



# Lunch & Learn

## Economics and Environment

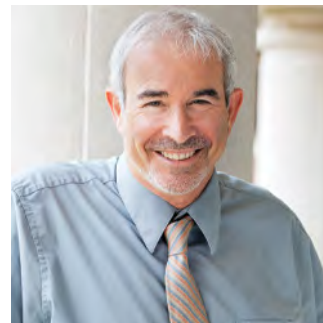
Presented by the Office of the Vice Chancellor for Research, the  
UNC Environmental Finance Center, & School of Government

# Economics and Environment Panel



## Panel Emcee: Erin Riggs

*Environmental Finance Center Executive Director*



## Donald Hornstein

*Aubrey L. Brooks Professor of Law, UNC School of Law*



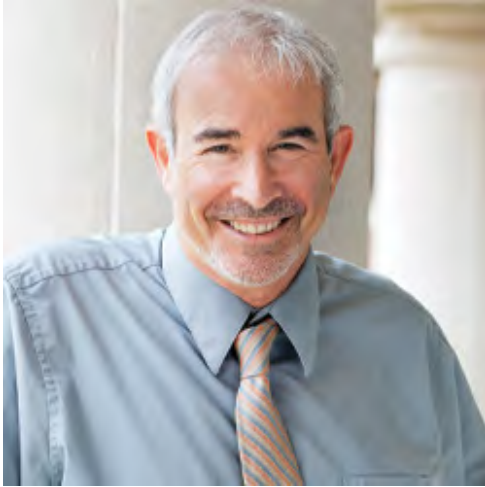
## Ric Colacito

*Professor of Finance, Sarah Graham Kenan Scholar, and Faculty Director of the Center for Excellence in Investment Management, Kenan-Flagler Business School*



