Contextualizing Natural Hazards & Impacts on Vulnerable Populations

Exercise Worksheet

The RAFT | Resilience Adaptation Feasibility Tool

SECTION ONE: INTRODUCTION

Goal

This exercise seeks to **(1) understand the specific impacts of hazards on a locality** and **(2) identify populations vulnerable to those impacts**, with an emphasis on social and economic conditions that may exacerbate risk to hazards. It aims to build upon existing tools and processes that exist, including Hazard Mitigation Plans and Emergency Operations Plans.

The exercise is intended to consider vulnerability within the context of flooding hazards, but the blank worksheet included in the appendix can be adapted for any high-priority hazard a community faces. Section two presents the exercise with flooding as the hazard of concern, while section three presents a blank exercise worksheet with instructions for building it out with other priority hazards in focus.

Purpose

By understanding the impacts of hazards, we can better identify who is vulnerable to those hazards and conduct effective outreach, education, and planning accordingly. Assessing vulnerability is particularly critical for both individuals who are directly-impacted by hazards and those who are socially vulnerable due to underlying socioeconomic conditions and situations that can make preparing for and responding to hazards challenging (see box right). By identifying these "*priority populations*", we can identify specific knowledge and resources needed to **better prepare the community for the impacts of hazards**, including those created or exacerbated by climate change.

This exercise can be conducted in parallel with other resilience-building exercises, including regional hazard mitigation planning and Emergency Risk Communication (ERC) planning.

***Outputs of this exercise can be used in the following ways**:*

- Local impacts of hazards are fed into Hazard Mitigation Plan (HMP) updates and Emergency Operations Plan (EOP) updates;

Conditions that may exacerbate risk to hazards include:

- Income below the federal poverty level
- Limited English-language skills
- Mental illness and substance use disorders
- Chronic illness and disabilities
- Homelessness
- Limited mobility and agency (elderly populations, residents of short- and long-term care facilities, children)
- A lack of health insurance
- Temporary residency (including migrant workers, visiting tourists/second home owners)
- A lack of reliable internet access or cell phone coverage
- A lack of reliable transportation
- Limited use of modern amenities, including transportation and communication technologies (e.g. Amish and conservative Mennonite communities)
- Connection to historic or cultural resources at risk of hazards (e.g. Tribal Nations and communities)
- Experience of historic traumas causing low trust of government messages or actions (e.g. African Americans, migrant workers, Tribal Nations)

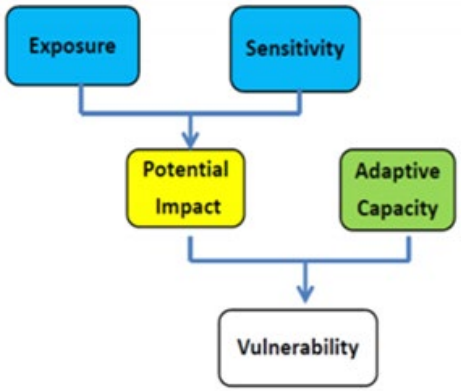
- Priority populations identified are considered during the Emergency Risk Communication (ERC) assessment planning and communications strategy updates (Note: it is recommended to complete Steps 1-4 of this tool prior to beginning the ERC planning);
- Local impacts of hazards, priority populations identified, and opportunities identified are used as a basis for more comprehensive resiliency planning efforts, such as creating a locality resilience plan, integrating resiliency into the comprehensive plan, etc.
- Opportunities to fill data gaps and address flooding impacts are used to inform the locality's project scoping and/or grant application efforts.
- Opportunities to improve service provision to priority populations are elevated to appropriate staff within local government, or partners at community service organizations.

Step 5 in this exercise, "Identifying Next Steps" asks users to document opportunities identified from brainstorming during each prior step in the process. Users are encouraged to engage with this section to document ideas about next steps at any point in the process.

