



Chapter 1. Introduction

When a major natural event strikes, it is often described as a natural disaster. Natural disasters and their aftermath have long affected humans and the built environment. Pre-disaster hazard mitigation is about preventing or minimizing the physical, financial, and human impacts of natural disasters. The Federal Emergency Management Agency (FEMA) describes hazard mitigation as “sustained actions taken to reduce or eliminate long-term risk from hazards and their effects.”

The New River Valley Hazard Mitigation Plan 2017 update is a revision to the 2011 update of region’s original plan, adopted and approved by FEMA in May 2005. In this updated plan, new data and analysis has improved the hazard identification and risk assessment used to determine mitigation strategies. All sections of this plan have been updated to include the newest information and data available. In the intervening five years, the participating local governments (Floyd, Giles, Montgomery, and Pulaski Counties, City of Radford, and the Towns of Blacksburg, Christiansburg, Glen Lyn, Narrows, Pearisburg, Pembroke, Pulaski, and Rich Creek) have completed several projects identified in the Hazard Mitigation Plan, including property acquisition in Pulaski and Pembroke and regional cooperation in response activities such as the organization of the New River Valley Swiftwater Association.

This plan will focus primarily on natural hazards: flooding, drought, wildfire, landslides, karst, rockfall, earthquake, winter weather, winds, and severe weather. An overview of potential human-caused hazards and preparedness for such events in the region will be presented.

1.1 Hazard Mitigation Planning

The purpose of this plan is to meet the requirements set forth in the Disaster Mitigation Act 2000 (DMA 2000). Specifically, the DMA 2000 requires state and local government to identify hazards, assess their risks and community vulnerability, and to describe actions to mitigate those risks and vulnerabilities. The plan is meant to be a framework for decreasing needs for post-disaster funds for recovery and reconstruction through pre-disaster actions.

Adoption of this plan and approval from FEMA is required for localities to remain eligible to apply for the five Hazard Mitigation Assistance (HMA) Programs. They include the four annual grant programs; Pre-Disaster Mitigation Program (PDM), Flood Mitigation Assistance (FMA), Repetitive Flood Claims (RFC), and Severe Repetitive Loss (SRL) and the post-disaster Hazard Mitigation Grant Program (HMGP). Three of these programs (FMA, RFC, and SRL) are directly linked to the National Flood Insurance Program (NFIP). HMGP and PDM can also be used to fund tornado safe rooms, wildfire mitigation, etc.

There are two types of properties that are targeted for mitigation from flooding hazards: repetitive loss properties and severe repetitive loss properties. Repetitive loss properties are



those buildings which have flood insurance from the NFIP and have filed two or more claims against that insurance in a rolling ten-year period. Severe repetitive loss property is a residential property that is covered under an NFIP flood insurance policy and has

- a) at least four or more claims against an NFIP policy of over \$5,000 each, and the cumulative amount of such claims payments exceeds \$20,000; or
- b) at least two separate claims payments (building payments only) have been made with the cumulative amount of the building portion of such claims exceeding the market value of the building.

As of February 2017, there are 33 severe repetitive loss properties in the NRV and three repetitive loss properties. Table 1.1 below more fully details these properties.

Table 1.1. Repetitive and Severe Repetitive Loss Properties by Locality

Locality	Repetitive Loss Properties	Severe Repetitive Loss Properties
Town of Christiansburg	0	2
Floyd County	1	1
Giles County	1	5
Montgomery County	1	15
Pulaski County	0	6
Town of Pulaski	0	2
Town of Narrows	0	2

There are four basic phases of emergency management: mitigation, preparedness, response, and recovery. Preparedness and mitigation measures occur prior to a disaster event. Preparedness refers to plans and strategies for efficiently handling disasters as they occur. Response and recovery occur during and after a disaster event, respectively, to return the community to normal operations as quickly as possible. Mitigation includes the long-term strategies determined to reduce risk to life and property from a disaster event.

