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Community Environmental Resilience: How to Identify, Support, and Improve It

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Today's Session

GOAL

Demonstrate ways to protect human health and the environment by engaging communities in building resilience to extreme events

AGENDA

I. Defining resilience
   A. What is resilience
   B. Flooding scenario application
II. Identifying resilience
   A. Indicators
   B. Flooding scenario application
III. Improving resilience
   A. Flooding scenario application
   B. Final discussion

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What's next

I. Defining resilience
   A. What is resilience– and why is it important
   B. Flooding scenario application
II. Identifying resilience
   A. Indicators
   B. Flooding scenario application
III. Improving resilience
   A. Flooding scenario application
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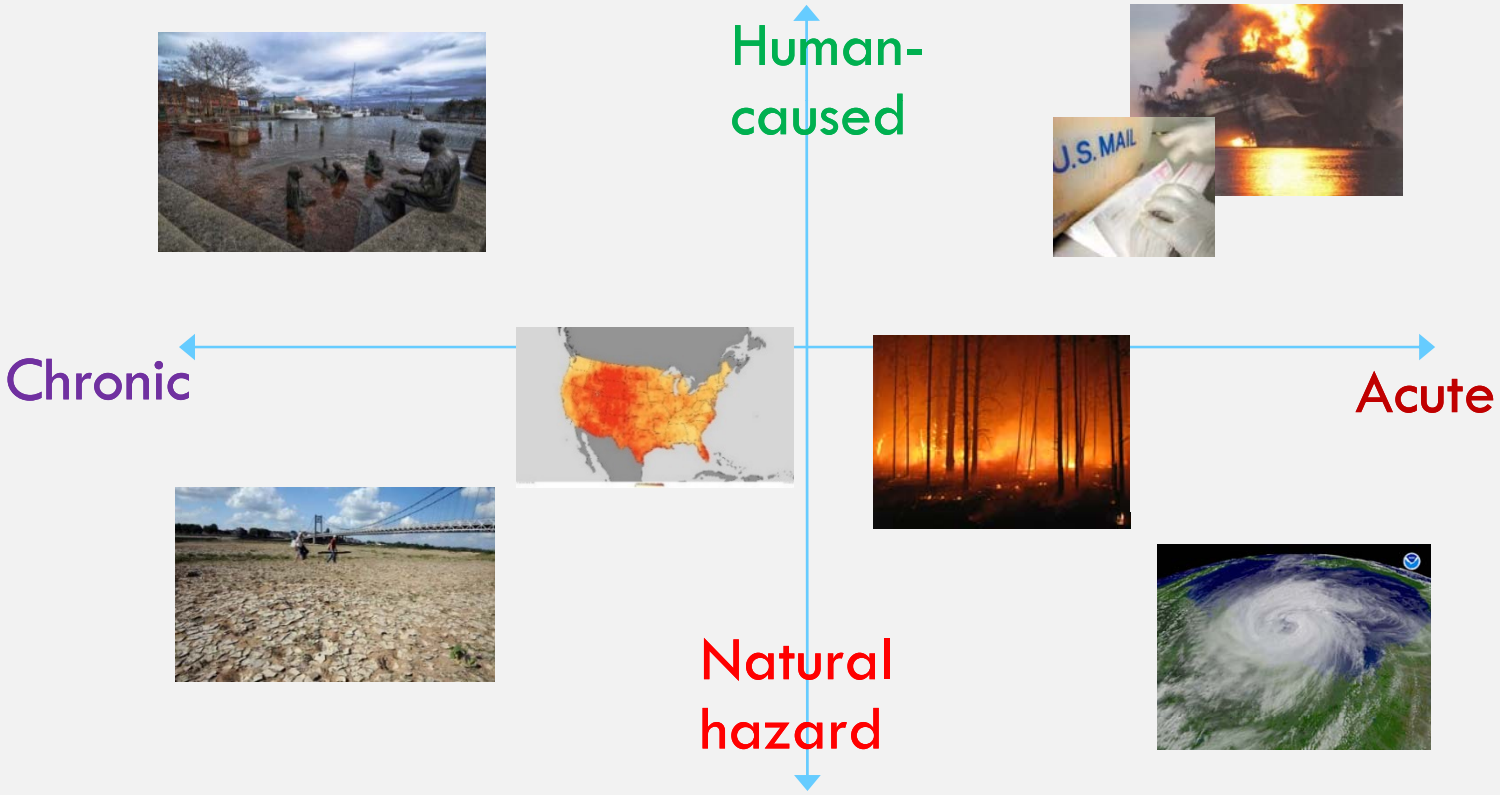
'Resilience' means the ability to anticipate, prepare for, & adapt to changing conditions & withstand, respond to, & recover rapidly from disruptions. Adapted from PPD-21 & EO 13653