## Siddhartha Roy

*Environmental Engineer and Research Associate, UNC Water Institute*



## Donald Hornstein

*Aubrey L. Brooks Professor of Law, UNC School of Law*

***Climate Adaptation – Is Insurance Part of the  
Solution or Part of the Problem?***

**Donald T. Hornstein  
Aubrey L. Brooks Distinguished  
Professor of Law**









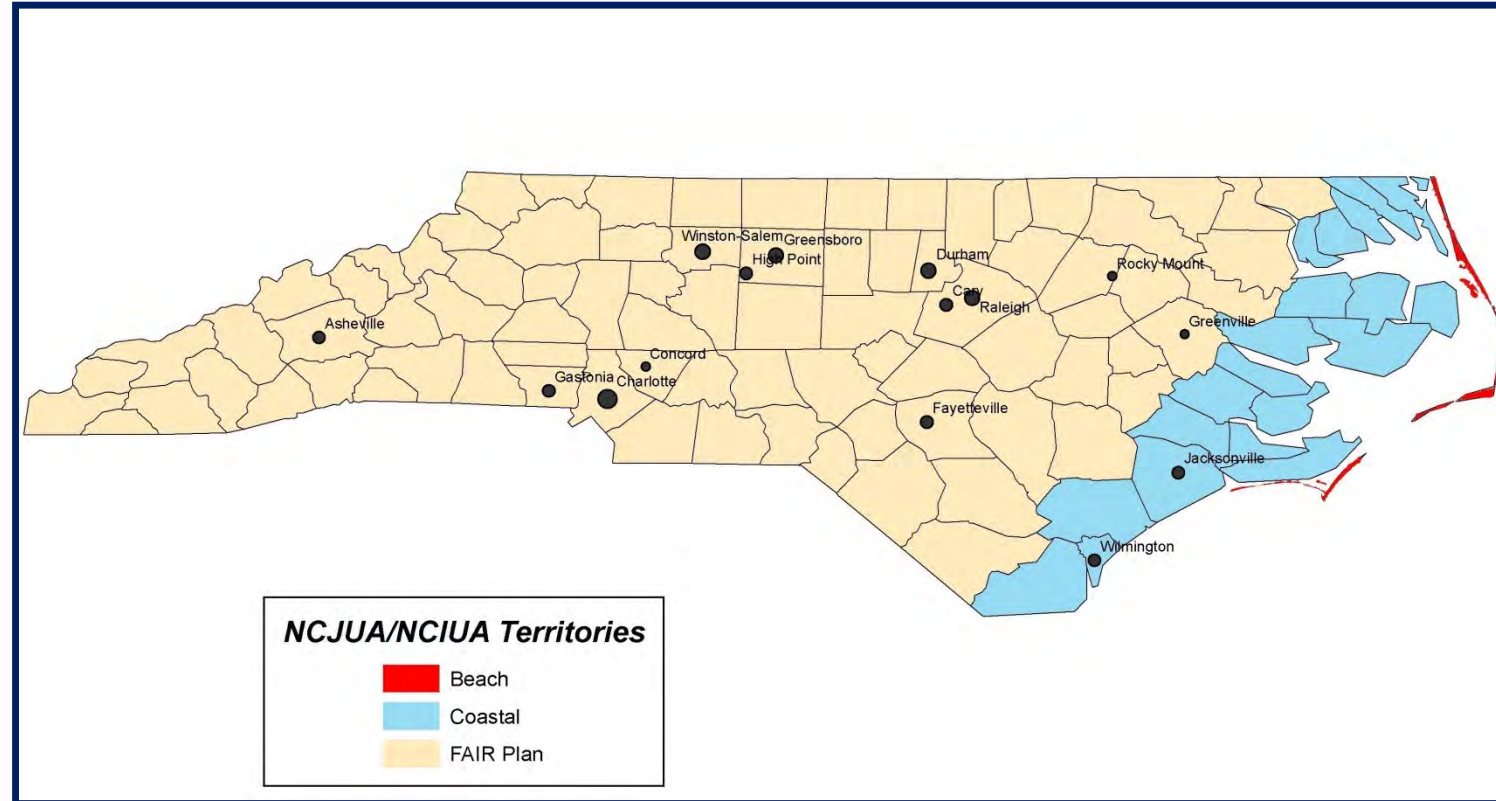






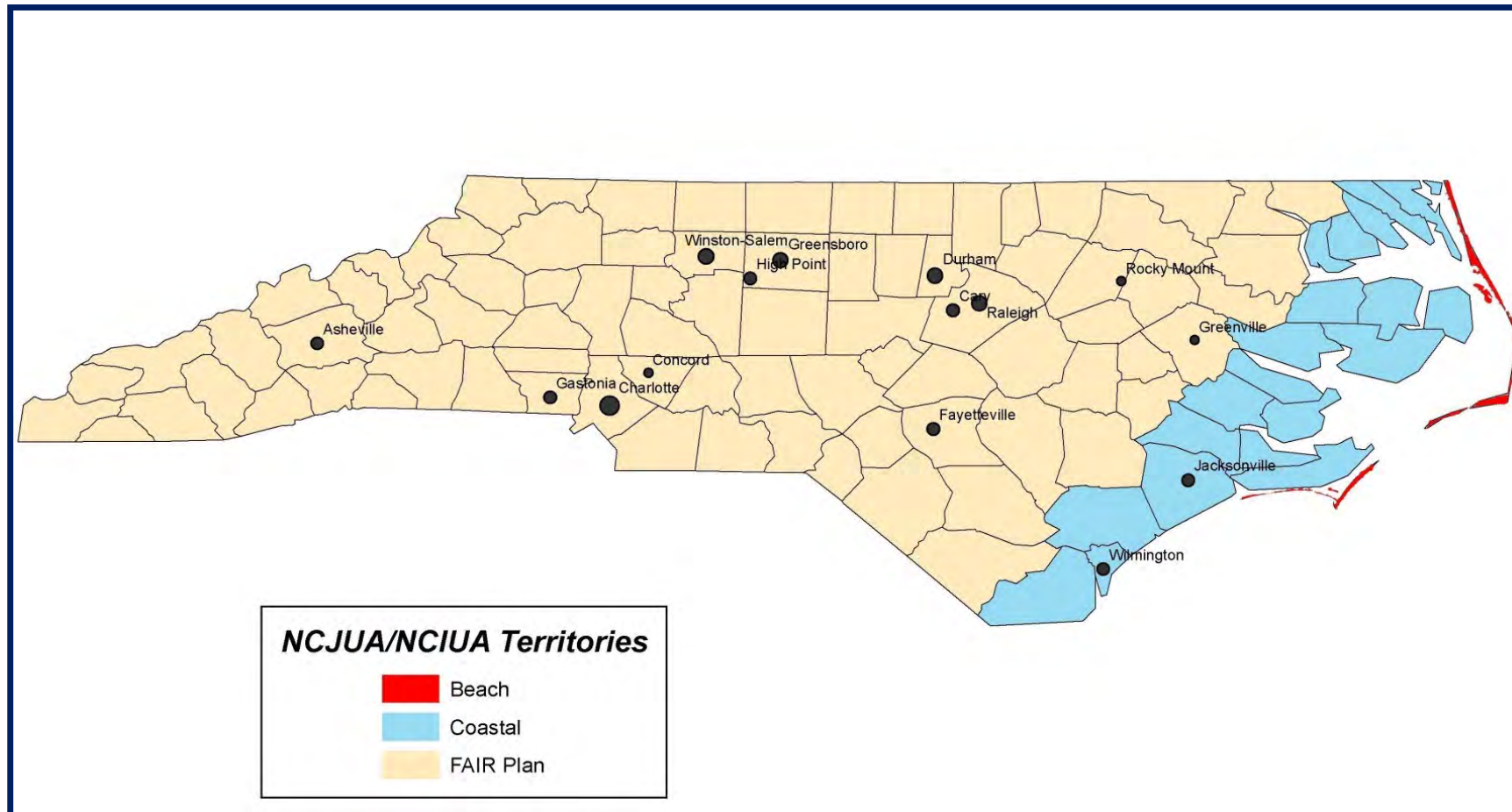


# NCIUA/Coastal Property Insurance Pool FAIR Plan Coverage Territories



Coastal Area is served by the Coastal Property Insurance Pool and the FAIR Plan. The FAIR Plan provides Dwelling Fire and Commercial Fire coverage forms.

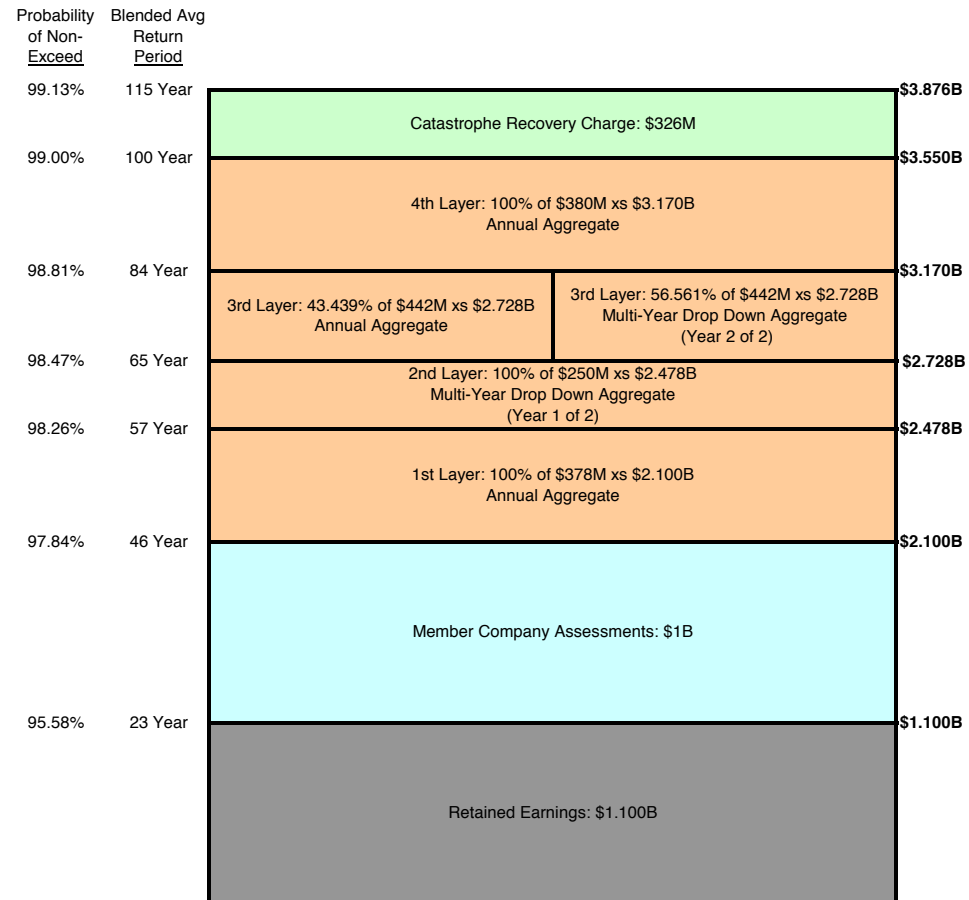
# Meet the NCIUA





# Meet the NCIUA, financially

NORTH CAROLINA INSURANCE UNDERWRITING ASSOCIATION  
2016 RISK FINANCING STRUCTURE

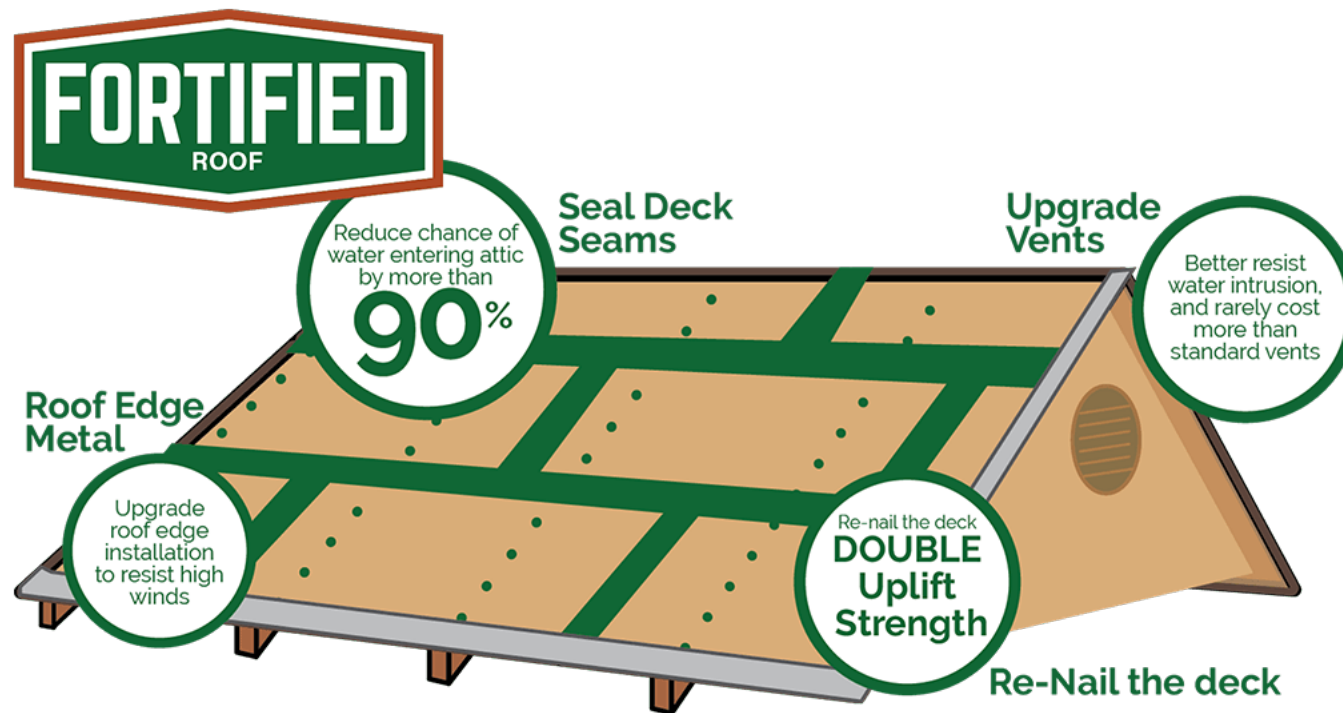


# Meet the IBHS





# Meet IBHS "Fortified" Roofs



# The Resiliency Value Proposition

\$50 million spent on IBHS Fortified Roofs

=

**\$67 million SAVED from lower losses and  
lower reinsurance costs**



# The results on the NC coast

We have re-roofed just under 10,000 houses in four years

We expect to re-roof approximately 5,000 more this year

Ours is the largest, single-insurer-led climate resiliency project in both the United States and the world