The benefits of planning to mitigate for natural hazards include a systematic approach for identifying hazards, their risks, and strategies for minimizing those risks. In planning prior to a disaster, the high emotions and rushed environment are absent allowing a diverse group of stakeholders to collaborate to develop strategies from which the community derives the most benefits. The opportunities offered by approaching mitigation planning proactively allow local communities to shape not only post-disaster recovery, but also achieve additional community objectives, such as recreation and housing and economic development.

Implementation of mitigation strategies is the final step of these planning efforts. Mitigation strategies can take many forms, most commonly directed towards flooding, hurricanes, and

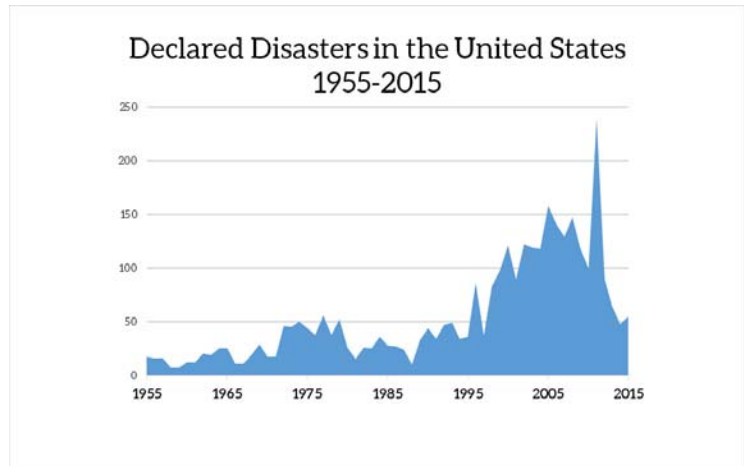


earthquakes, three historically catastrophic events. The true community benefits of mitigation planning are not realized until the construction or installation of these projects is completed.

1.2 History of Hazard Mitigation Planning in the United States

Presidentially declared
natural disasters since 1953

3,356

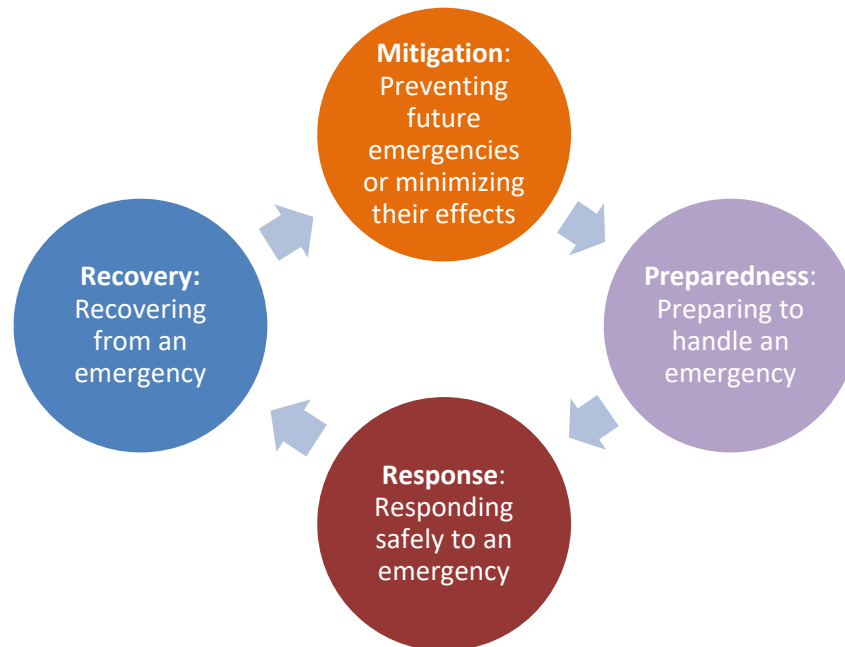


When one thinks of natural disasters, one thinks of FEMA and the American Red Cross providing emergency food, water and shelter to victims. The sky-rocketing costs of these relief efforts have served as a costly reminder of the need to think more about prevention. In a word, “hazard mitigation” is prevention. The case for hazard mitigation rests solidly with the ounce-of-prevention-is-worth-a-pound-of-cure argument.

