






— Insurance in a Green Infrastructure World

11th Annual Green Infrastructure Conference



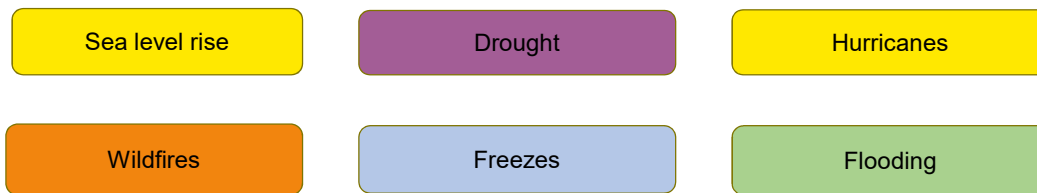
— Insurance in a Green Infrastructure World

Panelists:

		
<p>Lorene (“Renie”) Boudreau Ballard Spahr LLP</p>	<p>Viv Bennett The Nature Conservancy</p>	<p>Raghuv eer Vinukollu Munich Re US</p>

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Frequency and Severity of Weather Events is Increasing



- As of October 10, 2023, the U.S. has had 24 weather or climate disasters with losses exceeding \$1 billion each.
 - Source: National Oceanic and Atmospheric Administration
- Insured losses from severe storms in the U.S. have exceeded \$50 billion in 2023
 - Source: Aon

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The Insurance Crisis

- Climate change has led to a situation where insuring certain properties and projects is not actuarially sound.
- Seven out of the top 12 carriers in California including Allstate and State Farm have pulled back coverage due to the rising costs associated with wildfires.
- Rising premiums: property insurance premiums for U.S. solar facilities have risen up to 50% in the past year
- Coverage caps

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— **What Role Can the Insurance Industry Play:**

- As an investor . . . to fund green infrastructure?
 - Invest directly
 - Buy green bonds to finance resiliency projects
- As a risk mitigator . . . through new insurance offerings that can unlock financing for long-term green infrastructure projects?

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OCTOBER 2023




Natural and Nature-Based Solutions: A Multi-Benefit Approach to Reducing Risk

For Ballard Spahr – Green Infrastructure Conference

Viv Bennett
Director of Protection and Conservation Strategies, TNC

HAZARDS increasing in frequency, duration, and intensity

HEAT	DROUGHT	WILDFIRE
COASTAL IMPACTS	EROSION	FRESHWATER FLOODING



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Working With Nature – Natural and Nature-Based Solutions

Enhance ecosystem resilience in both natural and human-dominated systems.

NNBS exist on a spectrum from gray to green.

- Gray infrastructure
- Natural infrastructure
- Green infrastructure

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NNBS - Multiple Benefits



- ✓ More resilient infrastructure
- ✓ Job opportunities
- ✓ Community development
- ✓ Economic revitalization
- ✓ Improved quality of life
- ✓ Workforce recruitment
- ✓ Improved water and air quality
- ✓ Recreational opportunities & access
- ✓ Fish, timber, other natural products
- ✓ Improved physical and mental health
- ✓ Cultural benefits
- ✓ Wildlife and biodiversity support

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NATURAL & NATURE-BASED SOLUTIONS

- Stormwater mitigation
- Urban tree canopy
- Floodplain reconnection and restoration
- Streambank stabilization



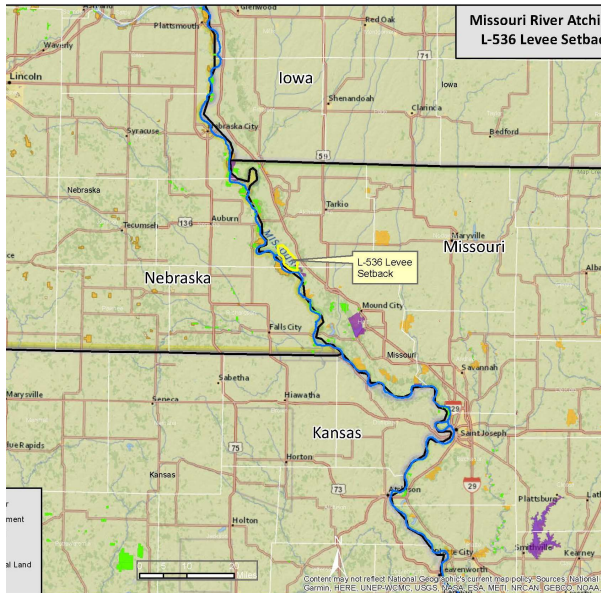
- Regenerative agriculture
- Edge-of-field practices
- Forest fuel management
- Coral reef restoration



