Getting Started with Climate Resilience

The Climate Toolkit Symposium

October 28, 2025

1:00-2:30 pm

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Co-Founder & Managing Director

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Program Officer, Grants & Research

Environment & Culture Partners

Agenda

1. Introduction + Definitions: road to climate resiliency and sustainability
2. Organization Assessment Worksheet
3. Climate Resiliency Roadmap and Case Study

Learning Objectives:

- Establish a baseline organizational assessment.
- Understand what organization needs to move forward.
- Learn how to create a roadmap to climate resiliency.

Housekeeping

1. Introduce yourself to two people you do not know.
2. Trade business cards/LinkedIn.
3. Sit near your new friends – you'll be talking to them in small groups later in the workshop!

Photo courtesy of the Detroit Zoological Society

Introduction

The road to sustainability and resiliency

Definitions

RESILIENCE: The ability to recover effectively and to successfully adapt to challenges through flexibility and adjustment to external and internal needs.

EXPOSURE: The **presence of people, assets, and ecosystems** in places where they could be adversely affected by hazards as well as the influence of the intensity and frequency of any given hazard or combination.

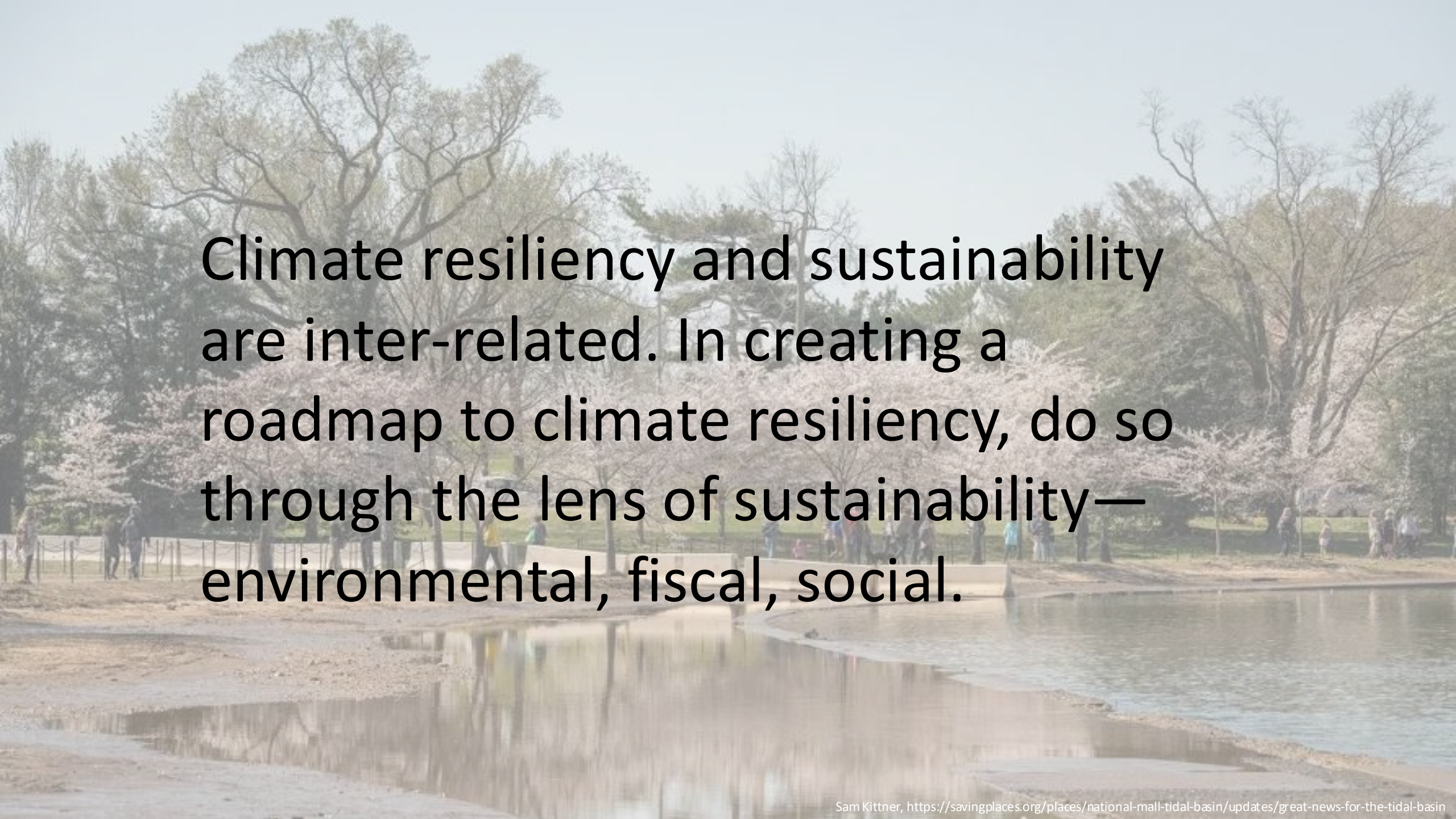
HAZARD: An **event or condition** that may cause injury, illness, or death to people or damage to assets. Natural hazards are often amplified by climate change and the degree of vulnerability to the hazard.

RISK: The potential for negative consequences where something of value is at stake. In the context of the assessment of climate impacts, the term risk is often used to refer to the potential for adverse consequences of a climate-related hazard.

VULNERABILITY: The **susceptibility to hazards** that encompasses exposure, sensitivity, potential impacts, and adaptive capacity.

Risk = Hazard × Exposure × Vulnerability

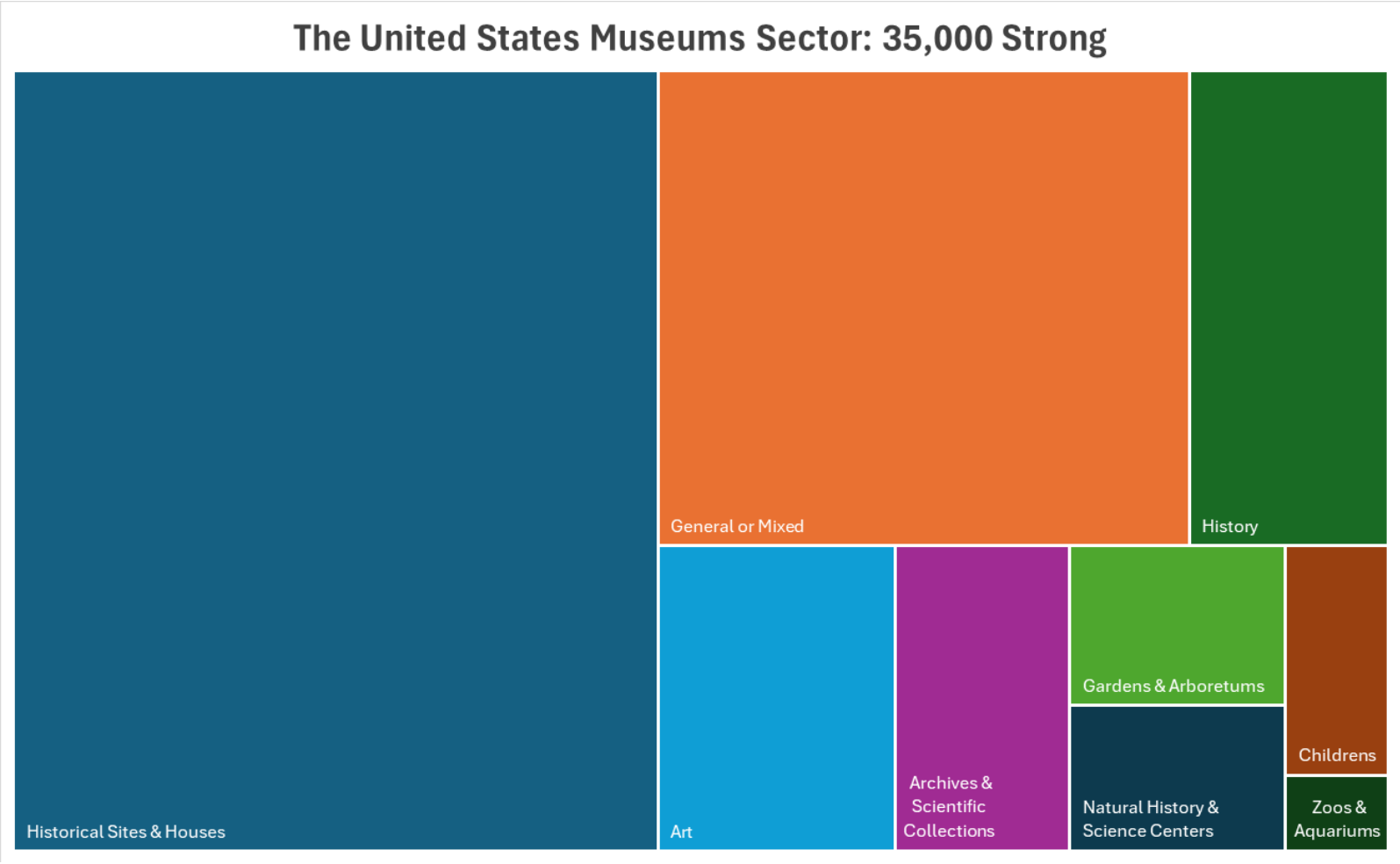
Definitions adapted from the US Resilience Toolkit, https://toolkit.climate.gov/content/glossary.



Climate resiliency and sustainability are inter-related. In creating a roadmap to climate resiliency, do so through the lens of sustainability—environmental, fiscal, social.

