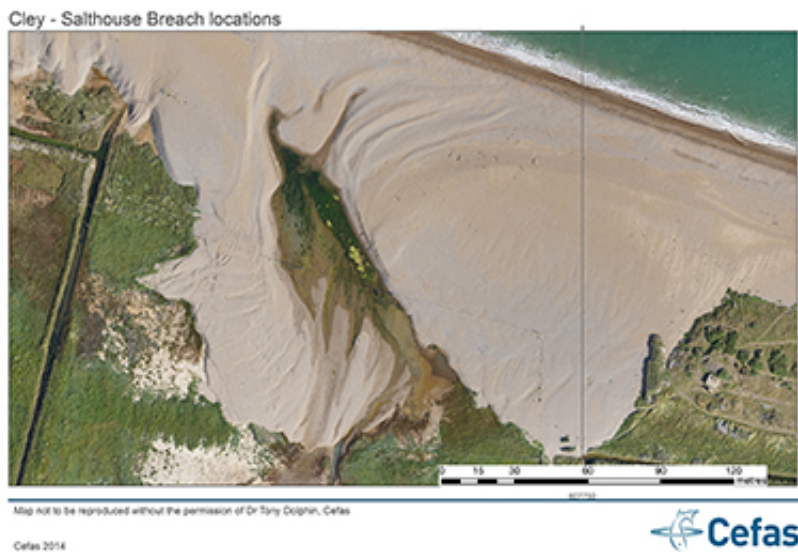


Remote piloted aircraft maps storm surge impacts

December 5 2014



One year on from the biggest UK storm surge for 60 years, new aerial photos have revealed details of breaches to the natural and man-made coastal defences on part of the East Anglian coastline.

Researchers from the University of East Anglia (UEA) and the Centre for Environment, Fisheries & Aquaculture Science (Cefas) are mapping selected areas hit by the surge on 5 December 2013. Although damage to flood defences was much lower in 2013 than in 1953, there was still extensive change to the coastline, damage to seawalls, and saltwater

flooding.

The work is part of a Natural Environment Research Council (NERC) funded short-term project to better understand the initial environmental and societal impacts caused by the 2013 storm surge and the resulting saltwater flooding. Such understanding is vital for developing improved responses to such events in the future and mitigating their impact.

Dr Trevor Tolhurst, lead scientist on the project and lecturer in UEA's School of Environmental Sciences, said: "This project is a once in a lifetime opportunity to collect data to improve our understanding of the impacts of a severe natural event and investigate how these events are perceived and responded to.

"Due to their rarity, our understanding of the impacts of these large storm surges on coastal habitats is poor. It is essential that such events are included in the investigation of future changes to our coasts and in the development of appropriate response strategies."

Coastal habitats are socially and economically important, supporting significant wildlife populations, protecting the coastline against erosion, and are widely used for recreation and attracting many tourists who boost local economies.

The threat from climate change to these habitats has been globally recognised and a better understanding of the processes that shape these habitats is a major priority for maintaining the services they provide to wildlife and society.

This project is addressing existing gaps in knowledge by investigating coastal seawater flooding and the impacts it has on vegetation, soil organisms, carbon and nitrogen cycles, as well as the responses of society.

The Cefas aerial mapping team, led by Dr Tony Dolphin, used their small Remote Piloted Aircraft to build very high resolution photo and topographic maps of parts of the North Norfolk coastline. These maps chart the storm surge breaches in the man-made coastal defences along the North Norfolk Coastal Path near Blakeney and breaches and sediment movement along the Cley – Salthouse gravel Barrier.

Sediment was transported inland over 100 meters, in places infilling protected saline lagoon habitats. The photos also provide a post-surge baseline of the condition of the freshwater marshes and saline lagoons at the National Trust's Blakeney Freshes and Norfolk Wildlife Trust's Cley Marshes and are proof of concept for an innovative research approach that will enable the cost-effective mapping of the impacts of future extreme events.

Tony Dolphin, Coastal Scientist and RPA pilot at Cefas, said: "The RPA technique is ideal for mapping the physical breaches and sediment movement, as well as the impact on vegetation, and habitats caused by the storm surge. Compared to traditional aerial photography, the RPA can be rapidly deployed following extreme events and provides higher resolution map products.

"Using these images we should for the first time be able to calculate the amounts of sediment that move in these surges, the distances they move in a few hours, and possibly even the direction and velocity of the flows. Coastal managers need this information to better understand why certain areas might be vulnerable to flooding and how to mitigate the effects.

"While data is still being processed and the projects findings won't be published until later in 2015, the effects of the surge are already becoming clearer. Evaluation of the images continues alongside periodic sampling providing time series data which will allow researchers to assess the resilience of the coastal zone to flooding and salt water

ingress.

"In addition to mapping and analysis of the storm surge, Cefas are using the RPA technique on a large range of coastal applications, including salt marsh and river bank erosion, flood defence monitoring, beach monitoring and intertidal habitat mapping."

Cefas' high resolution aerial datasets form part of a wider project aiming to assess the short term effects of the surge, which will provide the basis for future work assessing longer term impacts. Other data from the project indicate soil and freshwater invertebrates were killed by the saltwater flooding, however, plants living along the coast were more resilient. The functioning of soil microbes that are vital for maintaining a healthy habitat were also impacted.

Dr Tolhurst said: "There is a challenge in translating scientific knowledge into real-world decision-making. This project is engaging with local communities and coastal managers in North Norfolk and bodies such as the Environment Agency to better inform decision making."

"The resulting strategies will, we hope, benefit the entire coastline of the country, its habitats and those living close to it, in the future. But this is just the first step, longer-term work is required to determine how the coastal environment and local populace recover from such extreme events. "

As part of the project an event was held last month in Blakeney, bringing together local people, councillors, businesses, stakeholders and researchers to discuss the effects of the storm surge and the projects findings to determine how research can help communities, and to provide further local information to inform the project.

Provided by University of East Anglia

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