



Overcoming Impediments to Flood Resilience: Paths Forward

Welcome!

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Overcoming Impediments: Paths Forward

Promoting solutions to rise in flood losses

Understanding how much morality, the law, and equity support safe development

Understanding the need for current, actionable, understandable information on risk

Educating on true risk

Influencing transformative behavior change through higher standards of care, litigation, and inspiration

Learning Objectives

1. Describe higher standards, including the Community Rating System (CRS), as part of a long-term solution to flood loss
2. Explain the limitations of current National Flood Insurance Program (NFIP) mapping in identifying flood risk
3. Explain common impediments to flood resilience and suggest ways to overcome them

Our Main Message:

Even if We Perfectly Implement Current Standards, Damages Will Increase

“Following only the minimum standards of the Flood Insurance Program guarantees worse future flood disasters.”

~ Bill Robison, City of Tulsa, OK

“The National Flood Insurance Program is the most cost effective program of Disaster Risk Reduction in the history of the United States.”

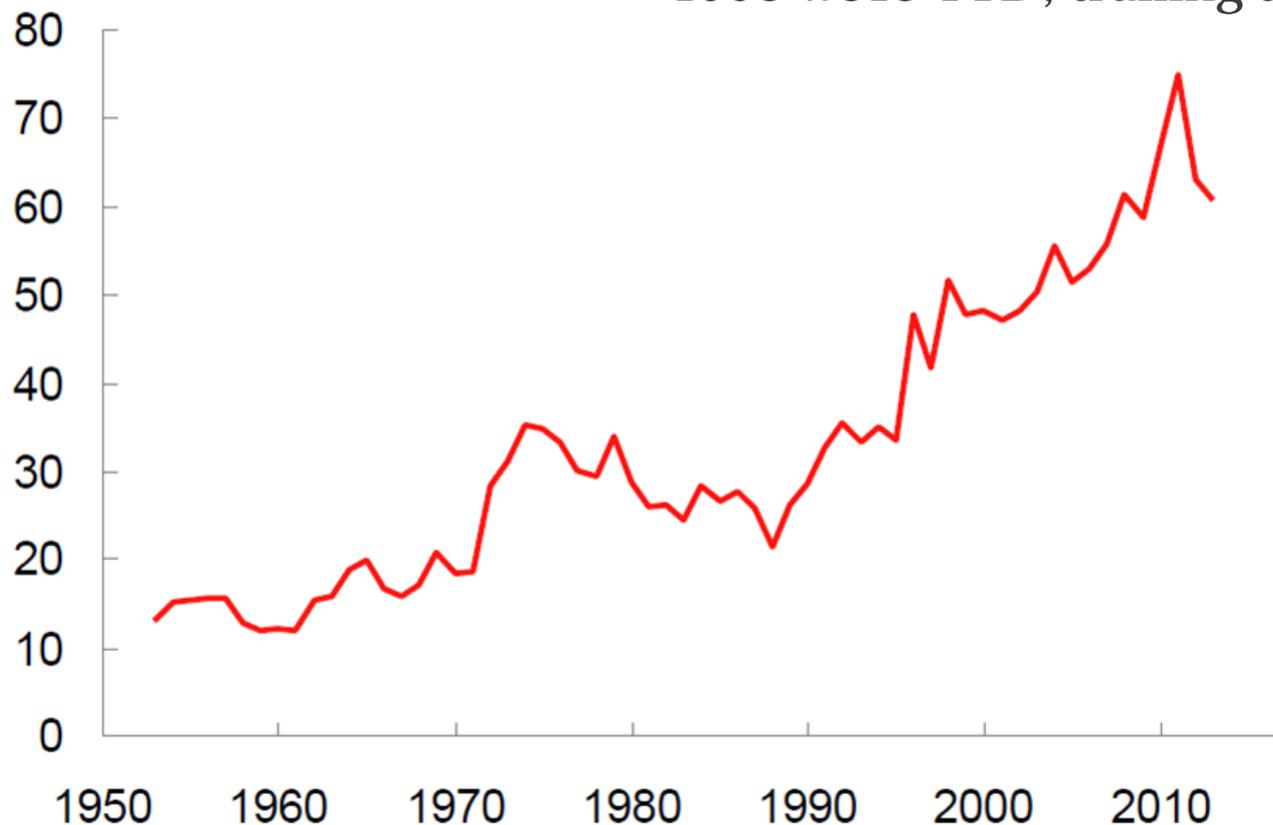
~ Ed Thomas, NHMA President

Adapting to Increasing Climate Impacts

- 
- **Stop** making things worse as investments and populations inevitably increase
 - **Participate** in opportunities to change legislation
 - **Remove** perverse incentives
 - **Reward** good planning, safe building, and safe reconstruction

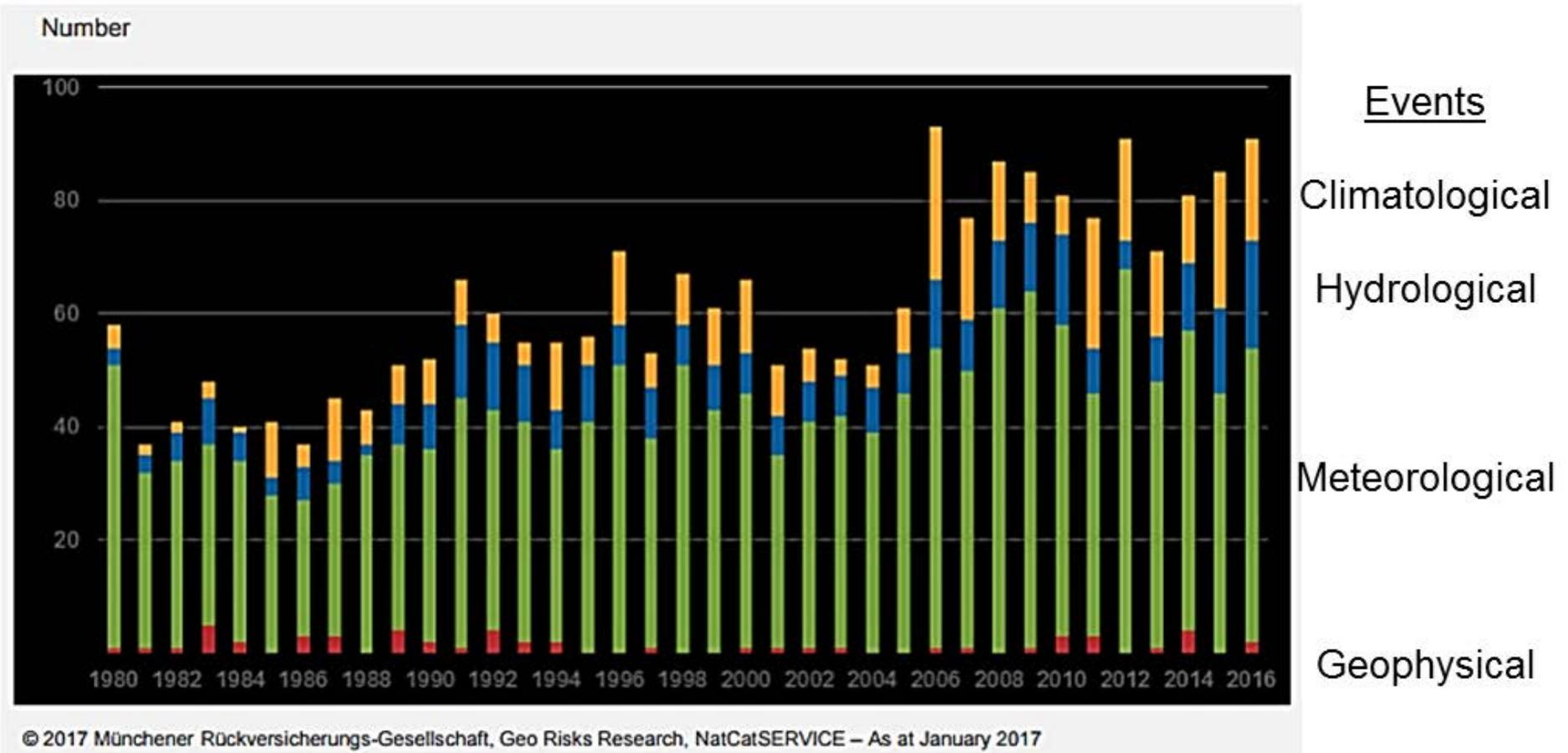
Growth in the Number of Declared Disasters

1953-2013 YTD; trailing three year average



Source: FEMA

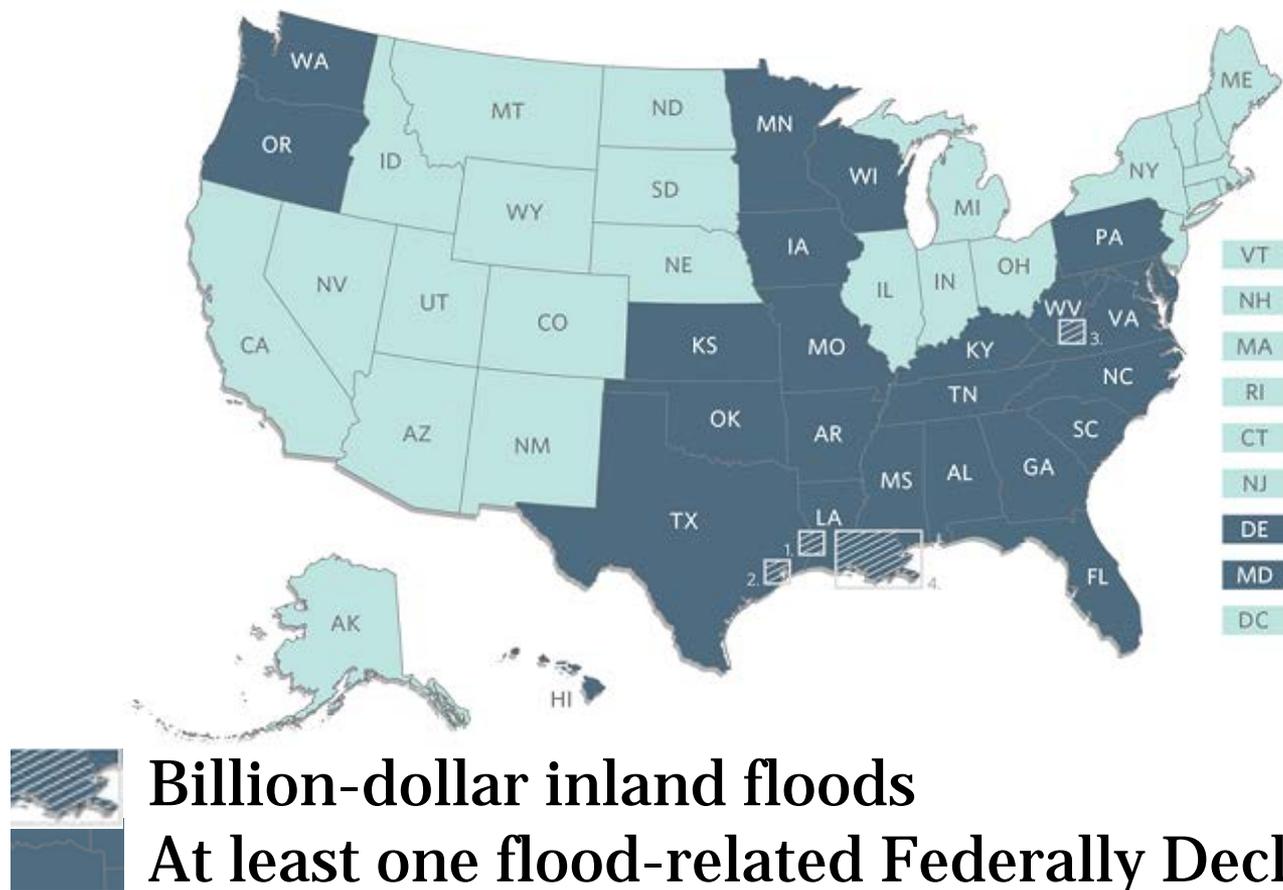
Loss Events in the U.S. (1980-2016)



