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Attribution study of the December 1998 flooding in the South of Ireland

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Increases in annual precipitation and in the occurrence of extreme precipitation events have already been detected in Ireland since the middle of the 20th century. The changes in precipitation are primarily associated with the number of rain days, rather than the amount of rain. Many parts of Ireland are vulnerable to pluvial floods predominantly caused by longer periods (greater than 24 hours) of low intensity (less than 5mm/hour) precipitation. However, antecedent weather and environmental conditions influence the magnitude of the flooding.

The Munster Blackwater Catchment, in the south of Ireland, is one of the least modified major catchments in the country, with a low level of urbanisation. The catchment has an area of approximately 3324 km2.

The year 1998 is selected as a study case for being wetter than normal and the wettest for 30 years in some places. On the 29th December over 30 mm were registered in southern areas. On the 30th and 31st another depression affected the catchment area. During these three consecutive days of rainfall, more than 50 mm were recorded at Cork. Mount Russell registered the highest daily rainfall value of December on the 29th with a total of 35 mm.

The heavy rainfall between the 29th and the 31st of December 1998 led to a major flood on the Munster Blackwater, with a peak flow occurring on the 29th (the highest of the year and the fourth-highest since 1977). The rainfall caused a quick response of the river level due to the near-saturation of the soils in the catchment, with the river overtopping its banks on the 30th and lasting more than 48 hours. More than 5 IR£ million (c. €.35 million) damage was caused to property.

The historical precipitation record for the Blackwater catchment was analysed with observations data provided by two government agencies, Met Éireann and the Office of Public Works (OPW). Both datasets were subjected to a process of quality control (QC) and homogenization when required. The results of the QC exercise led to the selection of a database of suitable stations and a historical period with a sufficient number stations of long records to contextualize the event and validate models.

Models comprising two different experiments were examined: one, which represents the world as we know it today (factual), and other with the world as it would have been without anthropogenic climate change (counterfactual). The probabilities of events similar to that which led to the 1998 floods in both scenarios were calculated. The values were used to determine if this kind of event is more likely to happen due to climate change through the calculation of the risk ratio (RR).

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