



# Co-Creation Webinar Series

*The space where innovation and climate resilience meet.*

AMERICAN SOCIETY OF  
ADAPTATION PROFESSIONALS

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# Co-Creation Webinar Series

*The space where innovation and climate resilience meet.*

## ***Global Adaptation Action:*** **Building Equity Through Collaboration Before Crisis**

[www.adaptationprofessionals.org/adaptation-co-creation-series](http://www.adaptationprofessionals.org/adaptation-co-creation-series)



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# Tech Check!



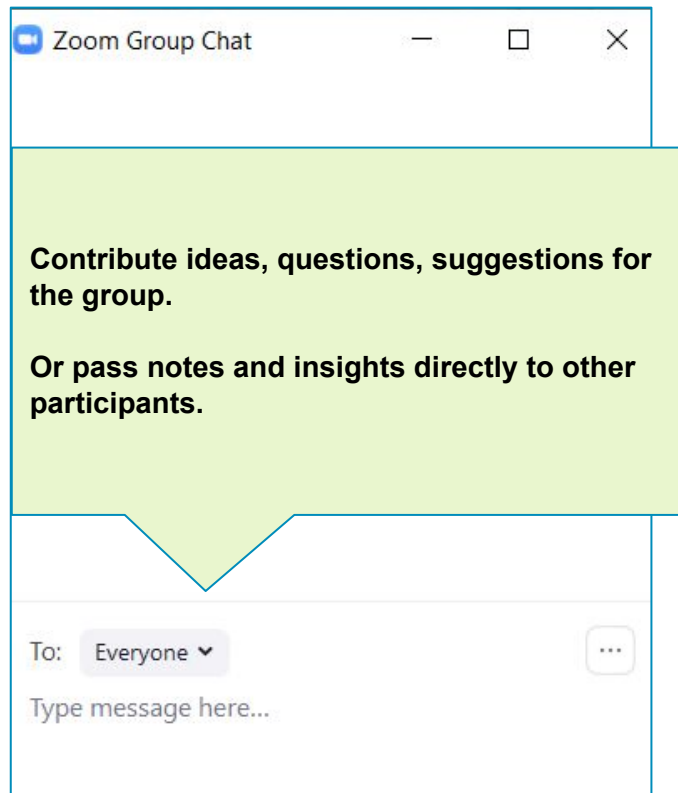
- ▶ Microphones Off



- ▶ Cameras on or off

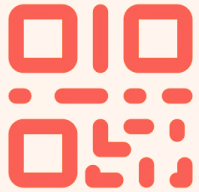


- ▶ Send tech support questions in the Zoom chat. Use Slido for Q&A.



**Tech Help:**  
**Beth Gibbons or Meagan Putnam**

slido



**Join at [slido.com](https://slido.com)  
#269480**

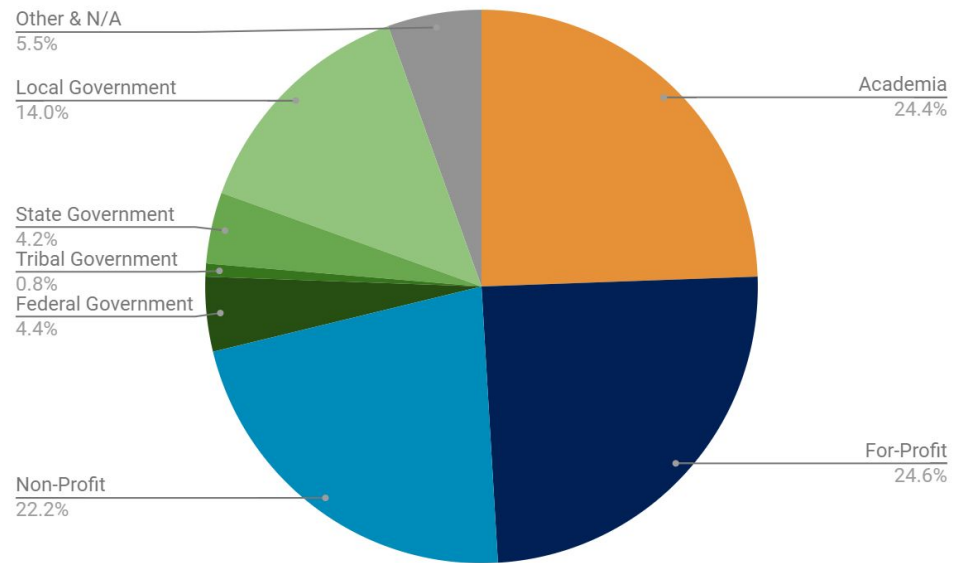
① Start presenting to display the joining instructions on this slide.



# Adaptation Professional

*Someone who uses future climate information into their day to day work.*





# Organizational Members at ASAP



## ***Recent Additions:***

*Arup and Institute for Sustainable Communities*

## ASAP Connects



*Meet new people  
and explore new  
ideas*

## Adaptation Careers



*Excel in your job &  
find new  
opportunities*

## Adaptation Voices



*Get and give essential  
stories, news, &  
resources*

## ASAP Serves



*Become an  
adaptation leader &  
give back to the field*



# 2022 Webinar Schedule



## Co-Creation Webinar Series

*The space where innovation and climate resilience meet.*

- ▶ Innovative adaptation practice with tangible results
- ▶ Cross-sector project teams
- ▶ Justice and equity

### Adaptation + Mitigation Nexus

- ▶ Transportation Innovations (**May 18**)

### Global Adaptation Action

- ▶ Breaking the Disaster Cycle: Building Equity Through Collaboration Before Crisis with ARISE-US (**TODAY**)
- ▶ Multilateral Adaptation Action (**September 21**)

### Advancing the Adaptation Field

- ▶ The Adaptation Workforce (**November 16**)
- ▶ Measuring Adaptation Success (**January 18**)

[www.adaptationprofessionals.org/adaptation-co-creation-series](http://www.adaptationprofessionals.org/adaptation-co-creation-series)



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## *Global Adaptation Action:* **Building Equity Through Collaboration Before Crisis**



**Camila Tapias**  
Spin Global and  
ARISE-US



**Antoine Richards**  
Institute for Diversity &  
Inclusion in Emergency  
Management



**Shefali Juneja  
Lakhina**  
Wonder Labs



**Ma. Laurice  
Jamero**  
Manila  
Observatory



**Elisa Mariel  
Trujillo Leyva**  
ARISE-Mx

# UN Disaster Risk Reduction ARISE Value Proposition

The global recognition of the significant, lasting impact that climate change and disasters will have on economic growth, community wellbeing, and related financial and economic systems, is rapidly growing. For companies, big and small, to survive and even prosper in this environment, they need to adapt fast. The uncertainties and transformation brought about by climate change and disasters can be seen as significant risks but also as opportunities.

By connecting a passionate community of business and other public and private partners, ARISE works as a catalyst for business innovation and for knowledge sharing to reduce risk for a sustainable and resilient future. Through its regional and national Networks and links into the global policy discussions on sustainability, climate action and disaster risk reduction, ARISE offers its members the opportunity to demonstrate leadership in cooperating with public partners to reshape business, society and financial frameworks to implement tailor-made solutions for all industries and sectors, leading to take risk-informed decisions, formulate adaptive strategies and implement preventative actions.

ACT NOW  
BE RESILIENT  
CREATE IMPACT  
HELP SOCIETIES  
EXPAND YOUR NETWORK



# ARISE –Priorities

- **SMEs**: enhancing the resilience of Small and Medium Enterprises.
- **Investors**: integrating disaster and climate risk into investment decisions by the financial sector.
- **Insurance**: incentivizing disaster risk reduction and enhanced data for risk-informed decision-making through engagement with the insurance industry as global risk manager.
- **Infrastructure**: supporting resilient infrastructure development.





