



*North Carolina*

# Climate Risk Assessment and Resilience Plan

Impacts, Vulnerability, Risks, and Preliminary Actions

## Appendix C: North Carolina Mountain and Piedmont Regional Workshops Report

June 2020



**North Carolina  
Executive Order 80  
Mountain and Piedmont  
Regional Resiliency Workshop Report**  
October – November 2019





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## Executive Summary

The following report provides a synopsis of the five NC Mountain and Piedmont Regional Workshops hosted by the Department of Environmental Quality (DEQ) with support from its sister cabinet agencies, and its public, private, and non-profit partners. These workshops were conducted in support of Governor Cooper's [Executive Order 80: North Carolina's Commitment to Address Climate Change and Transition to a Clean Energy Economy](#). Section 9 of the order directs NC Department of Environmental Quality (DEQ), with support of cabinet agencies and informed by stakeholder engagement, to prepare the 2020 North Carolina Climate Risk Assessment and Resiliency Plan (2020 Resilience Plan)

Over 200 stakeholders representing a diverse group of local governments, non-profit organizations, environmental, and community groups were gathered for two workshops in the Mountain region and three workshops in the Piedmont region of the state in order to meet the following objectives:

- learn about some of the latest climate science available for the state,
- share regional climate change and resiliency challenges,
- generate strategies that could be implemented at the local level,
- generate recommendations that could be implemented at the state level, and
- prioritize regional vulnerabilities to be addressed in the North Carolina Climate Risk and Resiliency Plan

The NC Mountain and Piedmont Regional Workshops were designed following the completion of the NC Coastal Resilience Workshops and the NC Coastal Resilience Summit. The day-long workshops guided stakeholders through two educational Technical Sessions followed by a lunchtime presentation. In Technical Session I, a lead climate scientist gave an overview of the current climate trends and impacts specifically tailored to the region. In Technical Session II, a panel of local government officials, state regional office staff, university partners, business owners, and non-government organization staff from the Mountain or Piedmont provided varied local perspectives on local hazards, impacts and challenges and share approaches to managing short- and long-term environmental, economic and societal changes. The lunchtime presentation set the stage for afternoon discussions by giving context to local and community level climate resilience and introducing proven successful resilience strategies. The day ended with a 2-hour facilitated discussion surrounding local climate impacts, current and possible actions by local governments, and recommendations for state governments to further support local communities. Participants were asked to respond to the following questions:

1. How has your community been affected by natural hazards and long-term stressors?
2. What steps have you already taken to reduce future climate hazards and risks? What actions would you like to take and what are the barriers you face?
3. How can the state better support communities in addressing climate hazard risks and impacts?

All responses to these questions and recommendations for state government from each workshop are listed and categorized in this report.

## Purpose

On October 29, 2018, Governor Roy Cooper signed Executive Order No. 80: North Carolina's Commitment to Address Climate Change and which establishes goals and directives designed to address climate change in North Carolina by reducing greenhouse gas emissions, reducing energy consumption in state government buildings, increasing the use of zero emission vehicles, and promoting clean and renewable energy businesses and workforces.

Section 9 of the order directs NC Department of Environmental Quality (DEQ), with support of cabinet agencies and informed by stakeholder engagement, to prepare the 2020 North Carolina Climate Risk Assessment and Resiliency Plan (2020 Resilience Plan).

In an effort to gain stakeholder input for the 2020 Resilience Plan, DEQ, in conjunction with other cabinet agencies and its public, private, and non-profit partners, planned and hosted five workshops in the Mountain and piedmont regions of the state. The objectives of these workshops were to convene stakeholders in order to:

- learn about some of the latest climate science available for the state,
- share regional climate change and resiliency challenges,
- generate strategies that could be implemented at the local level,
- generate recommendations that could be implemented at the state level, and
- prioritize regional vulnerabilities to be addressed in the North Carolina Climate Risk and Resiliency Plan

The Mountain and Piedmont Regional Resiliency Workshops were designed following the completion of two workshops done in the Coastal region of the state by DEQ's Division of Coastal Management (DCM) in May of 2019.

Workshops were hosted by partnering organizations on the dates listed below.

**Table 1: Locations of the Mountain and Piedmont Regional Resilience Workshops**

Workshop Location	Workshop Date	Host Organization
Sylva, NC	Tuesday, October 15, 2019	Southwestern Community College
Hickory, NC	Wednesday, October 16, 2019	Western Piedmont COG
Kernersville, NC	Monday, November 4, 2019	Piedmont Triad Regional COG
Pembroke, NC	Thursday, November 7, 2019	Lumber River COG
Wilson, NC	Tuesday, November 12, 2019	Upper Coastal Plain COG

## Workshop Design

### Planning Team

The Mountain and Piedmont workshops were planned, designed, and executed by a team of cabinet agencies, Regional Councils of Governments, Non-Government Organizations, and University partners, led by DEQ. The planning team was divided into two groups based on geographic reach and influence to ensure that the needs of mountain and piedmont stakeholders were adequately represented.

<b>Workshop Planning Leads</b>	
Sushma Masemore	NC Department of Environmental Quality
Tira Beckham	NC Department of Environmental Quality
Sherri Stanley	NC Department of Environmental Quality
<b>Mountain Workshop Planning Team</b>	
Carolina Jimenez	DEQ EJ Board + Hometown Strong
Mary Roderick	Land of Sky COG
Ariel Christensen	NC Department of Health & Human Services
Julie Mayfield	MountainTrue Asheville
Lily Fulconer	NC Hometown Strong
Ken Taylor	NC Department of Environmental Quality
Phillip Trew	High Country Council of Governments
Jim Fox	UNC Asheville
John Wear	Western Piedmont COG
Russ Harris	Region A COG
Renee Kramer	NC Department of Environmental Quality
Rodney Butler	NC Department of Natural and Cultural Resources
<b>Piedmont Workshops Planning Team</b>	
Jen Schmitz	Triangle J COG
Kelly Larkins	Piedmont Triad COG
Grace Lawrence	NC Department of Commerce
Rodney Butler	NC Department of Natural and Cultural Resources
Tom Hoban	Cape Fear River Assembly
Ron Townley	Upper Coastal Plain COG
Robert Hiatt	Upper Coastal Plain COG
Lauren Thie	NC Department of Health & Human Services
Michelle Nance	Centralina COG
Stephanie Harmon	Kerr Tarr COG
David Richardson	Lumber River COG
Joe Hudyncia	NC Department of Agriculture
Sonya Johnson	Lumber River COG
Renee Kramer	NC Department of Environmental Quality



