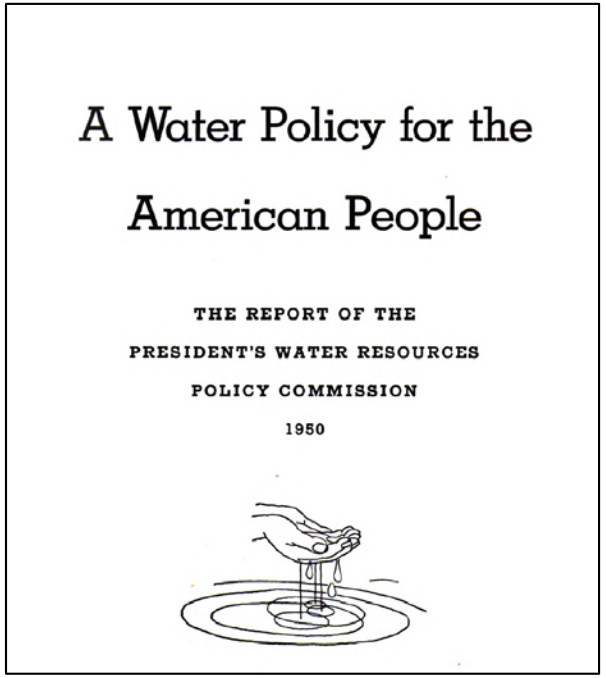
A Water policy for the American People – *Revisited*

Martin Doyle
Lauren Patterson
Erika Smull



Duke
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ENVIRONMENT

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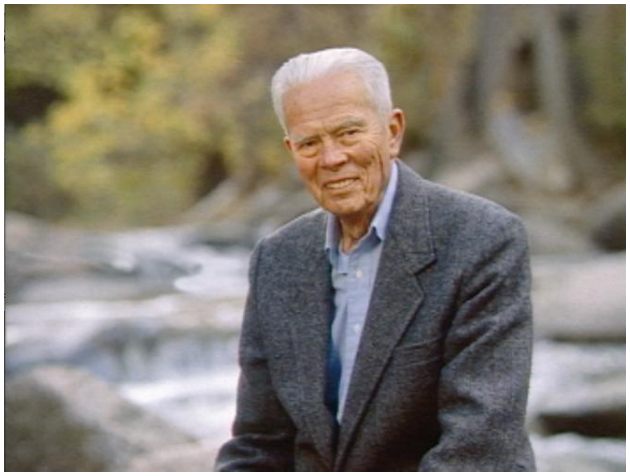
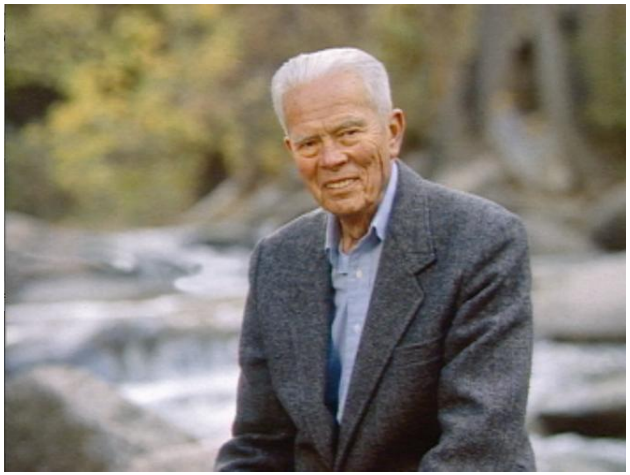
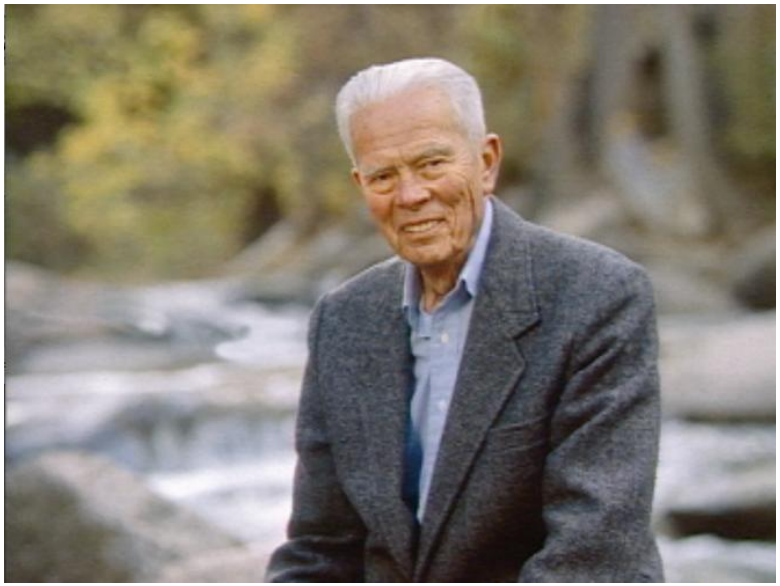




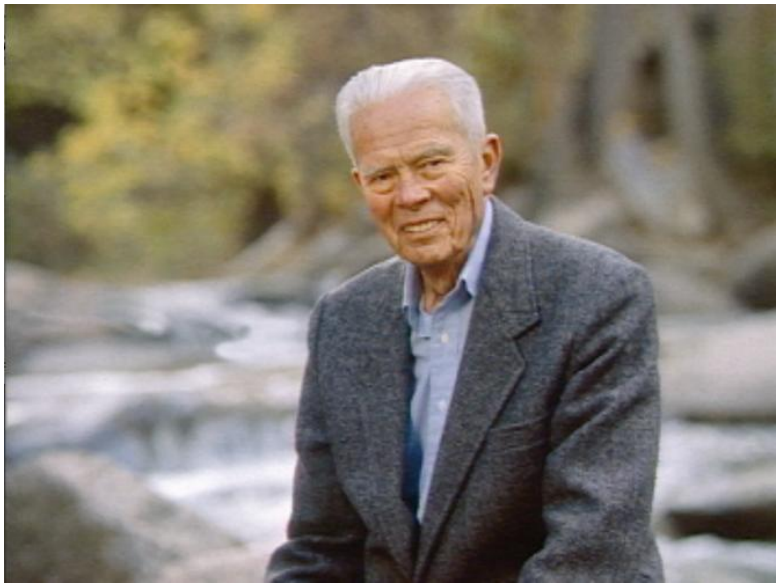
Dawn Wright
Chief Scientist
Esri, Inc.

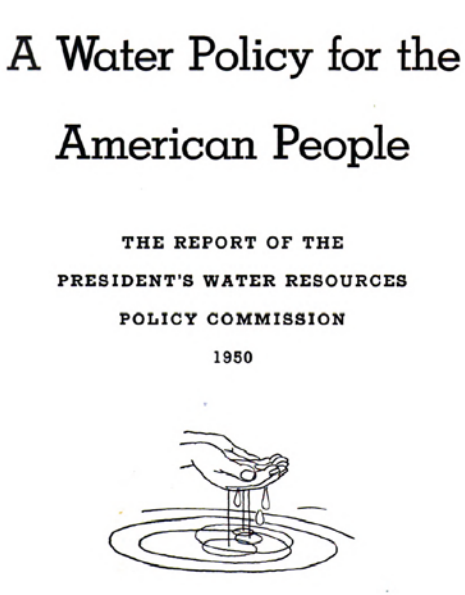
Budhu Bhaduri
Geospatial Science & Human Security,
Oak Ridge National Lab



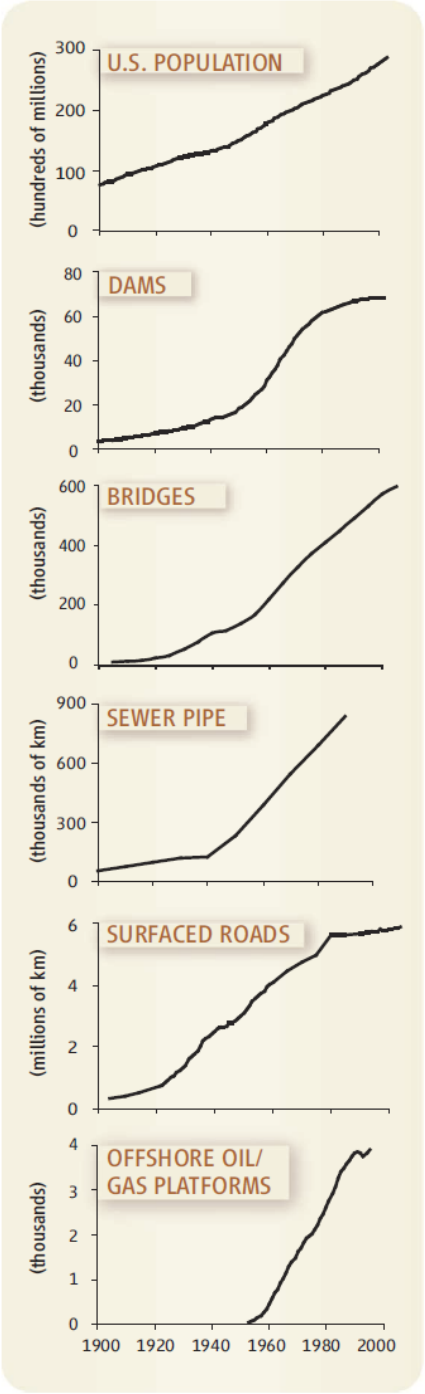
A Water Policy for the American People

THE REPORT OF THE
PRESIDENT'S WATER RESOURCES
POLICY COMMISSION
1950





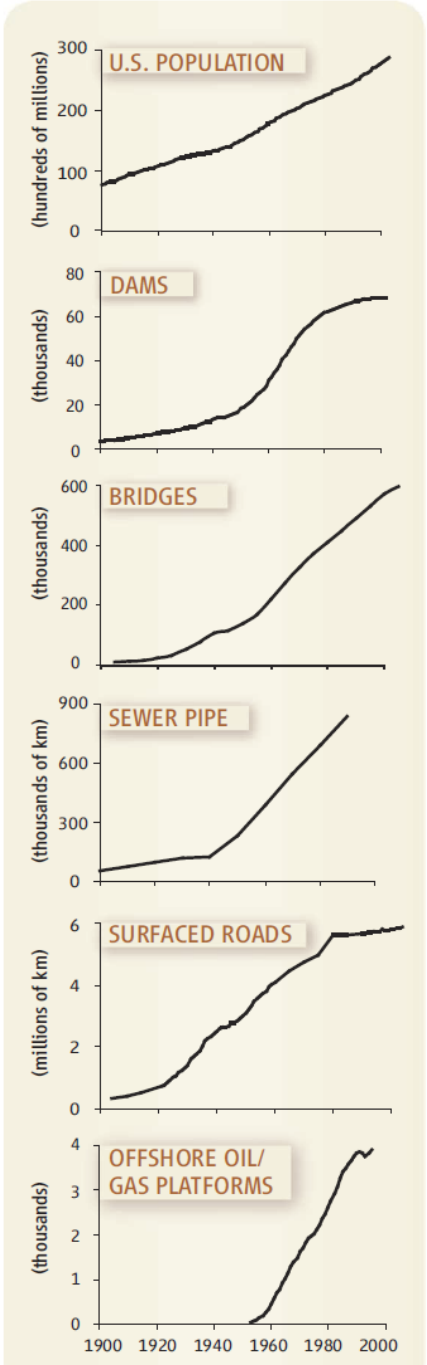
"The broad assumption on which this report is based is that of an expanding economy. … We have achieved, and expect to achieve in the future, a constantly rising standard of living for a growing population."



