



# West Virginia Risk Explorer

Localized risk assessment tools for analysis and visualization

## West Virginia Flood Resiliency Framework (WVFRF)

June 4, 2025



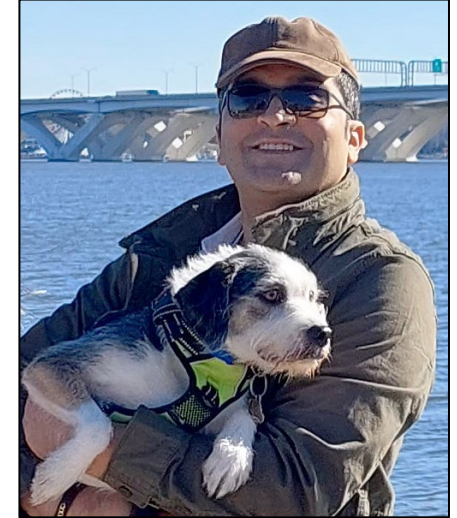
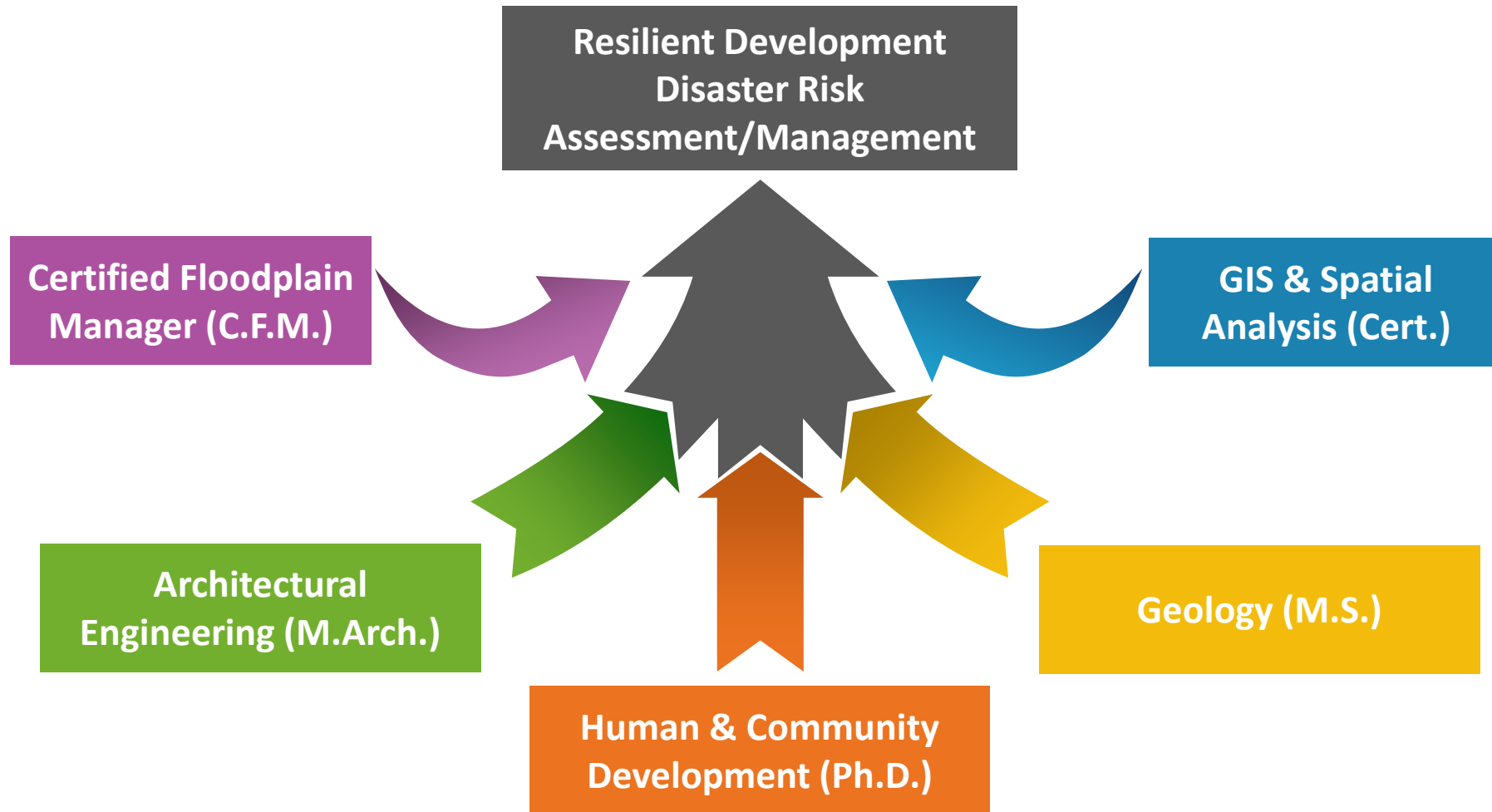
WV GIS Technical Center  
West Virginia University



