

## MACH Focus Areas



# Adaptation Strategy Design

## What problem does this focus area address?

As climate change intensifies, problems like rising sea levels, extreme weather, and wildfires become more severe. Governments, businesses, and individuals must make tough decisions about how to respond with limited resources.

These are complex problems with no easy solutions. For instance, coastal cities must decide when and where to invest in infrastructure to protect from rising seas. Communities face choices about changing building codes or relocating from risky areas. Homeowners in flood zones must weigh their options—for example, do they elevate a home, move, or do nothing?

## How can this research be used?

In light of these challenges, the mission of MACH's Adaptation Strategy Design research group is to help decision-makers ranging from governmental agencies to individuals better navigate the complex tradeoffs associated with climate-change adaptation. These are difficult decisions, often extending beyond simple economics into the realms of ethics and social responsibility.

Adding to the complexity are the uncertainties inherent in climate change projections. Pinpointing the exact timing, location, and scale of sea-level rise and extreme weather events remains a formidable challenge.

Additionally, not everyone faces climate risks equally. For example, low-income communities and those with health issues often have fewer

## What is MACH?

The Megalopolitan Coastal Transformation Hub (MACH) is a consortium of 13 institutions that brings together academics, policymakers, and community leaders to research climate change impacts and develop effective, evidence-based responses in the Philadelphia–New Jersey–New York region and beyond. Learn more about MACH at [coastalhub.org](http://coastalhub.org).



Coastal Climate Risk



Housing, Insurance, and  
Mortgage Markets



Municipal Finances



Household Decision-Making



Transdisciplinary Research  
and Co-Production Design



resources to adapt. The research group analyzes tradeoffs between potential benefits and drawbacks of adaptation strategies in light of a community's values and objectives.

To help navigate these complex trade-offs, the group employs sophisticated tools such as cost-benefit analysis, decision analysis, multi-objective optimization, and computational modeling. These tools enable researchers to carefully assess the impacts of different strategies and to identify solutions that yield additional benefits.

### How does this research relate to the work of other focus areas?

Ultimately, adapting to climate change is not just a technical challenge; it is a societal issue. Tough decisions must be made about how to invest limited resources. This group's research highlights how to make the most of available resources by integrating findings from many of MACH's other research groups, including projected risks from compound flood modeling and insights into household-level decision making from interviews with community members.

*The work described here is conducted by researchers at Dartmouth College affiliated with the MACH consortium. Contact [coastalhubinfo@gmail.com](mailto:coastalhubinfo@gmail.com) for more information.*

### KEY POINTS

- Climate-related issues like sea-level rise, extreme weather, and wildfires are becoming more severe, forcing governments, businesses, and individuals to make difficult decisions with limited resources.
- The MACH Adaptation Strategy Design research group studies the complex decision-making process involved in climate adaptation.
- The group considers the uncertainties of climate projections and focuses on ethically defensible resource distribution, tradeoffs between benefits and drawbacks, and strategies reflecting community values.
- Researchers use advanced tools like cost-benefit analysis and computational modeling to evaluate climate adaptation strategies.
- Adapting to climate change is a societal issue. This group's research explores how values, economics, and politics shape effective and ethically defensible adaptation strategies.



*Examples of climate adaptation include (clockwise from top left) the construction of infrastructure such as seawalls, beach replenishment, house elevation, and relocation. Every method involves a balance of benefits and drawbacks and long-term implications for residents.*

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