Disruptions, or ***extreme events,*** may be:



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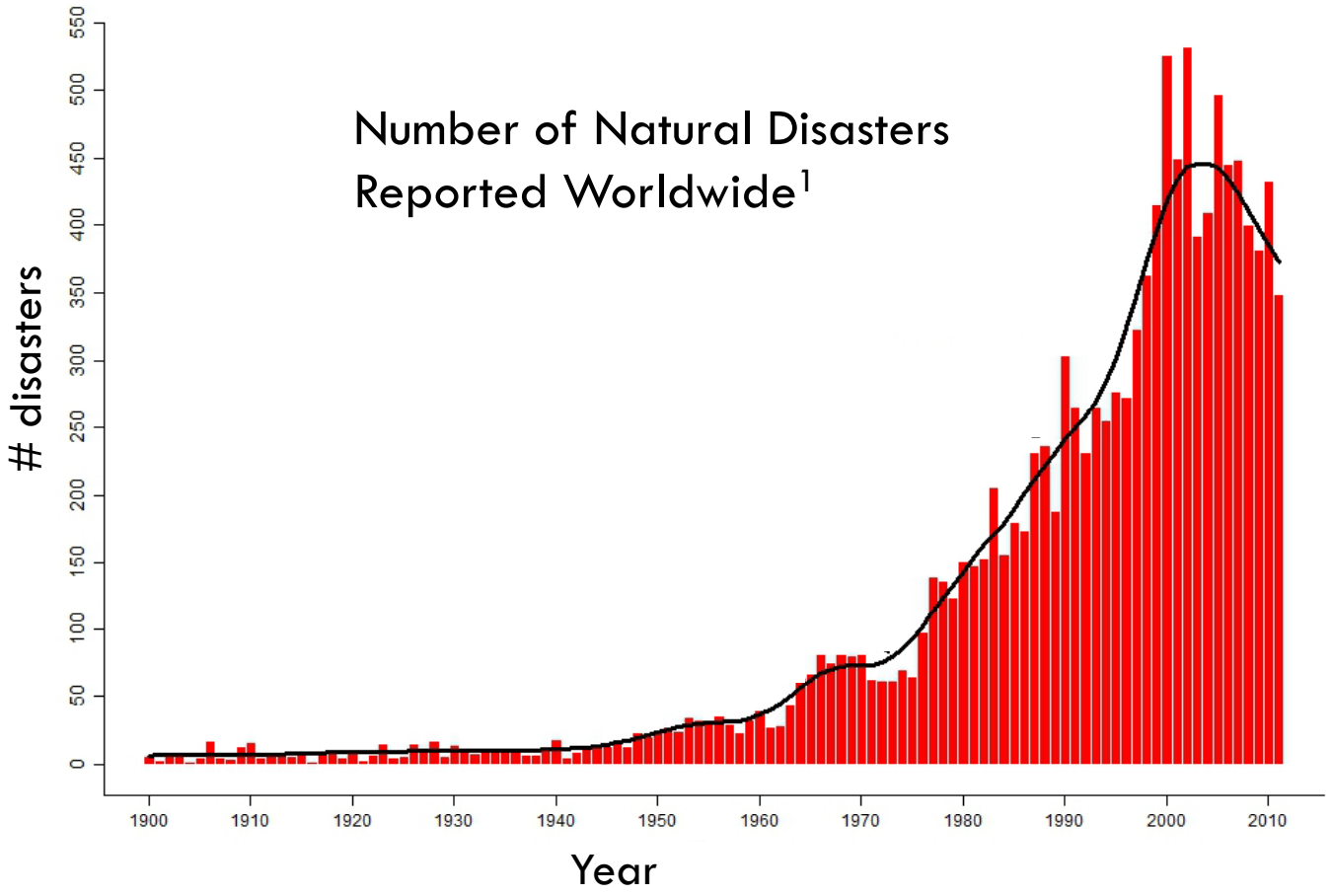
What is community environmental resilience?