Audience

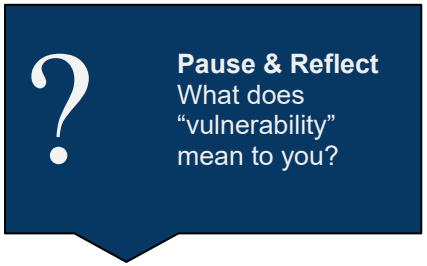
This exercise is designed to be used by interdisciplinary teams of individuals from a locality (County, City, or Town) with a vested interest in hazards and their impacts. It aims to be accessible to audiences who have not historically led or been actively included in hazard mitigation planning or climate resilience planning processes, recognizing that individuals outside of traditional hazard planning roles can make important contributions to these efforts.

Government staff (local, regional, and state, private sector representatives, non-profit organizations and advocacy groups, and community members can all add valuable information to ensure this tool is complete, accurate, and useful.



Definitions

- ***Vulnerability*** is a function of combined factors of exposure, sensitivity, and adaptive capacity.[1] Exposure refers to the changes in the environment likely to be experienced (i.e. the extent of flooding); sensitivity refers to the degree to which those environmental changes create negative impacts; and adaptive capacity refers to the ability to adapt to environmental changes.
- ***Priority populations*** is a term used throughout this document to refer to both individuals who are vulnerable to natural and climate hazards as a result of their direct exposure to impacts, as well as individuals who experience social and economic conditions, including marginalization, that increase their vulnerability to those impacts.
- ***Social vulnerability*** is a term commonly used across the health, social service and public administration fields (see a list of terms in this resource document). This term is generally meant to encompass social groups who have been historically excluded or whose needs are not fully met by traditional service providers listed in the text box on page 1.



[1] Image by EcoAdapt, http://ecoadapt.org/data/documents/IntrotoVunerabilityandAdaptationPlanning_Midpen.pdf

SECTION TWO: UNDERSTANDING THE IMPACTS OF FLOODING

Flooding, including coastal flooding caused by storm surge, nuisance flooding caused by sea level rise and land subsidence, and both riverine and localized inland flooding caused by periods of intense rainfall leading to surface runoff are considered priority hazards for coastal Virginia. A flood hazard is "the potential for inundation that involves risk to life, health, property, and natural floodplain resources and functions. It consists of three elements: severity (magnitude, duration, and extent of flooding), probability of occurrence, and speed of onset of flooding." The following exercise asks users to identify flood hazards specific to their community, and then identify populations likely to be affected by those impacts.

Step 1 - Gather information on flooding

Review existing resources
Begin by locating your Hazard Mitigation Plan. Review the plan to understand assessment of flood risk, and reference any visualization tools they use. Document some key points about flooding for your locality:

What are the sources of flooding most relevant to your locality?

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What flooding mitigation goals and actions are established for your locality?

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Identify the assets your locality values
Brainstorm the cultural, historic, ecological, and economic buildings and infrastructure, locations, resources, and features of your locality that are central to your locality's sense of identity. Focus on identifying things that are unique to your community, the value of which may not be understood by outsiders or communicated by data alone.

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Visualize flood risks

Next, build upon the hazard mitigation plan by using mapping tools to visualize flood risk and how it will change over time. Overlay inundation map layers for different sources of flooding with map layers representing *what* is impacted (critical assets to your community), as well as *who* is impacted. If your locality has Geographic Information System (GIS) staff and capabilities on hand, you may wish to use GIS software to create specialized maps for your locality. If your locality has limited GIS capacity, you may opt to use online mapping tools instead. For more information about local GIS resources and available data layers, contact your regional Planning District Commission. Be sure to consider both current floodplains, as well as future flooding scenarios driven by climate change (changes in sea level and precipitation patterns) as you review the tools.

Document trends you have uncovered

Consider - What types of assets are exposed to flood risk? Who is exposed to flood risk? How do the visualizations confirm or contrast your experiences on the ground?

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Document any data gaps

What additional map data would be helpful to understand how flooding is impacting your locality, and what assets are at risk? Revisit this section as you work through other sections of the document.

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Step 2 - Identify flooding impacts on your locality

Working as a team or in small, interdisciplinary groups, **use the chart below to fill in known *and* suspected impacts of flooding specific to your locality**.

