RESILIENCE is the New Sustainability

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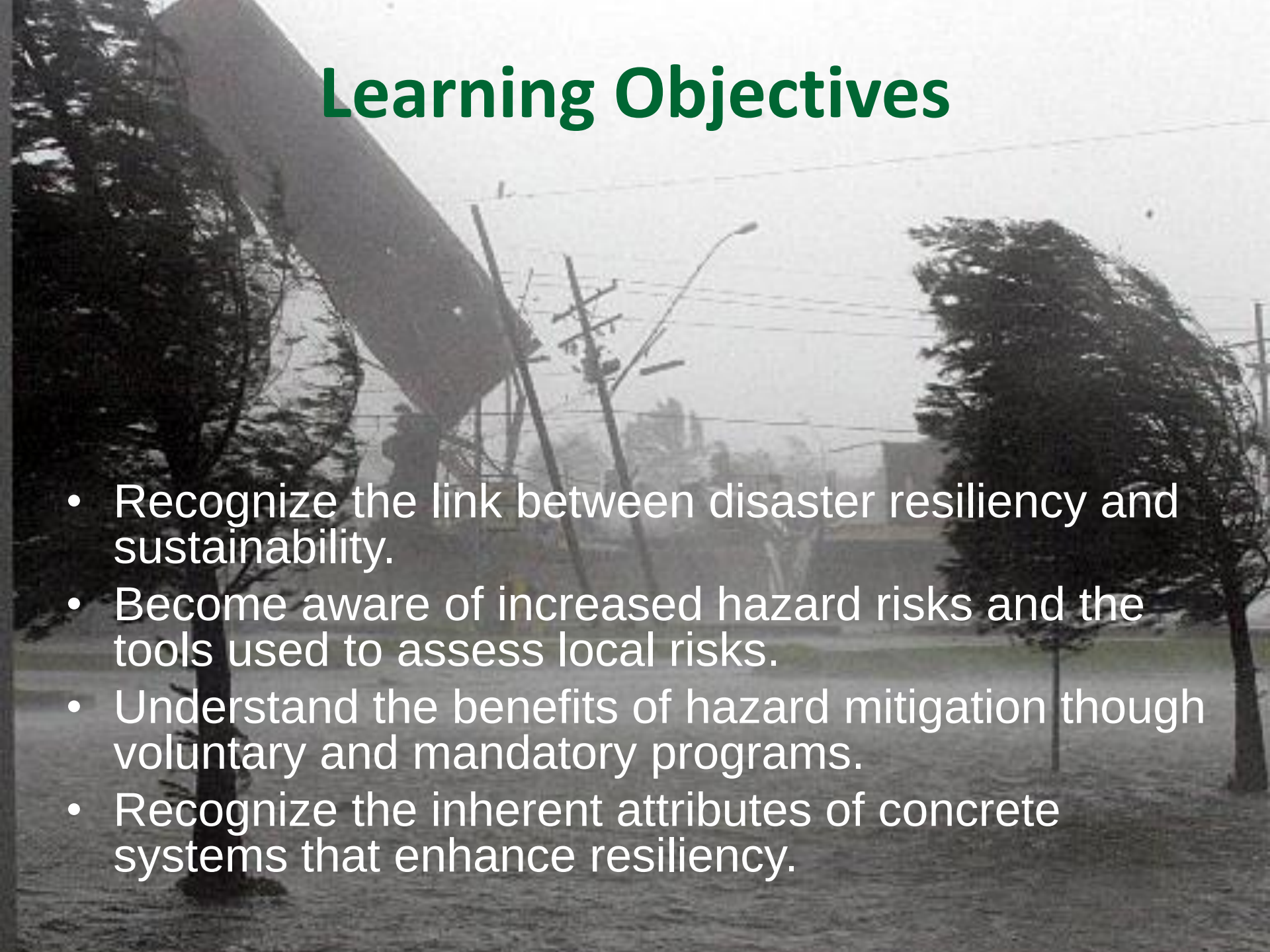
National Ready Mixed Concrete Association

