

The Waters of West Virginia

A Science & Technology Policy Perspective

Joan Centrella

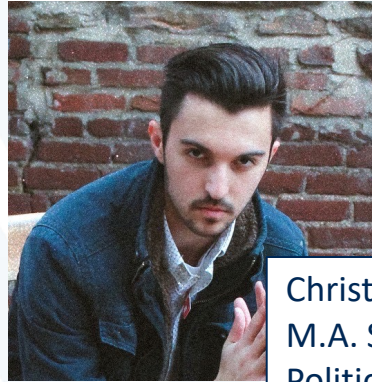
Director, Bridge Initiative for Science and Technology Policy,
Leadership, and Communications

WV VOAD 2022 Conference
Partnering in Resiliency
Charleston, WV
September 20 - 21, 2022

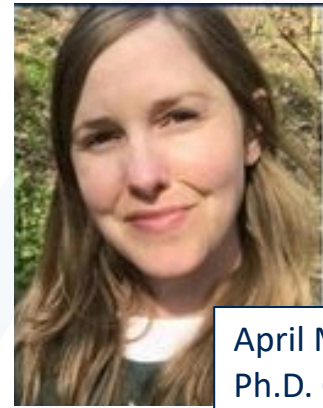
Our team for VOAD



Brooke Eastman, Ph.D.
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BRIDGE

**WVU's Initiative for Science and Technology
Policy, Leadership, and Communications**

Translating the work of WVU researchers to policymakers to fulfill WVU's mission as West Virginia's R1 Land Grant University.



**So our research at WVU
can benefit communities
and inform policymaking**

Bridge Initiative

Bridging Science & Technology to Policy

- **Interdisciplinary Science and Technology Policy Initiative**
 - Begun in 2020
 - Supported by the Provost and the Vice President for Research
- **Partner with researchers across WVU**
 - Work with them to translate the results of their research to policymakers
 - Engage with communities and other stakeholders
 - Develop policy options and recommendations
 - Engage with policymakers
- **Key features:**
 - Interdisciplinary - working together across campuses from different areas
 - Building community networks
 - Faculty and student development – empowering the next generation
- **Community/stakeholder engagement and input is essential**
 - *We would like to learn from and work with you*

Idealized Roles of Science in Policy & Politics

Pielke, Jr, Roger A., *The Honest Broker*

Pure Scientist

- focuses on research w/out considering its use
- typically does not engage directly with decision-makers

Science Arbiter

- informs decision-making by research or assessments
- interacts w/ decision-makers
- typically does not interact closely with stakeholders

Issue Advocate

- focuses on implications of the research for a particular political agenda

"Honest Broker" of Policy Alternatives

- engages w/ decision-makers and stakeholders
- aims to **clarify** and **expand the scope** of choices available to decision-makers



All four roles are important and necessary



Waters of West Virginia

The Waters of West Virginia

During the 2020-2021 academic year,

- *more than 20 WVU faculty & staff researchers from Chambers, Davis, Eberly and Statler colleges as well as the Energy Institute and the Extension Service*
- *worked together to develop a guide for West Virginia's federal, state, and local policymakers*

Why study water in West Virginia?

Many concerns:

- Wastewater issues
- Aging infrastructure
- Unsafe drinking water
- Acid mine drainage
- Adverse climate events
- Floods, floods, floods...

Many Opportunities:

- Outdoor recreation
 - whitewater rafting,
 - kayaking
 - fishing...
- Great natural beauty
- Tourism and migration
- Economic development

So, we posed a question:

What actions, if any, should West Virginia policymakers take to enhance West Virginia's resiliency to adverse climate-related water events as well as the development of its existing and potential water-related economic and societal opportunities?

Focus on 3 sub-questions:

- **Infrastructure**

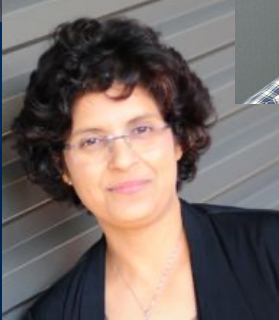
- *What is the relationship of the waters of West Virginia to its economy, society, and related infrastructure? (e.g., poor drinking water quality, wastewater issues, crumbling dams and bridges)*