Source: [Munich RE, NatCatSERVICE, Loss Events in the U.S. 1980-2016](#)

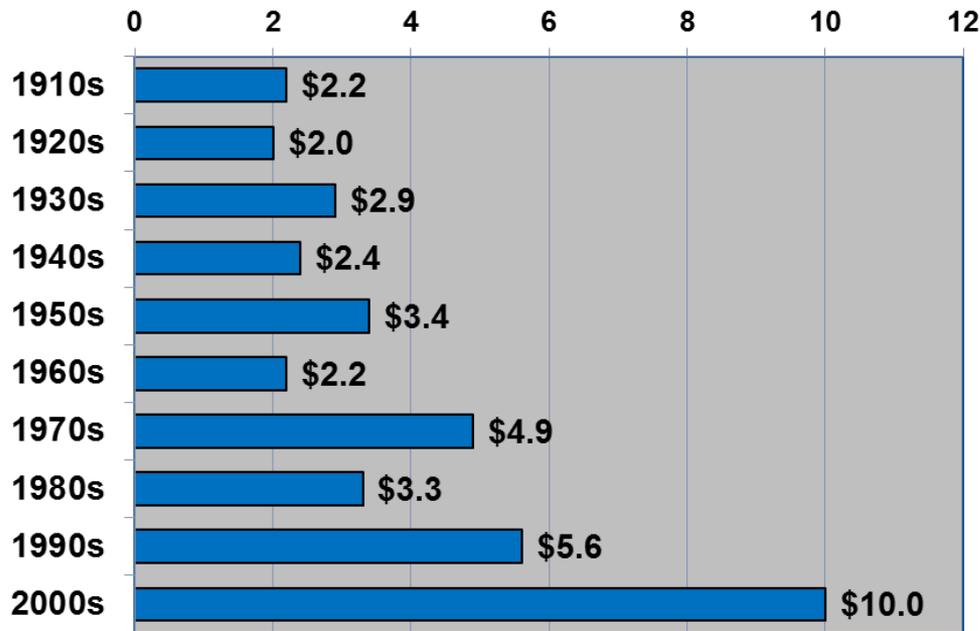
U.S. Flooding Disasters Cost 2016

Flooding is the most common and costliest [natural disaster](#) in the U.S.



Trends in Flood Damages

Average Annual Flood Damages



Billions (adjusted to 1999 dollars)

- \$6 billion annually
- Four-fold increase from early 1900s
- Per capita damages increased
- Hurricanes Katrina, Rita, Wilma, Ike, and Sandy

Reducing Flood Losses

Many communities have been national leaders in reducing flood losses



- ***Can the NFIP be improved?***
- ***Is it now being improved?***
- ***What happened?***
- ***What can we do?***

Saving Money on Flood Insurance

FEMA has programs to help owners reduce their risk and save money on flood insurance



FEMA

- Community-wide discounts through the **Community Rating System (CRS)** ***More on this later***
- FEMA grant programs support rebuilding and relocating
- Use of higher deductibles to lower premium costs

The smartest way to save is to build higher!
However, higher building has severe limitations, especially in mountainous areas

Webinar on Floodplain Management & Development in Terrain with Steep Slopes

Preventing Flood Disasters from Becoming Disastrous

- Brian Varrella, Chair, Colorado Association of Stormwater and Floodplain Managers



[click to access webinar]



Building and Rebuilding Decisions: Selling the Whole Community on Common Sense

- Elevation lowers risks and premiums
- Special Flood Hazard Area (SFHA) – “ZONE A” Example

Is the Base Flood Elevation adequate?

**PREMIUM AT 4 FEET BELOW
BASE FLOOD ELEVATION**

\$9,500/year
\$95,000/10 years

Homes built below
BFE could be hit
hard by an increase
to full-risk rates



BFE

**PREMIUM AT
BASE FLOOD ELEVATION**

\$1,410/year
\$14,100/10 years



BFE

**PREMIUM AT 3 FEET ABOVE
BASE FLOOD ELEVATION**

\$427/year
\$4,270/10 years

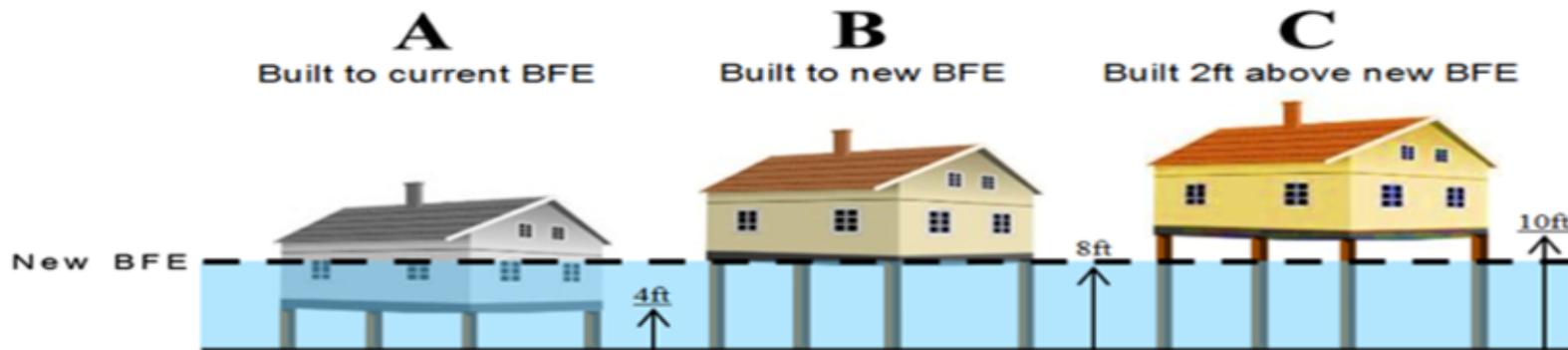


BFE

Elevating 3
feet above
BFE could
lower
premiums
significantly!

Building and Rebuilding Decisions: Costs and Benefits

- Future insurance savings can more than offset higher construction costs

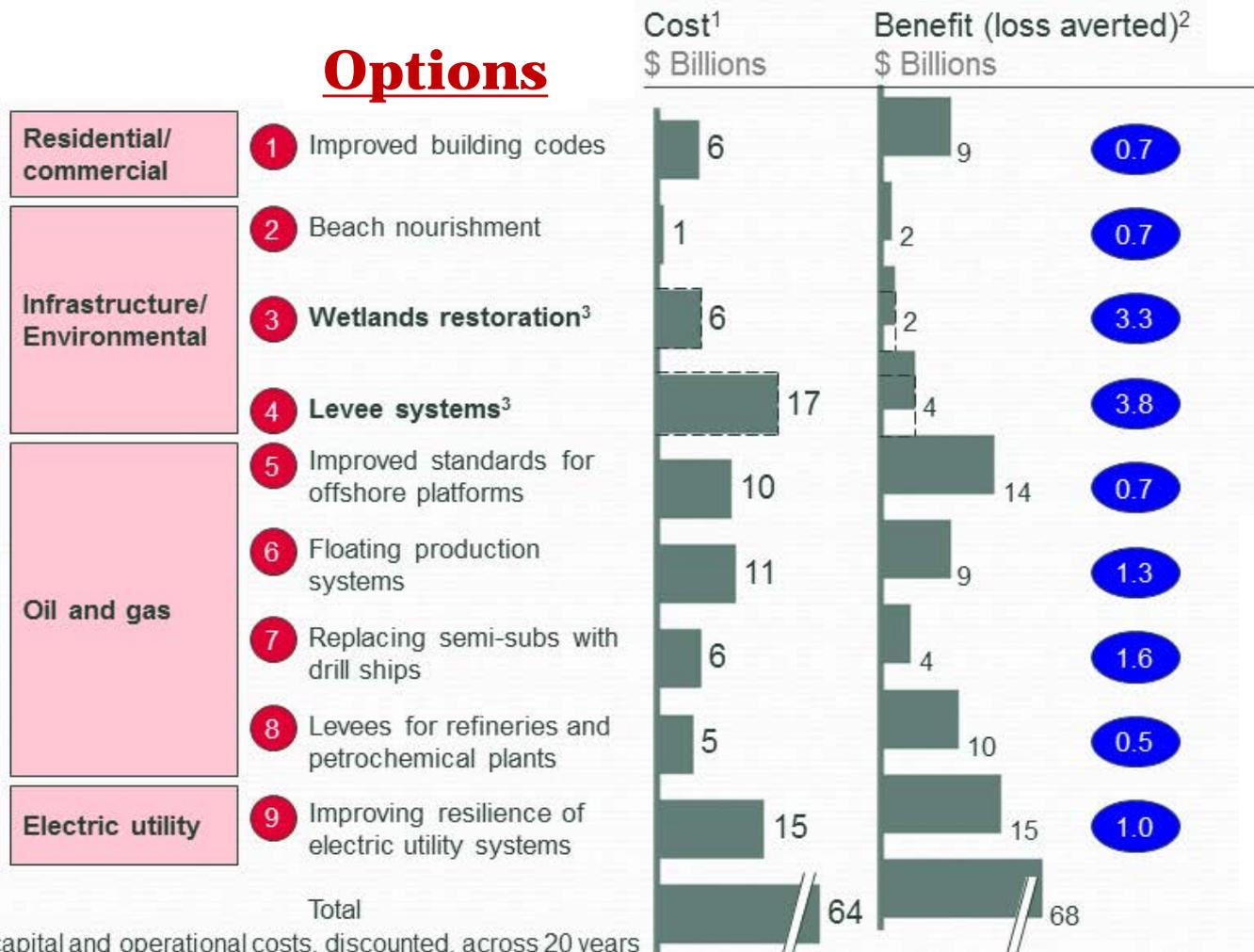


Think Long Term Value; View; Estate Planning

ELEVATION / COSTS	4 ft	8 ft	10 ft
Foundation	\$18,000	\$29,000	\$30,000
Flood Insurance/yr	\$17,500	\$ 7,000	\$ 3,500
Mortgage increase + flood/yr	\$17,500	\$ 7,588	\$ 4148
Peace of Mind	☹️	😊	😊

Homeowner pockets more than \$13,000/year compared to the current BFE

Efficient Resilience Options



x Average C/B ratio



Which option is not mentioned?

