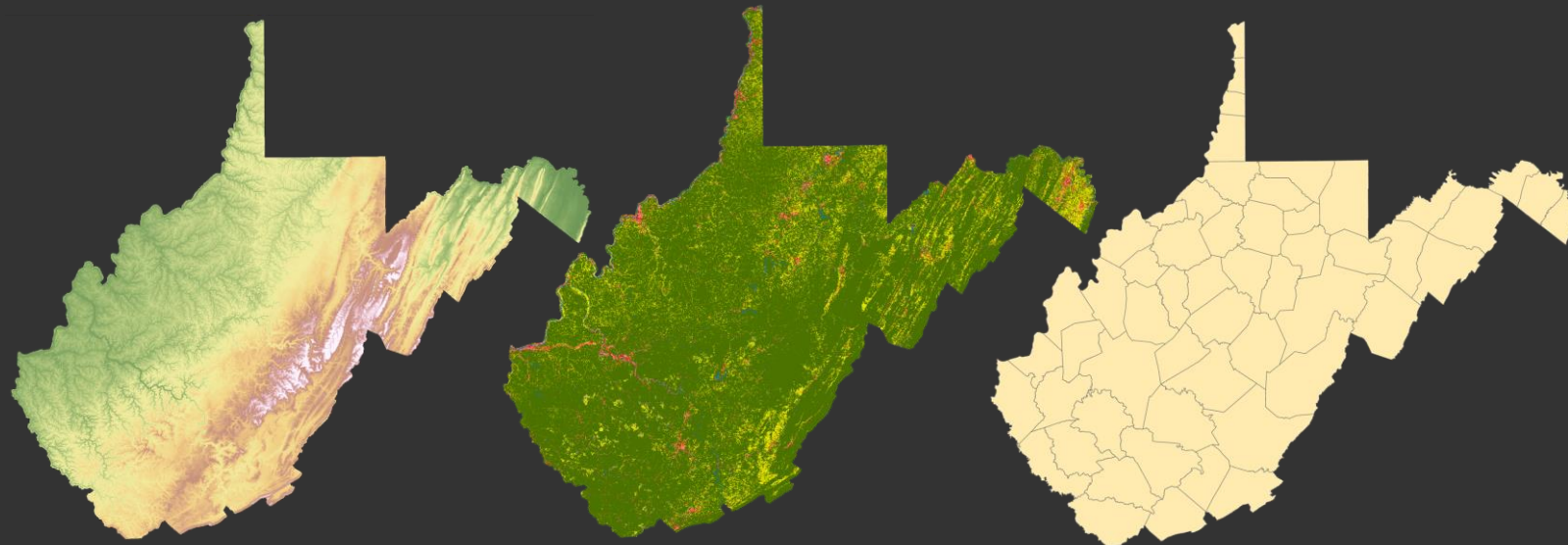
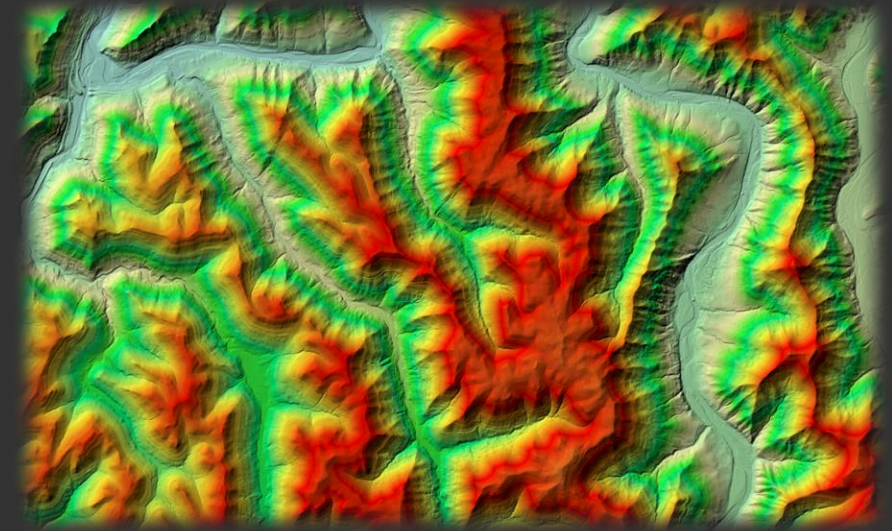
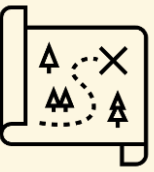


# WV GIS Tech Center

Joint Legislative Committee on Flooding







# About Us

## Donaldson

- Director/Project Manager



## Maxwell

- Faculty Director
- Assistant Professor (WVU Geology and Geography)



## WVGISTC

- Two GIS Programmers/Developers
- Three GIS Analysts
- Contractors/Consultants
- Graduate Research Assistants
- Student Workers