Minimizing environmental risks associated with chronic and acute extreme events, quickly returning critical environmental & ecological services to functionality to serve community needs after events, while applying learning to reduce community vulnerabilities & risks to future incidents.

Adapted from EPA 2014

Why is resilience important?

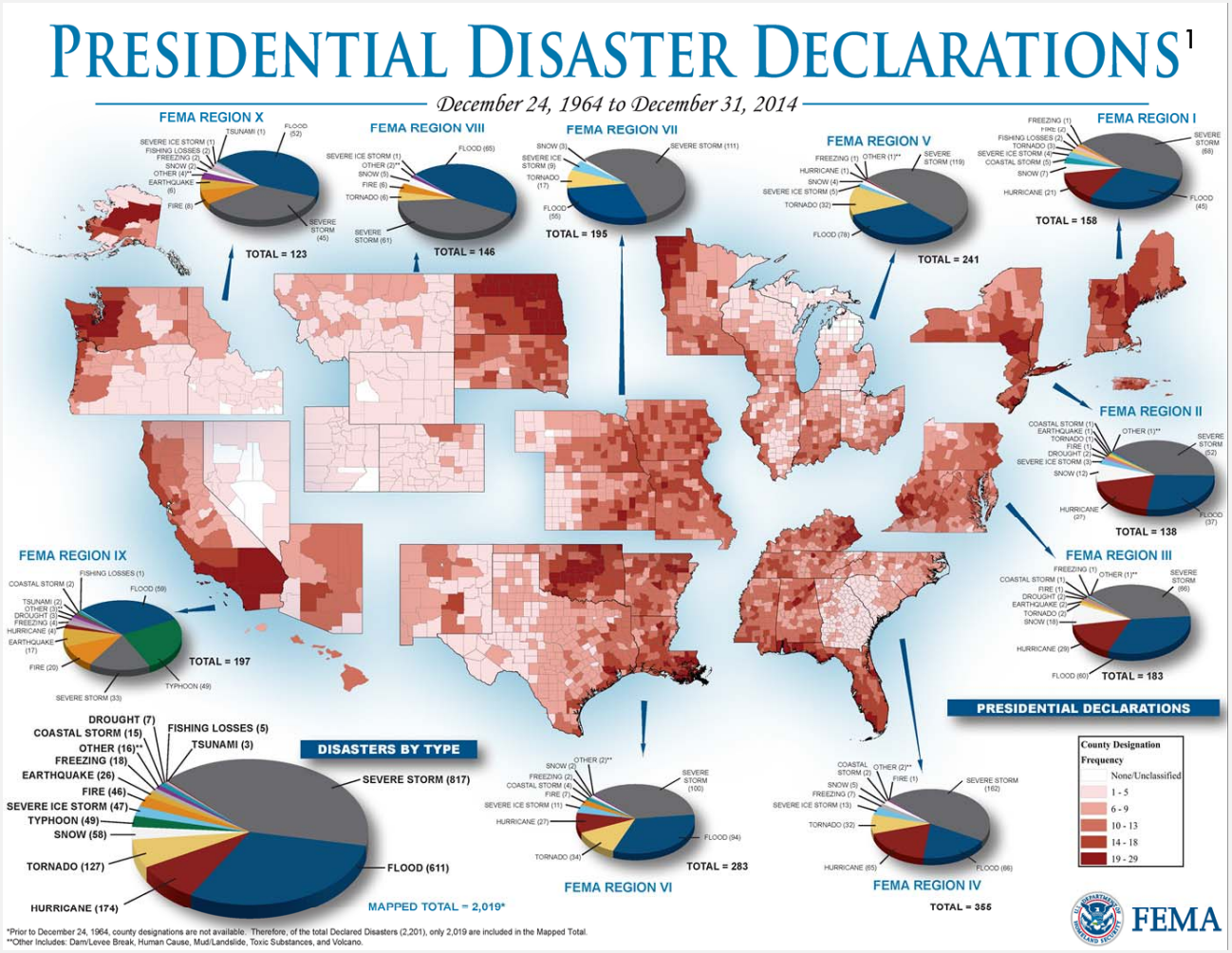
We're experiencing more & more extreme events



[1]EMDAT

Why is resilience important?