# Thank you!

Contact Donald Hornstein at  
[dhornste@email.unc.edu](mailto:dhornste@email.unc.edu)



## Siddhartha Roy

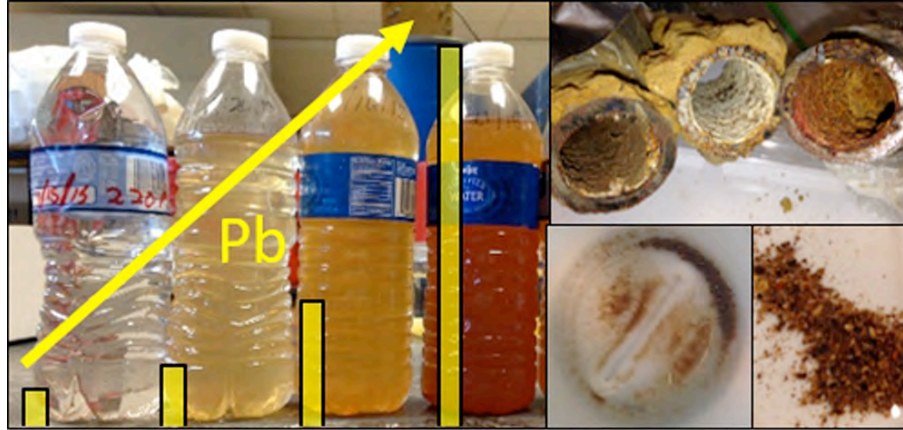
*Environmental Engineer and Research Associate, UNC  
Water Institute*



# Unintended Consequences of Negative Labeling During Environmental Emergencies: Lessons from the Flint, Michigan Water Crisis

Siddhartha Roy, UNC Water Institute

Co-authors: Keith J. Petrie, Greg Gamble, Marc A. Edwards

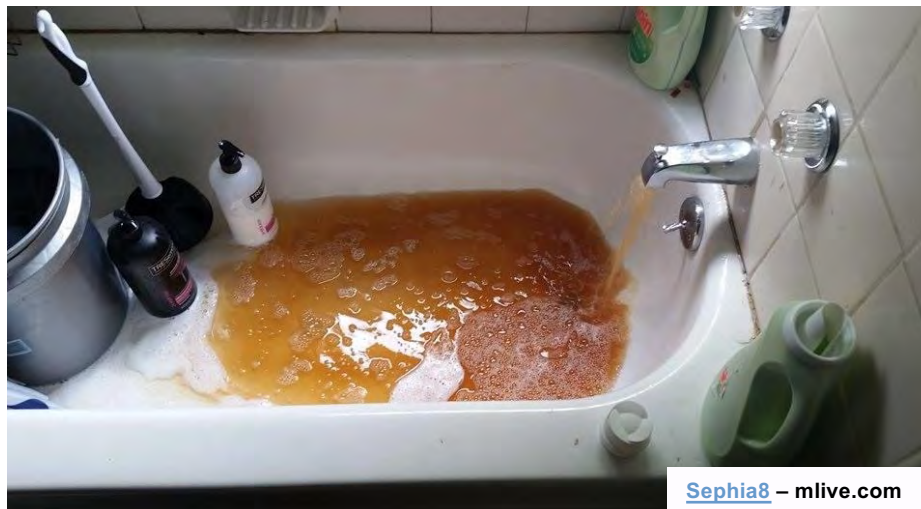


Flint Water Crisis “Ground Zero”



Regina H. Boone—Detroit Free Press/

# Flint, Michigan Water Crisis (April 2014-October 2015)

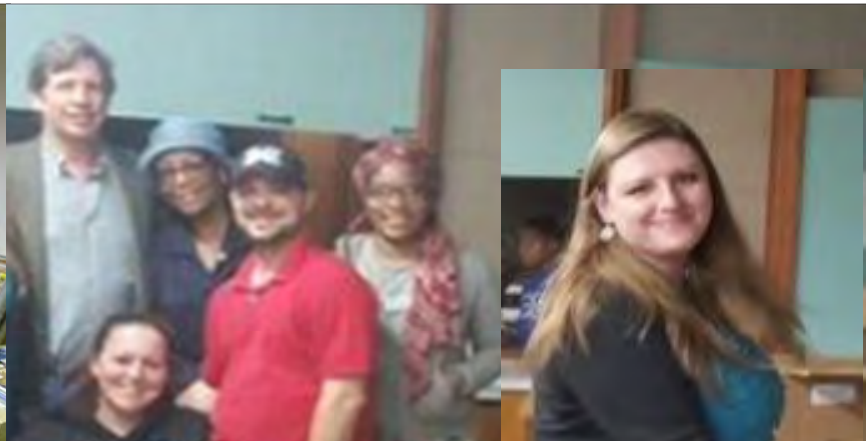


[Sephia8](#) – mlive.com



Sam Owens/AP





Aug 2015: Flint residents and Virginia Tech team (Marc Edwards PI) sampling 269 homes.

**LEAD LEVELS EXCEEDED**  
**FEDERAL STANDARDS**

*Pieper et al., ES&T, 2018*







*Off the Charts*



REUTERS INVESTIGATES

## The thousands of U.S. locales where lead poisoning is worse than in Flint

By [M.B. Pell](#) and [Joshua Schneyer](#) | Filed Dec. 19, 2016, 2 p.m. GMT

A Reuters examination of lead testing results across the country found almost 3,000 areas with poisoning rates far higher than in the tainted Michigan city. Yet many of these lead hotspots are receiving little attention or funding.

"All the News  
That's Fit to Print"

# The New York Times

Late Edition

Today, some sunshine, turning cloudy, a bit of rain late, high 57. Tonight, periodic rain, turning colder, low 34. Tomorrow, windy, a colder day, high 40. Weather map, Page B8.

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\$3.00



BRITTANY GRASSMAN FOR THE NEW YORK TIMES

Nakiya Wikes's son, Jaylon, has had 30 suspensions. "Soon, you're going to have to suspend the whole school system," she said.