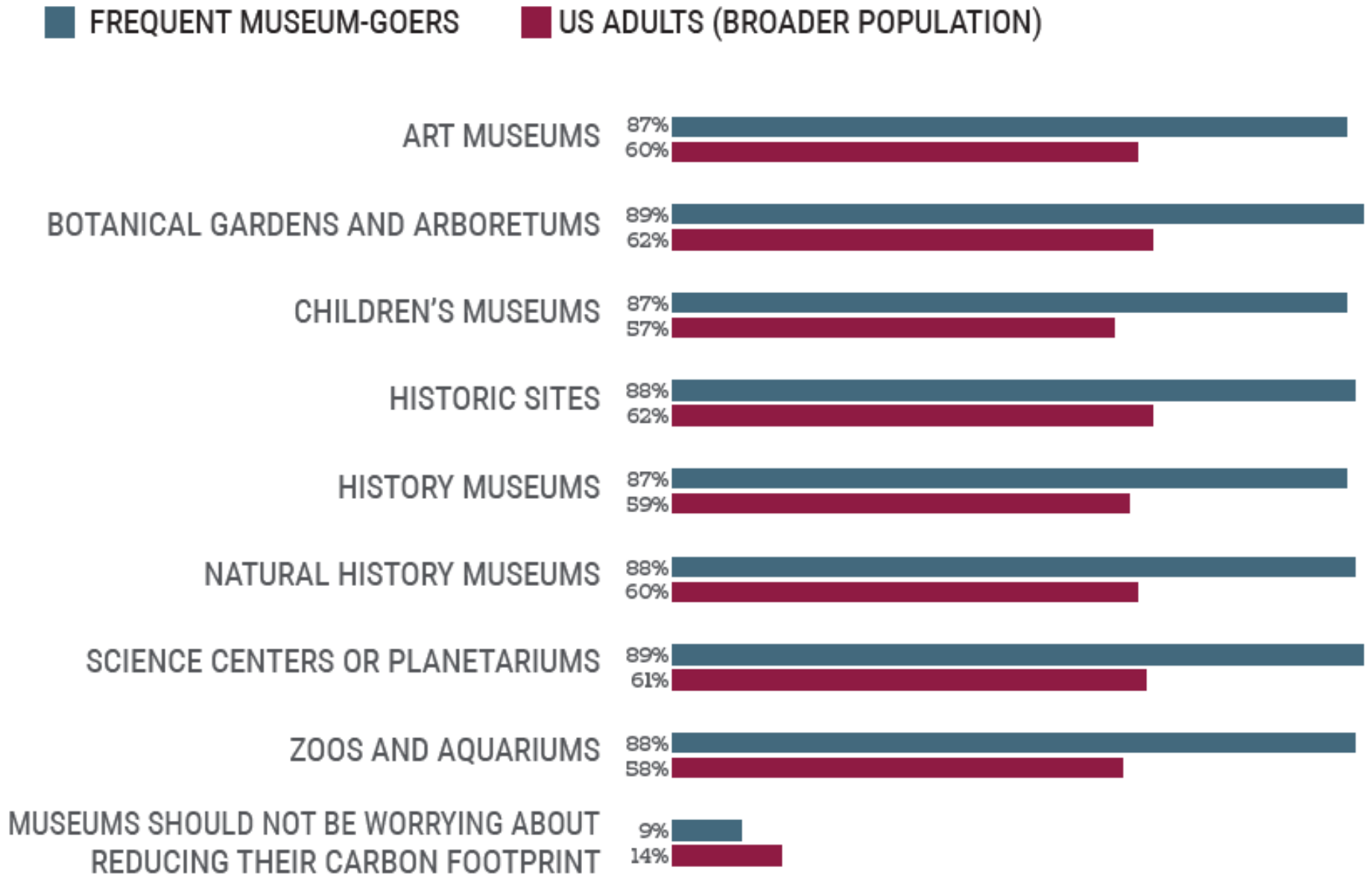
Sam Kittner, https://savingplaces.org/places/national-mall-tidal-basin/updates/great-news-for-the-tidal-basin

Acknowledgement + Dedication



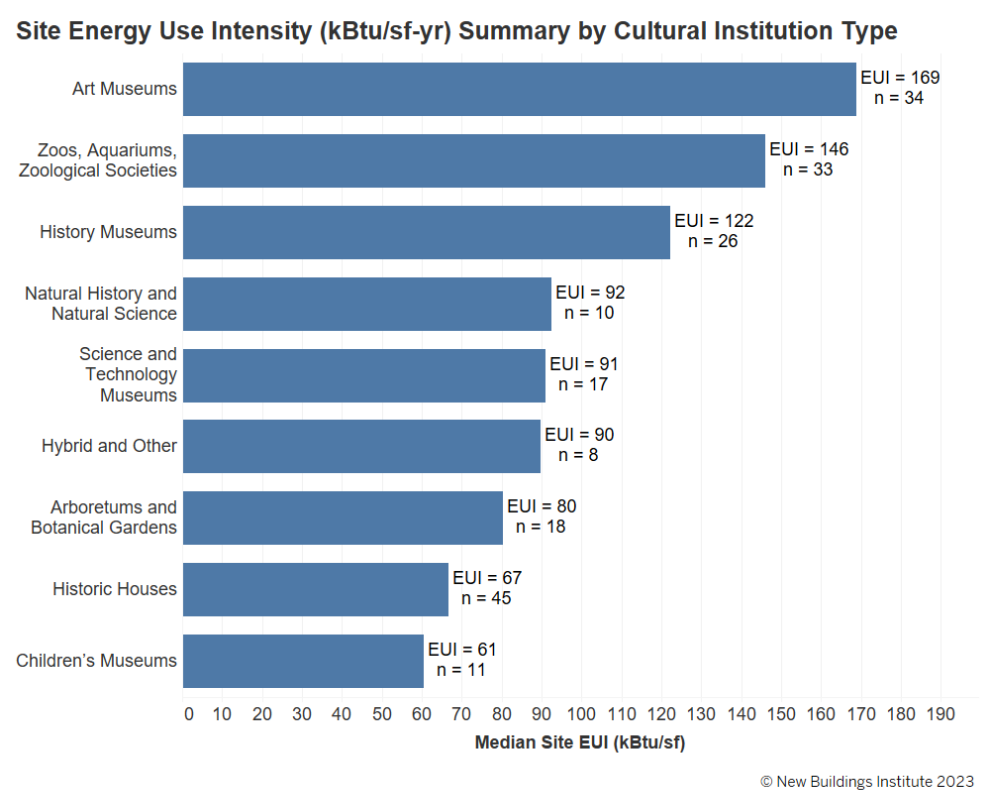
- ✓ We acknowledge climate change is an existential threat to the cultural sector.
- ✓ Keep records of how climate change is affecting your institution/collections.
- ✓ Institutional dedication to making a climate resiliency and sustainability plan?
- ✓ Assemble a resiliency team and assign roles.

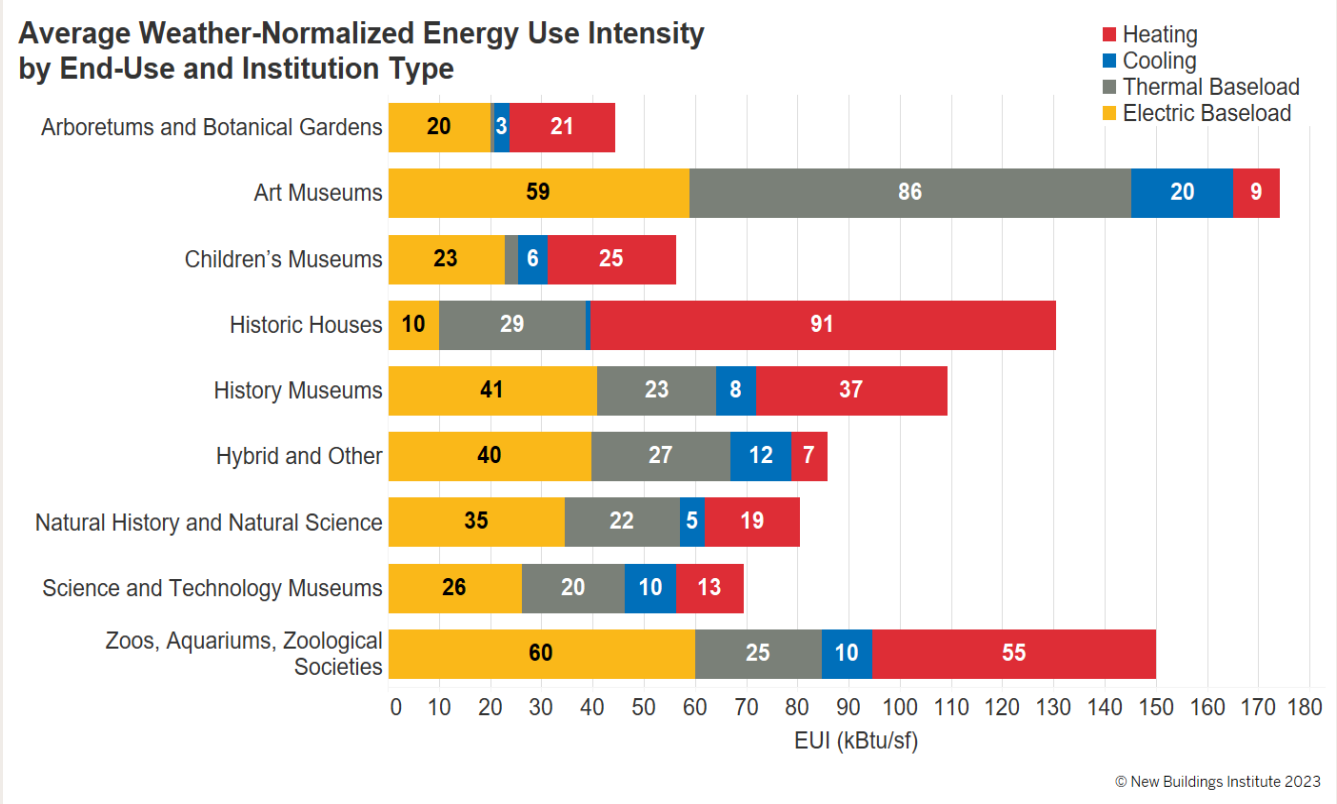
What types of museums should be working to reduce their carbon footprint and operate in more sustainable ways?