1950 – 1980 – Era of Building

Doyle et al. 2008, Science

1950 – 1980 – Era of Building



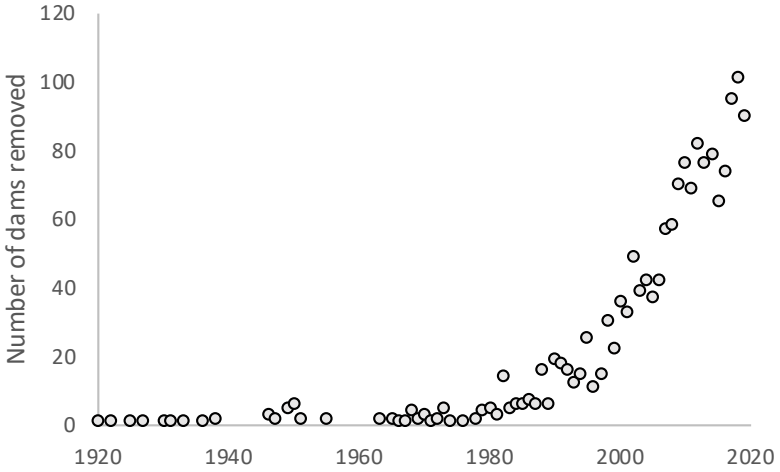
Doyle et al. 2008, Science

"The rise of water resources policy to meet ever-changing conditions provides one of the great examples of the effectiveness of a democratic society in meeting the widely varying needs of its people."

- President's Commission, 1950

Glen Canyon Dam, US Bureau of Reclamation

1970 – 2010: Era of Conservation and Restoration



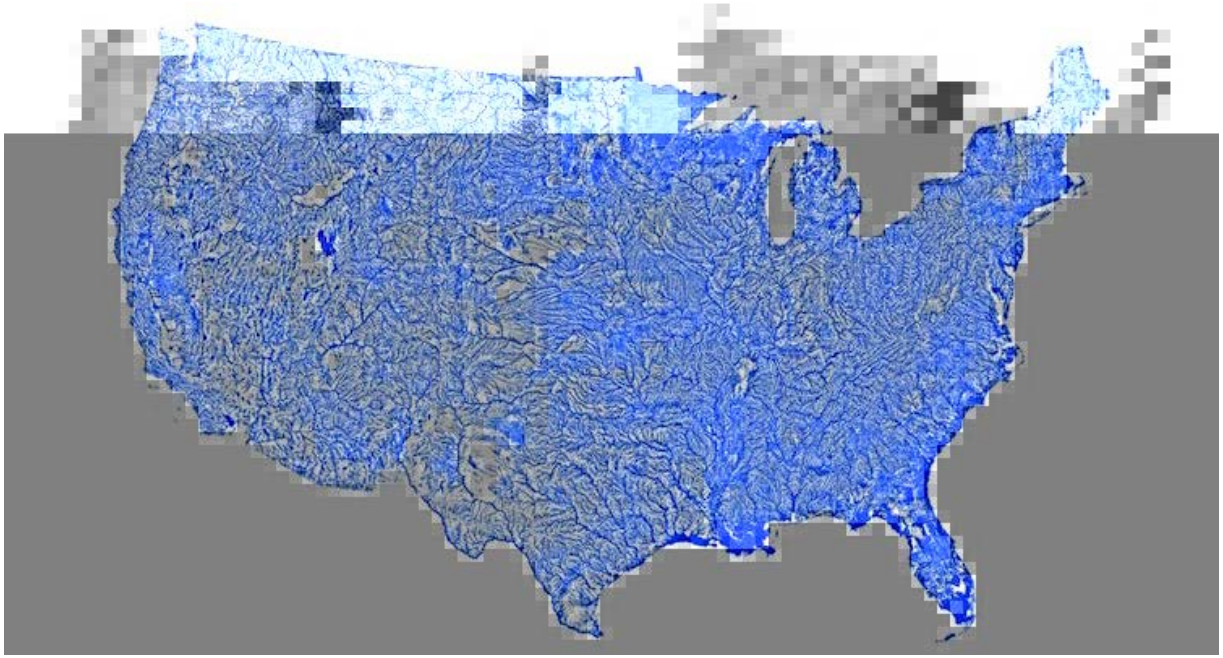
"The rise of water resources policy to meet ever-changing conditions provides one of the great examples of the effectiveness of a democratic society in meeting the widely varying needs of its people."

- President's Commission, 1950

Elwha Dam Removal, National Geographic
Dam removal data: American Rivers

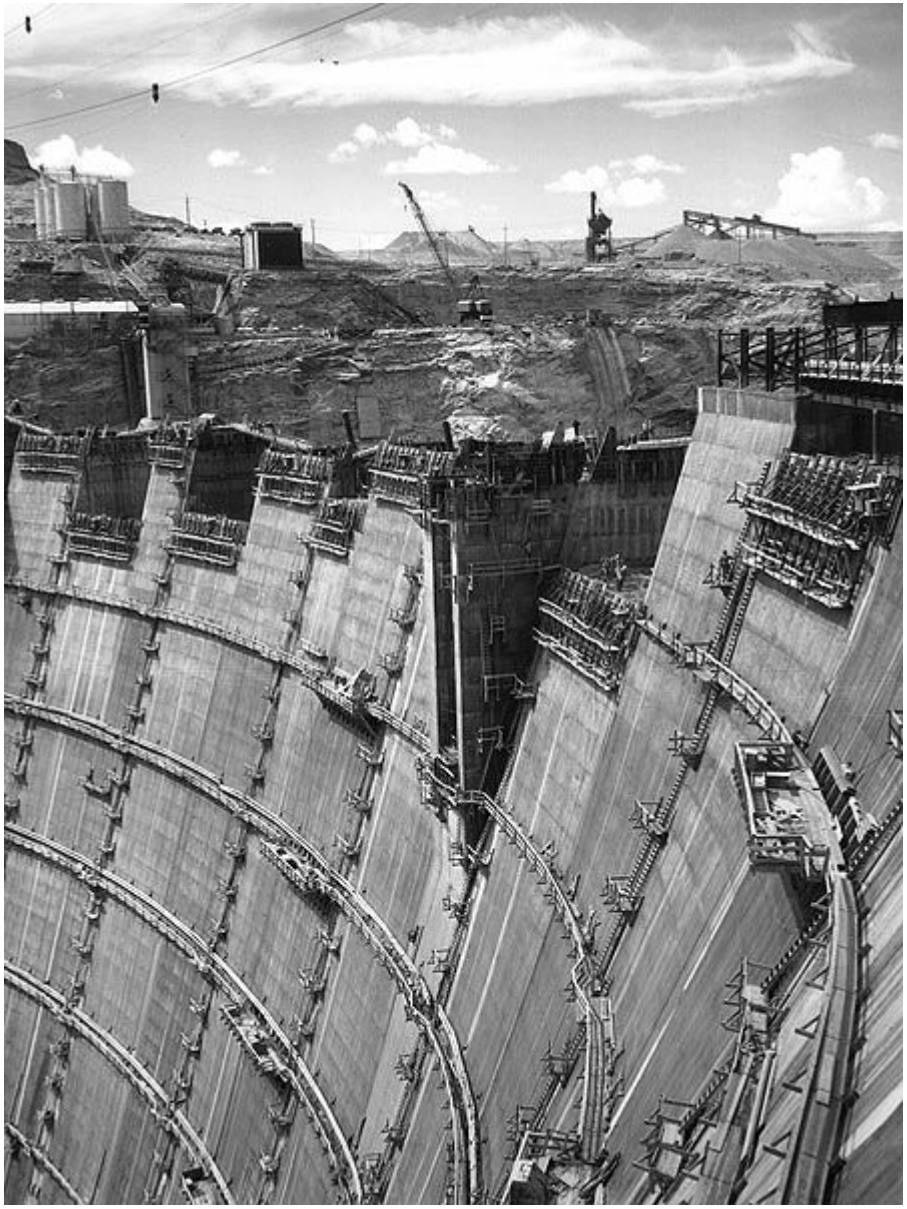
"*The rise of water resources policy to meet ever-changing conditions provides one of the great examples of the effectiveness of a democratic society in meeting the widely varying needs of its people*."
- President's Commission, 1950

My hope/expectation 10 years ago - my generation would be one defined by
Large-scale restoration
Adaptation to climate change
Modernizing water data – Google for water, smart water grid…