NRMCA

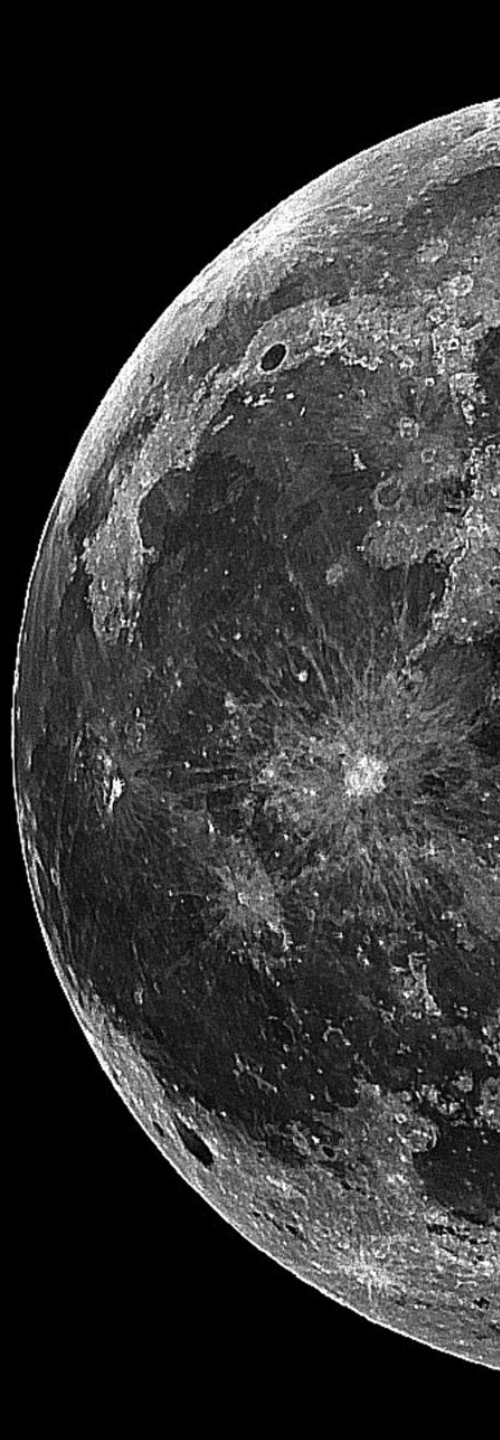


Learning Objectives

- Recognize the link between disaster resiliency and sustainability.
- Become aware of increased hazard risks and the tools used to assess local risks.
- Understand the benefits of hazard mitigation though voluntary and mandatory programs.
- Recognize the inherent attributes of concrete systems that enhance resiliency.