- Levee setbacks
- Grey/green infrastructure
- Watershed restoration
- Mangroves



The L536 - Large Scale Levee Setback



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2019 Flood Impacts - Atchison County Missouri

- **56,000 acres under water**
- **14 commercial businesses underwater**
- **166 homes flooded**
- **278 citizens forced to evacuate**
- **1,295 agricultural buildings flooded**
- **Estimated \$25 million in lost ag revenue**
- **Transportation Issues**
 - ❑ **121 miles of roads destroyed**
 - ❑ **1-29 closed for approximately 187 miles between St. Joseph and Omaha – the largest closure of interstate highway in history of interstate system (Atchison County midway between these cities)**
 - ❑ **US Hwy 136 out of Rock Port into Nebraska closed for 216 days**
 - ❑ **Major disruption of BNSF railroad service as main line was shut down for several months**

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L536 Large Scale Levee Setback

Why did TNC get involved?

- *Flood Resiliency and Nature-Based Solutions*
- *Floodplain Restoration and Ecosystem Benefits*
- *We were asked!!*

Partner Goals – Set the Levee Back

- *ACLD and USACE – reduce repairs*
- *NRCS – create habitat*
- *NWCOG – improve vitality*
- *MDNR, MDC, SEMA, MDED – various*
- *TNC – habitat, room for the river, ecosystem services, flood resiliency, help the community, demo site, affect policy procedures practices processes culture, innovate and find new ways of working, and so much more*

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L536 Large Scale Levee Setback

Learn More:

www.nature.org/moriverlevee

- Webpage
- Story Telling Video
- Fact Sheet
- Communications
- Playbook



STORIES IN MISSOURI

Reconnecting the Missouri River Floodplain

The construction of a levee setback will reduce flooding impacts on the community and restore a more natural floodplain.

November 02, 2020



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Reinsurance and NBS White Paper



Nature's remedy: Improving flood resilience through community insurance and nature-based mitigation



Phase 1 – White Paper – DONE!

Phase 2 – THE ASK:

Work with one or more major employers or communities to pilot the money savings transfer into NBS and community flood resiliency

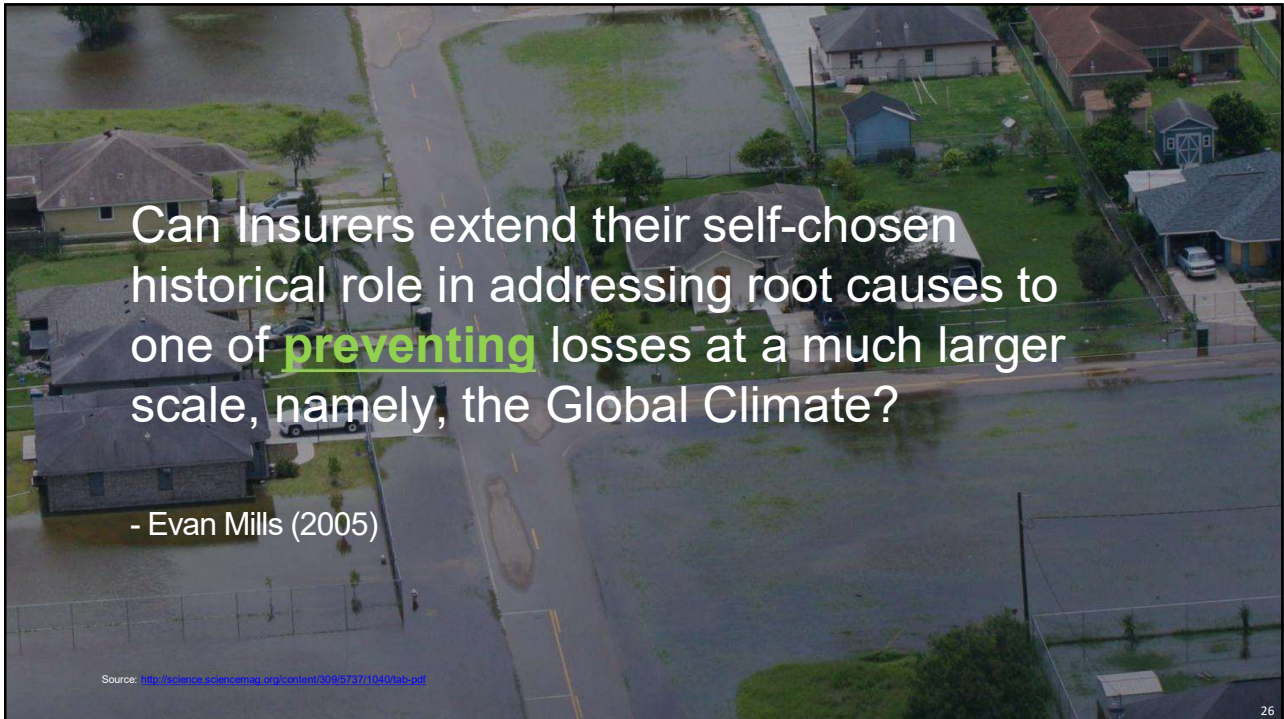
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Community Flood Resilience Insurance

