

## Insurance's Role at Climate's Frontlines: Crisis, Innovation, and Community

March 7, 2025

Foley Hoag LLP, Boston

*and*

Streaming on Zoom



**Sustainable  
Solutions Lab**

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# PROGRAM INTRODUCTION

## Insurance's Role at Climate's Frontlines: Crisis, Innovation, and Community



# Setting the Stage: The Insurance Market in the Face of Climate Change – Recorded Remarks

**U.S. Senator Sheldon  
Whitehouse  
State of Rhode Island**

# Reimagining Insurance Markets That Work for Everybody

**Charlie Sidoti**

*Executive Director  
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MARCH 2025 - ENVIRONMENTAL BUSINESS COUNCIL OF NEW ENGLAND

# Reimagining Insurance Markets That Work For Everyone

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Insurance Role at Climate's Frontlines

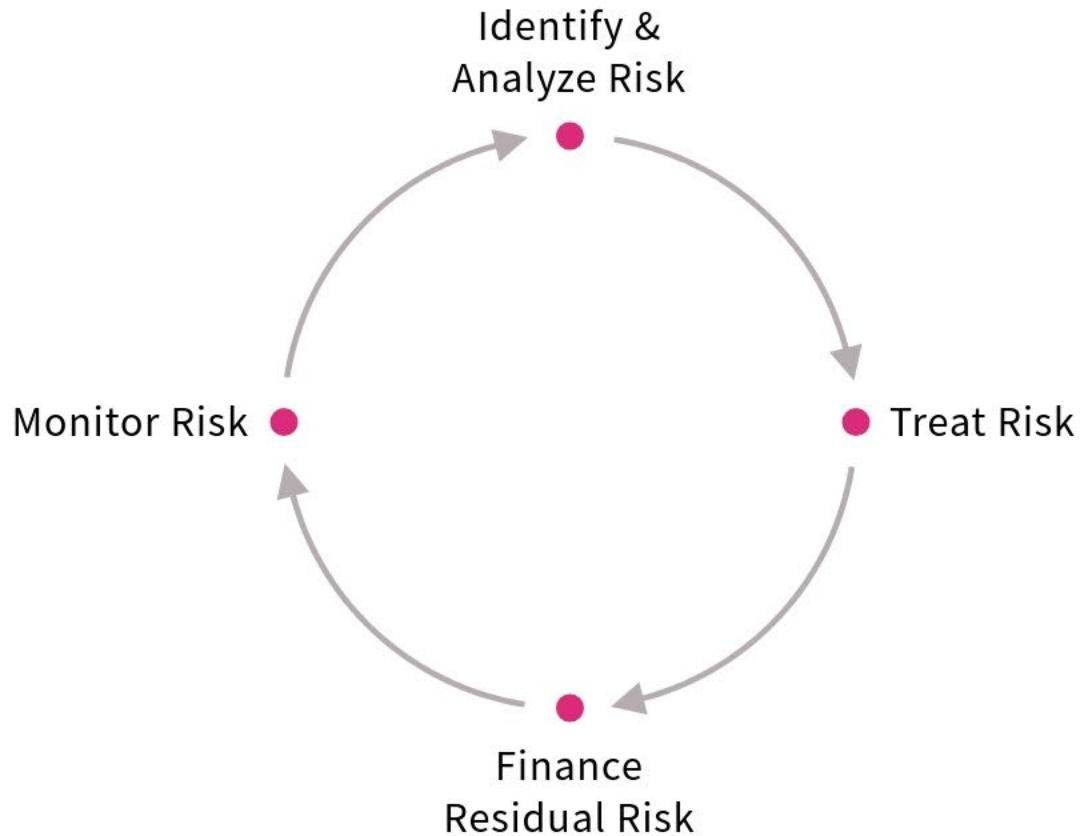
Crisis, Innovation & Community

# Agenda

- 1 | Risk & Insurance Management Basics
- 2 | The Challenge
- 3 | Innovation Road Map
- 4 | Catalytic Capital
- 5 | What Success Looks Like

# The Fundamentals

Risk: The Potential for Harm



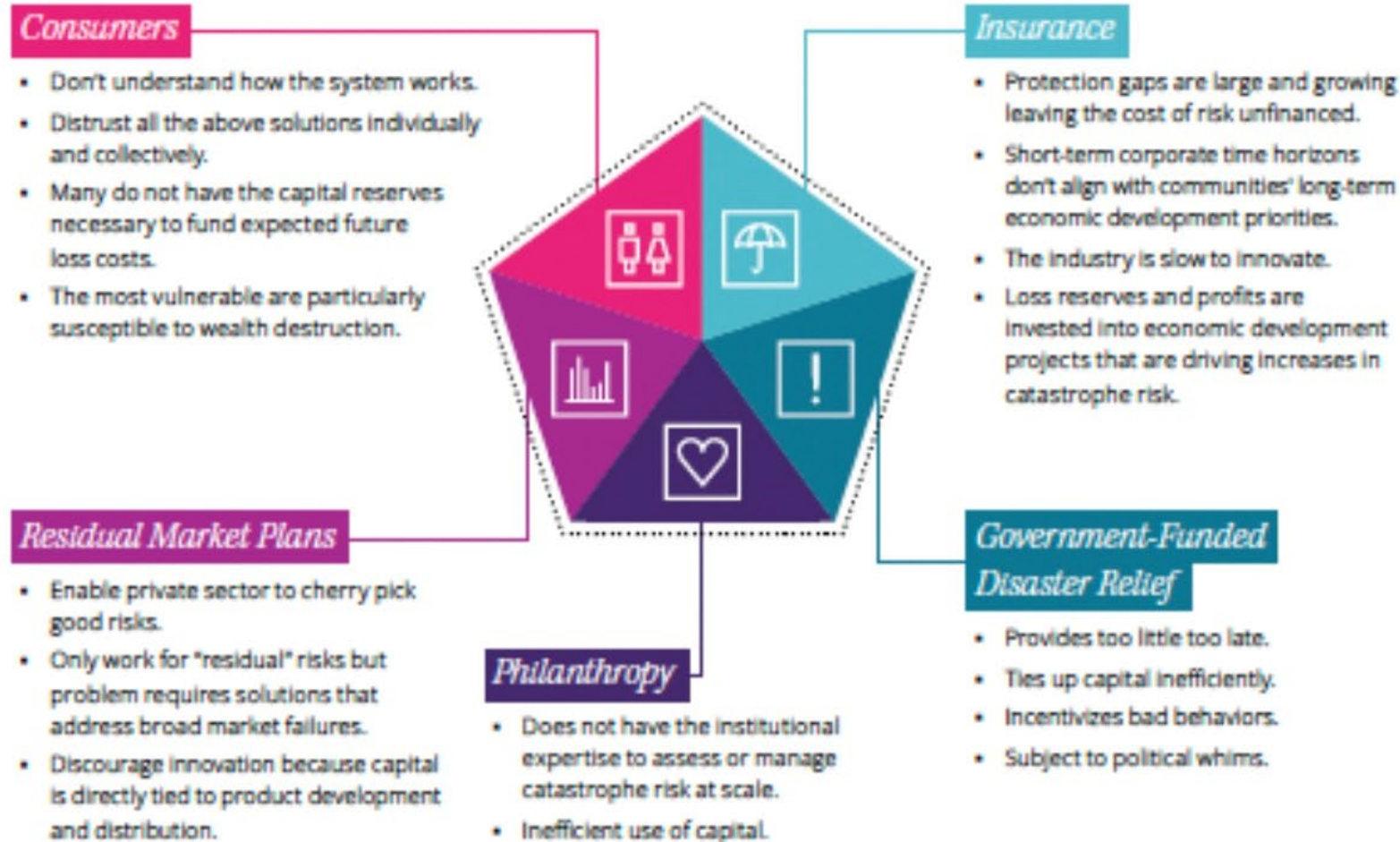
- Risk: "Potential"
  - Frequency, Severity, Confidence Level/Certainty
- Approaches to Analysis
  - Engineering
  - Actuarial
  - **Market-based Considerations**
- Only Possible Treatments
  - Avoid, Mitigate, Accept, or Transfer
- Financing Risk
  - Pre-loss Funding - (Insurance, funded reserves, risk retention groups, self-insurance funds/captives)
  - Post-loss Funding - (Current expensing, loss sensitive programs, debt financing, post loss assessments, fair plans, most relief)
  - **Contractual** Risk transfer (Insurance)



## The Problem

# We have met the enemy and it us!

Exhibit 2. The Current Risk Financing Ecosystem



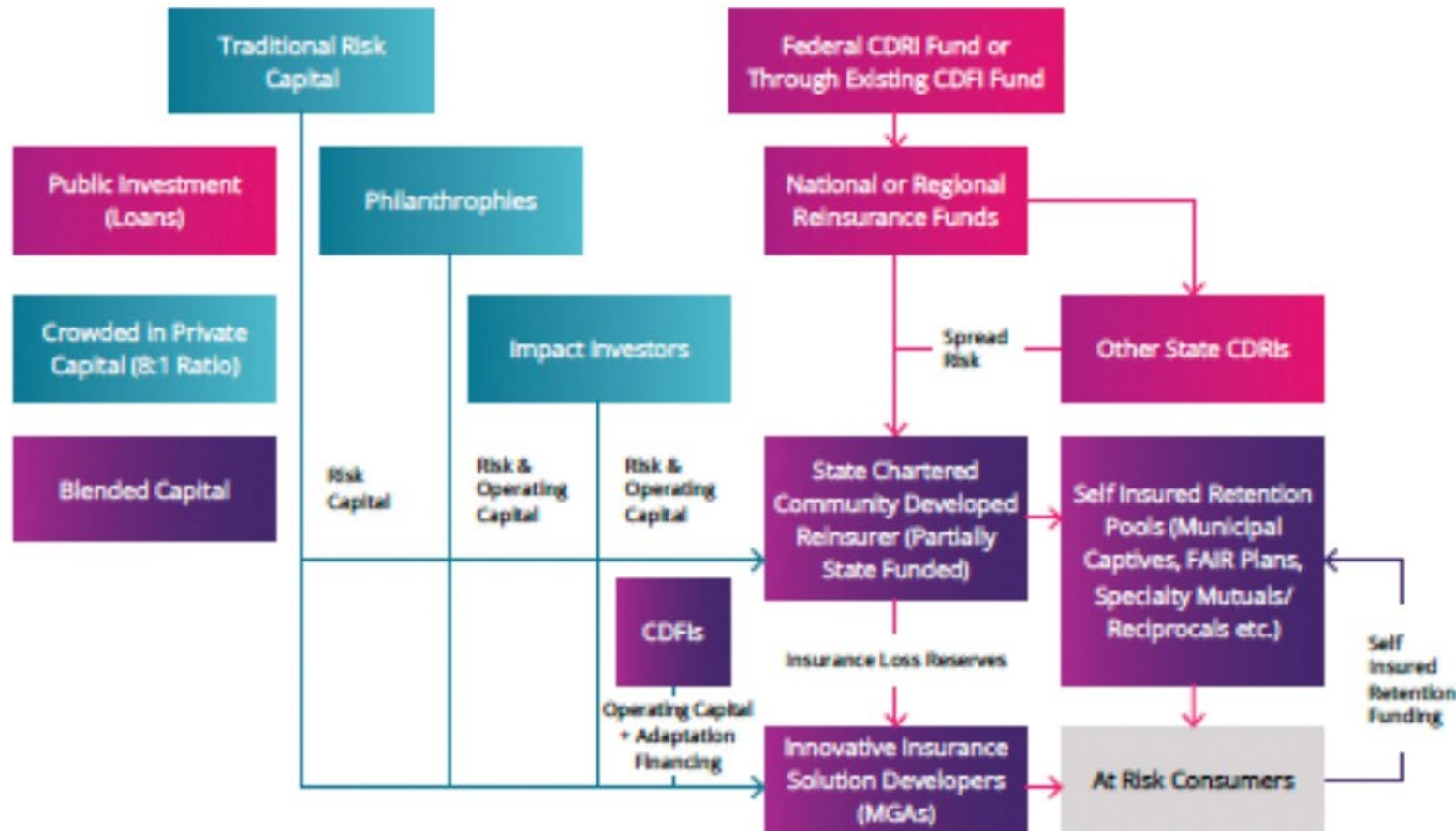
- Protection gaps are large and growing
- The total cost of risk and who it lands on is unknown.
- Incentives are misaligned