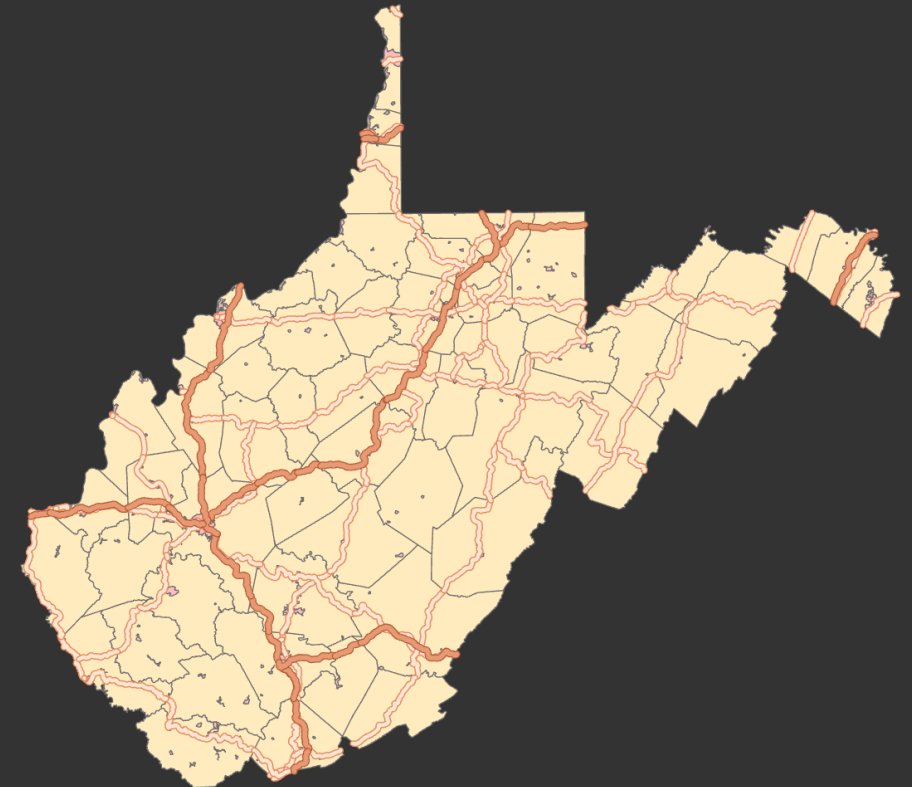


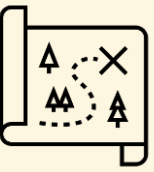
WV GIS Technical Center  
 WVU Department of Geology & Geography  
 330 Brooks Hall  
 P.O. Box 6300  
 Morgantown, WV 26506  
 Phone: (304) 293-0557  
 Fax: (304) 293-6522



# Establishment

- ❖ Executive Order 4-93 (November 1993)
- ❖ Through West Virginia Geologic and Economic Survey and Department of Commerce
- ❖ On April 23 1998, Governor Cecil Underwood dedicated the center in new laboratory facilities in the Department of Geology and Geography at West Virginia University
- ❖ Provide **coordination** and **technical support** in the development and operation of **geographic information systems (GIS)** for the state's **spatial data infrastructure**
- ❖ Statewide geospatial activities are coordinated through the WV Office of GIS Coordination, WV Geological and Economic Survey





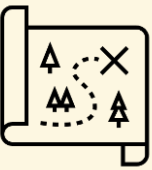
# Mission

1. **Reduce duplication** of data development efforts among organizations
2. **Catalog and distribute** GIS spatial data and information free-of-charge through the internet
3. **Coordinate acquisition of new data** additions to the West Virginia Spatial Data Infrastructure
4. Assist with **strategic planning, development, and implementation** of **statewide mapping guidelines**
5. Provide **advisory services** and training programs in the field of geographic information science
6. **Conduct research and provide education** towards improvement of geographic information technologies



# Services to the State

---



# Spatial Data Clearinghouse



- ❖ <https://wvgis.wvu.edu/data/data.php>
- ❖ [https://www.mapwv.gov/gis\\_services.html](https://www.mapwv.gov/gis_services.html)
- ❖ Over 300 unique datasets and 120 web services
- ❖ Valued at more than \$70 million dollars
- ❖ In 2023 the wvgis.wvu.edu webpage averaged over 53,000 views (i.e., page loads or reloads either from internal or external links) and 581 visits (i.e., landing on page from an external page) per day with over 19 million page views and 212,000 page visits for the entire year

In need of updating and modernization. This web-based clearinghouse is central to the state's geospatial data infrastructure.

The screenshot shows the West Virginia GIS Technical Center website. The header includes the logo and navigation links: Home, GIS Data, GIS People, Resources, Training, About, and Help!. The main content area is divided into sections: 'About' (providing contact information for the WV GIS Technical Center), 'Data Spotlight' (featuring a 'Hillshade 1- to 3-Meter Statewide Mosaic'), and 'Featured Organizations' (listing partners like Map West Virginia, State GIS Coordinator, and WVAGP). A 'News' section highlights the 'New Voting Precinct Online Map Launched' on 3/4/2022.

The screenshot shows the 'GISData/Services' page. It includes a header for 'WV GIS Technical Center GIS Services' and a note about service updates. Below is a table titled 'Imagery - Leaf Off' with columns for Name, Description, Projection, Date, Information, and REST Services.

Name	Description	Projection	Date	Information	REST Services
WV Aerial Photo Mixed Resolution	Sheriff's imagery updated with more recent and higher resolution (typically 6") local imagery	Web Mercator	2010-2023	<a href="#">Link</a>	<a href="#">Link</a>
Sheriff Association 2010-2012	12" (rural) and 4" (urban) pixel resolution, mostly leaf-off. 4" denoted by magenta boxes. Largest viewing scale 1:282.	Web Mercator	2010-2012	<a href="#">Link</a>	<a href="#">Link</a>
WV SAMB 2003 2ft WebMercator	2-ft pixel resolution	Web Mercator	2003	<a href="#">Link</a>	<a href="#">Link</a>

ned completely covering the state and has been delivered and processed. Use the following link to find your election boundaries: [MapWV.gov/vote!](http://MapWV.gov/vote!)

unloading the elevation data: [LIDAR Metadata](#) and [WV Elevation and LIDAR](#)





# Web Maps and Services

Home Static Maps Interactive Maps GIS Data/Services

WV GIS Technical Center  
**Map West Virginia**

West Virginia Flood Tool

Provides effective means to make informed decisions about the degree of flood risk for a specific area or property!

Mapping Gateway for West Virginia

MapWV is a public gateway to online mapping resources in the Mountain State. It allows user access to a wealth of high-quality maps and geographic data via the Internet.

All of our maps are free for use by the public. Feel free to use them as you need. If you've got a unique use for one of our maps, we'd love to hear about it!

Get Static Maps!

Get Interactive Maps!

Looking for GIS data?

Check out our GIS Data Clearinghouse or our GIS Map Services for GIS Data!

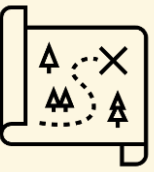
GIS Data Clearinghouse GIS Data Services

Copyright © 2018 West Virginia GIS Technical Center, All Rights Reserved. Please check our [Terms of Use](#) for rules and regulations regarding map usage.