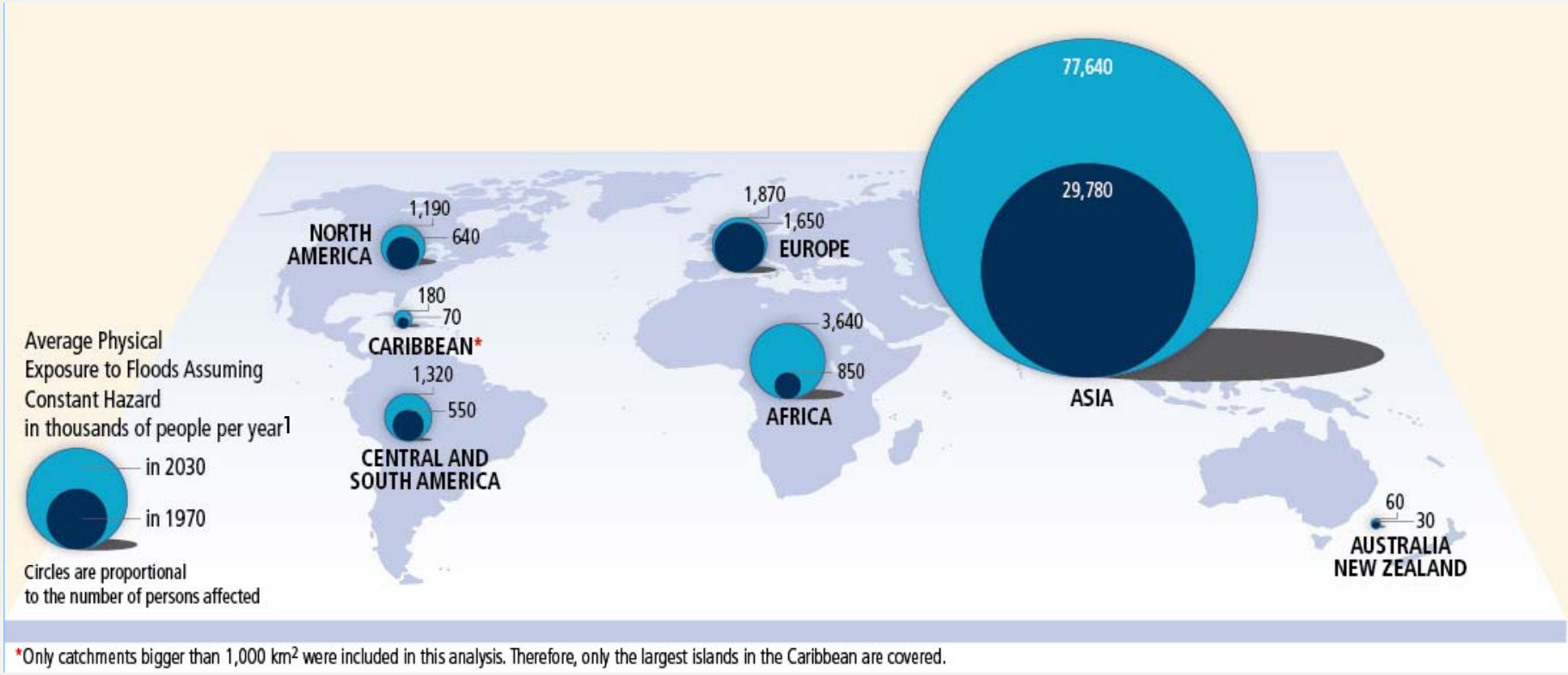
Extreme events affect communities all across the United States



[1]FEMA

Why is resilience important?