Sources: 2022 Annual Survey of Museum-Goers, n = 90,747; 186 museums participating 2022 Broader Population Sampling, n = 1,017

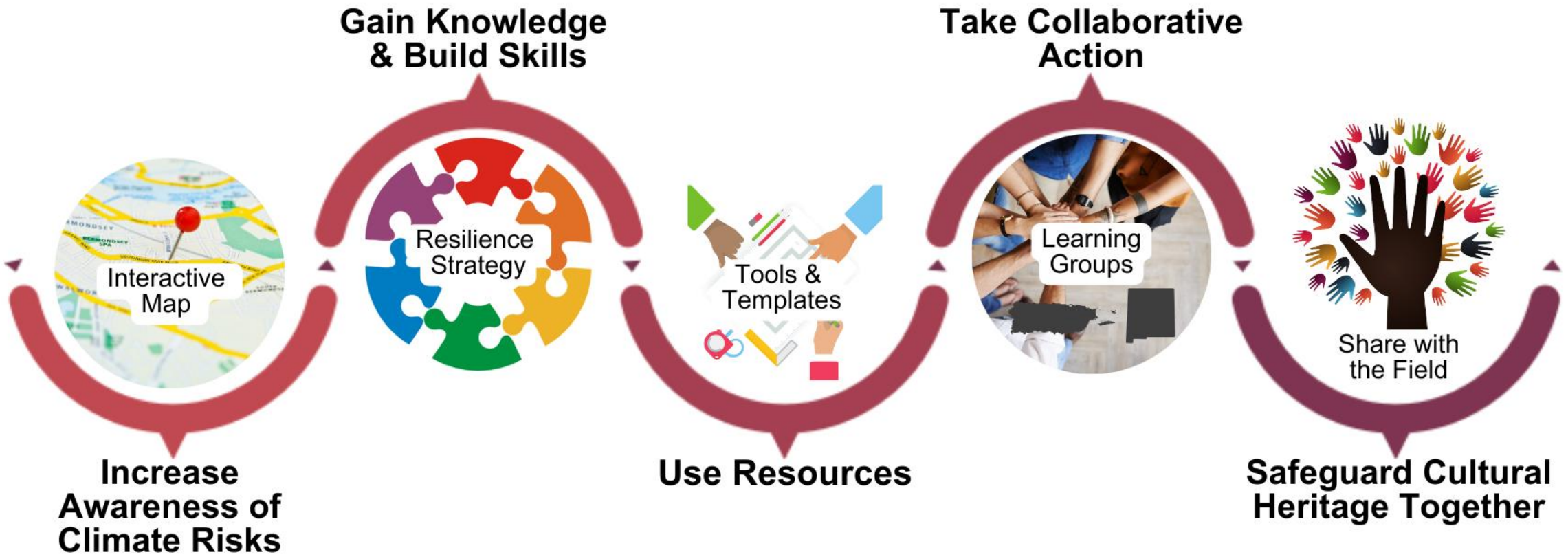
The research from Culture Over Carbon identified **art museums** as having the **highest energy use intensity** (EUI) out of eight other museum and cultural organization types, which **equates to higher energy costs and operational carbon emissions**.





Climate Resilience Resources for Cultural Heritage

Resilience.culturalheritage.org



Climate Resilience Strategy: Approach and Components

Introduction

- **Executive Summary**
- **Introduction**
- **Methodology**

Discovery & Design

- **Identify Team**
- **Conduct Baseline Assessments**
- **Identify Vulnerabilities and Risks**
- **Prioritize Resilience Focus Areas**

Implement

- **Implementation**

Maintain & Share

- **Share + Communicate Plan**
- **Develop Annual Review Schedule**
- **Develop Appendices**

The Climate Resilience Resources

1. Climate Resilience Strategy Approach and Guide
2. 8 Learning Modules and Exercises to Build Climate Resilience Strategy
3. Hazard Risk Assessment Map with Site-level Reports
4. Site-level Vulnerability Assessment Survey
5. Recommendations and templates for forming and sustaining Learning Groups
6. Examples of Climate Resilience in Action from the Learning Groups

Learning Modules

1. Introduction to Climate Change and Resilience
2. Understanding Vulnerabilities to Climate Change Impacts & Repercussions
3. Mapping Hazards and Risks
4. Assessing Vulnerabilities of Cultural Heritage to Climate Change Impacts and Related Events
5. Resilience Resources: Planning and Preparation
6. Developing Community Involvement
7. How Collaborations Build Resilience
8. Maintaining Resilience

Components

- Terms and Definitions
- Core Concepts and Approaches
- Activities
- Next Steps
- Resources for Further Study

Build Resilience as a Community: Learning Groups

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Centro Ceremonial Indígena de Tibes

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Biblioteca Comunitaria Especializada

LIGA DE ARTE

MAC

NEW MEXICO

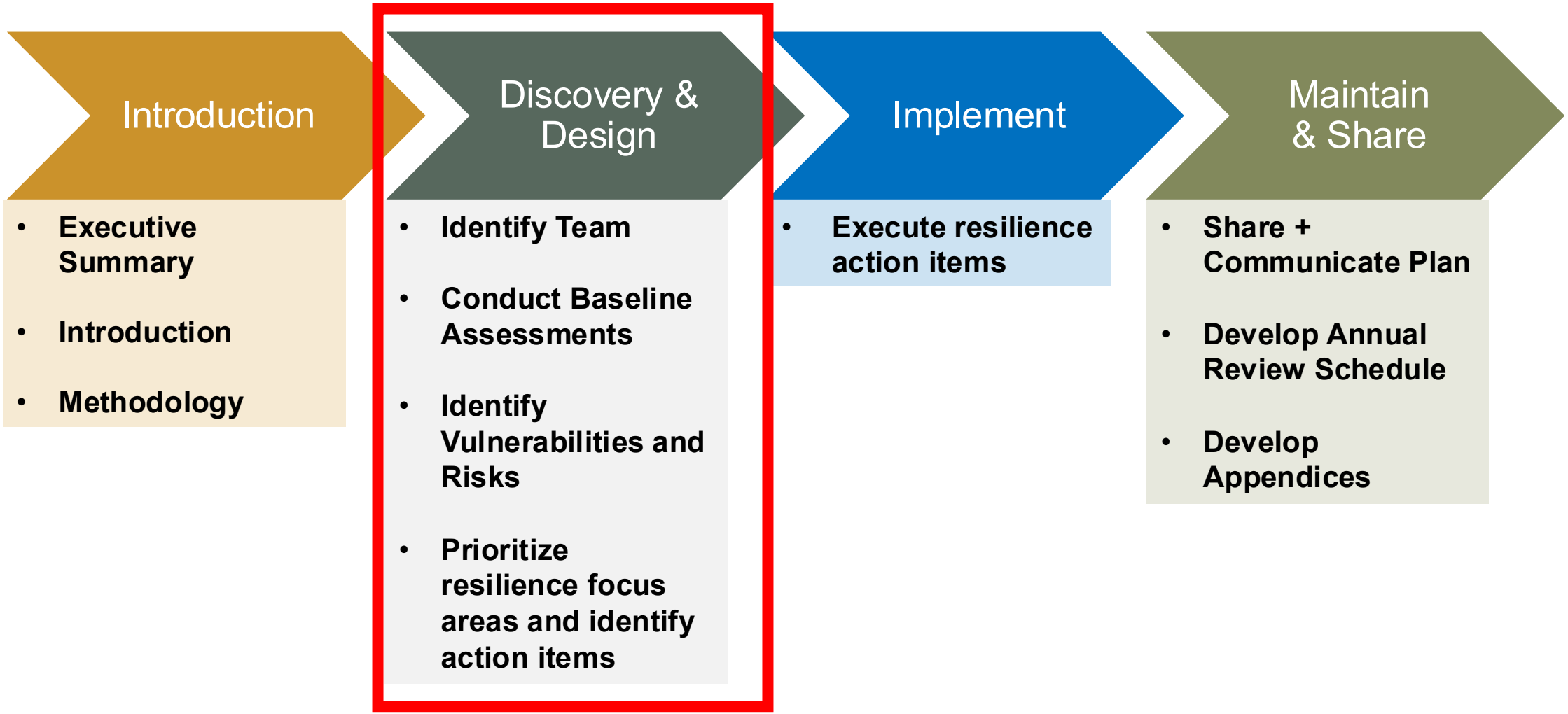
MAXWELL MUSEUM OF ANTHROPOLOGY

MILLICENT ROGERS MUSEUM

MUSEUM OF INTERNATIONAL FOLK ART

Organization Assessment Worksheet

Climate Resilience Strategy: Approach and Components



Complete Organization Assessment Worksheet
5 mins

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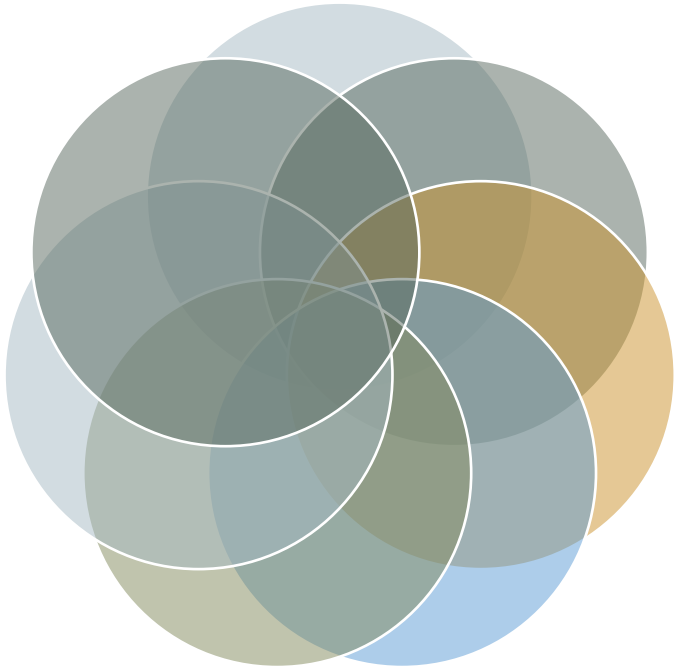
Purpose

Community Hub

Urban Revitalization

Community Development



Library

Entrepreneurship

Historical Archive

Ethical Behavior

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Fundación Sila M. Calderón

1. Team Building

- Internal staff
- Board
- External stakeholders

- ✓ College students and faculty
- ✓ Private individuals
- ✓ Government officials
- ✓ Book authors
- ✓ School students
- ✓ Other cultural institutions

Discussion
3–5 mins

Who has bought in to climate work? Who has not? What do you need to do to secure buy-in?