# ARISE Members

- It is a UNDRR-led network of private sector entities which currently comprises:
  - ✓ More than **28** national networks.
  - ✓ Over **360** member companies.
  - ✓ Nearly **850** members in the shared community cloud across **49** countries.
  - ✓ Members from private and public sectors.
- Members voluntarily commit to support and implement the Sendai Framework Disaster Risk Reduction 2015 – 2030, aligned with the 2030 Agenda for Sustainable Development and its Sustainable Development Goals (SDGs), Paris Climate Agreement, New Urban Agenda and Agenda for Humanity.
- Join ARISE-US Network: <https://www.linkedin.com/groups/13958427/>



# Case Study #1

An equitable  
decision intelligence  
tool for emergency  
management



**Co-Creation  
Webinar Series**

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**Camila  
Tapias**

Spin Global  
and ARISE-US



**Antoine Richards**

Institute for  
Diversity &  
Inclusion in  
Emergency  
Management

# Cultivating Equity Through Collaboration

Wednesday, July 20<sup>th</sup> , 12:00 PM-1:30 PM EST



# Camila Tapias



Camila Tapias  
SPIN Global

# Strategic Planning.

We provide our clients comprehensive expertise, guidance, and decision support solutions.

# Partnerships.

We prioritize inclusion of private, non-governmental and public sectors, and traditionally underrepresented groups.

# Impact Innovation.

We combine operations, research, and technology with science, data, and “last mile” user needs.

# Neighborhoods and Nations.

Our solutions are sensitized to reflect the operating environment at any scale.



SPIN<sup>®</sup>



# Developing an Equitable DEI Tool

Bias in data

The need for an equitable DEI tool

Preventing further harm in underserved communities



# DEI in Emergency Management

Equity must be intentional

Emergency managers should acknowledge existing inequities

There is a need to develop partnerships across sectors





# Functional Pilots

A woman with dark hair, wearing a yellow sweater, is shown from the chest up, looking upwards and to the right. She is holding a tablet in her left hand and reaching out with her right hand towards a large, glowing globe in the center of the frame. The background is a dark blue, futuristic digital environment with various data visualizations, including line graphs, bar charts, and circular progress indicators, all overlaid on a grid of light blue lines. The globe is the central focus, showing the Americas.

New Hanover County, NC

Workflow review

Scenario-based approach





First setup



Workflows



Models



DI Workflow Preview

Next

### Build your workflows



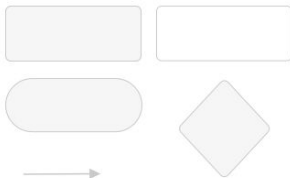
Preperdness - Shelter operations

Incident response - Flood

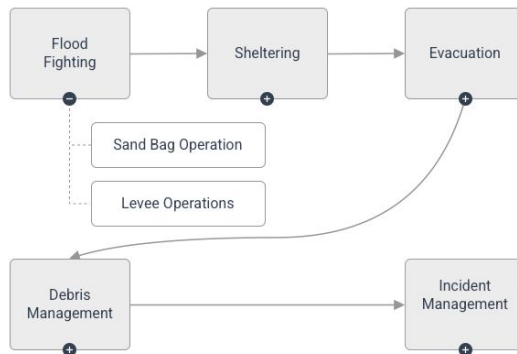


Hazard Mitigation

### Workflow build toolbox

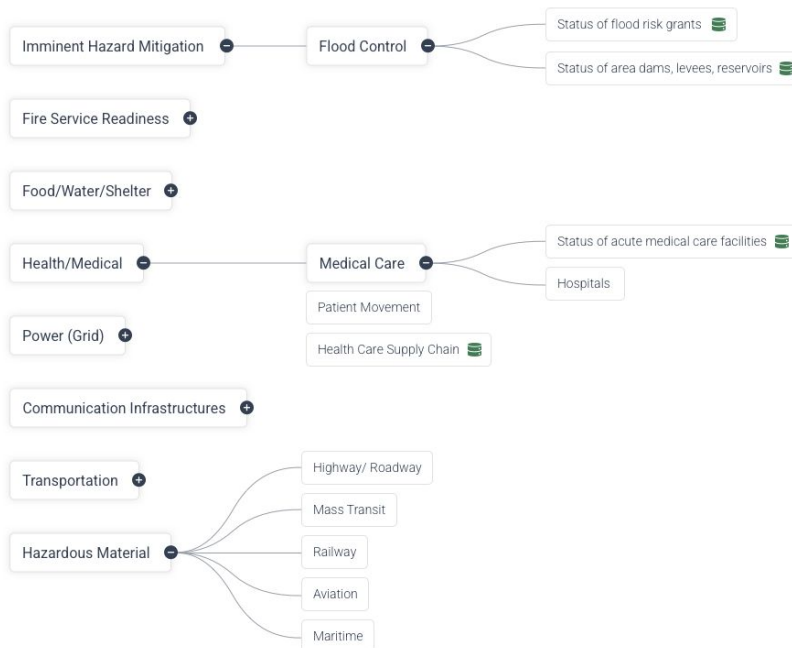


> Model Connector



## Choose your models

- ☐ Prevention
- ☐ Protection
- ☐ Mitigation
- ☐ Preparedness
- ☐ Response
- ☐ Recovery
- ☒ Community Lifelines
  - ☐ Equity & Diversity in EM
  - ☐ Infrastructure
  - ☐ Shelters



## Data sources

Select a metric in the model  
to connect a data source

Metric

First setup



Workflows



Models



DI Workflow Preview

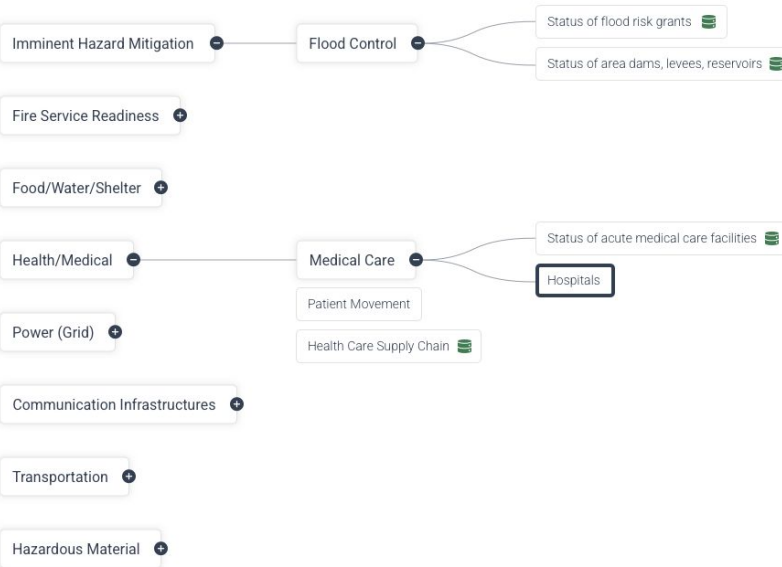
Back

Next

## Choose your models

 Search models

- ☐ Prevention
- ☐ Protection
- ☐ Mitigation
- ☐ Preparedness
- ☐ Response
- ☐ Recovery
- ☒ Community Lifelines
  - ☐ Equity & Diversity in EM
  - ☐ Infrastructure
  - ☐ Shelters



## Data sources

Mertic selected:

Hospitals

Select the data source you want to connect:



First setup



Workflows



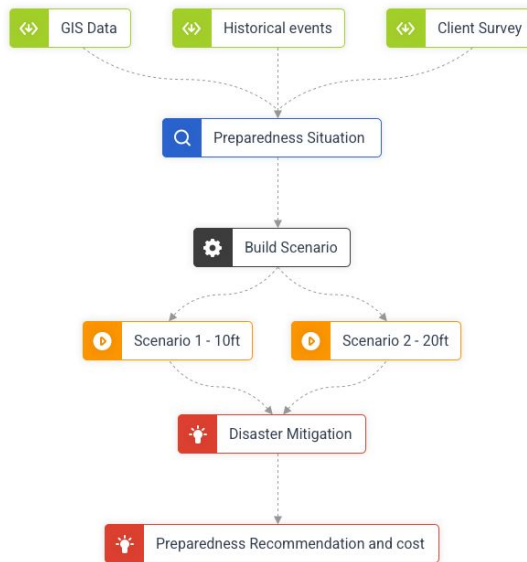
Models



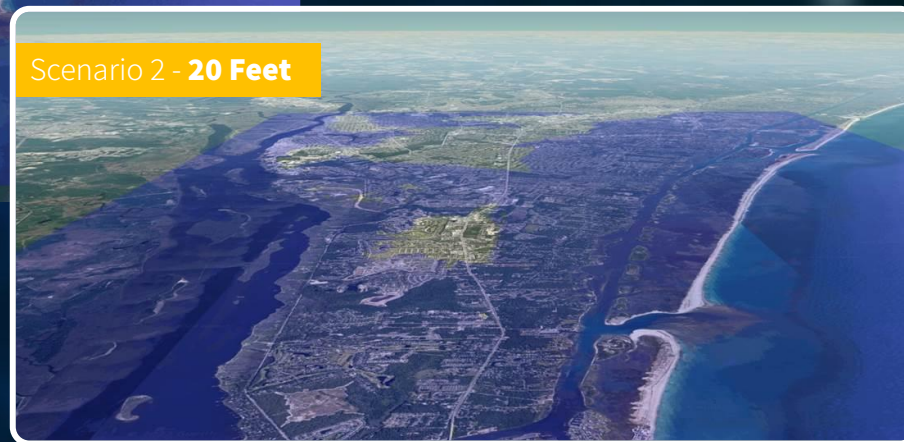
DI Workflow Preview

Back

Make my 4cast!



## 2 Flood Scenarios



Dashboard

Graph

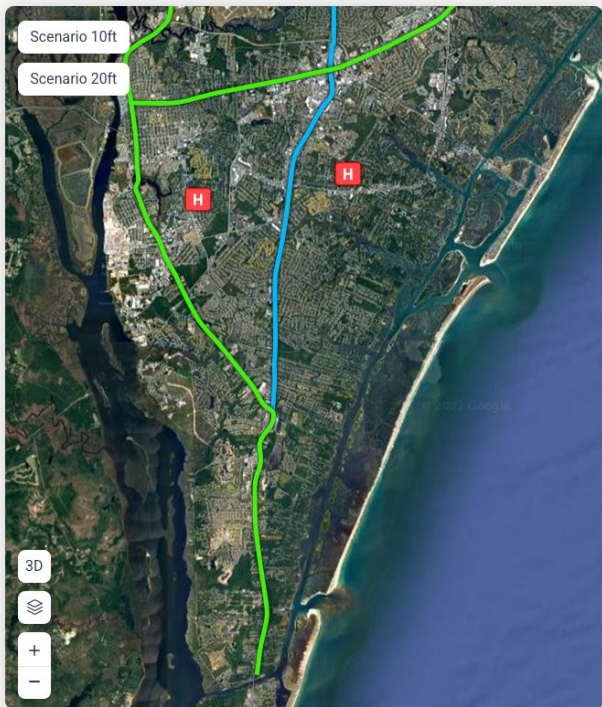
Map

Workflow

Structure

Comparison

Additional Reports



### Community Lifelines

92%

Imminent Hazard Mitigation

95% ⓘ

Fire Service Readiness

85% ⓘ

Food/Water/Shelter

99% ⓘ

Health/Medical

92% ⓘ

Power (Grid)

100% ⓘ

Communication Infrastructures

90% ⓘ

Transportation

85% ⓘ

Hazardous Material

90% ⓘ

### Decision Intelligence



⚠️ 5% of all properties in New Hanover County have greater than a 26% chance of being severely affected by flooding

👍 A maritime evacuation plan is required

👍 First responders need training in flood scenarios

👍 Shelters and emergency equipment must be inspected

### Highlights

Infrastructures

⬆️ 86%

Shelters

⬇️ 100%

Diversity

⬆️ 82%

Fire Service

⬆️ 100%



Dashboard

Graph

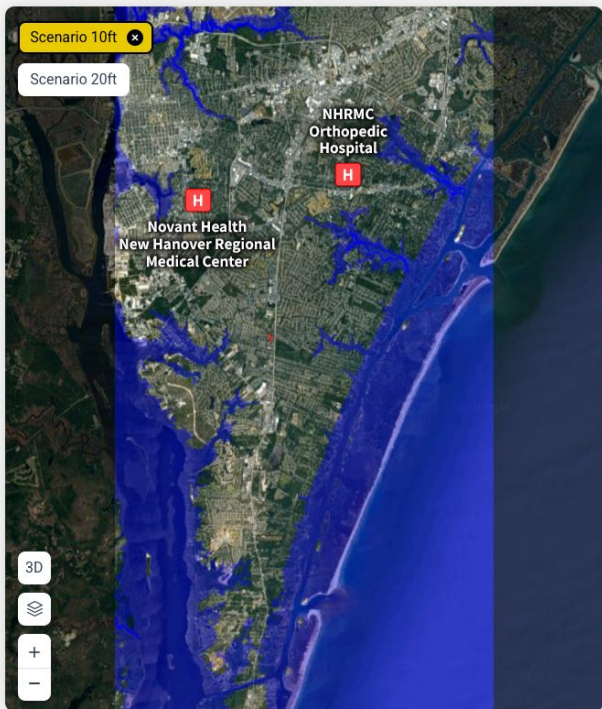
Map

Workflow

Structure

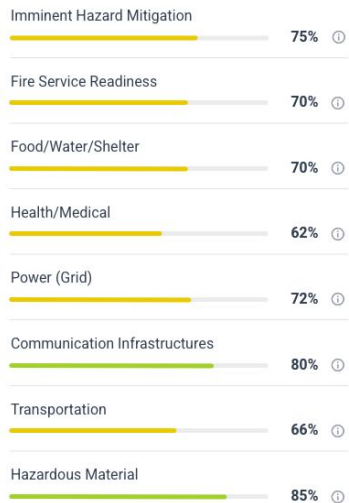
Comparison

Additional Reports



## Community Lifelines

73%



## Decision Intelligence



- ⚠️ Evacuation routes are flooded.
- 👍 NC-132, US- 17 road should be used and prepared maritime evacuation routes.
- ⚠️ Shelters flooded
- 👍 Shelters should only be used in the Central and Northern areas of the county.
- 👍 Prepare for an evacuation of 10,000 people
- 👍 Prepare for maritime evacuation of dozens of people