## The Problem

# Need for Catalytic Risk Capital (Ins. Loss Reserves)

We need Community Development Reinsurance

**Exhibit 5. Sources of Risk Capital to Backstop Innovative Insurance**  
Government led funding designed to crowd in private capital (8:1 Ratio)



- 1500 CDFIs  
1 CDRI - GreenieRE
- Catalytic Ins. Capital
  - Close to community
  - Mission Driven
  - Design to promote innovation
  - Community Level up

Reimagining How **The System** of Insurance/Risk Finance Is Delivered

# Physical & Financial Resilience For Everyone

We Support Both Industry (Supply)-led & Community (Demand)-Led Innovators





# We are working with communities in VA, CA, MA & HI.

And building a pipeline of projects, community test sites and funding partners to support innovative projects.



## Southwestern Virginia

As one of the winners of the **2024 RISE Riverine Community Resilience Challenge**, we will work with a SW VA community on a TCOR and community insurance program pilot.



## California

In partnership with the **California Department of Insurance**, and funded by the **Robert Wood Johnson Foundation**, we will establish a microinsurance pilot program in six low-income and wildfire-prone communities in CA.



## City & County of Honolulu, HI

As a team led by HR&A, we are contracted by the **City and County of Honolulu** to provide climate finance planning services, which will include training for community insurability planning.



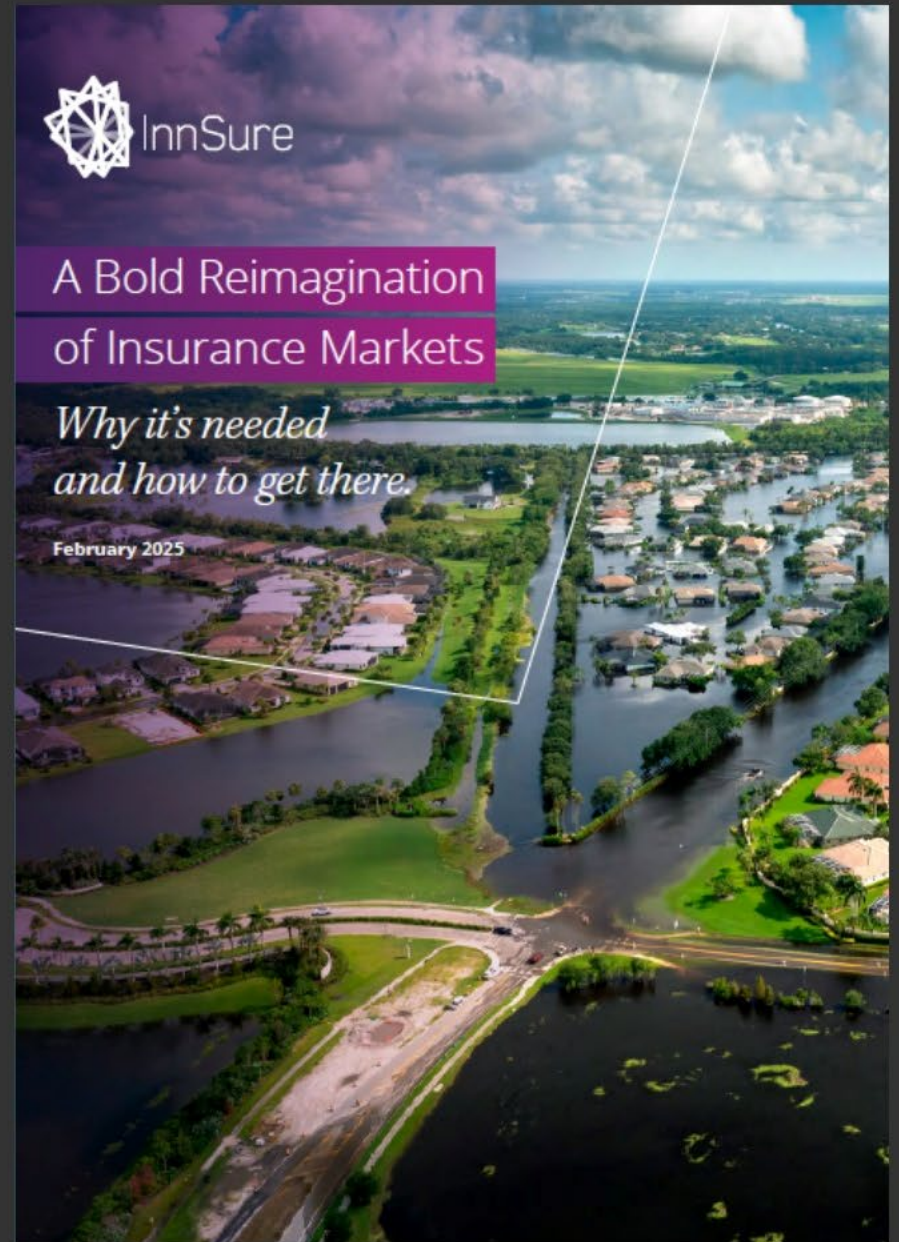
## Salem, MA

InnSure is working with the Town of Salem, MA to design and launch a home resilience audit program and create feedback mechanisms to capture the value of program impacts in insurance markets.

# Thoughts? Questions?

Charlie@InnSure.org

QR Code to White Paper





# Intersections of Insurance and Nature-Based Solutions

**Michael Beck**

*Director, Center for Coastal Climate Resilience  
University of California, Santa Cruz*

# Intersections of Insurance & Nature-Based Solutions

Prof. Michael Beck, UC Santa Cruz  
Director & AXA Chair



**Center for Coastal  
Climate Resilience**

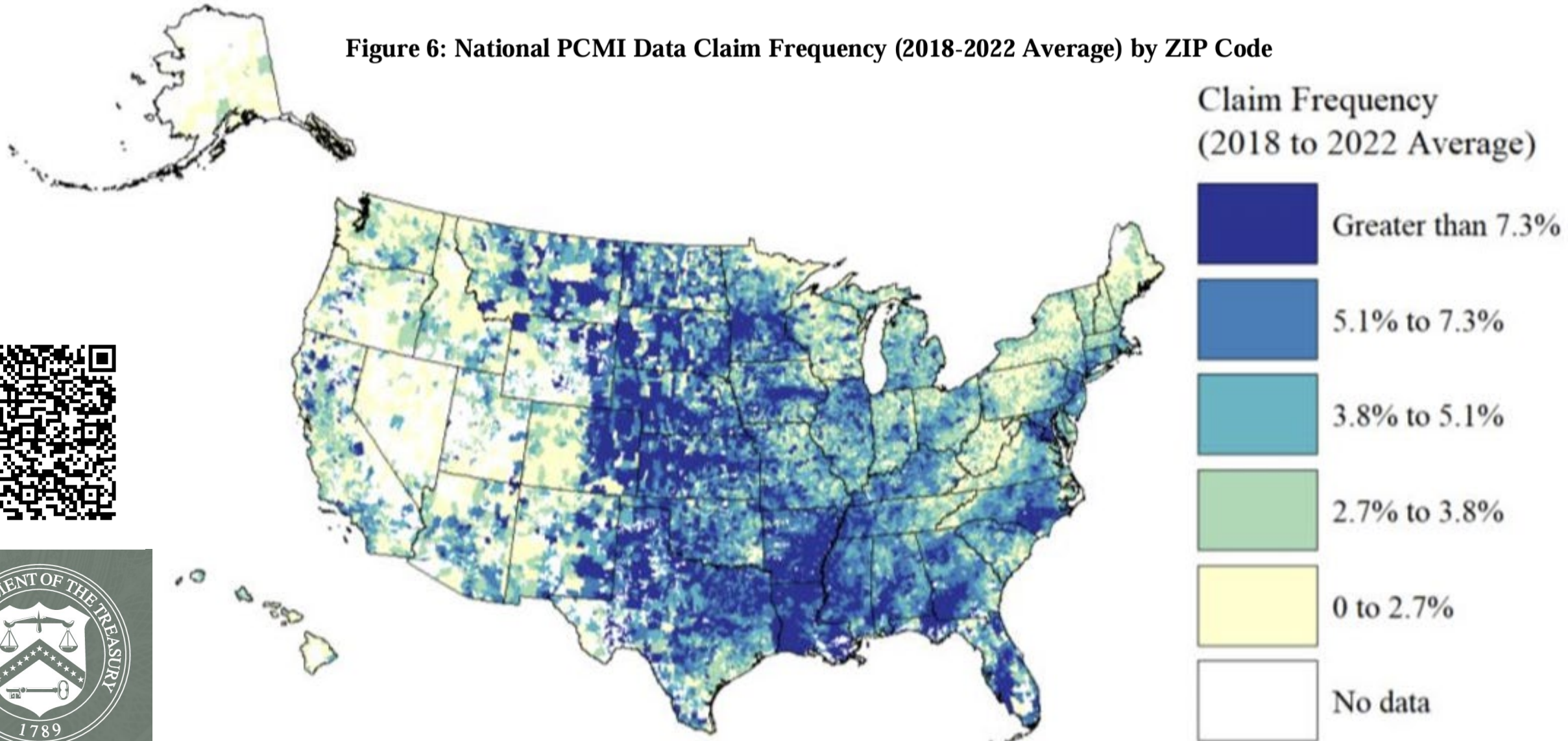


# Risks are Rising



# Rising Claims (& Costs of) Insurance

Figure 6: National PCMI Data Claim Frequency (2018-2022 Average) by ZIP Code





# Assess Risk | Value Nature | Incentivize Solutions

- Assess Coastal Risks
- Rigorously Value Benefits of Nature & NBS
- Identify Incentives to Invest in Solutions to Reduce Risk + Enhance Environment