The left column will serve as a guide for the types of impacts you may see. In the right column, you will delve into specific locations, assets, and issues relevant to your locality. Refer back to the visualization tools and your findings from step 1 for support, where needed. Where appropriate, distinguish between flood sources.

Types of Flooding

Non-tidal streams and rivers are subject to precipitation-driven flooding, which can also affect areas not near water bodies, in the present and future. Tidally-influenced water bodies, such as the ocean and tidal ponds, are also subject to storm surge and tidal nuisance flooding in the present, and sea level rise in the future. Robust models that take into account both past flooding and broader trends should be used to predict future flooding hazards.

Update this column with the types of flooding impacts identified in your HMP	***Use this column to brainstorm how those impacts manifest in specific locations, assets, and issues in your locality***
Damages to infrastructure, property, crops	
Disruptions in access to community services, utility services, water supply	
Harm to public and environmental health (e.g. septic concerns, wastewater treatment concerns)	
Secondary impact of **shoreline erosion** and associated property damage, loss of tax base, and water quality degradation	

Step 3 - Identify who is likely to be affected by flooding impacts

Working as a team or in small, interdisciplinary groups, **use the chart below to identify the populations in your locality known or suspected to be impacted by flooding**. Ensure that you give consideration both to the people living, working, and traveling in affected areas, as well as people who may be acutely affected by risks due to other socioeconomic factors, like amount of disposable income, access to transportation, reliance on electricity for medical reasons, etc.

Consider whether there are any resources specific to your locality that can support in identifying these populations. For example, non-profits or community-based organizations serving the community who have data to contribute or reports to share as resources (i.e. the Red Cross, faith-based organizations, food banks). These groups can be invited to participate in the brainstorming process.

Example: Northern Neck Resource Council

In the Northern Neck, the Northern Neck Resource Council coordinates resources and services between different community agencies. Their goal is to "increase community support and connectedness" in the region, and host monthly meetings, as well as list service providers and their contact information on their website. This type of organization can be a great asset to your team in identifying priority populations using this exercise.

(https://nnkresourcecouncil.wordpress.com/)

Update this column with the types of flooding impacts identified in your HMP (see previous table)	***Use this column to brainstorm:*** **Who is impacted?** *(Consider both those in geographic proximity to the impacts, as well as those likely to experience impacts more acutely due to their socioeconomic situation.)*
Damages to infrastructure, property, crops	Geographic proximity to risk: • Socioeconomic factors that exacerbate impacts: •
Disruptions in access to community services, utility services, water supply	Geographic proximity to risk: • Socioeconomic factors that exacerbate impacts: •
Harm to public and environmental health (e.g. septic concerns, wastewater treatment concerns)	Geographic proximity to risk: • Socioeconomic factors that exacerbate impacts: •

Secondary impact of **shoreline erosion** and associated property damage & water quality degradation	Geographic proximity to risk: • Socioeconomic factors that exacerbate impacts: •

Step 4 - Identify who has limited ability to prepare for, respond to, and recover from flooding impacts

Working as a team or in small, interdisciplinary groups, **use the chart below to identify the populations in your locality known or suspected to have limited capacity or resources to prepare for, respond to, and recover from flooding impacts.** Focus on physical and intangible barriers that individuals or institutions (i.e. local government, first responders, community groups) may face in implementing the listed techniques, rather than exposure to floodwaters. Refer back to the definitions on page 2 as an aid.

Techniques and adaptive responses	**Who may have limited ability to implement these techniques?**
Preparedness	
Understand flood risk	•
Sign up for community warning system	• *Ex., Individuals with **lack of internet and cell phone service** for information about hazards/information being disseminated about emergency situations.*
Learn and practice evacuation routes, shelter plans	•
Gather supplies	•

Purchase flood insurance	•
Property protections and structural adaptation	•
Response	
Go to a previously identified safe location	•
Evacuate immediately if directed to do so;	•
Listen to emergency alert systems for instructions;	•
Return home only when deemed safe by authorities	•
Recovery	

Assess and document damage and other impacts	•
File insurance claims	•
Identify sources of assistance	•

Step 5 - Identifying Next Steps

For each brainstorming step, review or revisit key findings as a full group. Then, **use this section to identify opportunities for action** to reduce the direct impacts of flooding on infrastructure and resources, as well as to build the resilience of priority populations.