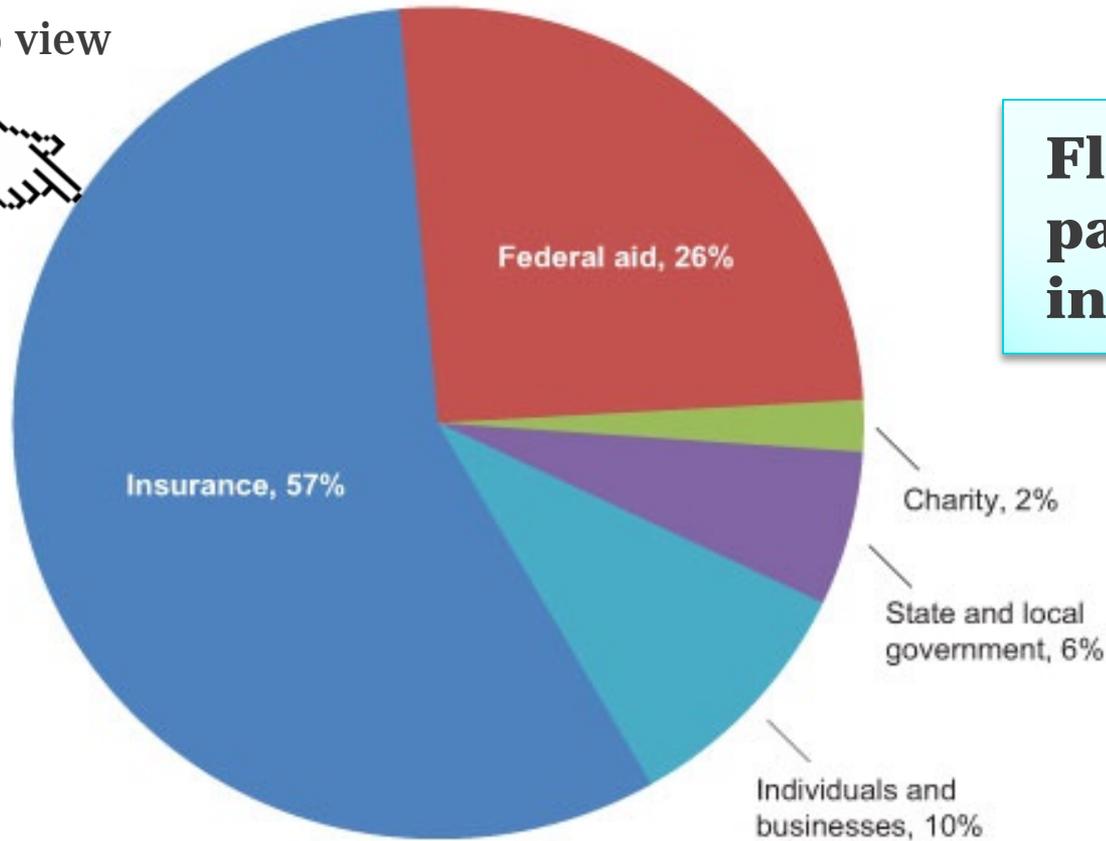
1 Total capital and operational costs, discounted, across 20 years
 2 Total loss averted, discounted, across 20 years
 3 Included despite high C/B ratios due to strong co-benefits, risk aversion

Many thanks to Cynthia McHale of CERES for this information

System of Disaster Relief

Share of Costs Paid for Major U.S. Hurricane Events, 1989-2004

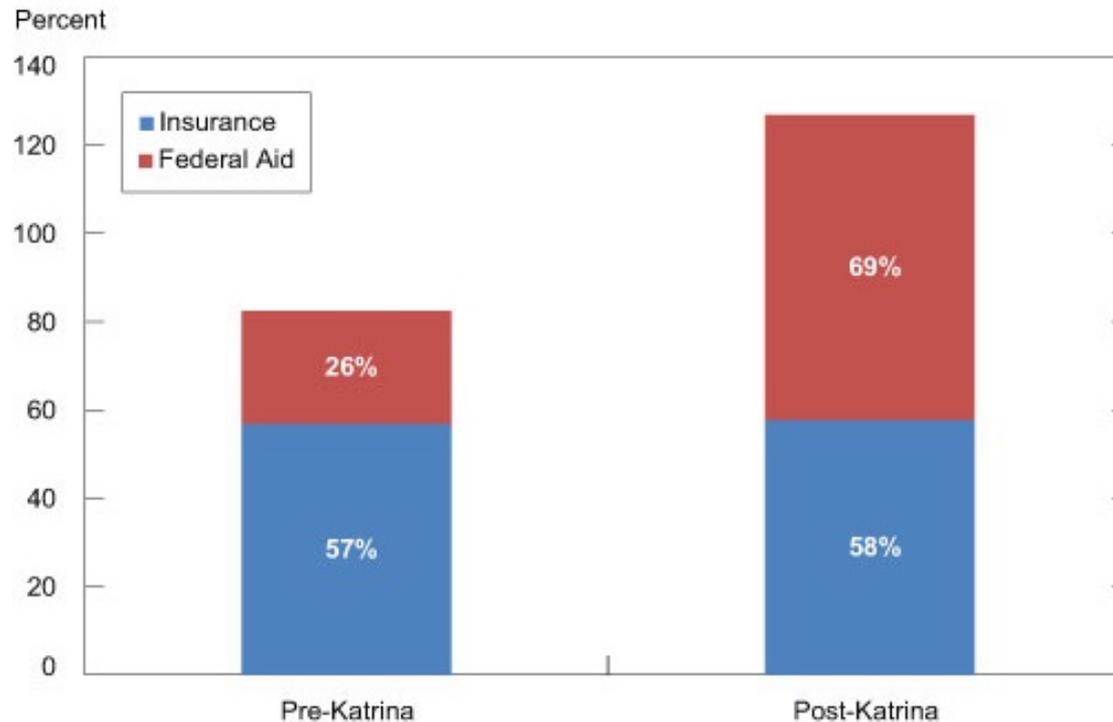
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Flood insurance payments not included

Assistance Not Including Flood Insurance Payments

Share of Costs Paid by Insurance and Federal Aid for Major Hurricane Events Before and After Katrina



New York Federal Reserve Study: *How Will We Pay for Superstorm Sandy?*

“With this expansion of federal disaster assistance, payments from private insurance companies and the federal government exceeded the total economic cost of events since Katrina by about 25 percent.”



Liberty Street Economics

« The Impact of Superstorm Sandy on New York City School Closures and Attendance | Main | The Path of Economic Recovery from Superstorm Sandy »

DECEMBER 20, 2012

How Will We Pay For Superstorm Sandy?

Jaison R. Abel, Jason Bram, Richard Deitz, and James Orr

While the full extent of the harm caused by superstorm Sandy is still unknown, it's clear that the region sustained significant damage and disruption, particularly along the coastal areas of New York, New Jersey, and Connecticut. As we describe earlier in this series, the economic costs associated with natural disasters are generally thought to arise from the damage and destruction of physical assets and the loss of economic activity. These costs can be substantial, running into the tens of billions, and impose significant stress on the affected communities. In this post, we assess who will ultimately pay the economic costs imposed by the storm. Based on data from recent hurricane events, it is likely that the federal government and private insurance companies will more than cover the aggregate costs. In the short run, though, there may be strains on state and local governments as well as on individuals and businesses as they await reimbursement.



[click to view article]

[How Will We Pay for Superstorm Sandy?](#)

By Jaison R. Abel, Jason Bram, Richard Deitz, and James Orr

Community Rating System (CRS)

- What is it?
- Why do we need it?
- How does it help?
- What is cross-subsidization?



Earning Credits through CRS

- Public Information
- Mapping and Regulations
- Flood Damage Reduction
- Flood Preparedness



Comparison: Credits/Rates/Reduction

CREDIT POINTS	CLASS	PREMIUM REDUCTION SFHA*	PREMIUM REDUCTION NON-SFHA**
4,500+	1	45%	10%
4,000 – 4,499	2	40%	10%
3,500 – 3,999	3	35%	10%
3,000 – 3,499	4	30%	10%
2,500 – 2,999	5	25%	10%
2,000 – 2,499	6	20%	10%
1,500 – 1,999	7	15%	5%
1,000 – 1,499	8	10%	5%
500 – 999	9	5%	5%
0 – 499	10	0	0

*Special Flood Hazard Area

**Preferred Risk Policies are available only in B, C, and X Zone for properties that are shown to have a minimal risk of flood damage.

CRS by the Numbers

United States

- 22,242 NFIP communities
- 1,391 CRS communities (6.25%)
- 69% of policies issued in CRS communities

Pennsylvania

- 2,467 NFIP communities
- 34 CRS Communities
- Highest Scoring:
Harrisburg & Wilkes-Barre
 - Class 6
 - 20% discount in SFHA
 - 10% elsewhere in community

CRS: Part of the Solution

- Adopting higher standards
- Reducing potential for liability



What is the NFIP Grandfathering Rule?