HURRICANE SANDY OFFERS A TEACHABLE MOMENT

PERFECT STORM: MORE TO COME




SANDY HIGHLIGHTS OUR
FRAGILE INFRASTRUCTURE

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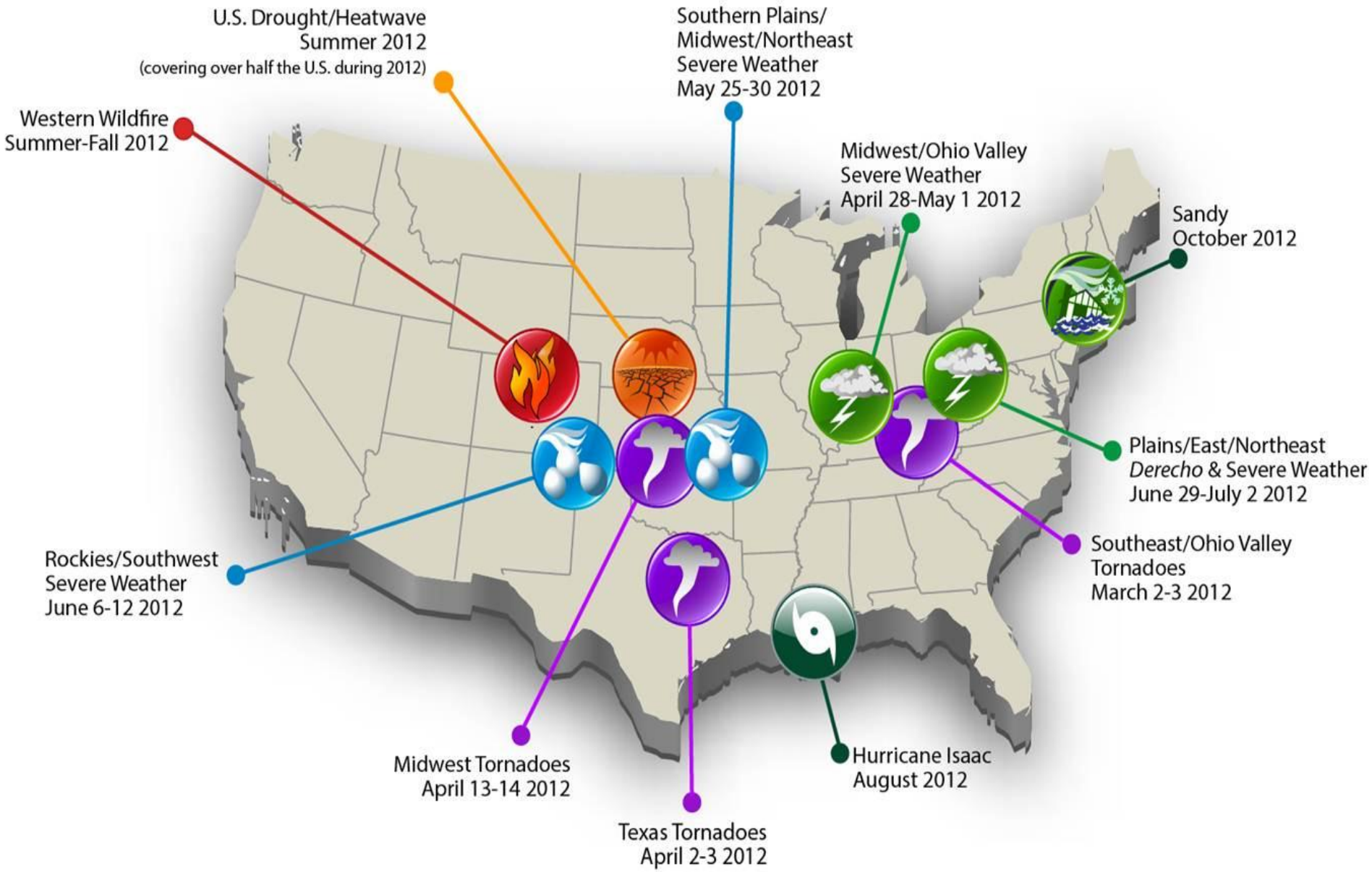
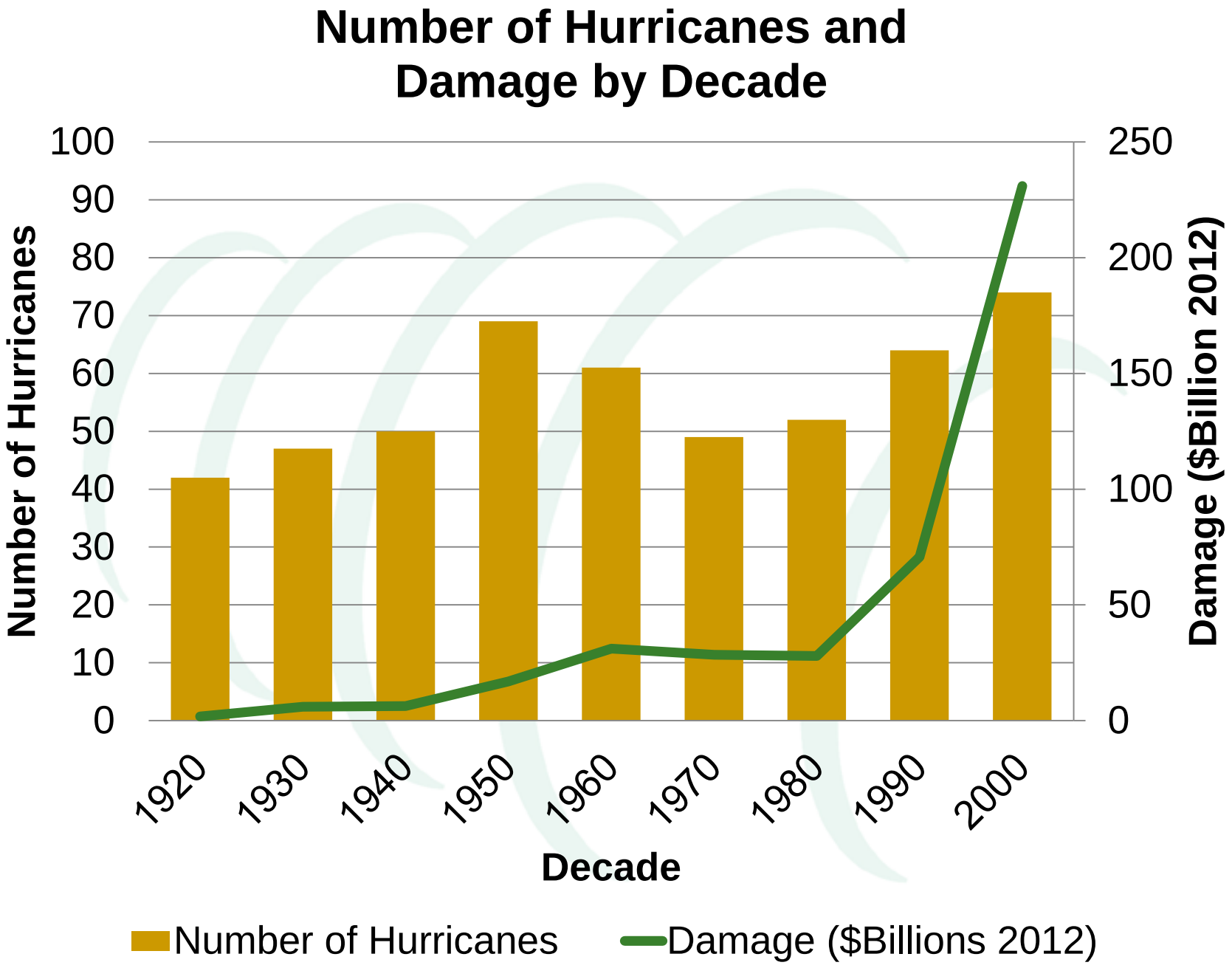
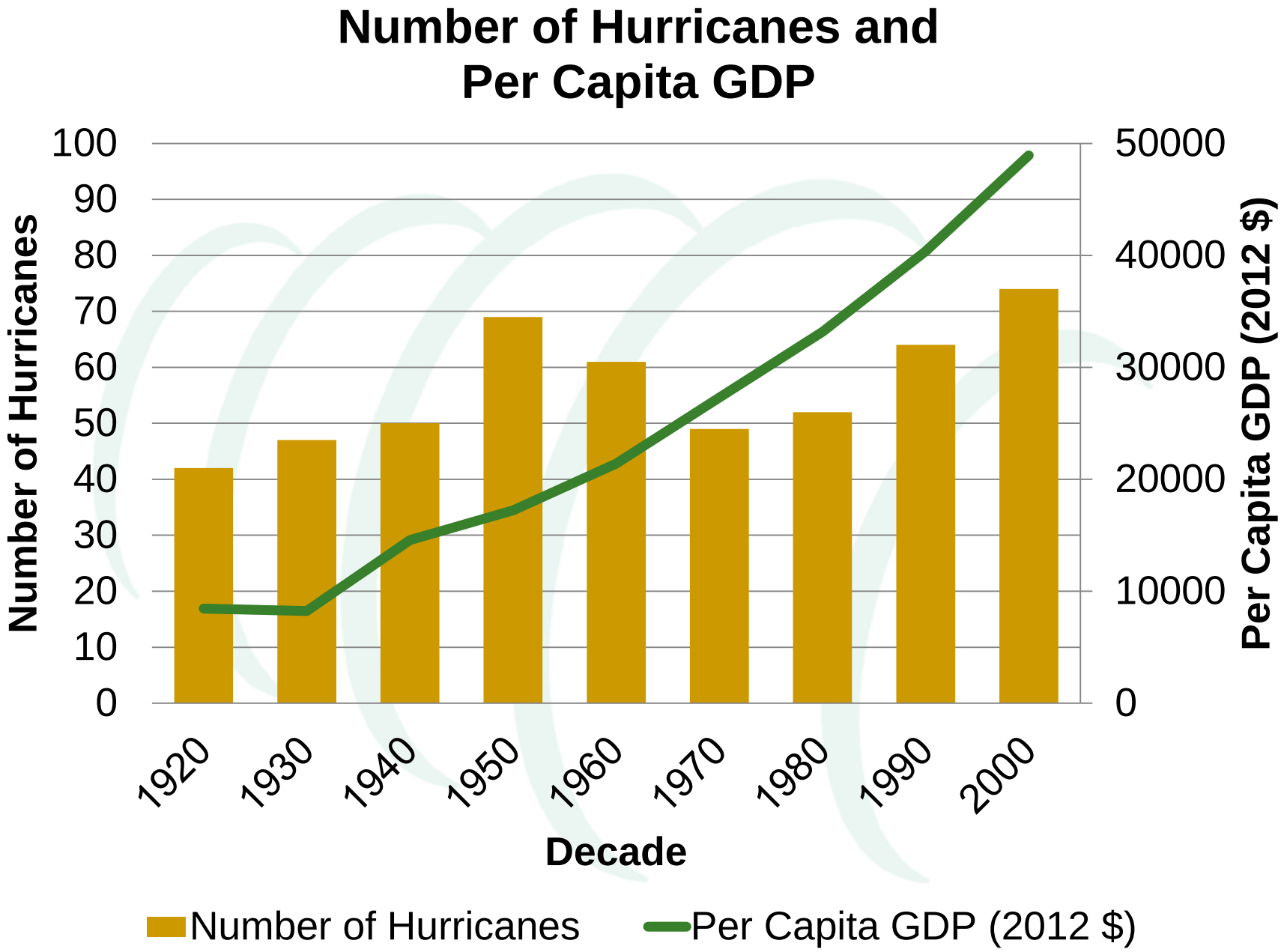
U.S. 2012 Billion-dollar Weather and Climate Disasters




