

NEW RIVER VALLEY HAZARDS, RISKS AND MITIGATION OPTIONS

Introduction

The New River Valley is susceptible to a wide range of natural hazards. The region's history of hazards and effects is documented below to the full extent available. As is evident in Figure 11, about 25% of disasters are very localized to one jurisdiction; another 10% affect 3 to 5 localities. The majority of disasters affect a much broader area. Consequently, this analysis is done for the region as a whole, though distinctions are made as needed for smaller areas. First, mitigation terminology will be discussed.

Hazard Identification

Although hazards are classified in various

ways, this Plan uses the FEMA classification system (Multi-Hazard Identification and Risk Assessment publication, 1997.) FEMA generally classifies natural hazards based on the conditions that cause the events:

- ✓ **Atmospheric:** including hurricanes, nor'easters, thunderstorms and lightning, windstorms, severe winter storms, and extreme summer heat;
- ✓ **Hydrologic:** including floods, erosion, and drought;
- ✓ **Geologic:** including landslides and earthquakes; and
- ✓ **Other:** including wildfires often triggered by unintentional human activities.

FIGURE 11
Number of Localities Affected by Declared Disasters in Virginia

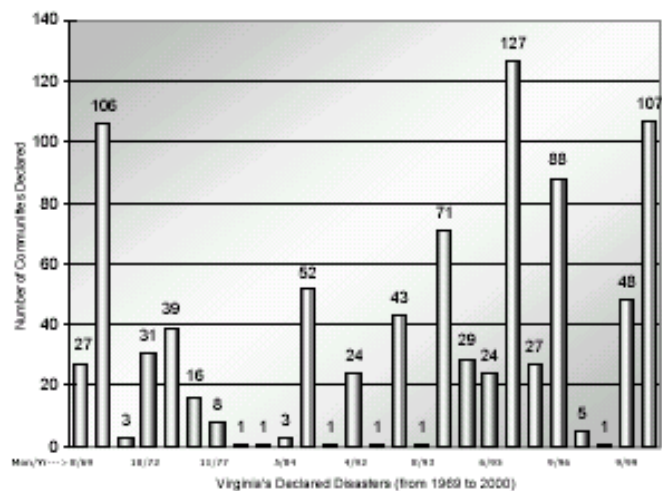


Figure 2-2. Number of Virginia Cities and Counties Declared, by Disaster.

Risk Assessment

Risk assessment seeks to define the probability of events and the likely consequences of events. Currently, risk assessment is based primarily on the historical events of communities, with the assumption that hazards are straight-line occurrences. Unfortunately, in the New River Valley, there is no central repository of past hazard events for individual areas or the region. Consequently, “pieces of the puzzle” have been gathered from a wide range of sources, including personal accounts, files in local planning and engineering departments, newspaper accounts, previous studies and plans, federal and state agencies’ documents, and Internet resources. On occasion, pertinent hazard histories of nearby areas are included here.

In addition to basic review of historic events, scientific research, such as seismology, seek to aid our understanding of the risk and vulnerability. High risk factors, both natural and human, which increase vulnerability to natural hazards are presented herein. It is these risk factors which mitigation seeks to reduce. In some instances, such as flooding, geologic hazards and wildfire, risk and vulnerability are closely associated with geographic areas. In other instances, such as drought, wind and winter storms, risk and vulnerability are more closely linked to human activities. Mitigation seeks to minimize losses associated with hazards by identifying and reducing risk factors.

Definitions

Hazard: an event or physical condition that has the potential to cause fatalities, injuries, property damage, infrastructure damage, agricultural loss, damage to the environment, interruption of business, or other types of harm or loss.

Mitigation: sustained action taken to reduce or eliminate the long-term risk to human life and property from natural hazards and their effects. Note that this emphasis on long-term risk distinguishes mitigation from actions geared primarily to emergency preparedness and short-term recovery.

Natural Hazard: hurricanes, tornados, storms, floods, high or wind-driven waters, earthquakes, snowstorms, wildfires, droughts, landslides, and mudslides.

