

New insights into US flood vulnerability revealed from flood insurance big data

March 19 2020



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An international team of scientists, led by the University of Bristol, has found that current estimates of flood risk rely upon methods for

calculating flood damage which are inadequately verified and match poorly with observations.

Instead, [building](#) damage at a given [flood](#) depth is highly variable and can be characterized by a beta distribution.

When calculating flood risk—that is, translating modelled representations of the physical phenomenon of flooding to its impacts—it is common to apply a 'depth-damage function' or curve, which relates a given water depth to a proportional building loss (for example one metre of water equals 50 per cent loss of building value).

Academics have understood that this depth-damage relationship is variable and that there is no perfect fit, but it is still common to apply such curves which are inadequately verified.

The new study, published today in the journal *Nature Communications*, used commonly applied curves, developed by various US government agencies, and examined how they compare to millions of actual flood insurance claims made in the US.

The study's aim was then to find out if ubiquitous curves have any skill in replicating real measured losses and, if not, find the true relationship between depth and damage in the claims record.

It found that universally applied depth-damage curves show low skill in the replication of property-level damages, rendering the results of projects where they have been applied (for example the justification of billions of dollars of infrastructure investment) suspect.

Instead, depth-damage is highly variable: damages per depth are generally concentrated at high (>90 per cent) and low (90 per cent) damage and lower probability of low (

Citation: New insights into US flood vulnerability revealed from flood insurance big data (2020, March 19) retrieved 13 August 2024 from <https://phys.org/news/2020-03-insights-vulnerability-revealed-big.html>

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