A Partnership between TNC and Munich Re.

James Doona
Raghuveer Vinukollu



Can Insurers extend their self-chosen historical role in addressing root causes to one of **preventing** losses at a much larger scale, namely, the Global Climate?

- Evan Mills (2005)

Source: <http://science.sciencemag.org/content/309/5727/1040.full.pdf>

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Climate Change and P&C Insurance: The Threat and Opportunity Nov 2020, McKinsey & Company



Insurers, however, must be careful not to underestimate the true threat of climate change. Because its effects are systemic, climate risk is likely to stress local economies and—more grimly—cause market failures that affect both consumers and insurers. More frequent catastrophic events, in combination with the need to meet evolving regulatory requirements, can threaten company business models—and make insuring some risk unaffordable for customers or unfeasible for insurers. **Stakeholders**—such as customers, shareholders, and regulators—are **therefore likely to demand that insurance solutions go beyond traditional risk transfer to explicitly address risk mitigation**. These risks can be either physical, directly affecting the insurance business, or transitional, affecting insurers' portfolios as assets are repriced. Insurers should seize this moment to stress-test their exposure to climate risk and rebalance their portfolios. Perhaps more importantly, **insurers should use their understanding of risk to help organizations mitigate and adapt**—and thus protect a greater share of the global economy. In particular, the industry should develop products that cover climate-related risk specifically and should revisit its (potentially carbon-intensive) investment strategies. **The effects of climate change are already here**, and efforts to respond at scale will take time. With the **long-term viability of the industry at stake**, insurers should act now.

MR Best Practice

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Building Climate Resilience in Cities

<https://www.climatepolicyinitiative.org/publication/building-climate-resilience-in-cities-through-insurance/>



- Report recommendations:
 - Increase investment in risk assessment and technical capacity building to use risk assessments effectively.
 - Provide incentives to local governments for the assessments of these risks and understanding the broader landscape of risk management plans
 - Address implementation barriers.
 - **Develop an effective resilience plan for the city along with the insurance industry.**
 - **Engage the insurance sector** around urban needs, capacities, and data.

MR Best Practice

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How to Stem Increasing Losses from Natural Hazards



RISK = HAZARD **x** VULNERABILITY **x** EXPOSURE (people, \$)



Climate change requires mitigation

- Emissions reduction
- New technologies
- Long-term sustained effort

Climate change requires adaptation

- Data analytics, information, best practices
- Building codes/construction, land use, etc.
- Risk reduction, risk transfer (insurance)
 - More immediate impact

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Community is a Fundamental Idea Behind Insurance



1. Insurance creates efficiencies by pooling of risks

- A form of leverage: each policyholder can access the greater resources of the insurer
- Putting each policyholder's exposures into a portfolio drives down each holder's risk