## Stakeholders

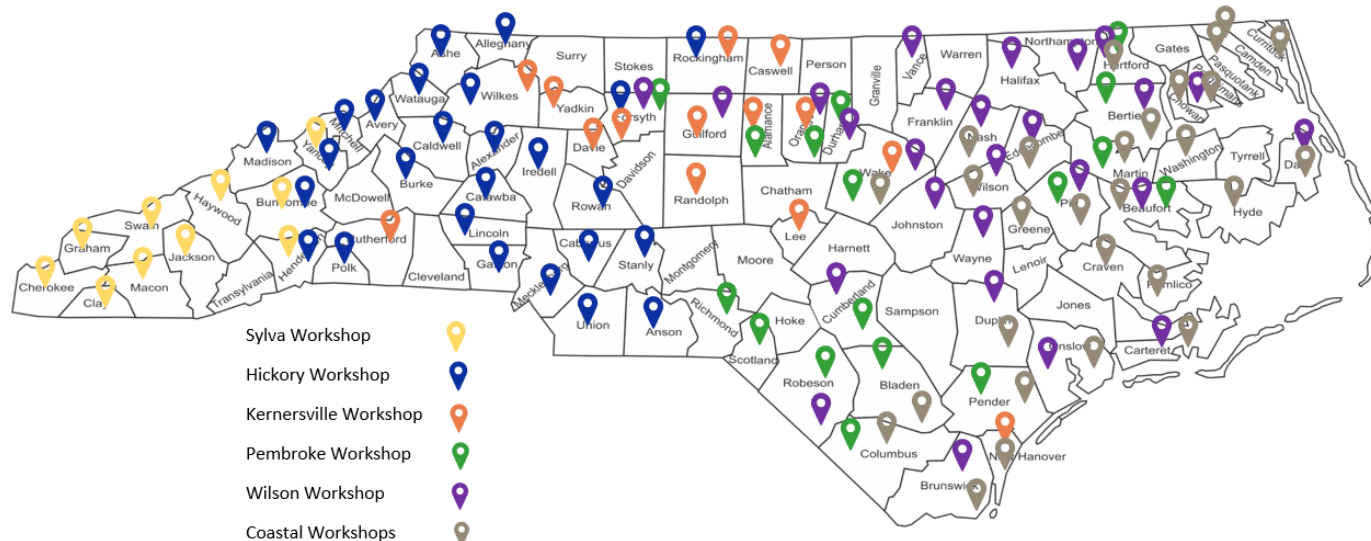
The effects of a changing climate are evident in all sectors and the impacts can be felt by across the state. By working with North Carolina Councils of Government, Universities, and State officials, the planning team was able to reach a wide variety of stakeholders for participation in the workshops. The following participant groups were encouraged to attend:

- **Local government officials:** town council, county commissioners, mayors, etc.
- **Local Planners:** town/county managers, planners/community development, public works directors, emergency managers, floodplain administrators, public health officials, parks and recreation, etc.
- **Community Organizations:** Environmental advocacy groups, environmental justice organizations, tribal communities, faith-based organizations, etc.
- **Business, Commerce, and Agriculture:** Local business owners, department of agriculture, city commerce, forestry, etc.
- **Supporting Organizations:** Environmental groups, academia, consultants, etc.

Workshop attendees came from various organizations representing a diverse range of beliefs, values, and communities.

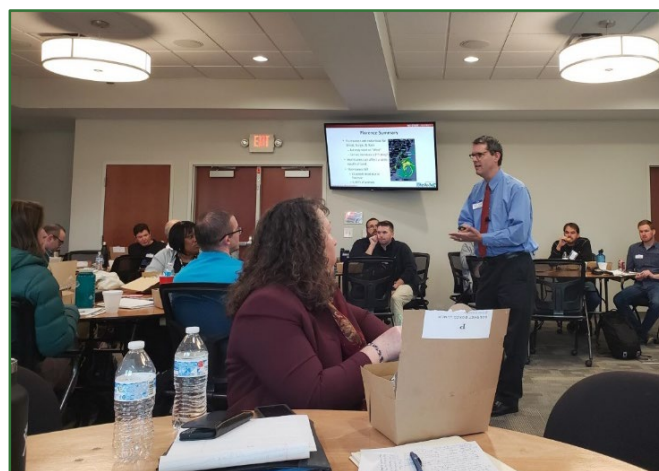
Workshop	Total Participants
Sylva, NC	45
Hickory, NC	43
Kernersville, NC	58
Pembroke, NC	45
Wilson, NC	57





**Figure 1: Participant locations**

Over 300 participants from 82 of the 100 North Carolina counties gave their input to the Regional Resiliency Workshops in the Mountain, Piedmont, and Coastal regions of the state. Stakeholders from over 100 local governments, community organizations, environmental organizations, tribal communities, and other interest groups convened together to identify regional climate impacts, develop strategies for local action, and generate recommendations for state government.



## PARTICIPATING ORGANIZATIONS

Alexander County	Fair Share Farm, LLC	River Guardian Foundation
American Rivers	Flat Rock Village Planning Board	Rummel, Klepper, & Kahl Civil Engineering
Appalachian Landslide Consultants, PLLC	Forsyth Soil & Water Conservation District	Robeson County Solid Waste
AppHealthCare	Franklin County	Robeson Soil and Water Conservation District
Asheville Area Chamber of Commerce	Gannett Fleming Inc.	Rock and Wrap It Up! North Carolina
Audubon North Carolina	Graham County	Rockingham Soil and Water Conservation District
Avery County Planning Department	Green \$aves Green	Rockingham County Board of Commissioners
Burlington-Graham Metropolitan Planning Organization	Greensboro Community Sustainability Council	Rockingham County Consolidated Public Health Division
Biola University	Greensboro EarthQuakers	Rutherford Electric Membership Corporation
Blowing Rock, North Carolina	Greensboro Sustainability Council	Scotland county
Board of Orange County Commissioners	Guilford College	Scotland County Emergency Services
BRIDGE Project	Guilford County Emergency Management	SE NC Climate, Justice, and Disaster Recovery Project
Buncombe County Health & Human Services	Halifax County	Second Harvest Food Bank of Nwnc
Caldwell County	Haywood Waterways Association	Southern Economic Development Council
Cape Fear Council of Governments	Henderson County	Sound Rivers
Cape Hatteras Electric Cooperative	High Country Council of Governments	Southern Alliance for Clean Energy
CASE Consultants International	Jackson County	Southern Environmental Law Center

Caswell County Government	Kerr Tar Regional Transportation Planning Organization	Southwestern Commission
Catawba County	Land of Sky Regional Council	Starbright Farm
Catawba County Emergency Services	Lanier Consulting	Swain County
Catawba County Soil & Water Conservation	Lumbee River Electric Membership Cooperation	Swain Emergency Management
Catawba Riverkeeper Foundation	Lumbee Tribe of North Carolina	Terracon Consultants, Inc
Center for Energy Research and Technology	Lumber River Council of Governments	The Conservation Fund's Resourceful Communities Program
Centralina Council of Governments	Macon County Public Health	The NC Zoo/Keep Randolph County Beautiful
Cherokee County Emergency Management	Madison County Soil and Water Conservation District	The Pew Charitable Trusts
Citizens' Climate Lobby	Mainspring Conservation Trust	Town of Biltmore Forest
City of Archdale	Manos Unidas/Black River Health Services, Inc	Town of Boone
City of Asheboro	Mecklenburg Soil and Water Conservation District	Town of Carrboro
City of Asheville	Mid-East Commission	Town of Elon, NC
City of Conover	Moffatt & Nichol	Town of Franklin
City of Fayetteville	MountainTrue Asheville	Town of Hillsborough
City of Greensboro	Nash County Emergency Management	Town of Liberty
City of Lenoir	Nash County Soil & Water Conservation District	Town of Liberty Parks and Recreation
City of Morganton	NC Chapter of Sierra Club	Town of Milton
City of Randleman	NC Clean Energy Technology Center	Town of Nashville
City of Southport	NC Conservation Network	Town of North Wilkesboro
City of Wilson	NC Cooperative Extension	Town of Red Springs

City of Winston-Salem	NC Department of Commerce	Town of Seaboard
Clay County Emergency Management	NC Dept. of Agriculture and Consumer Services	Town of Spring Lake
Clean Air Carolina	NC Division of Soil and Water Conservation	Town of White Lake
Conservation Trust for NC	NC DOT Board	UCC Disaster Ministries
Cumberland County	NC Emergency Management	University of North Carolina
Cumberland County Cooperative Extension	NC Farm Bureau	Upper Coastal Plain Council of Governments
Cumberland Storm Water Conservation District	NC Grange	USDA-NRCS
Davie Storm Water Conservation District	NC Policy Watch	Watauga County Planning & Inspections Department
Division of Soil and Water Conservation	NC Rural Center	Western Piedmont Council of Governments
Down East Council	NC State University	Wilkes Soil and Water Conservation District
Duke University	NC Wildlife Resources Commission	Wilkes County Soil & Water Conservation District
Durham Environmental Affairs Board	North Carolina Coastal Federation	Winyah Rivers Alliance
Eastern Band Cherokee Indians	North Carolina State University	Witt O'Brien's
Eastern Band of Cherokee Indians	Office of US Senator Richard Burr	WNC Health Network
Economic Development Administration	Piedmont Electric	Yadkin County
Environmental Defense Fund	Piedmont Triad Regional Council of Governments	Yancey County Emergency Management
Economic Development Partnership of NC	Polk County	
Environmental Management Commission	Presbyterians for Earth Care	
Equinox	Red Springs City Council	

## Agenda and Presentations

The Mountain and Piedmont workshops were designed following the layout of the NC Coastal Resilience Workshops conducted by DEQ's Division of Coastal Management. The day-long workshops were separated into morning and afternoon sessions. The morning sessions consisted of two educational Technical Sessions, followed by a lunchtime presentation. The afternoon session consisted of a two to three part facilitated discussion led by state agency representatives to generate strategies and recommendations for state agencies.