2. Baseline Assessments: Climate

A. Identify climate risks impacting institution and community.

B. Identify local and regional climate/resilience/ sustainability assessments, plans.

C. Engage in community: risks, vulnerability, support orgs.

Tidal Basin

Risk Time Period

Use dropdown to select a time.

Next Year (FEMA)

- Current
- Next Year (FEMA)
- Now - 2050 (Climate Check)
- Now - 2044 (NOAA)
- 2035 - 2064 (NOAA)
- 2070 - 2099 (NOAA)

0%
Disadvantaged

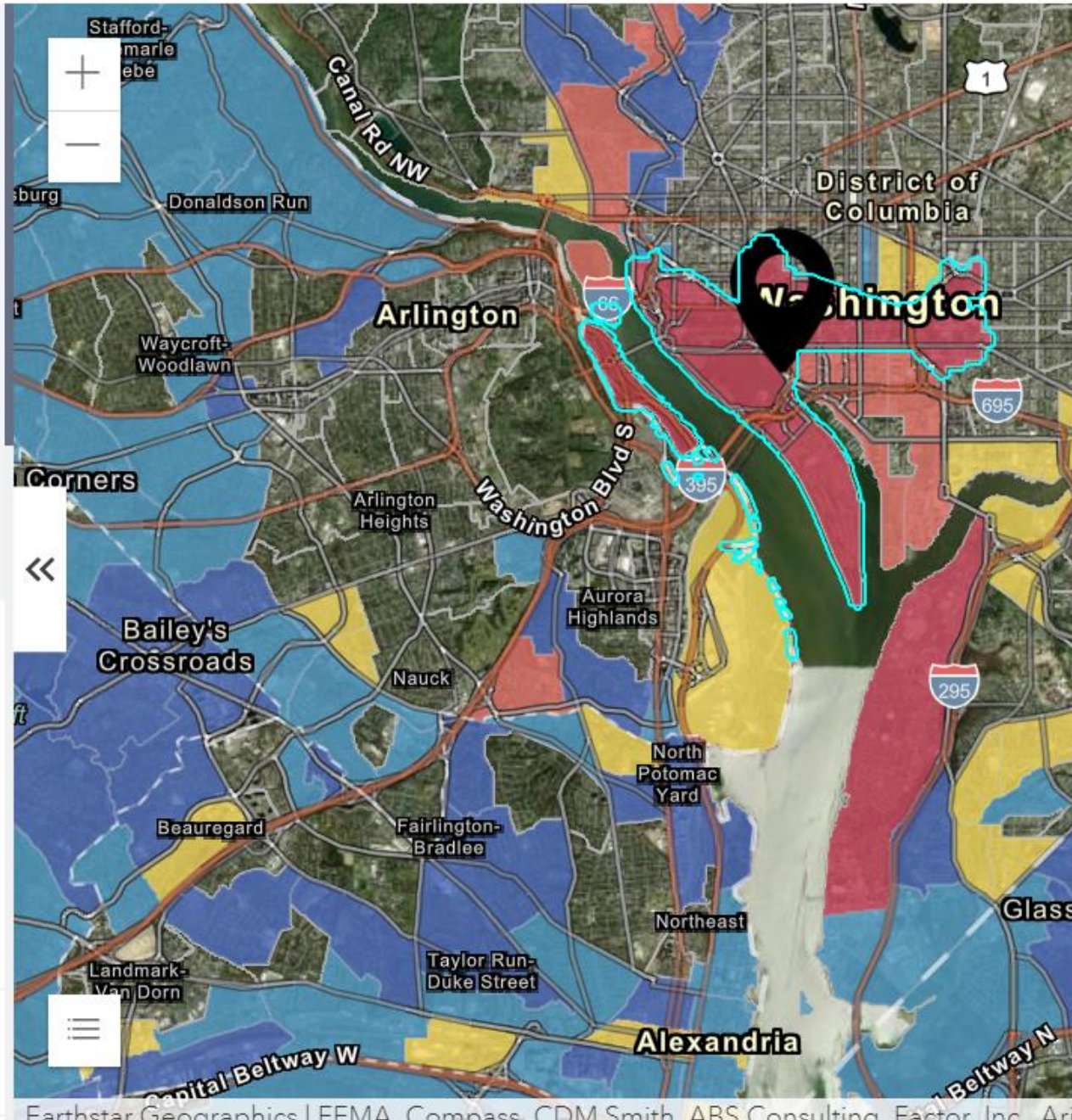
Not Resistant
Building Code

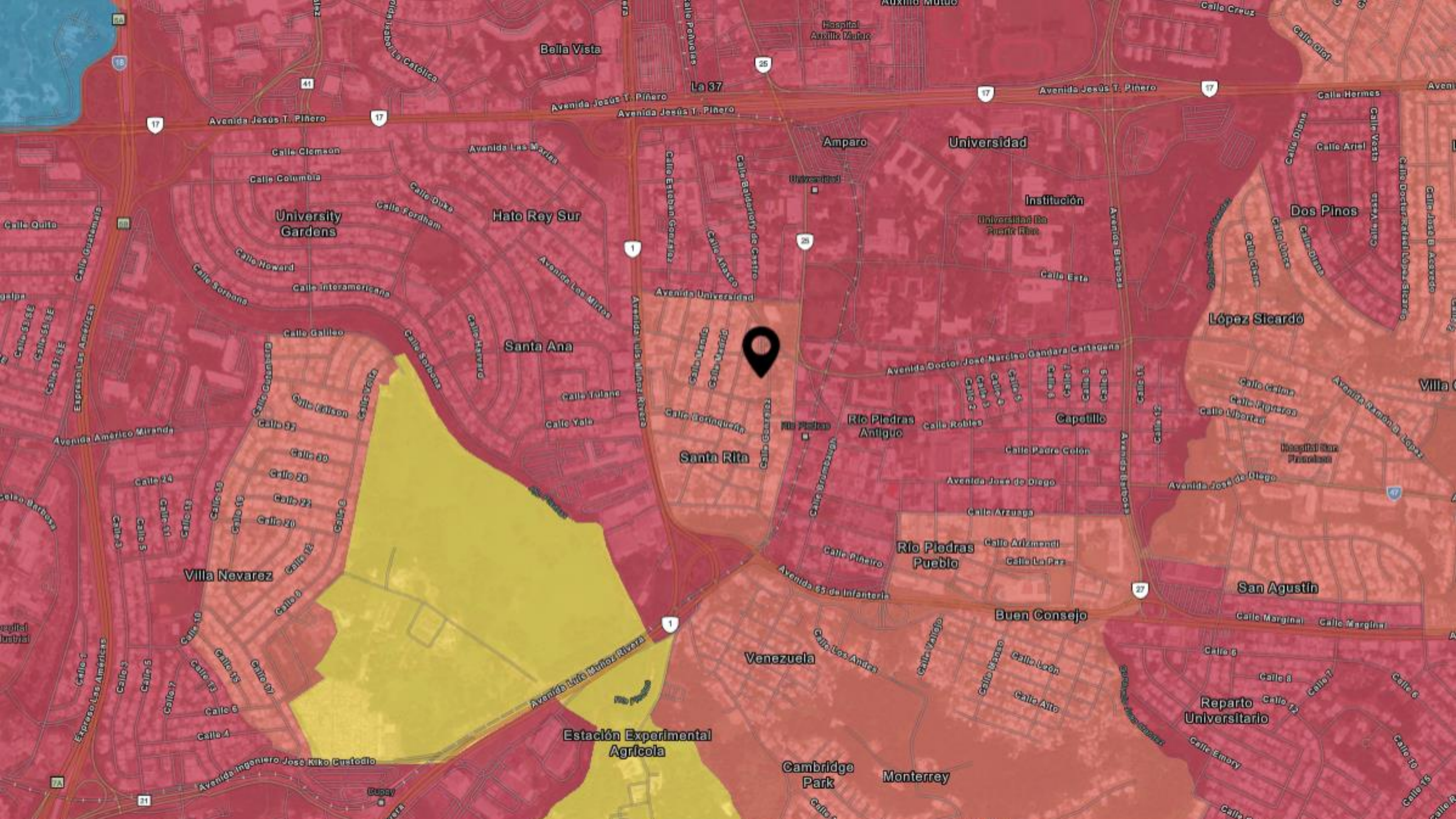
om ClimateCheck

Next Year (FEMA)