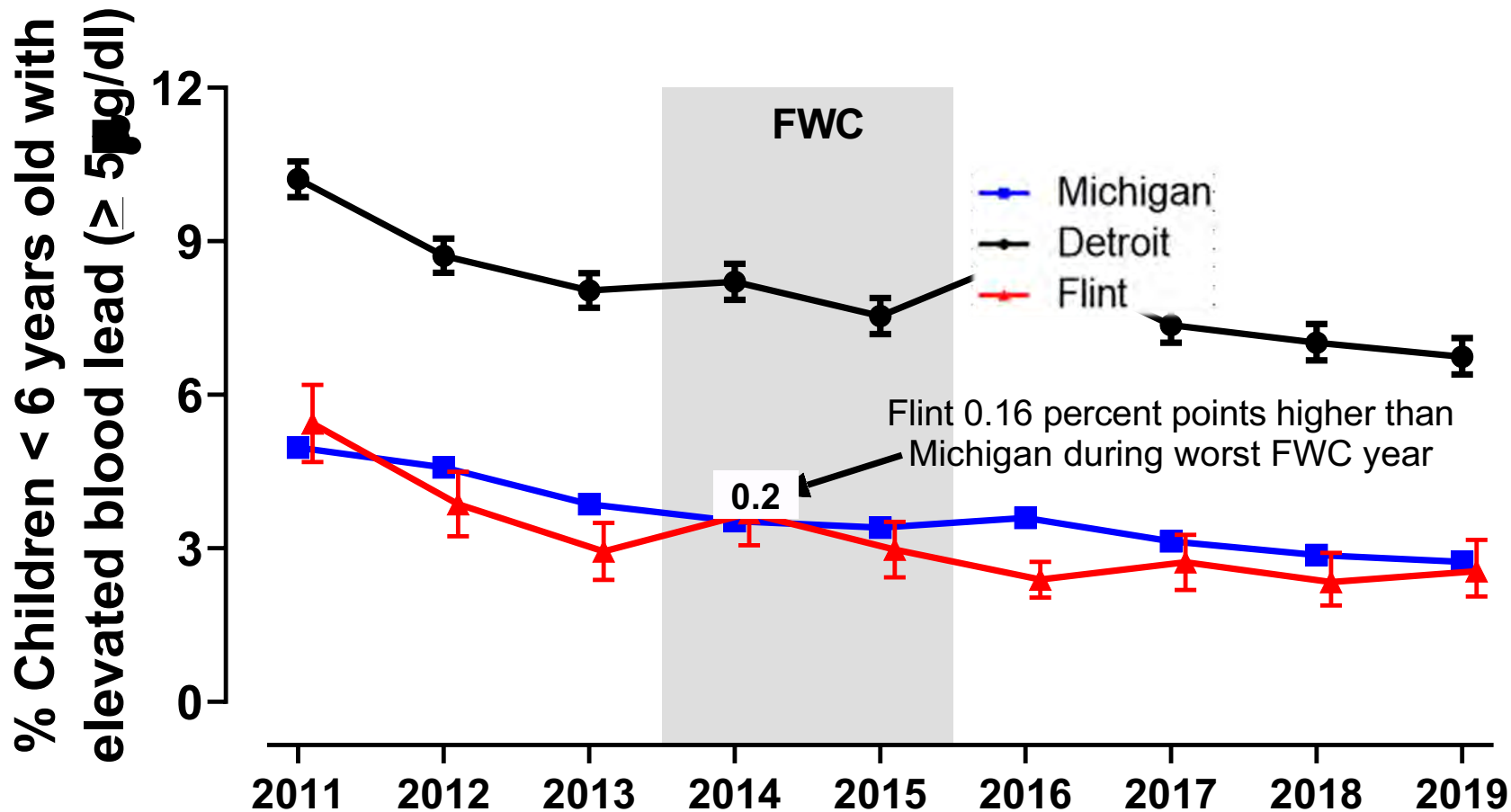
## *A Legacy of Poisoned Water: 'Damaged Kids' Fill Flint's Schools*

# **Lead exposure from water → increase in special education enrollment**

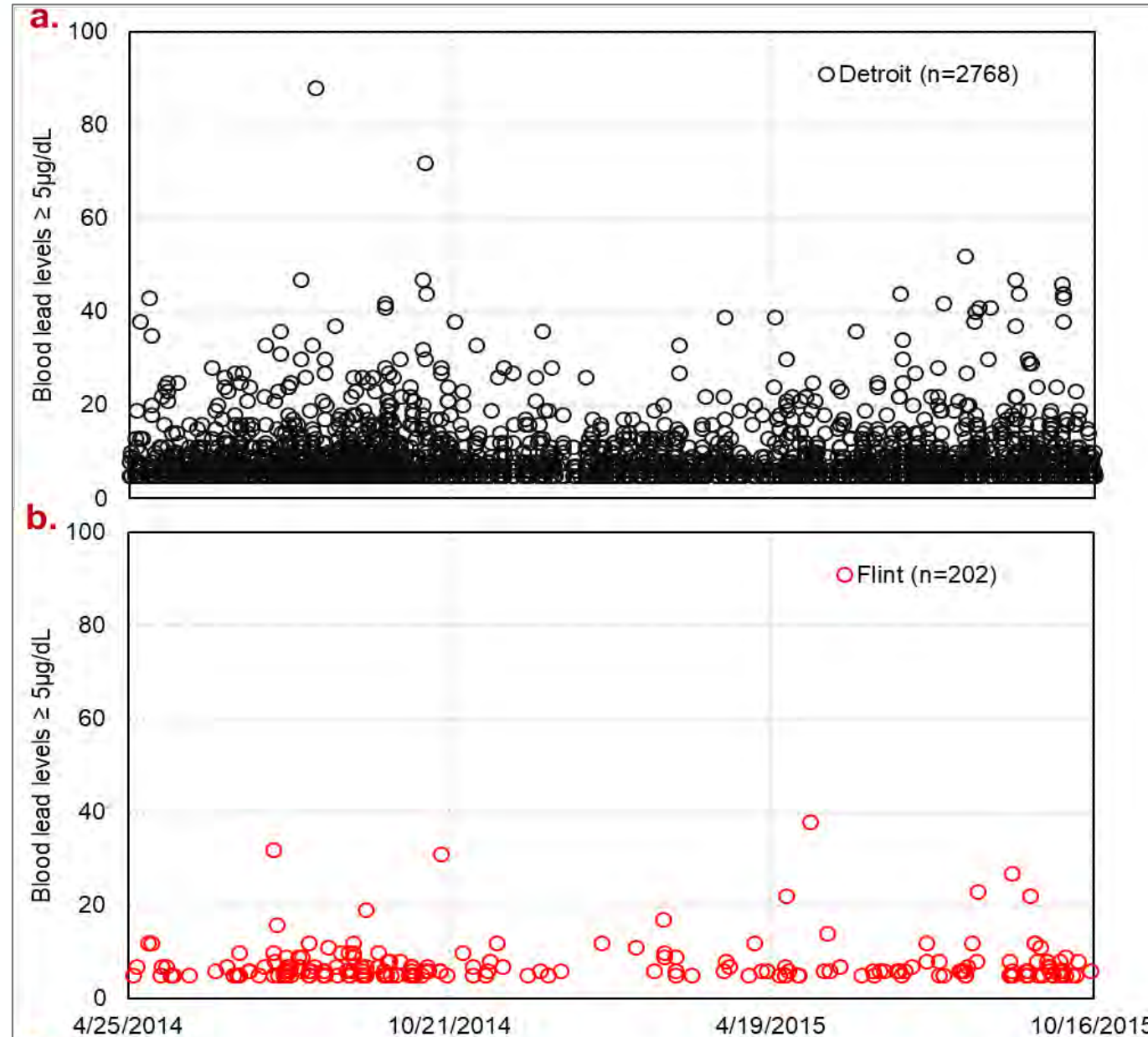
Core message from NYT and 60 Minutes reporting