# About me

**Behrang Bidadian**

Working at the WV GIS Tech Center since 2019





# Flood Risk in WV

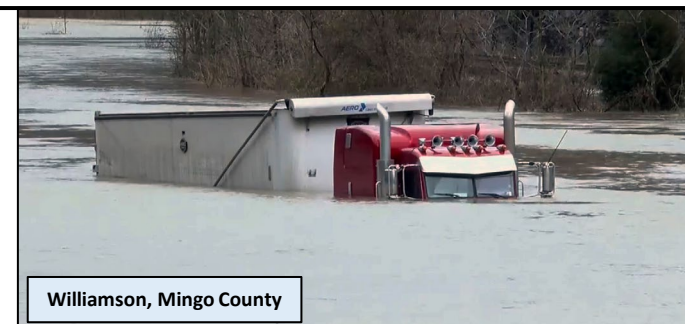
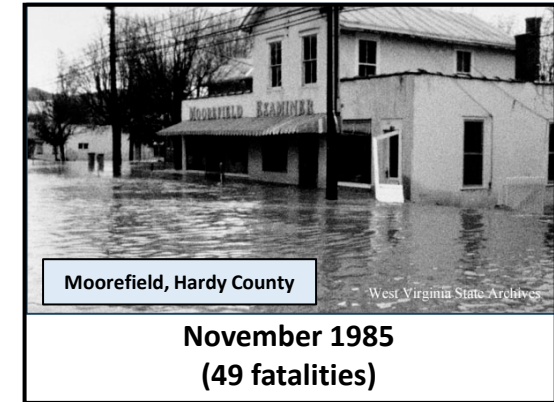
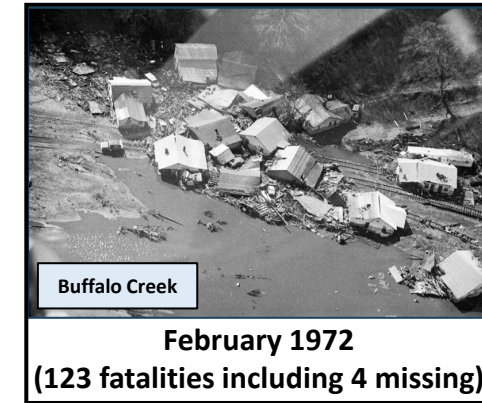
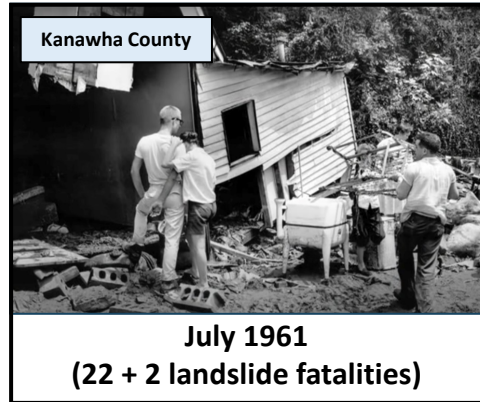