Based on historical data

Active	Event	Severity
	Riverine Flooding	Very High
	Landslide	Relatively High





Bella Vista
Hospital Auxilio Mutuo
La 37
Avenida Jesús T. Piñero
Amparo
Universidad
Calle Clemson
Calle Columbia
Avenida Las Marías
Calle Duke
Calle Fordham
University Gardens
Hato Rey Sur
Institución
Universidad De Puerto Rico
Dos Pinos
Calle Quito
Calle Howard
Calle Sorbona
Avenida Los Mirtos
Calle Interamericana
Avenida Universidad
Calle Esta
López Sicardó
Calle Galileo
Santa Ana
Avenida Doctor José Narciso Gándara Cartagena
Calle Harvard
Calle Tulane
Calle Yale
Avenida Luis Muñoz Rivera
Calle Borinqueña
Calle Georgetti
Río Piedras
Río Piedras Antiguo
Calle Robles
Capetillo
Calle Calma
Calle Figueroa
Calle Libertad
Avenida Ramón B. López
Avenida Américo Miranda
Santa Rita
Calle Padre Colón
Avenida José de Diego
Hospital San Francisco
Calle Brumbaugh
Calle Arzuaga
Avenida Barbosa
Villa Nevarez
Río Piedras Pueblo
Calle Arizmendi
Calle La Paz
Calle Piñeiro
Avenida 65 de Infantería
San Agustín
Buen Consejo
Calle Marginal
Venezuela
Calle Los Andes
Calle León
Calle Alto
Reparto Universitario
Calle Emory
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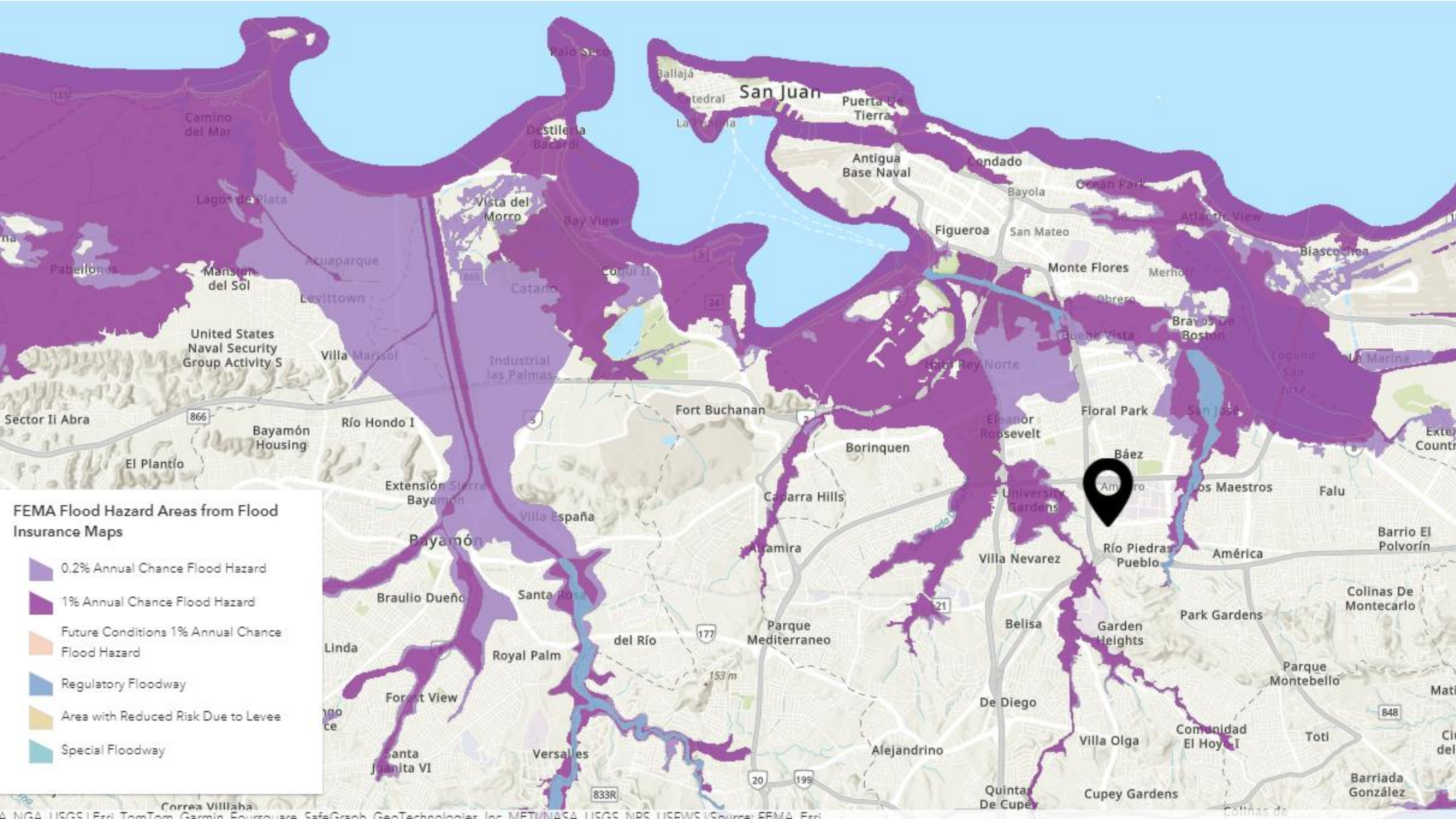
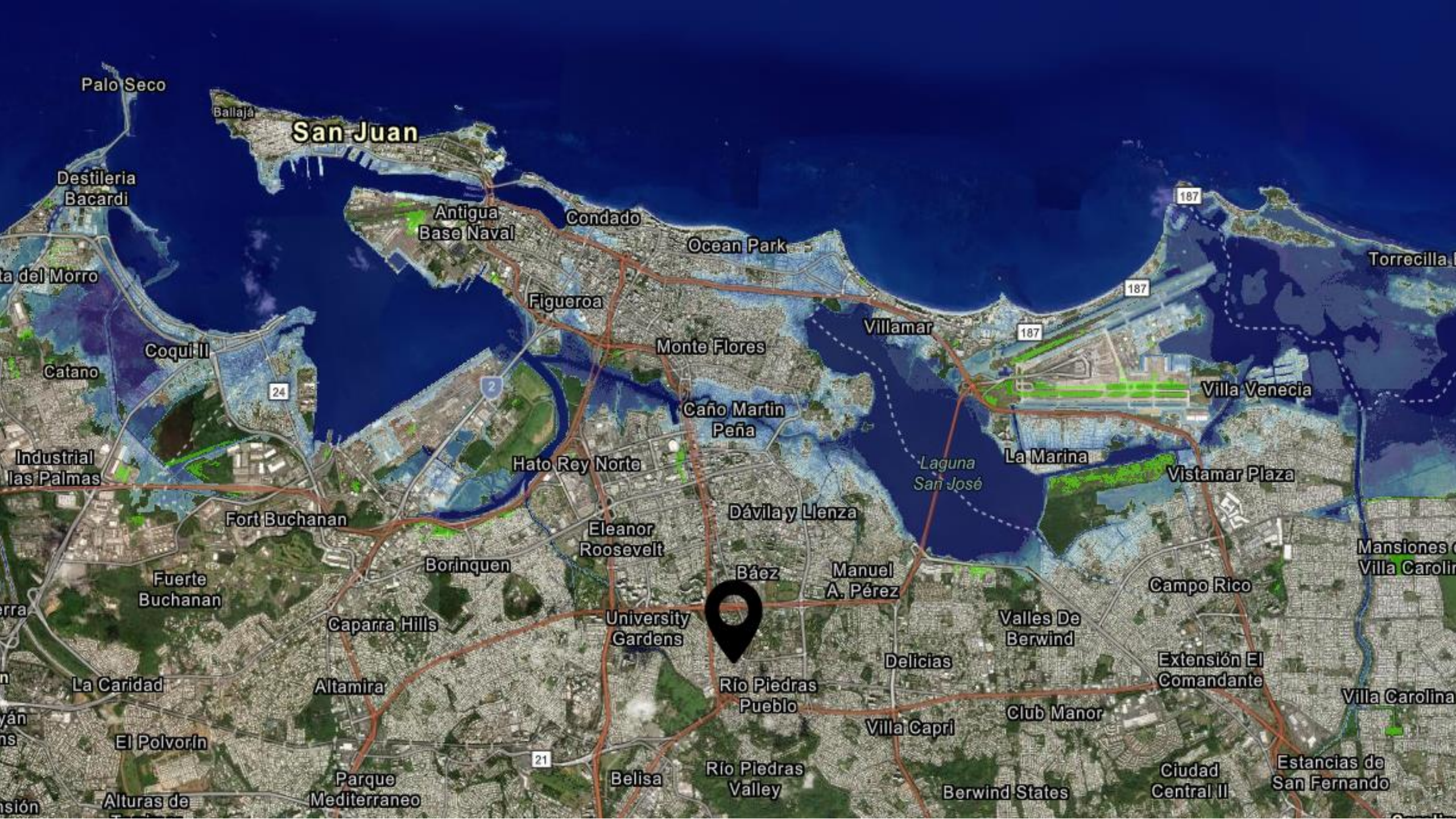
Avenida Luis Muñoz Rivera
Estación Experimental Agrícola
Avenida Ingeniero José Kiko Custodio
Cambridge Park
Monterrey
Cupey


