

Disparities in the distribution of flood adaptation resources could be curbed by equity-weighting, research suggests

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Credit: Ian Turnell from Pexels

As the effects of climate change intensify, the need for efficient and equitable climate adaptation policies is becoming more urgent. This is

especially true for U.S. coastal counties impacted by climate-induced sea-level rise and the socio-economically vulnerable areas within them that are often characterized by higher flood risks.

Conventional benefit-cost analyses used to allocate adaptation resources in coastal areas have often resulted in distributional inequities. In a [study](#) published in *Environmental Research Letters* examining flooding adaptation measures in New York City (NYC), researchers at Princeton University and the Environmental Defense Fund show how a new type of benefit-cost analysis can better account for the value of flood mitigation benefits to low-income households.

The study focuses on two adaptation measures: property buyouts and retrofitting. Property buyouts are when governments purchase properties from residents in high flood-risk areas, while retrofitting involves elevating and wetproofing buildings. For each adaptation measure for each building, the researchers calculated benefit cost ratios (BCRs). The researchers calculated adaptation costs using data from the NYC Department of City Planning and the Federal Insurance and Mitigation Administration. The benefits of each measure were quantified by calculating the value of expected avoided damages over a 50-year time horizon.

When the researchers used traditional valuation methods, the BCRs were highest in census tracts with fewer disadvantaged communities, implying that there may be an implicit bias in resource allocation towards less vulnerable populations.

"The current application of BCRs inherently favors affluent and non-disadvantaged communities due to their higher property values," explains lead author Joe Lockwood, a Ph.D. student at the Department of Geoscience. "Essentially, the more valuable the property, the higher the avoided costs of damage appear, and the more justified the

adaptation measure seems, economically. This skews our climate adaptation strategies to favor wealthy and non-disadvantaged communities, who may already possess the means to protect themselves."

In an alternative model, the researchers recalculated benefit cost ratios with "equity-weighted" benefits that would operationalize the assumption that a dollar saved from avoided damages would have a greater effect on a low-income household's well-being than a high-income household. In a benefit-cost analysis, these weights effectively place more value on the benefits of buyouts and home elevations in disadvantaged communities.

"The US Office of Management and Budget recently updated their guidelines to federal agencies to allow the use of these weights in federal benefit-cost analyses, but they have yet to be broadly applied," explains co-author Jesse Gourevitch, a postdoctoral fellow in the Economics Team at the Environmental Defense Fund. "This work demonstrates the feasibility of implementing these weights and what their implications might be in practice."

With the inclusion of equity weights, there was a substantial increase in BCRs for adaptation measures in communities such as the Bronx and Jamaica Bay. According to the researchers, this indicates that equity weightings have the potential to reduce bias in hazard mitigation funding within the United States.

"Some governmental decisions on flood recovery and adaptation are currently prioritized using Benefit-Cost Analysis," explains Michael Oppenheimer, the director of the Center for Policy Research on Energy and the Environment and Albert G. Milbank Professor of Geosciences and International Affairs and the High Meadows Environmental Institute. "Continuing to use traditional formulas will continue historical

inequity in outcomes of these programs. The new approach, if applied by governments, could begin to remedy this failure."

More information: Joseph W Lockwood et al, Socioeconomic distributional impacts of evaluating flood mitigation activities using equity-weighted benefit-cost analysis, *Environmental Research Letters* (2024). [DOI: 10.1088/1748-9326/ad4ef8](https://doi.org/10.1088/1748-9326/ad4ef8)

Provided by Princeton University

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