Hazard identification: the process of defining and describing a hazard, including its physical characteristics, magnitude and severity, probability and frequency, causative factors, and locations or areas affected.

Risk: The potential losses associated with a hazard, defined in terms of expected probability and frequency, exposure, and consequences.

Vulnerability: The level of exposure of human life and property to damage from natural hazards.

Adapted from *Planning for Post-Disaster Recovery and Reconstruction*, FEMA and APA, 1998.

Mitigation

Mitigation is, in a word, “prevention.” Like “sustainability,” the goal of mitigation is learning to live safely and respectfully within the natural eco-system. This Plan reviews past mitigation efforts in the New River Valley. Moreover, it previews the range of possibilities for future mitigation efforts (see the box below). Finally, it recommends mitigation priorities for the New River Valley.

Mitigation Options

Prevention: activities that keep hazard problems from getting worse through planning

- ✓ Comprehensive planning
- ✓ Land-use ordinances and regulations, such as zoning and subdivision
- ✓ Building codes
- ✓ Open space preservation
- ✓ Storm water management
- ✓ Drainage system maintenance
- ✓ Water conservation programs
- ✓ Requirements to bury utility lines (and/or tree maintenance)
- ✓ Road clearing, snow fencing
- ✓ Activity policies (such as strict sports policies regarding lightning)
- ✓ Planning, studies, and systems analysis, such as securing multiple sources for water

Property Protection: activities usually undertaken by property owners on a building-to-building or parcel basis.

- ✓ Relocation
- ✓ Acquisition of private structures
- ✓ Building elevation
- ✓ Retrofitting and flood-proofing
- ✓ Strengthening or adding “flexibility” (as for earthquakes or snow loads)
- ✓ Rain catchment systems (green roofs and rain-barrels)
- ✓ Flame-resistant roof and siding
- ✓ Eliminate fuel ladders to house
- ✓ Insurance

Natural Resource Protection: activities to preserve or restore natural areas or natural functions of floodplain and watershed areas. They are often implemented by parks, recreation, or conservation agencies or organizations.

- ✓ Wetlands protection
- ✓ Erosion and sediment control
- ✓ Best management practices for (development, agricultural, and forestry)

Mitigation Options

continued

Emergency Services: measures taken during a flood to minimize its impact. These measures are the responsibility of localities' emergency management staff and owners/operators of critical facilities.

- ✓ Emergency response planning
- ✓ Regional coordination and collaboration
- ✓ Dam condition monitoring
- ✓ Flood warnings
- ✓ Flood response, evacuation and rescue
- ✓ Critical facilities protection
- ✓ Health and safety maintenance

Structural Projects: mostly associated with efforts to keep floodwaters away from an area. Often designed by engineers and maintained by public works staff.

- ✓ Reservoirs
- ✓ Levees/floodwalls
- ✓ Diversions
- ✓ Channel modifications
- ✓ Storm sewers
- ✓ Burying utility lines (minimize ice disruption; should not do in floodplain!)
- ✓ Interconnect utility to improve redundancy and security

Public Information: activities to advise residents and visitors about hazards, ways to protect themselves and their property, and the natural and beneficial functions of natural systems. They are usually implemented by a public information office.

- ✓ Map information
- ✓ Past hazard event information
- ✓ Outreach projects
- ✓ Real estate disclosure
- ✓ Library
- ✓ Technical assistance
- ✓ Environmental education

Adapted from Association of State Floodplain Managers , September, 2000 and the National Flood Insurance Program, Community Rating System Example Plans, January, 1999, and NRV Hazard Mitigation Meetings, 2002-03.