### 1. Executive Order 80 Overview and Workshop Objectives

During the opening presentation of the workshops, a member of the DEQ lead team provided an overview of Governor Cooper's Executive Order 80 Section 9 and state's efforts leading to the development of the 2020 Resilience Plan. The purpose of this presentation was to give attendees a clear understanding of the role of local input in the 2020 Resilience Plan and the significance of their participation.

### 2. Technical Session I: How has the Climate Changed in the Region and What is Expected Moving Forward?

In the first Technical Session, lead climate experts with recent publications in the field from universities across the state provide an overview of historic, present, and projected regional climate patterns. Additionally, the climate scientists presented the preliminary findings of the NC Climate Science Report.<sup>1</sup> These presentations serve to help participants to understand global, state, and regional climate trends and stressors. The climate experts who presented during Technical Session I of the Mountain and Piedmont Regional Resilience Workshops are listed in table 3.

Table 3: Technical Session I Speakers

Technical Session I: How has Climate Changed in the Region and What is Expected Moving Forward?	
Dr. Kathie Dello	NC State University- State Climate Office
Dr. Walter Robinson	NC State University
Dr. Kenneth Kunkle	North Carolina Institute for Climate Studies

### 3. Technical Session II: How are Climate Hazards and Impacts Affecting the Local Community?

In the second Technical Session, a panel of local government officials, state regional office staff, university partners, business owners, and non-government organization staff from the Mountain or Piedmont provided varied local perspectives on local hazards, impacts and challenges and shared varying approaches for managing short- and long-term environmental, economic and societal changes

<sup>1</sup> Kunkel, K.E., D.R. Easterling, A. Ballinger, S. Bililign, S.M. Champion, D.R. Corbett, K.D. Dello, J. P. Dissen, G.M. Lackmann, R.A. Luettich, Jr., L.B. Perry, W.A. Robinson, L.E. Stevens, B.C. Stewart, and A.J. Terando, 2020: North Carolina Climate Science Report. North Carolina Institute for Climate Studies, 233 pp. <https://ncics.org/nccsr>

associated with climate change hazards and impacts. Members of the panel were asked to reflect on the following questions from the perspective of their fields and experience:

1. *What are the top two climate hazards and impacts to your region/ community?*
2. *How are these impacts affecting the different sectors of the community (ecosystem, infrastructure, businesses, etc.)?*
3. *How are local governments preparing for and responding to these impacts?*
4. *What are some knowledge gaps that you find as you engage with community members?*
5. *What strategy has been the most effective in community level resilience planning?*

The outcomes of this panel led to a group discussion regarding the limitations and constraints put on small businesses and vital industries which support the local economy as well as the challenges facing local governments attempting to enact resilience measures.

**Table 4: Speakers for Technical Session II**

<b>Technical Session II: How are Climate Hazards and Impacts Affecting the Local Community?</b>	
Mary Roderick	Land of Sky Regional COG
Brian Burch	NC DOT Region 14
Katie Scheip	Chimney Rock State Park
Mike LaVoie	Eastern Band of Cherokee Indians
Justin Query	NC Forest Service
Brian Horton	Western Piedmont Council of Governments
Dr. Jill Sidebottom	NC State University
Andrea Eilers	Triangle J COG
David Phlegar	City of Greensboro
Jim Vose	US Forest Service
Joey Hester	NC Agriculture and Consumer Services
Sarah Bowman	Surry County Community College
Jen Schmitz	Triangle J COG
Brandon Love	City of Lumberton
Kathie Cox	Scotland County Health Department
Jonelle Kimbrough	Sustainable Sandhills
Chad Ham	City of Fayetteville
Kaley Huston	Triangle J COG
Eric Evans	Edgecombe County
Anita Turnage Jones	Wilson County Chamber of Commerce
Linda Joyner	Town of Princeville
Gordon Deno	Wilson County Emergency Management
Ron Townley	Upper Coastal Plain COG

#### 4. Lunchtime Presentation: Regional Resiliency Solutions

In order to set the stage for a productive facilitated discussion on local resilience, university partners with expertise in climate resilience tackled regional climate hazards and impacts and provided options for resiliency that can be implemented at a local level. Both speakers have experience with local resilience planning and gave examples of successful measure being employed in other states and municipalities that could be used by local officials and businesses.

**Table 5: Lunchtime Presentation Speakers**

Lunchtime Presentation: Regional Resiliency Solutions	
Dr. Bill Hunt	NC State University
Dr. Jim Fox	UNC Asheville's NEMAC

### Facilitated Discussions

During the Facilitated Discussion portion of the workshop, participants were separated into six preassigned focus area groups based on their professional roles and area of expertise. Focus groups were facilitated by representatives from corresponding North Carolina cabinet agencies (Table 7).

**Table 6: Workshop Focus Groups**

Workshop Focus Groups	
Agriculture, Business, and Commerce	Environment and Natural Resources
Local Planning	People and Community
Public Health	Transportation

**Table 7: Facilitators for Facilitated Discussions**

Facilitated Discussion Assigned Agencies	
Agriculture, Business, and Commerce	Department of Commerce
Local Planning	Department of Public Safety
Public Health	Department of Health and Human Services
Environment and Natural Resources	Department of Environmental Quality
People and Community	Department of Natural and Cultural Resources
Transportation	Department of Transportation



Participants were asked to respond to the following questions in the context of their focus groups.

1. *How has your community been affected by natural hazards and long-term stressors?*
  - a. Participants provided examples of natural climate hazards of concern and how they have impacted their respective sectors.
2. *What steps have you already taken to reduce future climate hazards and risks? What actions would you like to take and what are the barriers you face?*
  - a. Participants gave examples of programs and projects currently underway in their communities, potential actions which would further increase local resilience, and limitations facing communities such as time, capacity, and funding constraints.
3. *How can the state better support communities in addressing climate hazard risks and impacts?*
  - a. Participants were asked to give specific examples of programs, policies, and areas of assistance needed to improve local resilience that could be implemented by state entities.

The responses to these questions gave insight into the problems facing local governments, businesses, and the general communities of the Mountain and Piedmont region.

## Overarching Themes

Across the state, stakeholders expressed similar concerns regarding the following issues:

- Lack of local capacity
- Lack of climate resilience knowledge
- Need for improved floodplain and watershed mapping and management tools
- Need for local government hazard mitigation planning
- Lost revenue for small businesses, agricultural, and outdoor employees during flooding and landslide events
- Single access roads are often blocked by climate hazards and prevent access to emergency services
- Need for comprehensive technical assistance with federal recovery grant process
- Lack of reliable broadband access in rural communities during disasters

## Discussion and Feedback Summaries

The responses and feedback provided by stakeholders during the Facilitated Discussion sessions at each workshop were distributed to cabinet agencies and used to inform potential options for state action in the 2020 Resilience Plan. Discussions with cabinet agency representatives gave a fresh perspective on the challenges facing local governments and communities and highlighted the need to account for regional differences in the Mountain and Piedmont.