- When flood map changes occur, the NFIP provides a lower-cost flood insurance rating option known as “**grandfathering**”
- Available for property owners who:
 - Already have flood insurance policies in effect when the new flood maps become effective and then maintain continuous coverage; or
 - Have built in compliance with the FIRM in effect at the time of construction



NFIP Grandfathering for Pennsylvania Communities



Flooding in the Shipoke neighborhood bordering the Susquehanna

Tropical Storm Lee in Pennsylvania, 2011



Flooding north of Middletown along the Swatara creek, completely isolating the house

Future of Flood Insurance and Federal Standards

- Homeowners Flood Insurance Affordability Act (2014)
- Biggert-Waters (2012)
- Executive Order on Federal Floodplain Standards (EO 13690)
- Executive Order on Earthquake Standards (EO 13717)
- New Flood Insurance Mapping Standards: Technical Mapping Advisory Council (TMAC)
- Rate Increases

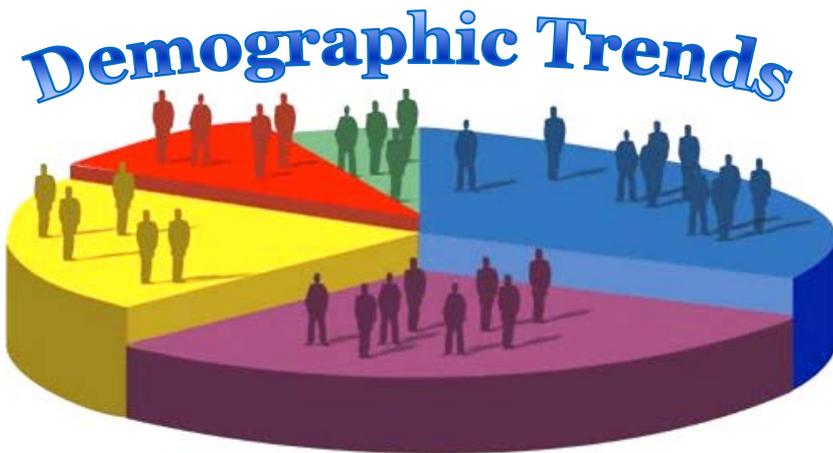


How Can We Accomplish Disaster Risk Reduction?

***“Well begun is
half done”***

~ Aristotle

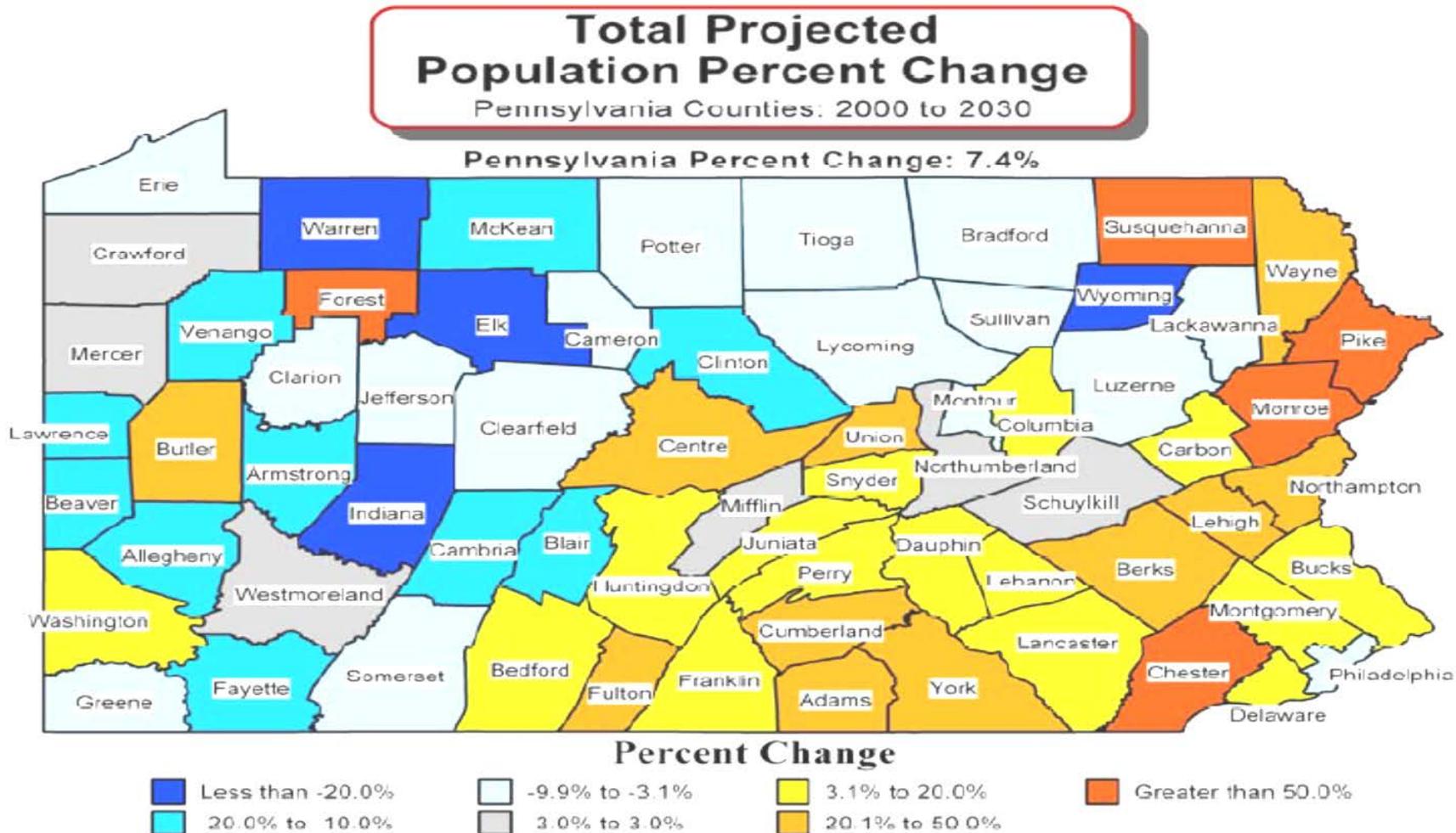
Seizing the Opportunity to Build a Safer Future



“More than half of the built environment of the United States we will see in 2050 does not exist today.”

~ Dr. Arthur “Chris” Nelson,
FAICP at Rocky Mountain
Land Use Institute, March 13,
2015

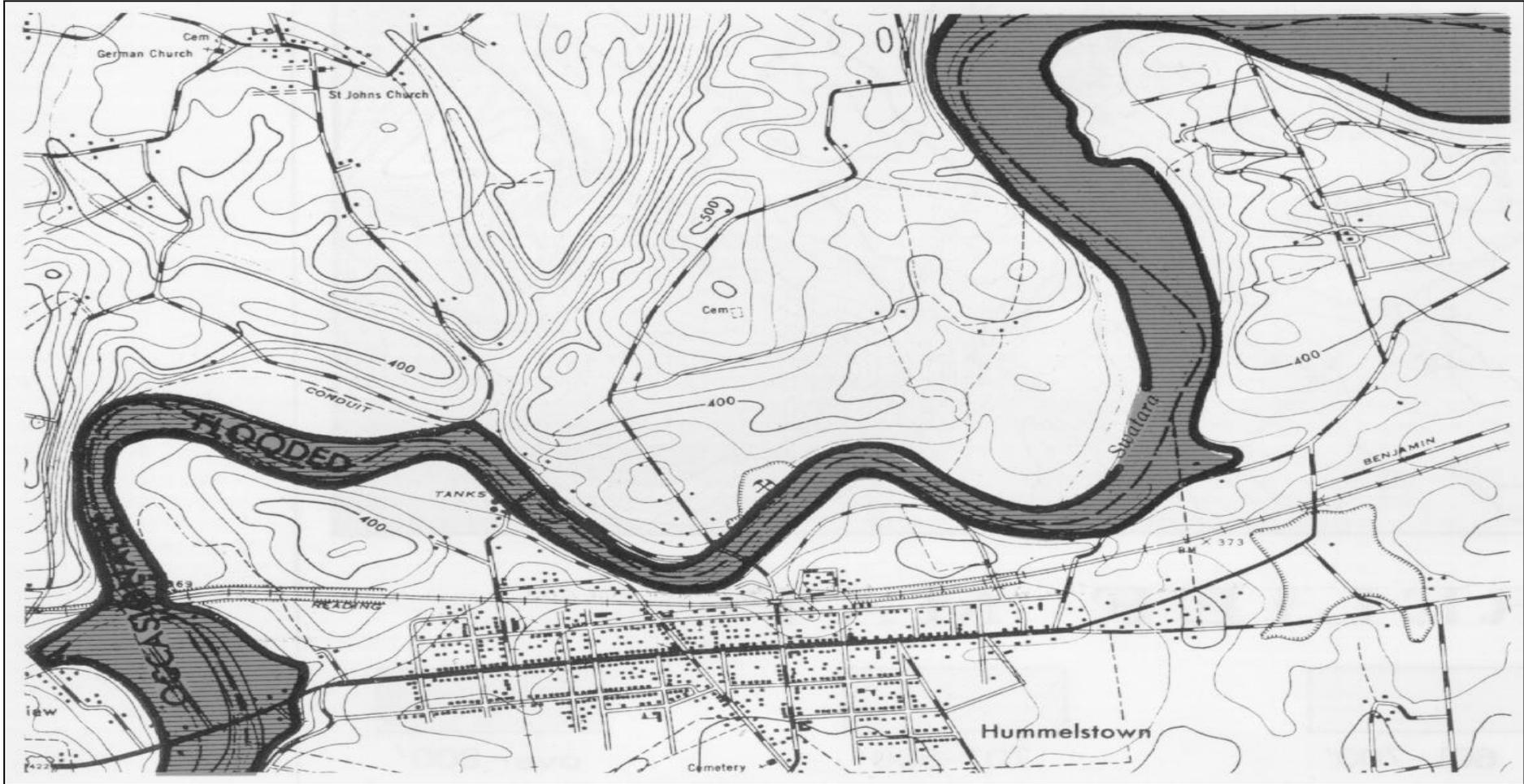
Pennsylvania Population Projections



Where is the Floodplain?



Where is the Floodplain?



Where is the Floodplain?