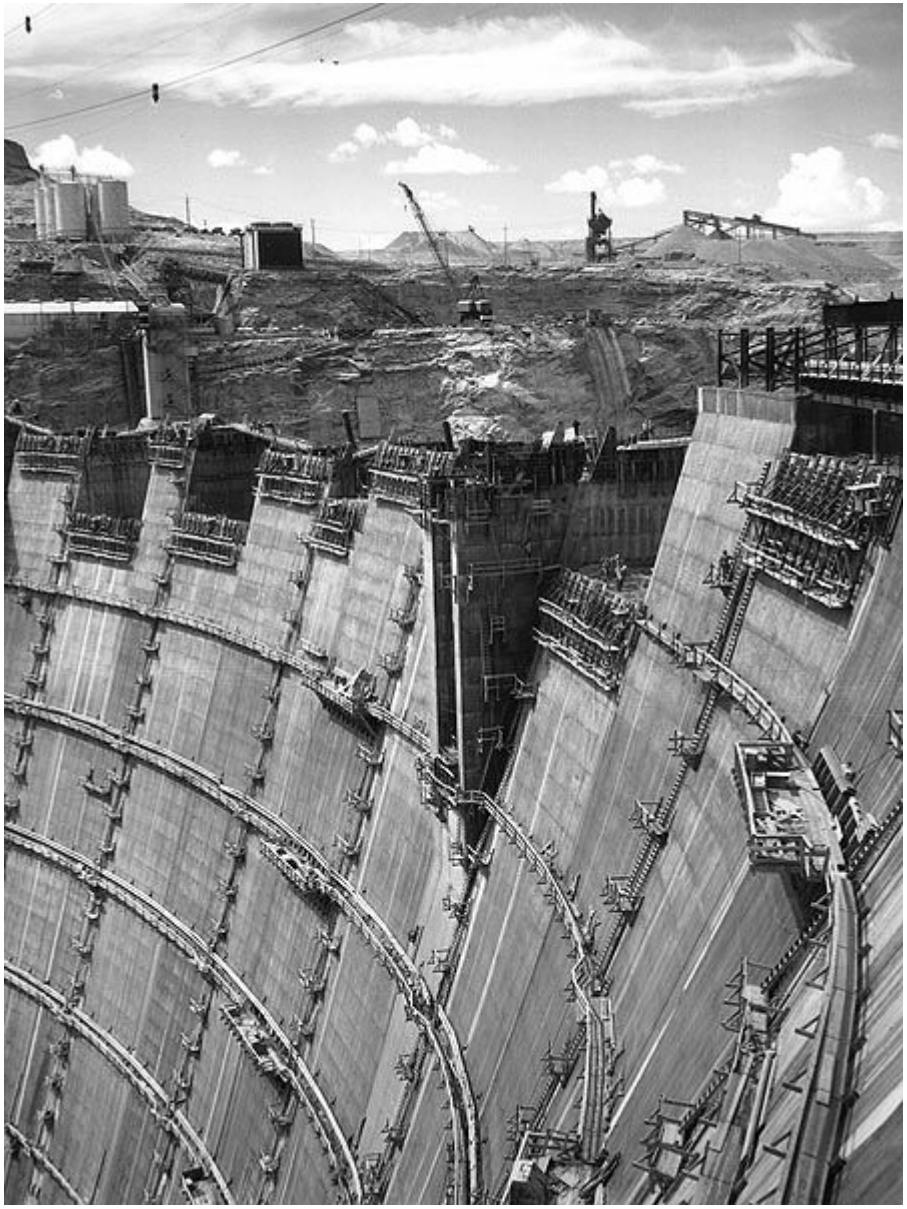


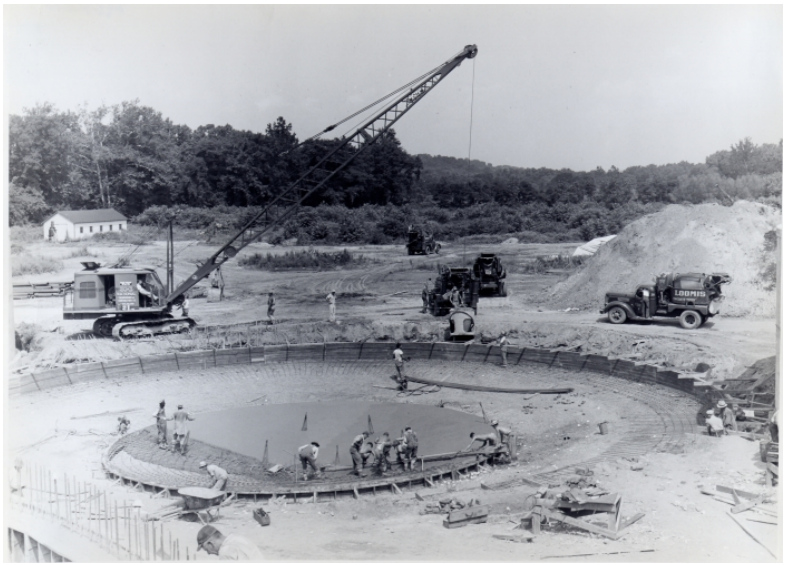

FLINT WATER PLANT

National water development envisioned by dam-building,

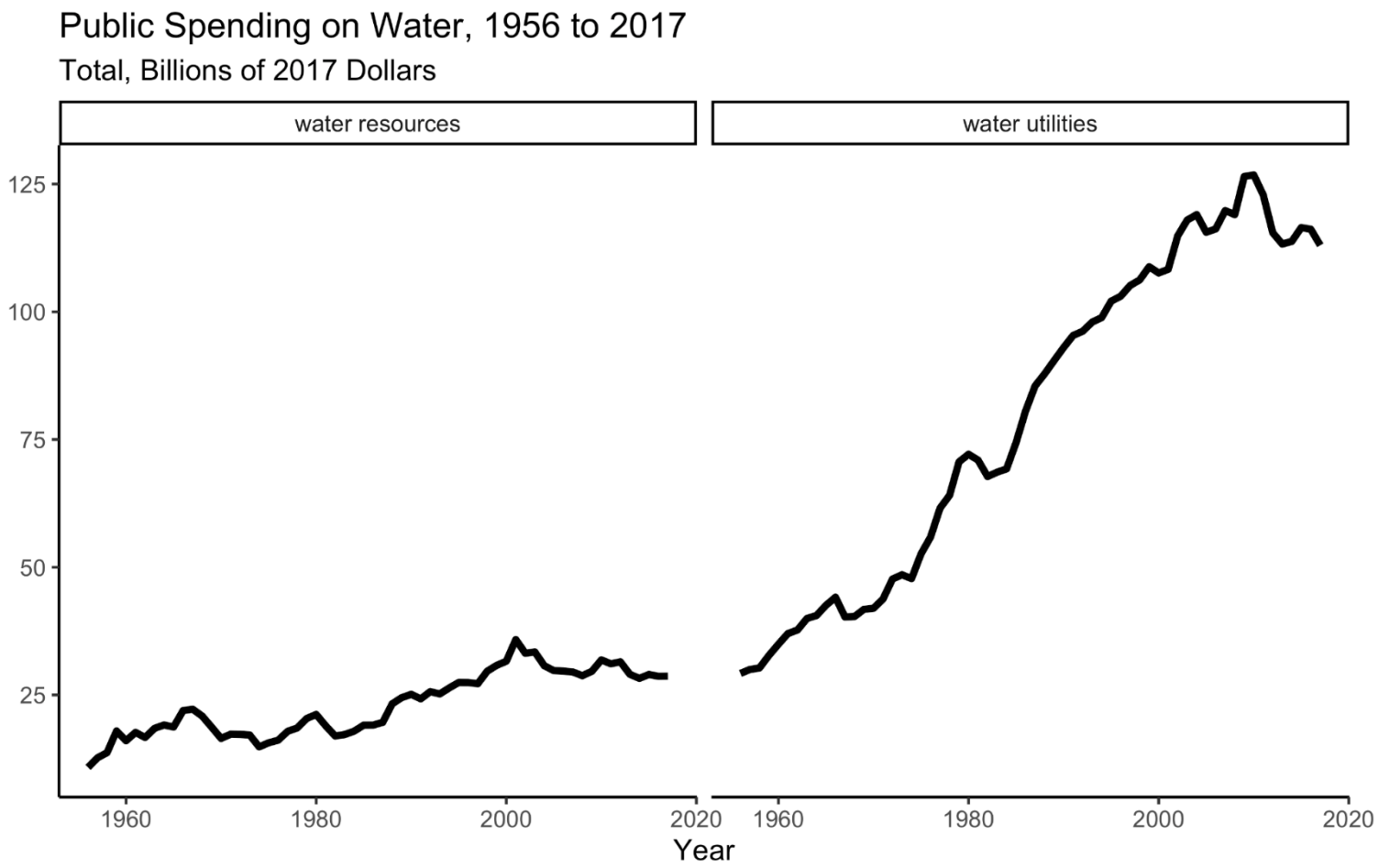


National water development envisioned by dam-building, but rarely by sewer-building





Most public spending for water is on drinking water and wastewater utilities



Data from: Congressional Budget Office

"How great a share of this investment [in water resources development] should be financed by the Federal Government and what should be the division of responsibility between the many agencies of Federal, State, and local government, private groups, and individuals are matters of proper concern to every citizen."
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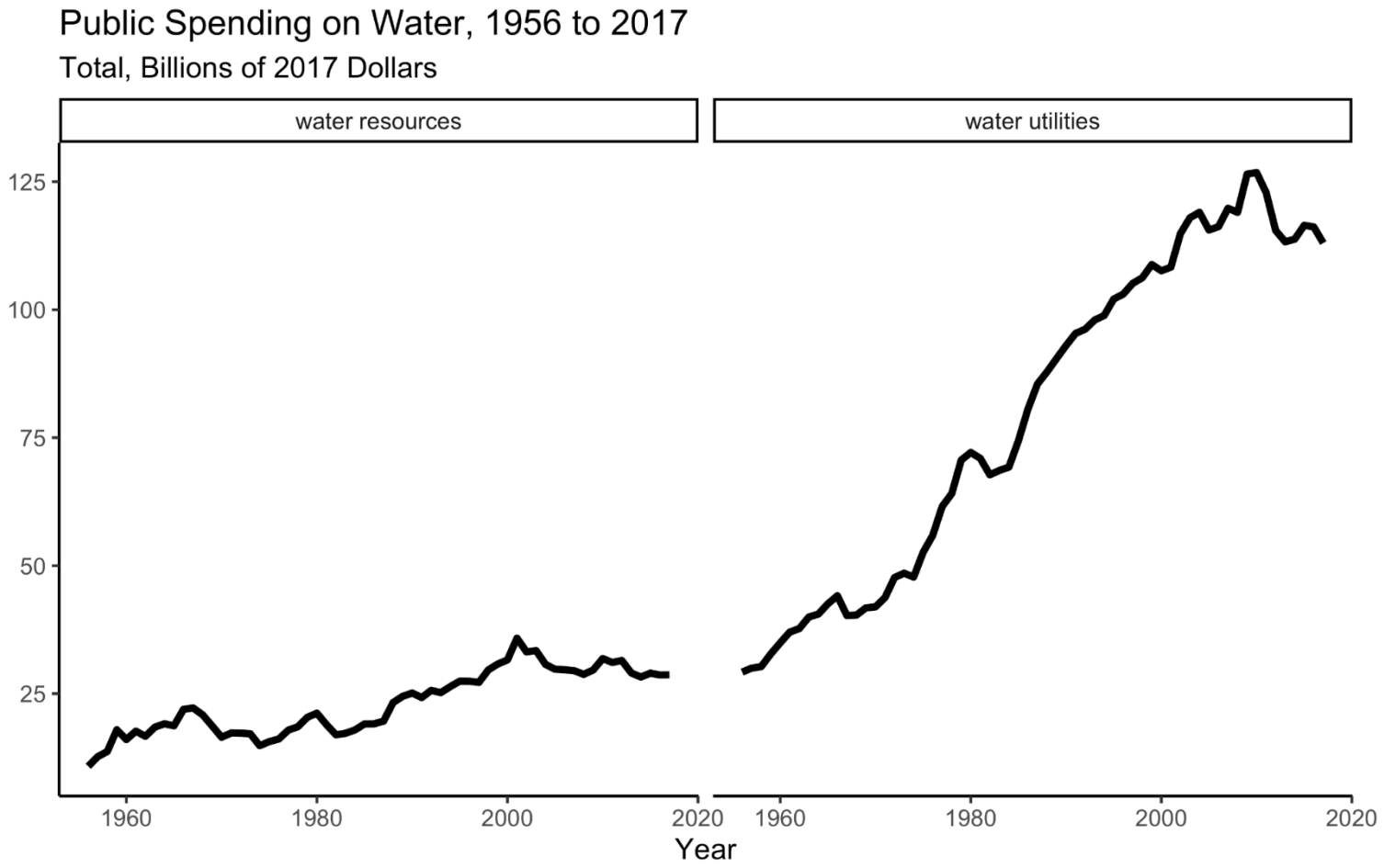
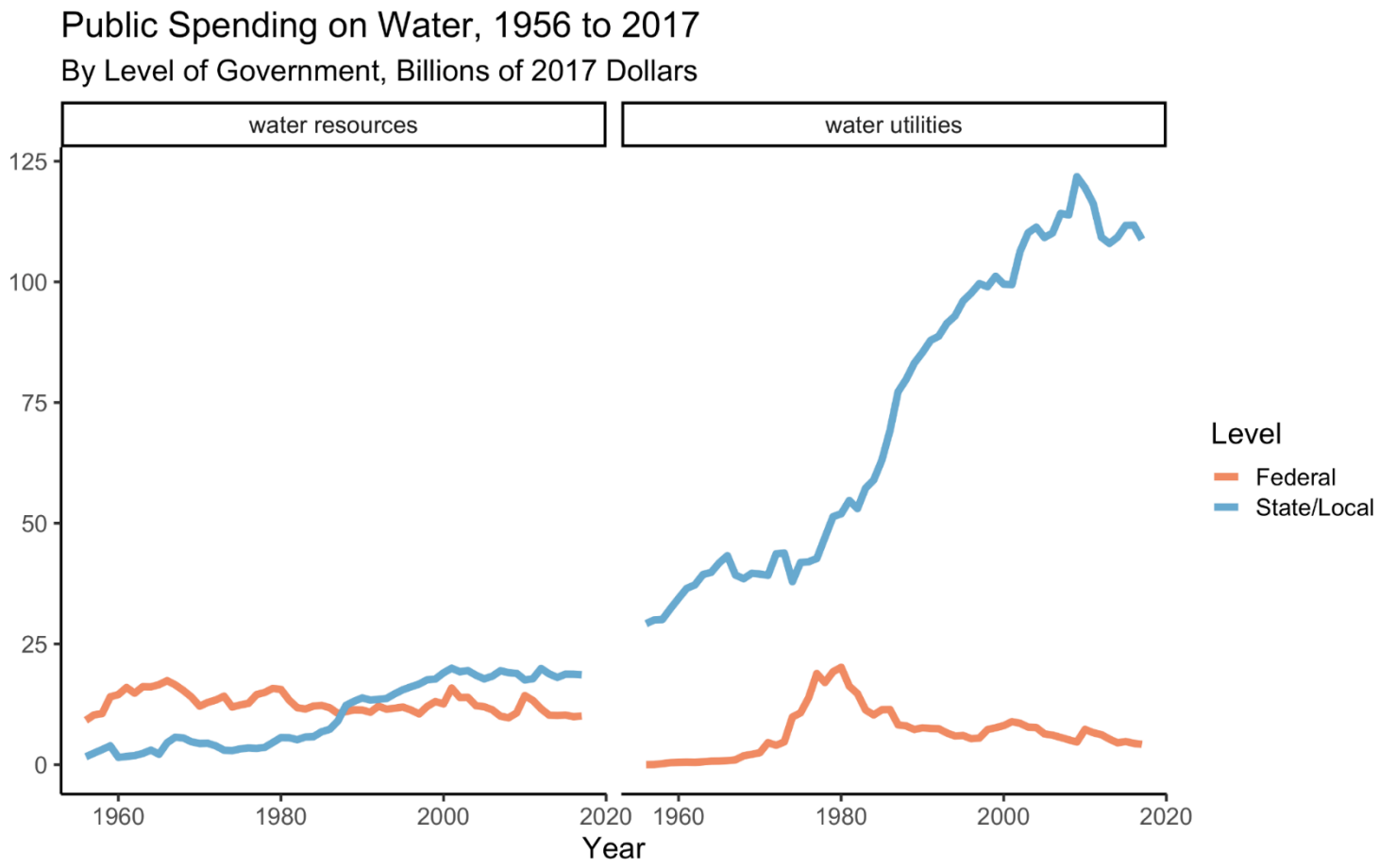