Forces of Nature: Economic Valuation of Coastal Protection from Mangroves

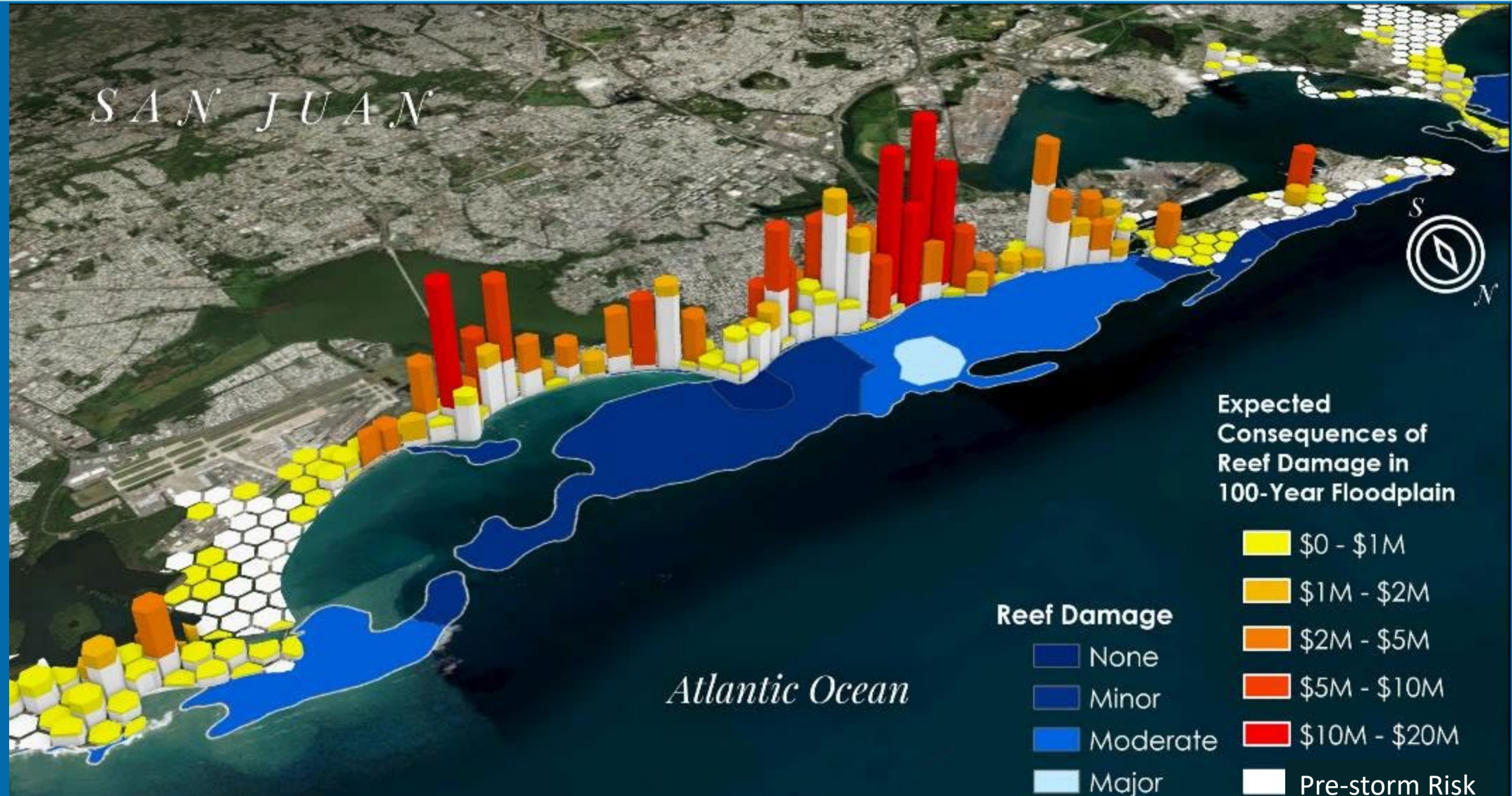
# How Mangroves Protect Coastlines



<https://www.youtube.com/watch?v=29tLtykLkTM&feature=youtu.be>



# Quantifying How Hurricane Damage to Reefs Increases Flood Risk



Storlazzi, Reguero, Beck et al. 2021 (USGS). 2022 (Nat Sust). 2025 (Sci Adv)



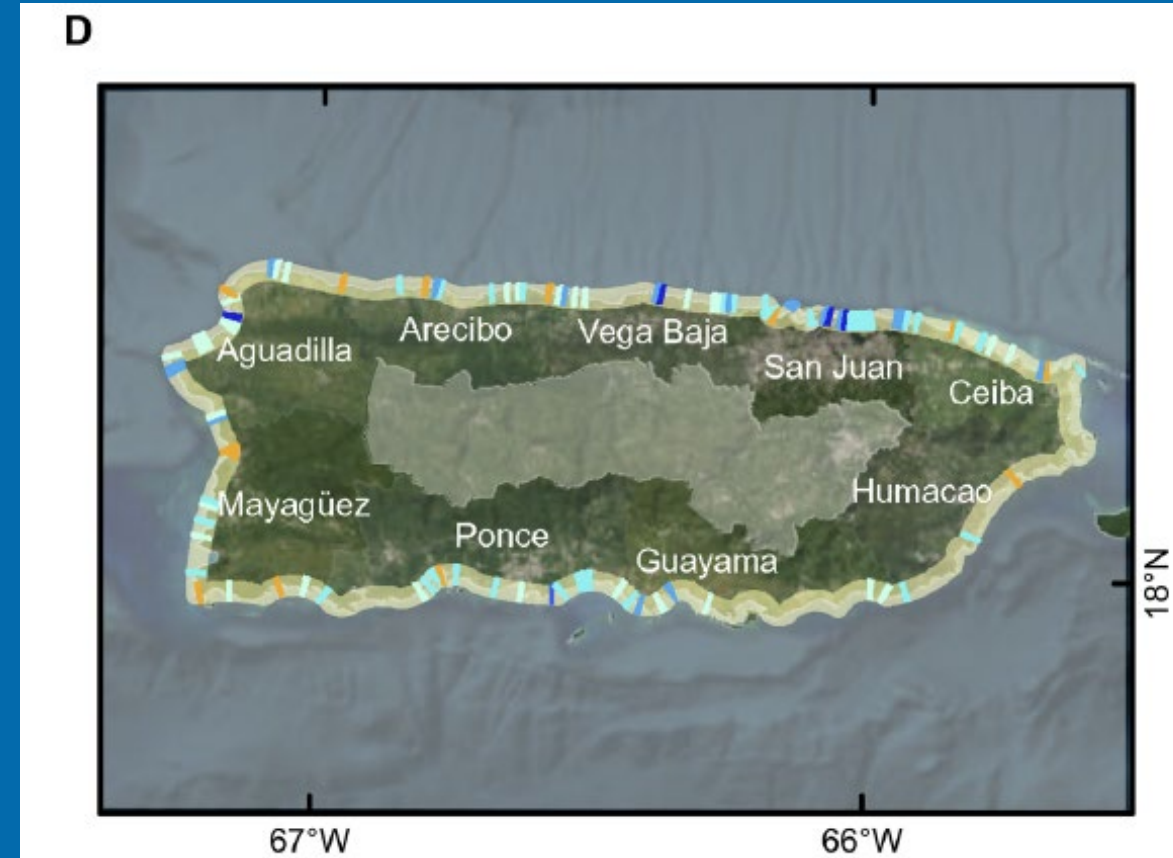
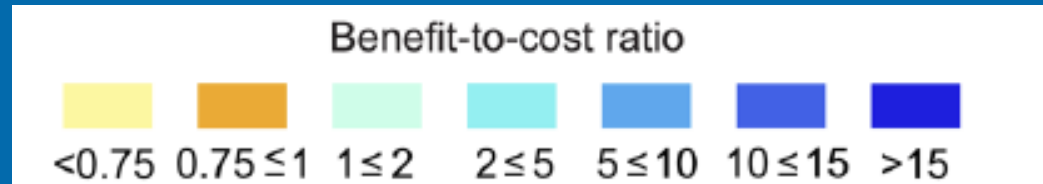
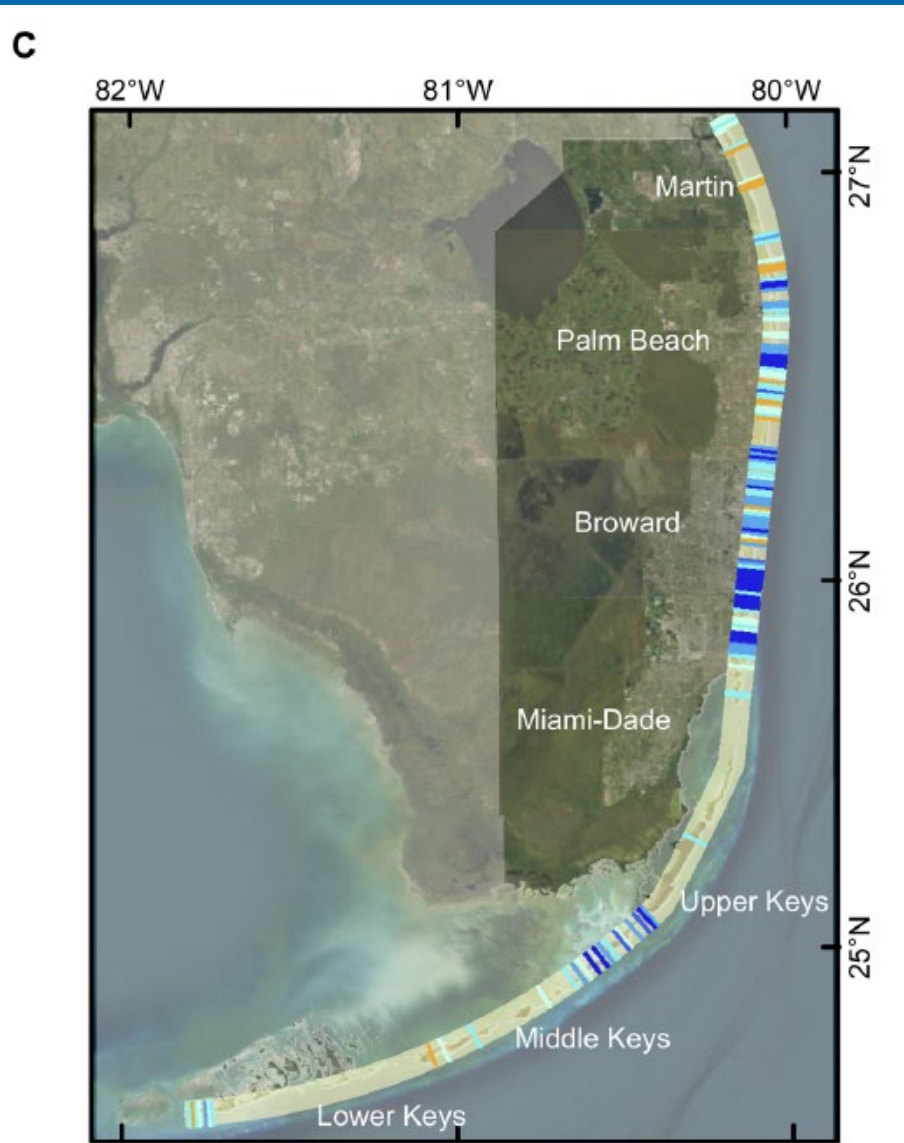
# Quantifying The Benefits of Reef Restoration