64 Federally-Declared Flood Disasters since 1953

220 Loss of Lives

About 98,000 Buildings (9%)  
in 1%-annual-chance (100-yr) Floodplain

About 199,000 Persons (11%)  
Reside in 100-yr Floodplain





# WV Floodplain Building Inventory (BI)



## Flood Exposure Assessment (Building-Level)

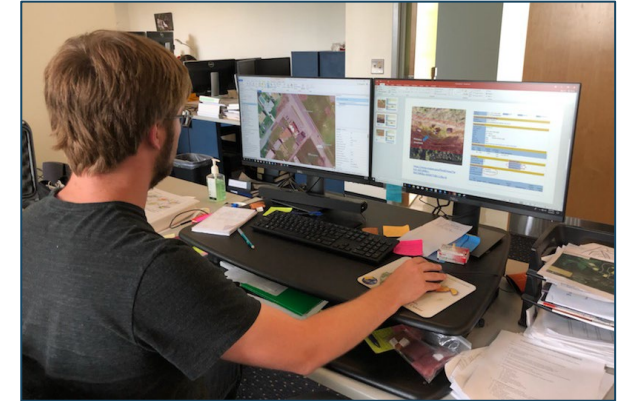
Funded by: FEMA Hazard Mitigation Grant Program (HMGP) and State Hazard Mitigation Office

- All primary (insurable) structures in the 1%-annual-chance (100-yr) floodplain
- Community Assets (Historical & Non-Historical) in the 100-yr floodplain
- Essential Facilities in the 100-yr and 500-yr floodplains

### Essential Facilities



### Community Assets



Detailed building characteristics from tax assessment

+

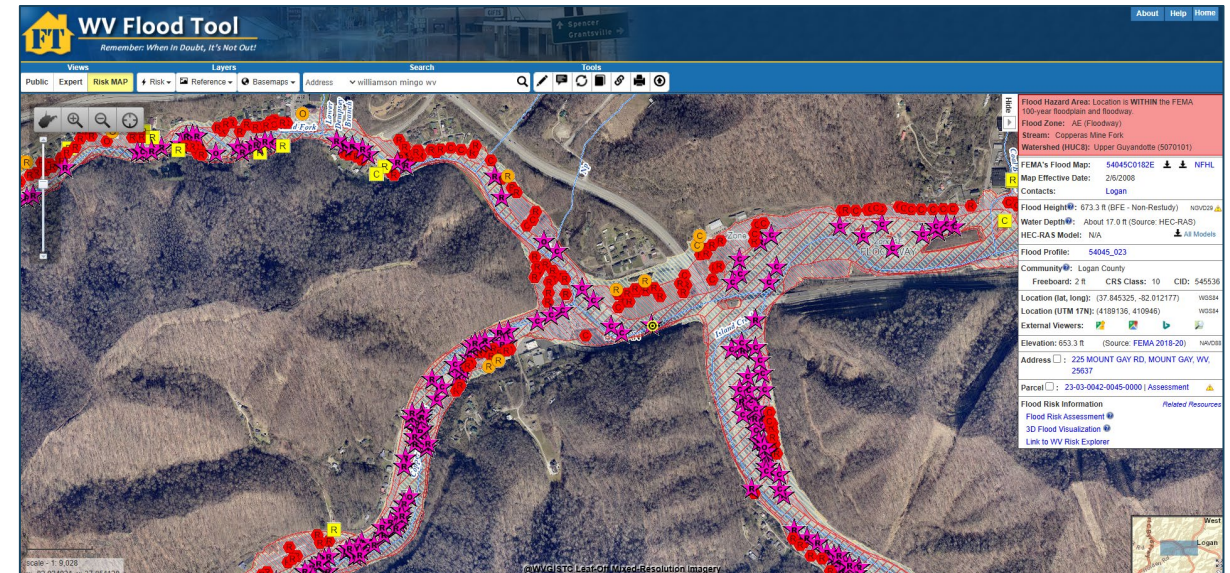
Population exposure and displacement estimates (100-yr flood)

Manual process of identification using Arc GIS

+

Programmed scripts to extract and process data

Product: **WV Flood Tool**  [mapwv.gov/flood](http://mapwv.gov/flood)



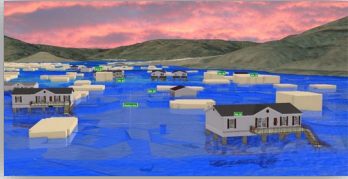


# WV Flood Resiliency Framework (WVFRF)



*A virtual hub of risk assessment, visualization, planning, and training resources for building community flood resiliency in WV*

