

From 1.5°C to 2°C global warming nearly doubles the impact of river floods on human lives and economy

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Future projections of the impact of climate change on river flooding at a global scale often focus on changes in vulnerability or exposure, and in direct economic damage. Global estimates on loss of human lives, and projections of economic damage that also include indirect economic effects (welfare losses) are still scarce, however. A recent study published in *Nature Climate Change* fills the gap.

In this study, population exposed to flooding, numbers of casualties, direct economic damage, and subsequent indirect impacts (welfare losses) have been estimated under a range of temperature (1.5°C, 2°C and 3°C global warming) and socio-economic scenarios. Current vulnerability levels were kept constant, and no future adaptation was assumed, since it is practically impossible to estimate how progress on adaptation will take place in different parts of the world. The estimates are based on two scenarios of socioeconomic growth.

According to the authors, their results 'offer the most complete picture of the consequences of floods on society'.

Population exposed to flooding

At present (reference period (1976-2005)), each year about 58 million people are exposed to river flooding globally. This number would increase by 50% to 60% if the ambitious mitigation target of 1.5°C is reached, and by 76% to 102% in a 2°C warmer world. At 3°C warming, the increase would be 120% to 188%. These ranges reflect the outcomes of the two scenarios of socioeconomic growth.

Numbers of fatalities

Global flood mortality shows a more pronounced rise with warming. In the current climate, global river flood mortality is nearly 5,700 fatalities per year. Under 1.5°C global warming this mortality would increase by 70% - 83% (9,700 - 10,400 casualties). For 2°C global warming an increase by 103% - 134% (11,500 - 13,300 casualties) is estimated. At 3°C warming, the increase would be 180% - 265% (15,900 - 20,800 casualties).

Direct damages

At present, the scientists estimate global direct river flood damages to be €110 billion per year on average, the same order of magnitude as previous global studies. The three levels of global warming would increase this damage by 160% - 240% (1.5°C), 320% - 520% (2°C), and 620% - 1,000% (3°C), respectively.

Welfare losses

The increase in direct flood damages leads to welfare losses for all regions at all warming levels. The global welfare reduction with respect to a scenario without climate change is projected to reach at least 0.27%, 0.40% and 0.53% at 1.5, 2 and 3°C warming, respectively. Welfare losses strongly differ from one region to another. Some advanced economies, such as Japan, South Korea and North America, are barely affected, whereas highly populated developing regions, such as China and south Asia (including India), may undergo welfare losses much higher than the global average. In fact, the greatest overall flood impacts are projected for Asia at all analysed warming levels.

Source: Dottori et al., 2018. Nature Climate Change 8: 781-786.

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