- **Effects of a Changing Climate**

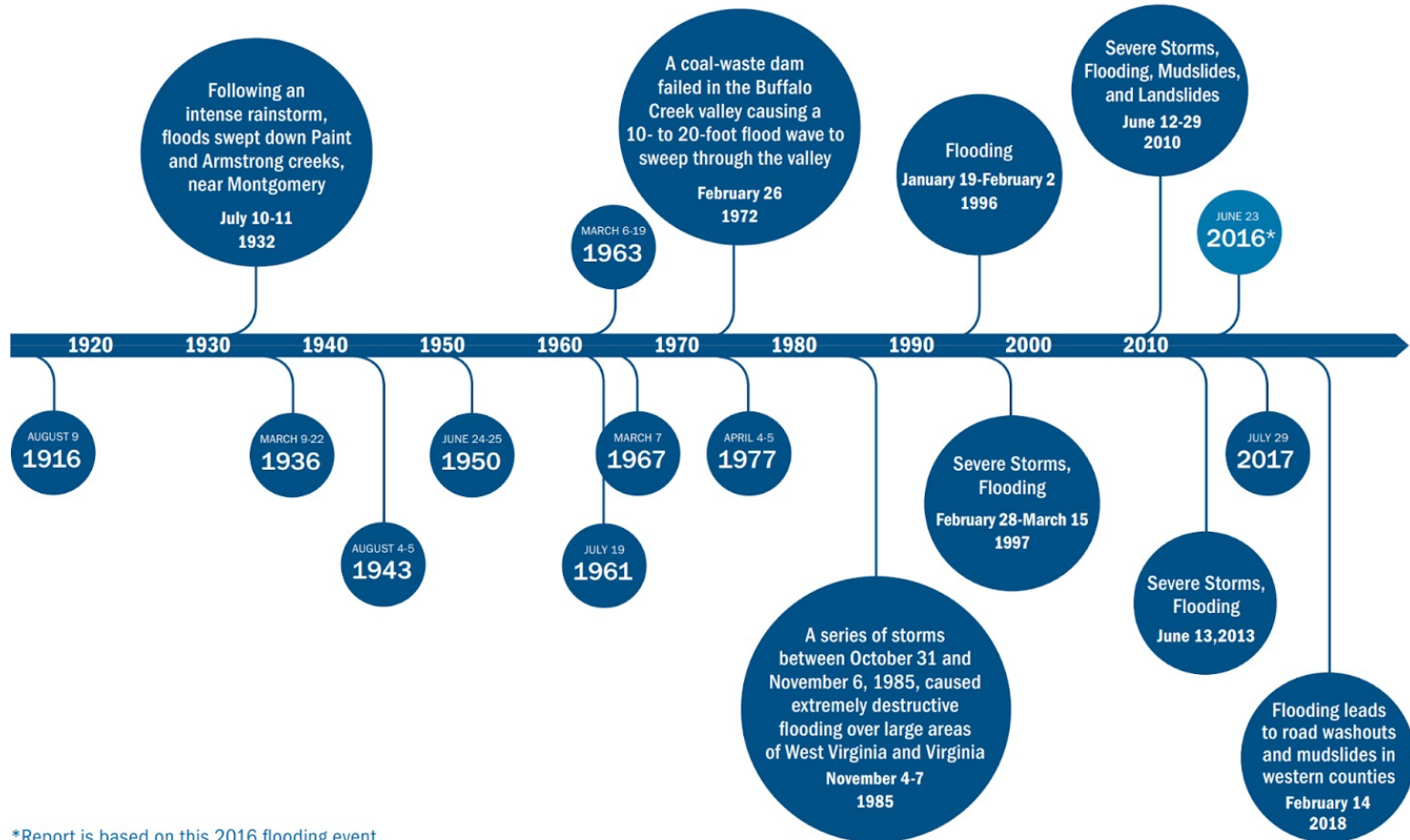
- *What are the challenges and opportunities of climate change for West Virginia's economies, communities, and ecosystems? (e.g., flooding, drought)*

- **Economic Development**

- *How might West Virginia enhance its development of potential economic and societal opportunities related to water based on current scientific, technical, and financial opportunities? (e.g., stimulus/infrastructure bill; hydropower partnerships, outdoor recreation opportunities)*



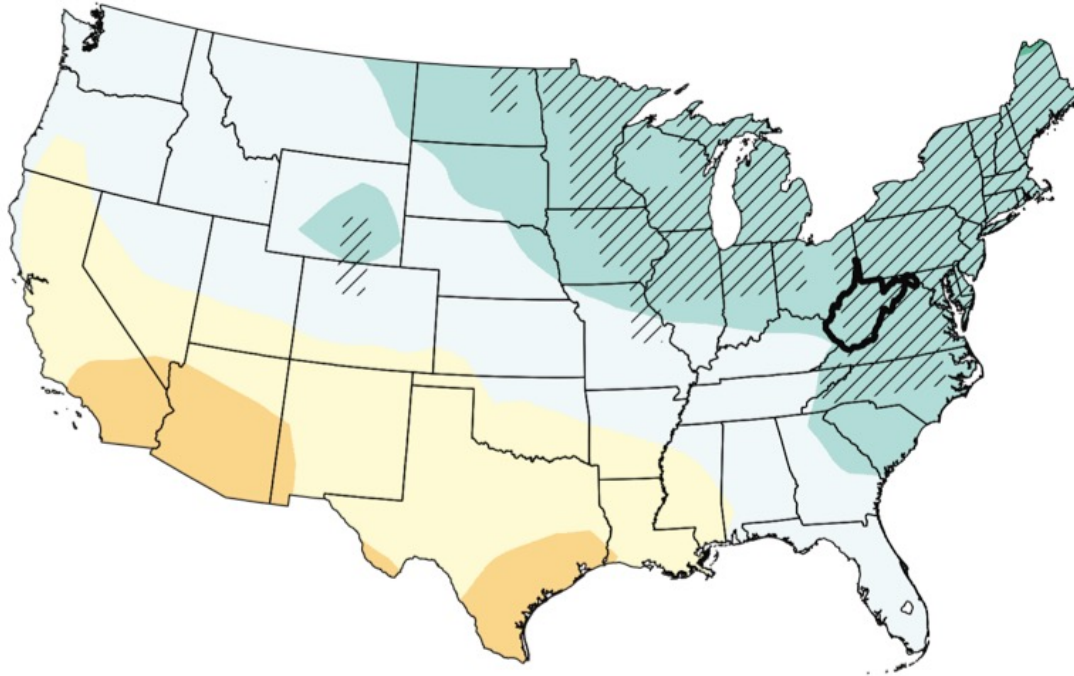
Timeline of notable flood events in WV 1916-2018 (FEMA 2018)



*Report is based on this 2016 flooding event.



