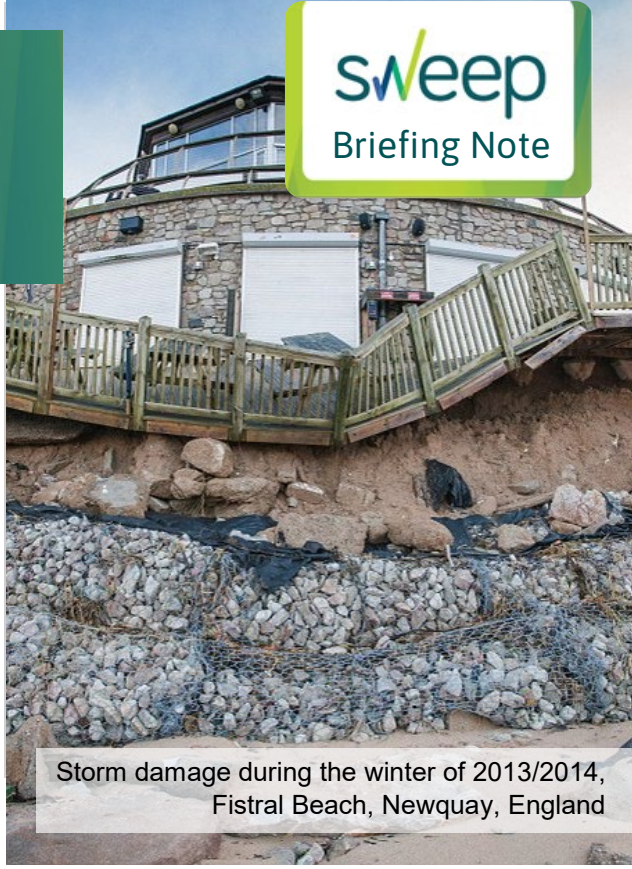
Coastal Change Management Areas: A new methodology

A Case study with Torridge, North and East Devon Local Planning Authorities

sweep Briefing Note



Storm damage during the winter of 2013/2014, Fistral Beach, Newquay, England

This briefing note provides an overview of a new, scientifically-robust methodology designed to support Local Planning Authorities demarcate Coastal Change Management Areas (CCMAs) which significantly improves on previous guidance.

The methodology was successfully trialled on the Taw-Torridge Estuary (North Devon) and around Sidmouth (East Devon) before being recommended for inclusion in Local Plans, as 'materials consideration' for coastal planning and engineering decisions, and used to extend CCMA mapping for the whole of these coastline areas.

This work was undertaken as part of the NERC-funded SWEEP programme (South West Partnership for Environment and Economic Prosperity). Full details of the project and methodology can be found on the SWEEP website.

CCMA: An area identified within Local Development Plans as likely to be affected by physical changes to the shoreline through erosion, coastal landslip, permanent inundation or coastal accretion.

Who should read this?

- Local Planning Authorities
- Coastal Management Policy makers
- Risk Management Authorities (RMAs)

Why does this matter?

With the UK coastline retreating up to a metre every decade due to erosion, landslips, flooding and shifting sediments, Local Planning Authorities (LPAs) have the difficult task of managing future developments along these unstable coastal and estuarine margins.

To address these issues, the UK's National Planning Policy Framework requires LPAs to identify where shorelines are likely to change significantly over the next 100 years. These designated Coastal Change Management Areas (CCMAs) can then be used to inform planning and management decisions.

LPAs, however, often lack the confidence, in-house expertise, or consistent methodology to establish such designations. This means that very few CCMAs currently exist, and coastal development continues in active coastal zones with little regard for future shoreline shifts.

In response, SWEEP scientists worked with a range of project partners to develop a new scientifically robust method that planners could adopt, the public understand, and which improved upon existing guidance by incorporating the latest climate science. This was trialled in Sidmouth, East Devon (a coastal wave-dominated environment prone to erosion) and the Taw-Torridge estuary, North Devon (a tide-dominated environment impacted by flooding).

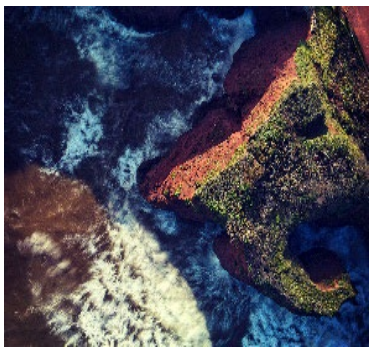
The output was a clear, concise methodology for use by any LPA, which could deliver the underlying science needed to support the process of designating CCMAs.

