

# COASTAL HAZARDS, EQUITY, ECONOMIC PROSPERITY, AND RESILIENCE (CHEER) HUB



CHEER is an NSF-funded Coastlines and People (CoPe) Hub that connects 11 universities, more than 50 researchers and students, and regional community partners. We study coastal hazards; their effects on buildings, households, and economies; and government policies intended to mitigate harm while also promoting social equity and economic prosperity.



Hub researchers engage in a broad set of projects related to hazards, equity, economics, and resilience, but our central focus is a collaborative effort to build a dynamic computational tool that can support policy design by modeling different scenarios, objectives, and constraints. Our [Stakeholder-based Tool for the Analysis of Regional Risk \(STARR\)](#) builds on years of previous work and is already able to perform some analyses. However, the tool continues to evolve as we add layers of complexity, nuance, and trade-offs. [We are forming a standing practice partners group with semi-annual meetings because we want your input to inform our future versions of the STARR framework. Our goal is to make its results, outputs, or the model itself as useful as possible to you and practitioners like you.](#)



Existing models can forecast storms, estimate damages, or recommend the 'best' strategy to reduce risk. **STARR is different.** It integrates decades of research on how households, governments, and insurance companies make decisions to predict how these actors will respond to changing coastal hazards and to changes in government policies (e.g., different incentives for home retrofits or constraints on insurance pricing). One study, for example, compared three different land use regulations that communities in Eastern North Carolina could adopt and how each would be expected to affect the number of new homes built in floodplains over the coming decades. [As a practice partner, your questions will spark new research projects like this one, and your expert insight into how decisions are truly made will help vet and improve how well STARR models those decisions and their outcomes.](#)

**STARR is dynamic:** it steps through time and changes conditions year to year. Each year, stakeholders make decisions based (in part) on variables describing population, buildings, demographics, hazards, and economic conditions. Government actors set policies and budgets, and insurers and households respond. Hurricanes may or may not occur each year (based on probabilistic models from our Hazards team). We update variables to reflect changes due to the decisions (e.g., homes built, homes bought out or retrofitted) and hazards (e.g., homes destroyed), and the model steps to the next year. Early versions of STARR recommended government policies (e.g., how many home retrofits to fund and where) based on what decisions were most likely to reduce damage from

hurricanes over time. However, policymakers are not just concerned about reducing damage, so we are currently working on versions of STARR that will also consider the effects of policy choices on equity and economic prosperity. We hope to identify strategies that produce win-win-win situations or, if that is not possible, to better understand and to quantify the trade-offs at stake.

Modeling coastal hazards, buildings (type, size, mitigation techniques, estimated damage under different hurricane scenarios), households (composition, demographics, and expected responses), and economics requires extensive data collection. STARR is currently focused on **eastern North Carolina**, but we plan to expand to **Houston and Port Arthur, Texas**, and we are working on the data collection and initial modeling necessary to do so. Our goal is to build a framework and tools that others can expand even further – to include more geographies, more actors, more objectives, more hazards.

## Additional Details

### Types of STARR Products

- Policy recommendations to achieve specific objectives (e.g., the amount, number, and distribution of home retrofit grants to maximize reductions in overall economic losses)
- What-if scenarios to explore policy variations (e.g., what if funding were allocated to maximize equity or what if government disaster aid funding rules changed)
- Hazards projects (e.g., hurricane probability)
- Damage and loss projections (we are working towards a more holistic understanding of household disruption)
- Economic projections (e.g., impacts on revenue, employment)
- Disaster aid estimates over time

### Hazards Included:

*Currently:* hurricanes, severe wind, flooding  
*Coming Soon:* inland flooding, sea level rise

### Government Policies Included:

- Home retrofit grants (for all or only insured households)
- Buyouts (number, price, spatial distribution)
- Insurance mandate (with capped profit factor)

### Running the Model

Currently, running STARR requires big computing power, several days, and a technical expert. We'd like to discuss a more accessible version.

### How is STARR different?

STARR goes beyond HAZUS or IN-CORE and other such tools by enabling comparisons of different policy scenarios and by predicting actions of insurers, households, and government policies over time. It provides dynamic insights for long-term planning.

## Questions For You

*(to discuss at our meeting)*

- What outputs or products would you find most useful (or usable)? What formats (e.g., reports, datasets, maps)? This could be you or others in your organization or field. This could be products from the list at the left or something new.
- What types of questions do you wish STARR could answer or what scenarios it could represent? What are your most pressing challenges, questions, or data needs?
- Would you like to be able to run STARR yourself (individually or as an organization)? We are curious if there is interest in a more accessible version of STARR (in whole or parts) and what features that would need to have to be usable.
- If we were to add more hazards or more policy options, what should we prioritize?
- What are we missing?

Learn more: [www.drc.udel.edu/cheer](http://www.drc.udel.edu/cheer)