Data from: Congressional Budget Office

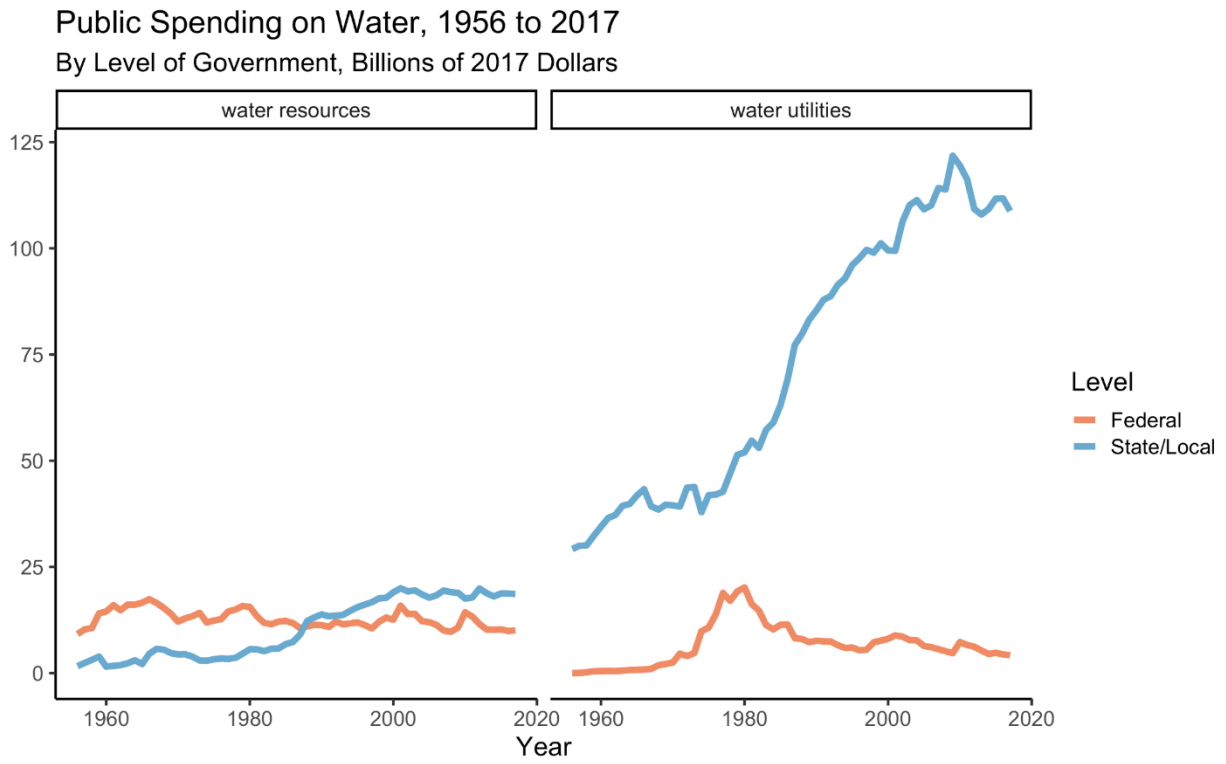
Most public spending is being done by state and local governments, not the federal government



Data from: Congressional Budget Office

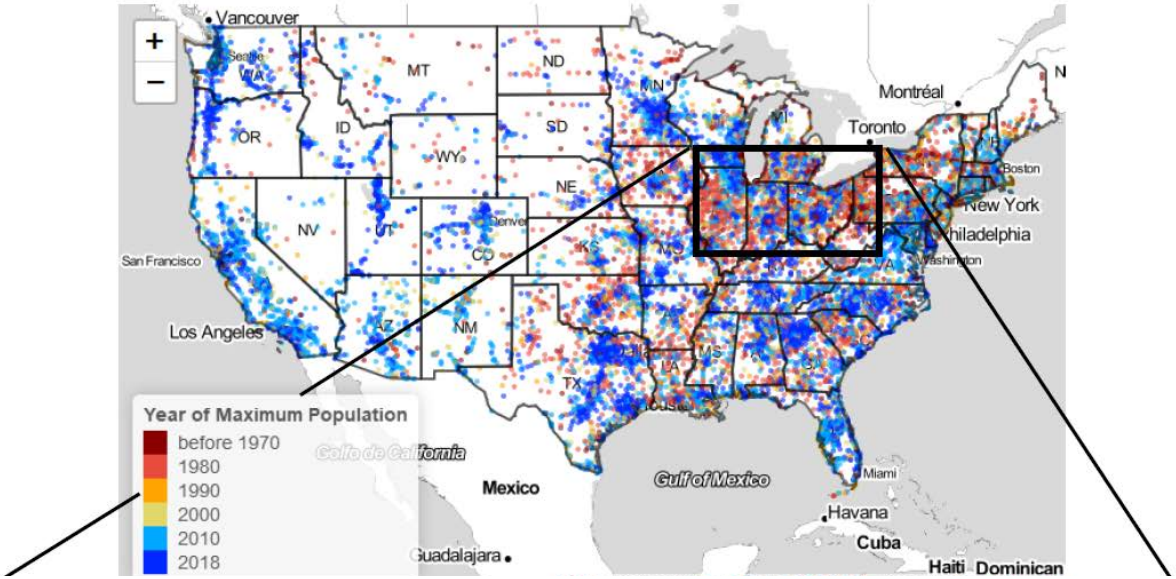
If budgets = priorities,
And if we are looking for a new national water policy

Then a new national water policy needs to address local water & infrastructure challenges



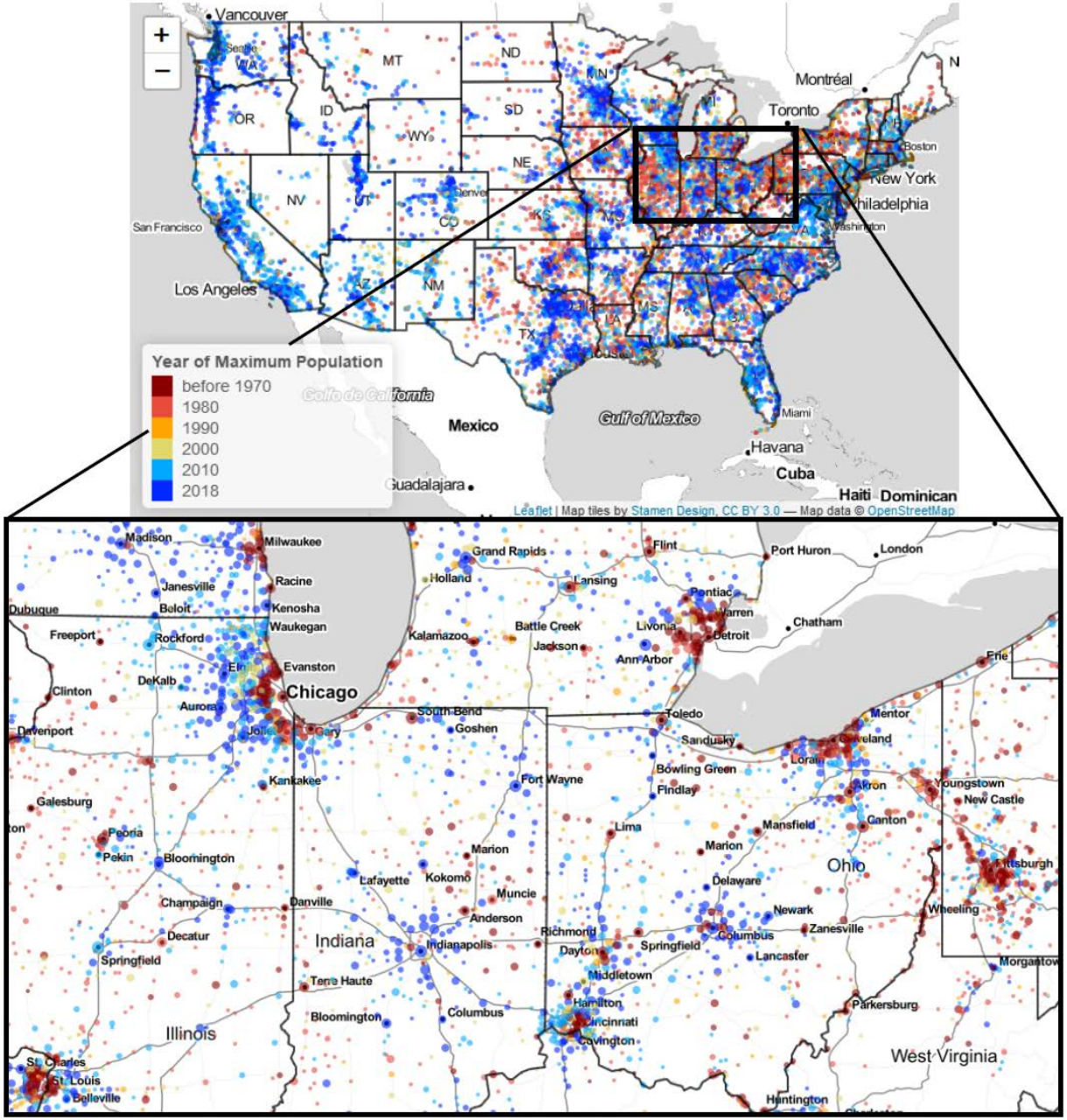
Data from: Congressional Budget Office

Years of Maximum Population for Census-Designated Places Located Within US Metropolitan Statistical Areas



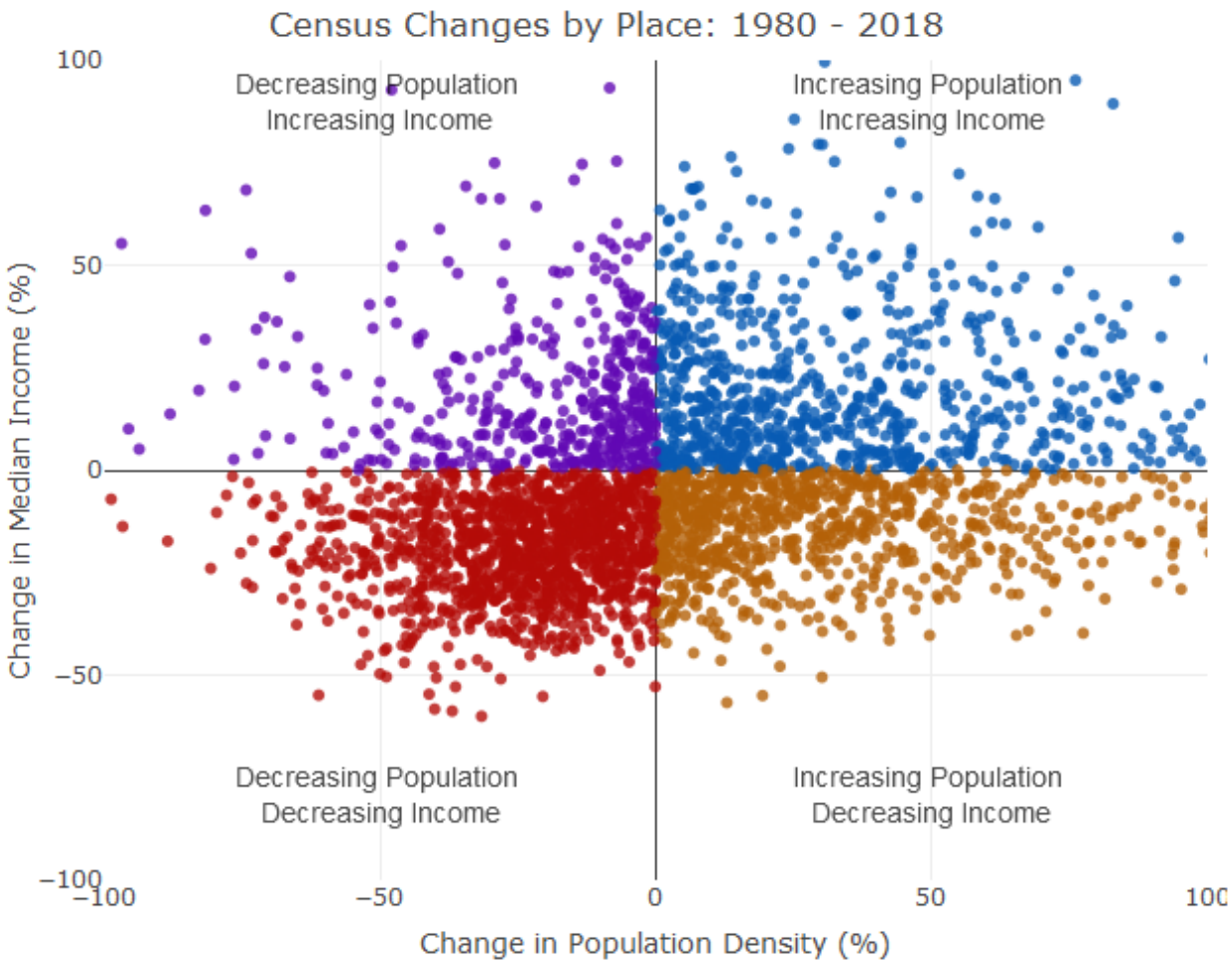
Data: US Census; Analysis: L. Patterson

Years of Maximum Population for Census-Designated Places Located Within US Metropolitan Statistical Areas