More people and resources are exposed to extreme events



[1]IPCC

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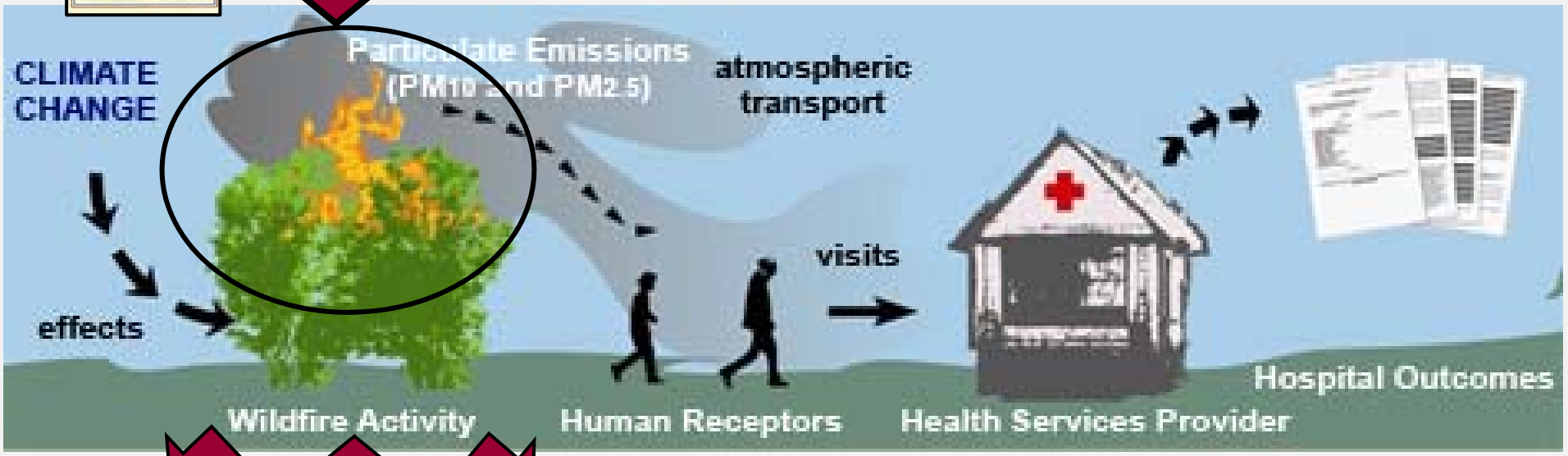
Why is resilience important?

Complex interactions & cascading effects of extreme events across tightly coupled social & environmental systems

History of Fire Suppression



Property & Economic Loss

Invasive Cheatgrass

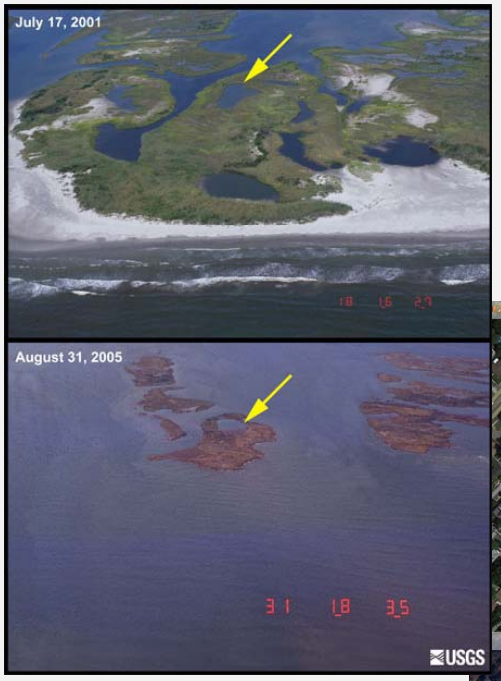
Erosion; Flood risk

Why is resilience important?