Stakeholder groups identified possible actions for both local and state government, as well as the barriers to climate resilience. All identified impacts, barriers, and actions can be found below.

*(\*Asterisks indicate recommendations and ideas shared by multiple focus groups)*



## Sylva, NC

### Agriculture, Business, and Commerce

#### Question 1: How has your community been impacted by natural hazards and long-term stressors?

##### Flooding, Runoff, and Drought

- Impacts to businesses
- Failing pipe systems
- Impacts to crop production
- Impacts to indoor air quality
- Increased pest prevalence
- Wear on infrastructure
- Increased fuel loads
- Decreased income from agriculture

##### Temperature Changes and Heat

- Increased fuel loads
- Decreased income from forest services
- Harmful algal blooms
- Reduction of agricultural lands

##### Landslides

- Sinkholes
- Loss of topsoil

##### Wildfires

- Damage to crops\*
- Dangerous single access roads\*
- Costs of additional civil staff
- Air pollution and acid rain

##### Impact Variability

- Sprawl patterns from climate refugees
- Damage to tourism industry
- Impacts to cultural resources

#### Question 2: What steps have you already taken to reduce future climate hazards and risks? What actions would you like to take and what are the barriers?

##### Current Actions

- Stormwater management best practices
- Landslide mapping
- Agricultural tax valuation
- Active forest management
- Plant breeding programs
- Coordination between departments for permitting enforcement

##### Potential Actions

- Best Management Practices specific to the Mountain region

- Regional minimum ordinances
- Coordinated sustainable forestry
- Carbon sequestration incentives for farmers
- Farmland preservation
- Additional Greenways and greenspaces
- Improved warning systems for emergency management – specifically for farmers
- Improved rural broadband systems

#### **Barriers**

- Slow processing of federal funds
- State and Federal ordinance enforcement
- Lack of resources
- Lack of education and expertise
- Lack of stormwater data\*
- Out of date building codes
- Lack of enforcement and best management practices

### **Question 3: How can the state better support communities in addressing climate hazards and impacts?**

#### **Financial Support**

- Funding for community resiliency plan development and implementation
- Improved funding mechanisms for greenways and clean transportation
- Cost sharing for resiliency planning

#### **Technical Assistance**

- Planned preparation assistance
- Implementation of community resiliency plans
- Incorporating resiliency into economic development
- Improved response to local needs
- Erosion planning and enforcement
- Local forestry planning

#### **Resources**

- Improved local staff capacity

#### **Education, Training, and Outreach**

- Social media outreach and education
- Translations of climate data and information
- Plain-language climate data and information
- Planning discussions between local and state government agencies
- Forestry stewardship

#### **Data and Research**

- Climate data specific to western NC and local communities

#### **Regulation and Policy Changes**

- Broader permissions for housing density

## Environment and Natural Resources

### Question 1: How has your community been impacted by natural hazards and long-term stressors?

#### **Flooding, Runoff, and Drought**

- Agricultural impacts\*
- Agricultural runoff into freshwater ecosystems
- Wear on infrastructure\*
- Flooding leads to increased landslides

#### **Landslides**

- Pipes insufficient to bear loads

#### **Wildfires**

- Impacts lead to landslides on mountains

#### **Temperature Changes/Heat**

- Tree death

#### **Hazard Unpredictability**

- Effects to ecotourism
- Increased anxiety
- Change in season length

#### **Species Interaction**

- Native species being overrun by invasive species
- Increase in disease vectors
- Invasive species removal tears away native unground species

#### **Contamination**

- Runoff from flooding leads to freshwater and soil contaminants
- Drainage of sewer effluent

### Question 2: What steps have you already taken to reduce future climate hazards and risks? What actions would you like to take and what are the barriers?

#### **Potential Actions**

- Clearing stream blockages
- HOA Technical Assistance
- Additional Best Management Practices
- Improved alert systems for hazardous waste
- Cooperation between other agencies and communities

#### **Barriers**

- Public mindset
- Lack of education
- Lack of training for technical staff
- Lack of funding

### Question 3: How can the state better support communities in addressing climate hazards and impacts?

#### Financial Support

- State grants for water mitigation projects
- Funding for rural broadband projects
- Incentives for resiliency projects
- Clean water management trust fund
- Research funding at the local level
- Conditional grant funding

#### Technical Assistance

- Building capacity for local and regional resiliency planning

#### Education, Training, and Outreach

- Resiliency Training for local decision makers
- K-12 Climate science education
- State communication with local officials on community level issues

#### Data and Research

- Improved mapping systems
- Additional research on long lasting effects of current best Management Practices
- Parcel-level floodplain mapping
- Shared data resource between all agencies

## Local Planning

### Question 1: How has your community been impacted by natural hazards and long-term stressors?

#### Flooding, Runoff, and Drought

- Poor Water Quality

#### Landslides

- Influence on major projects
- Soil erosion
- Sinkholes

#### Wildfires

#### Hazard Unpredictability

- Added pressure on growth and development

### Question 2: What steps have you already taken to reduce future climate hazards and risks? What actions would you like to take and what are the barriers?

#### Current Actions

- Incorporation of comprehensive land use plan

#### Potential Actions

- Stricter land ordinances
- Cost benefit analyses

**Barriers**

- Lack of land use regulations
- Uninformed buyers
- Passive processes
- Divide between state and local decision-makers
- Limited use of occupancy tax
- Lack of diverse economic development
- Lack of broadband availability
- Lack of knowledge
- Non-funded disaster impacts/ non-declared impacts

### Question 3: How can the state better support communities in addressing climate hazards and impacts?

**Financial Support**

- Funding for environmental impact assessments
- Asset protection funding

**Technical Assistance**

- Addressing climate adaptation in local planning\*
- Rural planning assistance\*

**Resources**

- Mobile air quality monitors

**Education, Training, and Outreach**

- Mass transit as an alternative transportation method\*
- Increased communication between state and local governments
- Better education and framing of climate hazards and impacts\*
- K-12 climate hazard education

**Data and Research**

- Emphasis on land use in Hazard Mitigation Plans\*

**Regulation and Policy Changes**

- Local occupancy tax use
- Region-specific land use regulations

## People and Community

### Question 1: How has your community been impacted by natural hazards and long-term stressors?

#### Flooding, Runoff, and Drought

- Chronic flooding in low income neighborhoods
- Floodplains not properly mapped\*
- Wear on infrastructure
- Lack of affordable housing outside of floodplains
- Pressure on agricultural industry
- Impacts to stormwater

#### Landslides

- Soil erosion
- Sinkholes

#### Wildfires

- Air Quality
- Increased impact to sensitive population
- Ground level ozone and particulate matter

#### Hazard Unpredictability

- Stress on vegetation and agriculture
- Access to jobs and homes limited

#### Temperature Changes

- Pest/ insect invasion on agricultural lands
- Need additional Central heating/cooling infrastructure in affordable housing

### Question 2: What steps have you already taken to reduce future climate hazards and risks? What actions would you like to take and what are the barriers?