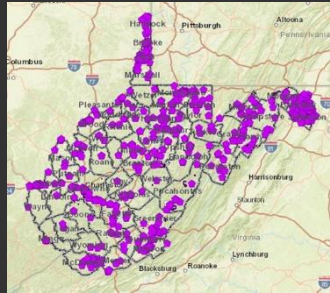
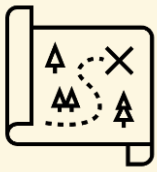
Visit the West Virginia State Web Portal at [www.wv.gov](http://www.wv.gov). Any questions or comments: [Contact us](#). Updated July 2018.

- ❖ [www.mapwv.gov](http://www.mapwv.gov)
- ❖ Publicly accessible gateway to essential base map layers and geoprocessing services
- ❖ In 2023 mapwv.gov had on average over 106,000 page views and 8,000 page visits per day with a total of over 38 million views and 2.9 million visits.
- ❖ The most visited app is the WV Property Viewer (<https://www.mapwv.gov/parcel/>) followed by the WV Property Assessment app (<https://www.mapwv.gov/assessment/>).
- ❖ Other key services/apps include the WV Flood Tool (<https://www.mapwv.gov/flood/>), WV Trail Inventory (<https://www.mapwv.gov/trails/>), and Hunting, Trapping, Fishing Map (<https://mapwv.gov/huntfish/>).

Requires continuing support/maintenance



# Interactive Maps



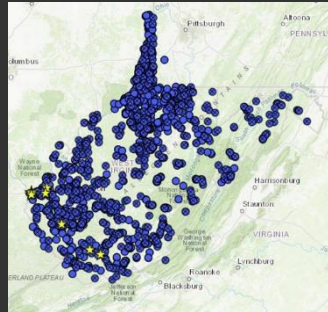
## WV Cultural Resources

<https://mapwv.gov/shpo/>



## Property Viewer

<https://www.mapwv.gov/parcel/>



## Landslide Tool



## Trail Inventory

<https://www.mapwv.gov/trails/>



## Flood Tool

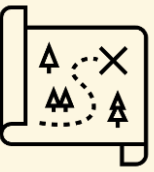
<https://www.mapwv.gov/flood/>



## Hunting and Fishing

<https://mapwv.gov/huntfish/>





# Teaching/Workforce Development

❖ West Virginia Association of Geospatial Professionals (WVAGP)



<https://www.wvagp.org/>



<https://wvview.org/>

❖ West Virginia View

## West Virginia Association of Geospatial Professionals

[Home](#) » [GIS Foundations \(Three-Day Workshop\)](#)

[Back](#)

Add to my calendar

**Start** June 03, 2024

### GIS FOUNDATIONS (THREE-DAY WORKSHOP)

**End** June 05, 2024

#### GIS FOUNDATIONS TRAINING COURSE

**Schedule** 3 sessions

#1. June 03, 2024, 8:00 AM  
5:00 PM (EDT)

*Instructor-Led, In-Person course*

**Dates:** June 3-5, 2024

#2. June 04, 2024, 8:00 AM  
5:00 PM (EDT)

**Location:** West Virginia University, Brooks Hall

#3. June 05, 2024, 8:00 AM  
5:00 PM (EDT)

GIS Foundations is a thorough overview of the most widely used tools and skills for the GIS Professional. The topics are broken up into sections over 3 days and students can attend any or all of the days as needed. All coursework will be utilizing ArcGIS Pro.

**Location** Brooks Hall,  
Morgantown, WV  
26505

**Spaces left** 13

**General Agenda:** (see more details at bottom)

**Registration**  
(depends on selected options)

• **Day 1 (Monday) Topic:** *GIS Foundations I: Basics of ArcPro* - This course is designed to introduce the fundamental concepts of geographic information systems, demonstrate their use and value, and provide practical skills which can be directly applied to the work environment. **Prerequisite:** Students are strongly encouraged to have basic computer operations knowledge, file management etc.

**Base fee:**

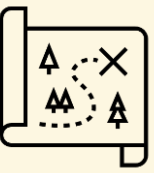
• **Day 2 (Tuesday) Topic:** *GIS Foundations II: Foundations of GIS* - This course is designed to provide an overview of the basic building components for an effective and useful GIS. The course focuses on best practices for building a functioning GIS topics cover databases and tables, querying and selection processes, basic analysis tools, and the basics of editing. **Prerequisite:** Students are strongly encouraged to have basic GIS skills, or the GIS Foundations I course.

**Non-Member, All Foundations (I, II, and III) - \$600.00**

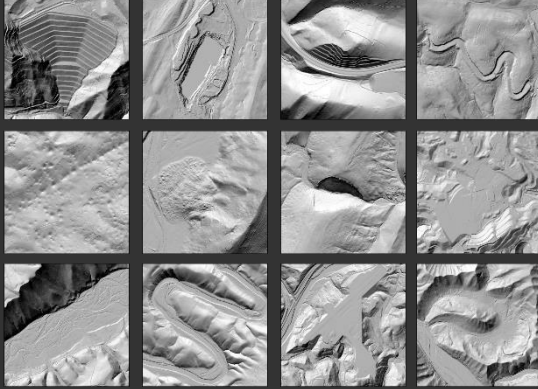
Full rate (\$200/day) for all days of the workshop.

• **Day 3 (Wednesday) Topic:** *GIS Foundations III: Spatial Analysis & Modeling* - This course is designed to introduce more detailed analysis options and tools. **Prerequisite:** Students are strongly encouraged to have experience using GIS, or have taken the GIS Foundations I and II courses.

