Geomorphological science can mitigate severe storm and flood damage

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Credit: University of Glasgow

A year after Storm Desmond struck the UK and at a time when the UK's Committee on Climate Change have called for urgent action to address the risks to the UK from climate change, a group of world-leading geomorphologists have laid out how their discipline can help policymakers and practitioners develop more effective storm and flood-damage limitation and mitigation strategies.

Geomorphology is the study of how land is formed, shaped and changed by the natural processes of erosion and deposition. Geomorphologists study how responsive the landscape is to extreme floods and storms, and how, in turn, the landscape itself can buffer or accentuate the risks posed to society by extreme climate events. This understanding of landscapes is

crucial to helping society become more resilient to the growing numbers of severe storm events occurring worldwide.

In a new paper published in the journal Earth Surface Processes and Landforms, researchers from the Universities of Glasgow, Cambridge, Lausanne and Lincoln, Dartmouth College and Massey University show how geomorphological research can play a central role in improving the resilience of land and people from storms and floods in the future.

This global account of the state of geomorphological science and climate extremes has a few key messages:

- Landscapes are dynamic features: Geomorphology can identify areas most at risk of change from extreme climate events to aid land use planners and improve societal resilience
- Landscapes have memory: Research on past patterns of flood and storm events over hundreds or thousands of years can help improve our predictions for the future.
- Landscapes are cumulative: Clustering of high rainfall events can lead to extreme flood or erosion impacts even where flood waters for an event are not individually extreme.
- Landscapes are buffers: Landforms can help to shield society from the impacts of extreme events

The paper's lead author Dr Larissa Naylor, of the University of Glasgow's School of Geographical and Earth Sciences, said: "As the planet's climate continues to change and severe storms and flooding become both more frequent and more unpredictable, geomorphological science can help better predict and manage the effects of these events on people and property.

"By adopting geomorphologically-grounded climate change adaptation strategies we will be able to develop more resilient, less vulnerable

societies fit to live in an age of climate extremes."

Professor Tom Spencer of the University of Cambridge said: "It's vital for geomorphologists to work closely with engineers, ecologists and landscape planners to make informed decisions about how land is used in the future and how future risks can be planned for as effectively as possible."

Professor Mark Macklin of the University of Lincoln/University of Massey said: "One of the most concerning findings of our study is that the impact of anthropogenic climate change on hydrological extremes is only just beginning. Furthermore, floodplain sedimentary archives show that recent floods are by no means unprecedented and flood risk assessment needs to be rethought worldwide."

More information: Larissa A. Naylor et al. Stormy geomorphology: geomorphic contributions in an age of climate extremes, *Earth Surface Processes and Landforms* (2016). DOI: 10.1002/esp.4062

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