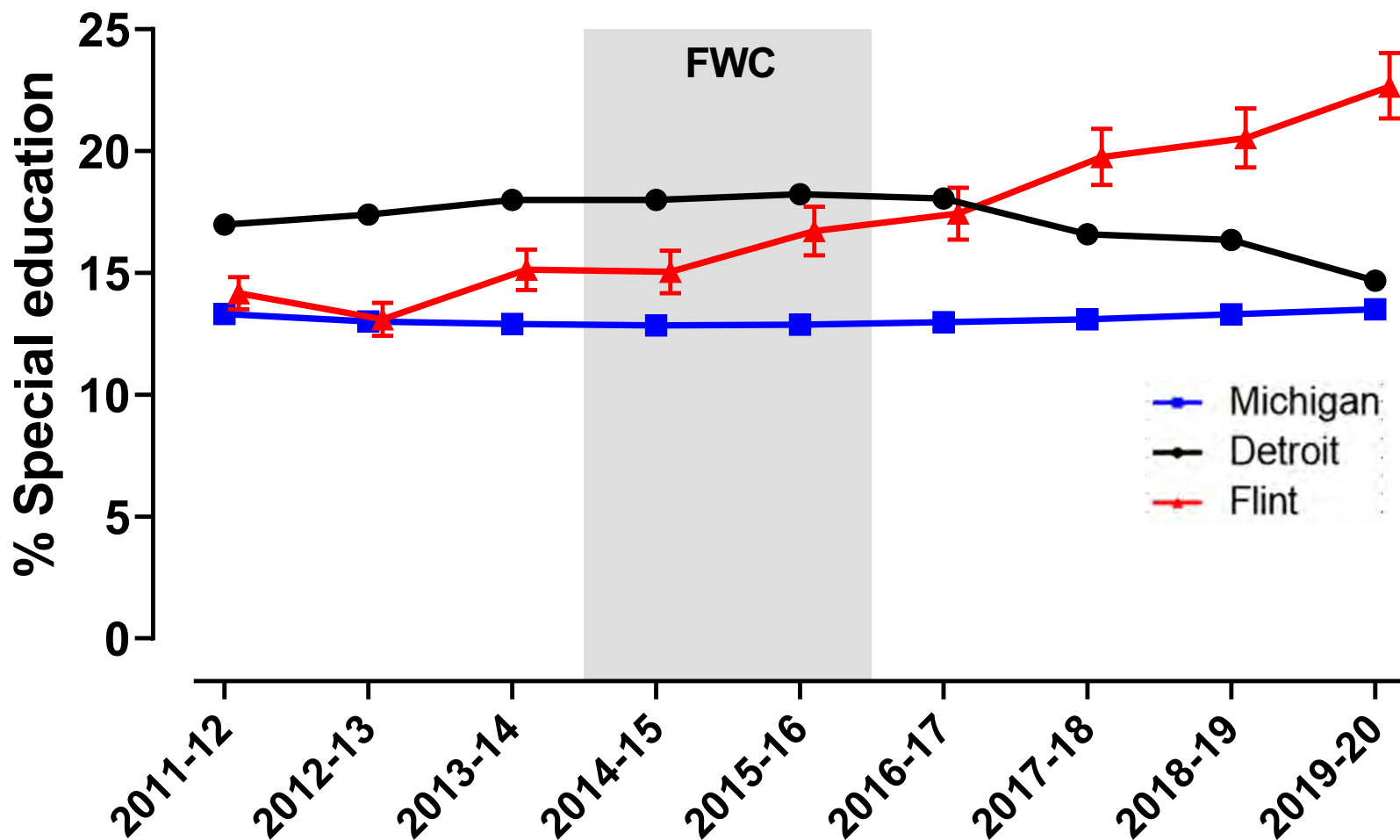
Measure`	Flint	Detroit (Control)
Water source	1950s-Apr 2014	
	Lake Huron	Lake Huron
	Apr 2014-Oct 2015	
	<b>Flint River</b>	Lake Huron
	Oct 2015 – present	
	Lake Huron	Lake Huron
Population < 5 years old, %	7.6%	7.3%
Employment Rate, %	41.3%	44.6%
Median household income, 2014-18 (2018 dollars)	\$27,717	\$29,481
Health outcomes, overall rank in Michigan	82 of 83 (Genesee Co.)	83 of 83 (Wayne Co.)
Poverty rate	40.4%	36.4%
Worst American city to live in, rank	#1	#3
Total Crime rate per 100,000 (2018)#	12,942.1	13,610.8
% decline in total students attending public schools in 10 years	43.1%	68.4%
% of total resident students attending charter schools, 2018-19	45.6%	37.9%



Flint kids' blood lead always much lower than Detroit kids and statistically indistinguishable from Michigan average during crisis.

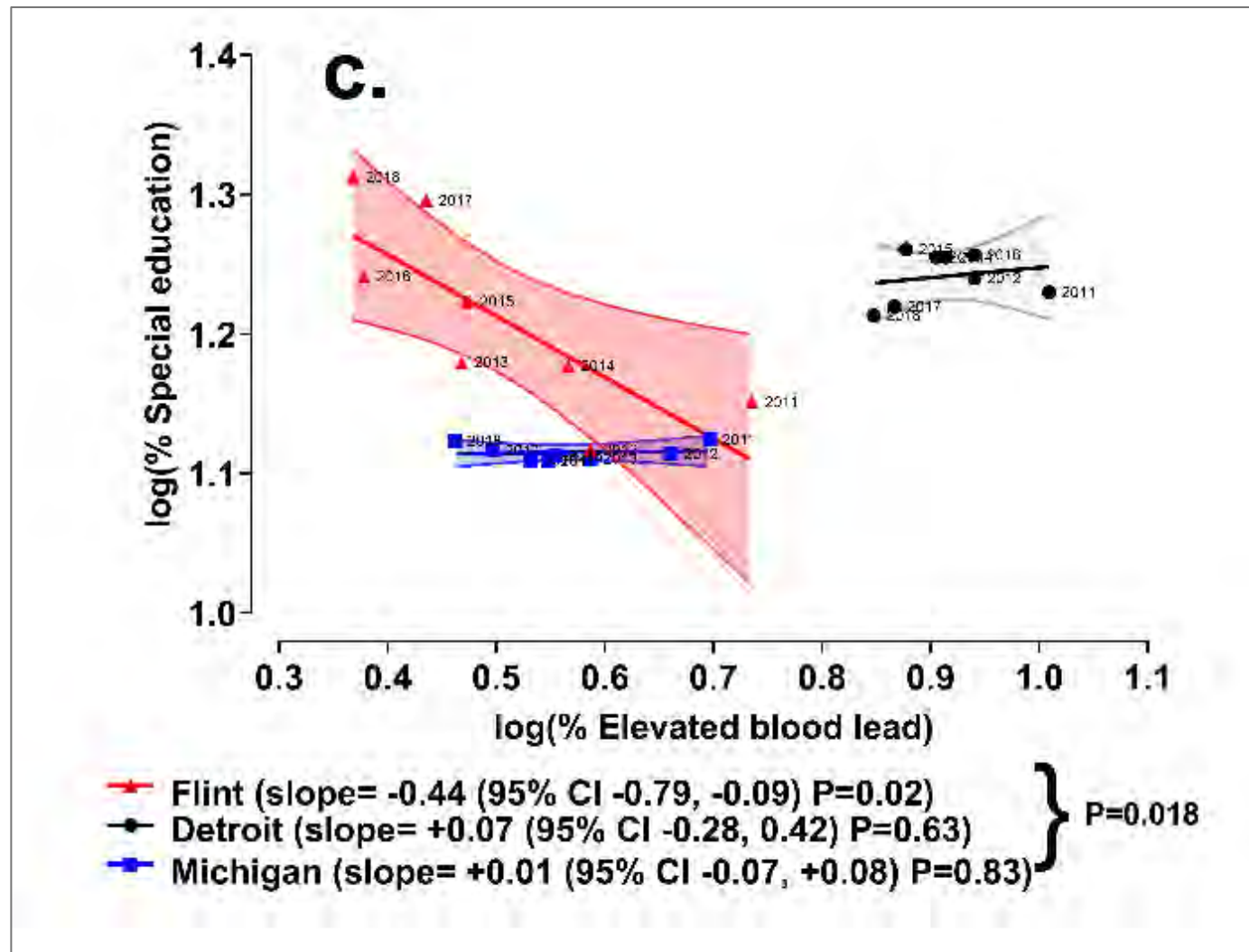






As Flint kids blood lead went down

special education went up



# What Else Could Be Responsible?

## Confounders evaluated:

- Waterborne contaminants besides lead
- Poverty
- Poor nutrition (SNAP)
- City of Flint emergency manager decisions
- Flint Community Schools' funding and policies



TIME

**The  
Poisoning  
Of An  
American City**



Toxic water. Sick kids.  
And the incompetent  
leaders who betrayed Flint  
*By Josh Sanburn*

# The 1930s Monster Study on Orphans



Told they stuttered, even if they did not.



**Five of the six children that were normal speakers, developed speech problems.**

Praised for speaking well, even if they were actually stuttering.