<https://www.wvagp.org/event-4829791>



# Project/Data Highlight



## Statewide LiDAR Elevation Data

<http://data.wvgis.wvu.edu/elevation/>



## Landslide Hazards

<https://www.arcgis.com/apps/webappviewer/index.html?id=cb01c47cfa884309b4f38dcd7542f805>



## Statewide High-Res Aerial Imagery

<https://services.wvgis.wvu.edu/ArcGIS/rest/services>



## Tax Parcels

<https://www.mapwv.gov/parcel/>

## Highway plan scanning

<http://www.mapwv.gov/DOTplans/>

**Highway Plans Locator**  
Search and View Scanned Highway Plans

Enter one or more search criteria

Free Text: <input type="text" value="search criteria"/>	Sign System: <input type="text" value="Any"/>	Project Title: <input type="text" value="search titles for..."/>
County: <input type="text" value="Any"/>	ProjectWise: <input type="checkbox"/>	Federal Project: <input type="text" value="search federal projects for..."/>
Route: <input type="text" value="route number..."/>	(Through): <input type="text" value="ending mile..."/>	State Project: <input type="text" value="search state projects for..."/>
Mile Marker: <input type="text" value="starting mile..."/>	(End Year): <input type="text" value="ending year..."/>	Project Key: <input type="text" value="search keys for..."/>
Fiscal Year: <input type="text" value="starting year..."/>		Bridge: <input type="text" value="search for bridge numbers..."/>

Show first 100 matches only

**Addressing**  
<http://wvsams.mapwv.org/samsii/>

# WV Flood Tool

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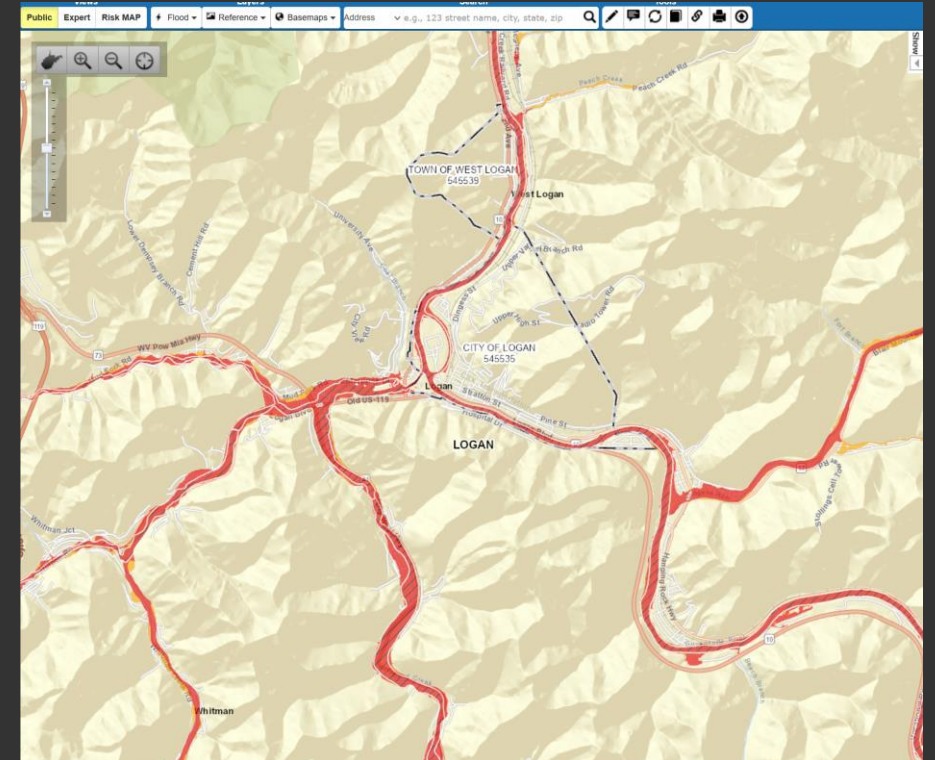




# West Virginia Flood Tool

❖ Support the **public** and **floodplain managers** of **268 flood-prone communities** with regulatory and **flood risk products** including maintaining an inventory of **98,000 structures** located in **high-risk floodplains**.

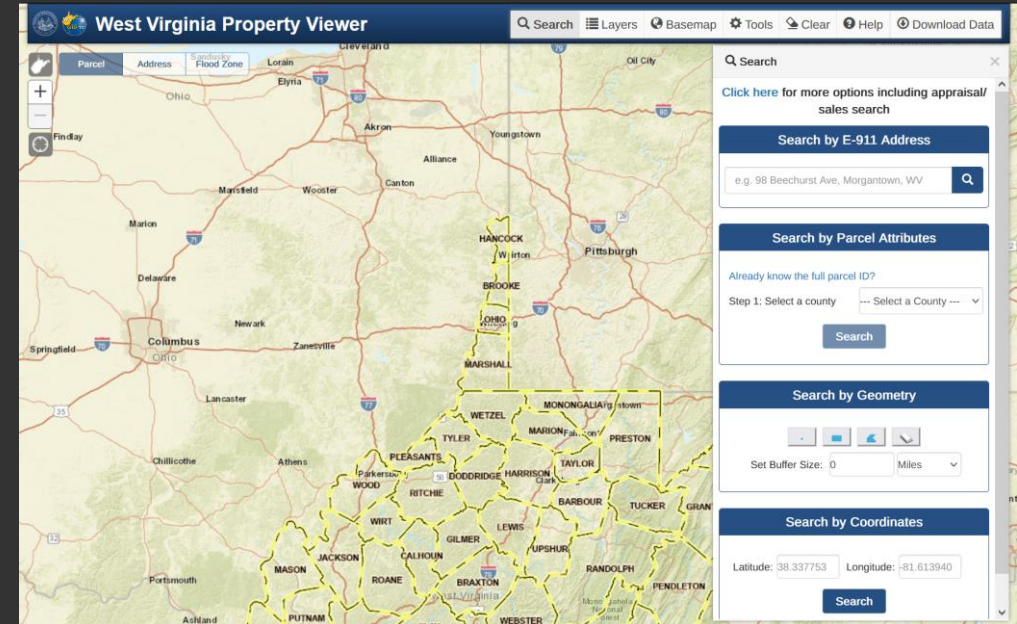
❖ [www.mapwv.gov/flood](http://www.mapwv.gov/flood)





# West Virginia Property Viewer

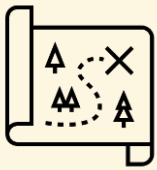
- ❖ Coordinate with county assessors and **WV State Tax Department** to maintain **1.4 million parcels** on the WV Property Viewer
- ❖ [www.mapwv.gov/property](http://www.mapwv.gov/property)
- ❖ **Most popular** website hosted by the Center
- ❖ Weekly updates of **delinquent properties** from the WV State Auditor's Office