## Highlights

Infrastructures

✓ 75%

Shelters

✓ 65%

Diversity

✓ 59%

Fire Service

✓ 70%

Dashboard

Graph

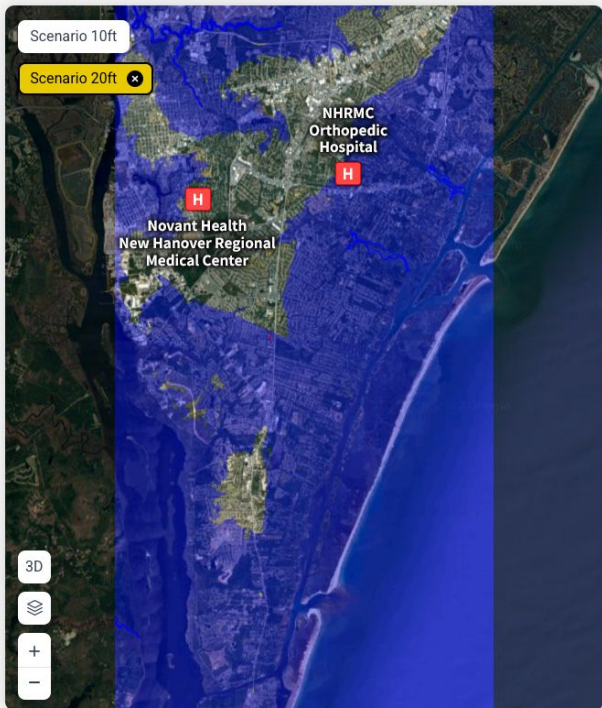
Map

Workflow

Structure

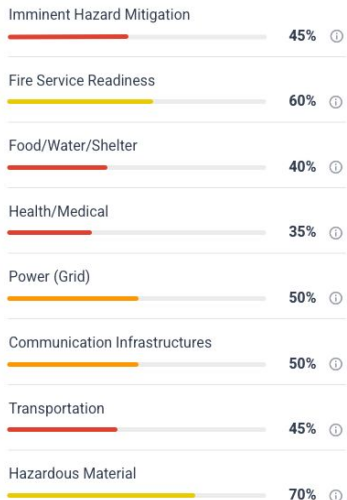
Comparison

Additional Reports



## Community Lifelines

49%



## Decision Intelligence



- ⚠️ Evacuation routes are flooded
- 👍 NC-132 road should be used
- 👍 Prepare for maritime evacuation of hundreds of people
- ⚠️ Shelters flooded
- 👍 Recommended Shelters:  
College Park Elementary School, John J. Blair Elementary School, Winter Park Elementary School, Roland-Grise Middle School, Pine Valley Elementary School, Edwin A. Alderman Elementary School
- ⚠️ 2800 evacuees is a low assumption in relation to population growth and risks
- 👍 Prepare for an evacuation of 20,000 people
- 👍 Early evacuation plan for a population from the south
- ⚠️ 70% of hospitals capacity is down as a result of flood
- 👍 Establish a field hospital or mobile medical unit
- 👍 Castle Hayne Road debris needs to be removed, get beaver dam's eliminated if there's a drainage blockage
- 👍 Plan engineering long-term improvements in Castle Hayne
- 👍 Add 2 more Fire Rescue Task Force teams
- 👍 According to the National Institute of Building Sciences, every \$1 spent on flood risk reduction saves \$7 on future disaster losses. Smart planning saves lives and can minimize the impact and cost of flooding.

## Highlights

Infrastructures

✓ 59%

Shelters

✓ 35%

Diversity

✓ 47%

Fire Service

✓ 60%



# Synergy Between Equity and Technology

Operational effectiveness

Technology will expedite and provide efficient insights to DEI and planning challenges

Current solutions require a manual, services-based approach

# Antoine B. Richards



Antoine B.  
Richards  
I-DIEM

# About I-DIEM

## Purpose

I-DIEM is a global non-profit established to facilitate change by integrating equity into all aspects of emergency management. Our focus is on humanity and our vision supports the empowerment of marginalized communities within all phases of the disaster management cycle.

## Mission

Our mission is to support development and implementation of innovative community-based mitigation and adaptation projects to enhance resilience in diverse, vulnerable, and underserved communities.

## Vision

The vision of I-DIEM is to enhance global resilience and improve emergency management outcomes by leveraging diversity, equity, and inclusion.

# About I-DIEM

## Advocacy

- 8 Congressional Testimonies
- Leader in Disaster Equity
- Equitable Considerations for FEMA Polices and Programs
- BRIC Recommendations
- National Disaster Safety Board
- Ensuring Equity in Disaster Resilience, Response, and Recovery Act
- Virtual Equity Roundtable Series (Community Conversations)

## Programs

- Equity Response Teams
- HERricane Program
- Julius Becton Jr. Scholarship Program
- I-DIEM Fellowship & Internship Program
- I-DIEM Partnership Program
  - College and University Partnerships
  - Nonprofit Partnerships
  - Volunteer Partnerships
- I-DIEM Jobs Board

# Thinking About Collaboration

**Definition:** “The Action of Working with Someone to Produce or Create Something”

**Synonyms:** Cooperation, Alliance, Partnership, Participation, Combination, Association, Concert, Teamwork, Joint Effort

**Common Knowledge**

**How Do We Achieve Effective Collaboration?**



# Connecting Silos: The Need for Collaboration

Healthcare / Hospitals	Emergency Management
Physicians Nurses Respiratory Therapists Radiologic Technologists Physician Assistants Nurse Practitioners Pharmacists Phlebotomists Chaplains Hospital Administrators Legal Social Work	Public Administration Engineering Public Health Emergency Management Sociology Psychology Urban Planning Public Policy Anthropology Political Science Environmental Science Geography Seismology Communication

# Understanding Collective Impact: Connecting Silos

Understand Where and Why Silos Exist

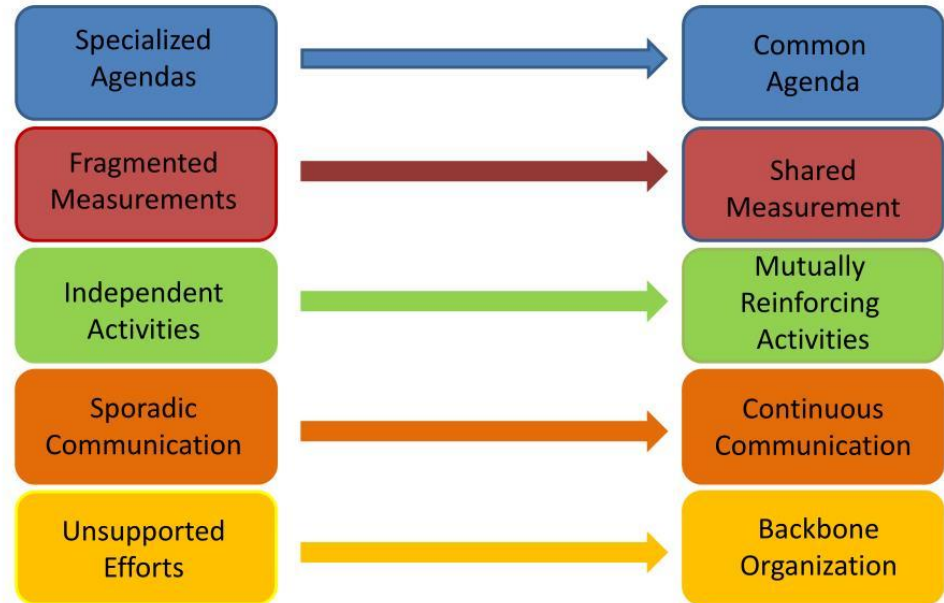
Understand Our Unique Roles and Expertise on Key Issues

Understand How Our Roles and Expertise Can Help Others With The Same Goals

Understand Mutual Beneficence



## Five Conditions for Collective Impact





# Connecting Silos: The Need for Collaboration

- Remember: “The Goal is NOT to Break Down Silos”
- Collaborative Thinking: The Goal is to Connect Silos
- Collaborative Thinking: Leverage Resources and Partnerships to Achieve Mutual Goals and Outcomes
- Collaborative Thinking: Partners and Collaborators vs. Competition
- Remember: The Most Successful Business and Partnerships Sustain on Collaboration



# Collaboration in Action

Equitable Decision Intelligence

Integrating AI into Emergency  
Management to Understand  
Vulnerability

Data Assessment

Equity Assessment Tools,  
Metrics, and Measures

Partnership – Policy, Practice,  
and Research



The banner features a dark blue background with a light blue geometric pattern of overlapping shapes and dots. The text is centered and uses a mix of white and light blue fonts. Below the title, there are four small square headshots of the speakers, each with their name and organization written underneath. At the bottom, there are two lines of text providing registration and learning more information, followed by logos for SPIN, I-DIEM, 4cast, and IAEM.