#### Current Actions

- Asheville Climate Resilience Plan
- SMS Alert System
- CommunityNET alert system
- Landslide mapping in 6 counties
- Floodplain mapping

#### Potential Actions

- Stricter land ordinances
- Cost benefit analyses
- Additional floodplain management
- Restore natural function to freshwater ecosystems
- Agricultural extension and outreach to rural communities and farmers
- Develop a rain gage network

#### Barriers

- Lack of adequate floodplain zoning
- Lack of funding for continued efforts\*



### Question 3: How can the state better support communities in addressing climate hazards and impacts?

#### Financial Support

- Resiliency management funding
- Climate impact tax
- Incentives for Best Management Practices

#### Technical Assistance

- Additional state oversight for laws and ordinances in rural counties
- Support efforts for rural broadband

#### Education, Training, and Outreach

- Environmental protection and resiliency training for local governments
- Additional Communication between state government and rural counties\*
- Climate impact awareness for undocumented citizens
- Training and education for climate adaptation

#### Data and Research

- Emphasis on land use in Hazard Mitigation Plans\*
- Update State design standards to consider storm frequency

#### Regulation and Policy Changes

- Increased local control of stormwater regulations
- Legislature funding of resiliency projects to reduce recovery costs
- Create a Resiliency Management Trust Fund for local governments
- Highway tax for alternative transportation similar to gas tax to support transportation projects

## Public Health

### Question 1: How has your community been impacted by natural hazards and long-term stressors?

#### Flooding, Runoff, and Drought

- More floods than historical patterns
- Heavy flooding events contribute to rise in mosquitoes
- Poor indoor air quality and mold growth in low income housing with poor to no central air
- Tribal communities more sensitive to drought
- Road closures prevent emergency evacuation

#### Temperature Changes and Heat

- Ticks and pests more prevalent
- Increased burden on the public health department
- Decreased snowfall
- Mental health effects
- Increased wellness checks to senior citizens

#### Landslides

- Lack of reliable emergency transportation routes

#### Wildfires

- Harmful outdoor air quality

**Question 2: What steps have you already taken to reduce future climate hazards and risks?  
What actions would you like to take and what are the barriers?**

**Current Actions**

- Strengthened public health codes in municipalities
- Controlled burns
- Risk reduction in urban areas

**Potential Actions**

- Encouraging recycling programs
- Increase public engagement\*
- Improvements to water quality
- Sharing information between communities
- Better enforced flood ordinances
- Subdivision ordinances to improve regional resiliency

**Barriers**

- Lack of knowledge\*
- Reviewing large vector parcels
- Difficult to recycle due to local ordinances
- Mistrust of government and cultural bias\*
- Generational knowledge gaps

**Question 3: How can the state better support communities in addressing climate hazards and impacts?**

**Financial Support**

- Increased grant funding
- Transparency in grant application process

**Resources**

- Mobile air quality monitors

**Education, Training, and Outreach**

- More accessible outreach to communities\*
- Health announcements that include tick and mosquito warnings
- Engagement with local land agencies

**Data and Research**

- Increased soil research and information
- Local and Regional health assessments
- DEQ air quality monitoring communication with emergency management

**Regulation and Policy Changes**

- Subdivision ordinances for delivery of fire services and emergency access

## Transportation

### Question 1: How has your community been impacted by natural hazards and long-term stressors?

#### Flooding, Runoff, and Drought

- Road blockages
- Current road design incapable of handling loads
- Wear on infrastructure-cannot handle population growth
- Fallen trees causing road blockages
- Water drainage patterns apply stress on infrastructure

#### Landslides

- Use of invasive species for erosion control affects the region

#### Wildfires

- Disruption to colonial pipeline and fuel availability

#### Hazard Unpredictability

- Road blockages increase commute time\*
- Limited road access in rural areas
- Limited road access affects tourism

#### Temperature Changes

- Snowfall and ice wears on infrastructure

### Question 2: What steps have you already taken to reduce future climate hazards and risks? What actions would you like to take and what are the barriers?

#### Current Actions

- Complete Streets Policy
- Encouragement of teleworking policies
- Increased education initiatives
- Increase in EV charging stations
- Increase in greenways
- Electric buses
- Cease using kudzu for erosion control
- Participation in Federal Flood Insurance

#### Potential Actions

- Green infrastructure to address stormwater intrusion
- Increased teleworking opportunities
- Steep slope ordinances
- Stormwater ordinances and regulations
- Increased EV stations
- Vulnerability mapping
- Permitting and infrastructure execution
- Landslide inventory
- Susceptibility mapping

#### Barriers

- Limited access to broadband

- Limited space for roads on the mountains
- Funding priorities
- Costs of EV adoption
- Stormwater containment
- Structural integrity

### Question 3: How can the state better support communities in addressing climate hazards and impacts?

#### Financial Support

- Transportation resiliency funding
- Funding for landslide mapping
- Rural broadband funding

#### Technical Assistance

- Work with communities to develop planning tools
- Prioritize transportation projects in resiliency planning
- State incentives for regional planning
- Multi-modal transit planning

#### Education, Training, and Outreach

- Community education on climate resiliency
- Increased collaboration with underserved populations in high risk areas

#### Data and Research

- Include EV infrastructure in state evacuation plans
- Road modeling for decreased vehicle miles travelled
- Mapping tool for vulnerabilities in economic and transportation planning
- Maintenance plans that incorporate culverts and drainage for stormwater management

#### Regulation and Policy Changes

- Steep slope ordinances
- Account for climate hazards in stormwater policy and regulations
- Increased local sovereignty in zoning

## Hickory, NC

### Agriculture, Business, and Commerce

#### Question 1: How has your community been impacted by natural hazards and long-term stressors?

##### Flooding, Runoff, and Drought

- Damage to and loss of major crops\*
- Agricultural lands diminished by erosion
- Disruption in crop yield affects quality and shipping of products
- Development and paved surfaces increases runoff into agricultural lands

##### Wildfires

##### Temperature Changes

- Shortened Ski season
- Disruptions to the Christmas Tree Industry affects tourism and economy

##### Landslides

##### Soil and Water Contaminants

- Stormwater runoff endangering freshwater ecosystems
- Spread of invasive species

##### Job Sustainability

- Decline in generational farming due to unsustainable income because of the natural hazards and impacts
- City and business development on prime agricultural lands

#### Question 2: What steps have you already taken to reduce future climate hazards and risks? What actions would you like to take and what are the barriers?

##### Current Actions

- Agricultural Water Resources Program
- Public Education
- DEQ geological survey

##### Potential Actions

- Encouraging no-till farming
- Encourage efficient grazing practices
- Local produce advocacy in stores and restaurants
- Stormwater mapping in municipalities
- Stormwater maintenance and needs mapping
- Local level Hazard Mitigation Planning\*

##### Barriers

- Lack of knowledge
- Lack of advocacy for local farmers by legislature,
- Funding for best management practices
- Staffing needs and lack of resources
- Lack of Business involvement
- Federal Stormwater Mitigation regulations

### Question 3: How can the state better support communities in addressing climate hazards and impacts?

#### Financial Support

- Support to Soil and Water Conservation Districts
- Protect open spaces with agricultural easements to increase ongoing sustainability

#### Technical Assistance

- Incentives for Climate hazard response
- Transparency and ease of access to available funding and education programs

#### Education, Training, and Outreach

- Trainings for Soil and Water Conservation Districts
- Social Media outreach and appeal to younger generations of farmers
- Sharing successes between communities
- Education of Best Management Practices in rural areas

#### Data and Research

- Data collection to prioritize the needs and outcomes of the business and agriculture sector and made available to municipalities and Councils of Government

## Environment and Natural Resources

### Question 1: How has your community been impacted by natural hazards and long-term stressors?

#### Water Quality

- Poor water quality\*
- Erosion and sedimentation
- Drinking water contamination
- Wastewater and sewage

#### Flooding

- Flash flooding
- Displacement of people and animals

#### High Winds

- Unpredicted variability causes adverse impacts to transportation
- Damage to infrastructure\*
- Cascading impacts
- Damage to powerlines

#### Temperature Changes

- Wear on infrastructure\*
- Dying trees and wildlife in state parks

**Question 2: What steps have you already taken to reduce future climate hazards and risks? What actions would you like to take and what are the barriers?**

**Current Actions**

- Water intake reduction planning
- Rehabilitation of sanitary sewer systems

**Potential Actions**

- Infrastructure rehabilitation
- Elevation of residential and commercial buildings
- Local education programs

**Barriers**

- Funding
- Lack of knowledge
- Legal action against local government by private sector

**Question 3: How can the state better support communities in addressing climate hazards and impacts?**

**Financial Assistance**

- Fines from upsets should go to infrastructure rehabilitation

**Technical Assistance**

- Enable and support settlement agreements
- Mainstream resilience planning into aspects of State planning.

