UK Rains Broke River Flow Record and Climate Change is to Blame

More water **flowed** out of UK rivers into the ocean during one day last month than ever before. As Storm Desmond drenched northern England on 5 December 2016, rivers across the country **discharged** a third more water than the **previous** maximum, according to new data **released** by the Centre for Ecology and Hydrology (CEH).

The news comes a day after a study found that unusually high **rainfall** was made between 50 and 75 per cent more **likely** by climate change. Three major storms – Desmond, Eva and Frank – **tracked** across Britain during December, creating what CEH called "extraordinary" hydrological **conditions**. They were largely responsible for the country's wettest month since **records** began in 1910.

On Honiston Pass in Cumbria, Desmond **delivered** more rain in 24 hours than ever previously seen anywhere in the country – 34.1 centimetres. **As a result**, many large river catchments in northern Britain recorded their highest every **peak** flows, says Jamie Hannaford, who **heads** hydrology monitoring at the CEH.

Throughout December, several major rivers **exceeded** previous record flows. The peak records flows on the Tyne, Lune and Eden during Storm Desmond, each at around 1700 cubic metres a second, were the three highest flows ever recorded on rivers in England and Wales, and more than 30 times the rivers' **respective** average flows, says the CEH. As these and other rivers breached their banks, some 16,000 **properties** flooded.

But heavy rains were not wholly to **blame** for the **floods.** The CEH's monthly summary says that floods in some places early in December caused **landslides** that blocked up rivers, and caused **damage** to structures such as bridges that then blocked flows. This **reduced** the amount of water the rivers could carry when heavy rains returned later in the month. As a result, communities such as Glenridding in Cumbria flooded twice.

Record heat

What **caused** the record rains? A **separate assessment** by meteorologists at Oxford University this week **reported** that while "**random** weather **variability** played a large role", wider climate conditions, including those from human-made climate change, **increased** the chances of the record rains by between 50 and 75 per cent.

In particular, says study leader Peter Uhe, the sub-tropical Atlantic waters over which the storms passed on their way to the UK were unusually warm. This warmed the air above and **allowed** the storms to hold more moisture, which rained out on northern Britain.

The warm Atlantic waters also explain the **exceptionally** high temperatures in much of the UK in December. A temperature record for central England, which goes back to 1659 and is the world's longest, showed that 2015 had the warmest December ever – around five degrees Celsius above the **recent** average.

Uhe's team **warns** that previous **reports** linking the unusual conditions to natural variability **derived** from a strong El Niño in the Pacific Ocean may be wide of the mark. "The **connection** with the El Niño signal is weak in December," it says. That leaves long-term climate change as a **key factor** in increasing the chances of record-breaking weather.

The analysis "**supports** previous indications that **human-induced** climate change is increasing the risk of heavy winter rainfall" in the UK, says Peter Stott, head of climate attribution at the Met Office Hadley Centre in Exeter.

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