Number of Hurricanes and Damage by Decade
Number of Hurricanes
Damage ($Billion 2012)
100
90
80
70
60
50
40
30
20
10
0
250
200
150
100
50
0
1920
1930
1940
1950
1960
1970
1980
1990
2000
Decade
Number of Hurricanes
Damage ($Billions 2012)


Number of Hurricanes and Per Capita GDP
Number of Hurricanes
Per Capita GDP (2012 $)
100
90
80
70
60
50
40
30
20
10
0
50000
40000
30000
20000
10000
0
1920
1930
1940
1950
1960
1970
1980
1990
2000
Decade
Number of Hurricanes
Per Capita GDP (2012 $)


Great SF Quake & Fire 1906

Katrina, New Orleans 2005

Stuck in Response mode.


And less dependence
on these guys.


Or these guys who
are in the same boat.
POLICE
00048
POLICE


Resilience focuses
on local community.


Nature
DISASTER
Human Development

Resilience is the New Sustainability

SCIENCE CONNECTIONS →

EXTREME WEATHER & CLIMATE CHANGE

→ Strongest Scientific Evidence Shows Human-Caused Climate Change Is Increasing Heat Waves and Coastal Flooding

TORNADOES

HURRICANES

SEVERE DROUGHTS

EXTREME PRECIPITATION EVENTS

COASTAL FLOODING

HEAT WAVES

Limited Evidence

Strong Evidence

Strongest Evidence

Source: Intergovernmental Panel on Climate Change SREX Report (2012)

Economic & Environmental Impact

LOUISIANA RANKS 1ST IN CRUDE OIL AND 2ND IN NATURAL GAS PRODUCTION IN THE U.S.

WETLANDS PROTECT PORTS THAT MANAGE ALMOST 20% OF WATERBORNE COMMERCE IN THE U.S.

COASTAL WETLANDS PROVIDE HABITATS FOR ALMOST 2 MILLION MIGRATORY WATERFOWL

Social Equity Impact

Natural Hazards Disproportionately affect the poor.


Disaster is a signal of the failure of a society to adapt to its new environment.

How do we Adapt?