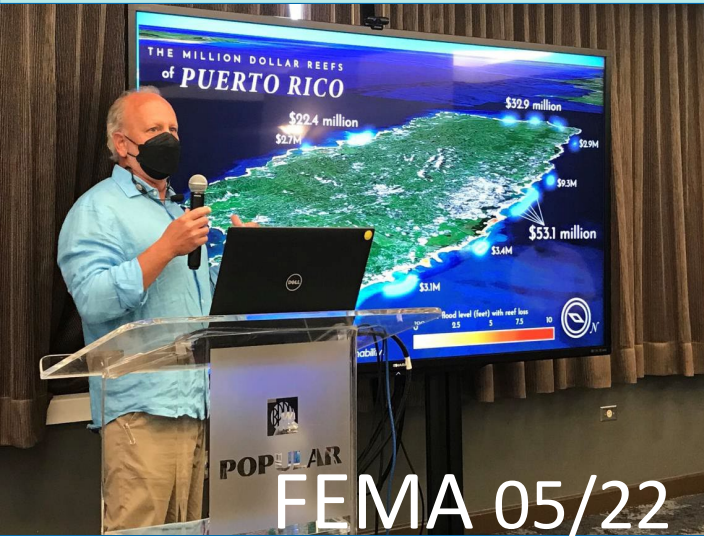


# Benefit Cost Analysis

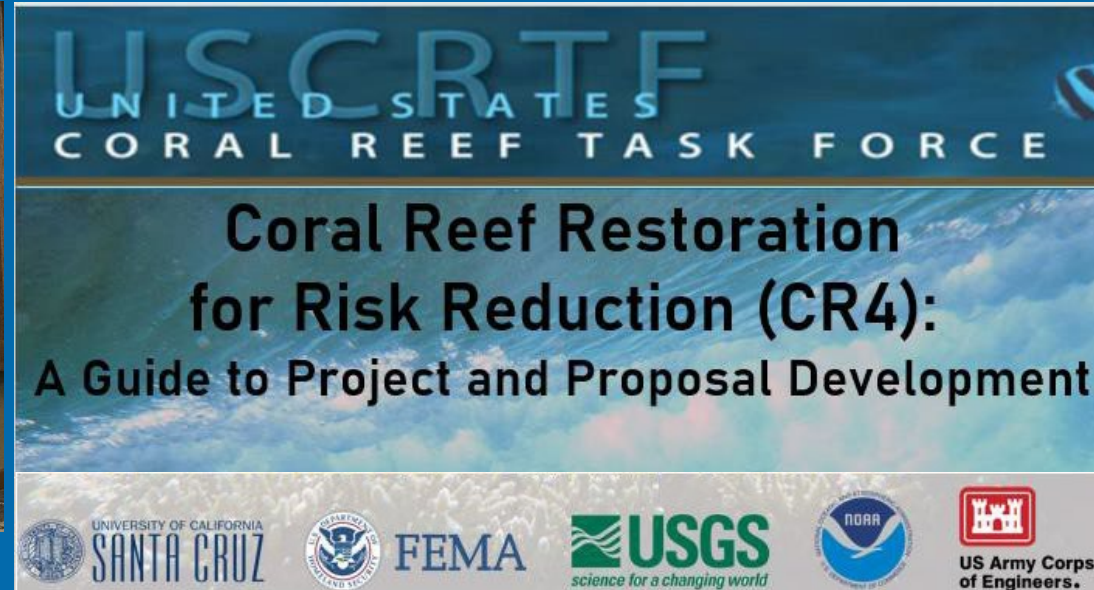
## Reef Restoration (30 yr, 7%)



# Changing Policy: Reefs as National, Natural Infrastructure



FEMA 05/22



USVI Gov Announces  
Exec Order Oct '23



**Coral reefs as national natural infrastructure:** The U.S. Coral Reef Task Force designated coral reefs as national infrastructure for coastal protection. The designation built upon Task Force member efforts to identify and prioritize federal funding for coral

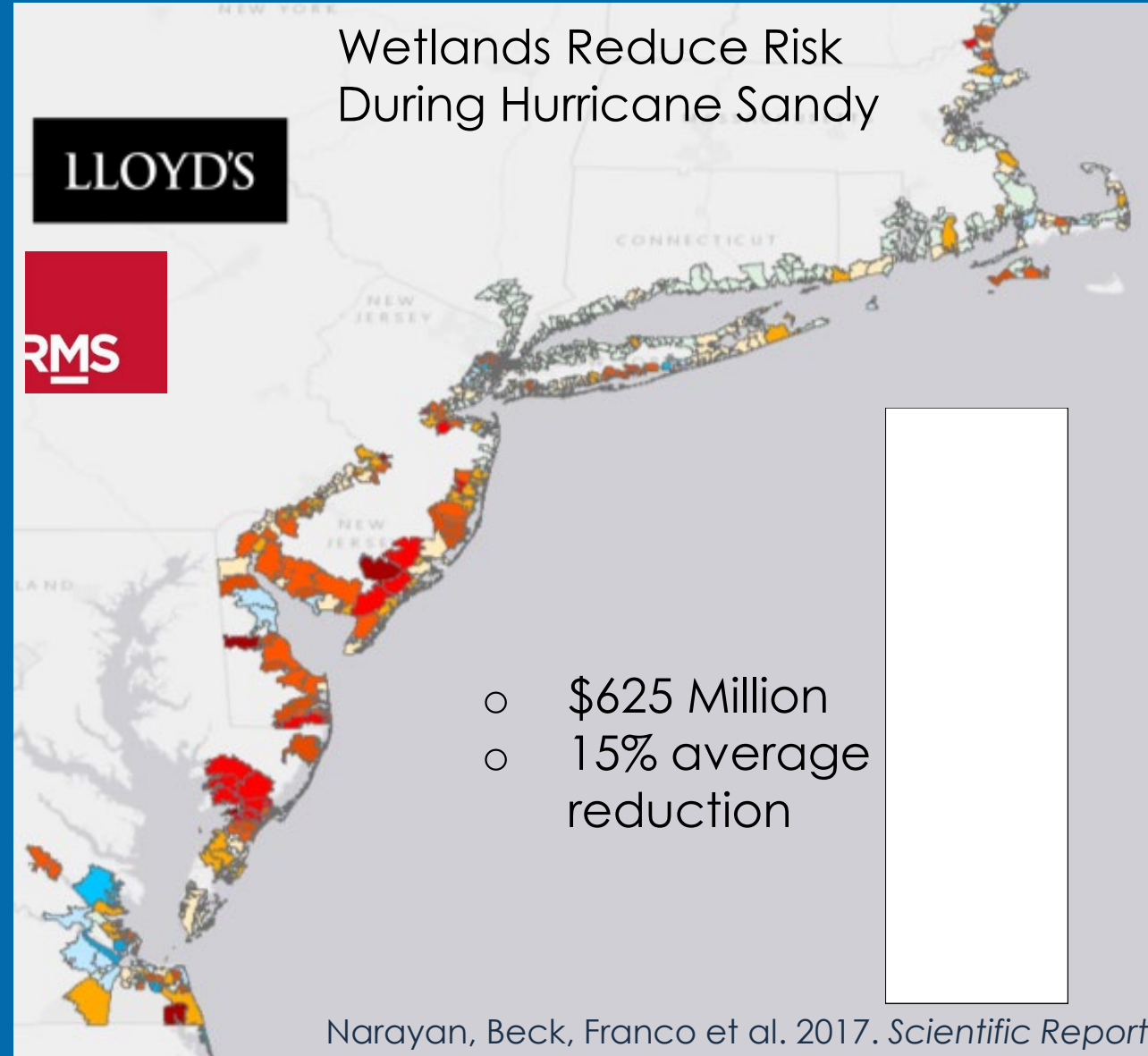


# Solutions/Recommendations

- Include natural assets in national accounting
- Rethink infrastructure investments
- Use disaster recovery funds to repair natural defenses
- Design insurance incentives for natural capital
- Build Innovative Demos

