

Case Study 1a: Fairbourne, Wales, UK.

Climate change, weather patterns and impacts on coastal defences and the fate of coastal communities in Wales has highlighted the need for effective use of resources. One of the major physical impacts of sea-level rise is erosion, particularly along the open coast and this is going to leave coastal infrastructure more vulnerable to storm waves. Thus sea-level rise, coupled with storm surges and high tides, will ultimately pose severe problems for shoreline management and the economy. Obviously, policy and implementation will be influenced by available techniques for defending the coast with due consideration being given to their cost and sustainability. In response to the recent storms, despite it being a time of austerity with cutbacks throughout the public sector, coastal infrastructure damage has resulted in the Welsh Government making £240 million available for repairs to coastal infrastructure. However, there is no clear strategy for how this money will be allocated or the expected lifetime of repairs.

Fairbourne (Figure 1) was inundated following January 2014 storms and the long term management policy to be adopted from 2050 for this town is 'no active intervention'.



Figure 1: Fairbourne (Source: Google Maps)

From 2025 as a first stage in not defending the Fairbourne shoreline, 'managed retreat' is recommended in the Shoreline Management Plans adopted by Gwynedd County Council. Defending the shoreline is costly, as shown to the south at Borth, where recently completed artificial reef sea defences and ancillary works cost £29 million. Coastal defence is of significant political and social importance and many television documentaries have recently been devoted to managed retreat at Fairbourne. Therefore, it is clear that 'managed retreat' and 'no active intervention' will have significant consequences for residents, but how robust is the underpinning data to support such policies?

Measuring beach profiles is the methodology adopted by Shoreline Management Partnerships to monitor coastal change. Based upon six monthly or even annual survey regimes, measurements are taken along widely spaced beach profiles that extend from the backshore to mean low water. Research carried out by Thomas et al. (2010, 2011a and b and 2012) showed that these annually averaged profiles can provide insights into the long term health of a beach and results did show correlation between similarly averaged forcing such as wind and waves along with their directional components. However, widely spaced beach profiles, often 1km or further apart, cannot provide enough detail to enable overall plan-form change to be accurately calculated, or for assessment of erosive impacts and recovery from storms. Therefore, decisions such as managed retreat and no active intervention are based on coarse-scale data and not the fine-scale robust dataset that should be collected to support such policies.

Present coastal defences and strategic management have not provided the best solutions, as an absence of accurate data has resulted in poor investment decisions. With sea level rise and storms becoming more unpredictable, there is a need to focus more effective use of limited resources. Therefore, Shoreline Management Plans are based on limited datasets, which are insufficient to support strategic decisions such as managed retreat. Many economic activities take place in the coastal zone and it is often where significant and high value infrastructure is located. Economic wellbeing of coastal communities is critical and there needs to be greater knowledge and understanding of problems informed by robust data. Managed retreat at Fairbourne will result in the loss of approximately 400 homes at a conservative cost of £60 million, without taking into consideration business and infrastructure losses. Ironically, if the Cambrian railway which passes behind the town of Fairbourne was to become threatened, then 'hold the line' would be the shoreline management policy response.

References:

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