In the past, prevention resources have successfully been focused on life-saving mechanisms, such as building codes, warning systems and public education. Largely the emphasis was on preparedness rather than land use regulation. The one notable exception is the NIFP, which requires floodplain management regulation and includes Flood Insurance Rate Maps (FIRMs), which serve to establish risk levels. Now, new effort is being orchestrated nationally to prevent future property damage through improved land use planning and other means. In the range of emergency management activities (Figure 1.1) this signals FEMA’s new commitment to focus not just on preparedness, response and recovery, but increasingly on planning and mitigation.



Figure 1.1. Emergency Management Phases



Though it portends to be that long-range process incorporating multi-disciplines and forestalling future problems, local land use planning has largely failed to give adequate attention to natural hazards. Recent joint efforts by the American Planning Association and FEMA (including books and seminars) are addressing the issue. Theoretically, assessment, planning and mitigation actions could and should intervene in the historic build-flood-rebuild cycle.

The turning point nationally was a rapid succession of major disasters with high relief and recovery costs. From 1989 to 1994, there were 294 Presidentially-declared disasters with a cost to the U.S. Treasury of over \$34 billion (Table 1.2). The total costs (to property owners, insurance companies and governments) of the seven largest events were overwhelming.

Table 1.2. Major US Disasters, 1989-1994

Year	Event	Location	Cost
1989	Hurricane Hugo	South Carolina	\$9 billion
1989	Loma Prieta Earthquake	northern California	\$7 billion
1991	East Bay Hills Wildfire	Oakland/Berkeley, California	\$1.5 billion
1992	Hurricane Andrew	Florida and Louisiana	\$30 billion
1992	Hurricane Iniki	Hawaii	\$1.8 billion
1993	Midwest Floods	Upper Mississippi Valley	\$12-16 billion
1994	Northridge Earthquake	southern California	\$28 billion

Source: *Planning for Post-Disaster Recovery and Reconstruction, APA/FEMA book*



According to the NOAA Center for Environmental Information, the United States has experienced 208 natural disasters where damages and costs exceed \$1 billion since 1980. These events range from periodic heat waves and drought during summer months and their resultant wildfires to hurricanes and winter weather events. In addition to natural disasters, the events of September 11, 2001 have increased the awareness of and need for mitigation planning for human-cause disasters. 9/11 was the first human-caused disaster to receive significant attention and funding from the federal government. Specifically, the 9/11 attacks were the impetus for many planning projects around the county to mitigate for these types of events.

The DMA 2000 established a national, pre-disaster mitigation program, streamlining disaster relief efforts, and attempts to control the costs of federal assistance. The DMA 2000 placed dramatic new emphasis on pre-disaster mitigation, requiring local and state “all hazards” mitigation plans be completed by November 1, 2004. Without these approved plans, local and state governments would be ineligible for most FEMA assistance in the future. Localities without an approved plan remained eligible for limited public assistance and debris removal costs, but are ineligible for individual assistance and mitigation assistance. Approved plans must be updated and re-approved every five years to maintain eligibility for this additional FEMA assistance for planning and mitigation.

1.3 Hazard Mitigation Planning and the Commonwealth of Virginia

Between 1969 and 2016, natural hazards resulted in 59 Presidentially-declared disasters in Virginia (Table 1.3 and Figure 1.2). Disasters affected every county and jurisdiction in the Commonwealth at least once during the 48-year period. Presidentially-declared disasters are generally declared when the disaster is of such proportions as to outstrip both local and state resources.

Table 1.3. Presidential Disaster Declarations in Virginia Since 1969

Declaration Date	Event Description	Number of Jurisdictions	NRV Counties Included
August 1969	Hurricane Camille	27	
June 1972	Hurricane Agnes	106	
September 1972	Severe Storms, Flooding	3	
October 1972	Flood	31	
April 1977	Flash Flood	16	
November 1977	Flood	8	
July 1979	Flood	1	
September 1979	Flood	1	
May 1984	Flood	3	
November 1985	Flood	52	
October 1989	Flood	1	