Although potential next steps are identified below, teams should take care to ground next steps in the specific needs, priorities, and opportunities present in their community. A key next step that all localities should consider is to integrate findings into Emergency Operations Plans, Hazard Mitigation Plans, and communications strategies.

Filling data gaps (Step 1)

- *Ex. Create a plan for monitoring and documenting impacts' severity, duration, frequency*
- *Reach out to state agencies for support in filling data gaps (i.e. VDEM, DCR, VDOT, etc.)*
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Addressing flooding impacts (Step 2)

- *Ex. Seek feedback on the list of impacts (has anything been missed?) from a broader group of stakeholders*
- *Ex. Create a prioritized list of impacts that require action by the locality to mitigate*
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Supporting priority populations likely to be affected by flooding (Step 3)

- *Ex. reach out to individuals within identified communities to understand their lived experience of flooding and gather additional information*
- *Ex. identify existing programs from the locality, PDC, state, or federal government designed to support these populations with the flooding challenges they face and share information about these programs with the identified communities.*
- *Ex. review communications approaches to identify potential barriers/gaps for reaching identified populations with key information on risk and opportunities to build resilience*
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Supporting priority populations with limited ability to prepare for and respond to flooding (Step 4)

- *Ex. make plans to adjust communication strategies to overcome barriers identified for information dissemination (i.e. distributing printed materials to areas that lack broadband coverage)*
- *Ex. reach out to individuals within identified communities to understand their lived experience of flooding and gather additional information*
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APPENDIX: USING THE EXERCISE TO EXPLORE ADDITIONAL HAZARDS

This exercise can be applied to hazards other than flooding by filling in the blanks in the worksheet below with the name of the selected hazard. The Northern Neck Regional Hazard Management Plan identifies the following hazards at the following priority levels:

- **Hurricanes, Tornado** - *"Significant" Priority*
- **Severe Weather (severe wind, lightning, hail events), Coastal Erosion** - *"Medium" Priority*
- **Drought, Winter Storms, Earthquake, Wildfire** - *"Low" Priority*

Step 1 - Gather information on the hazard

Review existing resources
Begin by locating your Hazard Mitigation Plan. Review the plan to understand assessment of _____ risk, and reference any visualization tools they use. Document some key points about _____ for your locality:

How prevalent is _____ in your locality?

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What _____ mitigation goals and actions are established for your locality?

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Identify the assets your locality values
Brainstorm the cultural, historic, ecological, and economic buildings and infrastructure, locations, resources, and features of your locality that are central to your locality's sense of identity. Focus on identifying things that are unique to your community, the value of which may not be understood by outsiders or communicated by data alone.

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Visualize _____ risks

Next, build upon the hazard mitigation plan by using mapping tools to visualize _____ risk and how it will change over time. Overlay map layers for _____ risk with map layers representing *what* is impacted (critical assets to your community), as well as *who* is impacted. If your locality has Geographic Information System (GIS) staff and capabilities on hand, you may wish to use GIS software to create specialized maps for your locality. If your locality has limited GIS capacity, you may opt to use online mapping tools instead. For more information about local GIS resources and available data layers, contact your regional Planning District Commission. Be sure to consider both current hazard risk, as well as future scenarios driven by climate change as you review the tools.

Document trends you have uncovered

Consider - What types of assets are exposed to _____ risk? Who is exposed to _____ risk? How do the visualizations confirm or contrast your experiences on the ground?

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Document any data gaps

What additional map data would be helpful to understand how _____ is impacting your locality, and what assets are at risk? Revisit this section as you work through other sections of the document.

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Step 2 - Identify _____ impacts on your locality

Working as a team or in small, interdisciplinary groups, **use the chart below to fill in known *and* suspected impacts of _____ specific to your locality**.

The left column will serve as a guide for the types of impacts you may see. In the right column, you will delve into specific locations, assets, and issues relevant to your locality. Refer back to the visualization tools and your findings from step 1 for support, where needed.