**No significant change.**



*'39 Experiment On  
Stuttering Draws Lawsuit*

Aug. 6, 2003 (New York Times)

*Orphans Studied in 1939  
Stuttering Experiment Settle  
Lawsuit for \$925,000*

January 2015 Fox News



# Nocebo Effect



Sketchplanations.com

- Negative expectations around a drug, treatment or exposure cause real, physical, and sometimes long-lasting symptoms
- Following exposure to real or perceived high levels of environmental toxins

## Exemplar Local and National Media Coverage (2016-21)

The media has noted **“brain damaged”** children feeling **“neglected, disposable”** and demonstrating **“inexplicable”** behaviors that resulted from **“prolonged,”** **“widespread,”** **“horrifying”** and **“unyielding”** impact of being **“poisoned”** from water.

# Messages Sent\* to Children (2016-23; select examples)

“In five years, these kids are going to have problems with special education [...] **cognition** problems. [7-10] years, they're going to have **behavioral problems**” – Pediatrician

An “**evolving, educational emergency,**” [...] “**threat of significant disability**” to “**Flint's youngest students**” - Former school superintendent

Children are “**at risk of developing a disability, or already have a disability**” and “face an unprecedented educational and civil rights disaster” – Class action lawsuit filing (\$641 million settlement)

“They are killing us ... they killed us. We are an invisible people ... and we don't matter.”

\*By parents, scientists, professors, celebrities, lawyers, clergy, teachers and the media



# Message Received by Flint Children

“Am I going to die?” - 6th grader

The principal said, don't wash your hand if you have a cut. – Flint child

“It's depressing. I don't think [the lead in Flint water situation] is ever going to change” – 15 year old

“Well, they said I'm not going to be smart anyway” – Flint boy “acting out” in school

“I think it's genocide.” – Flint 11<sup>th</sup> grader

“[Flint] kids are internalizing the messages about how the lead is affecting them”

The New Yorker, 2017

# Poisoned? Indeed.

Opinion

**The Children of Flint  
Were Not 'Poisoned'**

v.

**The Flint Children  
Were Indeed 'Poisoned'**



**The New York Times**

Jul 2018

# 2017: Alternative Spring Break to Reach 1000+ Flint Children



- ***“My students believe that they were poisoned, that they have no control over their behaviors and that they will never recover from lead exposure.”***
- ***“We have a school district where all that’s left are damaged kids who are being exposed to other damaged kids, and it’s causing more damage”***

Flint teachers quoted in NYT and NPR and teachers survey (MI Radio)



# EARLY RESULTS FROM 174 FLINT CHILDREN EXPOSED TO LEAD DURING WATER CRISIS SHOWS 80% OF THEM WILL REQUIRE SPECIAL EDUCATION SERVICES

*Five years ago, lead seeped into the tap water in Flint, Michigan, while state and local officials said everything was fine. Now, the same doctor who proved something was wrong is taking the first comprehensive look at the thousands of kids exposed to lead in Flint.*

2020:  
MAR 15

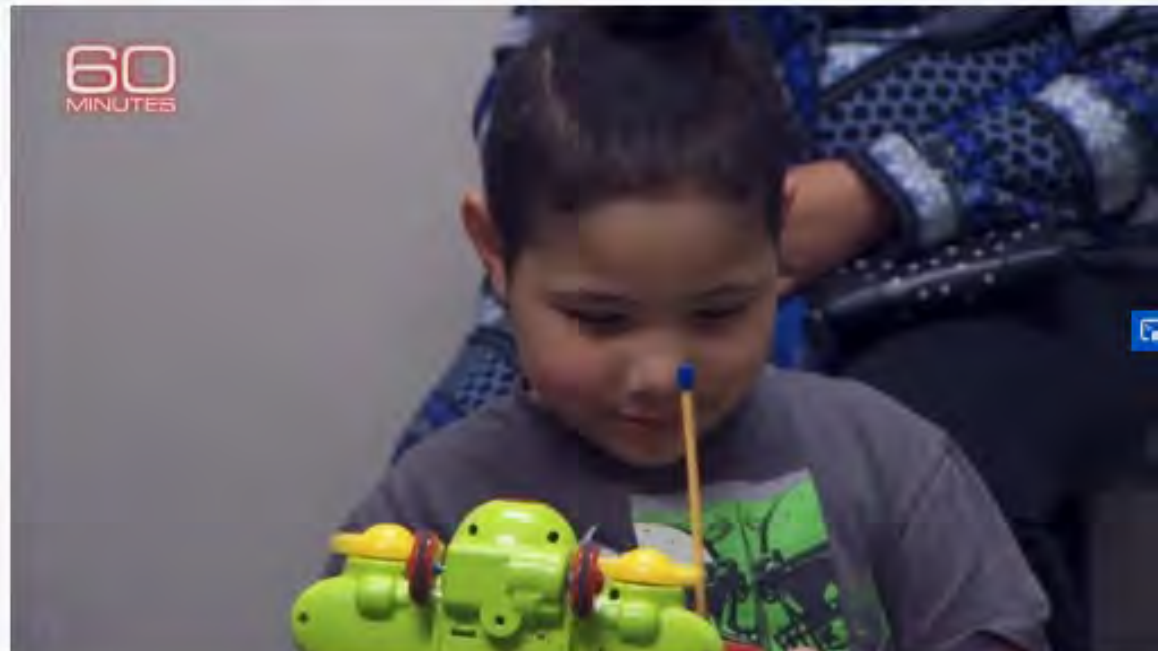
CORRESPONDENT  
SHARYN ALFONSI

FACEBOOK  
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TWITTER  
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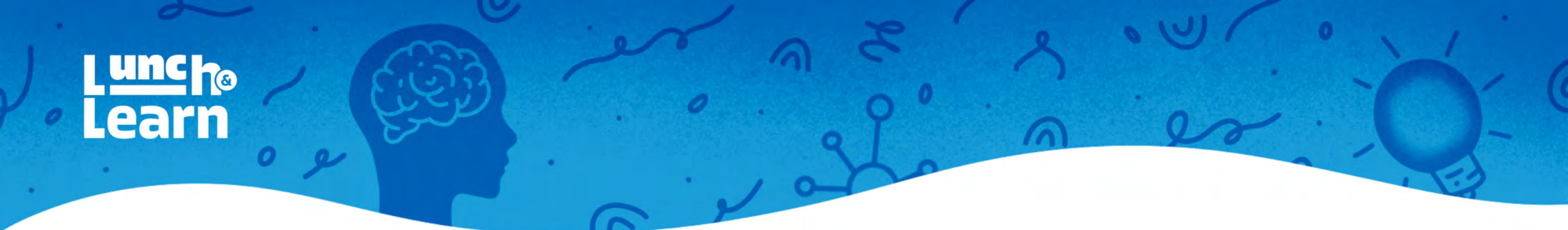
REDDIT  
r

FLIPBOARD  
f



New center screening  
Flint children for  
learning disabilities  
(80% diagnosis rate).

TV broadcast =  
10+ million audience



# Lead exposure from water $\neq$ increase in special education enrollment

An entire generation of children repeatedly told they are “lead poisoned” and “brain damaged” – the message was likely internalized – and we are witnessing a self-fulfilling prophecy play out.

# Hypothetical HUMAN SUBJECTS IRB PROPOSAL

Telling vulnerable children of Flint, MI\* that they are poisoned/damaged/cannot learn no matter what the actual exposure was.