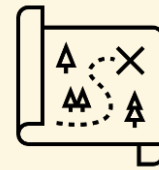
WVFRF



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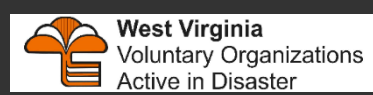
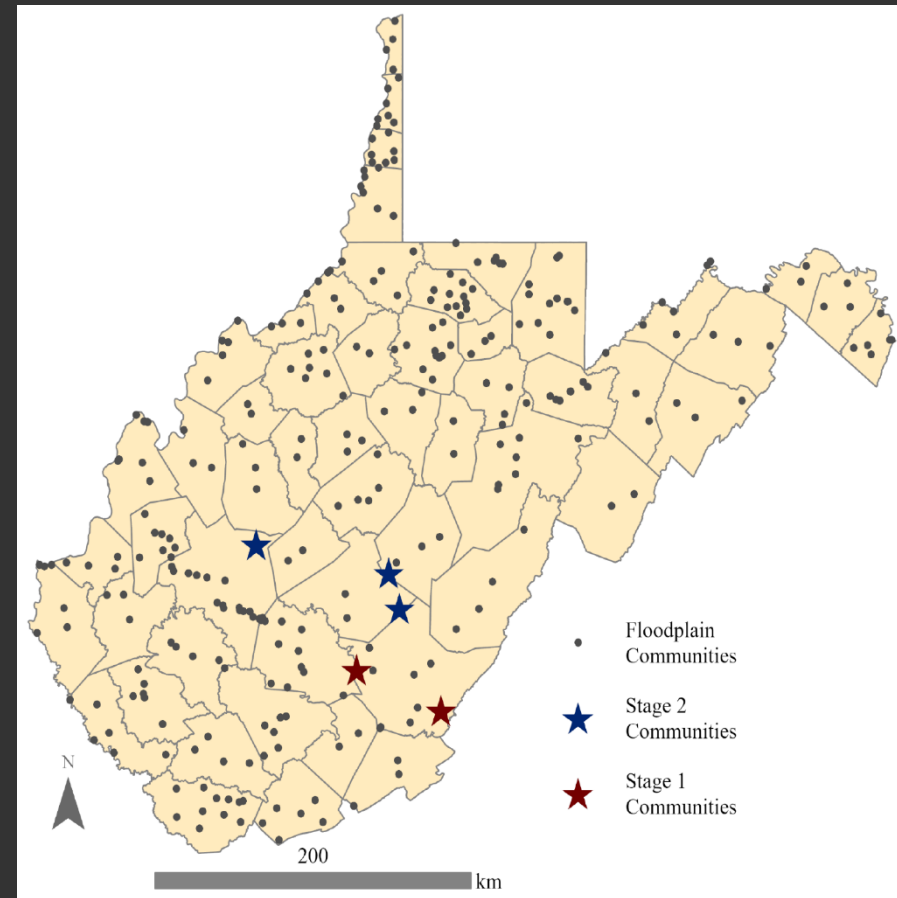


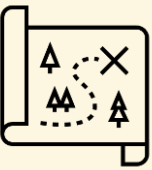


# WV Flood Resiliency Framework



- ❖ National Science Foundation  
- ❖ Award Number 2321985: "CIVIC-FA Track B: Creating the West Virginia Flood Resilience Framework for comprehensive disaster response and long-term community recovery"
- ❖ State-wide survey to assess how well WV residents have recovered from past floods and how prepared they are for future floods
- ❖ Flood risk indicator reports for all 286 floodplain communities in WV
- ❖ Develop in-depth flood risk visualization tools for select communities
- ❖ In-person and virtual trainings about floodplain management and flood insurance
- ❖ Host the Statewide Flood Resilience Symposium
- ❖ Build and launch the WVFR