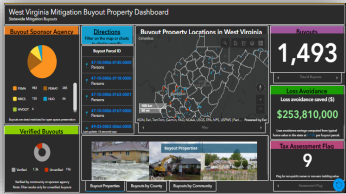
## Flood Visualizations



## WV Flood Tool



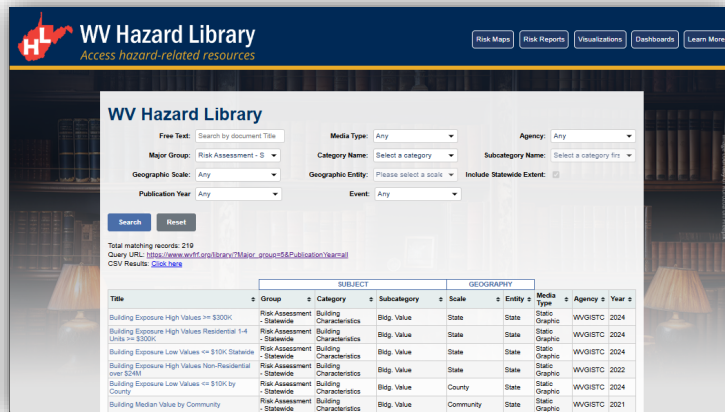
## Flood Dashboards



## WV Risk Explorer



## Example Tools



## Hazard Library

## RISK TOOLS

- WV Risk Explorer
- WV Flood Tool
- Visualizations
- Dashboards

*9 Geographic Scales*

## COMMUNITY ENGAGEMENT

- Focused Outreach Meetings
- Flood Symposium
- Resiliency Tools & Products
- Learning Resources & Reports

## HAZARD LIBRARY

Search online hazard resources by title, subject, media, event, geography, data, etc.

## STAKEHOLDERS

- Risk Reduction Associates
- Emergency Responders
- Floodplain Managers
- Local Officials
- Volunteers
- Public



## Community Engagement Meeting



## Flood Symposium Stakeholders





WVFRF (BETA)

[PROJECT OVERVIEW](#) [WV RISK EXPLORER](#) [WV FLOOD TOOL](#) [CONTRIBUTORS](#) [CONTACT US](#)

## WEST VIRGINIA FLOOD RESILIENCY FRAMEWORK



Image courtesy of The Atlantic

*A virtual hub of risk assessment, visualization, planning, and training resources for building community flood resiliency in West Virginia*

### PRIMARY TOOLS



WV Risk Explorer



WV Flood Tool



WV Property Viewer



WV Hazard Library

## Overall Flood Risk

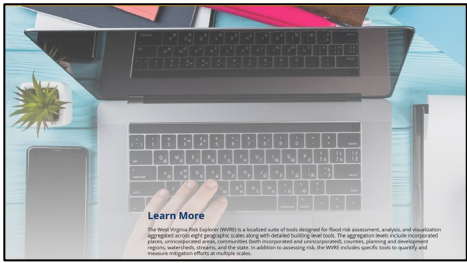
(1) FLOODPLAIN CHARACTERISTICS	(2) BUILDING EXPOSURE	(3) BUILDING CHARACTERISTICS	(4) CRITICAL INFRASTRUCTURE	(5) COMMUNITY ASSETS	(6) BUILDING DAMAGE LOSS	(7) PEOPLE / SOCIAL VULNERABILITIES	(8) OTHER HAZARDS
Floodplain Area	Building Floodplain Count <sup>1 2</sup>	Building Value <sup>1 2</sup>	Essential Facilities	Historical Assets	Substantial Damage Estimates* <sup>1 2</sup>	Population in Floodplain	Landslides
Floodplain Length <sup>1 2</sup>	Building Floodway Count <sup>1 2</sup>	Mobile Homes	Roads Inundated	Non-Historical Assets	Previous Claims	Population Displaced	Karst**
Floodplain Depth <sup>1 2</sup>	Building Floodplain Ratio <sup>2</sup>	Basement			Repetitive Losses	WV Social Vulnerability Index	Dam/Levee Failure**
Flood Disaster Frequency	Building Density <sup>1 2</sup>	One Story					
		Building Year*					