This analysis uses the following basic outline for each hazard:

- ⇒ Identify Natural **Hazard**, including past events
- ⇒ List existing or past **Mitigation** efforts
- ⇒ Potential future Impacts: What's at high **Risk and Vulnerable** (including trends)
- ⇒ **Mitigation** Options: What else could be done to prevent or minimize destruction during hazard event

Overview of Assessments

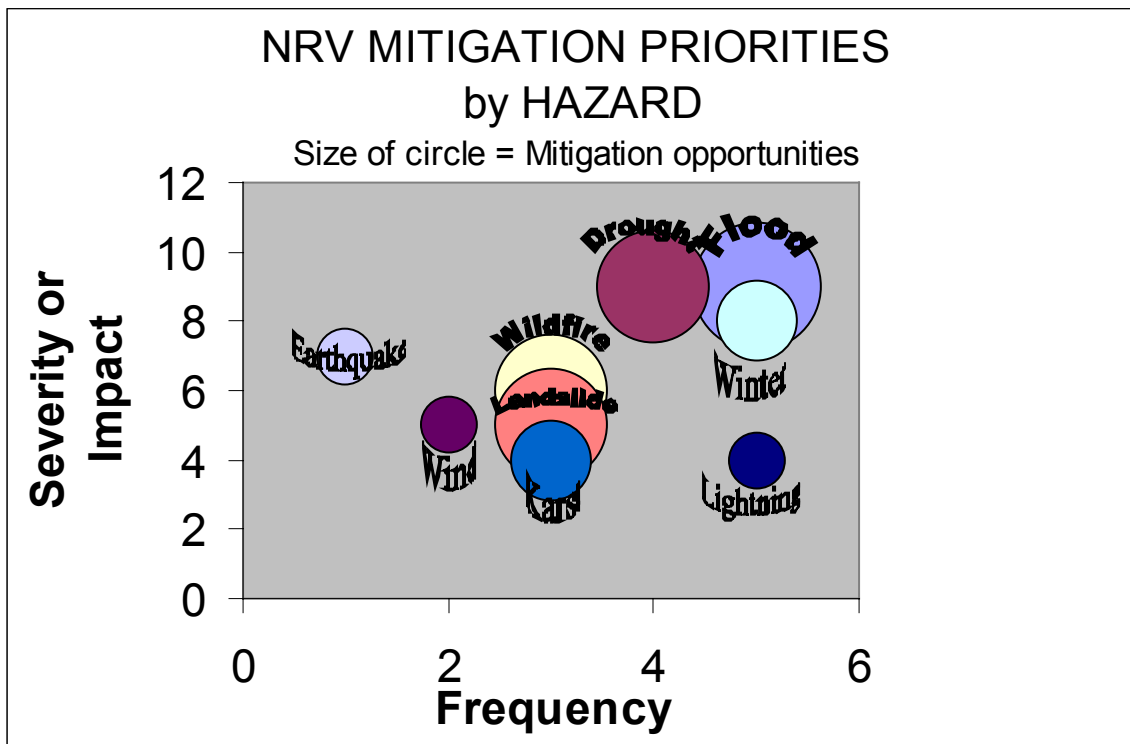
NRVPDC staff prioritized hazards for risk, based on a 125-year history of frequency and impact (Table 10; sources listed under Table 13). The highest risk hazards are flooding, drought, and severe winter storms. For planning purposes, hazards were then ranked based on frequency, impact and on the potential to mitigate in the future. Overall, flooding, drought, wildfire and landslides were deemed the top hazards for mitigation (Figure 12.)

TABLE 10
Priority Hazards in the NRV

	Additional Mitigation Opportunities	
	Limited	Many
High Risks	Severe Winter Storms	Flooding Drought*
Moderate Risks	Lightning	Wildfire
Low Risks	Sinkhole Wind	Landslide* Earthquake

Note: Unlike the remainder of the NRV, Floyd County has limited vulnerability to flooding, but exceptional vulnerability to drought, and moderate risk of landslide.

FIGURE 12



The analysis that produced Table 10 and Figure 12 are included in Tables 11 and 12 below. Note that the 125-year history is based on local government files, newspaper accounts, and other sources listed under Table 13. Older data is spotty at-best, but the best available information was used.