Data: US Census; Analysis: L. Patterson

Some cities are getting bigger and richer
Some cities are getting smaller and poorer



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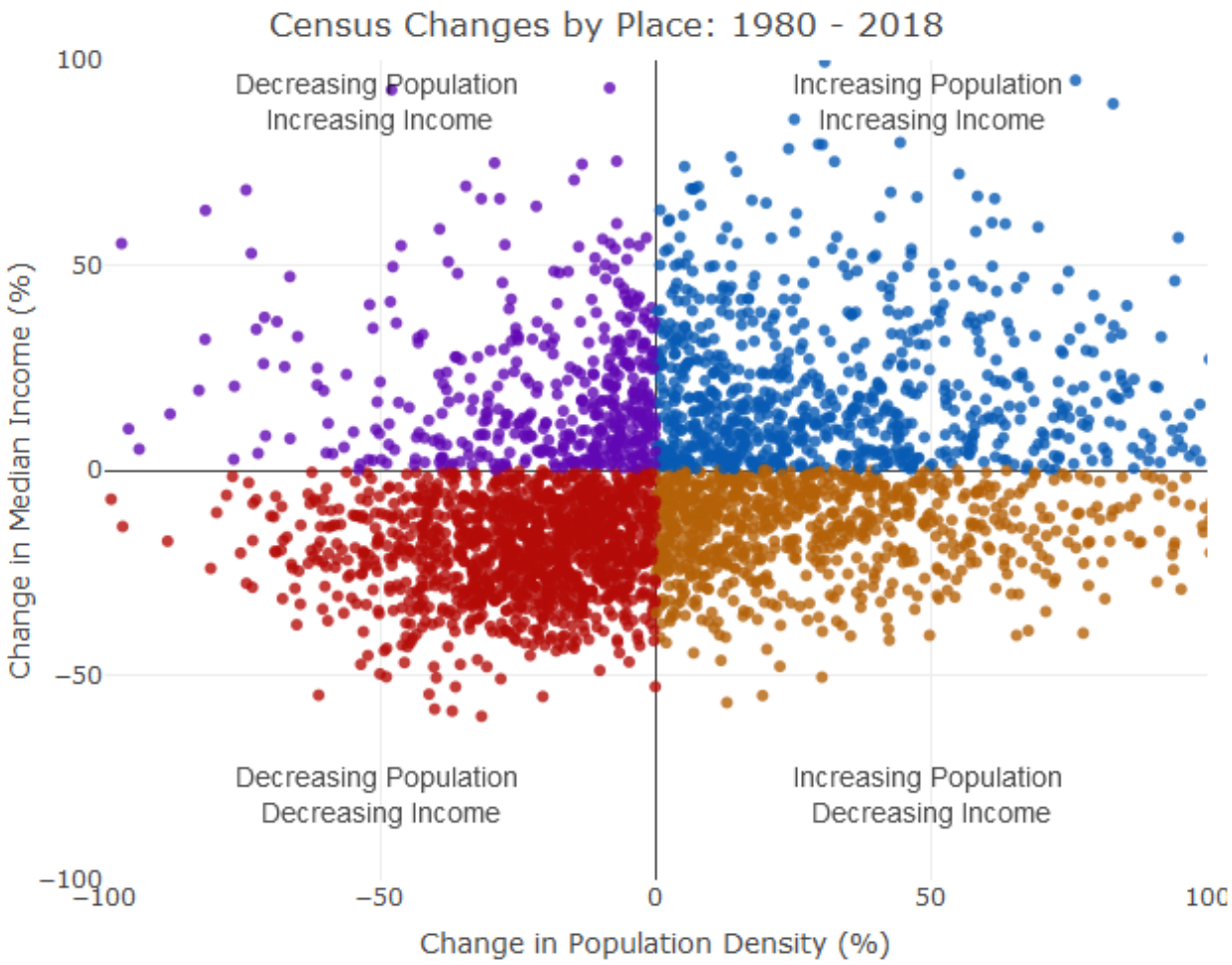
"The broad assumption on which this report is based is that of an expanding economy. … We have achieved, and expect to achieve in the future, a constantly rising standard of living for a growing population." - President's Commission



Data from: US Census
Analysis: L. Patterson

Shrinking cities often also have aging infrastructure
Aging infrastructure = violations & costs of consent decrees

Example of Declines in Population in Cities and Municipal Areas and Costs of Compliance With Stormwater Regulations

City	Consent Decree Cost *US$ million*	Change in City Population, 1970–2018[a] %	Change in Municipal Area Population, 1970–2018[b] %
St. Louis, Mo.	4,700	–51	11
Cincinnati, Ohio	3,290	–33	30
Cleveland, Ohio	3,000	–49	–11
Milwaukee, Wis.	3,000	–17	12
Washington, D.C.	2,574	–7	98
Kansas City, Mo.	2,383	–3	52
Chicago, Ill.	1,770	–20	20
Pittsburgh, Pa.	1,400	–42	–16
Akron, Ohio	897	–28	4
Evansville, Ind.	500	–15	24
Buffalo, N.Y.	380	–45	–16
Toledo, Ohio	433	–28	–1
Youngstown, Ohio	112	–54	–19

Data sources: Consent decree cost from US Environmental Protection Agency 2017; 1970 population estimates from US Census 1998; 2018 population estimates from US Census 2018; municipal statistical area (MSA) data accessed through IPUMS USA, University of Minnesota; Buffalo and Milwaukee consent decree cost figures from Renn 2019.

[a]Change in population in census-designated "Urban Places," usually the administrative unit for the city in question

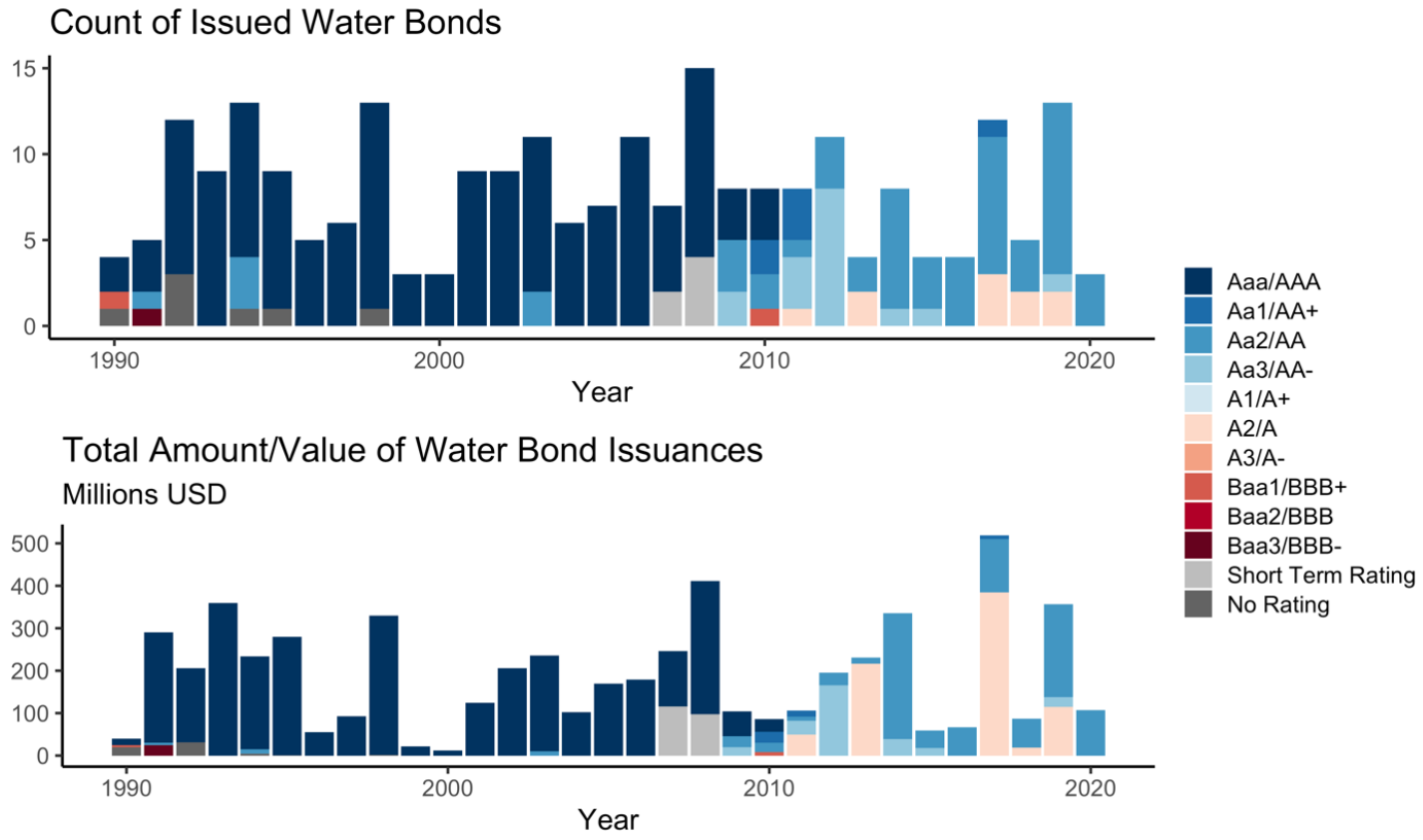
[b]Changes in population for census-designated MSAs: towns and counties surrounding a core city that are economically but not necessarily legally or administratively linked.

For comparison, over the same time period, the US population increased by approximately 60% (123 million).

Doyle et al. 2020. JAWWA

As population declines/stagnates, costs increase, the costs of capital also increase

Municipal bond ratings for water/sewer projects in 25 PA cities



Review of bond offering documents in PA cities, 1990 – 2020.
Smull et al. in review. ASCE-JWRPM.