**Education, Training, and Outreach**

- Community education and outreach

**Regulation and Policy Changes**

- Section laws have impacted local authorities and communities
- Allow community sovereignty in decision making
- Don't pass laws to encourage lawsuits to local authorities and regulatory agencies
- Impacts on local sovereign immunity capability

## Local Planning

### Question 1: How has your community been impacted by natural hazards and long-term stressors?

#### Water Quality

- Contamination to freshwater systems
- Water supply
- Wastewater and sewage failure

#### Flooding

- Power Outages
- Damage to agricultural lands
- Road blockages
- Increased impervious surfaces

#### Wildfires

#### High Winds

- Unpredicted variability causes adverse impacts to transportation
- Damage to infrastructure
- Cascading impacts
- Damage to powerlines

#### Temperature Changes

- Extreme heat
- Increased Emigration
- Dying trees and wildlife in state parks

### Question 2: What steps have you already taken to reduce future climate hazards and risks? What actions would you like to take and what are the barriers?

#### Current Actions

- Cost share programs for stream debris removal

#### Potential Actions

- Best management practices
- Top down regulation
- Incentives for alternate land use

#### Barriers

- Resistance to land use regulation
- Political Resistance\*
- Counter-productive state regulations
- Local attitudes and customs



### Question 3: How can the state better support communities in addressing climate hazards and impacts?

#### Financial Assistance

- Fines from upsets should go to infrastructure rehabilitation
- Tax credits for solar energy land use

#### Technical Assistance

- Local government resiliency planning

#### Education, Training, and Outreach

- Community education and outreach
- Local planning needs to be framed as a public safety issue

#### Regulation and Policy Changes

- Increased education rather than increased regulation
- Regulations on creative land use
- Increased code enforcement
- Minimum housing standards

## People and Community

### Question 1: How has your community been impacted by natural hazards and long-term stressors?

#### Economic Impacts

- Job loss
- Housing quality and availability
- Food Insecurity
- Drug Addiction
- Bridge closure impacting travel capacity \*

#### Health Impacts

- Indoor air quality
- Displacement of individuals
- Well systems drying up

#### Environmental Impacts

- Unstable environmental predictability impacts tourism
- Job availability for blue collar employees
- Winter storm impacts to transportation
- Water conservation in a drought
- Impacts to agriculture

**Question 2: What steps have you already taken to reduce future climate hazards and risks?  
What actions would you like to take and what are the barriers?**

**Current Actions**

- Coordination from non-government agencies and non-profits

**Potential Actions**

- Provide Public Assistance and communication
- Alternative access points for communities
- Discourage development in floodplains

**Barriers**

- Lack of access to floodplain mapping
- Lack of Knowledge
- Fear of changes to current systems in place
- Funding

**Question 3: How can the state better support communities in addressing climate hazards and impacts?**

**Financial Assistance**

- Funding oversight
- Allow local sovereignty in the allocation of funding to local projects
- Greater accountability in the allocation of funding

**Technical Assistance**

- Assist local government in identifying the resources already available
- Identification of regional point of contact for technical assistance
- Local toolkit for climate resiliency with state tools and contacts

**Education, Training, and Outreach**

- Make region-specific information available in plain text for all citizens
- Transparent flow of information from state to local government
- Resources and training for local emergency management

## Public Health

### Question 1: How has your community been impacted by natural hazards and long-term stressors?

#### Flooding, Runoff, and Droughts

- Mosquito prevalence
- Stagnant water
- Septic and well flooding
- Mold development in low income residential buildings
- Displacement of fragile communities
- Insufficient agricultural waste storage
- Flooding in downstream communities

#### Water Quality

- Water contamination
- Turbidity
- Harmful algal blooms
- Human interactions with freshwater contamination

#### Changing Temperatures

- Heat island effect
- Increased human-animal interaction (rabies, bites, and disease)

#### Severe Weather

- Displacement and damage from tornadoes
- Carbon Monoxide Poisoning
- Ice/Winter storms

### Question 2: What steps have you already taken to reduce future climate hazards and risks? What actions would you like to take and what are the barriers?

#### Current Actions

- City funding to plant trees
- Ordinances to purchase greenways and easements

#### Potential Actions

- Riparian buffers
- Education on individual actions
- Flood plain mitigation
- Flood plain mapping and projections
- Risk mitigation planning

#### Barriers

- Permitting
- Lack of community planning \*

### Question 3: How can the state better support communities in addressing climate hazards and impacts?

#### Financial Assistance

- Allocation of funds for public health

#### Technical Assistance

- Ease of access in funding for emergency recovery
- Evacuation route mapping for municipalities

#### Education, Training, and Outreach

- Community education programs
- More frequent Public Service Announcements
- Increased communication to the public

#### Regulation and Policy Changes

- Regulate flood mitigation actions

#### Data and Research

- Local health impacts monitoring system (ex. Cancer clusters, environmental quality, etc.)

## Transportation

### Question 1: How has your community been impacted by natural hazards and long-term stressors?

#### Flooding and Droughts

- Pipe flooding
- Drainage failures and sinkholes
- Wear on dated infrastructure cannot handle loads
- Impervious surfaces and drought
- Increasing stormwater costs
- Power outages
- Highways residing in floodplains

#### Landslides

- Transportation sector affected by road closure and detours

#### High Winds

- Unpredicted variability causes adverse impacts to transportation
- Damage to infrastructure

#### Temperature Changes

- Heat island effects in cities

#### Access

- One road access
- Culvert failure
- Difficult to maintain infrastructure in annexed territory

**Question 2: What steps have you already taken to reduce future climate hazards and risks?  
What actions would you like to take and what are the barriers?**

**Current Actions**

- Multi-transit greenways
- Ordinances on impervious surfaces
- Planning for resilient bridges
- Implementation of Best Management Practices

**Potential Actions**

- Inventory/mapping of culverts and bridges
- Roads need to adhere to DOT standards
- Public Involvement

**Barriers**

- Uncooperative landowners
- Political Pressure
- Resistance to change
- Local distrust of government

**Question 3: How can the state better support communities in addressing climate hazards and impacts?**

**Financial Assistance**

- Funding for resiliency efforts and planning
- Environmental Impact funding

**Technical Assistance**

- Assistance in Local Resiliency Planning
- Incentive programs for resiliency efforts

## Kernersville, NC

### Agriculture, Business, and Commerce

**Question 1: How has your community been impacted by natural hazards and long-term stressors?**

#### **Flooding, Runoff, and Drought**

- Heavy rains causing flooding in agricultural lands
- Flooding roads preventing small business operation

#### **Temperature Changes and Heat**

- Shorter growing seasons

**Question 2: What steps have you already taken to reduce future climate hazards and risks? What actions would you like to take and what are the barriers?**

#### **Current Actions**

- Emergency Management planning for storm events

#### **Potential Actions**

- Improved land use planning
- Reallocating funds for bridge and road damage

#### **Barriers**

- Skepticism on the reality of changing climate\*
- Long and ineffective recovery aid process
- Mistrust of government intervention

**Question 3: How can the state better support communities in addressing climate hazards and impacts?**

#### **Financial Support**

- Streamlined recovery aid process
- Incentives for sustainable business practices

#### **Technical Assistance**

- Consistent support from state government

#### **Education, Training, and Outreach**

- Outreach to small communities and local governments

#### **Data and Research**

- Research into changes in agricultural growing seasons
- Information about climate hazards to targeted audiences (civic groups, businesses, farmers, etc)

## Environment and Natural Resources

### Question 1: How has your community been impacted by natural hazards and long-term stressors?

#### Flooding, Runoff, and Drought

- Flash floods affecting emergency management
- Ecological changes on conserved lands
- Impacts to tourism
- Water quality deterioration

### Question 2: What steps have you already taken to reduce future climate hazards and risks? What actions would you like to take and what are the barriers?