Other Limitations of Current NFIP Mapping

- 50% of all maps are **not recently validated** with even recent old data
- All maps are **based on past history** – not the future
- May **ignore stormwater management issues** (will ignore less than one square mile drainage areas)

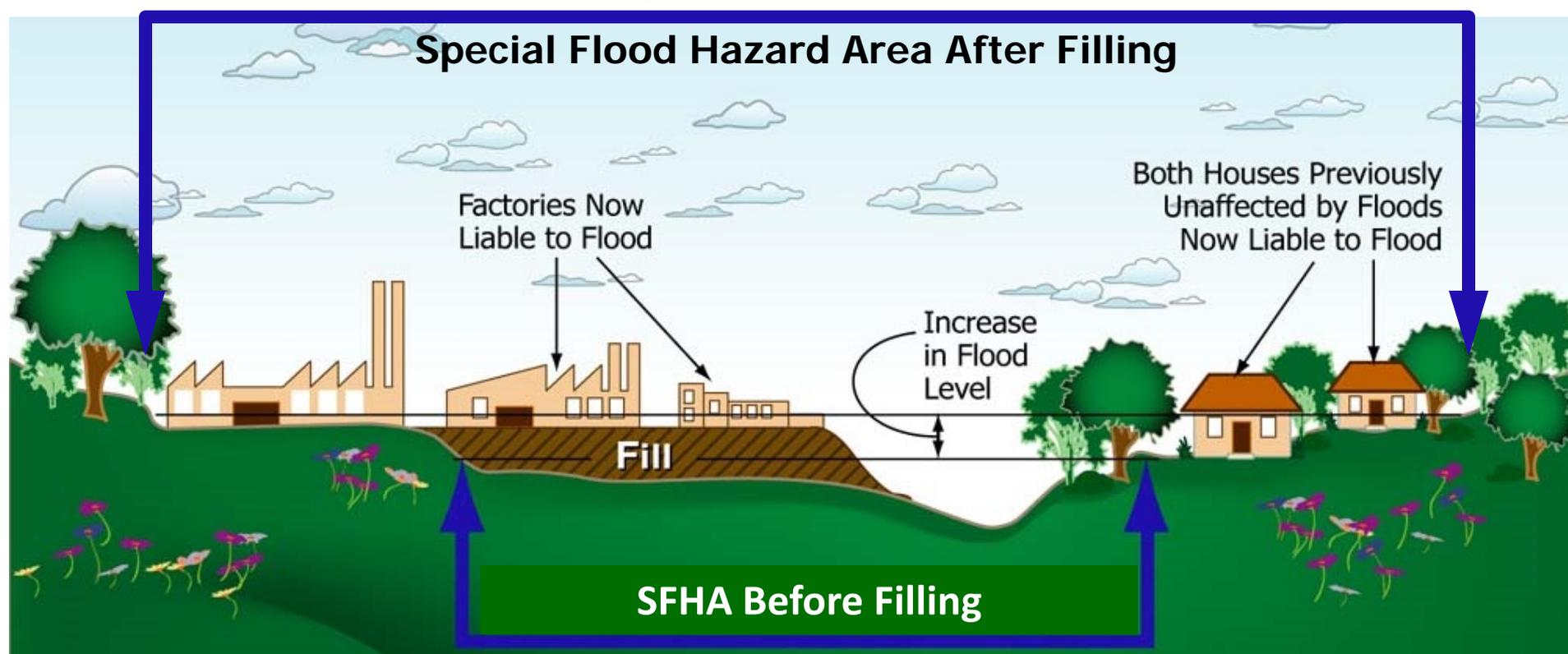
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[A Three-legged Stool on Two Legs: Recent Federal Law Related to Local Climate Resilience Planning And Zoning](#)

By Sarah J. Adams-Schoen and Edward A. Thomas, *The Urban Lawyer*, 47 URB. LAW. No. 3 (2015)

Today's Special Flood Hazard Area (SFHA) is Not Necessarily Tomorrow's Floodplain

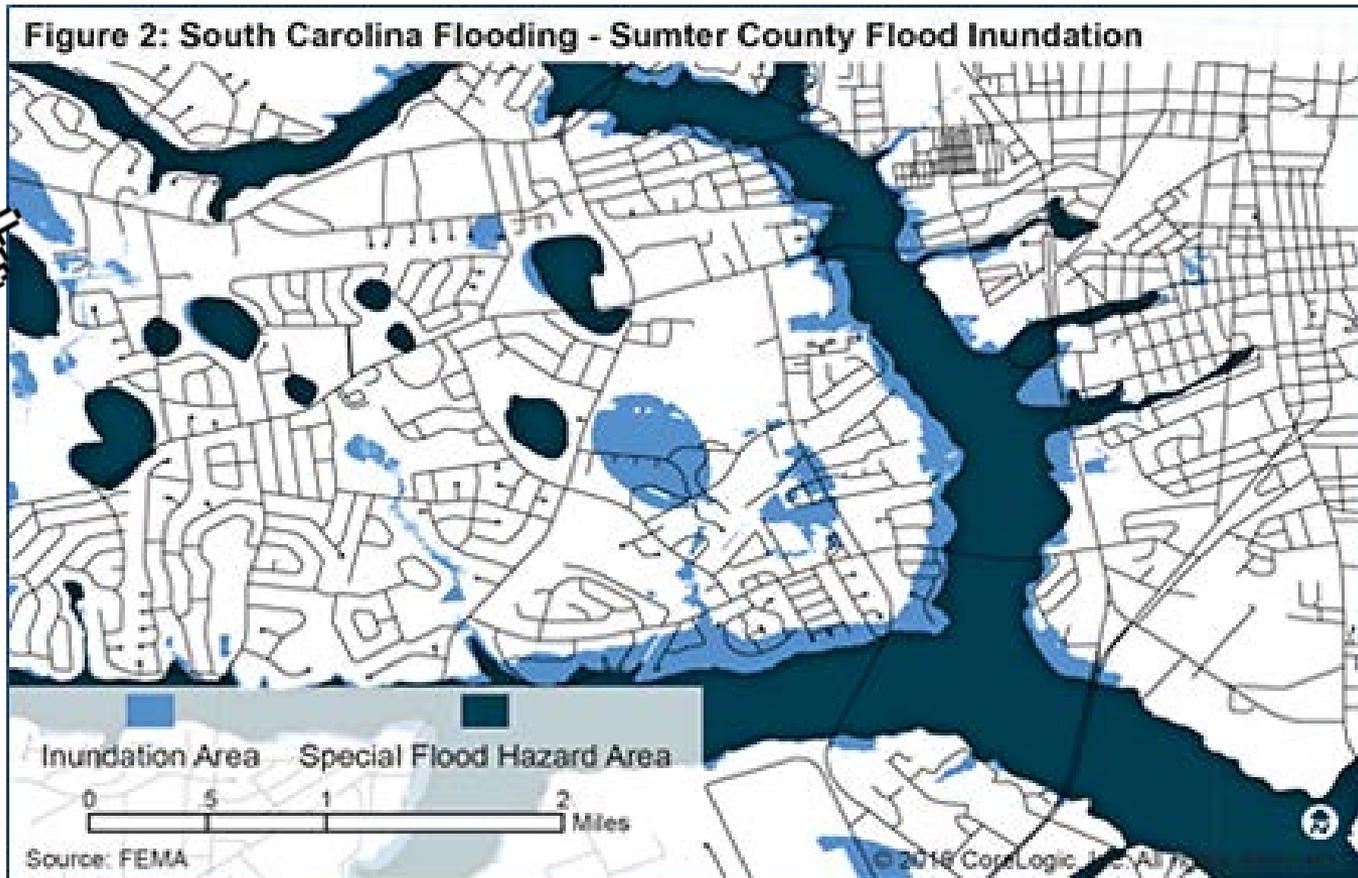


If large areas of the SFHA are filled, then there will be an increase in the land area needed to store flood waters

This means your home or business may be impacted

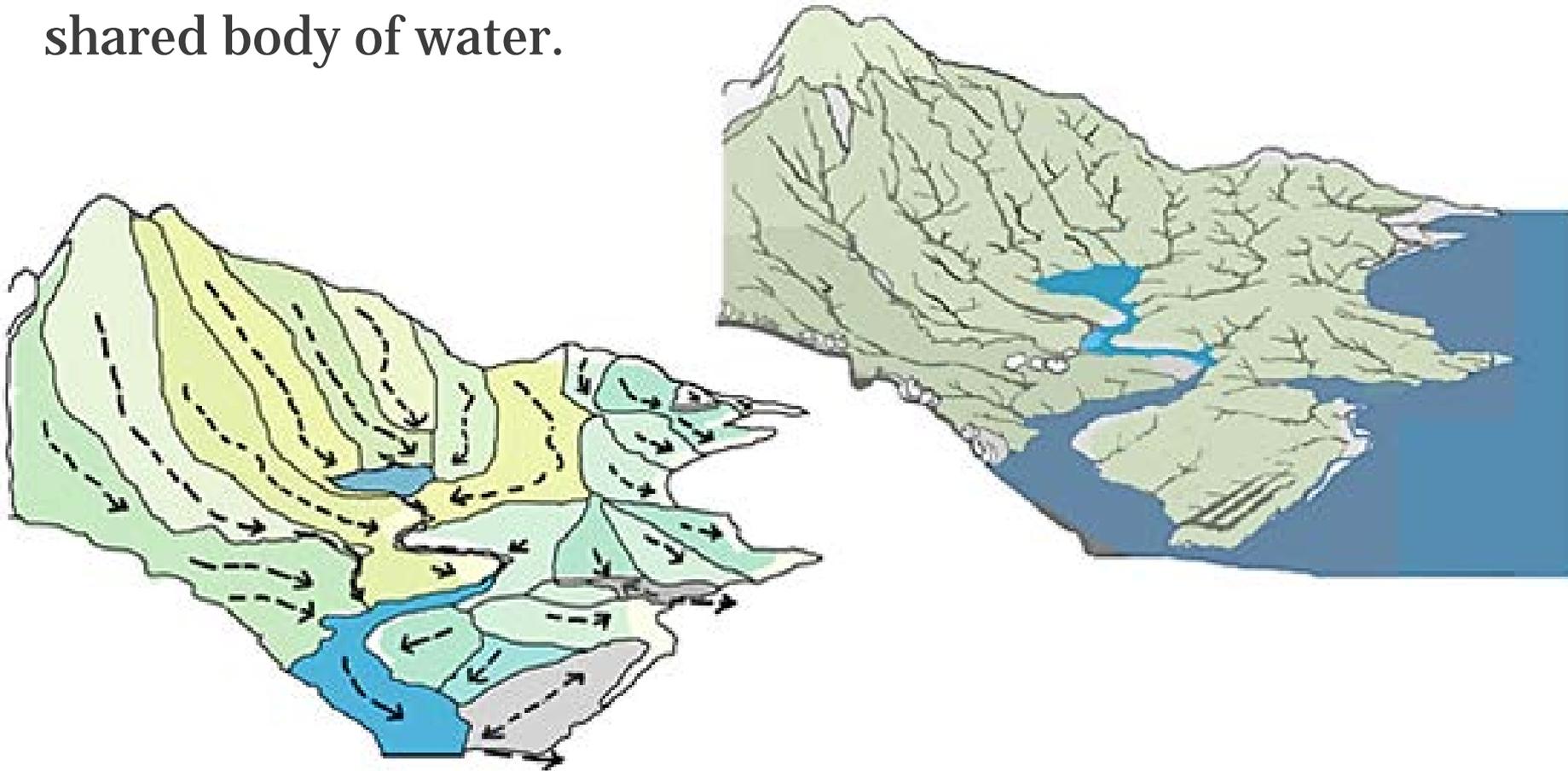
Understanding and Communicating Flood Risk

[click to view **CoreLogic** article]



What is a Watershed?