Trends affecting declining/shrinking cities:

1. Costs of service increasing (aging infrastructure, litigation, increasing regulations)
2. Decreasing ratings of debt = increasing costs of infrastructure finance
3. Little/no financial support from federal government
4. Decreasing population, loss of industrial/commercial water users

END RESULT:
Must increase costs on remaining customer base, which itself continues to decline =
Per-resident cost of water services increases

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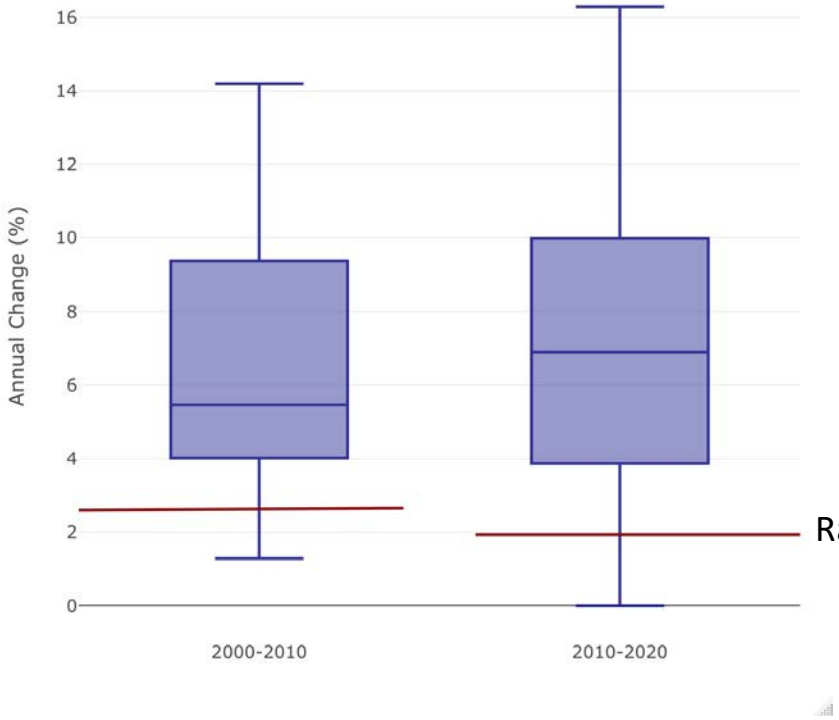

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END RESULT:
Must increase costs on remaining customer base, which itself continues to decline

WATER AFFORDABILITY

PLOS ONE

OPEN ACCESS PEER-REVIEWED
RESEARCH ARTICLE

A Burgeoning Crisis? A Nationwide Assessment of the Geography of Water Affordability in the United States

Elizabeth A. Mack, Sarah Wrase

Published: January 11, 2017 • https://doi.org/10.1371/journal.pone.0169488

AWWA WATER SCIENCE

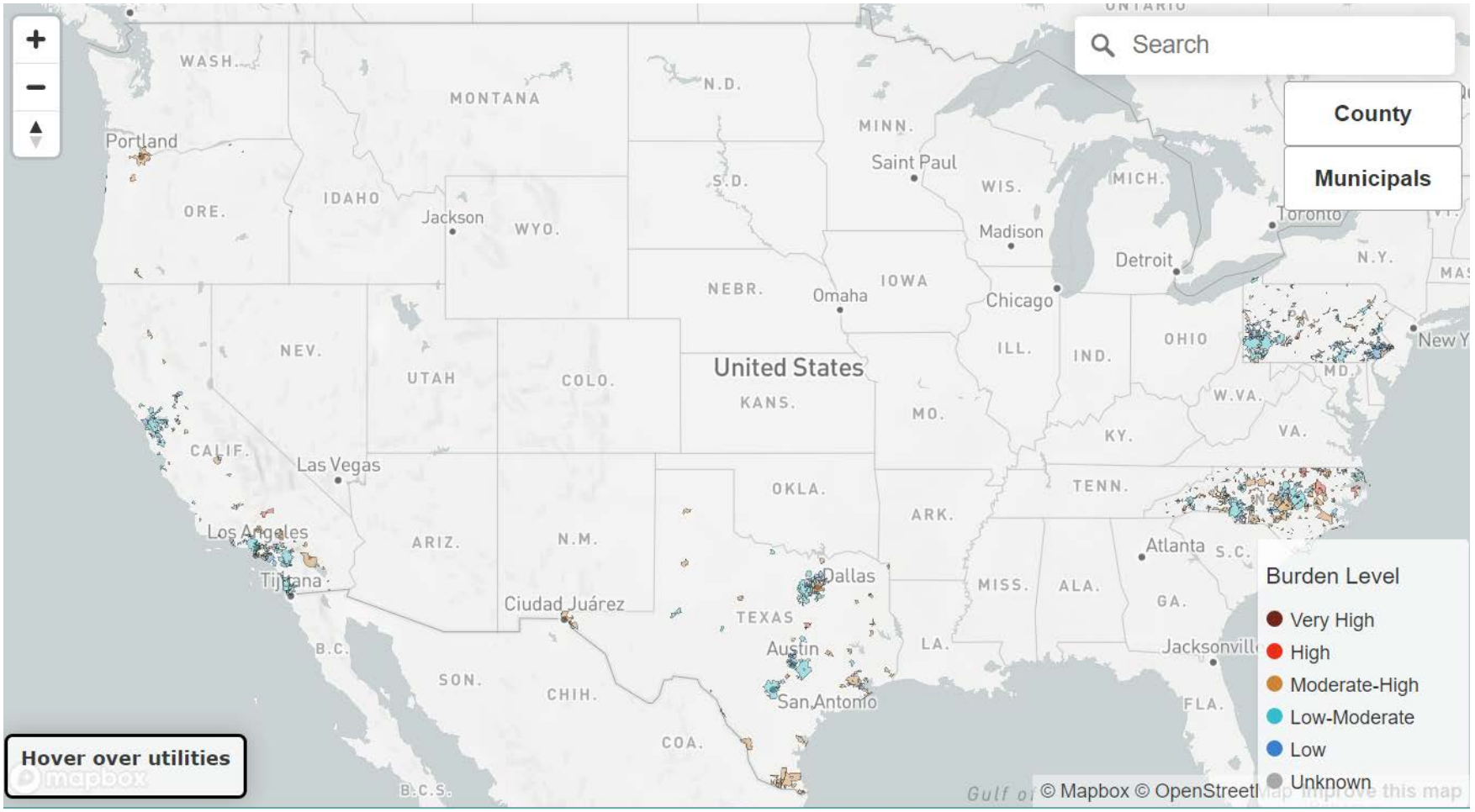
ORIGINAL RESEARCH

Water and sewer affordability in the United States: a 2019 update

Manuel P. Teodoro, Robin Rose Saywitz

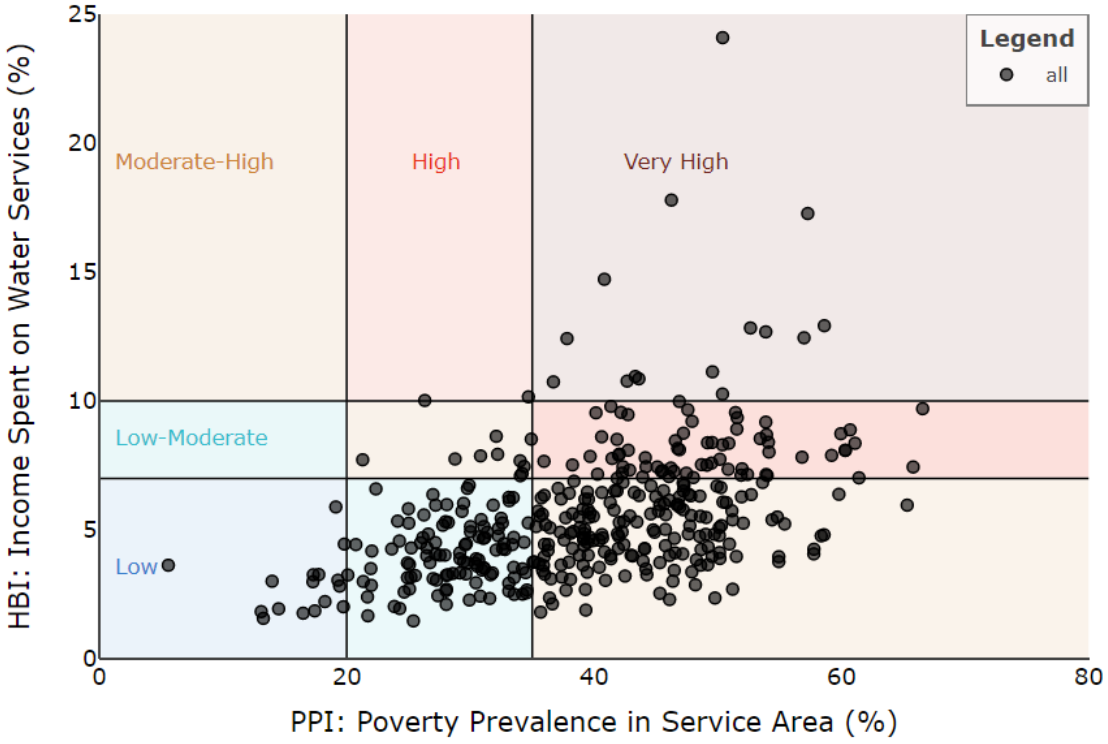
First published: 14 April 2020 | https://doi.org/10.1002/aws2.1176 | Citations: 1

What water affordability actually looks like



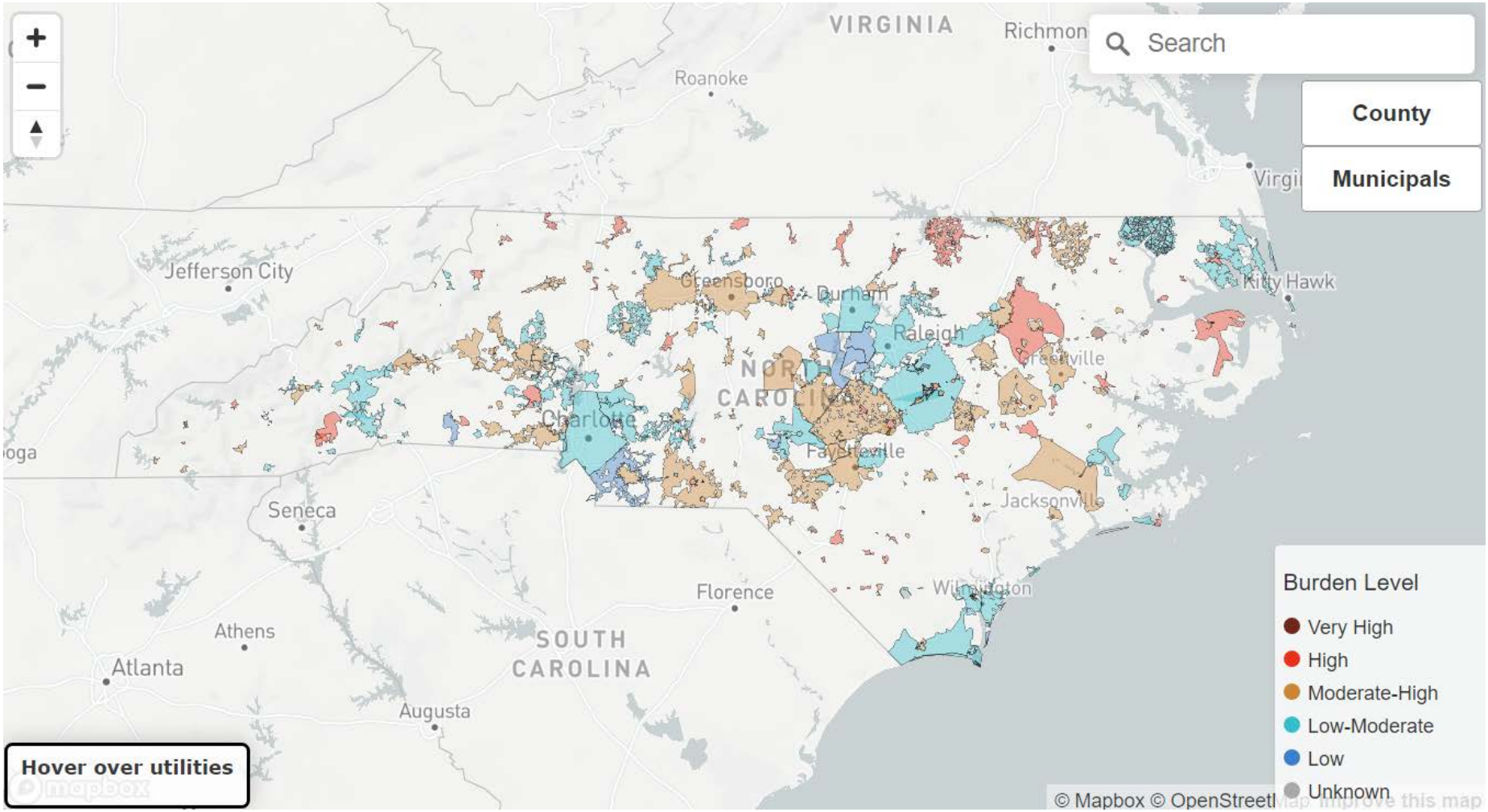
Patterson and Doyle. In review.

Using AWWA metric of affordability, categorize utilities based on their poverty prevalence and the portion of income going to water services for low-income households (20th percentile income)



Patterson and Doyle. In review.