\* Multiple Indicators

\*\* In Progress

<sup>1</sup> River/Stream Indicator

<sup>2</sup> Watershed Indicator





# Analytical & Visualization Tools at Multiple Scales

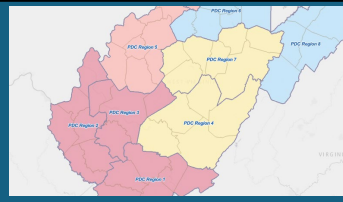


## Political Boundaries

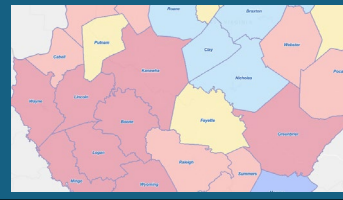
State



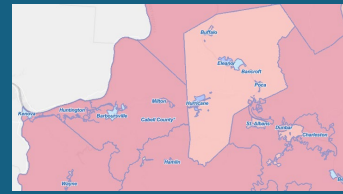
PDC Regions (11)



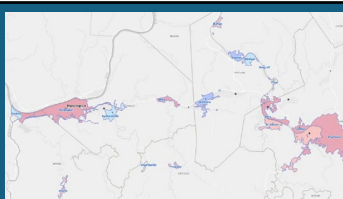
Counties (55)



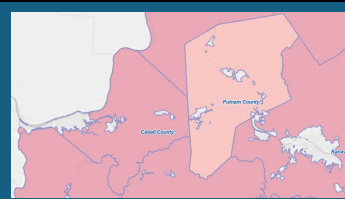
Communities (284)



Incorporated  
Places  
(229)

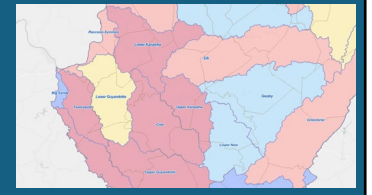


Unincorporated  
Areas  
(55)

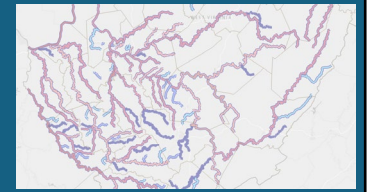


## Drainage Areas / Streams

Watersheds  
(33)



Streams/Rivers  
(156)

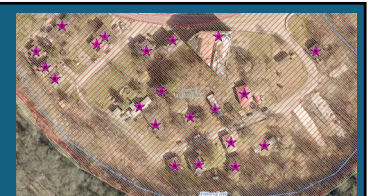


## Property Levels

Parcels



Buildings



# West Virginia Risk Explorer (WVRE)



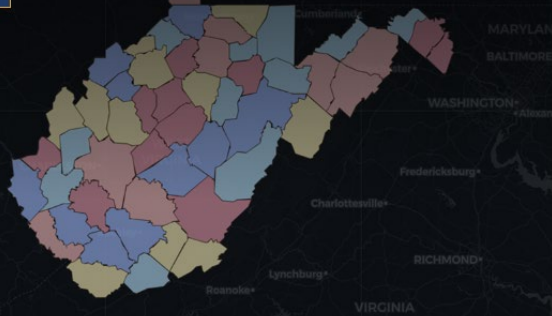
**Risk Assessment Tools:** Localized risk assessment tools for analysis

**WVRE Landing Page:** [wvfrf.org/wvre](https://wvfrf.org/wvre)

## WV Risk Explorer Maps

Interactively view and explore flood risk indicators on a map to identify areas of higher risk.

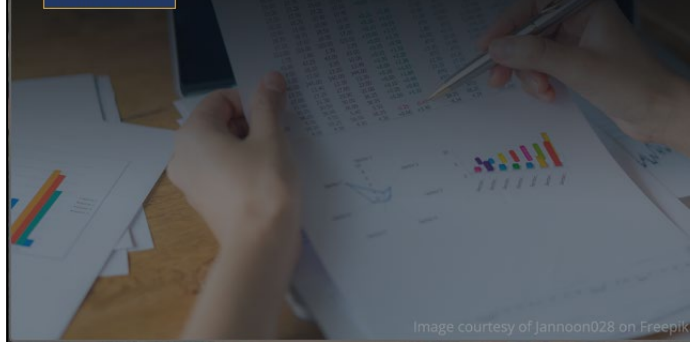
Risk Maps



## WV Risk Explorer Reports

View and download flood risk assessment and comparison reports in more detail.