Projected Change in Annual Precipitation



Change in Annual Precipitation (%)

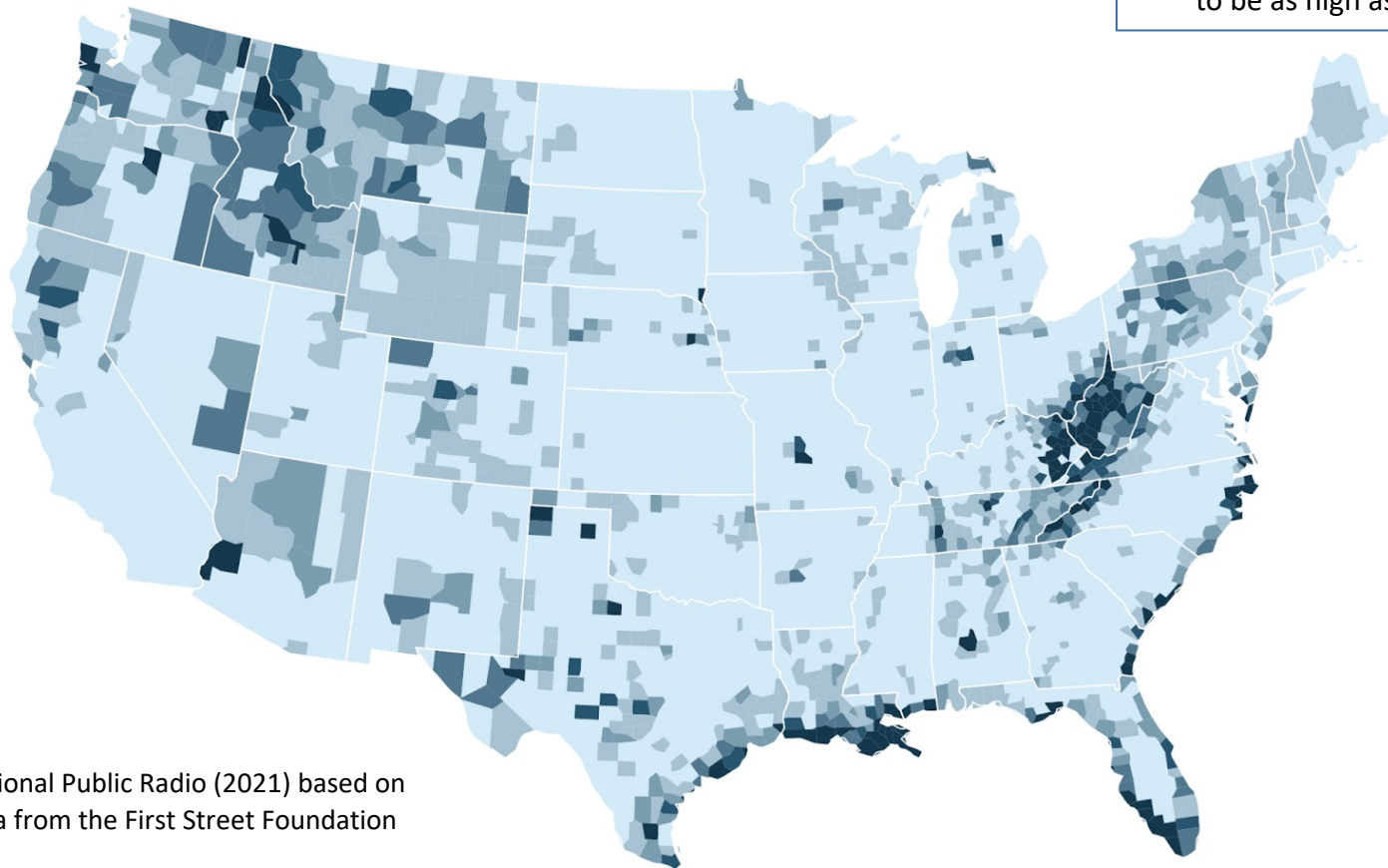


Projected changes in total annual precipitation (%) for the middle of the 21st century compared to the late 20th century under a higher emissions pathway.

Source: NOAA National Centers for Environmental Information (2022)

Where People Are At Risk For Flood Damage

Percent of residential properties at risk by county, 2020



- Essentially the entire state of WV is at risk (unlike for other states)
- The risk from flooding in WV is predicted to be as high as in coastal areas