Declaration Date	Event Description	Number of Jurisdictions	NRV Counties Included
April 1992	Flood	24	
March 1993	Snowstorm	43	
August 1993	Tornado	1	
February 1994	Ice Storm	71	
March 1994	Ice Storm	29	
June 1995	Flood	24	
January 1996	Blizzard	Statewide	
January 1996	Flood	27	
September 1996	Hurricane Fran	88	
August 1998	Hurricane Bonnie	5	
September 1999	Hurricane Dennis	1	
September 1999	Hurricane Floyd	48	
February 2000	Winter Storm	107	Floyd, Giles, Montgomery, Pulaski
July 2001	Flood	10	
September 2001	Pentagon Attack	1	
March 2002	Flood	10	
April/May 2002	Flood	2	
February 2003	Winter Storms/Flood	39	Floyd, Montgomery
September 2003	Hurricane Isabel	100	
November 2003	Flood	6	Giles
May 2004	Flood	3	
August 2004	Tropical Depression Gaston Flood	9	
September 2004	Tropical Depression Jeanne Flood	10	Floyd, Giles, Montgomery
July 2006	Severe Weather	13	Floyd
September 2006	Tropical Depression Ernesto	25	
November 2009	Nor'easter - flooding	12	
December 2009	Winter Storm	40	Montgomery
February 2010	Severe Winter Storm	49	Montgomery
April 2010	Severe Winter Snow Storm	39	Floyd
August 2011	Hurricane Irene		
November 2011	Virginia Earthquake	14	
June 2012	Derecho	63	Montgomery
October/November 2012	Hurricane Sandy	29	



Declaration Date	Event Description	Number of Jurisdictions	NRV Counties Included
January 2016	Severe Winter Storm and Snowstorm	30	
October 2016	Hurricane Matthew	4	

Source: VDEM 2017, "Presidentially Declared Disasters." <http://www.vaemergency.gov/news-local/presidentially-declared-disasters/>.

Figure 1.2. Presidential Disaster Declarations in the New River Valley (1969-2016)

Disasters, 2000-2015



Hazard mitigation in the Commonwealth of Virginia is facilitated by the Virginia Department of Emergency Management (VDEM). Specifically, the Hazard Mitigation Program is housed in the Recovery and Mitigation Program at VDEM. VDEM's Hazard Mitigation Program is responsible for writing and updating the state hazard mitigation plan, providing assistance for local plans, as well as administering grant programs designed to mitigate for these hazards.



Virginia's Hazard Mitigation Plan provides guidance for hazard mitigation in Virginia. Previous versions of the plan were approved beginning in 2001 and updated every three years, with the 2004 plan making changes to conform to new requirements within the DMA 2000. The plan was reapproved by FEMA after being re-adopted by the state on March 14, 2013.



1.3.1 State Plan Summary

The process for developing and approving the current Standard and Enhanced Hazard Mitigation Plan for Virginia began in 2012. Because the 2010 plan included a comprehensive update of the HIRA, VDEM retained those methodologies and updated the data based on events that had occurred in the interim. The state plan identifies flooding (coastal and riverine), non-rotational wind (hurricane and thunderstorms), winter storms, tornadoes, drought, wildfire, earthquake, landslide, land subsidence, and dam inundation as hazards that have the most impact on life and property in the Commonwealth (Table 1.4). The risk levels indicated below are a product of the updated HIRA including rankings from all 25 local hazard mitigation plans, 18 of which were approved by FEMA and 7 being revised at the time. Though these risk levels are accurate as an average statewide, variations in hazard histories and risks differ notably even among New River Valley jurisdictions, as will be seen later.

Table 1.4. State Assessment of Relative Risk of Natural Hazards*

High	Medium-High	Medium	Medium-Low	Low	Negligible
Flood	Non-Rotational Wind Winter Weather Tornado	Drought Wildfire	Earthquake Landslide	Land Subsidence (Karst) Dam Inundation	Erosion Thunderstorm Lightning Extreme Heat Extreme Cold Tsunami

* Modified from Table 3.16-1 of Virginia's Hazard Mitigation Plan

For each hazard, the state plan outlined historical occurrences, a general description of the hazard and its impacts and measures of magnitude along with additional information, dependent on the hazard. Of all the hazards occurring within the state, flood, wind, and winter storms were identified as having the most impact. Data for this plan was gathered from all available state, federal, local, and university sources including all 25 local hazard mitigation plans. The overall statewide ranking that is listed above is a product of the comprehensive data sources.