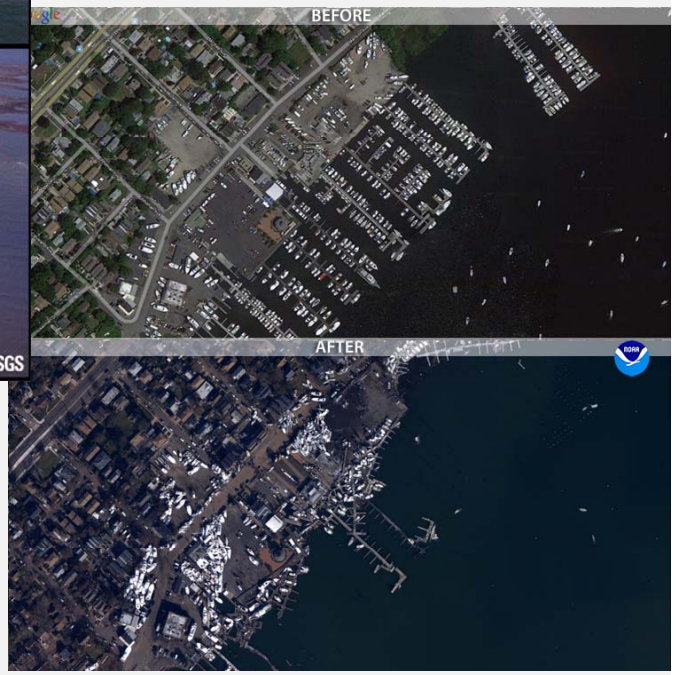
Extreme events can lead to irreversible environmental, social, and economic changes

- Ecosystems are already stressed
- Environmental systems are aging
- We'll pay now for resilience, or pay later…
  - $500 million for repairs and upgrades to water & wastewater treatment systems affected by Hurricane Sandy

Hurricane Katrina



Hurricane Sandy



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EPA's work supporting resilience during recent hurricanes

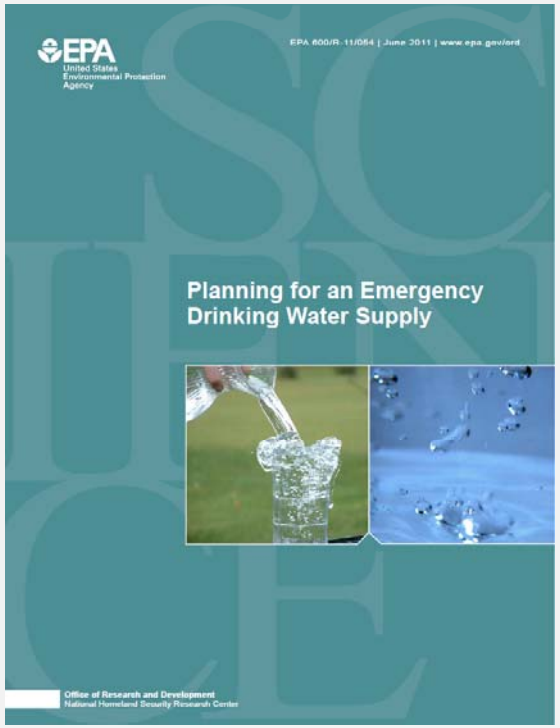
Response

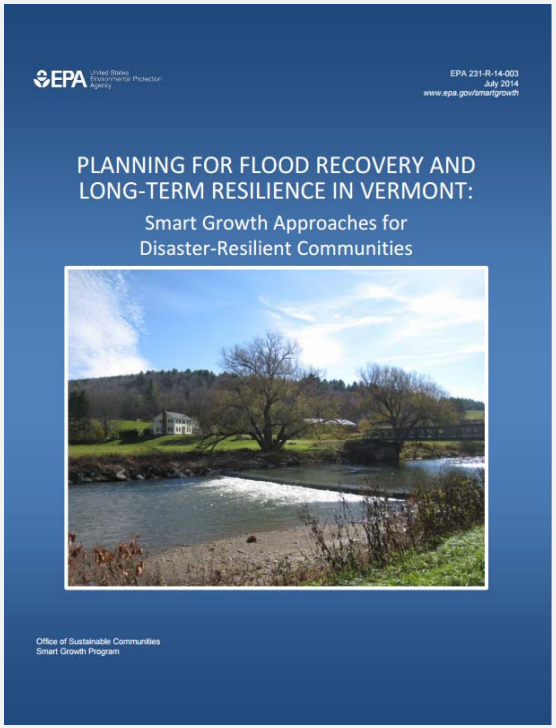
Recovery

Rebuilding

EPA's work supporting resilience during recent hurricanes

Learning & adapting to prepare for future disasters





Every $1 spent on hazard mitigation & preparedness saves $4 in post-disaster recovery and rebuilding costs[1]

[1]FEMA, NIBS

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What's next

I. Defining resilience
   A. What is resilience
   B. Flooding scenario: Application of resilience to coastal flooding in Hampton Roads, Va. & inland flooding in Cedar Rapids, Iowa

II. Identifying resilience
   A. Indicators
   B. Flooding scenario application

III. Improving resilience
   A. Flooding scenario application
   B. Final discussion

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Why flooding?