FEMA Flood Hazard Areas from Flood Insurance Maps
0.2% Annual Chance Flood Hazard
1% Annual Chance Flood Hazard
Future Conditions 1% Annual Chance Flood Hazard
Regulatory Floodway
Area with Reduced Risk Due to Levee
Special Floodway
San Juan
Puerta De Tierra
Antigua Base Naval
Condado
Ocean Park
Bayola
Atlantic View
Figueroa
San Mateo
Monte Flores
Biascochea
Camino del Mar
Destilería Bacardi
Vista del Morro
Bay View
Lagos de Plata
Acuaparque
Pabellones
Mansión del Sol
Levittown
Cataño
Coquí II
United States Naval Security Group Activity S
Villa Marisol
Industrial las Palmas
Hato Rey Norte
Bravos De Boston
Buena Vista
Sector Ii Abra
Bayamón Housing
Río Hondo I
Fort Buchanan
Borinquen
Eleanor Roosevelt
Floral Park
Báez
El Plantío
Extensión Sierra Bayamón
Caparra Hills
University Gardens
Los Maestros
Falu
Villa España
Bayamón
Altamira
Villa Nevarez
Río Piedras Pueblo
América
Barrio El Polvorín
Braulio Dueño
Santa Rosa
Colinas De Montecarlo
Park Gardens
Linda
Royal Palm
del Río
Parque Mediterraneo
Belisa
Garden Heights
Parque Montebello
Forest View
De Diego
Santa Juanita VI
Versalles
Alejandrino
Villa Olga
Comunidad El Hoyo I
Toti
Quintas De Cupey
Cupey Gardens
Barriada González
Correa Villlaba


Palo Seco
Ballajá
San Juan
Destileria Bacardi
Antigua Base Naval
Condado
Ocean Park
Torrecilla
la del Morro
Figueroa
Villamar
Coqui II
Monte Flores
Catano
Villa Venecia
Caño Martin Peña
Industrial las Palmas
Hato Rey Norte
Laguna San José
La Marina
Vistamar Plaza
Fort Buchanan
Dávila y Llenza
Eleanor Roosevelt
Mansiones
Villa Caroli
Borinquen
Báez
Manuel A. Pérez
Campo Rico
Fuerte Buchanan
Caparra Hills
University Gardens
Valles De Berwind
Delicias
Extensión El Comandante
La Caridad
Altamira
Río Piedras Pueblo
Villa Carolina
Club Manor
Villa Capri
El Polvorín
Parque Mediterraneo
Belisa
Río Piedras Valley
Ciudad Central II
Estancias de San Fernando
Alturas de
Berwind States
187
24
2
21

Other resources

- USDA Plant Hardiness Zone Map
- Climate Assessment Tool, Botanic Gardens Conservation International
- Landscape Succession for ‘Climate Ready’ Botanic Gardens: A Landscape Succession Toolkit
- Plants and Climate Change Education
- Zoo and Aquarium All Hazards Partnership

Discussion
5 mins

Have you evaluated your climate risks? What are they? If not, what do you think they are?

3. Baseline Assessments: Institution + Community

A. Institutional and/or collections assessment

B. Site Assessment

C. Community

A. Climate Risk Vulnerability Assessment

Climate Resilience Resources for Cultural Heritage

Climate Risk Vulnerability Assessment Tool for Cultural Heritage
as adapted from the Heritage Preservation/Foundation for Advancement In Conservation
RISK EVALUATION AND PLANNING PROGRAM

Vulnerability Prioritization Worksheet: Key

Likelihood of Hazard	Risk of Damage	Vulnerability Rating	Comments
1 = Very Low **2** = Relatively Low **3** = Relatively Moderate **4** = Relatively High **5** = Very High	**1** = No damage from climate impacts **2** = Slight (minor damage or slow-onset damage requiring in-house adaptations; operations continue to function; small monetary investment) **3** = Moderate (damage requiring extra labor; operations may need to be suspended; moderate monetary investment to return to regular operations) **4** = Severe (damage requiring outside services and vendors; temporary suspension of operations; significant monetary investment) **5** = Very severe (damage resulting in total loss of item/building/function/character; indefinite closure of institution)	The higher the number, the higher the risk Ratings of **16-25** will fill with red Ratings of **6-15** will fill with yellow Ratings of **1-5** will fill with green	Note information about previous occurrences, response times, or additional insights.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Holdings

- Government records
- Personal papers
- Art pieces
- Memorabilia
- Newspapers and magazines
- Photos
- Audiovisual materials

Direct Impacts

Hurricanes and Storms, Precipitation + Wind, High Heat + Drought

- Structural damage
- Loss of power
- Wind & water damage to the collection and building
- Humidity/condensation/mold
- A/C working at full capacity or overtime
- A lot of temperature fluctuations
- Problems with water service and cistern capacity
- Problems with access and service hours

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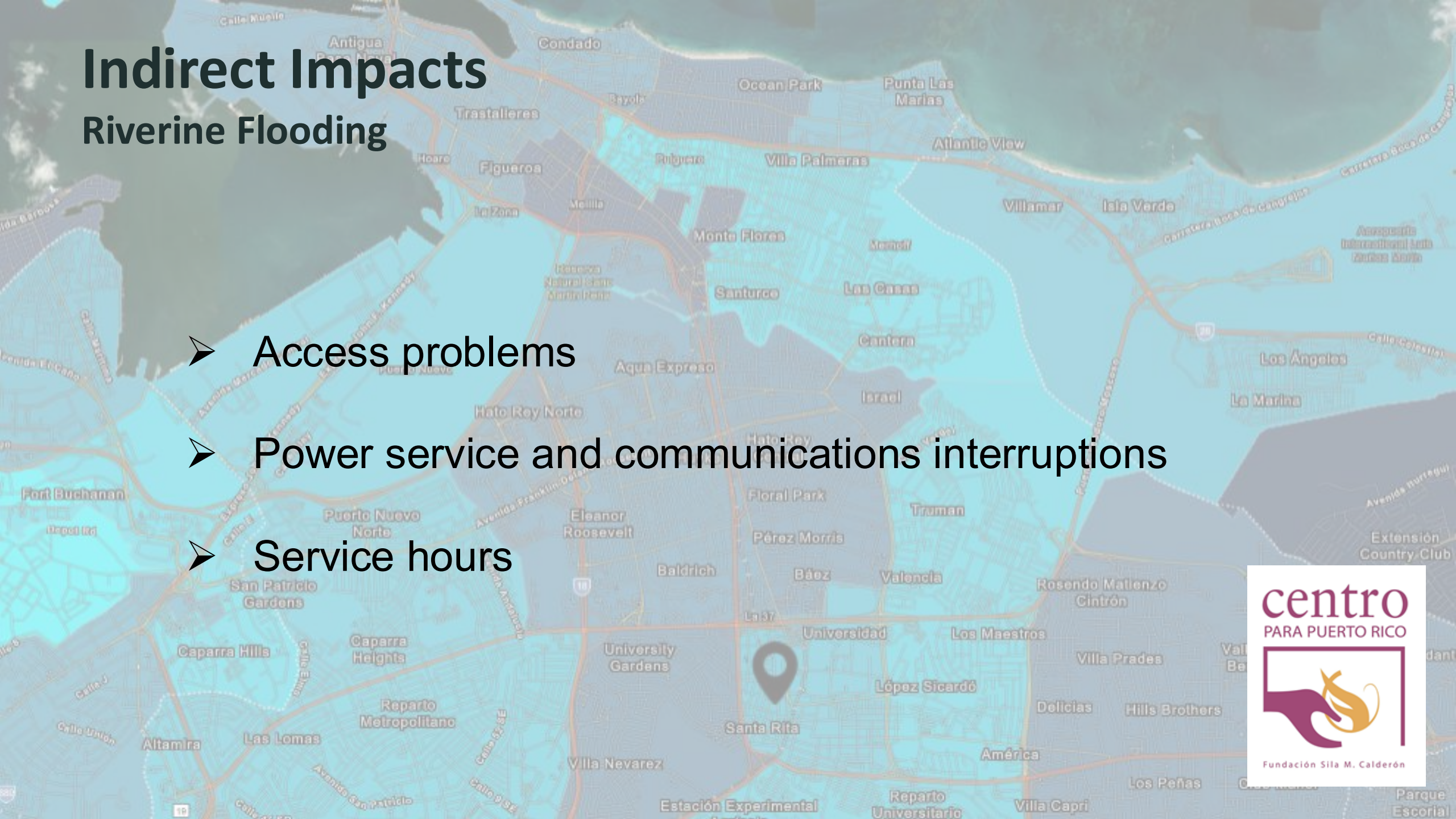
Indirect Impacts

Riverine Flooding

- Access problems
- Power service and communications interruptions
- Service hours