1.3.2 Virginia's Hazard Mitigation Goal

Virginia's stated hazard mitigation vision is simply **"to promote resiliency and reduce the long term impacts of hazards on human, economic, and natural resources throughout the state."** The four goals outlined in the state plan include:

- Identify and implement projects that will eliminate long-term risk, directly reduce impacts from hazards, and maintain continuity of critical societal functions.
- Incorporate mitigation concepts and objectives into existing and future policies, plans, regulations, and laws in the Commonwealth.



- Improve the quality of the data and analysis used in the hazard identification and risk assessment process in state, local, and university hazard mitigation plans.
- Through training, education, and outreach promote awareness of hazards, their risk, and potential mitigation actions in order to increase resiliency.

1.4 Virginia's New River Valley Hazard Mitigation History

In 2000, a summary-level hazard assessment was done of the three-state New River watershed by the non-profit New River Community Partners. That assessment, *New River All Hazards Mitigation Plan*, was generalized and did not involve assessment of special hazard areas, identification and assessment of key vulnerabilities, nor past, present or future mitigation priorities for local governments. While helpful in providing a snapshot of hazard data, that plan does not meet the DMA 2000 requirements for local governments.

In 2002, VDEM began funding the first round of local hazard mitigation plans, with all plans funded throughout the state by 2006. FEMA defined localities responsible for developing a hazard mitigation plan as “Any area or political subdivision within the Commonwealth of Virginia as defined by the Code of Virginia that has authority to create, adopt and/or enforce land use, zoning, or subdivision ordinances and regulations for the areas within its boundaries.” While planning district commissions do not have the authority to enforce or implement plans that they assist their member localities to draft, it was the intent of VDEM to combine as many of the local plans into regional plans using the expertise of the PDCs.

The preparation of the *New River Valley Hazard Mitigation Plan* is a joint effort of the local governments within the region and the New River Valley Planning District Commission (NRVPDC). The first New River Valley Hazard Mitigation Plan meeting the DMA 2000 was completed in December 2004, approved by FEMA in May 2005. The adoption dates for participating localities are indicated in Table 1.5. This update to the original New River Valley Hazard Mitigation Plan is the continuation of coordination between the localities to mitigate the impacts of natural hazards, building upon past efforts and studies.

Table 1.5. NRV Adoption of Previous Hazard Mitigation Plans

Locality	Adoption Date	Plan Update Adoption Date
Floyd County	March 8, 2005	January 10, 2012
Floyd Town	March 10, 2005	n/a
Giles County	March 3, 2005	December 15, 2011
Glen Lyn	N/A	n/a
Narrows	March 21, 2005	January 16, 2012
Pearisburg	March 8, 2005	December 13, 2011
Pembroke	March 11, 2005	December 5, 2011
Rich Creek	March 14, 2005	January 9, 2012
Montgomery County	April 25, 2005	January 23, 2012



Locality	Adoption Date	Plan Update Adoption Date
Blacksburg	March 8, 2005	December 13, 2011
Christiansburg	March 15, 2005	January 3, 2012
Pulaski County	March 28, 2005	November 28, 2011
Dublin	N/A	n/a
Pulaski	March 1, 2005	December 6, 2011
City of Radford	March 14, 2005	January 12, 2012

All NRV localities do long range land-use planning and regulation, which is a mitigation action. Additionally, most New River Valley jurisdictions participate in the National Flood Insurance Program, and thus have requisite floodplain regulations. Some local jurisdictions have also sought federal assistance from the US Army Corps of Engineers for floodplain studies. Additionally, some local governments have partnered with the FEMA, USDA and the state to implement mitigation activities such as housing relocation and stream modification.