#### Current Actions

- Buyouts of flood-prone properties to be converted into greenspaces

#### Potential Actions

- Identify sites for debris management
- Stormwater system maintenance
- Apply for grants to develop resilient energy systems

#### Barriers

- Flood-prone properties often not in established flood plains
- Outdated flood plain mapping
- Outdated design standards

### Question 3: How can the state better support communities in addressing climate hazards and impacts?

#### Financial Support

- Streamlined recovery aid process
- Incentives for sustainable business practices

#### Technical Assistance

- Consistent support from state government
- Flood mitigation training for local governments
- Local hazard mitigation planning

#### Education, Training, and Outreach

- Outreach to small communities and local governments\*
- Increased community awareness

#### Data and Research

- Research into changes in agricultural growing seasons

#### Resources

- Equipment for flood recovery

## Local Planning

**Question 1: How has your community been impacted by natural hazards and long-term stressors?**

**Flooding, Runoff, and Drought**

- Urban flash flooding
- Culvert overflow
- Increased rain intensity leading to utility failure
- Increased risk of wildfire from drought
- Road closures and lack of access roads

**Temperature Changes and Heat**

- Stress on wildlife
- Heat islands in cities

**Question 2: What steps have you already taken to reduce future climate hazards and risks? What actions would you like to take and what are the barriers?**

**Current Actions**

- Local hazard mitigation planning

**Potential Actions**

- Improved floodplain mapping

**Barriers**

- Lack of knowledge in community preparedness
- Difficulty with federal grants process

**Question 3: How can the state better support communities in addressing climate hazards and impacts?**

**Financial Support**

- Incentives for public health

**Technical Assistance**

- Collaboration with local government in state level planning
- Best Management Practices for municipalities to follow

**Education, Training, and Outreach**

- K-12 climate education

**Regulation and Policy Changes**

- Regionalized critical infrastructure



## People and Community

### Question 1: How has your community been impacted by natural hazards and long-term stressors?

#### Flooding, Runoff, and Drought

- Long-term displacement of families
- Long lasting Power outages
- Wastewater runoff in residential areas
- Infrastructure deteriorating in flooded areas
- Section 8 housing placed in flood prone areas

#### Temperature Changes and Heat

- Vector borne illnesses
- Extreme heat for outdoor workers
- “Long-term effects affect vulnerable communities the most”\*

### Question 2: What steps have you already taken to reduce future climate hazards and risks? What actions would you like to take and what are the barriers?

#### Current Actions

- Updated infrastructure
- Stormwater education
- 500-year floodplain planning
- Decreasing impervious surfaces through half-acre minimum lot size for developers
- Floodplain and watershed mapping
- Renewable energy resolutions

#### Potential Actions

- Improved infrastructure
- Improved education for the public
- Public cooling stations
- Improved bike/pedestrian safety measures

#### Barriers

- Political stresses
- Lack of grant funding for public health
- High cost of recovery and resiliency
- Lack of incentives for sustainable development

### Question 3: How can the state better support communities in addressing climate hazards and impacts?

#### Financial Support

- Incentives for public health

#### Technical Assistance

- Collaboration with local government in state level planning
- Best Management Practices for municipalities to follow

#### Education, Training, and Outreach

- K-12 climate education

#### Regulation and Policy Changes

- Regionalize critical infrastructure

## Public Health

### Question 1: How has your community been impacted by natural hazards and long-term stressors?

- Mosquito-borne diseases
- Poor air quality
- Increased cases of asthma
- Rural communities lacking adequate health services
- Emergency services slow to come due to lack of access roads
- Disproportionate impacts in vulnerable communities

### Question 2: What steps have you already taken to reduce future climate hazards and risks? What actions would you like to take and what are the barriers?

#### Current Actions

- Applying for 2018 disaster supplemental funding for the region (58 counties)
- Applying for OSHA funding

#### Potential Actions

- Improve heat standards for outdoor workers
- Floodplain mapping to reflect observed high risk areas

#### Barriers

- Community leaders lack trust in government programs
- Lack of community awareness of governmental programs
- Complicated FEMA application process
- Disproportionate funding for rural vs high density areas

### Question 3: How can the state better support communities in addressing climate hazards and impacts?

#### Financial Support

- Grants for improved infrastructure

#### Technical Assistance

- Streamlined process for disaster recovery/resiliency funding

#### Regulation and Policy Changes

- Regionalized critical infrastructure

#### Resources

- Gap funding/reimbursement for expenses that federal recovery aid does not cover

## Transportation

### Question 1: How has your community been impacted by natural hazards and long-term stressors?

#### Flooding, Runoff, and Drought

- Compromised roads and access areas
- Flooding on roads due to heavy rainfall.
- Culverts being washed-out
- Bridges in need of more frequent maintenance
- Unable to move safety personnel during road closures
- Developments in heavy flooding area

#### Temperature Changes and Heat

- Rail damage due to extreme heat

### Question 2: What steps have you already taken to reduce future climate hazards and risks? What actions would you like to take and what are the barriers?

#### Potential Actions

- Flood risk analyses for transportation planning
- Mapping flooded areas to establish new floodplains
- Smart highway development
- Developing in resilient areas
- Re-assess road development procedures

#### Barriers

- Perceived animosity toward state government
- Rebuilding in high risk areas
-

### Question 3: How can the state better support communities in addressing climate hazards and impacts?

#### Financial Support

- Grants for road design consistent with local demand
- Increased budget for road repairs
- Funding for public transit
- Grants for project planning

#### Technical Assistance

- Collaboration with local planners to develop Standard Operating Procedures\*
- Develop comprehensive transportation plans with heavy rainfall flooding and impervious surfaces

#### Education, Training, and Outreach

- Nature Based Solutions for balance between natural and built infrastructure
- Better communication with local governments and local development districts

#### Regulation and Policy Changes

- Stormwater control ordinances
- Allow local governments to have more restrictive stormwater controls
- 'Bottom-Up' approach to comprehensive planning
- Improved culverts to withstand high loads

## Pembroke, NC

### Agriculture, Business, and Commerce

**Question 1: How has your community been impacted by natural hazards and long-term stressors?**

#### Flooding, Runoff, and Drought

- Loss of revenue for small businesses (<25 employees)
- Crop destruction
- Customers unable to access local businesses
- Loss of tourism
- Damage to dams

#### Temperature Changes and Heat

- Farmer unable to work outdoors

**Question 2: What steps have you already taken to reduce future climate hazards and risks? What actions would you like to take and what are the barriers?**

#### Current Actions

- Emergency Management planning for storm events

#### Potential Actions

- Improved land use planning
- Reallocating funds for bridge and road damage

#### Barriers

- Skepticism on the reality of changing climate\*
- Long and ineffective recovery aid process
- Mistrust of government intervention

**Question 3: How can the state better support communities in addressing climate hazards and impacts?**

#### Financial Support

- Streamlined recovery aid process\*
- Incentives for sustainable business practices