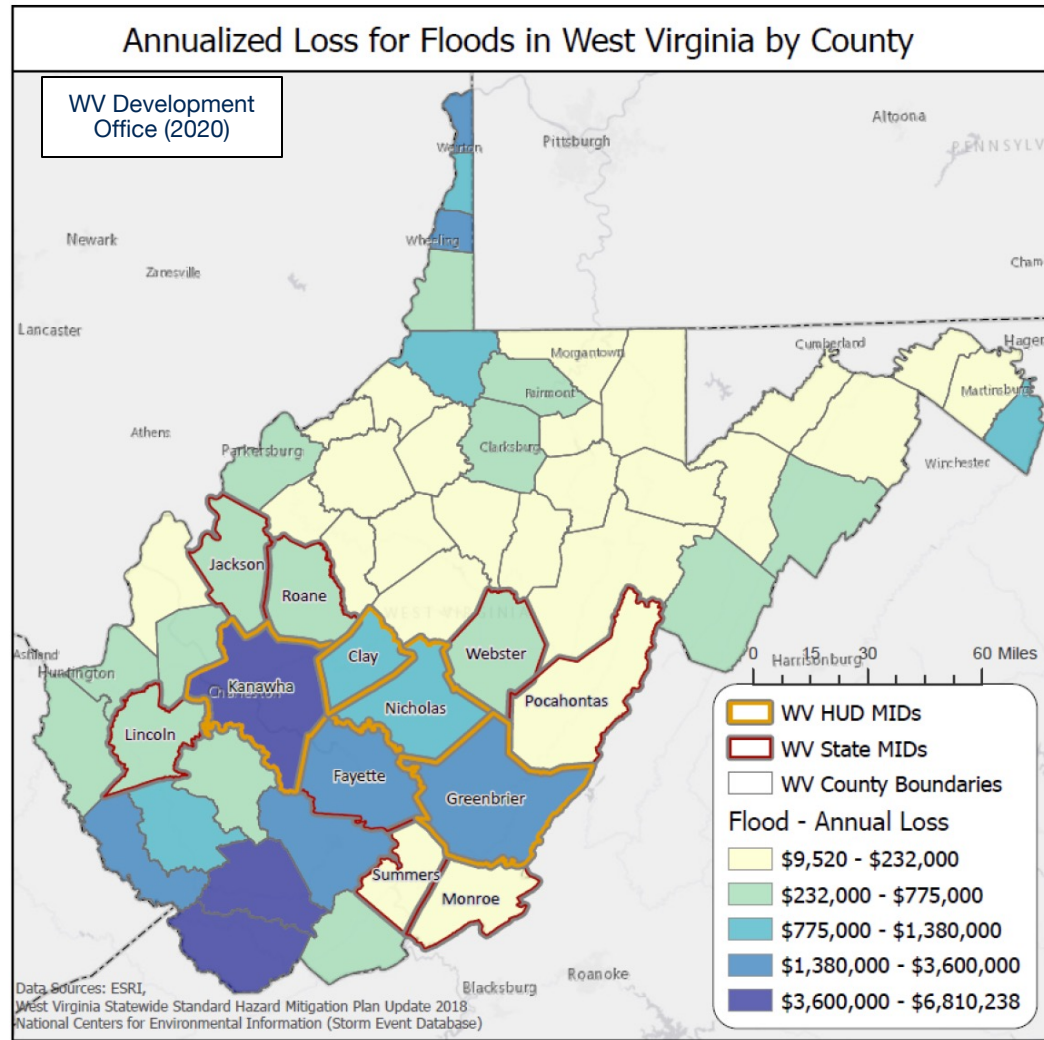
National Public Radio (2021) based on data from the First Street Foundation

for Science & Technology
Communications, and Leadership

Some of the costs of flooding...



Flood response to 2016 flood in Rainelle, WV
 Photo Source: Register-Herald (2016)





Dam Safety Performance Report WEST VIRGINIA



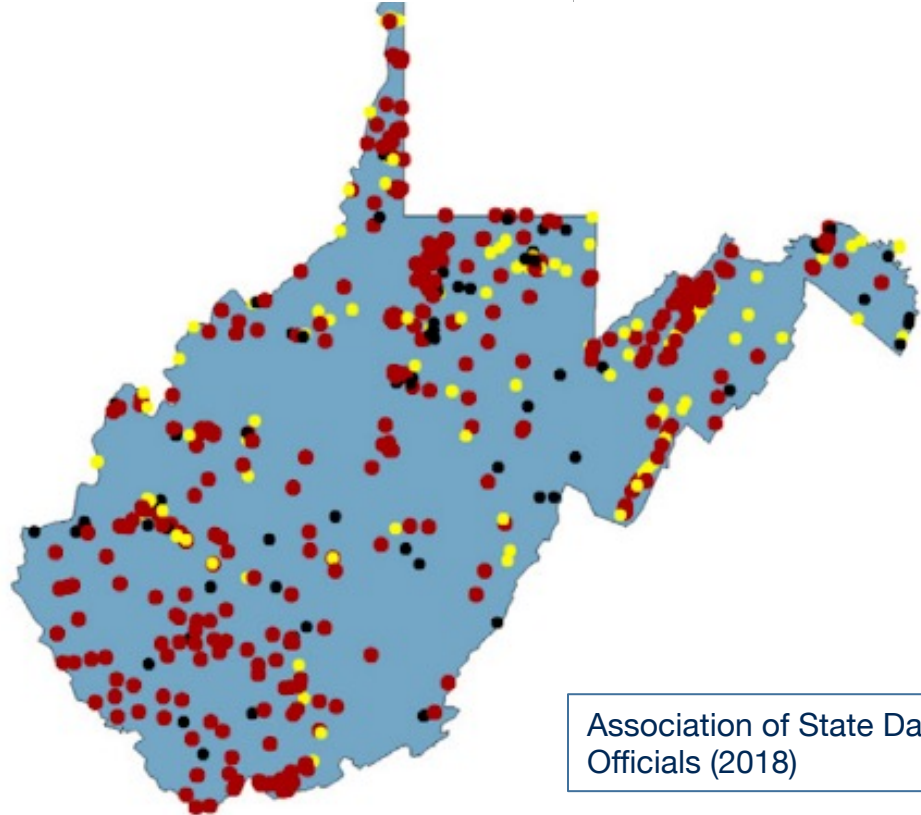
High-hazard potential dam: failure or mis-operation will cause loss of human life and significant property destruction



Significant-hazard potential dam: failure or mis-operation will cause significant property destruction.



Low-hazard potential dam: failure or mis-operation will cause minimal property destruction.