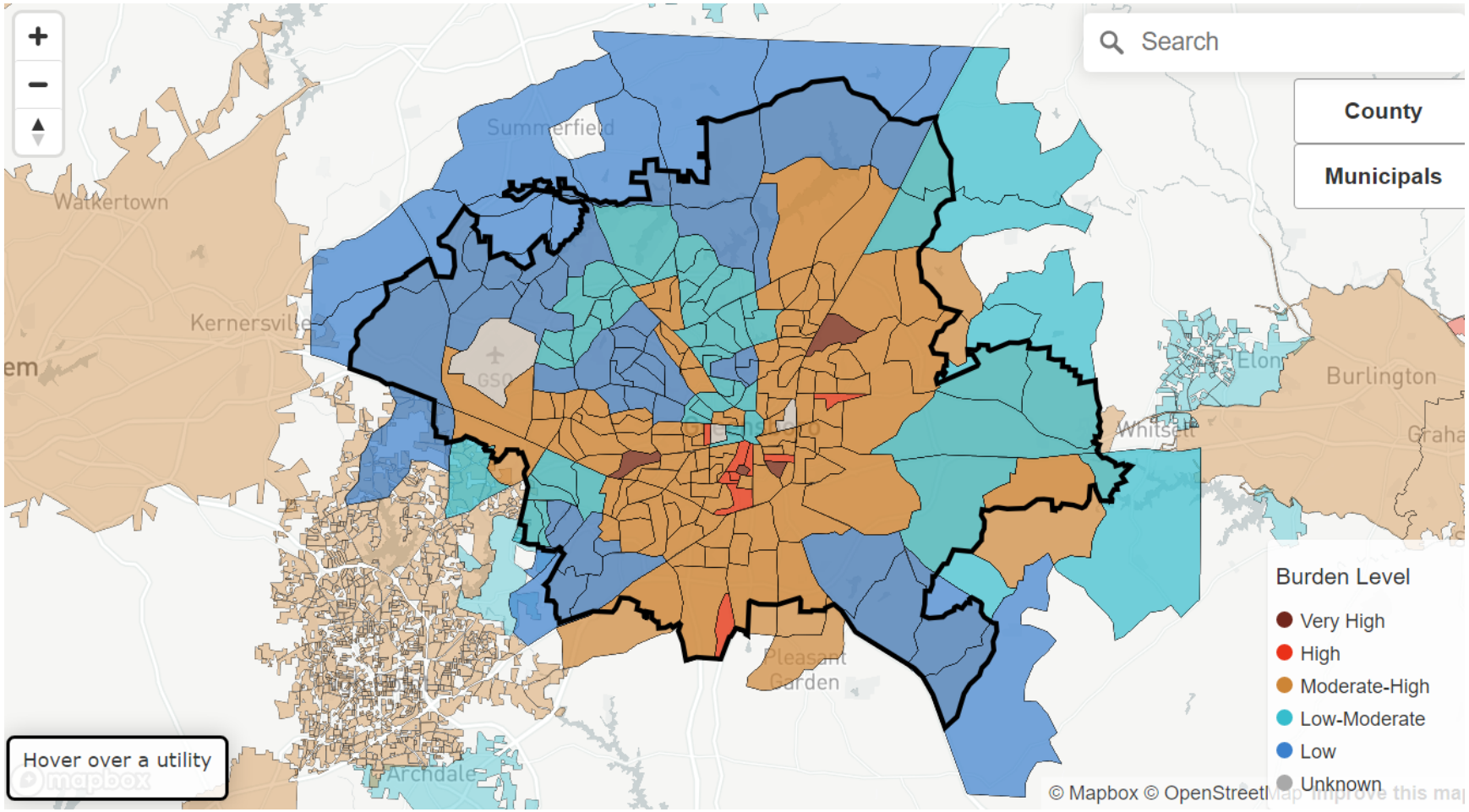
Visualizing affordability between utilities



Patterson and Doyle. In review.

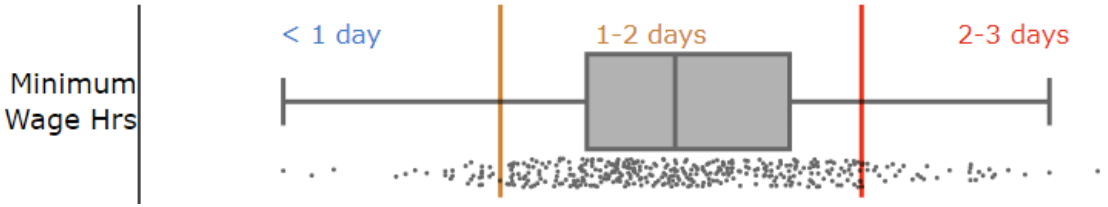
Using block group data from census, can also examine affordability at higher granularity

Affordability within Greensboro, NC at 4,000 gallons/month/household
~ 2.5 persons/household @ 50 gallons/person/day



Patterson and Doyle. In review.

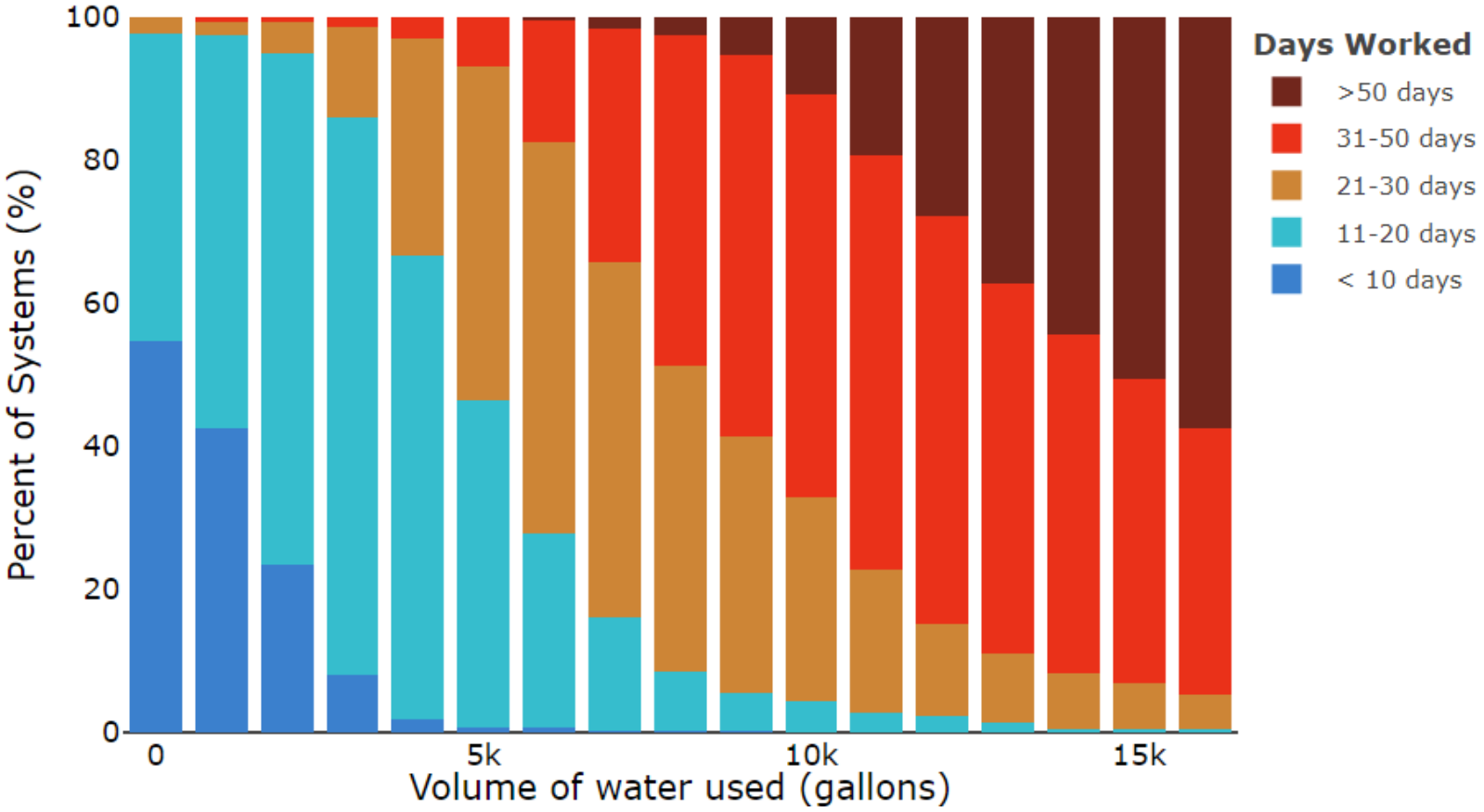
Or, more simply, the number of hours needed at minimum wage to pay for water bill (4,000 gallons/month)



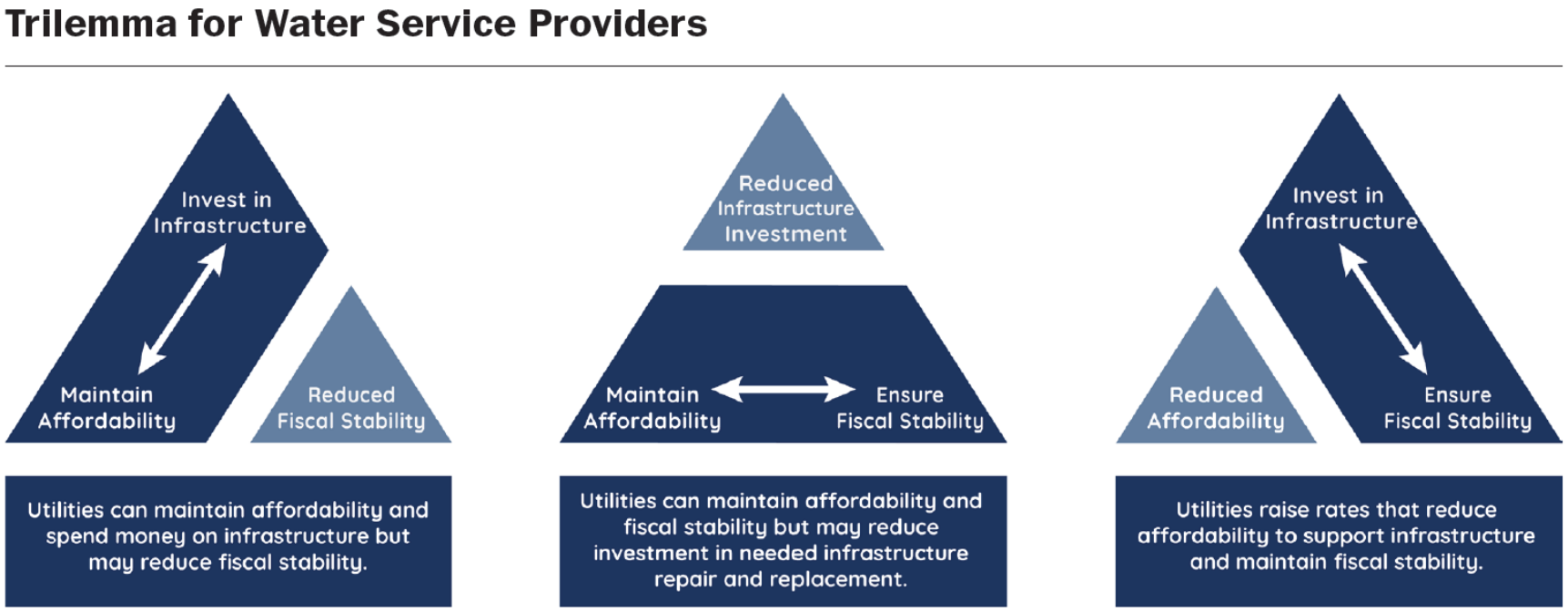
Patterson and Doyle. In review.