Equitable Decision Intelligence  
**Webinar**  
for Emergency Management  
September 29 11AM-12PM EST

Joel Thomas  
SPIN Global

Chauncia Wills  
I-DIEM

Nissim Titan  
4CAST

Sarah Miller  
IAEM

To register visit <https://bit.ly/Equity4EM>  
To learn more visit <https://www.equitabledecisionintelligence.org>

SPIN I-DIEM 4cast IAEM

# Closing Remarks

1. Email [equity@spinglobal.org](mailto:equity@spinglobal.org) to join Model Design Ideation conversations to contribute suggestions and requirements to future Model Versions
2. Access Open-Source Content: [\*\*https://github.com/4cast-ai\*\*](https://github.com/4cast-ai)
3. Sign up for an Equitable Decision Intelligence for Emergency Management Pilot: <https://forms.gle/3YGREgJ3znYoHgTS7>
4. Join the LinkedIn group: Equitable Decision Intelligence for Emergency Management <https://www.bit.ly/Equitabledecisionintelligence>
5. I-DIEM Resources & Toolkits: [Research & Resources Archives - I-DIEM](#)

# Case Study #2

Co-learning disaster  
resilience for caring,  
equitable, and just  
outcomes



**Co-Creation  
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*The space where innovation and climate resilience meet.*



**Shefali  
Juneja  
Lakhina**  
Wonder Labs



**Ma. Laurice  
Jamero**  
Manila  
Observatory

# Co-learning disaster resilience for caring, equitable, and just outcomes

Dr. Shefali Juneja Lakhina (she/her)

Co-founder, Wonder Labs

Website: [www.wonder-labs.org](http://www.wonder-labs.org) Twitter: @ShefJL and @WonderLabs1 Email: [shefali@lakhina.com](mailto:shefali@lakhina.com)



Wonder Labs

# OUTLINE

## **Context**

Bringing intentionality to entry points, partnerships, and desired outcomes

## **Methodology**

Adopting a person-centered approach for co-learning with CARE

## **Outcomes**

Converging for equity and justice outcomes



# CONTEXT



# CONTEXT

Funded by Australian Research Council and NSW Office of Emergency Management's 2017 Community Resilience Innovation Program grant.

Advised by Wollongong City Council, NSW Rural Fire Service, Illawarra Multicultural Services, Multicultural Communities Council of Illawarra, the Strategic Community Assistance to Refugee Families (SCARF), and two community representatives.

Research observers included the NSW State Emergency Service, Multicultural NSW, Shellharbour City Council, Kiama Municipal Council, Masjid As-Salaam in Berkeley, Australian Red Cross, and the International Organization for Migration.

# Co-learning disaster resilience with CARE



## Working with Illawarra refugees to build disaster resilience

PhD research aims to help refugees prepare for natural hazards

Available here:

<https://www.uow.edu.au/media/2017/working-with-illawarra-refugees-to-build-disaster-resilience.php>

## AUSTRALIA: ENGAGING REFUGEES FOR A DISASTER RESILIENT ILLAWARRA

Wollongong City Council today marks the International Day for Disaster Reduction 2017 theme 'Home Safe Home' with a commitment to inform, engage and partner with refugee households for a disaster-resilient Illawarra.

This commitment follows a recent partnership with the University of Wollongong's Australian Centre for Cultural Environmental Research, other local city councils, emergency management services, multicultural services, and diverse refugee communities in the Illawarra.

Funded by a NSW Office of Emergency Management 2017 Community Resilience Innovation Program grant, the University of Wollongong managed doctoral research project – 'Resilient Together', aims to provide insights into how refugee households learn about local natural hazards such as bushfire, storm surge and flash flooding, and what they do to feel safe and secure.

Based on in-depth interviews with 26 refugee households and 12 local organisations across the Illawarra, the research findings show that information on local hazards can be particularly important for refugees, even pre-arrival.

Within the first year of living in the Illawarra, refugees can experience the impacts of bushfire, storm, flooding, heatwave and sea-related hazards.

The findings show that as the first and most familiar point of contact, humanitarian settlement services, local multicultural services and places of worship have an important and untapped role in providing systematic access to hazard information and preparedness training.

# METHODOLOGY

## Co-learning disaster resilience toolkit



A person-centred approach  
to engaging with refugee narratives  
and practices of safety

Shefall Juneja Lakhina



Summary

**Section I:**  
What is 'co-learning  
disaster resilience'?

**Section II:**  
Thematic guidance

**Section III:**  
Person-centred  
mapping tool

**Section IV:**  
Operational framework

**Section V:**  
Case of the Illawarra

Annex

Key readings

Acknowledgements



# METHODOLOGY

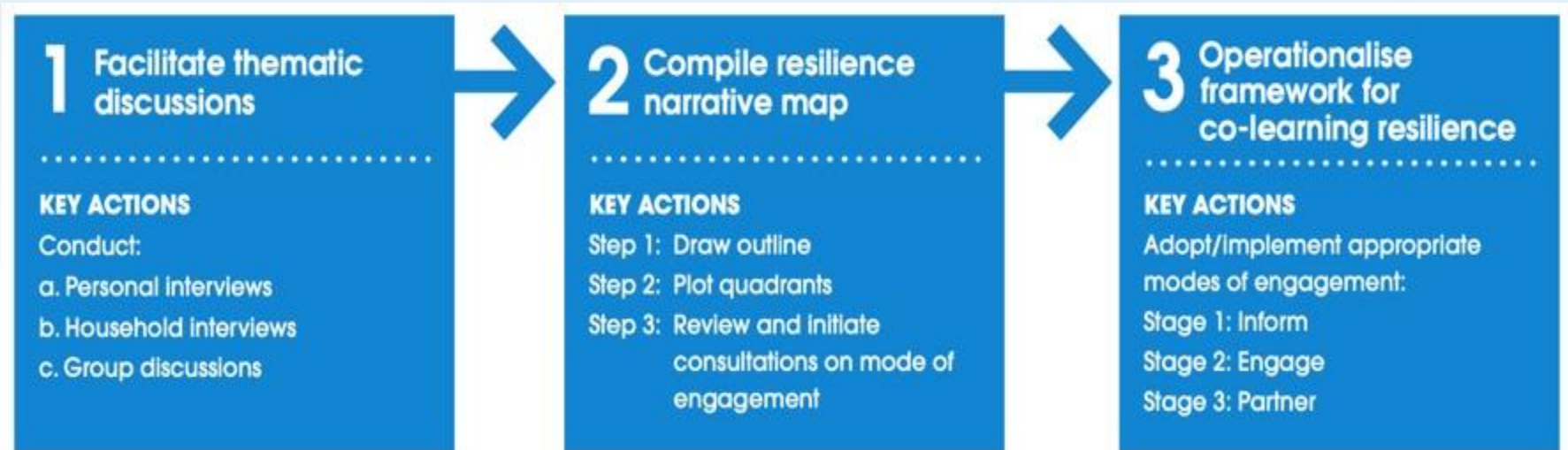
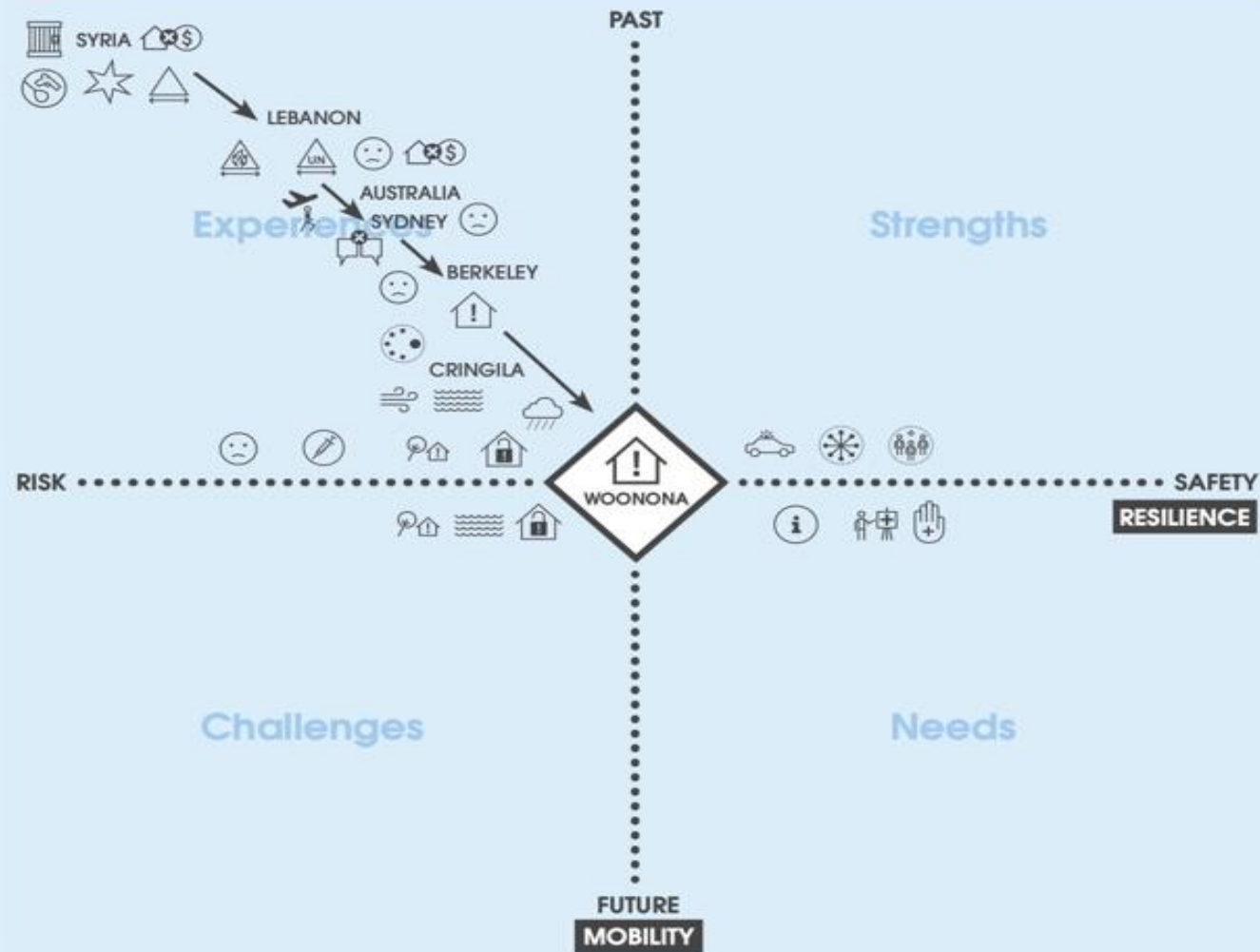