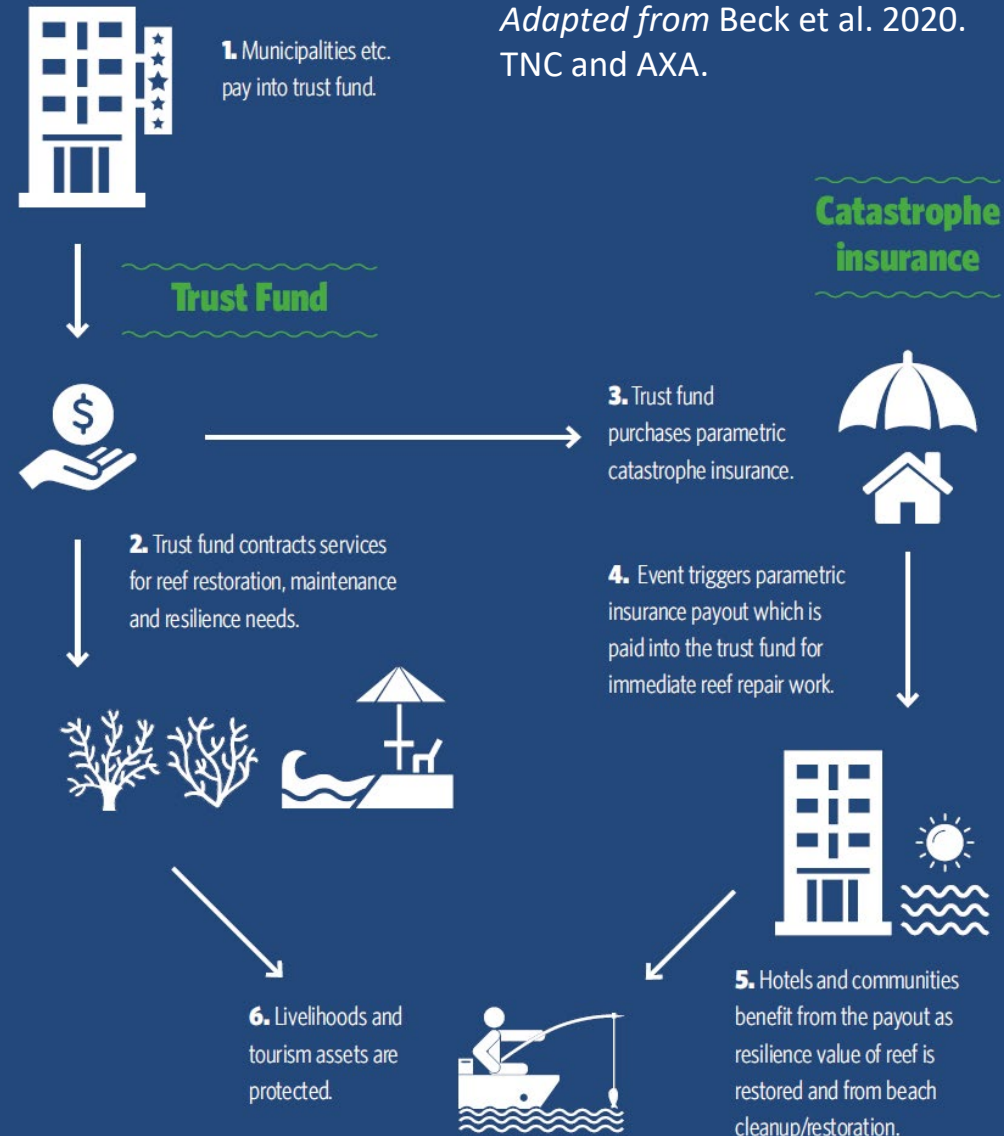


# Informing Risk Industry Models





# Insuring Nature



# Mangrove Protection & Insurance Premiums

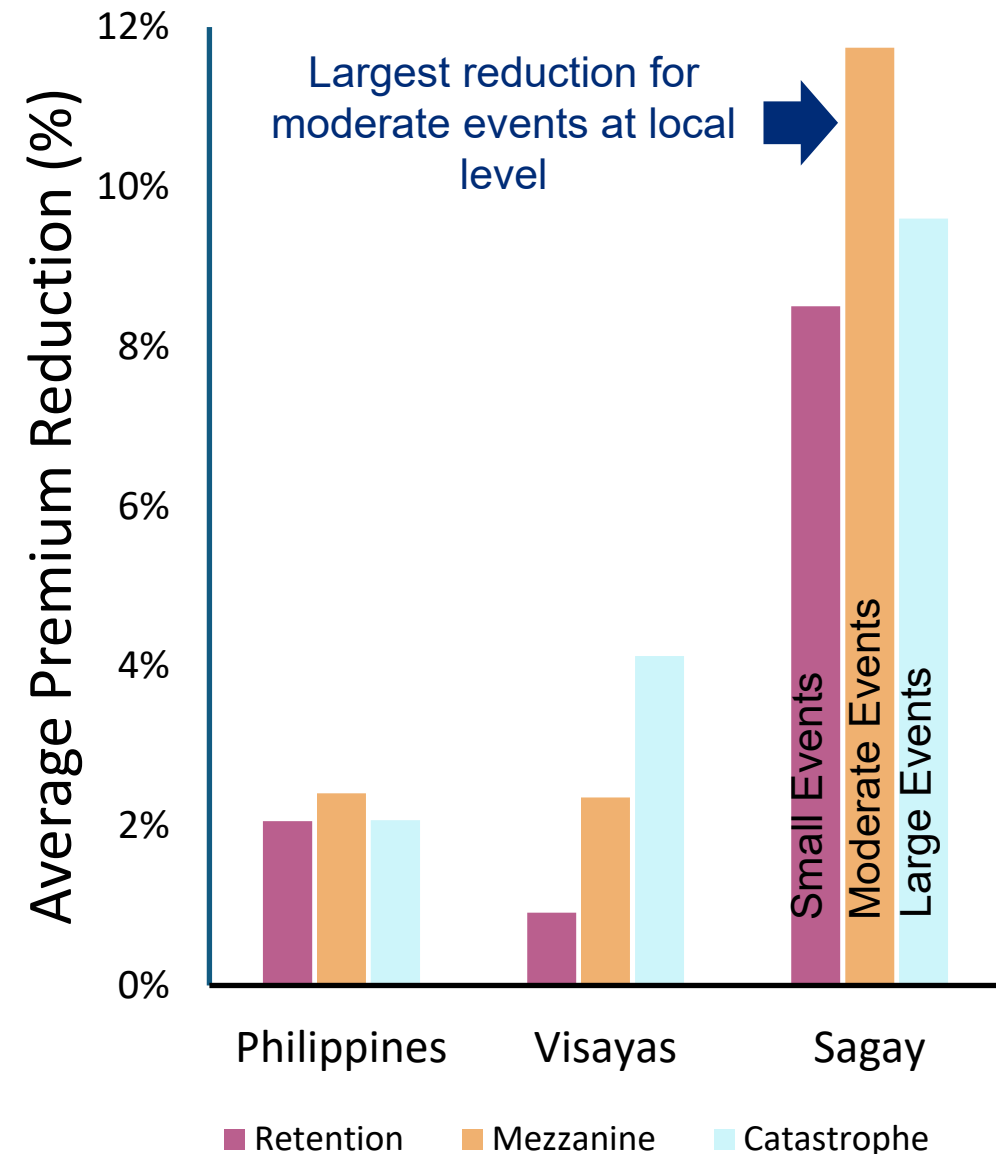


*National*

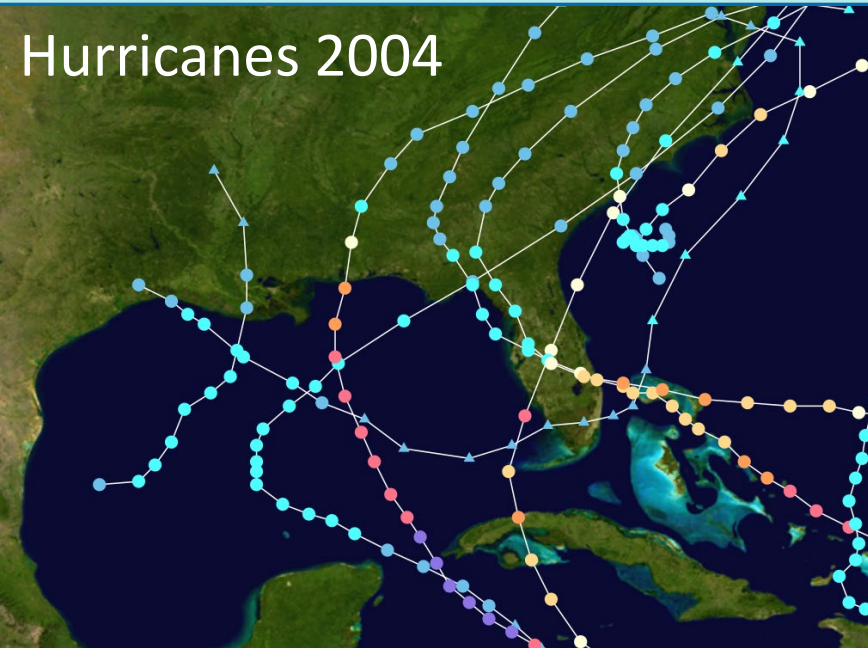
*Regional*

*Local*

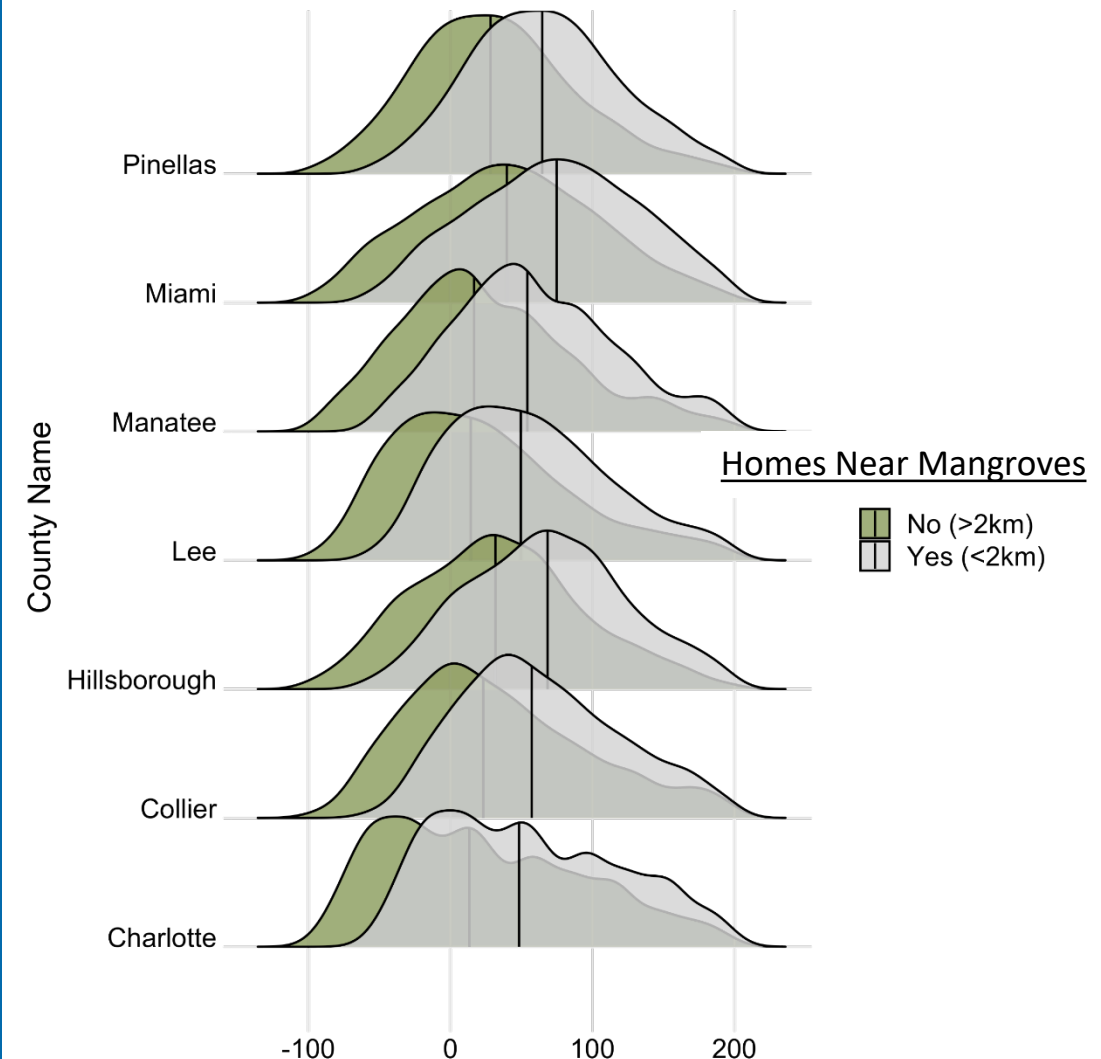
***“Businesses and homeowners in coastal communities in the Philippines protected by a mangrove forest may be able to reduce their hurricane insurance premiums by 12%”***  
Verderame et al., In Prep.