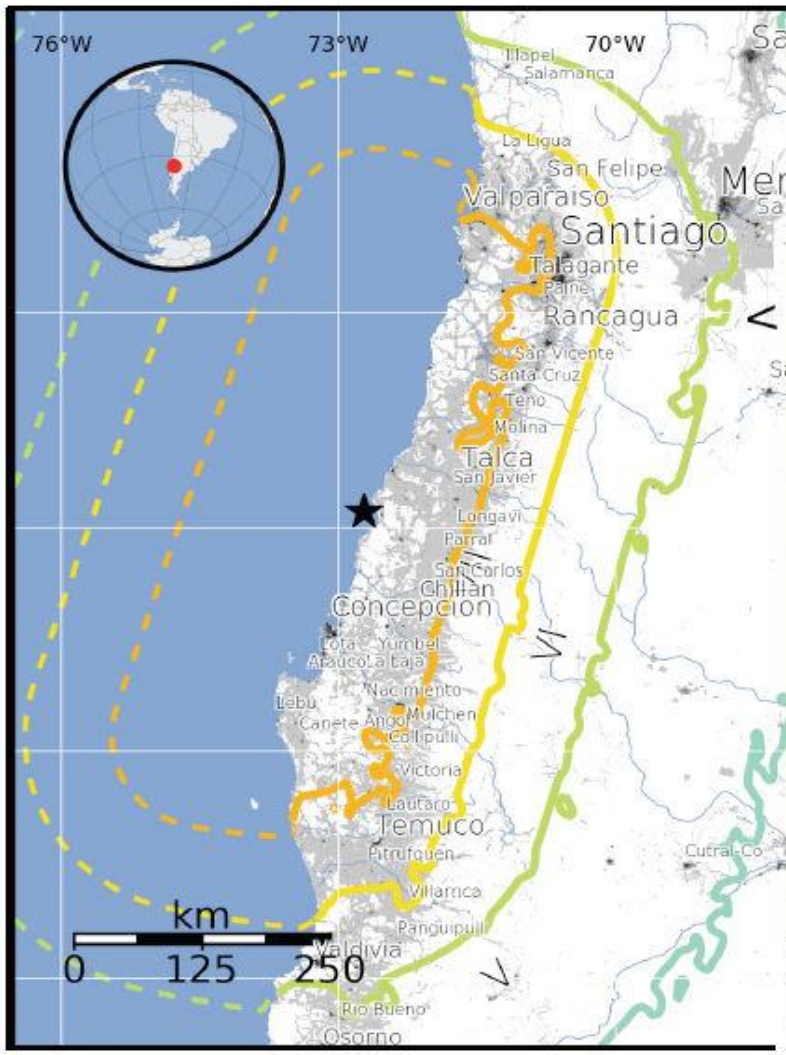
- Adopt a Building Code
- Encourage Voluntary “Code Plus” Construction
- Adopt High Performance Building Standards
- Build with Robust Materials