Update this column with the types of _____ impacts identified in your HMP	***Use this column to brainstorm how those impacts manifest in specific locations, assets, and issues in your locality***
	•
	•
	•
	•

Step 3 - Identify who is likely to be affected by _____ impacts

Working as a team or in small, interdisciplinary groups, **use the chart below to identify the populations in your locality known or suspected to be impacted by _____**. Ensure that you give consideration both to the people living, working, and traveling in affected areas, as well as people who may be acutely affected by risks due to other socioeconomic factors, like amount of disposable income, access to transportation, reliance on electricity for medical reasons, etc.

Consider whether there are any resources specific to your locality that can support in identifying these populations. For example, are there non-profits or community-based organizations serving the community who have data to contribute or reports to share as resources (i.e. the Red Cross, faith-based organizations, food banks). These groups could be invited to participate in the brainstorming process.

Update this column with the types of _____ impacts identified in your HMP (see previous table)	***Use this column to brainstorm:*** **Who is impacted?** *(Consider both those in geographic proximity to the impacts, as well as those likely to experience impacts more acutely due to their socioeconomic situation.)*
	Geographic proximity to risk: • Socioeconomic factors that exacerbate impacts: •
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	Geographic proximity to risk: • Socioeconomic factors that exacerbate impacts: •

Step 4 - Identify who has limited ability to prepare for, respond to, and recover from _____ impacts

Working as a team or in small, interdisciplinary groups, **use the chart below to identify the populations in your locality known or suspected to have limited capacity or resources to prepare for, respond to, and recover from _____ impacts.** Focus on physical and intangible barriers that individuals or institutions (i.e. local government, first responders, community groups) may face in implementing the listed techniques, rather than exposure to _____.

Techniques and adaptive responses	**Who may have limited ability to implement these techniques?**
Preparedness	
Understand _____ risk	•
Sign up for community warning system	• *Ex., Individuals with **lack of internet and cell phone service** for information about hazards/information being disseminated about emergency situations.*
Learn and practice evacuation routes, shelter plans	•
Gather supplies	•
Purchase insurance	•

Property protections and structural adaptation	•
Response	
Go to a previously identified safe location	•
Evacuate immediately if directed to do so;	•
Listen to emergency alert systems for instructions;	•
Return home only when deemed safe by authorities	•
Recovery	
Assess and document damage and other impacts	•

File insurance claims	•
Identify sources of assistance	•

Step 5 - Identifying Next Steps

For each brainstorming step, review or revisit key findings as a full group. Then, **use this section to identify opportunities for action** to reduce the direct impacts of _____ on infrastructure and resources, as well as to build the resilience of priority populations.

Although potential next steps are identified below, teams should take care to ground next steps in the specific needs, priorities, and opportunities present in their community. A key next step that all localities should consider is to integrate findings into Emergency Operations Plans, Hazard Mitigation Plans, and communications strategies.

Filling data gaps (Step 1)

- *Ex. Create a plan for monitoring and documenting impacts' severity, duration, frequency*
- *Reach out to state agencies for support in filling data gaps (i.e. VDEM, DCR, VDOT, etc.)*
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Addressing _____ impacts (Step 2)

- *Ex. Seek feedback on the list of impacts (has anything been missed?) from a broader group of stakeholders*
- *Ex. Create a prioritized list of impacts that require action by the locality to mitigate*
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Supporting priority populations likely to be affected by _____ (Step 3)

- *Ex. reach out to individuals within identified communities to understand their lived experience of _____ and gather additional information*
- *Ex. identify existing programs from the locality, PDC, state, or federal government designed to support these populations with the _____ challenges they face and share information about these programs with the identified communities.*
- *Ex. review communications approaches to identify potential barriers/gaps for reaching identified populations with key information on risk and opportunities to build resilience*
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Supporting priority populations with limited ability to prepare for and respond to _____ (Step 4)

- *Ex. make plans to adjust communication strategies to overcome barriers identified for information dissemination (i.e. distributing printed materials to areas that lack broadband coverage)*
- *Ex. reach out to individuals within identified communities to understand their lived experience of _____ and gather additional information*
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