Figure 1: Co-learning disaster resilience: Process flow and key actions.





Lakhina, S J (2018)  
Co-learning disaster  
resilience toolkit.  
University of  
Wollongong

# OUTCOMES



Multicultural Community Liaison Unit, formed in 2017



Helping community: Dohaumang Gualnam, Francis Htjaru, Burhan Zangana, Innocent Baradogomwa, Nidaa Mostafa, Elizabeth Jowanle, Joshua McLaren and Kirsten Englert-Adnum. Picture: Greg Ellis.

# OUTCOMES

“If I was not part of NSW SES, I don’t think my community would know what to do in a flood or storm. I’m not sure that NSW SES previously reached out to people of Karenni, Karen, or Burmese backgrounds to interact in a culturally sensitive way. Through the Multicultural Community Liaison Unit, people from the community feel more empowered – they feel they have a voice and can bring their experiences to the attention of NSW SES.”

—*Elizabeth Jowanie, Multicultural Community Liaison Unit, NSW State Emergency Service*

“Bringing different people from different backgrounds together – like different ingredients – combines to create an incredible community service. Everyone in the community is satisfied. Everyone wants to take part and contribute. It’s good to have different knowledge and skills. For example, speaking different languages. The Illawarra has a very diverse community and, in an emergency, if someone doesn’t speak English well, someone in the Multicultural Liaison Unit can help.”

—*Elie Butoto, Multicultural Community Liaison Unit, NSW State Emergency Service*

# UOW collaboration with SCARF and SES receives high commendation in the Resilient Australia Awards



A project that demonstrated the value of including refugees in local disaster planning, to help them prepare by acknowledging their skills and experience, has been recognised for its contribution to community disaster resilience.

The [Resilient Australia Awards](#) is a national program, convened by the Australian Institute for Disaster Resilience (AIDR), to promote and celebrate innovation and best practice disaster response.

The NSW Office of Emergency Management recently announced the award recipients, which included a University of Wollongong-led project called, 'Resilient Together: Engaging the Knowledge and Capacities of Refugees for a Disaster Resilient Illawarra'.

Resilient Together was a collaboration between local councils, emergency services, and refugee settlement programs.

It was Highly Commended in the Business Award Category, awarded recently by the Hon Troy Grant, Minister for Police and Emergency Services at the awards ceremony at Parliament House in Sydney.

The project set out to solve a critical gap in humanitarian programs, where refugees are not systematically given information about personal safety and home preparedness for a range of local and natural hazards.

Rather than simply create multilingual information packs, interviews with refugees from Africa, Southeast Asia and the Middle East who have lived in the Illawarra for up to 15 years provided understanding of how they learn about natural hazards and what they already do to feel safe and secure.

A crucial part of the research involved local settlement and multicultural services, often the first point of contact for new arrivals.

Through their connection to these communities they can help them understand and prepare for hazards, rather than making it the responsibility of emergency services.



# Living with Fire Design Challenge

## Reimagining Community Wildfire Protection Planning in Ventura County, California

The Kindling Equity team focuses on the meaningful inclusion of socially vulnerable communities in the Community Wildfire Protection Plan (CWPP) in Ventura County's Wildland Urban Interface. In collaboration with the Ventura Regional Fire Safe Council, the team engages with vulnerable communities (e.g., low-income, non-English speaking, Indigenous, housing-insecure) to understand their needs and ensure inclusive fire planning practices. The team's [Story Map](#) presents ecological data and diverse community feedback, to visualize the "projected" and "reimagined" states of wildfire risk in Ventura County. This project aims to understand the intersection of inequity and wildfire risk, as well as provide a framework for other local governments to generate more inclusive CWPPs. Read the Kindling Equity team's final project report [here](#).

## Reimagining defensible space in Santa Barbara County, California

This project created science-informed recommendations on wildfire-centric plant maintenance, species selection, and placement. In collaboration with the Santa Barbara Botanic Garden (SBBG), the team conducted interviews to develop a list of native species for combustion testing. In addition, the team carried out combustion trials with plants from SBBG to understand the hydration-flammability response of various species when well-watered and drought-stressed. The results will be communicated with the public through signs and workshops at SBBG and published through UCANR to reach community stakeholders. This team hopes to scale up this work to the County level to inform policy decisions on plant selection and defensible space. Learn more from the team's story map [here](#).

## Reimagining community resilience in Gold Hill, Boulder County, Colorado

This project developed an [innovative program](#) for wildfire adapted forest ecosystems and communities using a 100-acre forest thinning/meadow restoration project in Gold Hill, CO. In collaboration with the Boulder Watershed Collective (BWC), this team conducted a community survey to gauge wildfire mitigation knowledge, attitudes, and behaviors. The team held two nature walks to teach the public about the planned forest treatment area. In addition, the team held two community envisioning events to discuss "projected" and "reimagined" states of wildfire resilience based on multi-objective forest restoration projects. This project will inform BWC's efforts around wildfire mitigation practices and education with the Gold Hill community over the coming years. Lessons learned from this project can be used to inform other wildfire mitigation efforts in communities across the Front Range in Colorado. Learn more about the project methodology, findings, and outcomes [here](#).