But think about a larger family in an older house, with slightly less efficient fixtures:
6 persons/household @ 60 gal/person/day = 10k+ gallons/month

In ~75% of water utilities in NC, families using 10k gallons/month, at minimum wage, must **work 50 days per year to pay for basic water services**



The result is a trilemma for growing number of America's cities



Doyle et al. 2020. JAWWA

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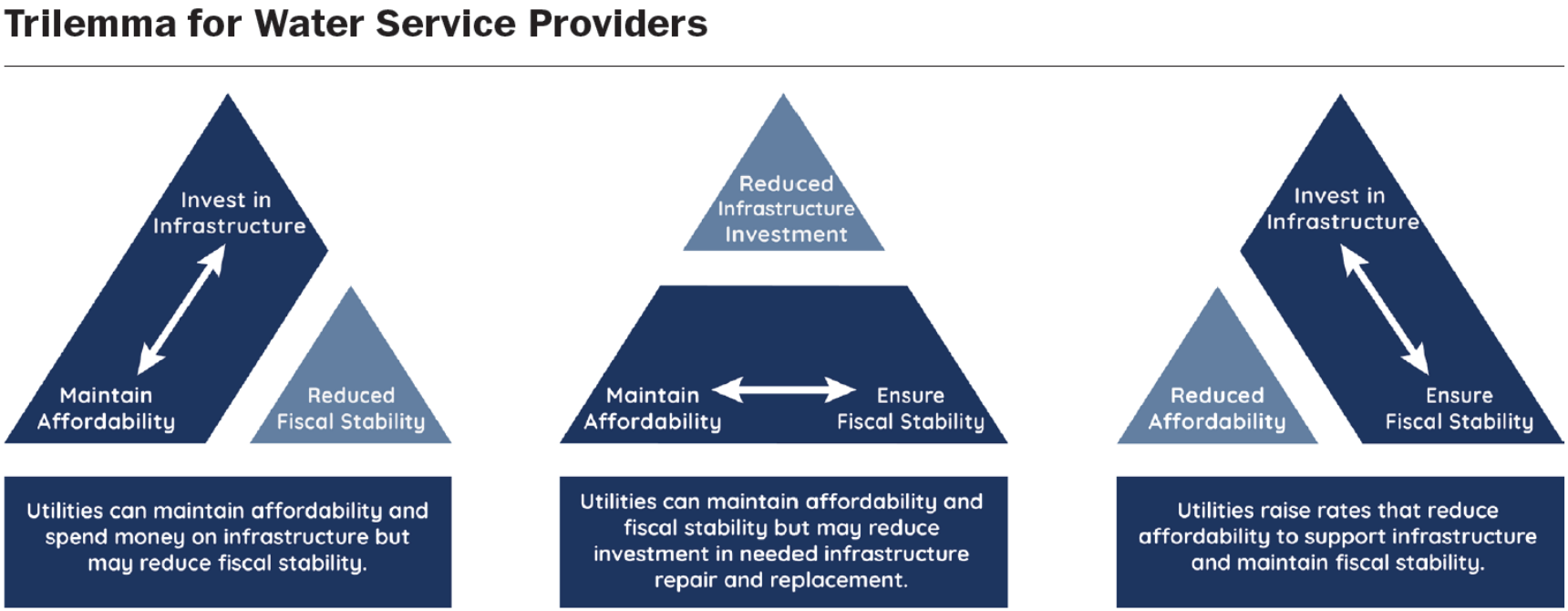


Municipal bankruptcy

Declining quality of water services

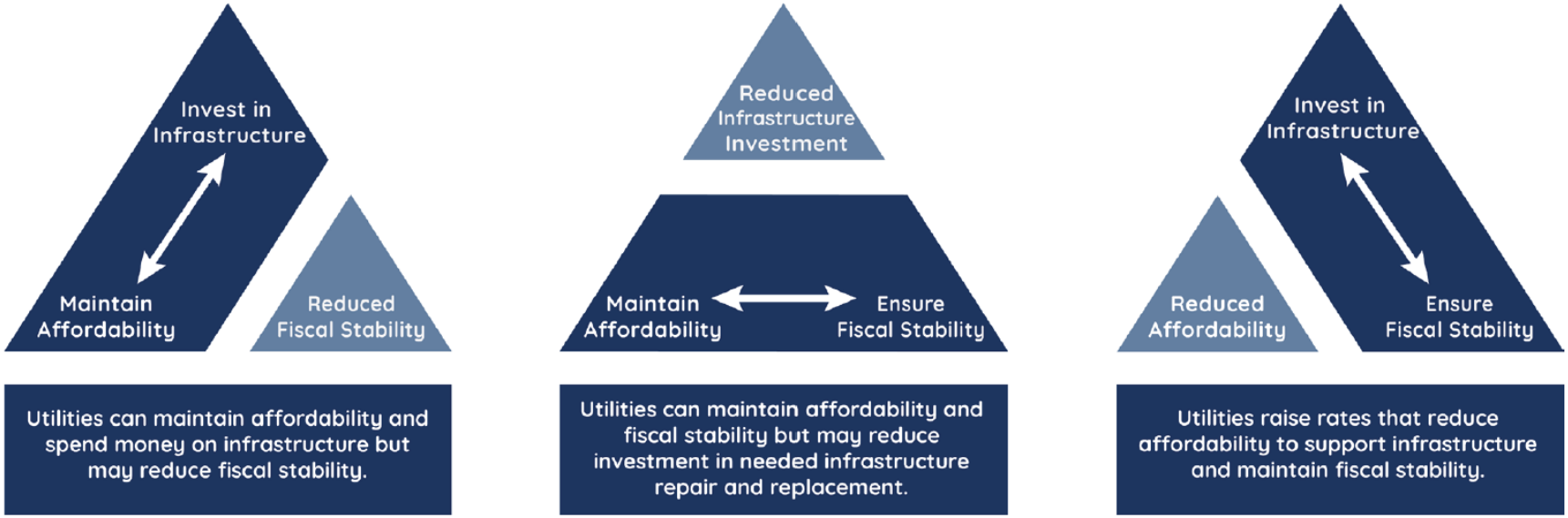
-

Unsafe drinking water
Sewer overflows

Unaffordable water for the poor

Doyle et al. 2020. JAWWA

Trilemma for Water Service Providers



Utilities serving stagnant/shrinking population are in an impossible situation under status quo national water policy approach.

"How great a share of this investment [in water resources development] should be financed by the Federal Government and what should be the division of responsibility between the many agencies of Federal, State, and local government, private groups, and individuals are matters of proper concern to every citizen."

- President's Commission, 1950

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Water Policy for the American People – Affordability?

What could federal government do to address affordability challenges?

Utilities directly:
State Revolving Funds

Households:
Low-Income Household Water Affordability Program
- LIHEAP for water
- Expansion of Customer Assistance Programs

Supplemental Water Assistance Program
- SNAP for water

WATER AFFORDABILITY & EQUITY:
RE-IMAGINING WATER SERVICES

A REPORT FROM THE 2020
ASPEN-NICHOLAS WATER FORUM

Lauren Patterson, Rapporteur

Duke NICHOLAS INSTITUTE FOR ENVIRONMENTAL POLICY SOLUTIONS

THE ASPEN INSTITUTE ENERGY & ENVIRONMENT PROGRAM

Gilbert F. White

2000

National Medal of Science

Physical Sciences

NATURAL HAZARDS CENTER

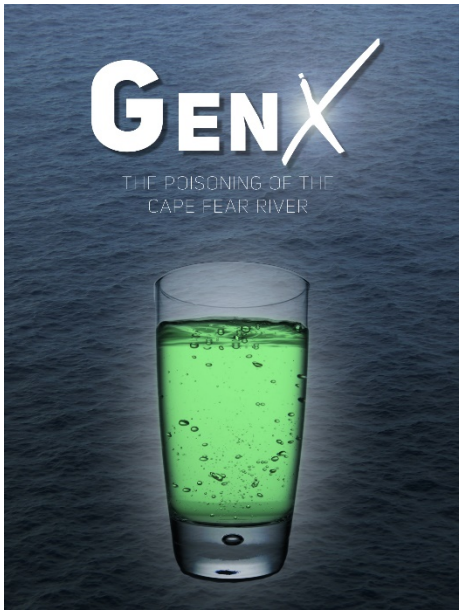
"Floods are 'acts of God,' but flood losses are largely acts of man" (Dissertation, 1942)

Growing number of ‘utility’ disasters

Flint water crisis (*Time* magazine)

Lead crisis in DC

Toxic algal bloom, Toledo (*Toledo Blade*)



PFAS/GenX crisis, NC
(*Encore* Magazine)

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Utilities directly:
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Supplemental Water Assistance Program
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Assist during utility disasters:
- Increased use of "emergencies" under Stafford Act?

WATER AFFORDABILITY & EQUITY:
RE-IMAGINING WATER SERVICES

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Duke NICHOLAS INSTITUTE FOR ENVIRONMENTAL POLICY SOLUTIONS

THE ASPEN INSTITUTE ENERGY & ENVIRONMENT PROGRAM

Growing number of ‘utility’

Flint water crisis (*Tim*

The White House
Office of the Press Secretary

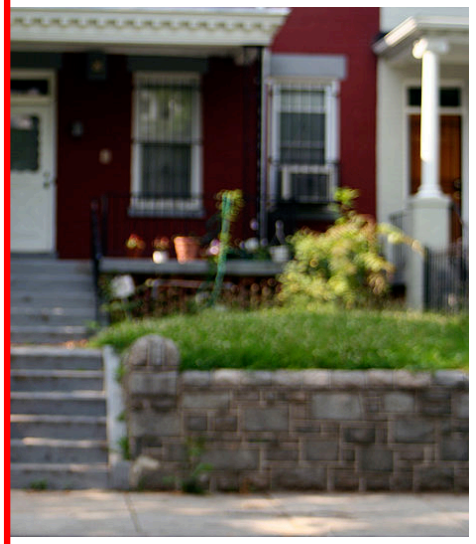
For Immediate Release January 16, 2016

President Obama Signs Michigan Emergency Declaration

The President today, in response to a request from the Governor submitted on January 14, 2016, declared that an emergency exists in the State of Michigan and ordered federal aid to supplement state and local response efforts due to the emergency conditions in the area affected by contaminated water.

The President's action authorizes the Department of Homeland Security, Federal Emergency Management Agency (FEMA), to coordinate all disaster relief efforts which have the purpose of alleviating the hardship and suffering caused by the emergency on the local population, and to provide appropriate assistance for required emergency measures, authorized under Ti
save lives and to protect property and public health
avert the threat of a catastrophe in Genesee County

Specifically, FEMA is authorized to identify, mobiliz
discretion, equipment and resources necessary to a
emergency. Emergency protective measures, limite
assistance, will be provided at 75 percent federal fu
assistance is to provide water, water filters, water fi
kits, and other necessary related items for a period



Lead crisis in DC

The White House
Office of the Press Secretary

For Immediate Release

President Obama Signs West Virginia Emergency Declaration

The President today declared an emergency exists in the State of West Virginia and ordered federal aid to supplement state and local response efforts due to the emergency conditions resulting from a chemical spill beginning on January 9, 2014, and continuing.

The White House
Office of the Press Secretary

For Immediate Release May 03, 2010

President Obama Signs Massachusetts Emergency Disaster Declaration

The President today declared an emergency exists in the Commonwealth of Massachusetts and ordered Federal aid to supplement State and local response efforts in the area affected by a water main break beginning on May 1, 2010, and continuing.

The President's action authorizes the Department of Homeland Security, Federal Emergency Management Agency (FEMA), to coordinate all disaster relief efforts which have the purpose of alleviating the hardship and suffering caused by the

NEWS

FEMA approves aid for Texas fertilizer plant blast

The remains of the the West Fertilizer Co. plant smolder in the rain in West, Texas. *Smiley N. Pool, AP*

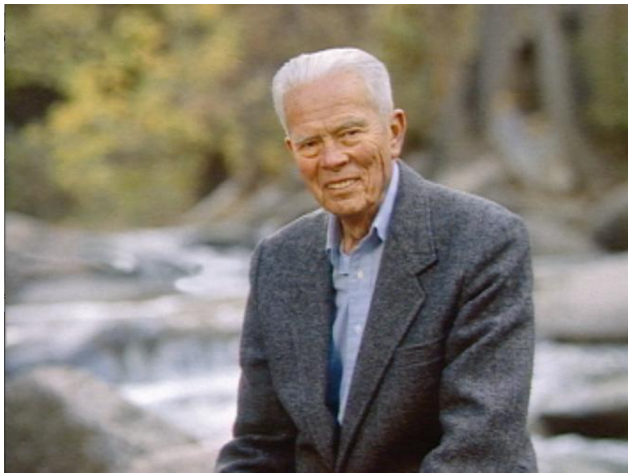
Story Highlights

- FEMA reversed an initial decision to deny a Texas town with aid to rebuild
- An April fertilizer plant blast caused damages and killed 15 there
- Originally%2C FEMA said the explosion was not severe enough for aid

FEMA initially declined request

Then-Gov. Perry (R-TX) appealed (with vocal support from Sen. Cornyn, R-TX).

If ‘utility emergencies’ become ‘utility disasters’ (under the Stafford Act), difficult to restrain federal government role



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