Association of State Dam Safety
Officials (2018)



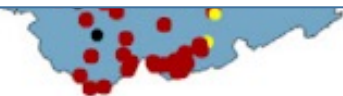
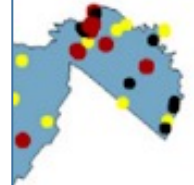
Dam Safety Performance Report

WEST VIRGINIA

- West Virginia's 30 federal dams are now more than 50 years old.
- These dams were designed for last century's climate and are potentially undersized for current and future predicted precipitation regimes.
- Most dams in West Virginia (278) are privately owned, and many (203) are owned by local governments.
- The West Virginia state government has only three engineers to monitor the safety of all the dams in the state.

mis-operation will cause minimal property destruction.

Association of State Dam Safety Officials (2018)



Stakeholder Input

- We held 5 roundtable discussions In April and May 2021
- Invited stakeholders to review the draft guide and provide their input
- We asked the participants to assess the draft policy options:
 - Pros and Cons
 - 4E's
 - Priority Ranking

APPENDIX C: ROUNDTABLE PARTICIPANTS

West Virginia University's [Bridge Science and Technology Policy, Leadership, and Communications Initiative](#) acknowledges the helpful comments from the following persons who attended one or more of the Roundtable Discussions, held in April and May, 2021:

[Christie Bailey](#)

Executive Director, National Coal Heritage Area Authority

[Robert Burton](#)

President, American Water

[Autumn Crowe](#)

Staff Scientist, WV Rivers Coalition

[Andrew Davis](#)

Special Projects Coordinator, New River Gorge Regional Development Authority

[Ben Faulkner](#)

Chairman, WV Mine Drainage Task Force

[Jacob Fowler](#)

Outdoor Recreation Coordinator, WV Tourism Office

[Vernon Haltom](#)

Executive Director, Coal River Mountain Watch

[Jacob Harrell](#)

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[Allison Keller](#)

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[Owen Mulkeen](#)

Associate Director, Friends of the Cheat

[Phillip Musegaas](#)

Vice President and General Counsel, Potomac Riverkeeper

[Anna Plantz](#)

Director of Partner Programs, WV Tourism Office

[Amanda Pitzer](#)

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[Garrett Richardson](#)

Monitoring Technician, Friends of the Cheat

[Angie Rosser](#)

Executive Director, WV Rivers Coalition

[Bryan Smith](#)

Treasurer, Save the Tygart Watershed

[Dennis Stottlemeyer](#)

Deputy Environmental Advocate, WV Department of Environmental Protection

[Kenneth Tawney](#)

President, Elk River Trail Foundation

[Melanie Thornton](#)

Professional Staff, Senator Shelley Moore Capito, U.S. Senate

[Monica Whyte](#)

Environmental Resource Specialist, Office of Environmental Health Service; Source Water Assessment and Wellhead Protection Program, WV Bureau of Public Health

[Tim Williamson](#)

CEO, FreedomWorks, LLC

The 4 E's:

A Framework for Evaluating Policy Options

Adapted by Deborah Stine, from Bardach, Eugene, *A Practical Guide for Policy Analysis: The Eightfold Path to More Effective Problem Solving*.

EFFECTIVENESS:

- What is the current policy?
- Is the new policy or program being considered likely to work better?
- If so, by how much?

EFFICIENCY:

- What is the cost of the current policy?
- What is the cost of the proposed policy relative to its expected benefits?
- Is the proposed policy the “best bang for the societal buck”?

EQUITY:

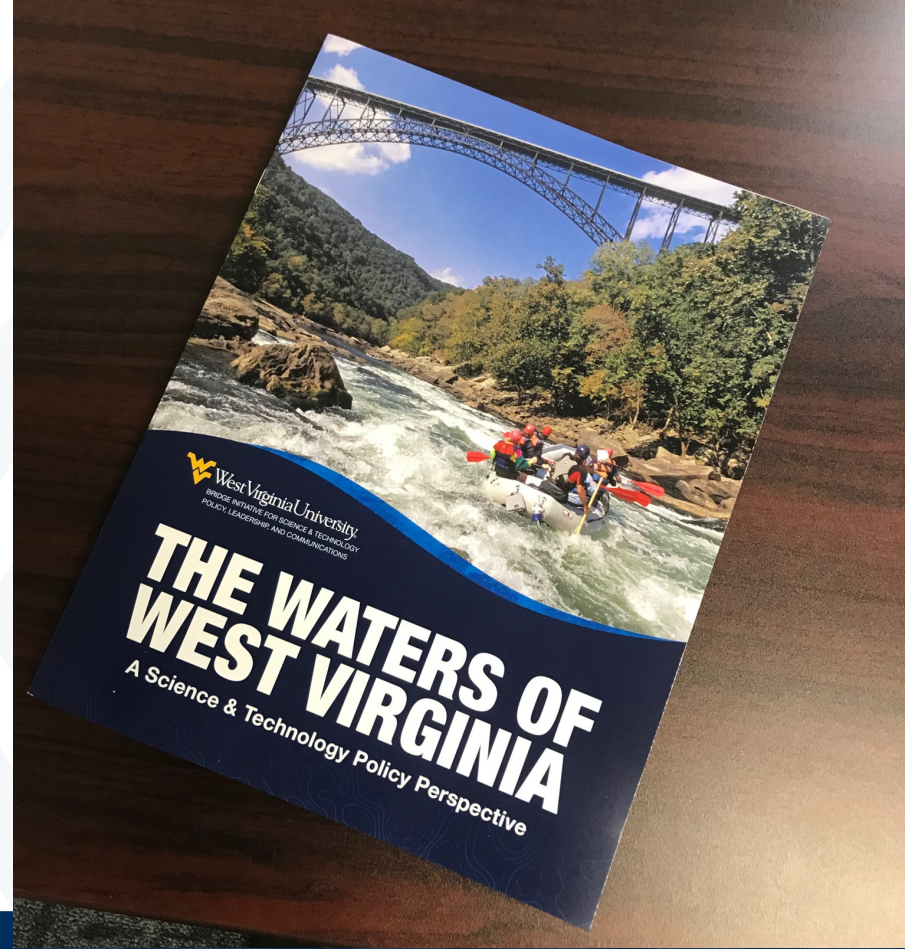
- Is the policy option fair or equitable?
- Who are the winners?
- Who are the losers?