## Inclusive evacuation planning for Marin County, California

This 6-week summer project augments Zonehaven AWARE by contributing to community-centered research and visual design for more inclusive evacuation planning. Specifically, the WEmap team examined the challenges and opportunities of inclusive evacuation planning for culturally and linguistically diverse communities in Marin County. In addition to developing a prototype for Zonehaven, the WEmap team applied intersectional, GIS, and design thinking methodologies to deliver open-source data that can contribute to just, inclusive, and equitable wildfire resilience outcomes. Learn about the team's project methodology, findings, and outcomes [here](#).



# CONCLUSIONS

Top-down communication  Co-learning

Inclusion and diversity  Equity and justice

Collaborative outputs  Convergent outcomes

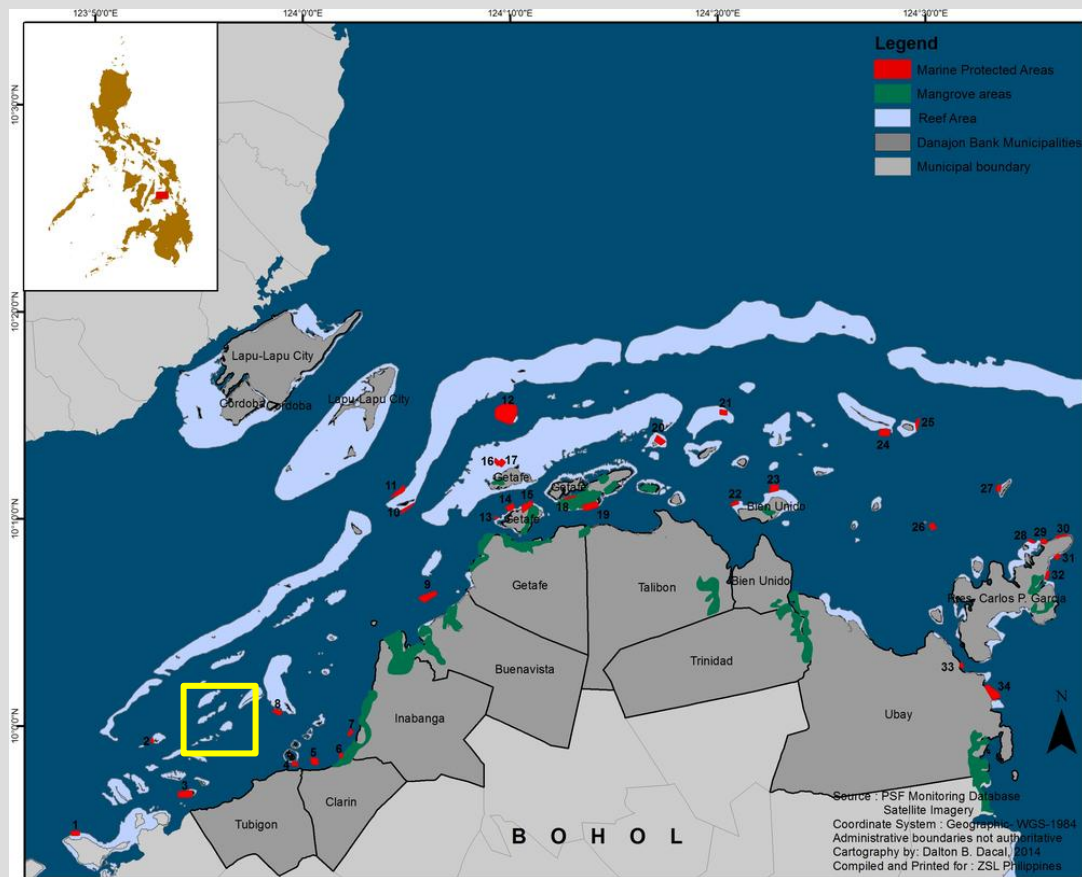
# ADAPTATION PRACTICES OF SMALL ISLANDS IN THE PHILIPPINES

Ma. Laurice P. Jamero, PhD

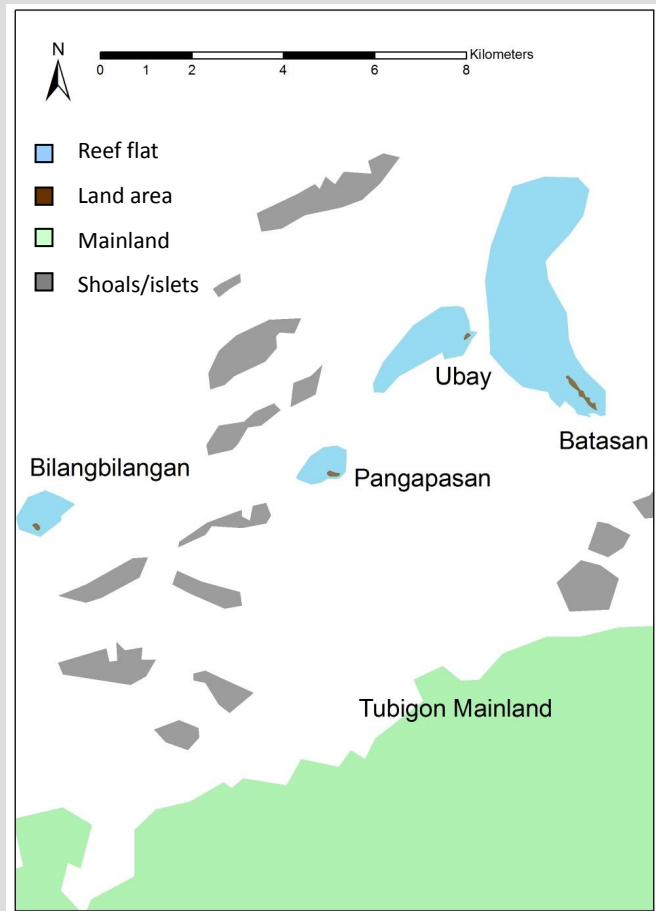
## CASE STUDY

Bohol, Philippines





Source: Project Seahorse (2015)









# Tubigon, Bohol, Philippines

Island	Small and low-lying islands		Impoverished fishing communities		
	Land area (ha)	Maximum elevation above water (m)	Population	Households	Households w/ income below poverty threshold
Pangapasan	2.1	2.24	621	130	34%
Bilangbilangan	1.7	2.12	529	108	73%
Batasan	5.8	2.20	1046	251	40%
Ubay	1.5	2.32	223	58	74%

Note: Population data from Community-Based Monitoring System (CBMS) Census 2014-2015 of the Municipality of Tubigon

## TIDAL FLOODING



## Onset of tidal flooding

Oct 2013: **7.2 Mw earthquake** in  
Bohol  
(epicenter: mainland)

**Land subsidence** in islands

**Flooding during normal spring tides**  
(Severity based on degree of  
subsidence)

*Note:* Islands rarely experienced  
flooding before earthquake

## Causes of tidal flooding:

- Local: earthquake (2013)
- Global: accelerated sea level rise

# Social impacts of flooding

Schools



Waste



Roads





## ADAPTATION STRATEGIES



350 Pacific



# Adaptation in Tubigon, Bohol

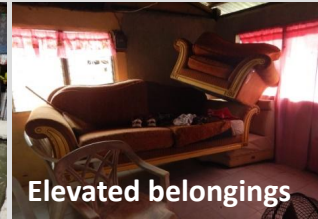
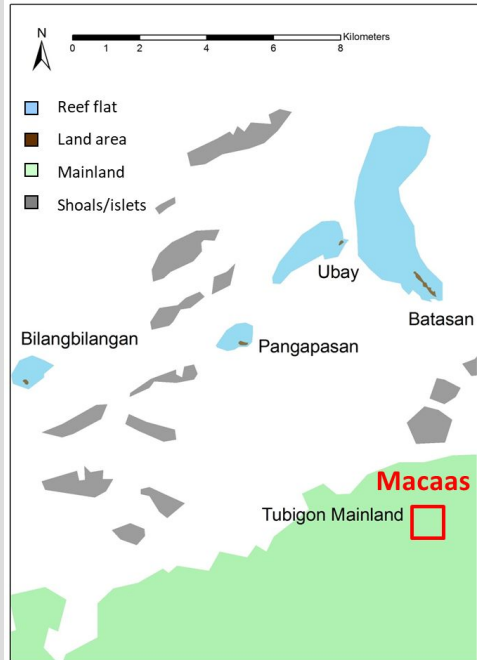
Retreat