TABLE 11

NRV Vulnerability Analysis and Mitigation Prioritization									
	Flooding*	Drought*	Wildfire	Severe Winter Storm	Severe Wind	Landslide	Karst*	Earthquake	Lightning
IMPACT									
degree of impact	4	4	3	3	3	3	3	3	3
size of area impacted	5	5	3	5	2	2	1	4	1
IMPACT Total	9	9	6	8	5	5	4	7	4
LIKELIHOOD	5	4	3	5	2	3	3	1	5
TOTAL VULNERABILITY	14	13	9	13	7	8	7	8	9
MITIGATION OPPORTUNITIES	5	4	4	2	1	4	2	1	1
TOTAL SCORE	225	144	72	80	10	60	24	7	20
	based on # of times in 125 years, though record is spotty								
NOTE: This assessment is based on available records for the past 125 years. Detailed information is only available for about the past 10 years, though even that is not rigorous and lacks consistent damage information.									
*Floyd County is the lone county in a different physiographic area; it is less prone to flooding and does not have karst, but it is more vulnerable to drought impacts.									

TABLE 12

Explanation of Hazard Assessment Numbers

Degree of Impact

- 1 Temporary, nuisance damage; no lasting effect
- 2 Clean-up; inexpensive
- 3 Significant expenditure for clean-up recovery/repair
- 4 Loss of life; major structural damage
- 5 Complete devastation; everything in path unusable--permanent