- Most common natural disaster in the U.S.
- Every state has experienced flooding in last 5 years[1]
- $8 billion in damages & 80 fatalities per year, on average[2]

- Many causes (heavy rains, tides, hurricanes, snowmelt)
- Many cascading effects (power outages, water & transportation disruptions, waste, pollution)
- Flood risk linked with other hazards (wildfires, drought, climate change)
- Social vulnerability

[1]floodsmart.gov; [2]NOAA

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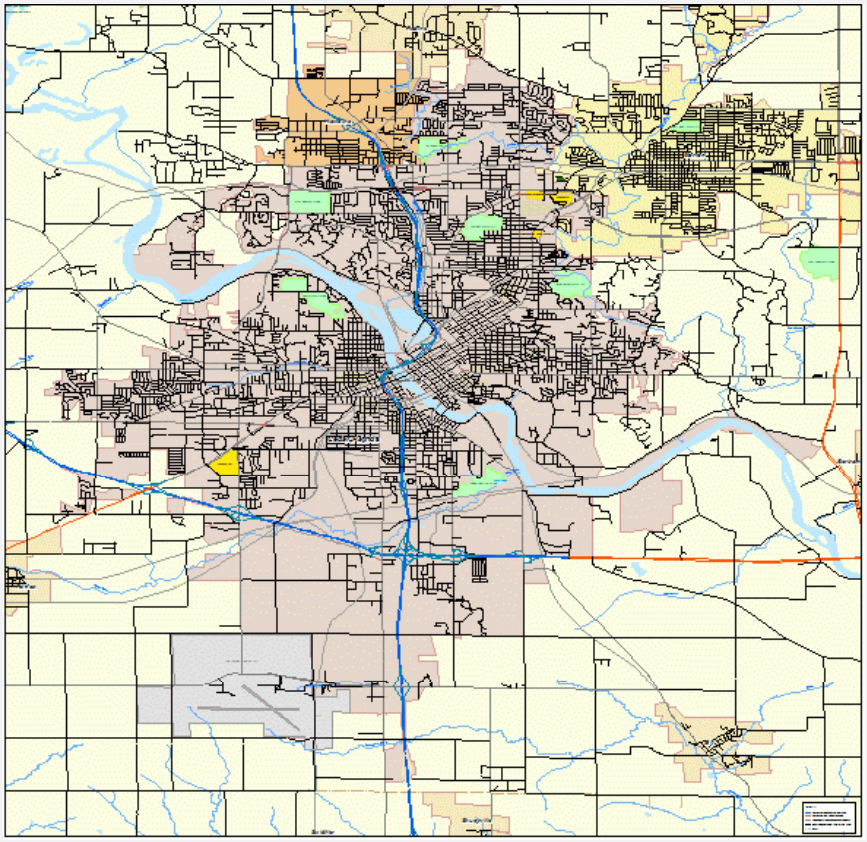
Flooding Scenario: Application of resilience

Hampton Roads, Va.

Cedar Rapids, Iowa



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Scenario goal & instructions

- Goal: Apply resilience concepts to flooding scenario
- Break into 4 groups of 12 by counting off by 4's
- Handout: scenario information
- In your group, read the handout & discuss:
  - *What environmental issues might arise in your flooding scenario?*

  Think about:
  - *What might immediate & secondary impacts be?*
  - *What environmental concerns might community members have?*
  - *What role might EPA play before, during, or after flooding?*

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Post-scenario discussion

1. *What environmental issues were similar or different for inland and coastal flooding?*