Risk Reports



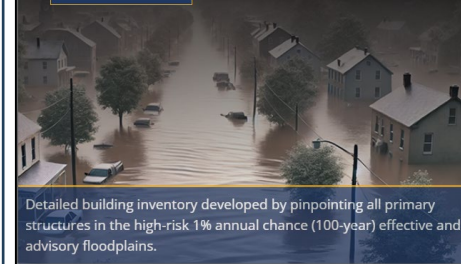
## WV Building-Level (BL) Risk

Analyze flood risk at the level of individual structures in detail.

BL Risk



Primary Structures



Significant Structures



## WV Flood Dashboards

Use the interactive dashboards to analyze risk factors and mitigation measures.

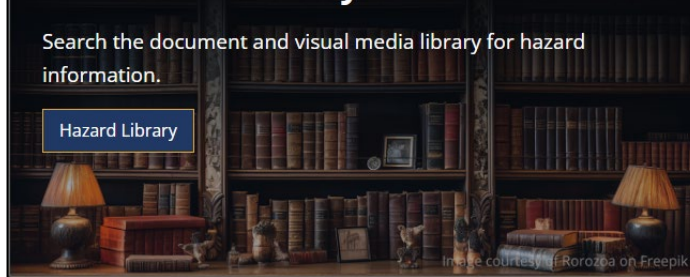
Dashboards



## WV Hazard Library

Search the document and visual media library for hazard information.

Hazard Library



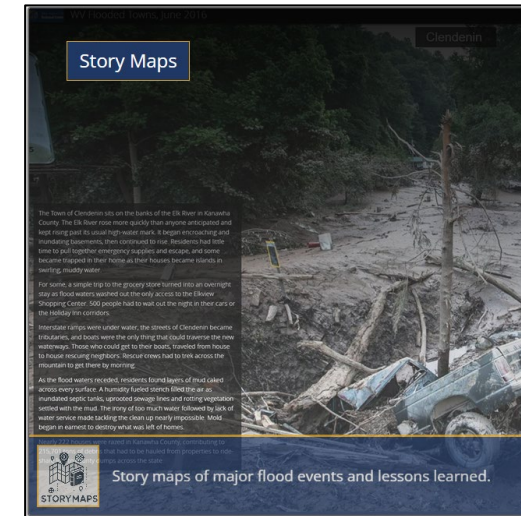
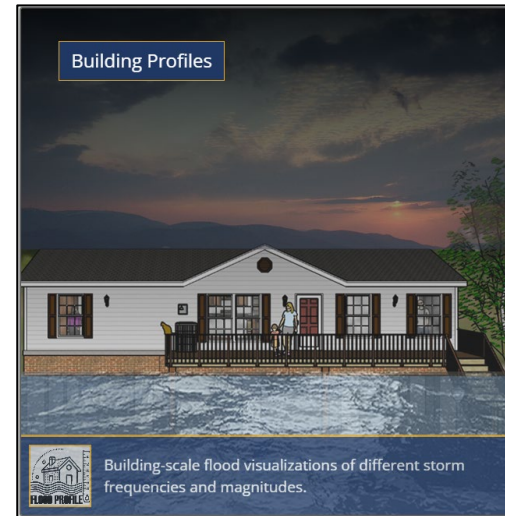


# West Virginia Risk Explorer (WVRE)...



## Risk Communication Tools:

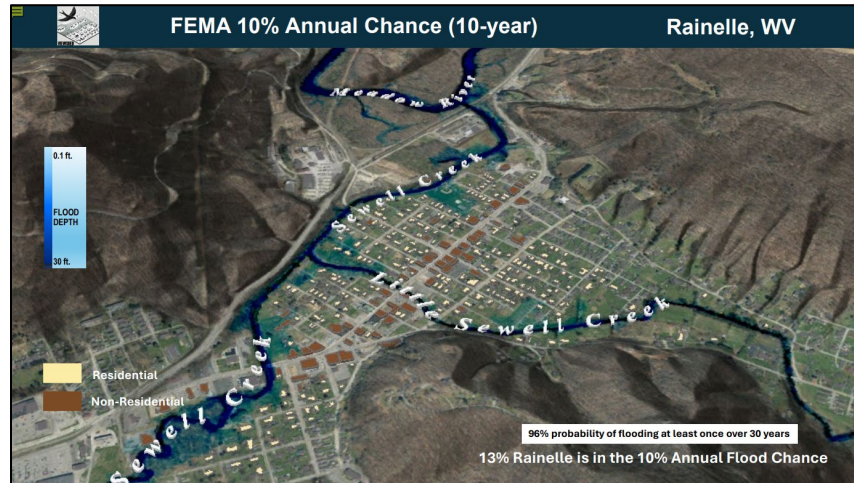
Facilitating risk comprehension for different groups of stakeholders