In-situ

Relocation

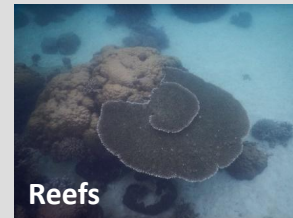
Evacuation

Community-based adaptation

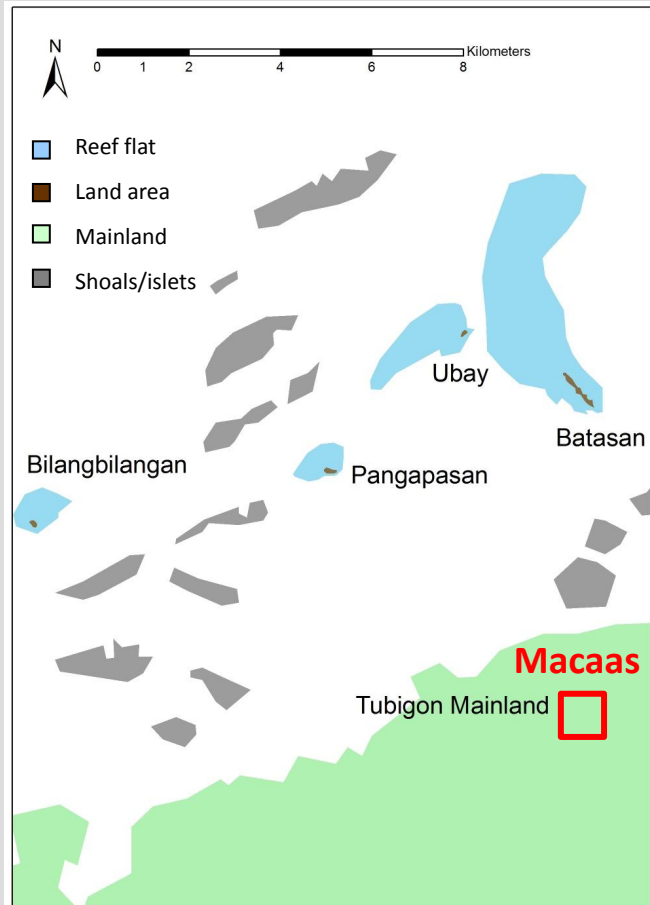


Ecosystem-based adaptation

Coastal engineering



# Permanent relocation to mainland



## Challenges

### Municipal Government struggling:

- Main reason: no funds
- No construction yet
- No livelihood assistance
- Temporary solution: Evacuation during hazards mandatory

### Community reluctant to move

- Main reason: Livelihood based on fishing
- Relocation site also prone to disasters: river flooding, and tidal flooding

# Temporary evacuation to mainland

	Before Earthquake	After Earthquake
Evacuation practice	Rarely evacuated	Readily evacuates to designated area on island or mainland
Risk information	Typhoon strength	<ul style="list-style-type: none"><li>• Typhoon strength</li><li>• Tide level</li><li>• Timing: Peak tide vs expected landfall</li></ul>
Decision criteria	Strong typhoon is destructive	Weak typhoon during high tide is destructive

## Challenge to implementation

Current early warning systems do not provide tidal info

## Effectiveness against tidal flooding

Prevented loss of lives during the passage of several typhoons

# Ecosystem-based adaptation

## Challenges

### Reefs

- Ability of corals as natural wave barriers not well-known by communities
- Were mined instead



### Mangroves

- Ability of mangroves well known, being planted eagerly
- Variety of planted mangroves not as resilient against waves (Villamayor et al, 2016)



# Coastal engineering

Island	Seawalls
Batasan	No seawalls, but want to build one on Habagat* side
Ubay	Habagat* side functional (35m), Amihan* new (9m)
Pangapasan	Habagat* side functional (24m), Amihan* collapsed (20m)
Bilangbilangan	Habagat* side collapsed (220m), Amihan* none

\*Note: Habagat = Southwest monsoon, Amihan = Northeast monsoon



Damaged (Bilangbilangan)

**Challenge:** old seawalls damaged

Damaged seawalls offer reduced protection against waves

**Environmental risk:** Seawalls (damaged or not) can accelerate coastal erosion



Maladaptation

Successful Adaptation

Adaptation-maladaptation continuum

Towards more vulnerable, inequitable adaptation that increases risk for humans and ecosystems, has mitigation tradeoffs

Towards equitable and effective adaptation with human, ecosystem and mitigation co-benefits

**Benefits to humans**

Increases social vulnerability and/or causes unintended harm to humans

Decreases social vulnerability; build adaptive capacity to new disturbances

**Benefits to ecosystem services**

Increases climate-related impacts on ecosystems and ecosystem services

Reduces climate-related impacts on ecosystems and ecosystem services

**Equity outcomes**

Worsens present and/or future condition of the poor, low-income, ethnic groups and/or females

Highly beneficial to the poor, low-income, marginalized ethnic groups and/or females

**Transformation potential**

Does not facilitate or unintentionally inhibits deep, systemic change

Contributes to deep, systemic change of norms, practices, behaviors

**Reduced GHG emissions**

Causes additional GHG emissions

Does not increase GHG emissions OR has mitigation co-benefits (e.g. sequesters CO<sub>2</sub>)

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# Discussion



**Co-Creation  
Webinar Series**

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**Elisa Mariel  
Trujillo Leyva**  
ARISE-Mx

# Thank you to our experts!

- ❖ **Antoine B. Richards** - Chief of Staff, Institute for Diversity & Inclusion in Emergency Management
- ❖ **Camila Tapias** - Global Disaster Resilience Specialist, SPIN Global and ARISE US Board Member
- ❖ **Shefali Juneja Lakhina** - Co-Founder at Wonder Labs
- ❖ **Ma. Laurice Jamero** - Head of Resilience Collaboratory at Manilla Observatory
- ❖ **Elisa Mariel Trujillo Leyva** - National Director for ARISE Mx

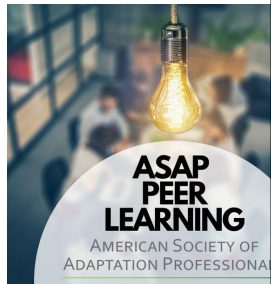
*Special thanks to Joyce Coffee, Climate Resilience Consulting!*



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# Upcoming Opportunities



## Register for Upcoming Co-Creation Sessions

### Global Adaptation Action

- Multilateral Adaptation Action (**September 21**)

### Advancing the Adaptation Field

- The Adaptation Workforce (**November 16**)
- Measuring Adaptation Success (**January 18**)

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Principles of  
Featured Speaker

s of Quality  
Change Adaptation

## Next Co-Creation Webinar - September 21

Multilateral Adaptation Action: The Global Stocktake

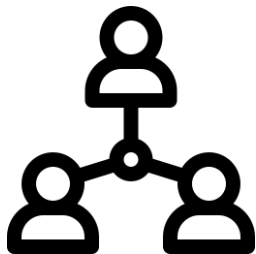


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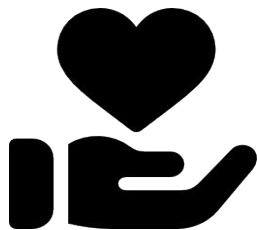
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# **Networking in Small Groups**