# Mangrove Effects on Home Value: Perceptions of Risk & Benefits Impact Price



## % Change in Home Prices After 2004





# Transparency in Risk Models: Comparing Climate Change and Habitat Loss

## Flooding in Caye Caulker, Belize

Reef loss  
(present 50 yr storm)

Climate Change 2050  
(0.5m slr + future 50 yr storm)

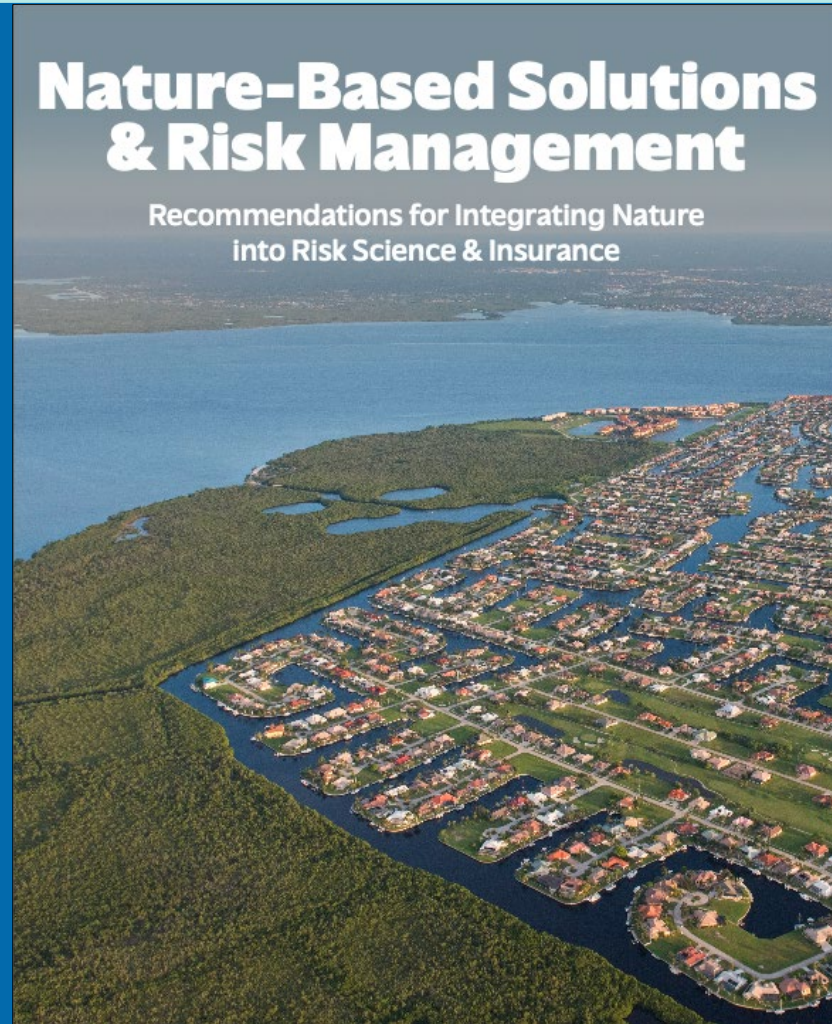




# NBS & Risk Management Report



- Aim to advance nature in risk science, risk management & insurance
- A Few Key Recommendations:
  - Industry should quantify habitats benefits
  - Build client demand for nature's benefits
  - Include nature in local mitigation & recovery plans
  - Include waves & reefs in industry flood models



# Perspectives on Nature & Insurance

## In terms of Nature Positive, Resilience Building Efforts

- Direct Benefits of Industry – Limited
  - Uptake in understanding of risk reduction benefits
  - Application of benefits  
(e.g., in models, advisory services)
  - Products
- Indirect Benefits- Major, Growing & Unintentional
  - Impact Development Patterns in high risk, high conservation areas (eg wetlands, forests)
  - Policy makers have biggest impact, but decreasing
  - Availability and Cost of Insurance growing influence





# Check Out My AXA Master Class



<https://www.youtube.com/watch?v=HHLewYYv2TM>



**Center for Coastal  
Climate Resilience**

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**UC SANTA CRUZ**

Web: [climateresilience.ucsc.edu](http://climateresilience.ucsc.edu)

LinkedIn: [@ucscclimateresilience](https://www.linkedin.com/company/ucscclimateresilience)

YouTube: [@ClimateResilience](https://www.youtube.com/channel/UCClimateResilience)

# Financial Risk Management Challenges and Strategies for the Public Sector

**Benjamin McNeil**

*VP, Public Sector Solutions  
Swiss Re*



# Financial Risk Management Challenges and Strategies for the Public Sector

Ben McNeil, Swiss Re – Public Sector Solutions

March 7 2025



# Introducing Swiss Re's Public Sector Solutions Team



+1,400 bound transactions since 2011 demonstrate the need for the covers we offer



With our global footprint we provide tailored support for the specific needs of our public sector clients



Always innovating, we are a pioneer in emerging and industrialised markets

Our specialists are based in most of Swiss Re's global locations.



Known for being the first team in the reinsurance industry to be fully dedicated to the public sector.



# Topics

1	Public Sector Risks and the Role of Insurance	
2	Insurance Solutions	
3	Challenges and Opportunities	



# Public Sector Risks and the Role of Insurance

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BOSTON CITY HALL



# Governments and the broader public sector ecosystem are exposed to manifold risks, many of which can be managed with re/insurance



## Economic

- Fiscal crises
- Failure of financial mechanisms
- Un/der-employment
- Failure of critical infrastructures
- Energy price shocks



## Environmental

- Extreme weather events
- Mitigation and adaptation failures
- Natural disasters
- Biodiversity loss & ecosystems collapse
- Man-made environmental disasters



## Geopolitical

- Interstate conflicts
- Failure of regional / global governance
- Terrorist attacks
- Failure of national governance
- State collapse/crisis



## Societal

- Resource shortages
- Spread of infectious diseases
- Large-scale involuntary migration
- Profound social instability
- Failure of urban planning

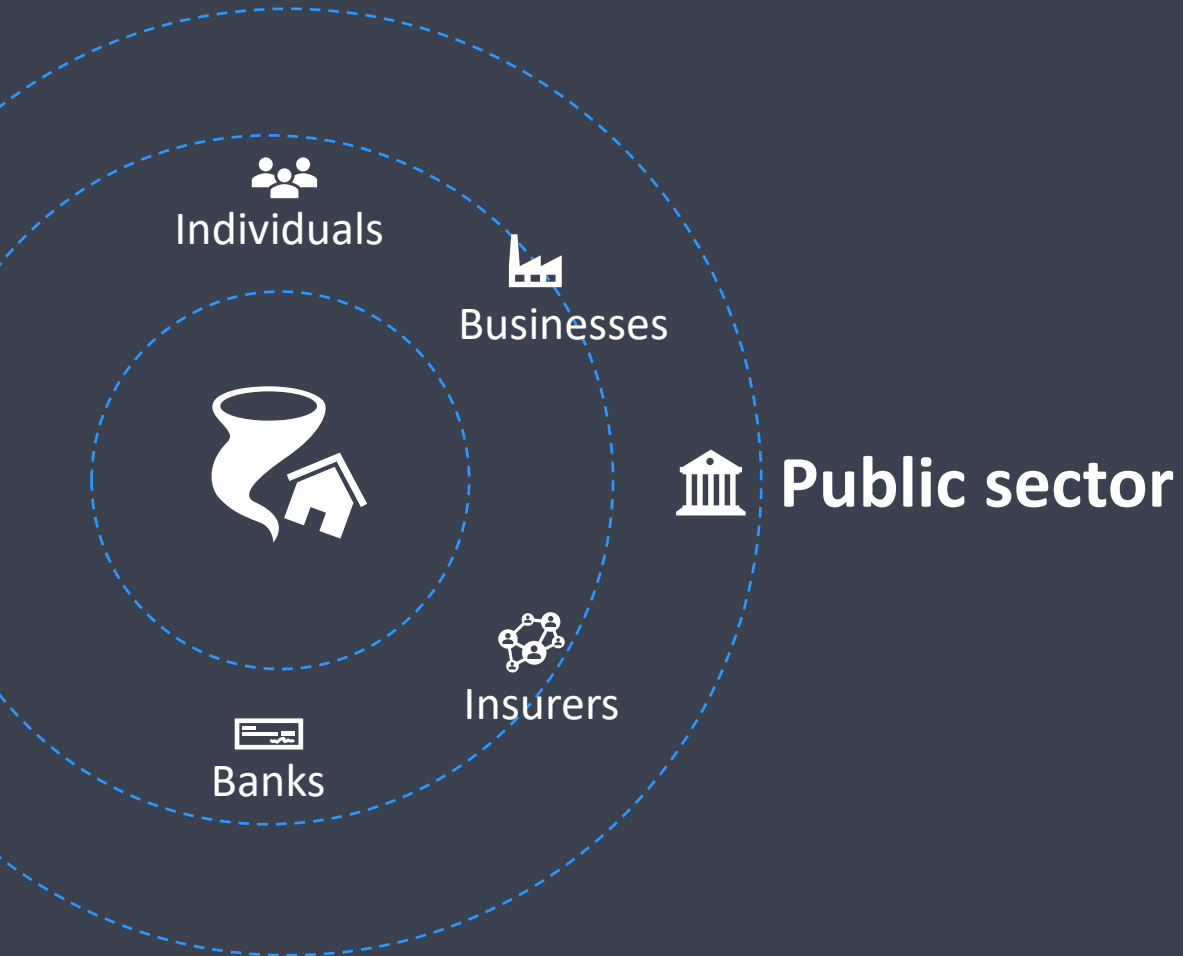


## Technological

- Cyber attacks
- Critical IT infrastructure breakdown
- Data fraud/theft
- Adverse consequences of advances



## Public budgets are put under strain in two ways following significant events



### Higher costs

- Emergency response costs
- Reconstruction of public property & infrastructure
- Support for non-insured households
- Cost of replacements (e.g., higher imports)



### Lower revenues

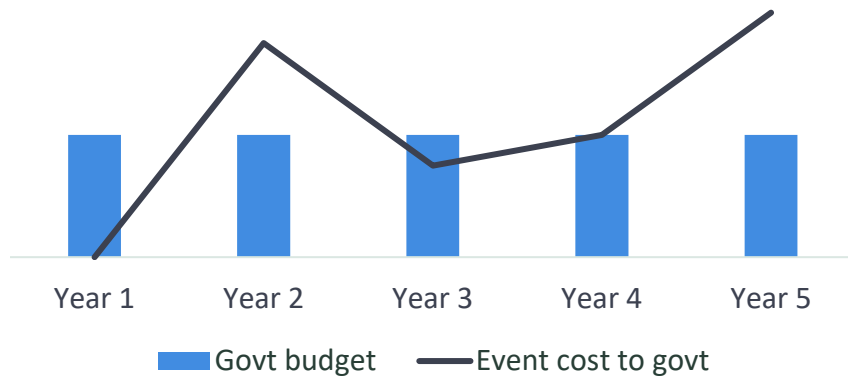
- Lower tax income
- Lower tourism income
- Lower export revenues
- Loss of investor confidence



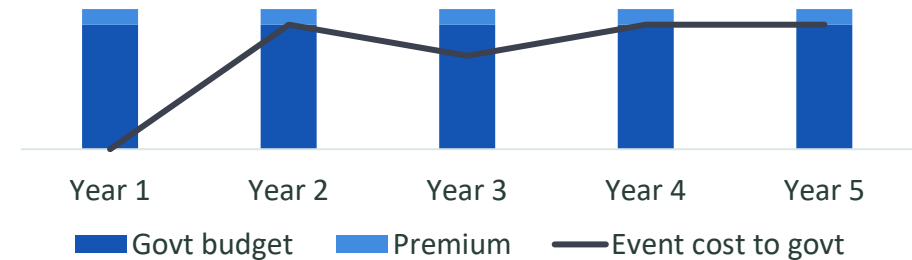
**Closing** the financing gap between insured and uninsured losses is thus in the public sector's **vital interest**.