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2c.	coastal flooding	1	X	1	**equals**	1	Consider both the force of water and the effects of saturation on buildings and materials. When water is present in great amounts it impedes travel and access, and carries damaging debris, sometimes with force. The water will carry harmful toxins and pollutants, and may require hazardous waste management and prolonged closure until cleanup is complete. It may disrupt utilities or require shut-downs in service. Prolonged exposure to water or residual moisture drives higher relative humidity, encourages mold growth, mechanically damages materials (whether the beams and walls of a building or the surfaces and components of an object).	**Coastal flooding would not affect the building or sorrounding communities, according to the maps. However, access to the area may be affected and it may also disrupt water supply for some time. The scoring only takes to consideration direct impact to the building and vecinity.**
2d.	drought	4	X	3	**equals**	12	Prolonged low relative humidity dries out objects and structures, damaging collections, buildings, roads and sidewalks. Water use restrictions or lack of water may lead to landscape die-off that increases the risk of wildfire. Parched land cannot absorb rainfall as easily and is at risk of surface and riverine flooding.	
2e.	earthquake	2	X	5	**equals**	10		
2f.	flash flood	3	X	2	**equals**	6	Water incursions arise from rising from the water tables, spilling in as surface water, driven in by wind, or leaking in through roofs where water cannot escape through gutters and downspouts. The impacts are can be both immediate and longer term, including structural damage and weakening, electronic systems destruction, and mold growth on surfaces and in	**Low probability to affect the building, but may affect surrounding areas and access to it.**
2g.	flooding below ground level or below the water table	?	X		**equals**	0		**Not sure. Will have to do more research.**
2h.	hail	1	X	3	**equals**	3	The phsycial impact of hail storms is particularly damaging to art, landscapes, vehicles, lighting, and solar panels outside during a storm event.	
2i.	heat wave	4	X	4	**equals**	16	Extreme or prolonged hotter-than-expected temperatures demand more cooling than a system may be prepared for: mechanicals may not be sized for such capacity, durable for extended demand. And energy sources - electricity or delivered fuel - may not last. Dehumidifcation systems may struggle to keep up with higher humidity common with some extreme heat events.	
2j.	heavy snow	0	X	0	**equals**	0	Consider implications of snow weight on buildings, sculpture, monuments and landscape components; impact and abrasion of hail as well; and disruption of transportation, access and utilities. Consider delayed impacts of snow melt causing flooding.	
2k.	hurricane	5	X	5	**equals**	25	**Similar to flooding and water leak hazards**	
2l.	ice storm	0	X	0	**equals**	0	Consider implications of the weight of ice on wires, buildings, sculpture, monuments and landscape components; and disruption of transportation, access and utilities.	
2m.	land/mud slide	1	X	2	**equals**	2	Dislocation of land can carry, bury or crush buildings, vehicles and debris. It can damage and destroy infrastructure, restricting access and interfering with utilities. The damage to a structure or mechanicals can render a building unsafe or unusable. The material contains pollutants and debris. Removal is difficult when equipment, access and dumping locations are not available. Melting permafrost, lowered water tables, and shifted land can weaken or permanently dislodge foundations and structural components for buildings, roads and utilities. Cracks in buildings, walks, roads, and foundations weaken the structure, and invite moisture that damages the component or allows unwanted moisture and humidity.	**Low probability to affect the building, but may affect surrounding areas and access to it.**
2n.	lightning strike	2	X	3	**equals**	6		**It would be a problem if lightning disrupts power supply.**
2o.	riverine flooding	3	X	2	**equals**	6	Rivers rise rapidly even far from the storm event, breaching dams and levees, overtopping banks, and overwhelming bridges and other structures. The force of the water can wash out roads and utilities, and physically damange or move landscape features, outdoor installations, and buidlings.	**Low probability to affect the building, but may affect surrounding areas and access to it.**
2p.	strong wind or tornado	2	X	3	**equals**	6	The force of wind - in a tornado, a mircoburst, a windshear event, or prolonged high winds due to weather movements - can knock down trees and infrastructure that interrupt power, communications and water supplies while also damaging and destroying buidlings through direct impact or airborne materials.	
2q.	tidal, tsunami, or other unusual water phenomena	3	X	2	**equals**	6	Water incursions from rising from the water tables due to higher high tides, or from storm surges can reach farther inland that is common. Salt water and debris will have short-term and long-term damage. Retreating water leaves behind contamination and detritus. Water trapped after tides retreat create lasting damage through moisture and humidity until it can be pumped out	**Low probability to affect the building, but may affect surrounding areas and access to it.**

Discussion
5 mins

What parts/collections of your site are most vulnerable? Think about infrastructure, people, and collections.

