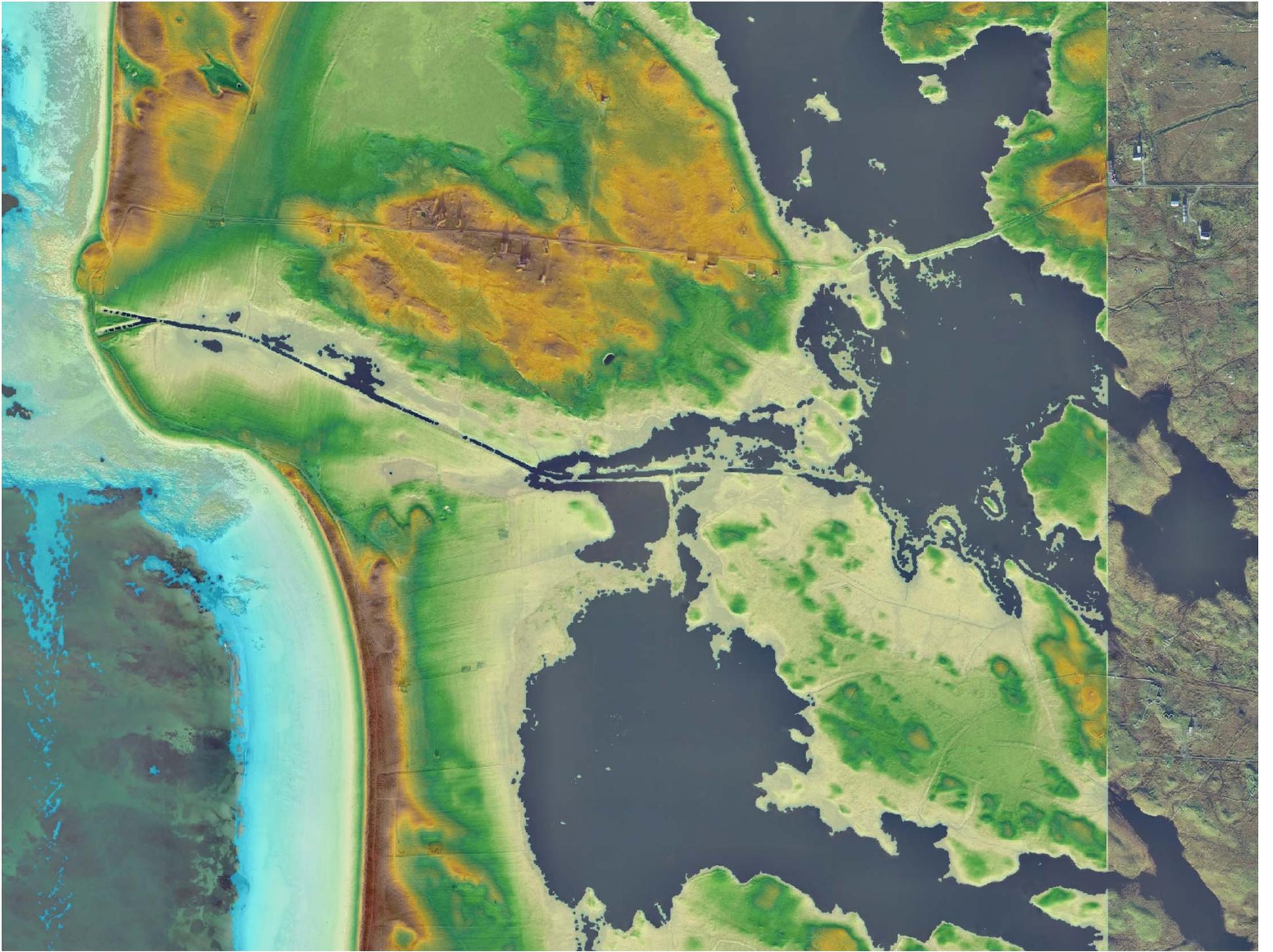
Storm surge conditions

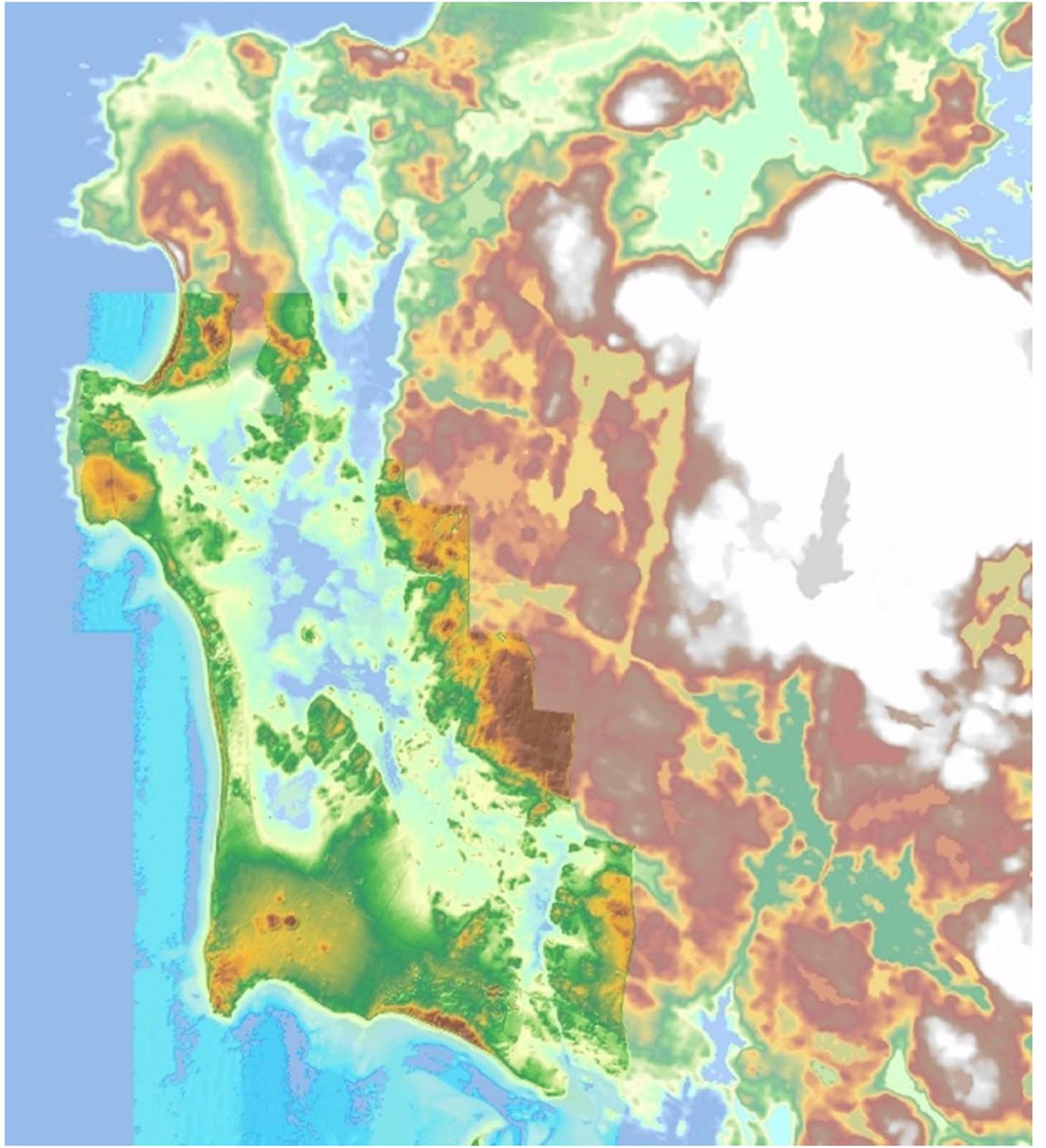




Uist connectivity 2

- High socio-economic connectivity
- Kelp bed (*Laminaria hyperborea*) 6-7 km offshore absorbs wave energy
- Kelp may not grow to match RSLR as waters very clear
- Historic environmental management critical to future climate change impacts





Everything is linked

Land and water, people and land,
sea and land



Everything is linked

Past and present

People and environment

Current SNH work

- Coastal Erosion Susceptibility Model (AR)
- Coastal Habitat Vulnerability Assessment (SA & AR)
- History of Uist canals and drains (SA)
- MASTS PhD: Assessing Saltmarsh Resilience in a Changing Climate (Univ Glasgow/AR)
- National Coastal Change Assessment (AR secondment to SG, multi-agency)

Conclusion

- Adaptation not resistance
- Citizen involvement in adaptation to avoid *ad hoc* resistance
- Adaptation requires information
- Ecosystem functionality still poorly understood
- Monitoring required to separate dynamism from trend
- Separate change from threat

Summary

- High environmental connectivity
- High inter-habitat feedback
- High socio-economic connectivity
- Roll-back will apply to parts of some ecosystems and not others
- When does change become threat?
- No roll back in land ownership/tenure
- Human response to climate change on coast may have more impact than the climate change itself