2. *How is resilience relevant to the communities where you work?*

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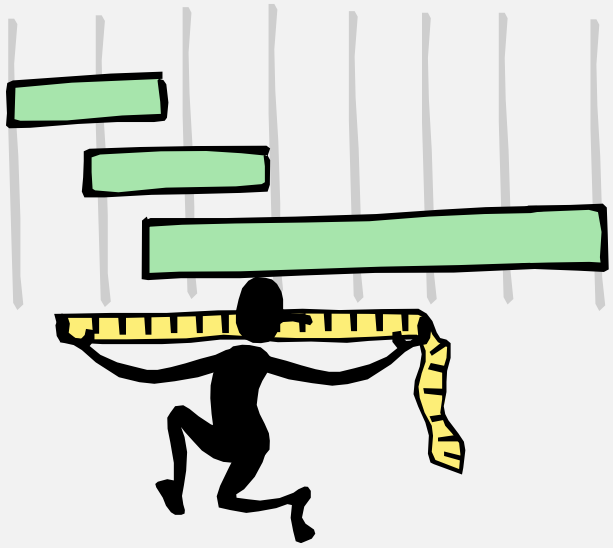
What does resilience look like? How can communities tell if they are more or less resilient? If they're improving over time?



Indicators to help identify resilience

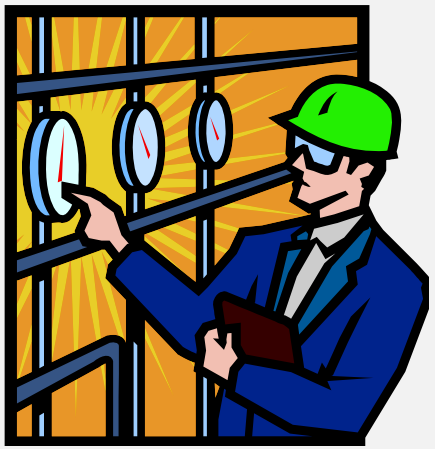
Indicators are measurable features that represent trends & conditions in social & environmental systems

The indicator	from	Tells us about
GDP	BEA	State of the economy
Benthic invertebrates in wadeable streams	EPA ROE	Diversity & ecological balance
Percent housing that is not mobile homes	Cutter et al, 2010	Resilience
Percent "green" debris disposal	EPA workshops	Resilience
Ratio of water availability to water consumption	Julius et al, forthcoming	Resilience

Good indicators: are timely, at the right scale; can be measured using high quality data; lead to action; measure things we value

What can indicators help us do?

- Benchmark conditions & reveal vulnerabilities
  - ⇒ Percent of city culverts sized to meet future stormwater capacity requirements
- Galvanize community support & action
  - ⇒ EPA Toxics Release Inventory
- Select interventions
  - ⇒ Impaired waters recovery potential indicators
- Stimulate relevant research
  - ⇒ Greenhouse gas emissions index
- Track progress over time
  - ⇒ Any of the above



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   B. Flooding scenario application: What are indicators of resilience to flooding?

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The resilience indicators on your list may tell you about trends & conditions in:

- ***Environmental vulnerabilities*** that increase risks from flooding
- ***Environmental protection*** from flooding
- ***Environmental harms*** that may arise because of flooding
- ***Environmental planning*** to improve resilience to flooding

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Scenario goals & instructions

- Goal: Determine the best indicators of resilience to flooding
- Handout: List of resilience indicators
- In your groups, discuss:
  - *Which of these indicators are most **relevant** to flooding resilience in your scenario & most **important** to community stakeholders?*
  - *Would you throw out any? Or add any?*
- Think about: What makes a good indicator? Are the indicators showing us pre-disaster, or post-disaster, trends & conditions?

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Scenario wrap-up

1. *Which resilience indicators were most relevant & important in the flooding scenarios?*
2. *Which resilience indicators seem most relevant and important for your work?*

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   A. Flooding scenario application: How to engage communities on improving resilience
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Scenario Goal & Instructions

- Goal: Put it all together!
- Instructions: *Design a strategy to engage communities on building resilience to flooding*
- Think about:
  - *What role might EPA & other stakeholders play?*
  - *What values would they bring to the table?*
  - *How would you incorporate indicators into your strategy?*
  - *What challenges do you foresee?*
  - Hint: start with the general community engagement strategies you learned from earlier sessions, then focus on what might make engagement on resilience unique

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Wrap-up discussion on scenarios

1. *What community engagement strategy did each group come up with?*
2. *What were the greatest challenges anticipated, and how can we work to overcome them?*
3. *What is the biggest lesson you will take home from today?*