\*poorest city in America (majority minority population)



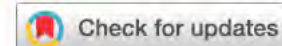
If you work with, talk to or about, or are from underserved communities and truly vulnerable populations experiencing environmental issues:

**Remember nocebo.**

**Erroneous, negative (media) labels can be internalized and lead to psychological harm, especially in children.**



Research Articles



## **Did a Nocebo Effect Contribute to the Rise in Special Education Enrollment Following the Flint, Michigan Water Crisis?**

Siddhartha Roy<sup>1,2</sup> , Keith J. Petrie<sup>3</sup> , Greg Gamble<sup>4</sup> , Marc A. Edwards<sup>1</sup> 

<https://cpe.psychopen.eu/index.php/cpe/article/view/9577>

Funding: US Environmental Protection Agency, Spring Point Partners

[sidroy@unc.edu](mailto:sidroy@unc.edu)

# Thank you!

Contact Siddhartha Roy at [sidroy@unc.edu](mailto:sidroy@unc.edu)  
Twitter/X: [@siddharthaxroy](https://twitter.com/siddharthaxroy)





## Ric Colacito

*Professor of Finance, Sarah Graham Kenan Scholar, and  
Faculty Director of the Center for Excellence in Investment  
Management, Kenan-Flagler Business School*

# About Me and My Agenda



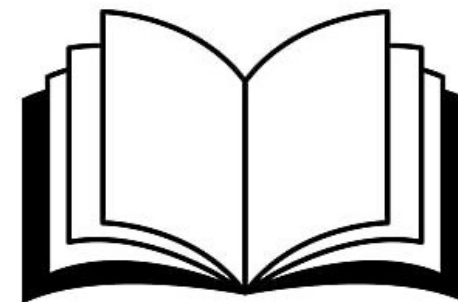
## Academic Background:

Macroeconomics &  
Finance



## Research Focus:

How do long-run global  
risks affect  
macroeconomic  
outcomes and asset  
prices?

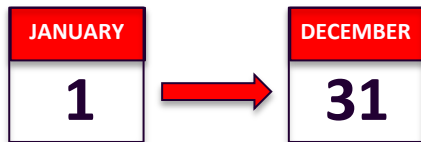
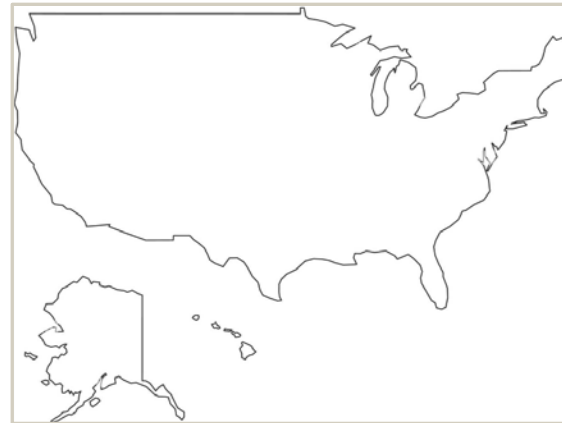


## Two papers:

What is the effect of  
rising temperatures on  
US GDP growth?

What is the effect of  
attention to climate  
change on exchange  
rates?

# Regressions of GDP Growth Rate on Temperature



Est Impact: -0.39  
(SE) (0.38)



-0.03 (0.33)   -0.41 (0.39)   -0.04 (0.29)   -0.07 (0.18)



-0.00 (0.07)   -0.15 (0.07)   0.10 (0.06)   0.00 (0.05)

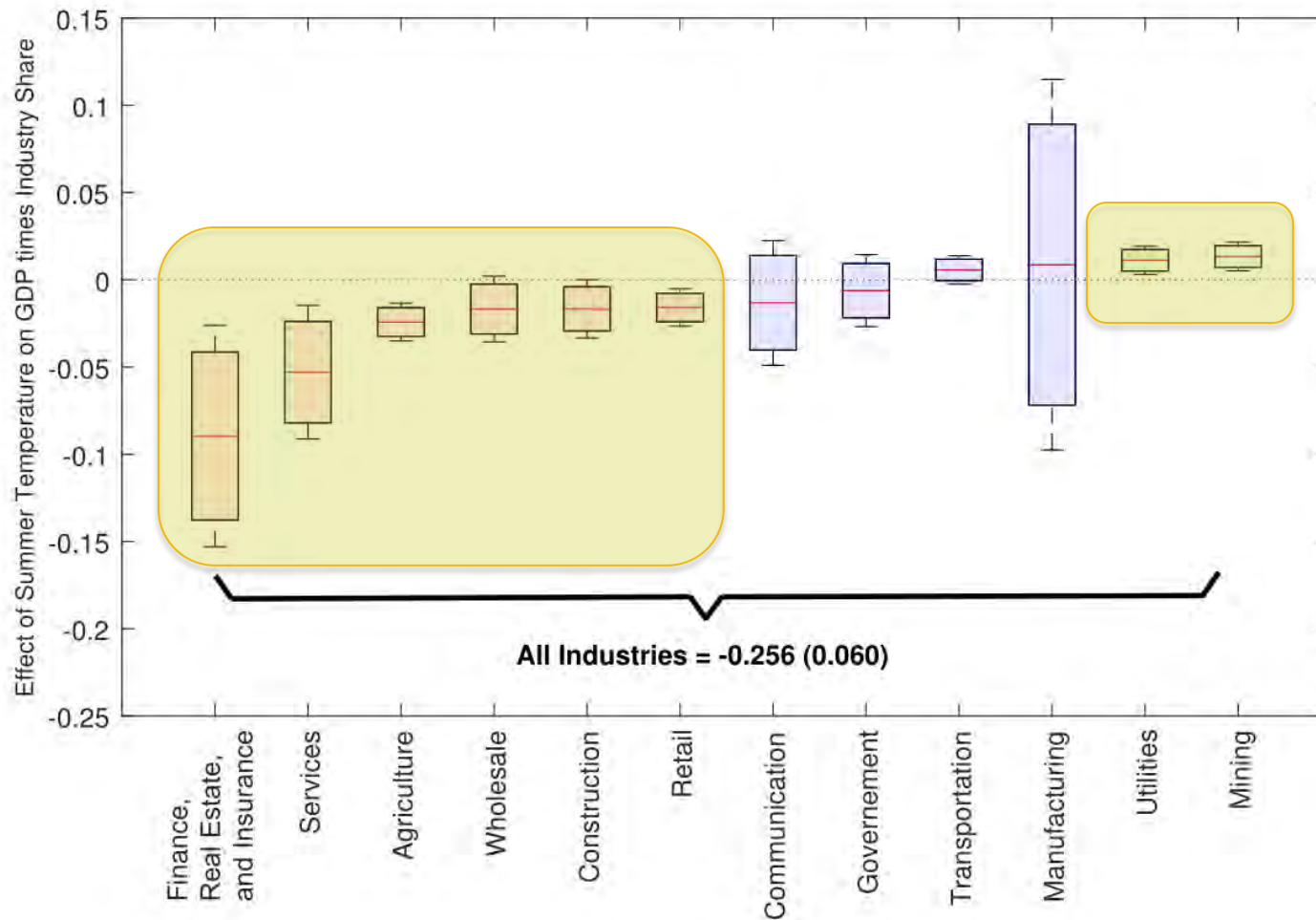
A 1° F increase in summer temperature is associated with a reduction in the annual growth rate of output of 0.15 pp