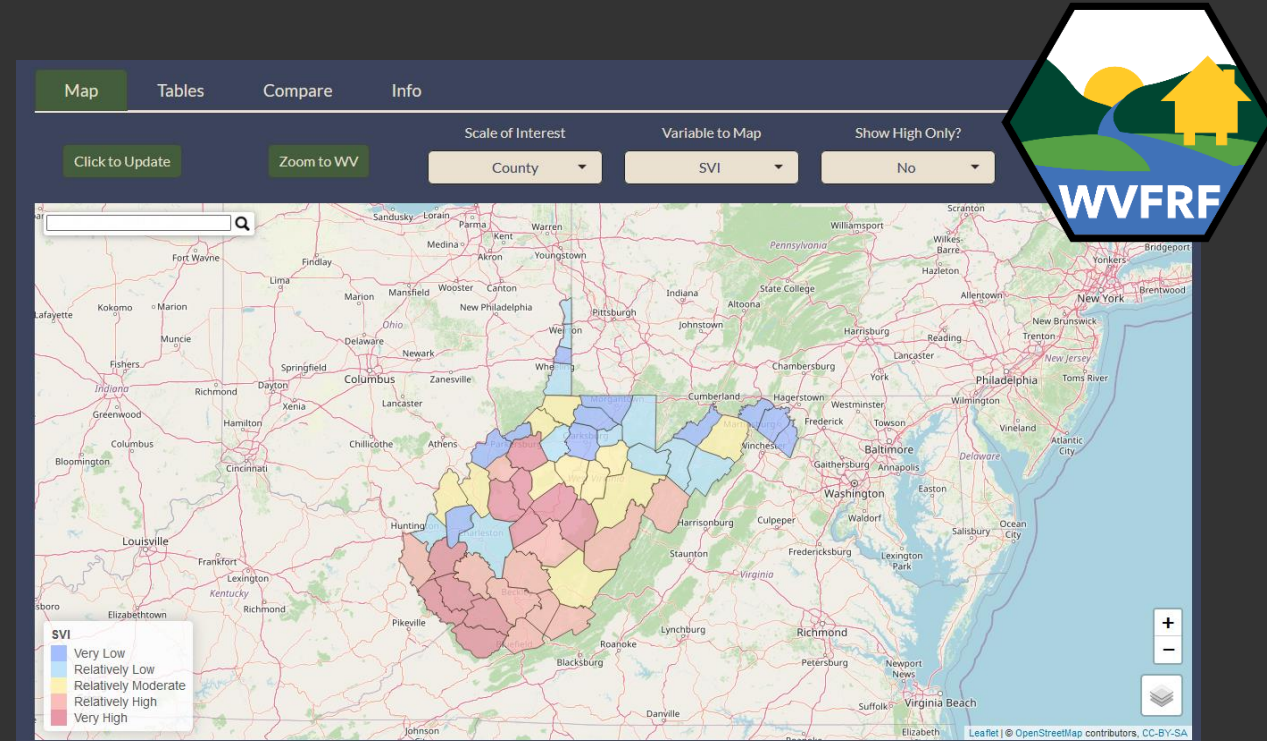


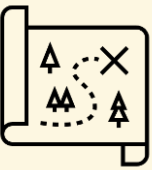


# Goals

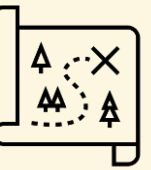


- ❖ Support **data-driven decision making** at multiple scales
- ❖ Aggregate **best available data**
- ❖ Support **State Resiliency Plan**
- ❖ Understand **risks and resiliencies**
- ❖ Prioritize **mitigation efforts**
- ❖ Link to resources from other agencies
- ❖ Interfaces for different users: property owners, business owners, community leaders, and mitigation professionals





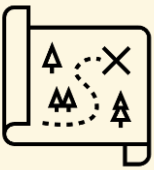
# Indicators



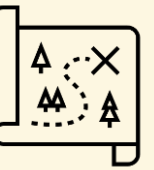
Major Categories	Detailed Categories	Tool Indicators
Flood Hazard Risk	Floodplain Area	6 indicators
	Floodplain Length	
	Declared Disasters	
	Flood Depth	
Structure Risk	Building Counts / Ratios	41 indicators
	Building Types & Values	
	Vulnerable Structures	
	FIRM Status	
	Building Year / New Construction	
	Significant Structures	
	Physical Damage Estimates	
	Recorded Building Damages	
People/Social Risk	Social Vulnerability	4 indicators
	Population Exposure	
Other Hazards	Population Displacement & Shelter Needs	4 indicators
	Dams/Levees	
Mitigation Measures	Landslide	9 indicators
	Structural Measures	
	Physical Non-Structural Measures	
	Non-Physical Non-structural Measures	

- ❖ Provide a variety of **indicators** at different **scales**
- ❖ Currently working on this phase of the project





# Indicators

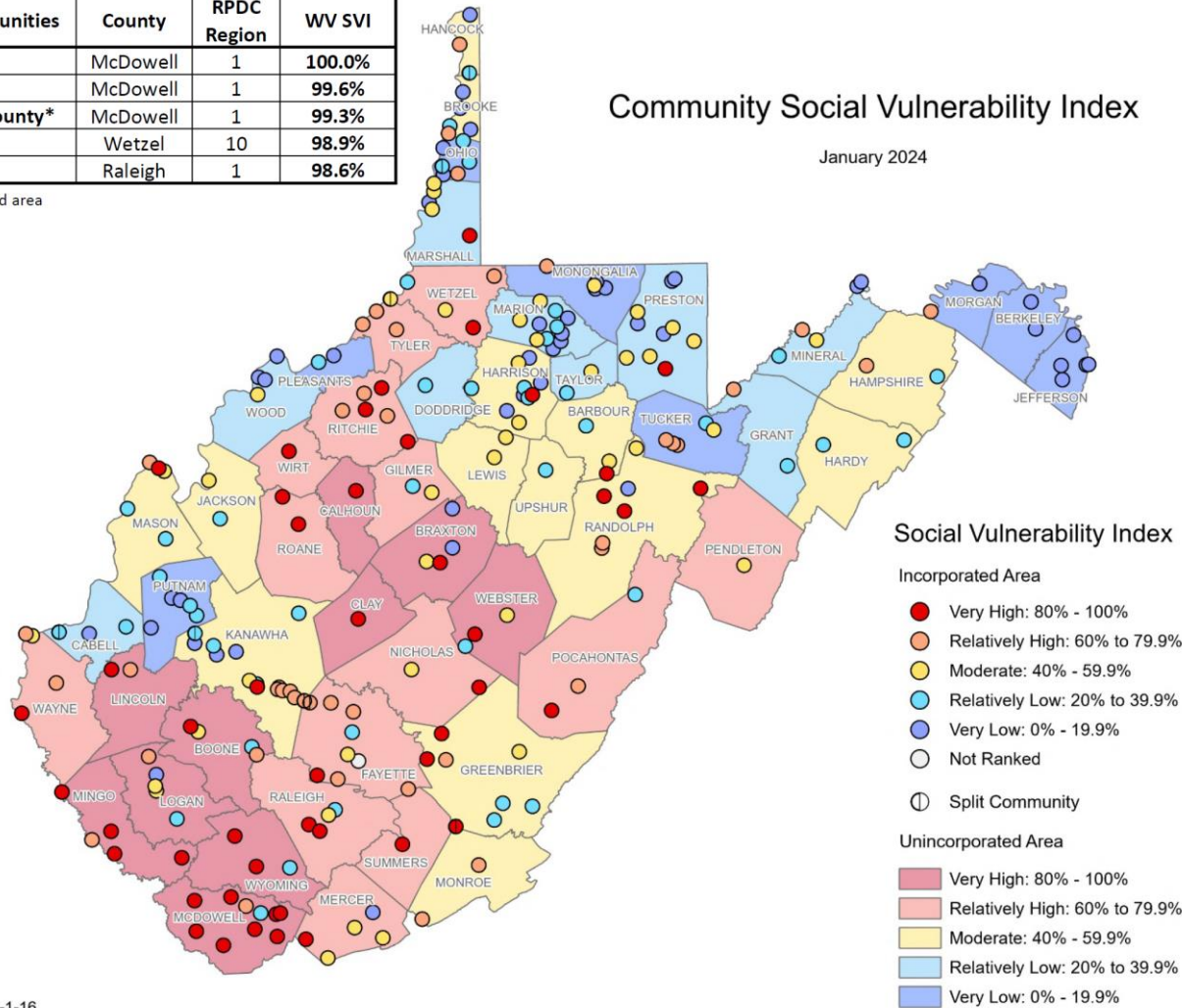


Top 5 Communities	County	RPDC Region	WV SVI
Anawalt	McDowell	1	100.0%
War	McDowell	1	99.6%
McDowell County*	McDowell	1	99.3%
Smithfield	Wetzel	10	98.9%
Lester	Raleigh	1	98.6%