# Re/insurance can help stabilise public budgets and ensure funds for post-event recovery

- Disaster events create expense spikes, requiring funds to be reallocated from other areas
- This causes delays in recovery and social tension



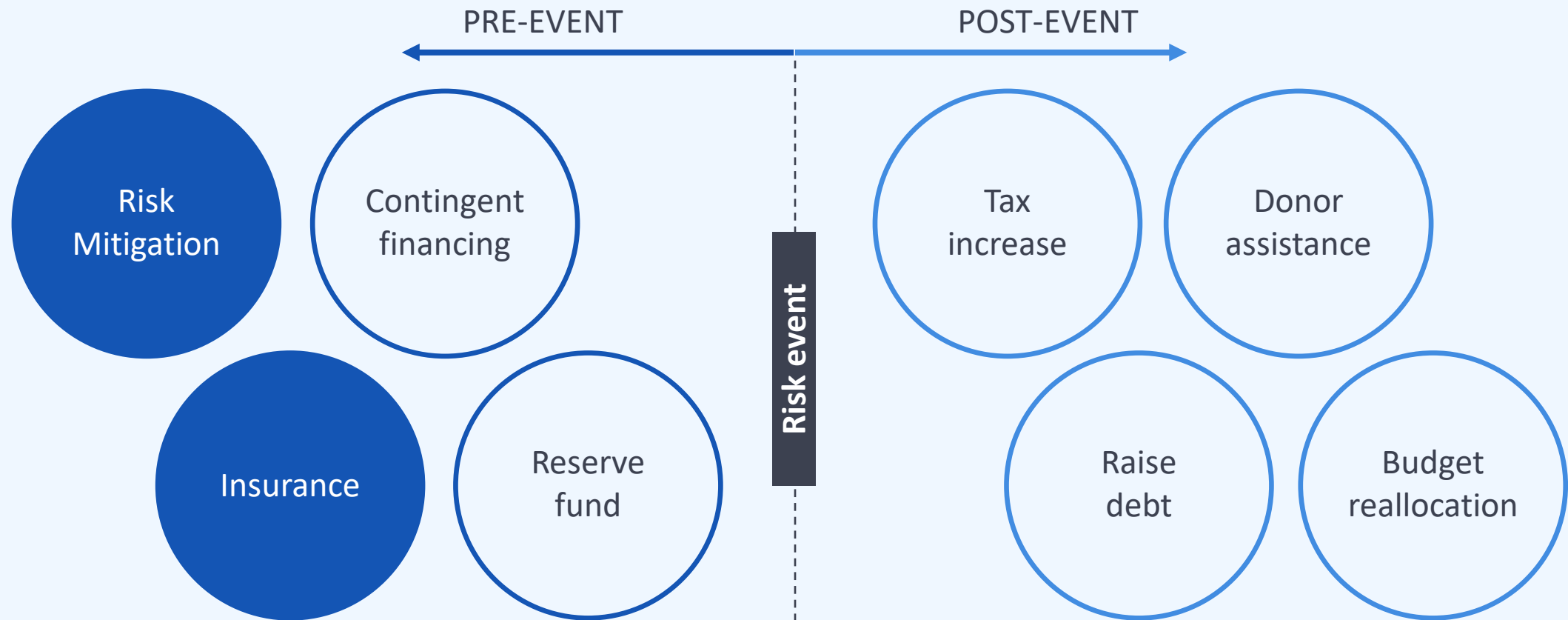
- A consistent premium payment covers the excess of costs when needed, creating budget stability
- It also frees up funds allocated for disaster relief to be invested into resilience initiatives



*Illustrative*

# Insurance, combined with risk mitigation, reduces the need to raise funds post-event

Regular premium payments are a more efficient budget management mechanism than responding with post-event handouts. This approach also frees up funds for government investment in innovation and resilient infrastructure.





# The different roles of insurance and risk transfer

## INSIGHTS



**Understand climate and physical risks**  
and potential impacts to locations, assets and value chain

## ENABLEMENT



**De-risk and enable investment**  
by including insurance at planning stage to assure project delivery and returns

## FAST RECOVERY



**Parametric insurance**  
index-based design, for early intervention, fast response post event, and recovery aid

## COMPENSATION



**Traditional indemnity insurance**  
provides compensation for loss or damage following independent assessment post event

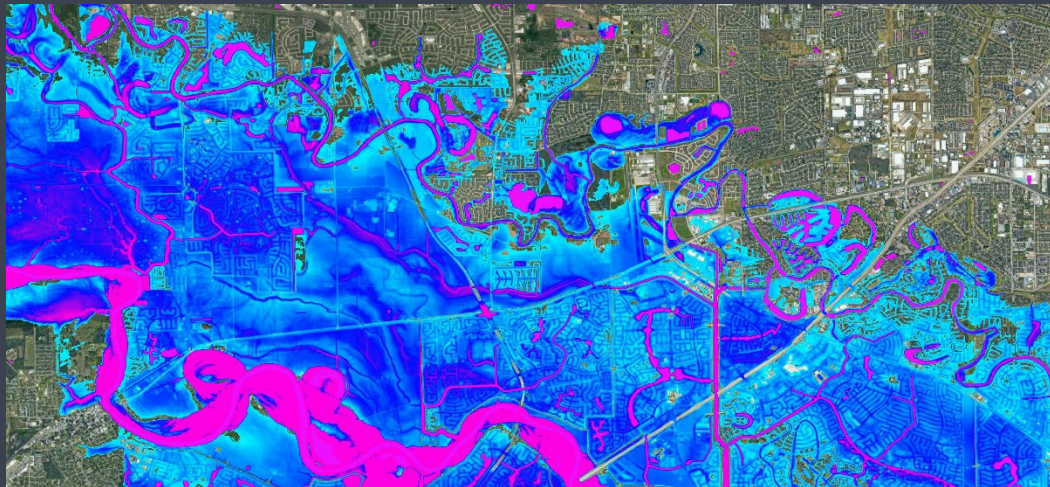


# Demonstrated accuracy that outperforms the competition

## A paradigm shift in our understanding of flood risks

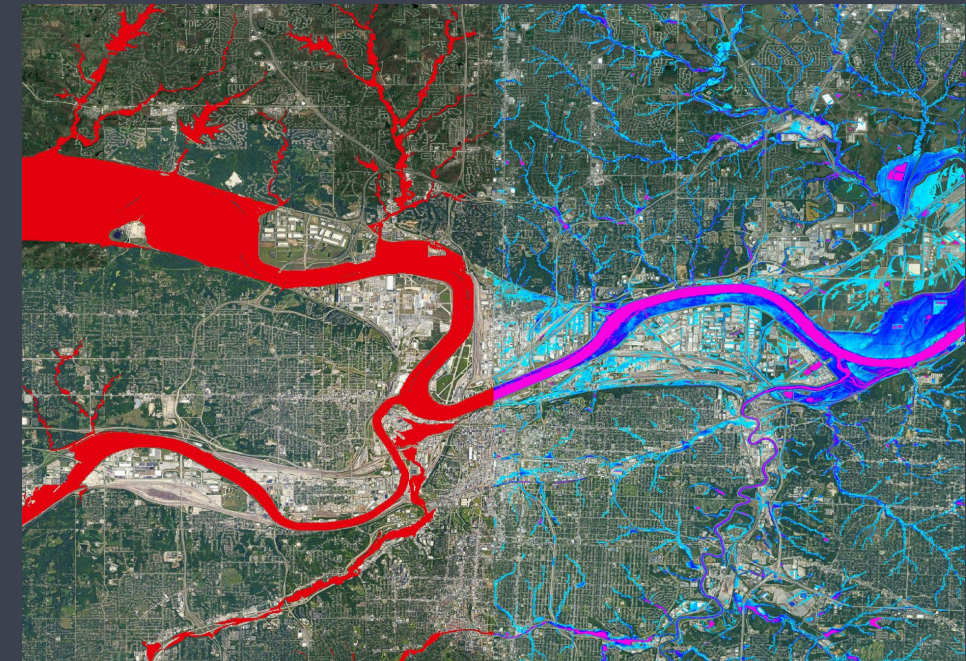
Fathom's model represents the most comprehensively validated flood model. Peer-reviewed comparisons against local models and observed events and losses have demonstrated that Fathom's models have unrivalled nationwide skill.

Fathom's latest model uses gold-standard LiDAR data to cover 94% of the buildings in the United States. This model has been proven to replicate local models, which cost over \$10bn, where they exist.



1-in-250 year simulated fluvial flood event, Houston

## Model implications



FEMA's model (red) only covers rivers and other high-risk zones. Fathom's US Flood Map is the first model to explicitly represent every river in the US – regardless of size.

# Insurance Solutions

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# Essentials of indemnity insurance

With indemnity insurance, the policyholder is protected against unforeseen economic losses or damages to a specific insured item (asset / service) up to a predetermined amount, known as policy limit. The insured item must have a clear value and legal insurability, with objective and regular value (re)assessments.

In exchange for premium payments, the insurer (i.e., the risk taker) agrees to reimburse the insured party for the incurred loss. This relationship benefits from an alignment of interest as both parties share the goal of loss prevention. The frequency and scope of the quantifiable risk\* must be predictable, supported by data, to facilitate underwriting.

Key elements needed for an indemnity insurance solution:

- ① Coverage scope  
(i.e., insured items/s and insured peril/s)
- ② Conditions  
(e.g., policy limits, deductibles, and exclusions)

## Payout mechanism



In the case of an event during the policy period, the insured files a claim.



The claim process is then initiated by the insurer.



The sustained loss is determined through loss adjustment.



The policyholder is then reimbursed (i.e., indemnification for repair or replacement of the insured item) by the insurer as per the policy conditions.



# Essentials of parametric insurance

As opposed to traditional forms of insurance, parametric insurance provides the insured with a pre-determined payout that is purely based upon physical parameters of an event.

Parametric coverages rely on objective, measurable indices to activate claims. They provide payments to the insured based on predetermined event index thresholds, not on assessed losses. Index thresholds are designed to respond to the insured's losses as closely as possible.

Key elements needed for a parametric insurance solution:

- ① Insurable interest
- ② The pre-agreed claims settlement amount
- ③ The pre-defined (triggering) event
- ④ The pre-defined index that serves as a proxy for sustained financial loss

## Trigger mechanism



A specific event, such as a tropical cyclone of a certain intensity or an earthquake of a certain magnitude, can trigger a pre-agreed payout.



The measured intensity of the triggering event, determined via an index and a payout function, dictates the claims settlement amount.