EASE OF POLITICAL ACCEPTABILITY:

- How will government officials & other policy actors appraise the proposed policy?
- Will there be too much opposition?
- Will there be too little support?

The Waters of West Virginia

- Activities:
 - Faculty/Staff study groups in Fall 2020
 - Briefings to WV Federal Delegation Winter 2021
 - Stakeholder Roundtables in Spring 2021
 - Faculty/Staff Recommendations Spring 2021
- Policymaker Guide
 - Available at <https://scitechpolicy.wvu.edu/>



Drinking Water and Wastewater Infrastructure Challenges in West Virginia

Access to safe and reliable drinking water and wastewater infrastructure are critical needs across West Virginia. The recent "West Virginia Infrastructure Survey" led by West Virginia University (WVU) researchers Emily Garter (Wadsworth Department of Civil Engineering) and Jamie Shinn (Department of Geology and Geography) asked West Virginia residents about their water infrastructure challenges that can be addressed through infrastructure investment and jobs act. It is critical to understand the ability of water utilities to provide safe drinking water to residents across the state.



Figure 1: Students at wastewater treatment plant.

Highlights

The results of the survey demonstrate that several key findings related to the operation and maintenance of drinking water and wastewater infrastructure:

- Succession Planning and Staff Recruitment / Retention
- Maintenance of Aging Infrastructure
- Maintaining an Adequate Base of Ratepayers to Fund Infrastructure
- Asset Management and Planning for Capital Investment

Results

Participants completing the survey were professionals working in areas related to water infrastructure at local and county levels, and were identified through resources like online lists of floodplain managers and public service commission reports. A total of 536 professionals were contacted via email with a link to the survey and 92 people answered most or all questions (17% response rate). There were 44 of 55 West Virginia counties represented in the responses (80%). Respondents ranked a variety of water utility operations as either a strength or a



Figure 2: The location of wastewater treatment plants in West Virginia. Source: WVU.

Update West Virginia's Floodplain Maps to Reduce the Financial and Personal Toll Posed by Flooding

Executive Summary

West Virginians face increased personal and financial risk from flood events due to inaccurate Federal Emergency Management Association (FEMA) floodplain maps. Due to this inaccuracy, West Virginians may not know they are in a floodplain so that they are unaware they are at personal risk if flooding occurs and do not purchase flood insurance coverage. West Virginia policymakers should partner with FEMA to update floodplain maps to incorporate both existing and projected extreme rainfall data to better inform citizens of flood risk.



Key Messages and Recommendations

- Inadequate and inaccurate FEMA floodplain maps for West Virginia, put homeowners and businesses at risk since not all homeowners who need insurance know that they should obtain it
- Only 16% of particularly vulnerable structures are covered by flood insurance
- West Virginia's policymakers can partner with FEMA to reconstruct and update its floodplain maps to incorporate both existing and projected extreme rainfall data. This would allow cities and government entities to better prepare for current and projected increased incidences of flooding due to climate change by improving flood insurance and infrastructure investments.

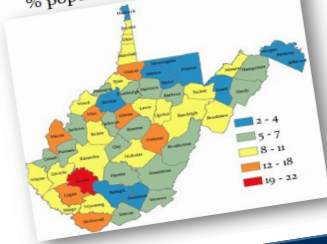
Introduction

West Virginia has a long history of extreme rainfall leading to flooding events. According to West Virginia's 2018 [Statewide Standard Hazard Mitigation Plan Update](#), all counties in West Virginia were ranked as having a high level of risk for flooding.

When flooding events do occur, the financial, social, and human toll are significant. As the frequency of extreme rainfall events increases due to climate change, the risk from flooding in West Virginia is predicted to be as high as that in coastal areas.

FEMA's current floodplain maps are based on historical data rather than potential future climate impacts. These maps indicate that almost 100,000 housing units in West Virginia are in floodplains. However, this number can be deceiving because many areas affected by past flooding have been located outside of the mapped floodplain and therefore many homeowners did not have flood insurance—even though they were eligible for this insurance.

% population living in 100-yr FP



Source: Percent of West Virginia Population Living in 100 Year Floodplain. (Professor Nicholas Zegre) (2021)

Improve Rural Community Wastewater Infrastructure to Enhance Rural Resilience



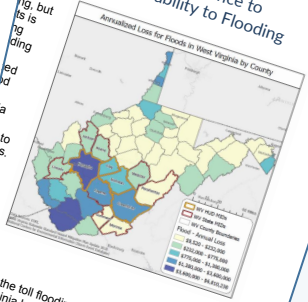
Investing in rural wastewater infrastructure not only puts West Virginians' health at risk but also prevents our state from realizing the economic benefits of adequate water services investment in the Mountain State.