The **entire** land area to which rain/snowmelt drains to a shared body of water.



With Full Build-Out, Flood Heights May Increase Dramatically

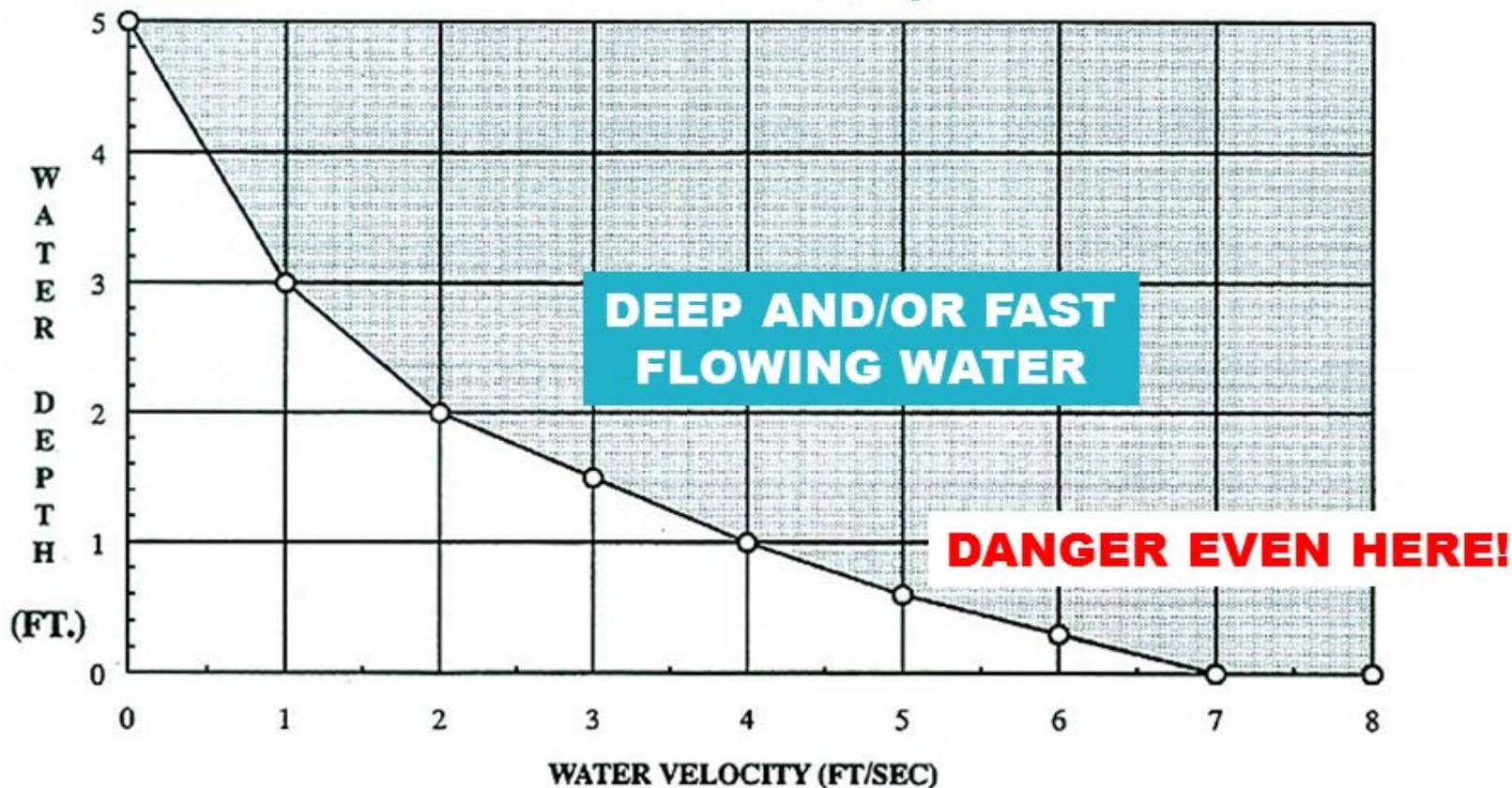
No Adverse Impact: New Direction in Floodplain Management Policy

- Larry Larson PE, CFM and Doug Plasencia PE, CFM
- Published in Natural Hazards Review Nov. 2001, IAAN 1527-6988

Consider Life Safety as Flood Heights and Velocities Increase

Why?

Deeper and Higher Water Results? Serious Public Safety Issues



Flood Risk =

(P = Probability of flood) X (Fx = All Consequences)



Courtesy of Pete Rabbon USACE

N 121°33'00.46" W

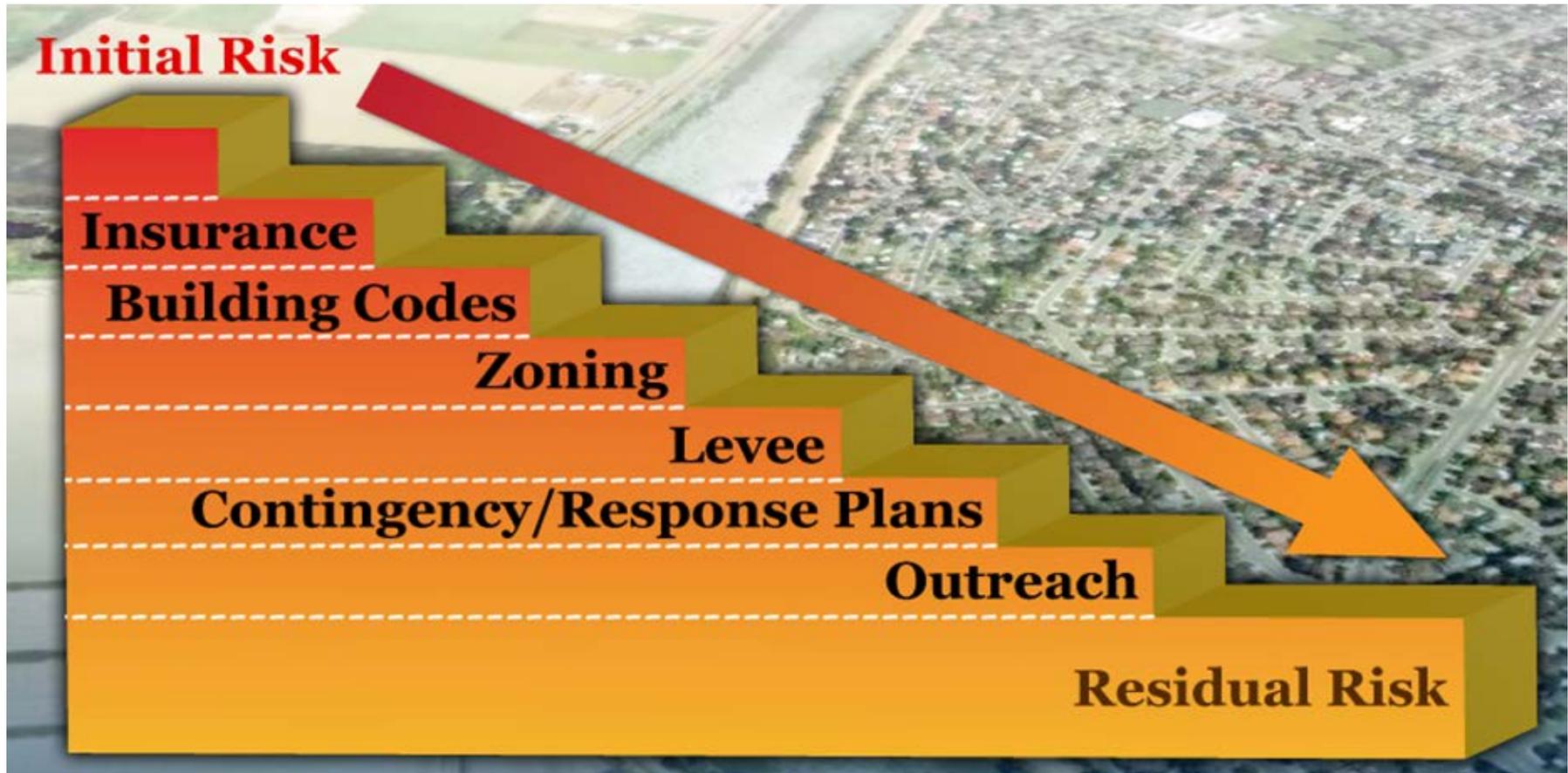
elev. 0 ft.

Jun. 2007

Eye alt

All Stakeholders Contribute to DRR

Risk Reduction Actions (Cumulative)



USACE graphic, courtesy of Pete Rabbon

Initial Risk

Stakeholders May Also Contribute to Increased Risk!

No or Inadequate Warning/Evacuation Plan

Sea Level Rise and Upstream Development Increases Flood Heights

Lack of Awareness of Flood Hazard, Absence of Flood, Business Interruption, and DIC Insurance

Critical Facilities Not Properly Protected From Flooding

Increased Development: more people and more costly development

Buildings & Infrastructure Not Properly Designed or Maintained

RISK

Vastly Increased Residual Risk

Treating Water as Garbage

"Diffused surface water should be treated as a necessary asset to replenish groundwater aquifers used for drinking water, and not as waste to be disposed of by landowners."