1. Adopt a Building Code

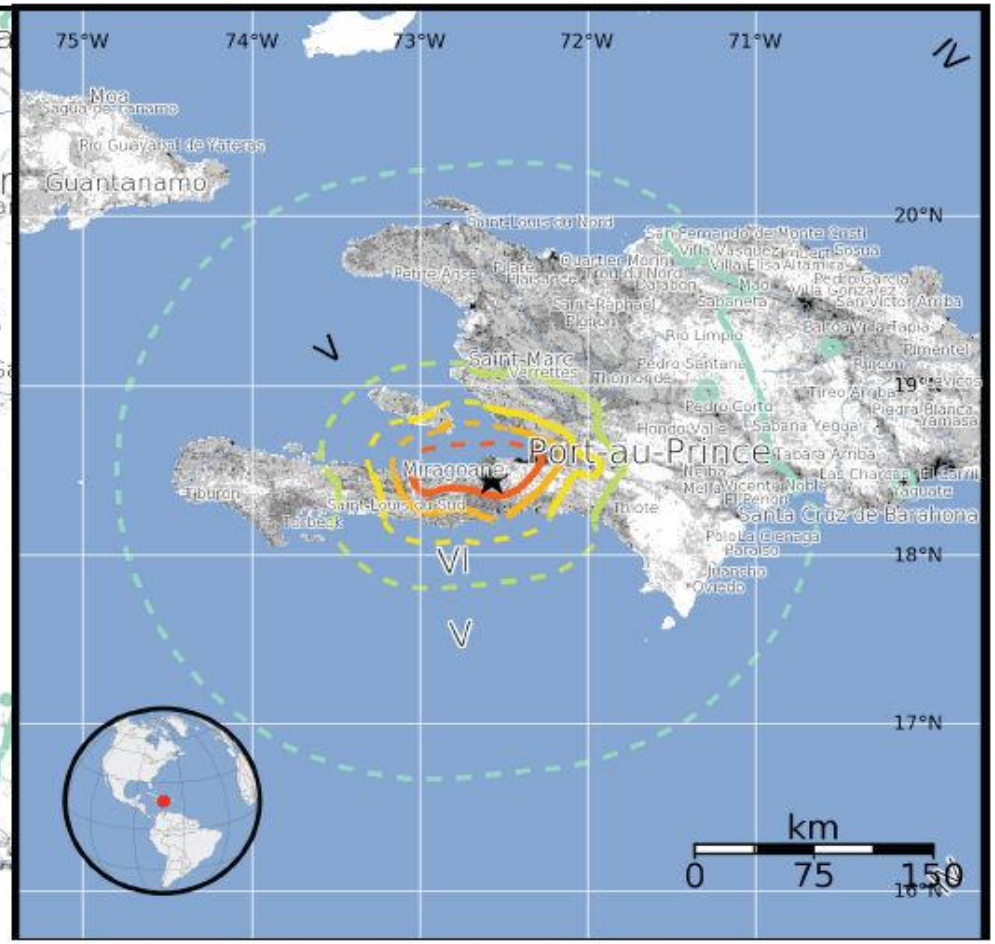
Population & Shaking Intensity

USGS

Chile



Haiti



PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	*<.17*	*.17-1.4*	*1.4-3.9*	*3.9-9.2*	*9.2-18*	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	*8.1-16*	*16-31*	*31-60*	*60-116*	*>116*
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+


Haiti
Jan 2010, Magnitude 7.0
230,000 Deaths


Chile
Feb 2010, Magnitude 8.8
279 Deaths

2. Voluntary “Code Plus” Construction

FORTIFIED® Building Programs

- Hurricanes
- Tornadoes
- Earthquakes
- Floods
- Wildfires
- Severe winter weather

FORTIFIED for Safer Living® Homes
Post-Hurricane Ike
Bolivar Peninsula, Texas

Estimate of Cost of FORTIFIED

+3 to 10 percent to hard costs

Typical code construction

90 mph wind

FORTIFIED construction

110 mph wind

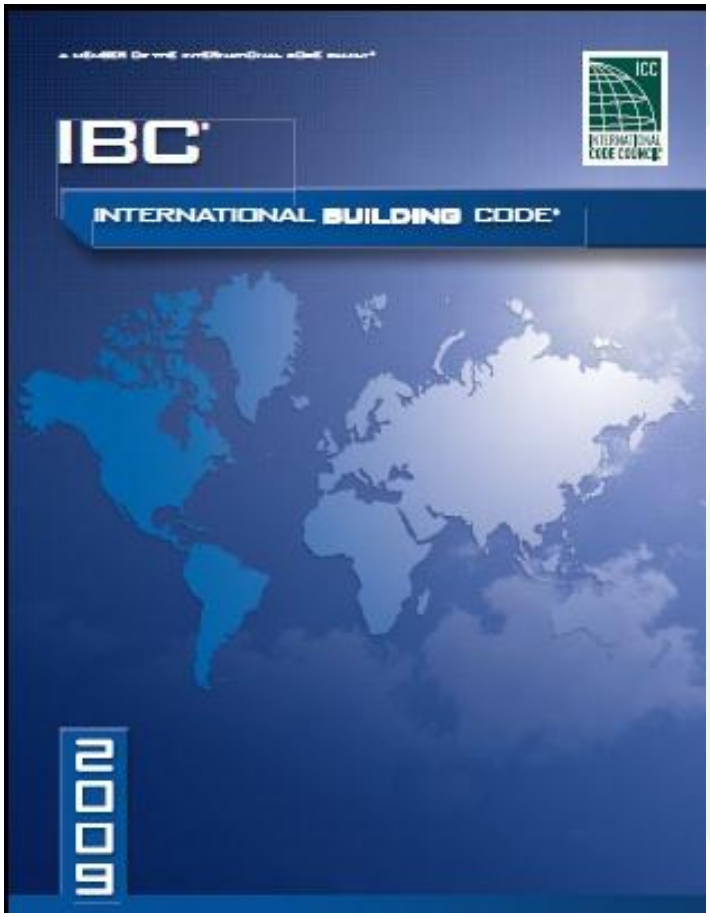

GREENSBURG
Green Town


GREENSBURG, KS
Rebuilding . . .
STRONGER, BETTER, GREENER!
Home of the "BIG WELL"
1 Mile Ahead
LUMINOUS NEON


Yes.