\* Unincorporated area

## Community Social Vulnerability Index

January 2024



### Social Vulnerability Index

#### Incorporated Area

- Very High: 80% - 100%
- Relatively High: 60% to 79.9%
- Moderate: 40% - 59.9%
- Relatively Low: 20% to 39.9%
- Very Low: 0% - 19.9%
- Not Ranked
- Split Community

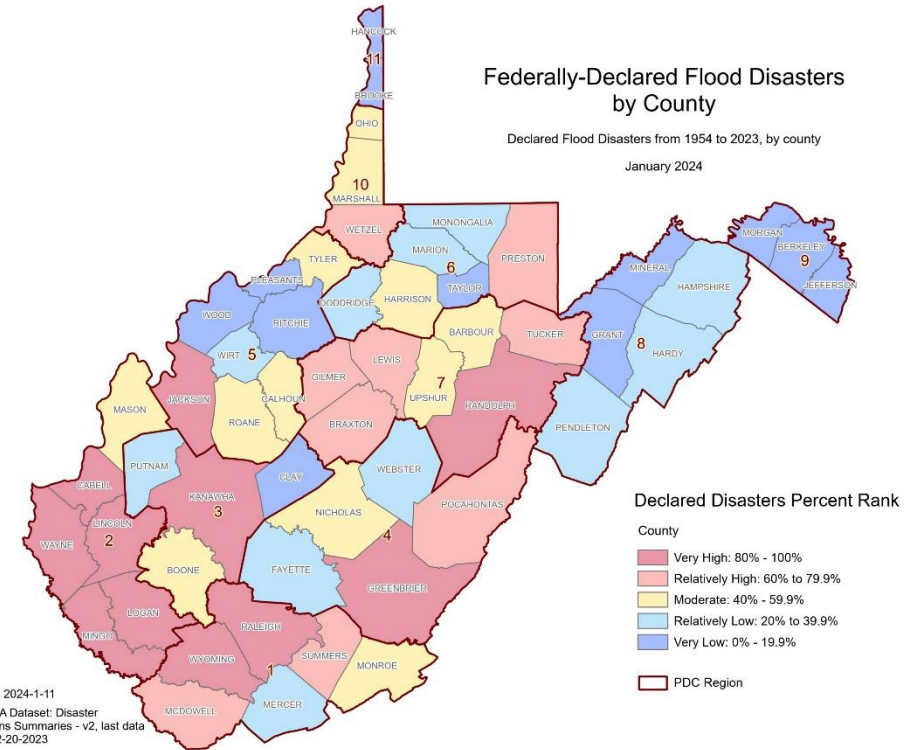
#### Unincorporated Area

- Very High: 80% - 100%
- Relatively High: 60% to 79.9%
- Moderate: 40% - 59.9%
- Relatively Low: 20% to 39.9%
- Very Low: 0% - 19.9%

WVGISTC 2024-1-16

## Federally-Declared Flood Disasters by County

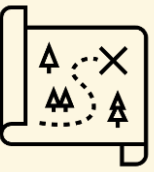
Declared Flood Disasters from 1954 to 2023, by county  
January 2024



### Declared Disasters Percent Rank

- County
- Very High: 80% - 100%
  - Relatively High: 60% to 79.9%
  - Moderate: 40% - 59.9%
  - Relatively Low: 20% to 39.9%
  - Very Low: 0% - 19.9%
  - PDC Region

WVGISTC 2024-1-11  
OpenFEMA Dataset: Disaster  
Declarations Summaries -v2, last data  
refresh: 12-20-2023



# Timeline



## Completed

Basic UI design  
People/social indicators



## In-Progress

Additional indicators  
Documentation



## To do

App refinement  
Integration with WRF

Social Vulnerability Indices						
	Mean	Median	Selection1	Selection2	Rank1	Rank2
Poverty Rate	20.2%	18.3%	27.7%	21.9%	0.79	0.61
Unemployment Rate	24.9%	23.1%	22.1%	13.0%	0.45	0.14
Vulnerable Age Rate	37.5%	37.8%	36.0%	37.5%	0.38	0.45
Disability Rate	21.9%	20.2%	31.9%	20.5%	0.84	0.52
No Highschool Diploma Rate	13.3%	11.9%	15.4%	8.3%	0.69	0.29
Population Change Rate	-9.7%	-8.2%	-20.9%	-9.1%	0.80	0.53
Median House Value	\$100,092	\$92,400	\$59,100	\$121,000	0.86	0.22
Mobile Home Rate	9.5%	6.3%	9.3%	0.0%	0.65	0.00
Social Vulnerability Index					0.84	0.21

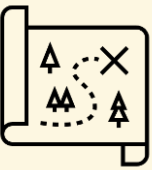
Click [here](#) for documentation.

```

server <- function(input, output, session) {
  observeEvent(input$mapAgg2,
  {
    if(input$mapAgg2 == "rData"){
      theChoices = rDataUN
    }else if(input$mapAgg2 == "unData"){
      theChoices = unDataUN
    }else if(input$mapAgg2 == "incData"){
      theChoices = incDataUN
    }else{
      theChoices = cDataUN
    }
  })
  updateSelectInput(session,
    "sample1",
    choices=theChoices)
}