Key Messages and Recommendations

- Safe drinking water in West Virginia has long been a concern as has the infrastructure used to provide that water and to manage wastewater. This infrastructure includes not only the treatment facilities but also the pipes used to convey drinking water to homes and wastewater from them.
- West Virginia's small, rural communities often lack the financial, management, and technical staff to operate their current infrastructure and apply for grants and other support to improve their infrastructure.
- West Virginia policymakers should facilitate coordination of regional approaches that bring together water and wastewater management organizations in multiple counties to improve economies of scale and reduce the cost of services to residents.

Policymakers should also provide a mix of funding for the matching funds needed to apply for federal grants. These regional collaborations can write proposals for federal funding and prioritize the allocation of matching funds, the development of a grant program, and the recruitment of staff on behalf of rural and underserved counties and communities.

West Virginia State Resilience Office to Assess Communities' Vulnerability to Flooding



Under the toll flooding can take on West Virginia has a high level of flooding risk in every county. Between 1993 and 2017, flooding infrastructure and high levels of damage and 103 deaths. Future plans for West Virginia at or near the top of the ranking for utilities, roads, fire and police

Flooding events have been plagued with long-term flood recovery efforts. A recent "West Virginia Infrastructure Recovery" report by the West Virginia Infrastructure Recovery Commission (WVIRC) and Emily Garter reported the need for increased water coordination of response efforts. Without voidable deaths.

In Rainelle, West Virginia, 24 hours of rain in 2017 to southeastern West Virginia killed 23 people, destroyed 1,500 houses and caused more than \$1 billion in damages.

Water issues are connected....

From the policy brief *Drinking Water and Wastewater Infrastructure Challenges in West Virginia* by Dr. Emily Garner

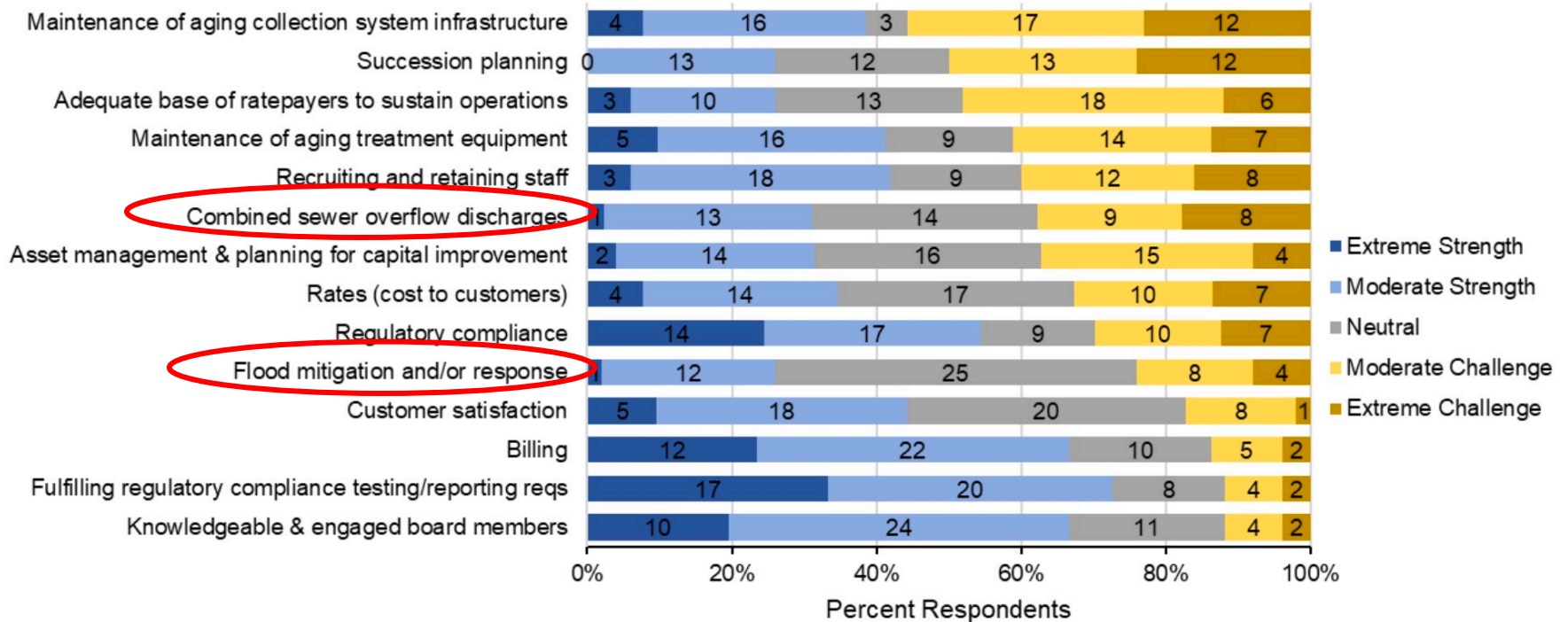


Figure 4: Challenges identified by respondents related to wastewater infrastructure and utility operations

Looking forward.....

- Continuing to work on water issues
- Current study: Carbon Dioxide Removal
- Up next: Rural Health Care
- Engage communities and other stakeholders at the start
 - Building networks
 - Community & stakeholder engagement → co-creation

New Opportunities: The Justice40 Initiative

(Executive Order 14008)

<https://www.whitehouse.gov/environmentaljustice/justice40/>

- **40% of the overall benefits** of certain Federal investments flow to disadvantaged communities that are marginalized, underserved, and overburdened by pollution
- **Scope:** climate change, clean energy and energy efficiency, clean transit, affordable and sustainable housing, training and workforce development, remediation and reduction of legacy pollution, and the development of critical clean water and wastewater infrastructure.
- **All Justice40 covered programs must:**
 - engage in stakeholder consultation and ensure that community stakeholders are meaningfully involved in determining program benefit
 - report data on the benefits directed to disadvantaged communities.
- DOE, USDA....other agencies working to figure out what this looks like!