2. Protected policyholders can make financial decisions with greater confidence

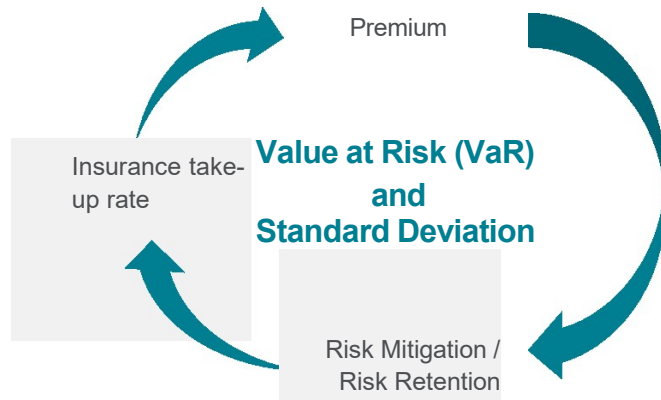
- Insurance reduces the "risk of ruin", which enhances the policyholder's financial profile
- Increases resilience as it increases overall reinvestment in and development of infrastructure
- "The transformative power of preparedness"

3. Community resilience insurance incentivizes risk mitigation & preparedness

- By including the entire community, there is no "weakest link"
- Survivability and continued reinvestment over time improves resilience

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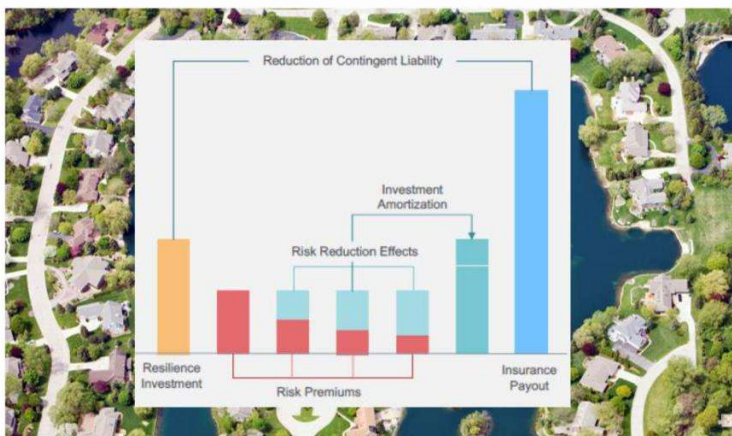
Insurance Can Create a Virtuous Feedback Loop



Protection Gap = f (Affordability, Rate Adequacy)

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Community Resilience Insurance A Sustainable and Integrated Approach to Risk Transfer and Risk Reduction



Aims to overcome the trade-off between risk reduction and risk transfer, linking them within a combined solution:

- ✓ A resilient investment at the beginning of the period reduces the underlying risk
- ✓ The risk mitigating impact is monetized via reduced premiums
- ✓ An incentive is created both for risk reducing infrastructure as well as for risk transfer, resulting in increased community resilience

<https://doi.org/10.1016/j.ecolecon.2019.106487>

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Community Flood Resilience Insurance (CFRI)

White Paper Study by Munich Re and The Nature Conservancy



Nature's remedy: Improving flood resilience through community insurance and nature-based mitigation

Updated: 11/22/2021

Scope of the White Paper Study

NFIP Policy Data: 2018 Snapshot



Missouri and Nebraska				
FloodZone	Total Policy Count	AVG BLDG CVG	AVG POLICY PREM	
A	9,968	\$	140,027	\$ 1,190
B	319	\$	186,238	\$ 1,005
C	566	\$	166,658	\$ 719
D	2	\$	77,750	\$ 1,824
N	170	\$	34,900	\$ 600
X	4,942	\$	181,265	\$ 585
Grand Total	15,967	\$	153,852	\$ 942

L536 Zip Codes				
FloodZone	Total Policy Count	AVG BLDG CVG	AVG POLICY PREM	
A	141	\$	120,601	\$ 1,248
C	1	\$	39,900	\$ 673
Grand Total	142	\$	109,072	\$ 1,166