# Summer Effects are Largest in the South

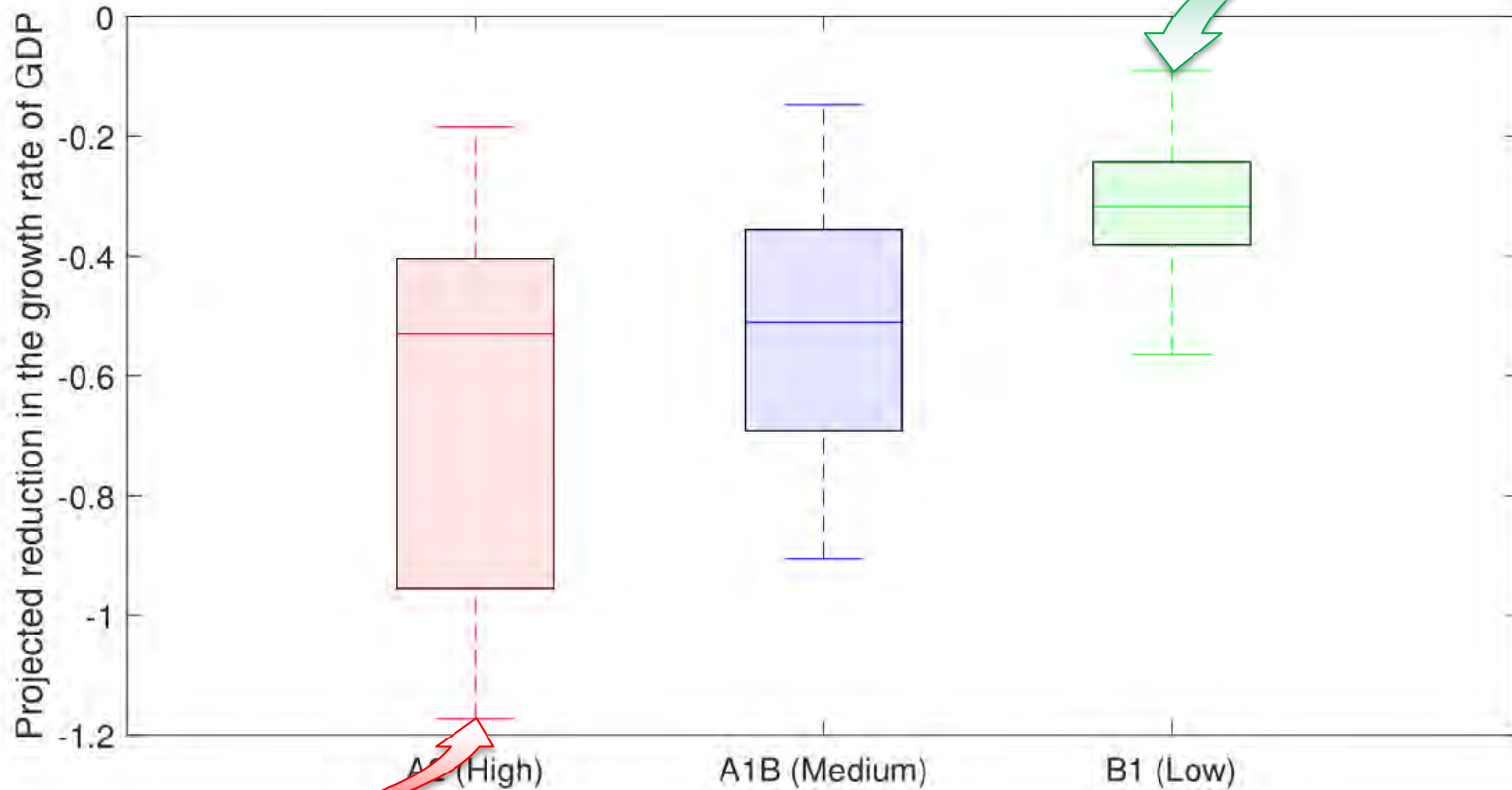


# Not Just Agriculture



- Sectors with negative impact account for more than 1/3 of total US GDP
- Small number of sectors with positive impact

# Projected GDP Growth Reduction in 100 Years

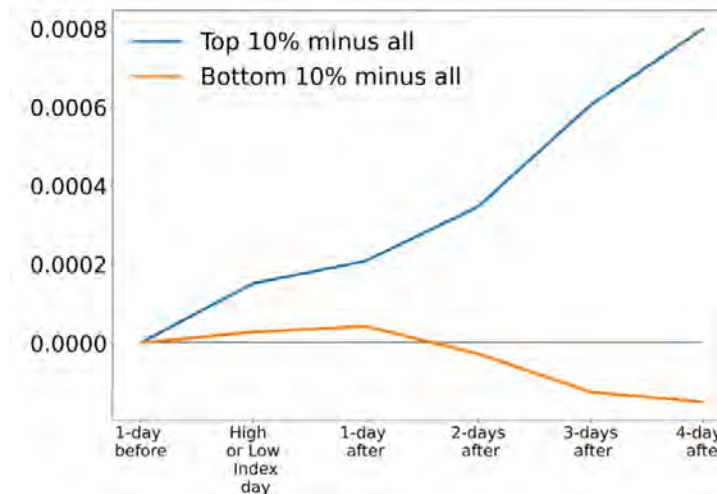
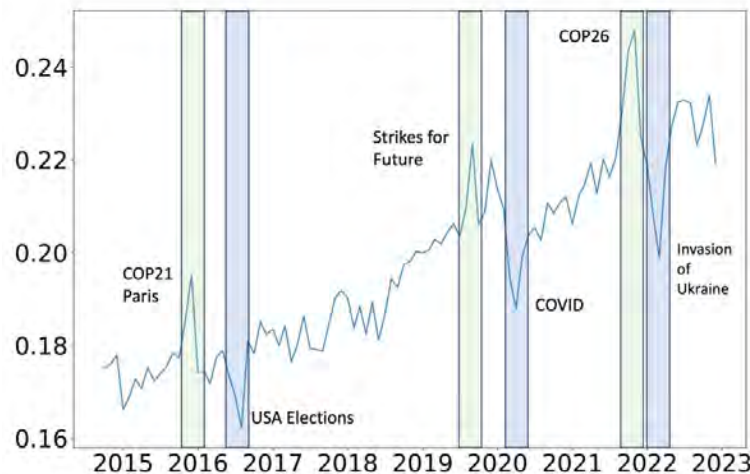
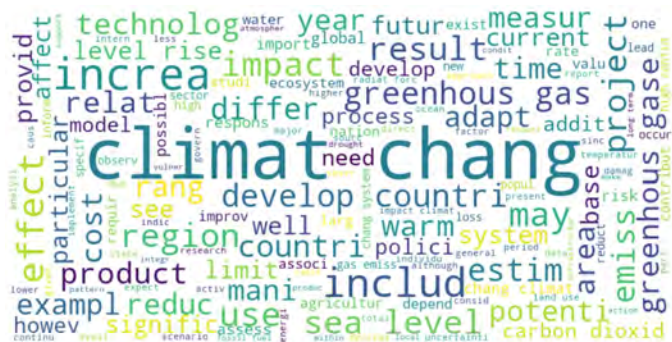


**Worst case scenario:**  
loss of about 1/3 of  
annual growth

**Best case scenario:**  
negligible loss of  
economic growth



# Climate Attention and Currencies



Build a corpus of authoritative texts about climate change

Construct a global climate attention index by comparing the news content from Twitter posts from official newspaper accounts in 27 countries

Currencies of countries with high exposure to global climate index appreciate following a spike in attention

# Thank you!

Contact Ric Colacito at [ric@unc.edu](mailto:ric@unc.edu)

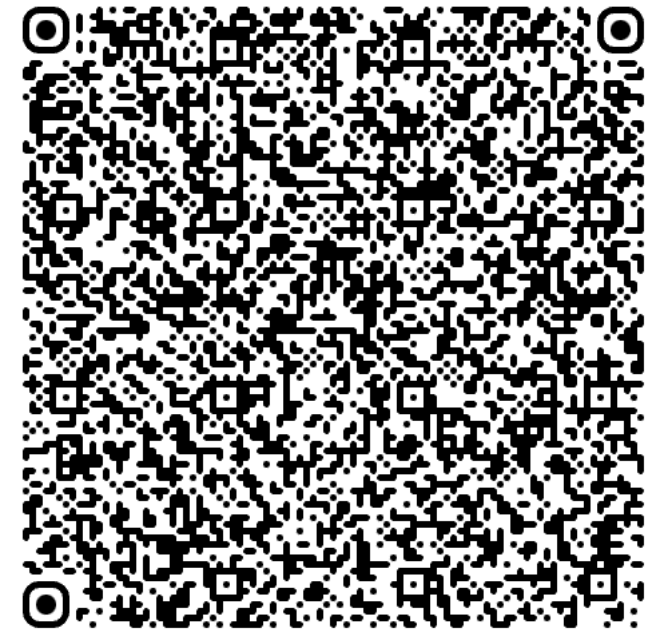
Website: [drric.web.unc.edu](http://drric.web.unc.edu)

UNIVERSITY  
**Research**  
WEEK

# Lunch & Learn

 **UNC** | RESEARCH

Thank you for  
participating in this Lunch  
& Learn presentation



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