Law Review Article

Darin L. Whitmer,
*Common Enemy or
Unilateral Threat: Why
Jurisdictions Need to
Become Reasonable in
Regards to Diffuse
Surface Waters*
41 Creighton L. Rev. 423,
April, 2008

A Solution

Go Beyond Federal Minimum Standards

Safe Development

- Looks at all hazards

No Adverse Impact

- Safe, resilient development

Community Rating System Model

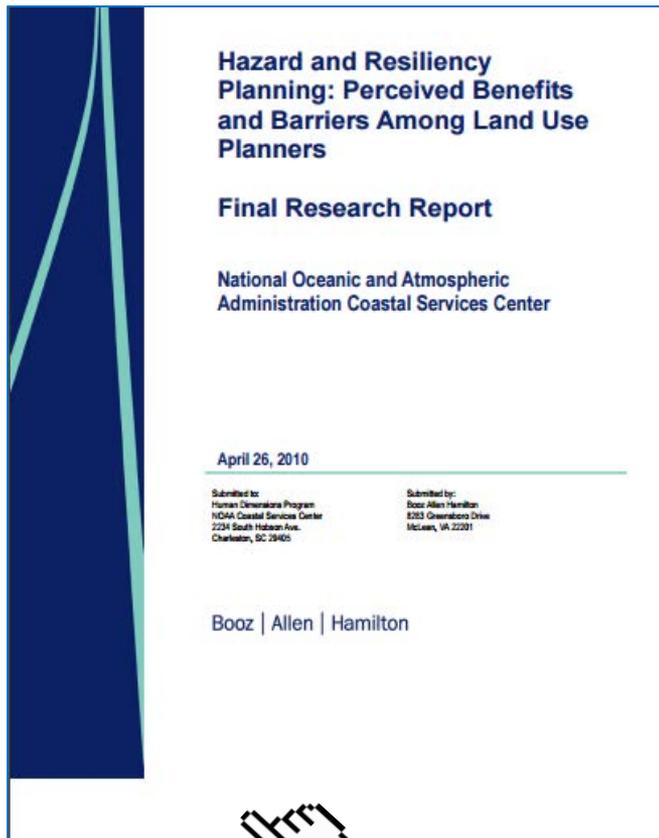
- Development decision-making
 - Planning
 - Emergency preparedness

The Choice of Development or No Development is a False Choice!

The choice we have as a society is rather between:

1. Well planned **development that protects** people, property, environment, and precious Water Resources while reducing the potential for litigation; or
2. Some current **practices that are known to harm** people, property, and natural floodplain functions... and may lead to litigation and other challenges

Why are Governments Not Acting to Prevent Harmful Development?



- The National Oceanic and Atmospheric Administration (NOAA) surveyed planners as to impediments to safe development
- Two major reasons cited:
 - **Fear of the “taking” issue**
 - **Economic pressure**

[click to view report]

Reason #1 for Insufficient Standards: Economics and Externality

- When one group pays maintenance or replacement of something yet a different person or group uses that same something, we often have problems
- Disaster assistance is a classic example of externality
 - **Who Pays For Disaster Assistance?**
 - **Who Benefits?**

Who Pays for Disaster Assistance?

Costs of flooding are usually largely borne by:

- a) The federal and sometimes the state taxpayer through
- Internal Revenue Service (IRS) Casualty Losses
 - Small Business Administration (SBA) loans
 - Disaster Community Development Block Grant (CDBG) funds
 - The whole panoply of federal and private disaster relief *
- b) By disaster victims themselves



* Described in *Planning and Building Livable, Safe & Sustainable Communities: The Patchwork Quilt Approach*, Ed Thomas et al.

Cui Bono? Who Benefits?

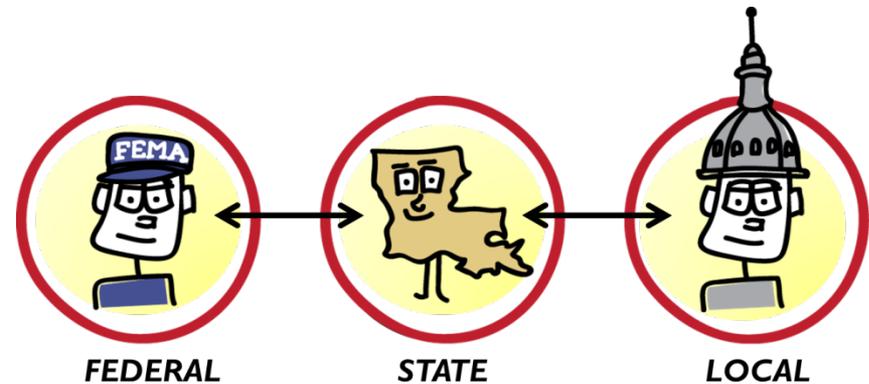
Who benefits from unwise or improper floodplain development:

- Developers?
- Communities?
- State government?
- Mortgage companies?
- The occupants of floodplains?

Possibly in the short-term, but definitely NOT in the long-term

Why Should the Government Do Something about This?

- Fundamental duty
- Protect the present
- Preserve a community's future
- Be a responsible trustee of the “Public Trust”



Why Else Should Professionals and the Government Do Something about This?

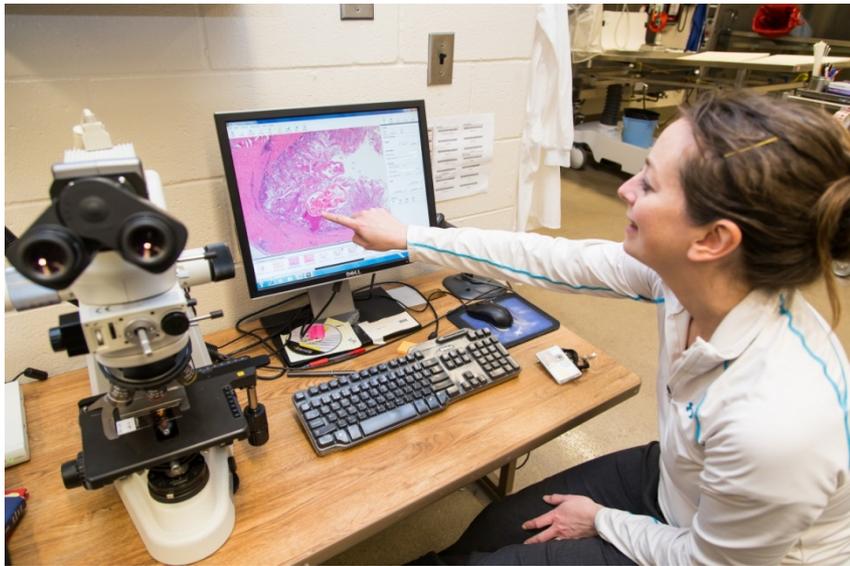
In a word...

Liability

Think about your Standard of Care!



Litigation for Claimed Harm is Easier Now than in Times Past



- Forensic hydrologists
- Forensic hydraulic engineers
- Forensic wildfire
- Other experts

New Trend in the Law

Increasingly, states are allowing lawsuits against communities for alleged “goofs” in permitting construction **OR** in conducting inspections

**A COMPARATIVE LOOK AT
PUBLIC LIABILITY
FOR
FLOOD HAZARD MITIGATION**

By
Dr. Jon A. Kusler, Esq.
Prepared for the

**Association of State Floodplain Managers
Foundation**



[click to view paper]

Three Ways to Support Reconstruction Following Disaster Damage

Self Help

- Loans
- Savings
- Charity
- Neighbors

Insurance Disaster Relief

- A combination of social insurance and self help

Litigation

The preferred alternative is to have **NO DAMAGE** due to safe land use and hazard mitigation

Ka Loko Reservoir - Kauai 2006

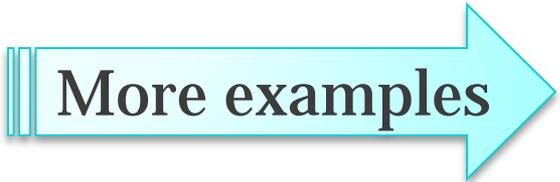


Civil damages and a criminal case for manslaughter
following this flood

Situations Where Governments and Landowners May Be Held Liable for Unreasonable Activity

Examples

- Construction of a road causes damage
- Stormwater system increases flows
- Floodgate blocks natural flow
- Development blocks watercourse
- Bridge without adequate opening



More examples

Situations Where Governments and Landowners May Be Held Liable for Unreasonable Activity (cont.)

Examples

- Grading land increases runoff
- Flood control structure causes damage
- Filling wetland causes damage
- Issuing permits for development which causes harm to a third party

The Good News

- The Supreme Court seems to agree with safe development based planning
- Justice Alito wrote in the majority opinion:

"Insisting that landowners internalize the negative externalities of their conduct is a hallmark of responsible land-use policy, and we have long sustained such regulations against constitutional attack. See *Village of Euclid v. Ambler Realty Co.*, 272 U.S. 365 (1926)."



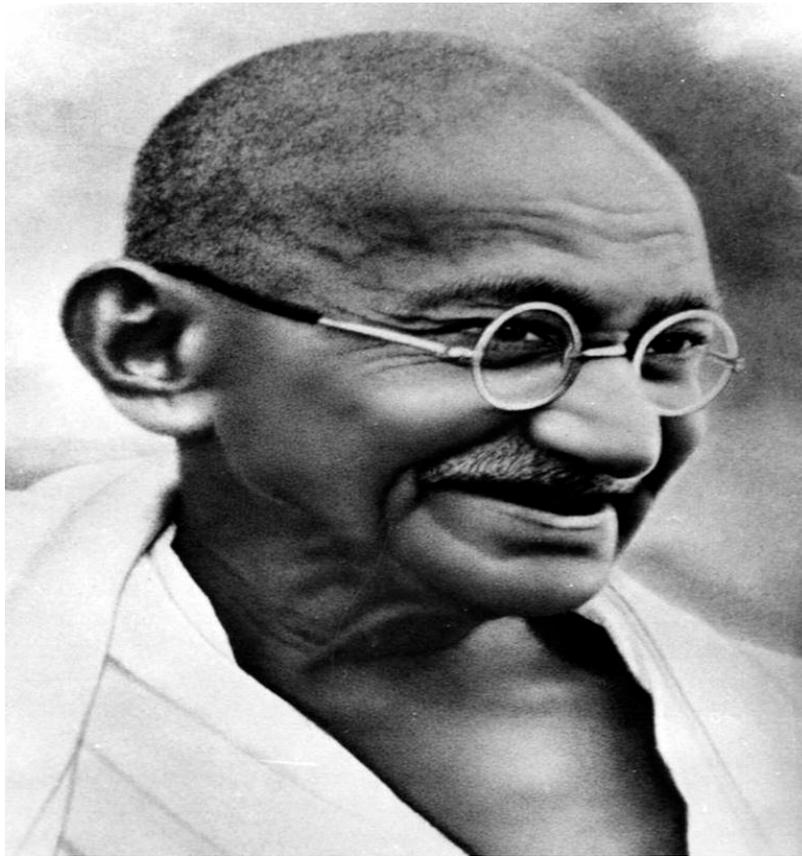
A Conservative, Property Rights View

The Cato Institute indicates that...

Compensation is not due when:

“... regulation prohibits wrongful uses, no compensation is required.”