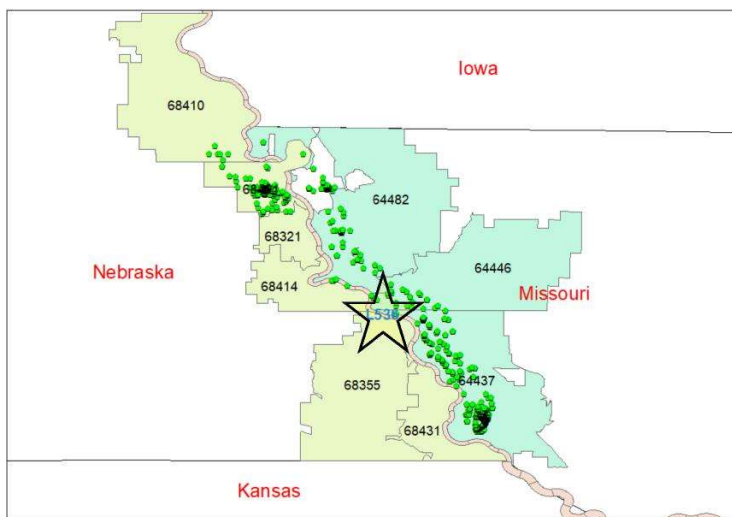
NFIP Claims Data 1978 - 2018



- 4,443 Claims
- Average Claim: \$14,597
 - Building Claim: \$11,859
 - Content Claims: \$2,636
 - ICC: \$103

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White Paper Study: Data / Region



- Property Data used in the selected zip codes
- Locations within 5 miles from the Missouri River
- Total 1,455 locations selected.
 - Building value: \$150,000
 - Content value: \$15,000

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Levee Setback in Missouri

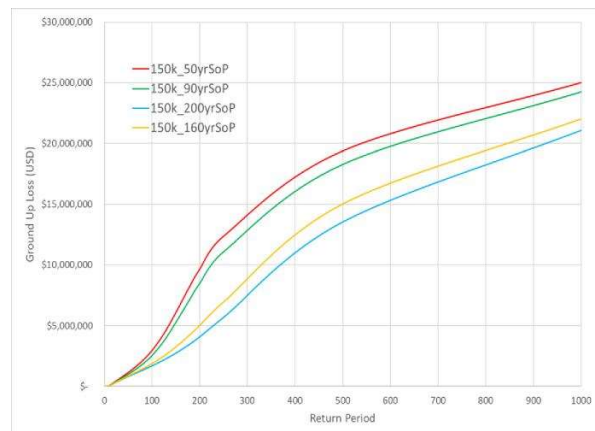


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Levee Setback: Modeling the Benefits



- **Perils Modeled:** River Flood and Flash Flood
- **Nature Based Solution:** L536 Setback Levee
- **Standard of Protection of Levee:**
 - v' Without a Setback Levee: 50 year
 - v' With a Setback Levee: 160 – 200 year
 - v' This standard of protection of the levee is applied to river flood modeling only (“fluvial flood”, as opposed to “pluvial flood”, caused by rainfall).



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Benefits of Community Flood Resilience Insurance (CFRI)



1. The welfare of the community requires community-wide participation
 - Not just for the high-risk, since all have a stake in preserving or improving the community
 - Community resilience protects common infrastructure
 - It also helps to maintain living standards, access to jobs, supermarkets, etc.

2. The most immediate effect is to stabilize the status quo
 - Post-catastrophe financial relief reduces “loss creep”

3. Longer-term enhances resilience, as insurance recoveries are reinvested in infrastructure
 - Breaks the cycle of “getting by” living conditions: the program enables improvements
 - Creates the financial flexibility to respond to climate threats

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CFRI Leads to Comprehensive Resilience Planning

Illustration of the White Paper Study



1. **NFIP premium** per structure: **\$1,166**
2. **\$581** (average) per structure, at a **50-year standard of protection**, the current standard to which levees in the region are currently expected to be managed.
3. **\$313** (average) per structure, if purchased on a community-wide basis, with a nature-based mitigation that sets the levee standard of protection to **160-to-200-years**.
4. If purchased on a community-wide basis, bonding mechanisms may in some instances support the mitigation efforts, further accelerating the virtual cycle.

Acres targeted for "green infrastructure"	956
Easement or acquisition cost per acre	\$ 3,600
Cost of land easement or acquisition	\$ 3,441,600
<hr/>	
Cost of NFIP (community-wide)	\$ 1,370,610
Cost of CFRI (community-wide)	\$ 454,688
Savings from CFRI	\$ 915,923
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Savings from CFRI	\$ 915,923
BBB muni financing rate	1.50%
Bond supportable via savings	\$ 61,061,500

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Thanks For Your Attention!

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