4. Planning

A. Prioritization matrix or roadmap

B. Plans + Documentation

i. Climate risk documentation

ii. Strategic plan

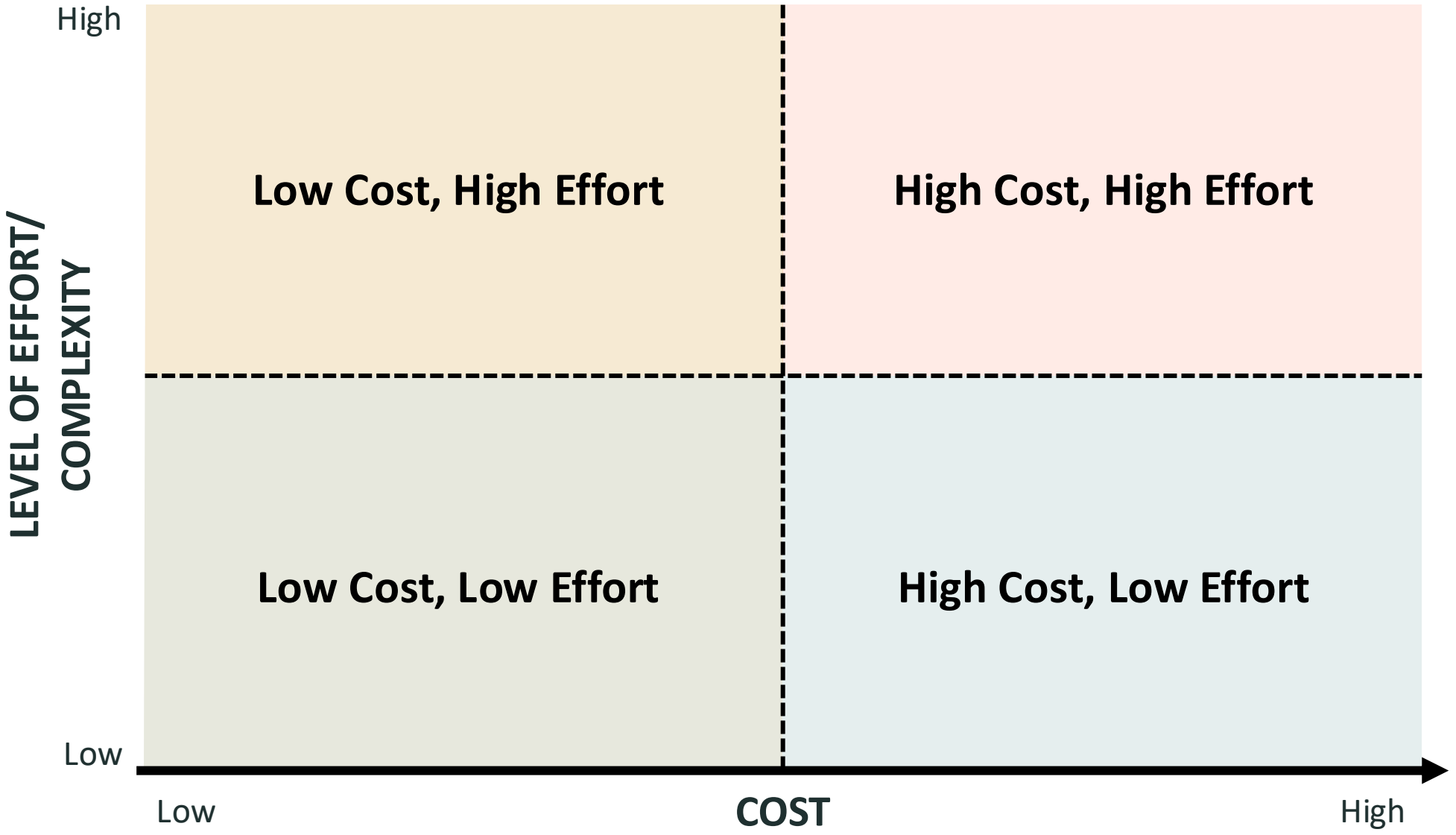
iii. Climate action plan

iv. Emergency preparedness and response plan

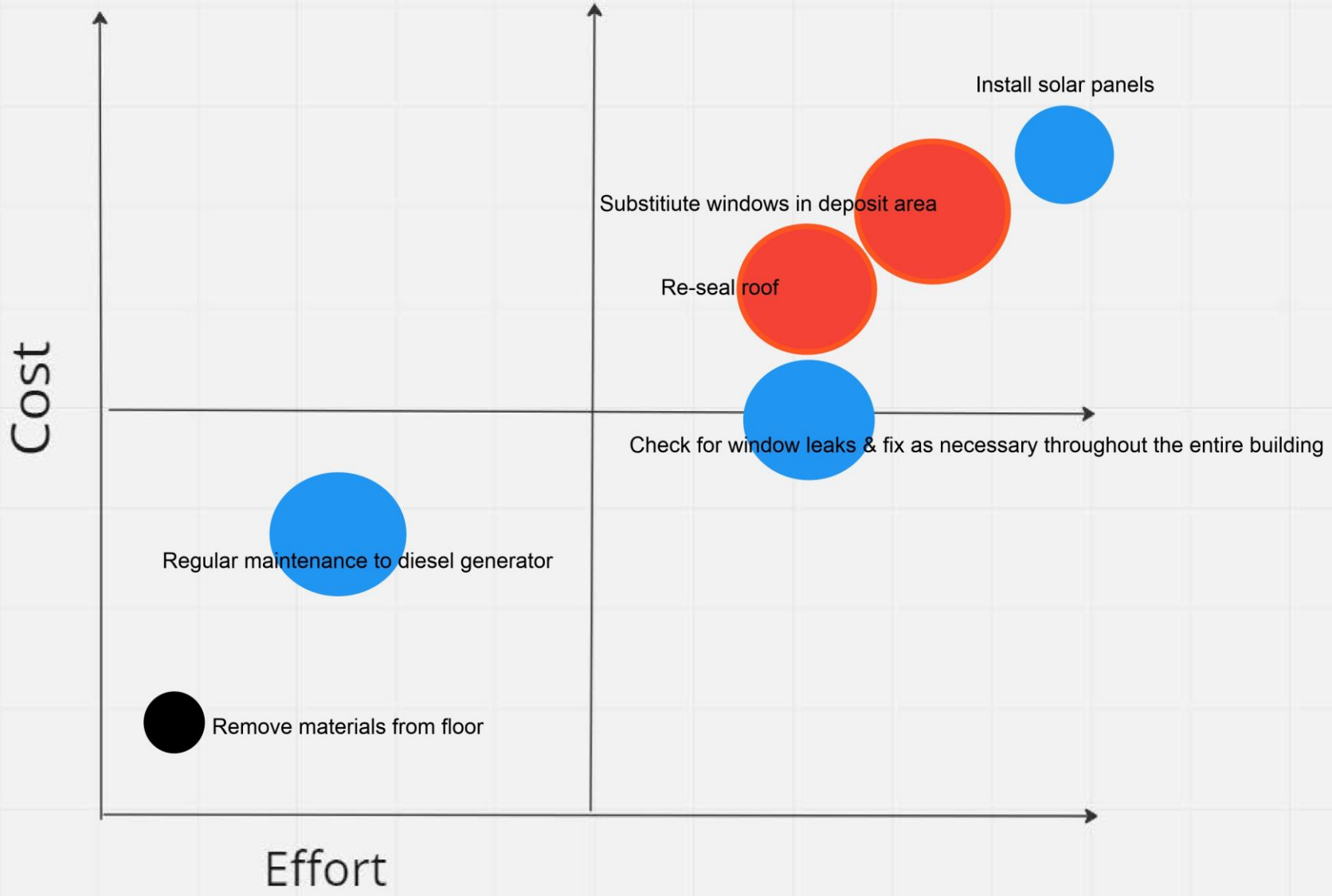
v. All hazards contingency plan

vi. Plan biosecurity/disease plan

Prioritization Framework: Cost vs Level of Effort



FSMC / Risk: Stronger/more frequent hurricanes & storms



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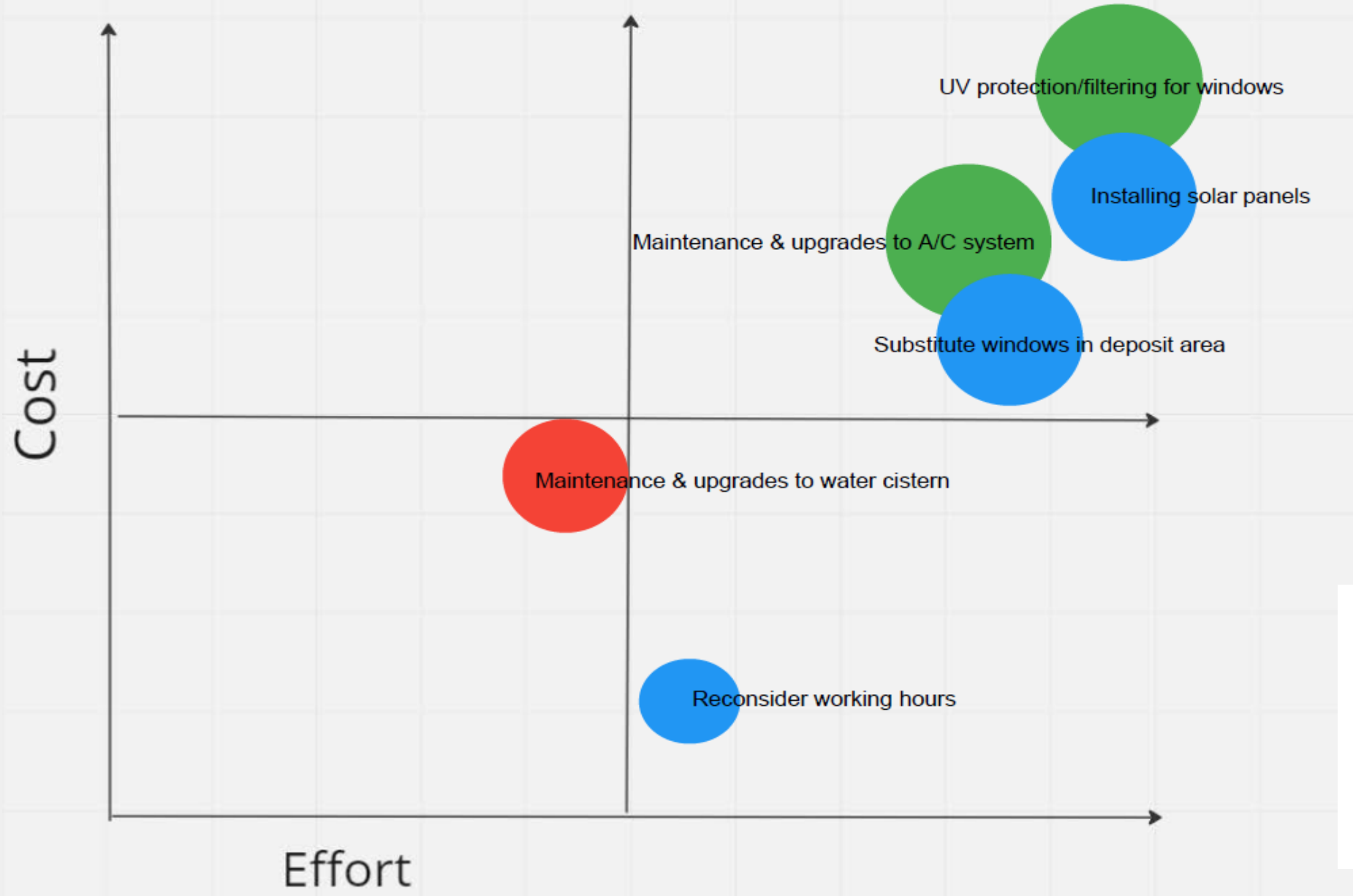
FSMC / Risk: High Heat



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Resilience Strategy Foci

- **Structure:** Consider UV protection and reinforcement for windows
- **Mechanical systems:** Upgrade HVAC and water cistern
- **Less reliance on electric grid:** Consider solar for backup power
- **Collections safety:** Upgrade HVAC and acquire backup power to decrease R/TH fluctuations
- **Community engagement:** Leverage space as a safe gathering area to provide fresh water and power

Melbourne Gardens

Rising temperatures and decreased precipitation

- Water management:
  - collect, treat and distribute storm water from within and around the gardens.
  - Provide 100% of irrigation water from sustainable water sources
- Landscape Succession Strategy:
  - retain a similar diversity of species
  - transition the collection; 2036 at least 75% of the species are suitable for the climate in 2090
- Infrastructure:
  - improve to adapt to predicted higher temperatures and more climatic extremes

Monterey Bay Aquarium

Energy Usage

- Team Building
  - Sustainability Engagement Survey biennially
  - Sustainability campaign for staff
  - Working groups for emissions
- Assessments
  - Greenhouse gas inventory annually
- Implementation
  - Building improvements to increase energy efficiency
  - Eliminate reliance on fossil fuels

Cincinnati Zoo & Botanical Garden

Energy Usage

Assessments

- Energy audits and assessment of utilities
  - Community
- Community Solar Resiliency Program
  - Implementation
  - Solar arrays
  - Battery storage and microgrid

Discussion
5 mins

Choose a climate risk and think about actions you need to take to increase your resilience. How will you maintain biodiversity, collections, and your site long-term?

What are you already doing that can also support your community?

4. Planning

B. Plans + Documentation

i. Climate risk documentation

ii. Strategic plan

iii. Climate action plan

iv. Emergency preparedness and response plan

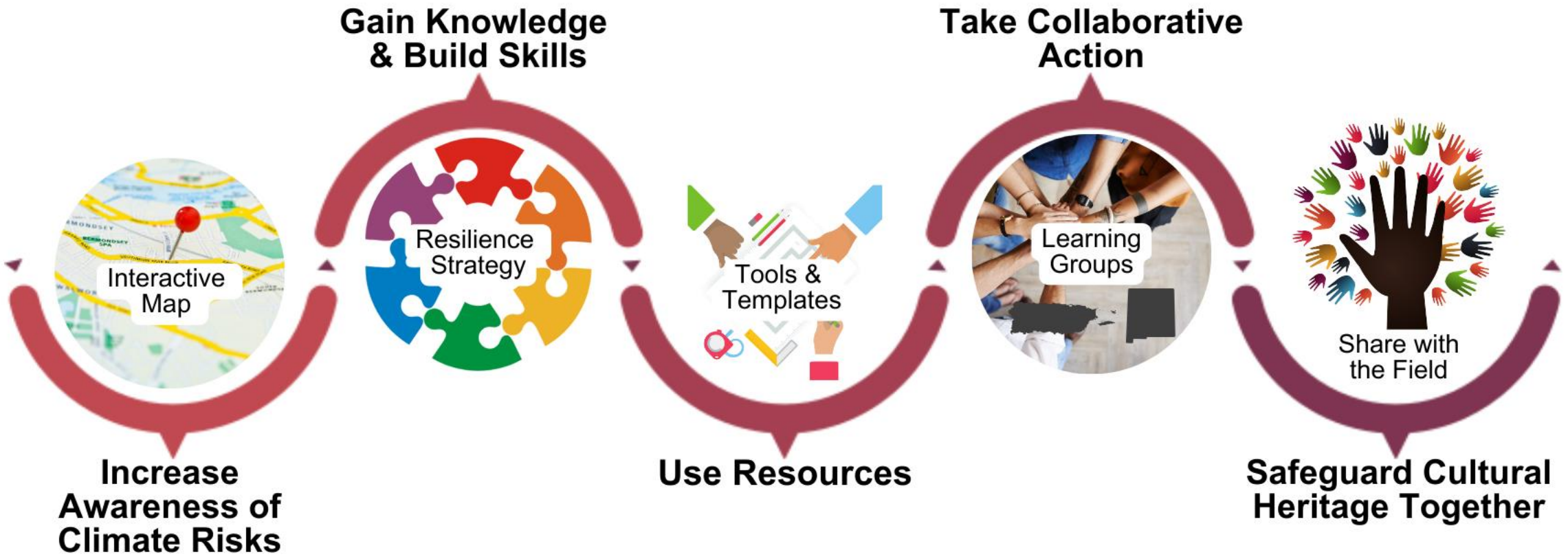
v. All hazards contingency plan

vi. Plan biosecurity/disease plan

Q&A

Climate Resilience Resources for Cultural Heritage

Resilience.culturalheritage.org



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Partners

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