Following the Presidential Disaster Declaration for Tropical Depression Gaston and its associated flooding in 2004, Giles County conducted a flooding mitigation project. During this project, the County acquired a home in Pembroke that was frequently flooded by Little Stony Creek. This property was turned to green space to avoid flooding impacts to the residents and their property. The photos below show the property before and after the mitigation actions.

Figure 1.3. Before and After Photos from Giles County Property Acquisition



Many documents were reviewed in the preparation of this plan. First, the comprehensive plans for all jurisdictions were reviewed. Additionally, all available flood insurance studies and Digital Flood Insurance Rate Maps (DFIRMs) by FEMA or the U.S. Department of Housing and Urban Development were reviewed. All pertinent regional and special studies, such as Army Corps of Engineer studies and private engineering firm studies provided by local governments were reviewed.



Both universities in the region, Virginia Tech and Radford University, have completed and adopted their own multi-hazard plans. These universities have been recognized by VDEM and FEMA as Disaster Resistant Universities. Virginia Tech's Hazard Mitigation Plan update was approved in 2014 and includes sections on flooding, winter and severe storms, wind (hurricane and tornado), drought, karst/sinkhole, landslide, wildfire, and earthquakes. Virginia Tech's plan also includes information about the human-caused hazards of arson/building fire, hazardous materials, and terrorism. Radford University's Hazard Mitigation Plan was also approved in October 2006. Radford University's plan included many of the same hazards as Virginia Tech's plan, but also included lightning and dam failure.

Planning and Public Policy Principles for Local Government

- Limit practice of subsidizing risks in hazard areas
- Build and share a base of knowledge about nature of risks and sustainable ways of living with hazards
- Develop a commitment and capacity to change the way hazardous areas are managed
- Coordinate and integrate policies to manage exposure to hazards with policies to accomplish economic, social and environmental objectives

Source: Natural Hazards: Land Use Planning for Sustainable Communities

1.5 Hazard Mitigation: Links to Sustainability

Though hazard mitigation has not gotten great attention in the past, it is compatible with and even essential for "sustainability." The concept of sustainability has grown out of the heightened environmental consciousness during the past 20 years. Sustainability seeks to balance natural, economic and social needs. According to FEMA (*Planning for a Sustainable Future*, 2000) a "sustainable community," is one which enhances quality of life while also ensuring that people "live within an eco-system's carrying capacity." One example of an important link between hazard mitigation and "sustainable development" is the function and value of forests and wetlands for water retention and quality. There is also potential for dual purpose, joint actions such as conservation easements to limit future development in critical areas.

Sustainable or "disaster resistant" communities demonstrate results including saved lives, reduced physical damage and economic loss, and shorter recovery period. They are, thus, much more attractive to individuals and businesses.

1.6 New River Valley Hazard Mitigation Plan 2017

The remaining chapters of this plan have been organized as follows

- Chapter Two, Community Profile: The Community Profile section outlines a physical and demographic description of the New River Valley region.



- Chapter Three, Planning Process: The Planning Process section describes how the plan was revised, the stakeholder involvement and public outreach, and review and incorporation of other plans and studies during the revision of this plan.
- Chapter Four, Hazard Identification and Risk Assessment: The Hazard Identification and Risk Assessment section evaluates the natural hazards and some human-caused hazards that are likely to affect the New River Valley. Additionally, data is analyzed to determine the impacts these hazards would have on the communities in the region.
- Chapter Five, Mitigation Strategies: The Mitigation Strategies section lists goals, objectives, and strategies identified by a stakeholder committee to address the hazards and risks previously identified as well as the capability assessment for each jurisdiction and the region as a whole.
- Chapter Six, Community Summaries: The Community Summaries section identifies hazards and mitigation strategies that are specific to each community.
- Chapter Seven, Plan Maintenance: The Plan Maintenance section outlines the process to have this update adopted by participating localities, as well as the implementation of the strategies and future maintenance of the regional plan.
- Appendices: The appendices include supplemental information to this plan which includes
 - Appendix 1: Meeting Documentation
 - Appendix 2: Adoption Resolutions
 - Appendix 3: Public Involvement Documentation
 - Appendix 4: Mitigation Projects
 - Appendix 5: Acronyms