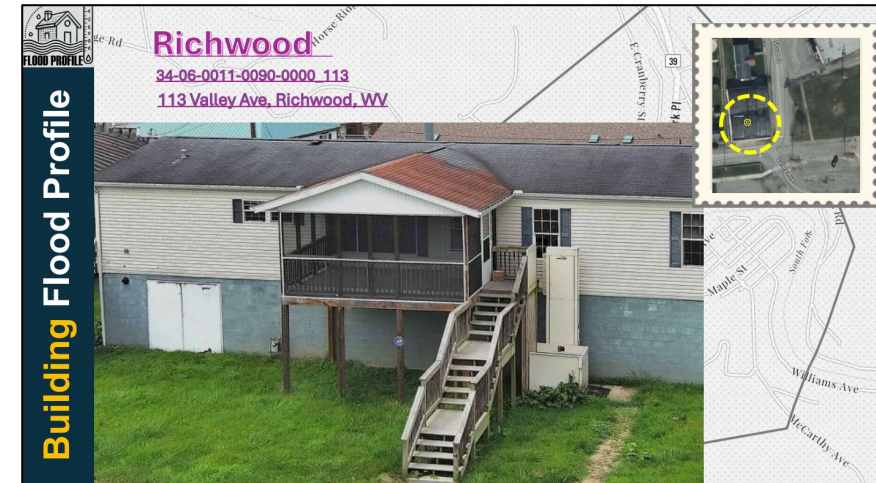
# West Virginia Risk Explorer (WVRE)...



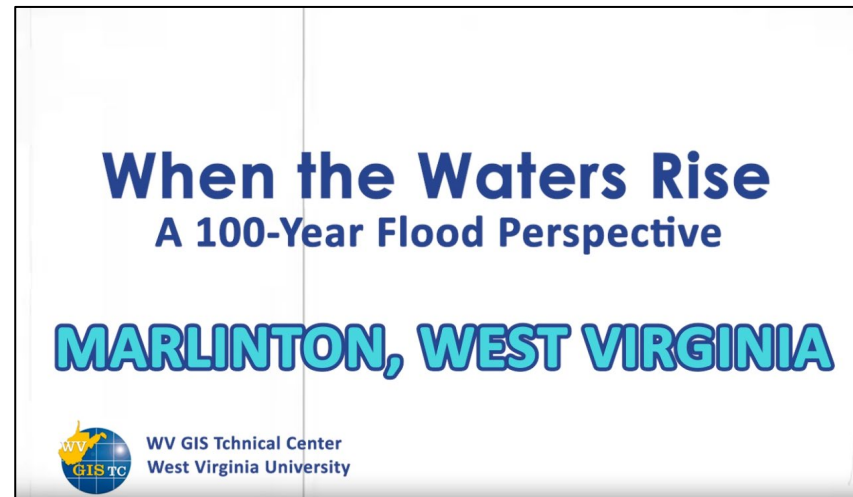
## Visualization Examples:



Viewshed for Rainelle



Building Profile in Richwood



3D Movie for Marlinton

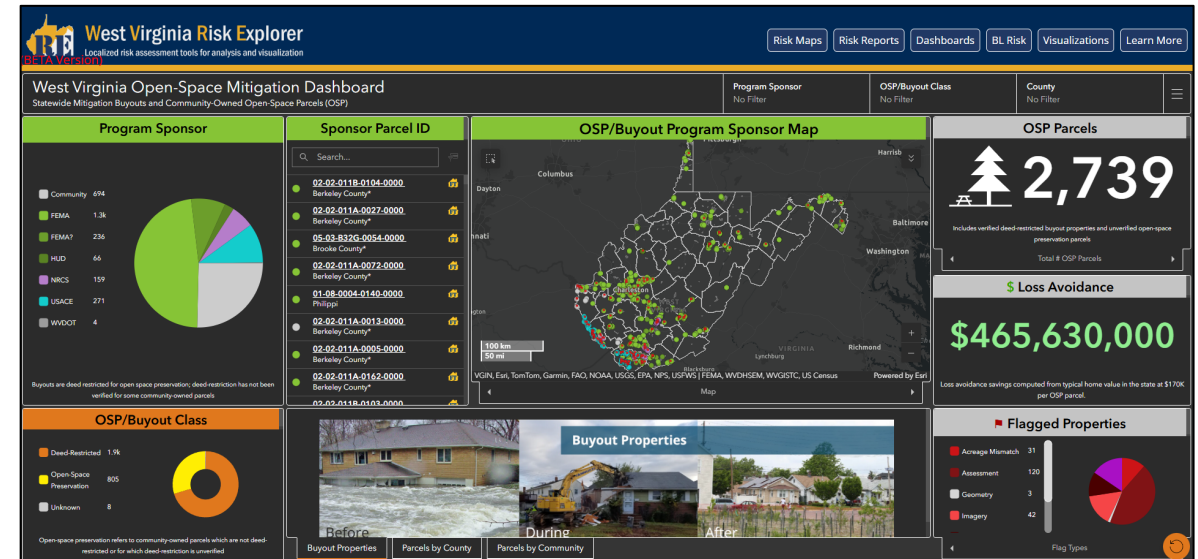
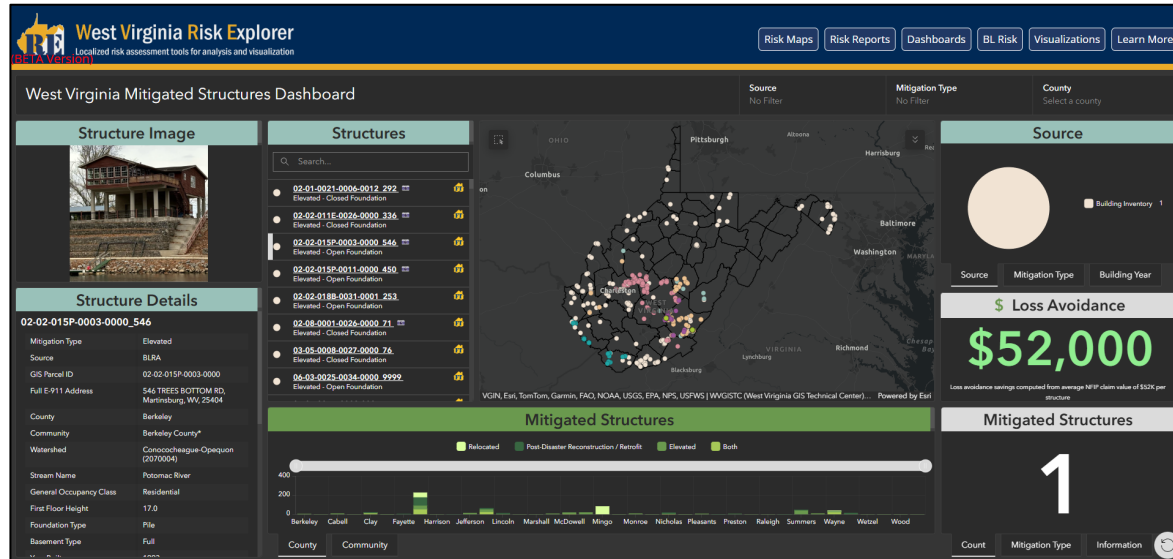


# West Virginia Risk Explorer (WVRE)...



## Mitigation Assessment Tools:

- Mitigated Structures Dashboard
- Open-Space Mitigation Dashboard



# Future Direction



Finalizing the Hazard Library (soon)

Future Maintenance and data updates?

Training?





# Thank you!

## Questions?



Framework website: [www.wvfrf.org](http://www.wvfrf.org)

WV Risk Explorer web tools: [www.wvfrf.org/wvre](http://www.wvfrf.org/wvre)

Email:

[behrang.bidadian@mail.wvu.edu](mailto:behrang.bidadian@mail.wvu.edu)

[kurt.donaldson@mail.wvu.edu](mailto:kurt.donaldson@mail.wvu.edu)