FEMA programs in the Justice40 Initiative

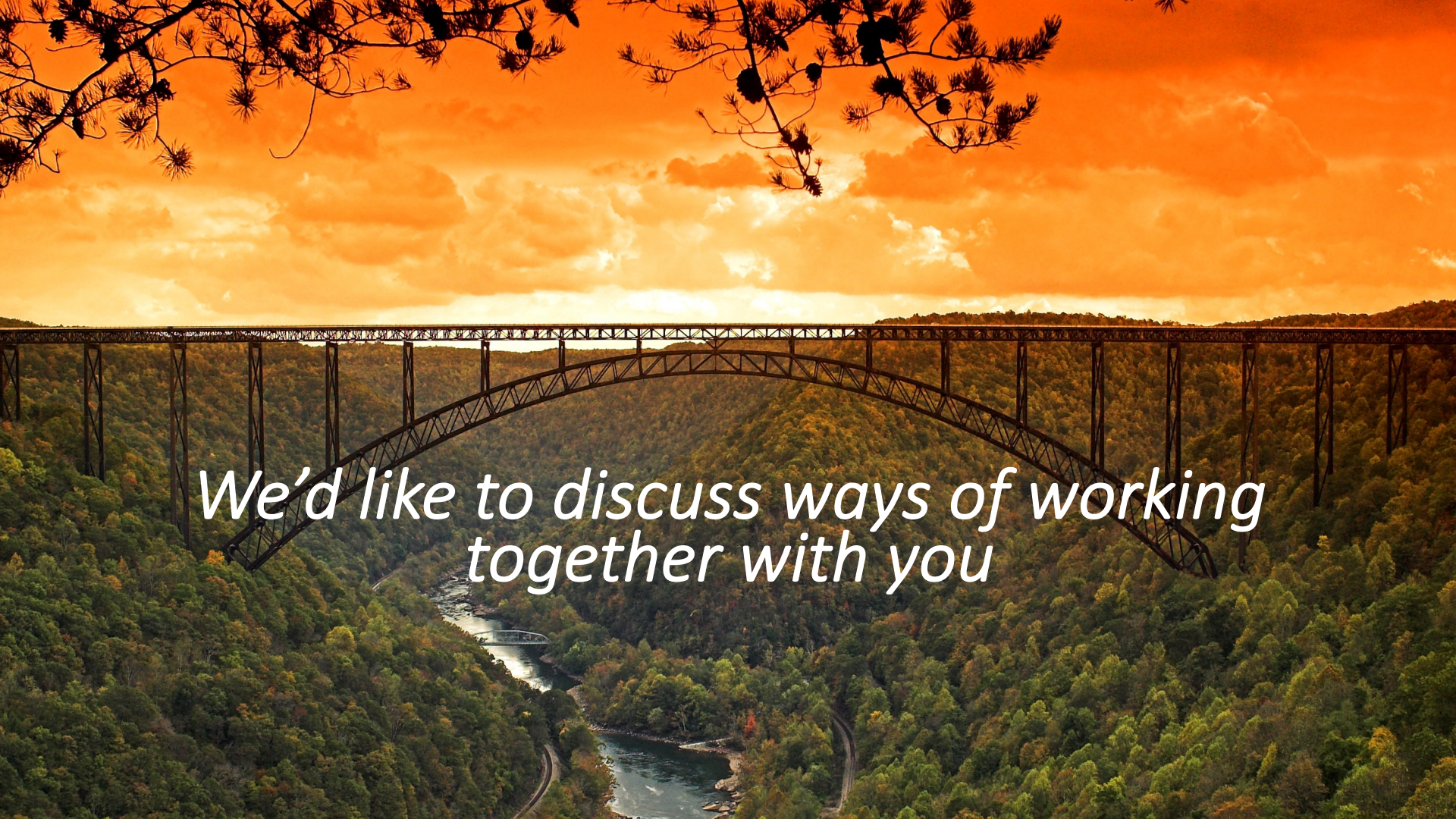
- Announced July 15, 2022

- <https://www.fema.gov/press-release/20220715/fema-announces-programs-included-biden-harris-administrations-justice40>

FEMA programs covered by Justice40 include:

- [Building Resilient Infrastructure and Communities](#) and [Flood Mitigation Assistance](#) competitive annual grant programs, which both provide [Hazard Mitigation Assistance](#) to state, local, tribal and territorial governments to make communities more resilient from natural hazards.
- [FEMA Risk Mapping, Assessment and Planning](#) and the [Regional Catastrophic Preparedness Grant Program](#), which help to ensure that communities are prepared for disasters.
- Through the Flood Mitigation Assistance program, the Justice40 Initiative also covers the [Swift Current Initiative](#), which is the [first FEMA initiative](#) funded through the Bipartisan Infrastructure Law to strengthen national preparedness and resilience.
- The **Swift Current Initiative** aims to better align the delivery of flood mitigation funding to provide improved support to disaster survivors by **expediting Flood Mitigation Assistance awards following a disaster**, rather than through an annual grant application cycle.

- The problems we face are real, and the challenges are many
- We are in a time of possibility and optimism
- Policy windows:
 - Flooding and other water issues
 - Carbon capture and storage
- Significant federal initiatives and spending
- Environmental and social justice are at the fore
- Justice40, Infrastructure and other spending....



*We'd like to discuss ways of working
together with you*