Equity and Morality Support Safe Development



According to Gandhi's Writings

“Sic Utere Tuo Ut Alienum Non Laedas”

Use your property so you do not harm others is

“A grand doctrine of life and the basis of (harmonious relationships) between neighbors”

Resilience and Disaster Risk Reduction

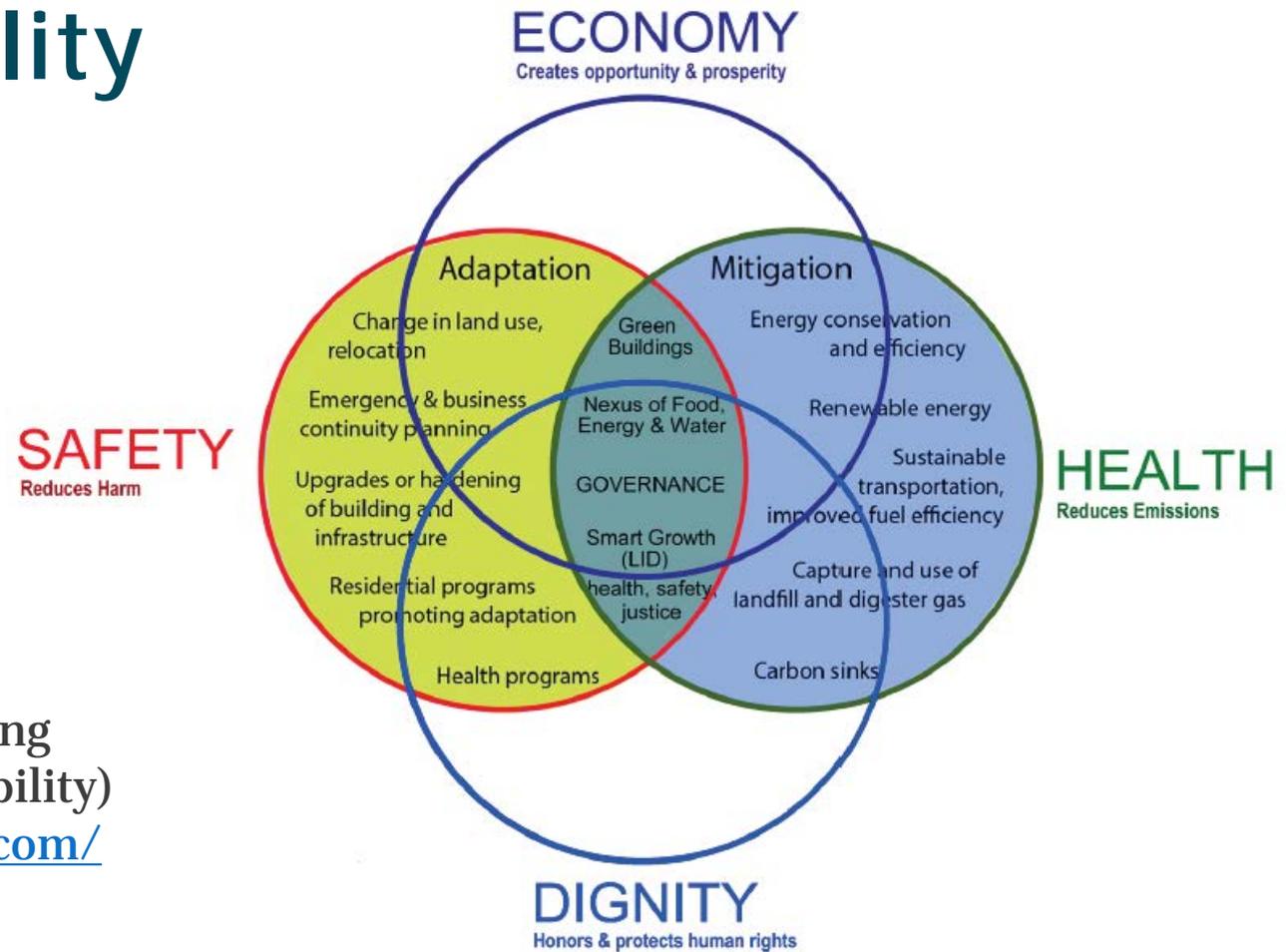
Resilience and climate adaptation are moving targets due to:

- Climate
- Population
- Type of development
- Other factors



Think of the arrows being shot at the target as development resources

Four Circles of Resilience and Sustainability



Credit: The OARS List
(Organizations Addressing Resilience and Sustainability)

<http://www.theoarslist.com/>

- Used with permission

Need a Common DRR Message Delivered by Many People



- Enroll in the Community Rating System (CRS) Program
- Build with higher freeboard, generally 4 feet or more above Base Flood Elevation (BFE), in areas subject to floods
- Understand the limitations of flood frequency projections based on the past, which include many unrealistic assumptions

Building Higher in Flood Zones: Freeboard



FEMA

Fact Sheet

Building Higher in Flood Zones: Freeboard – Reduce Your Risk, Reduce Your Premium

One way flood risk is communicated is through maps that show base flood elevations (BFEs), or the height floodwaters would reach during a 1-percent-annual-chance flood in any given year.

Freeboard is a term used by FEMA's National Flood Insurance Program (NFIP) to describe a factor of safety usually expressed in feet above the 1-percent-annual-chance flood level. The NFIP requires the lowest floor of structures built in Special Flood Hazard Areas (SFHAs) to be at or above the BFE, so a structure built with freeboard would have its lowest floor 1 foot or more above the BFE. Adding freeboard will reduce NFIP insurance premiums.

Benefits of Freeboard

There are many benefits to incorporating freeboard into new construction plans, the most important being safety (Figure 1). Freeboard provides a margin of safety against extraordinary or unknown flood risk. BFEs reflect estimates of flood risk, but there are many unknown factors that can cause flood heights to rise above the BFE, such as wave action, bridge and culvert openings being blocked by debris, and development in the flood plain. It is important to remember that floods more severe than the 1-percent-annual-chance event can and do occur.

Other benefits of freeboard include incurring less damage, easier and faster cleanup after a flood event, and lower flood insurance rates. Incorporating freeboard into building plans can result in substantial savings in flood insurance premiums each year, especially for buildings located in Zone V (a coastal flood zone at risk from wave action). Figure 2 shows potential flood insurance rates based on the amount of freeboard in both riverine (Zone AE) and coastal (Zone VE) environments.

Communities that incorporate freeboard into their local floodplain ordinances can earn discounts on flood insurance by participating in the NFIP's Community Rating System (CRS) program. CRS rewards communities that engage in floodplain management activities that exceed NFIP standards by offering discounts of up to 45 percent on flood insurance policies written in NFIP-participating communities.



Figure 1: Basic elevation above the BFE with 1 foot of freeboard

What's Floodplain Management?

Floodplain management is the operation of a program of preventive and corrective measures for reducing flood damage. NFIP helps communities develop floodplain management regulations that comply with NFIP regulations. Communities may adopt more restrictive regulations. Community officials may have knowledge of local conditions that require higher standards than the NFIP regulations, particularly for human safety.

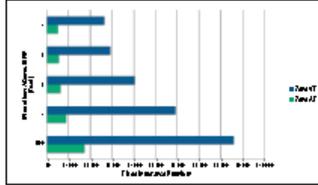


Figure 2: Maximum coverage for a \$250,000 residential building and \$100,000 contents

- Many States and communities have incorporated freeboard requirements into the elevation and floodproofing requirements stipulated by the NFIP
- Freeboard requirements vary, and it is up to the community to decide what is most appropriate given their location and other community conditions

Review of Learning Objectives

1. Describe **higher standards**, including the Community Rating System (CRS), as part of a long-term solution to flood loss
2. Explain the **limitations** of current National Flood Insurance Program (NFIP) mapping in identifying flood risk
3. Explain common **impediments** to flood resilience and suggest ways to overcome them

Disaster Risk Reduction Ambassador Curriculum

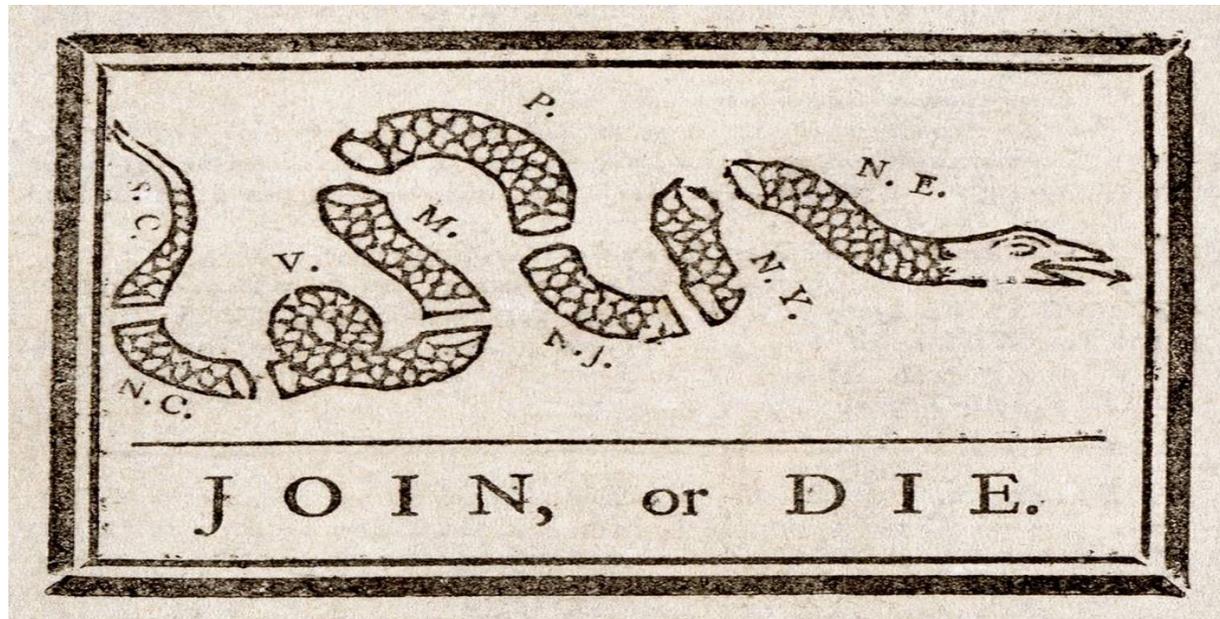
This Curriculum focuses on the concept of **disaster resilience**, or

“the ability to prepare and plan for, absorb, recover from, and more successfully adapt to adverse events”

Join Us!

Final Thought: Courtesy of Ben Franklin

**All of US Who Care About a Safer, Better Future
Need To Work Together**



Thank You!



DISASTER
RISK REDUCTION
Ambassador Curriculum

- **Questions and/or comments**
- **Contact information**

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