```

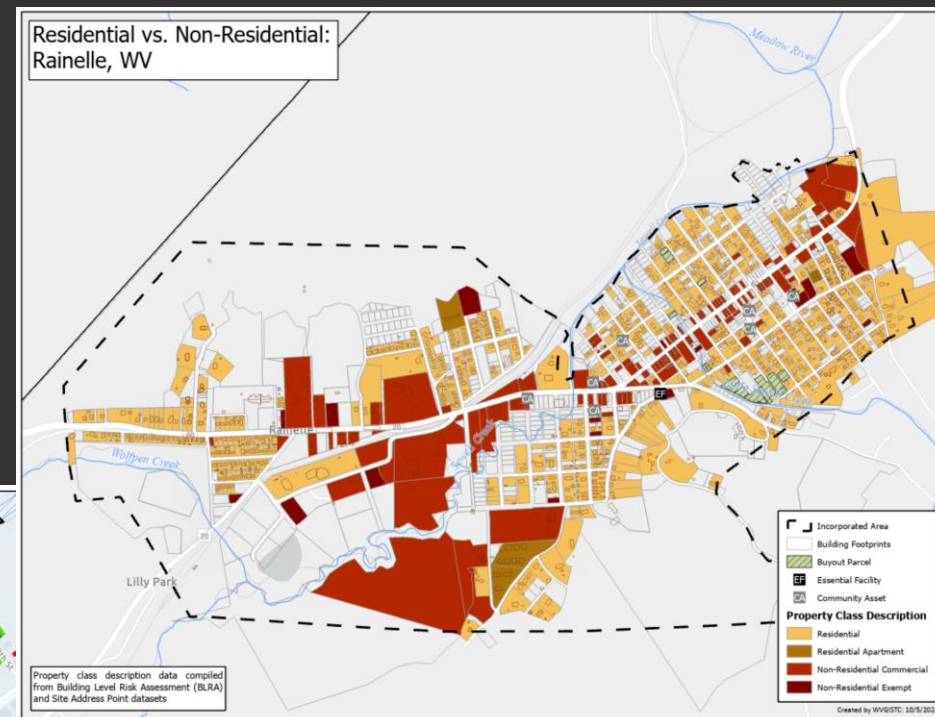
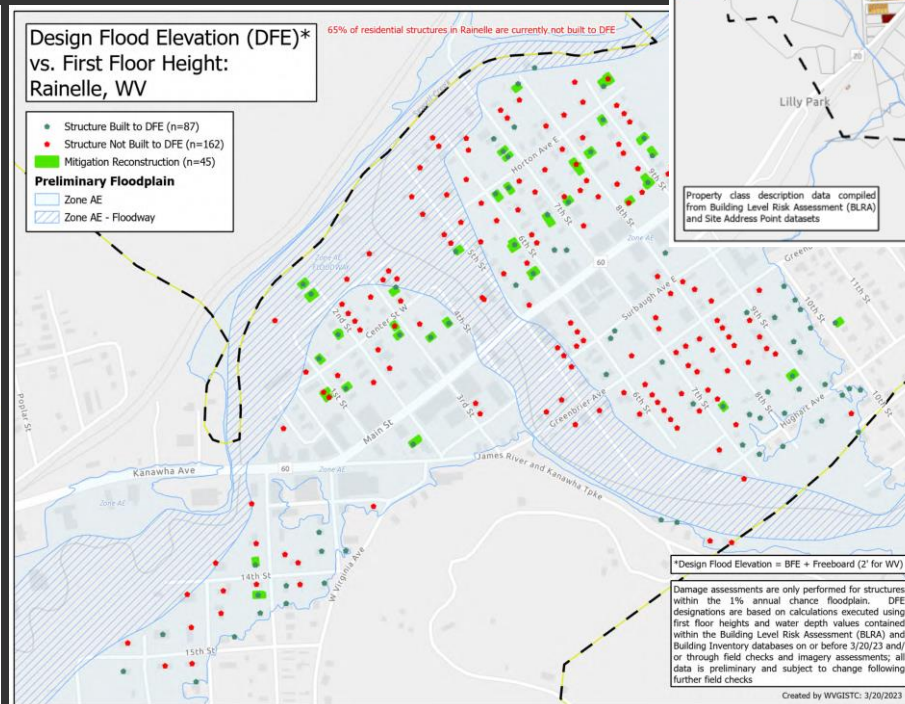
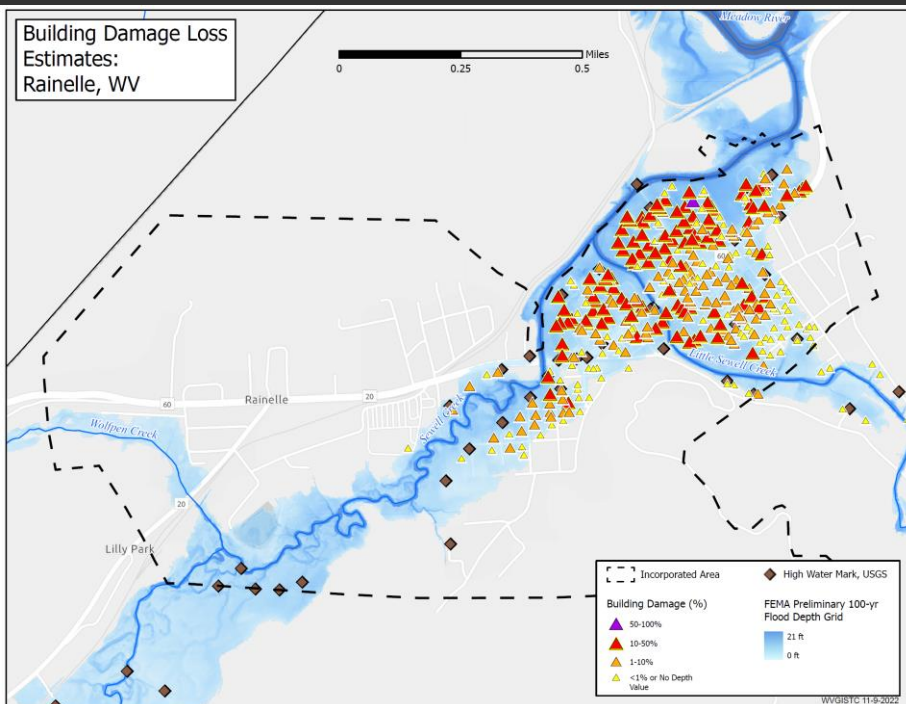
Beta version by July 2024/Version 1.0 by Oct. 2024



# Longevity



- ❖ Value of tool lies in **accuracy/timeliness of data**
- ❖ National-scale tools have **limited site-specific data**
- ❖ Developing such data is **time consuming and labor intensive**







# Maintaining/Expanding the WVFRF

❖ Initial funding from NSF ends in October 2025



❖ Maintenance and updates are needed

❖ Support SRO's mission



❖ Goal of finding a means to sustain the tool long-term

❖ Support for two analysts, hardware/software, travel