3. High Performance Building Standards

High Performance Building Standards



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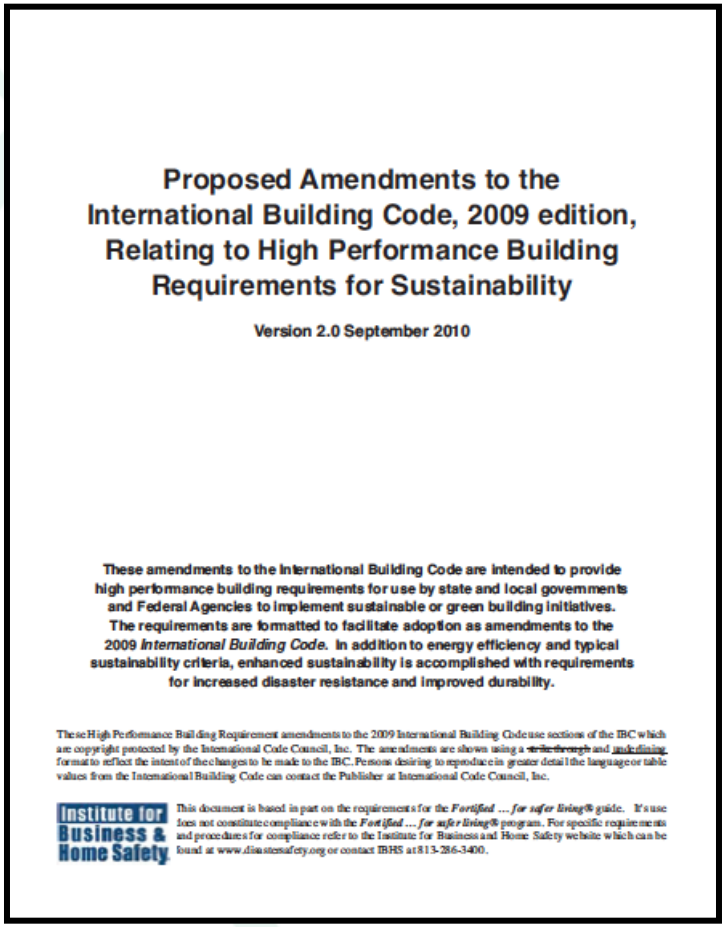

Proposed Amendments to the International Building Code, 2009 edition, Relating to High Performance Building Requirements for Sustainability

Version 2.0 September 2010

These amendments to the International Building Code are intended to provide high performance building requirements for use by state and local governments and Federal Agencies to implement sustainable or green building initiatives. The requirements are formatted to facilitate adoption as amendments to the 2009 *International Building Code*. In addition to energy efficiency and typical sustainability criteria, enhanced sustainability is accomplished with requirements for increased disaster resistance and improved durability.

These High Performance Building Requirement amendments to the 2009 International Building Code use sections of the IBC which are copyright protected by the International Code Council, Inc. The amendments are shown using a ~~strike-through~~ and underlining format to reflect the intent of the changes to be made to the IBC. Persons desiring to reproduce in greater detail the language or table values from the International Building Code can contact the Publisher at International Code Council, Inc.

Institute for Business & Home Safety

This document is based in part on the requirements for the *Fortified … for safer living®* guide. Its use does not constitute compliance with the *Fortified … for safer living®* program. For specific requirements and procedures for compliance refer to the Institute for Business and Home Safety website which can be found at www.disastersafety.org or contact IBHS at 813-286-3400.

= Improved Community Resilience

High Performance Criteria

4. Build with Robust Materials

Robust Building Materials…

- Versatile
- Strong
- Water Resistance
- Non-combustible
- Energy Efficient
- Durable

…Built to last

Concrete Systems

2007 EF-5 Tornado Greensburg, KS


2005 Hurricane Katrina, MS


1991 Wildfire Laguna Beach, CA

2011 EF4 Tornado, Tuscaloosa, AL

Another massive twister hits Moore

On May 3, 1999, Moore, Okla., was leveled by a record-setting EF-5 tornado, with winds measured at 318 mph (512 kph), the highest ever on the earth's surface, killing 41 people. According to the National Weather Service the wide storm that hit Moore on Monday was at least an EF-4, with winds up to 200 mph (322 kph).

NE 12th St.

1 km
1 miles

May 3, 1999 tornado path

Moore

Residential area

35

SE 4th St.

May 20, 2013 tornado path

Cemetery

Moore Medical Center

Both elementary schools destroyed

Plaza Towers Elementary School

Briarwood Elementary School

SE 19th St.

N

35

77

Source: ESRI, DeLorme, IPC, NAVTEQ, NRCan, USGS, TeleAtlas, National Weather Service, KOCO.COM

Conclusion

- Communities play a major role in resilience
- Voluntary programs FORTIFIED are valuable
- Most effective method is to change model building codes at the national level
- Build with more robust building material

- Disasters are inevitable, but their consequences need not be

THANK YOU FOR YOUR INTEREST

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