Likelihood: Significant impact+ occurrences since 1878

- 1 1 time
- 2 2 times
- 3 3 times
- 4 4 times
- 5 5 times or MORE

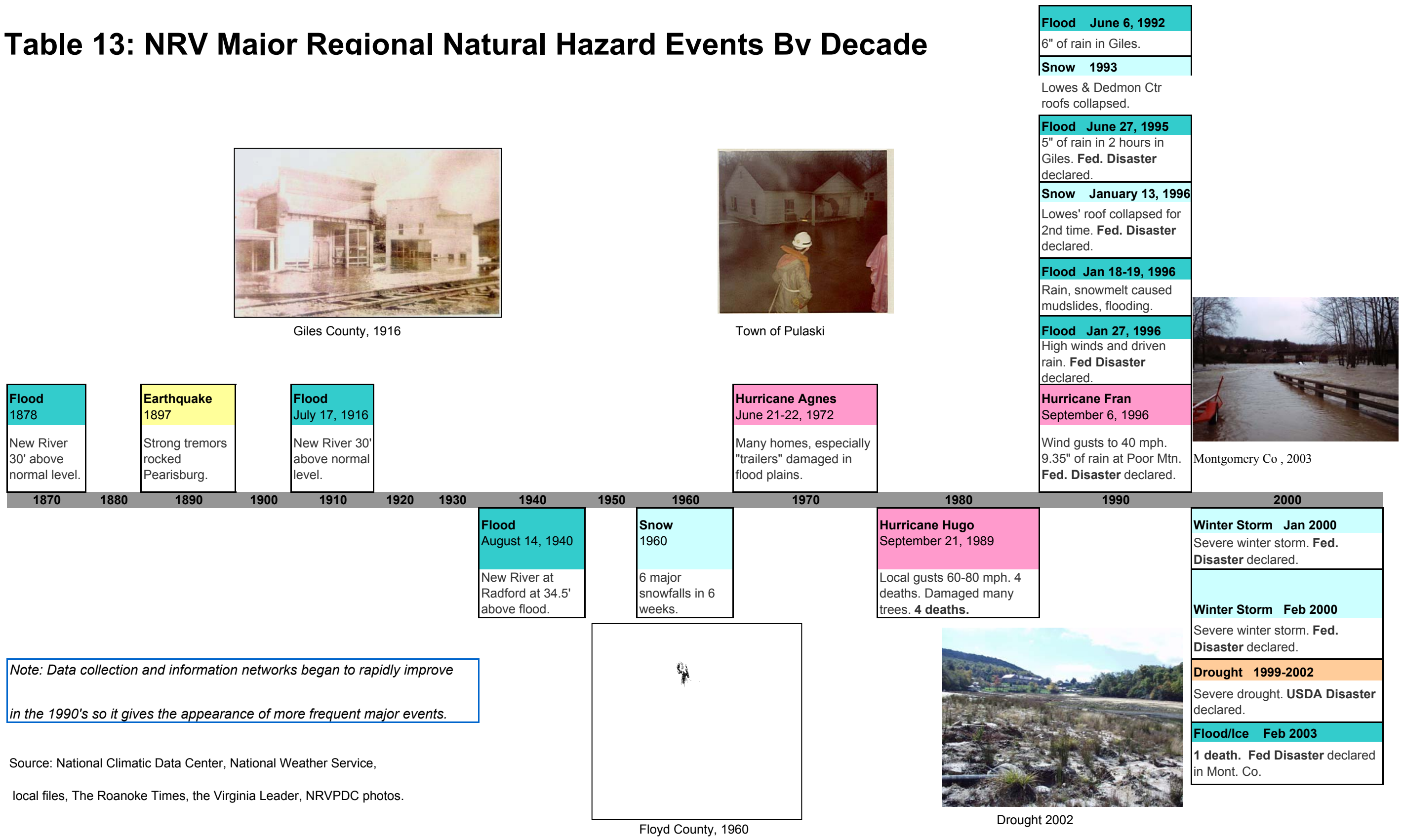
Size of area Impacted

- 1 neighborhood
- 2 community
- 3 most of a jurisdiction
- 4 more than 1 jurisdiction
- 5 entire region

Mitigation opportunities

- 1 Mitigation is difficult and highly impractical
- 2 Loss reduction is possible, but highly costly.
- 3 Loss reduction: emergency management or public outreach only
- 4 Multiple opportunities, including land use
- 5 Major land use planning mitigation opportunities

Table 13: NRV Major Regional Natural Hazard Events By Decade



Flood 1878
New River 30' above normal level.

Earthquake 1897
Strong tremors rocked Pearisburg.

Flood July 17, 1916
New River 30' above normal level.

Flood August 14, 1940
New River at Radford at 34.5' above flood.

Snow 1960
6 major snowfalls in 6 weeks.

Hurricane Agnes June 21-22, 1972
Many homes, especially "trailers" damaged in flood plains.

Hurricane Hugo September 21, 1989
Local gusts 60-80 mph. 4 deaths. Damaged many trees. **4 deaths.**

Flood June 6, 1992
6" of rain in Giles.

Snow 1993
Lowes & Dedmon Ctr roofs collapsed.

Flood June 27, 1995
5" of rain in 2 hours in Giles. **Fed. Disaster** declared.

Snow January 13, 1996
Lowes' roof collapsed for 2nd time. **Fed. Disaster** declared.

Flood Jan 18-19, 1996
Rain, snowmelt caused mudslides, flooding.

Flood Jan 27, 1996
High winds and driven rain. **Fed Disaster** declared.

Hurricane Fran September 6, 1996
Wind gusts to 40 mph. 9.35" of rain at Poor Mtn. **Fed. Disaster** declared.



Montgomery Co , 2003

Winter Storm Jan 2000
Severe winter storm. **Fed. Disaster** declared.

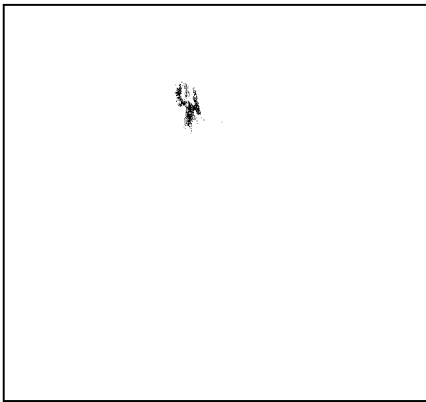
Winter Storm Feb 2000
Severe winter storm. **Fed. Disaster** declared.

Drought 1999-2002
Severe drought. **USDA Disaster** declared.

Flood/Ice Feb 2003
1 death. Fed Disaster declared in Mont. Co.

Note: Data collection and information networks began to rapidly improve in the 1990's so it gives the appearance of more frequent major events.

Source: National Climatic Data Center, National Weather Service, local files, The Roanoke Times, the Virginia Leader, NRVPCDC photos.



Floyd County, 1960



Drought 2002



Giles County, 1916



Town of Pulaski