> *"The SWEEP approach was invaluable in bringing all key stakeholders including the Environment Agency and Natural England to shape and move CCMA work forward and increase our confidence in this area."*
>
> **Ian Rowland, Senior Planning Officer, Torridge District Council**

> *"Information from the SWEEP CCMA mapping is helping us to take a new approach to an adaptive pathway, thus strengthening our submission."*
>
> **Chris Wilson, Coastal Engineer, Torridge District council**

Methodology for CCMA demarcation

The methodology below presents a robust, transparent, repeatable approach that can be undertaken using publicly available data.



Coastal types

Sandy beaches | gravel barriers | cliffs | estuaries

Data required

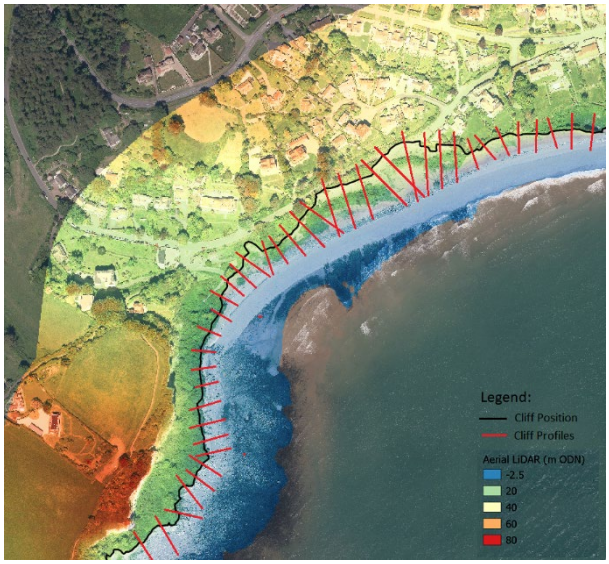
- Current shoreline position
  e.g. cliff top, high-water line or barrier crest
- Historic sea-level rise (SLR) rate
- Future sea-level rise (SLR) predictions

Approaches

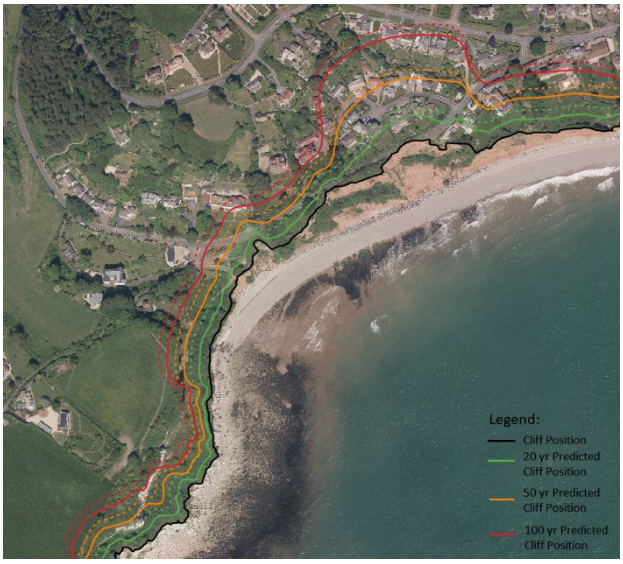
1. Cliffs	Derive historic retreat rates either through volumetric analysis of cliff profiles using two LiDAR datasets or using historic mapping to measure cliff top change. Apply predicted SLR to calculate the predicted future retreat rates to compute projected cliff position. Alongshore smoothing of the new cliff lines is required to manage the spatial variability in retreat rates caused by the episodic nature of cliff loss.
2. Beaches (sand/gravel)	Use the average cross-shore profile to calculate beach response under future SLR. This approach assumes profile shape will remain through landward migration of the beach.
3. Barriers	Derive historic retreat rates from historic mapping, aerial imagery or LiDAR by using barrier crest as a reference point. Apply barrier roll-back method using barrier volume to calculate barrier retreat under future SLR.
4. Estuaries	These environments are tide dominated and not exposed to significant erosion. CCMA mapping needs to consider future inundation extents by mapping projected flood levels onto current LiDAR digital elevation maps
5. Defended Coasts	Existing coastal defences make it very difficult to forecast shoreline change under SLR. Assumptions can be made that ignore defences (using methods above) but are likely to be unrealistic. All of this work can be undertaken within a GiS platform or Python/Matab software.

Output Mapping

CCMA mapping can be split into epochs to match Shoreline Management Plan outputs e.g. 20, 50 and 100 yrs. Where possible a 'buffer' or 'probabilistic' approach should be adopted to help convey the uncertainty inherent in the projected SLR rates.



Aerial imagery overlaid with LiDAR mapping, cliff position and cross-shore profiles.



Projected future cliff position for different epochs; buffers allow uncertainty to be visualised.

To find out more see the SWEEP website or contact Dr Tim Poate timothy.poate@plymouth.ac.uk

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