

Characterising coastal erosion and cliff retreat to inform local planning in North Yorkshire

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Coastal erosion was thought to threaten housing in Staithes in North Yorkshire. Research undertaken by a team of geographers from Durham University into cliff erosion was used to determine the rate of erosion, how climate change might affect that rate, and whether the erosion would endanger residents and their homes.

Challenge

The Cowbar Cottages in Staithes, North Yorkshire, are vulnerable to the effects of continuing coastal erosion in their location close to coastal cliffs. A consultancy project completed for the local council suggested that half of the 24 cottages at Cowbar would fall into the sea over the next century.

However, some locals had lived there for more than 30 years and argued that the predicted progression of cliff erosion had been overstated; some remembered that a small hedge on the cliff edge had been there for decades.

A correct prediction would have major implications for those living in the area.

Solution

The Cowbar residents asked for a second opinion, and invited a team from Durham University, including Professor Nick Rosser and Professor David Petley, who had been working in the area for a mining firm.

They used laser scanning, accurate to 2-3mm, to measure changes on the cliff face. They also used GPS surveys and Second World War aerial photographs to understand the geometry of the cliff.

The research found that the likely impact of climate change was negligible, and that less than 2 metres of the cliff had eroded in fifty years – much less than the consultants' original predictions.

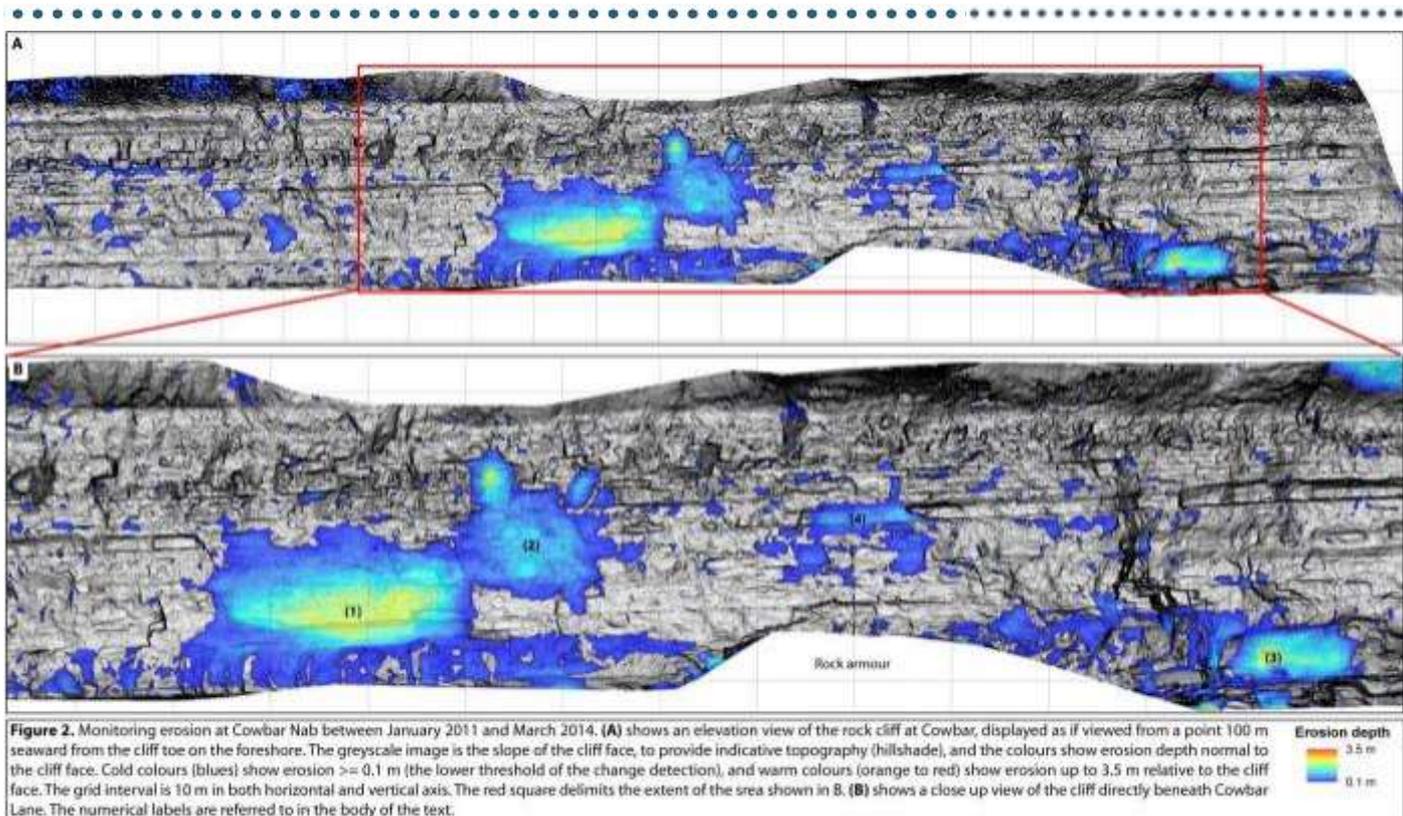
Benefits

Managing risk

The work emphasised the role of internal cliff dynamics and structure in cliff erosion. Professor Petley noted that while rainfall and weather did affect erosion, it was not the most important factor in determining how fractures behaved.

Professor Petley's team also worked on developing an early warning scanner to predict dangerous rockfalls in the future.

The refined understanding of coastal erosion at the Cowbar stretch of coast had major planning and coastal defence implications. The Shoreline Management Plan 2 (SMP2) produced in 2007 recommended protecting the cliff line locally to the west of Cowbar, which was a change from Shoreline Management Plan 1 (SMP1) policy and has been implemented.



A diagram produced as part of the erosion monitoring (from Rosser, 2014, p14)

Under SMP2, further demolition of cottages for access was rejected to create a 50-year period of protection, thus changing the viability of the area for the local residents and leading to the revision of damage cost estimates.

In 2019, a new plan to deal with coastal erosion and flooding will be created for the area, with £100,000 awarded to Scarborough Borough Council for the purpose.

Better decisions

The work of Professors Petley and Rosser was directly cited in the North Yorkshire coast Shoreline Management Plan 2. T

he erosion rates used for Cowbar were drawn from work by Professor Rosser, and were described as providing an “exceptional degree of accuracy”, providing specificity for a section of the coast that was not available for surrounding areas. SMP2 noted that the research was of “significant strategic value in understanding coastal erosion nationally.”

Further reading

[Second Shoreline Management Plan \(SMP2\)](#)

[Staithe flood and erosion defence plans to be drawn up \(BBC\)](#)