## Objective indices



Utilises clear, independent parameters like wind speed, magnitude or excessive rainfall.



These indices are reported by reputable and independent third-party data providers.

# Benefits of parametric insurance



## Fast payout

Parameterisation allows for fast payouts (within a few weeks), meeting liquidity needs and accommodating urgent interventions.

There is no need for loss assessments or a proven network of loss adjusters - simply provide an affidavit of loss.



## Transparent process

The parameter(s) used to determine payouts are based upon auditable, objectively measured, and independent data, which grants transparency to all parties.

Data is either publicly available or provided by the insurer to the insured.



## Leveraging data and technology

Leveraging state-of-the-art technology and high-quality data sets from renowned agencies to ensure precise modelling and monitoring.



## Flexible use of the funds

Payouts can be deployed to optimise recovery as deemed most suitable by the insured.



## Customisation and broader coverage

Solutions are highly customisable and can be tailored to fit individual needs and budgets.

It allows to insure risks that are otherwise uninsurable and to generally provide broader coverage.

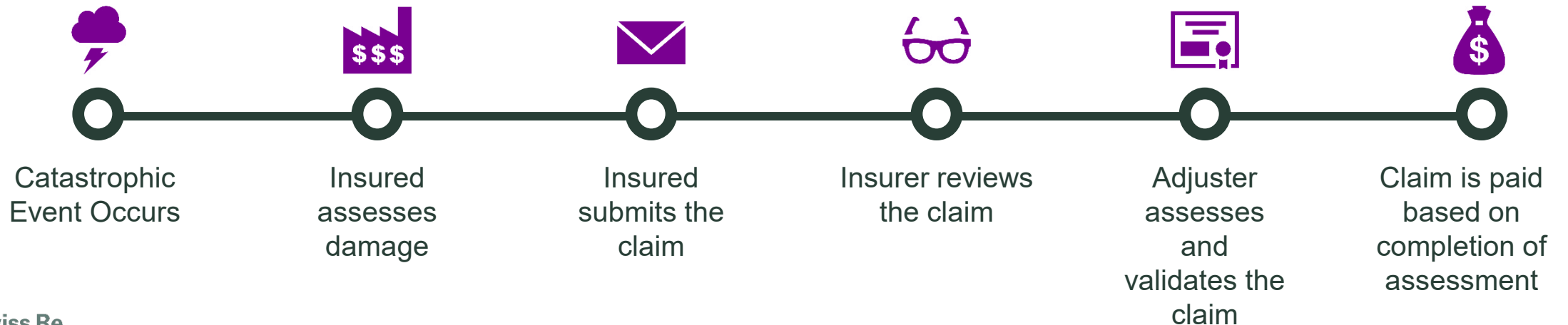


# Parametric Insurance: recover faster

## Parametric insurance



## Indemnity based insurance



# Multi-year single line covers reduce year-over-year pricing volatility and provide budget and risk capacity certainty over a multi-year term



Who is it for?

A multi-year single line (MYSL) is a structured product that could suit those who are looking for a solution that:

- Provides significant natural catastrophe peril limits on a non-cancellable contract
- Enables budget certainty by locking in a single rate over multiple years, which facilitates budgeting, especially for public entities who undergo an appropriation process
- Allows you to effectively deal with large concentrations in highly exposed natural catastrophe areas (e.g., earthquake risk in California)



How does it work?

MYSLs can be powerful tools in building a sustainable risk transfer program.

- Essentially, a MYSL will carve out a natural catastrophe layer (i.e., an individual peril such as earthquake from the traditional property policy) and offer coverage at a guaranteed rate over a multi-year term
- The terms and conditions are fixed and non-cancellable
- The premium is collected one year at a time (e.g., three annual payments for a three-year deal)
- The following treaty features can be added: i) term aggregate deductible (to reduce the cost), ii) reinstatement (to maintain uninterrupted coverage over the term), iii) no claims bonus



Benefits

- MYSLs give the insured access to sufficient and guaranteed capacity at stable costs, which provides budget certainty over a multi-year term
- MYSLs are simple to implement and administer
- The multi-year approach helps you to reduce year-over-year pricing volatility
- MYSLs help stabilize balance sheet and earnings against natural catastrophe exposures
- MYSLs can optimize overall spend on insurance by avoiding “stacking” of annual limits over time



Why Swiss Re?

## Leveraging our capacity and risk expertise

- We offer coverage for a broad range of risks, allowing you to leverage our risk expertise, technology platforms and strong balance sheet to help you better navigate the risks you are facing

## Designing tailor-made solutions

- We approach complex risk creatively and see it as an opportunity to tailor insurance, reinsurance or non-traditional risk transfer solutions that align with your specific needs and goals

## Improving your resilience with innovation

- Innovation is in our name, and we have the track record to back it up. We design innovative solutions intended to help our clients improve their resilience



## ASSISTING A MUNICIPALITY IN CALIFORNIA TO EFFECTIVELY RESPOND TO FLOOD DISASTERS

### The challenge

- A mid-size city in California faces significant flood exposure. Flooding in the city damages property, disrupts critical infrastructure and emergency services, and reduces economic activity.
- Due to limited capacity in the traditional flood insurance market, the city was left with a significant retention of flood risk.
- The city sought a financial recovery solution that would cover non-property losses such as costs related to emergency response or economic inactivity, and would also help them buy down their traditional property insurance deductible.

### The solution

- Swiss Re partnered with wholesale broker Amwins and the data provider Floodbase to develop a parametric flood insurance program that provides up to USD 2 million in emergency funding.
- The solution leverages a daily measurement of the maximum flooded area using satellite data and machine learning modeling. When a flood occurs, the maximum flooded area is measured across the city. If it exceeds the agreed threshold, a payment is issued to the city.
- Flexible, fast payouts allow the city to address the most pressing financial recovery concerns, whether that be supporting essential city operations, constituent services or municipal budgeting.

### The impact



If the policy had been in place, it would have led to a USD 1.78m payout for a major flood event in 2017, and a USD 870k payout for a flood event in 1998.



Residents and businesses can benefit from a faster, more efficient recovery because the city can deploy parametric proceeds more quickly and flexibly, to even include previously uncovered losses.



The speed and flexibility of parametric proceeds further increases the city's financial resilience and ability to recover quicker from flooding events.





# Challenges and Opportunities

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# Risk Management Challenges to the Public Sector

- Property market: rising rates, reduced coverage, and carrier exits
- Full range of mitigation investments are only partially captured by industry models
- Growing protection gap results in more burden on local, state and federal government budgets
- Potential property value decline
- Possible downgrade of municipal bond rating





# Innovations and Opportunities

- Engage your broker and carriers
- Reduce the protection gap
  - Risk awareness → Increased Participation
  - Incentivize and reward mitigation
  - Community based catastrophe insurance





# ASSISTING THE CITY OF NEW YORK TO HELP VULNERABLE COMMUNITIES RECOVER FASTER

## The challenge

- The area surrounding New York City is increasingly prone to sea level rise and floods. Currently, 780,000 of New York City residents live within or directly adjacent to the 500-year floodplain.
- Low- to moderate-income residents are disproportionately affected and struggle to access financial resources to recover after a flood.
- The Centre for NYC Neighborhoods (CNYCN) in partnership with the Mayor’s Office of Climate & Environmental Justice, the Environmental Defense Fund and SBP USA sought a solution to help better protect those residents flood risk.

## The solution

- Swiss Re partnered with reinsurance broker, Guy Carpenter, and the data technology firm ICEYE to develop a parametric flood insurance policy that provides up to USD 1.1 million in emergency funding.
- The solution leverages high-resolution data obtained through a mix of real-time satellite data, on-the-ground real-time sensors, and social media. When a flood occurs, the percentage of each insured neighborhood inundated by floodwaters is determined and if the percentage exceeds the agreed threshold, a payment is issued to CNYCN, who will subsequently distribute grants to households. This novel parametric insurance solution was awarded the Innovation Award at the 2023 Axco Global Insurance Awards.

## The impact



Those who qualify can receive a grant up to USD 15,000 from CNYCN in the aftermath of a major flood.



If the policy is triggered, residents of flood-affected households who qualify are eligible to receive a grant from CNYCN of up to USD 15,000, helping low- to moderate-income communities recover more quickly after a severe flooding event.



The pilot program inceptioned on February 1, 2023<sup>1</sup>, with the goal to scale within other parts of New York City in the coming years.

 [LEARN MORE](#)

<sup>1</sup> The program was renewed in May 2024.

Thank you!

Contact us

	
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# From Theory to Practice: The Flood Recovery Fund

**Theodora Makris**

*Senior Program Manager  
Center for NYC Neighborhoods*



**CENTER** for NYC  
**NEIGHBORHOODS**

# From Theory to Practice: The Flood Recovery Fund

Presented by Theodora Makris, Senior Program Manager

**March 7, 2025**



# Agenda

- ◆ Research findings
- ◆ Parametric insurance and the community-based model
- ◆ The Flood Recovery Fund
- ◆ Program development
- ◆ Partnership team
- ◆ Q&A

# Research findings

- ◆ Climate disasters are financial shocks to households: costs increase and/or incomes decrease
- ◆ Lower-income households and communities of color suffer disproportionately from climate events
  - Limited savings
  - Lack of access to credit
  - Prohibitively expensive insurance
- ◆ Existing gaps in the current disaster-recovery process
  - Delays in payment
  - Restrictive funding

# Parametric insurance and the community-based model

- ◆ Insures against severe rainfall flooding
- ◆ Areas of coverage include at-risk, inland neighborhoods
- ◆ Parametric Insurance
  - The Center is the insured and the beneficiaries are low to moderate-income homeowners in NYC
- ◆ Community Based Model
  - City government is currently prohibited from providing this kind of monetary assistance





# The Flood Recovery Fund

- ◆ A qualified event will officially launch the program
- ◆ Applications will become available on [FloodHelpNY.org](https://FloodHelpNY.org)
- ◆ Network Partner referral process
- ◆ The Center's Homeowner Hub can answer questions and make referrals
- ◆ Funding is currently limited

# Program development

- ◆ Community-informed
- ◆ Low barrier to entry application
- ◆ Eligibility criteria is consistent with other Center programming; documentation requirements are minimal
- ◆ The size of the insurance payout is based on the severity of the flood footprint and ranges from \$50,000-1.1M
- ◆ Grant award sizes are proportional to the insurance payout and range from \$5,000-\$15,000

# Partnership team

- ◆ Environmental Defense Fund
- ◆ Guy Carpenter
- ◆ Swiss Re
- ◆ The NYC Mayor's Office of Climate and Environmental Justice
- ◆ NYC Emergency Management
- ◆ SBP
- ◆ Raincoat



The background is a solid teal color with a white geometric pattern of intersecting diagonal lines forming a series of diamonds.

Questions?

# MODERATED PANEL DISCUSSION

Moderator: Kyle Johnson, *Kleinfelder*

Panelists:

- Michael Beck, *University of California, Santa Cruz*
- Theodora Makris, *Center for NYC Neighborhoods*
- Benjamin McNeil, *Swiss Re*
- Charlie Sidoti, *InnSure*