#### Technical Assistance

- Consistent support from state government

#### Education, Training, and Outreach

- Education and outreach to tribal communities

#### Data and Research

- Research into changes in agricultural growing seasons
- Information about climate hazards to targeted audiences (civic groups, businesses, farmers, etc)

## Environment and Natural Resources

**Question 1: How has your community been impacted by natural hazards and long-term stressors?**

### **Flooding, Runoff, and Drought**

- Leaking sewage
- Vectors
- Water Quality

**Question 2: What steps have you already taken to reduce future climate hazards and risks? What actions would you like to take and what are the barriers?**

### **Potential Actions**

- Additional outreach opportunities

### **Barriers**

- Economic impacts and take priority over environmental impacts (natural services need to be considered in decision-making)
- Public does not understand the significance of natural resources
- Tier 1 counties do not get priority assistance
- Lack of flood insurance
- Difficult FEMA processes

**Question 3: How can the state better support communities in addressing climate hazards and impacts?**

### **Financial Assistance**

- Grant match funding for projects in tier one counties
- Grants for conservation easements

### **Technical Assistance**

- Streamlined system for disaster recovery funding

### **Regulation and Policy changes**

- Regulation on poultry production

### **Data and Research**

- Installing rain gauges to collect rainfall data

## Local Planning

**Question 1: How has your community been impacted by natural hazards and long-term stressors?**

### **Flooding, Runoff, and Drought**

- Impacts to homes, businesses, and infrastructure
- Dam failure
- Culvert failure
- Damaged stormwater pipes

**Question 2: What steps have you already taken to reduce future climate hazards and risks? What actions would you like to take and what are the barriers?**

### **Current Actions**

- Disaster debris removal contacts
- Mold remediation projects
- Improved local ordinances for floodplain management

### **Potential Actions**

- Create programs to help citizens prepare for disasters/ evacuations
- Public education on recovery and climate impacts
- Maintain sewage system infrastructure
- Local hazard mitigation planning
- Watershed level planning

### **Barriers**

- Current flood maps are inaccurate

**Question 3: How can the state better support communities in addressing climate hazards and impacts?**

### **Financial Assistance**

- Grants for generators during power outages
- Grants for local hazard mitigation planning

### **Technical Assistance**

- Additional resources for debris clean up after storms
- Stormwater utility programs

### **Education, Training, and Outreach**

- Resiliency education programs for local governments

### **Regulation and Policy Changes**

- Modify home design standards to be more resilient

## People and Community

**Question 1: How has your community been impacted by natural hazards and long-term stressors?**

### **Flooding, Runoff, and Drought**

- Sickness from mold
- Power outages\*
- Non-point source pollution
- Job loss due to flooding and infrastructure damage
- Displacement and unsafe housing for low income citizens

**Question 2: What steps have you already taken to reduce future climate hazards and risks? What actions would you like to take and what are the barriers?**

### **Current Actions**

- Debris removal efforts
- Relocation of displaced communities
- Flood outreach and education
- Increased enforcement on inspections
- Land use planning

### **Potential Actions**

- Public Climate education
- Emissions enforcement on farms
- Elected official education

### **Barriers**

- Criteria for “substantial damage” is skewed
- Politics
- Uninformed elected officials

**Question 3: How can the state better support communities in addressing climate hazards and impacts?**

### **Financial Assistance**

- Funding for more resilient infrastructure
- Incentives for mitigation planning

### **Technical Assistance**

- Assistance with land use planning

### **Education, Training, and Outreach**

- Local hazard mitigation training
- Required climate education for local planners

### **Regulation and Policy Changes**

- Stricter elevation requirements for state buildings



## Public Health

**Question 1: How has your community been impacted by natural hazards and long-term stressors?**

### **Flooding, Runoff, and Drought**

- Interaction with contaminated water
- Mold intrusion
- Disposal of contaminated debris
- Agricultural waste runoff

**Question 2: What steps have you already taken to reduce future climate hazards and risks? What actions would you like to take and what are the barriers?**

### **Current Actions**

- Automated road closure warnings
- Community coalition development for information sharing
- Open shoulders during evacuation

### **Potential Actions**

- Public transportation methods during evacuation
- Evacuation language services
- Plain language public outreach

### **Barriers**

- Lack of regulation\*
- GPS inaccuracy

**Question 3: How can the state better support communities in addressing climate hazards and impacts?**

### **Technical Assistance**

- Streamlined system for climate hazard procedures

### **Education, Training, and Outreach**

- Statewide and regional best management practices
- Focused approach to community outreach
- Outreach and education in rural communities

### **Data and Research**

- Self-reporting road hazards on GPS applications

## Transportation

### Question 1: How has your community been impacted by natural hazards and long-term stressors?

#### Flooding, Runoff, and Drought

- Disruption to food distribution systems
- Increased commute times
- Water damage to vehicles
- Abandoned cars
- Lack of access roads during evacuation

### Question 2: What steps have you already taken to reduce future climate hazards and risks? What actions would you like to take and what are the barriers?

#### Current Actions

- Automated road closure warnings
- Community coalition development for information sharing
- Open shoulders during evacuation

#### Potential Actions

- Public transportation methods during evacuation
- Evacuation language services
- Plain language public outreach\*

#### Barriers

- Lack of regulation
- GPS mapping inaccuracy

### Question 3: How can the state better support communities in addressing climate hazards and impacts?

#### Technical Assistance

- Streamlined system for climate hazard procedures

#### Education, Training, and Outreach

- Statewide ad regional best management practices
- Focused approach to community outreach
- Outreach and education in rural communities

#### Data and Research

- Self-reporting road hazards on GPS applications

## Wilson, NC

### Agriculture, Business, and Commerce

#### Question 1: How has your community been impacted by natural hazards and long-term stressors?

##### Flooding, Runoff, and Drought

- High tides and flooding lead to crop loss
- Wet soil prevents field work
- Overflow of nutrient lagoons
- Inoperable tide gates
- Saltwater intrusion in agricultural land
- Lost work time
- Crop loss due to high tides

#### Question 2: What steps have you already taken to reduce future climate hazards and risks? What actions would you like to take and what are the barriers?

##### Current Actions

- Wetland Restoration Programs
- Farmers addressing drainage disruptions
- Watershed pump solutions
- Increased irrigation
- Energy audits of livestock operations

##### Potential Actions

- Local government education and outreach
- Construct wetlands for stormwater retention

##### Barriers

- Lack of state funding\*
- Overwhelming effects

#### Question 3: How can the state better support communities in addressing climate hazards and impacts?

##### Financial Assistance

- Assistance with small business disposal of hazardous materials

##### Technical Assistance

- Assistance with Rural capacity building
- Connecting communities with federal resources

##### Education, Training, and Outreach

- Local government training
- Assistance with economic development and capacity building in rural areas
- Soil conservation education programs for farmers

##### Resources

- Broadband access in rural communities

## Environment and Natural Resources

**Question 1: How has your community been impacted by natural hazards and long-term stressors?**

### **Landslides and Wildfires**

- Limited long-term capacity
- Pollution and chemical runoff
- Increased erosion

### **Flooding, Runoff, and Drought**

- Nuisance flooding
- Removed vegetation
- Access to public safety in rural areas
- Damaged crops affect rural livelihood
- Electrical power interruptions
- Slow assistance timing
- Flash droughts cause crop failure

**Question 2: What steps have you already taken to reduce future climate hazards and risks? What actions would you like to take and what are the barriers?**

### **Current Actions**

- Local watershed cleanup efforts
- Low impact development projects
- River basin planning

### **Potential Actions**

- Education and Outreach to K-12
- Additional debris cleanup resources
- Sustainable watershed engineering

### **Barriers**

- Limited resources in rural communities
- Lack of political identity in rural communities
- Limited staff trained in resiliency
- Lack of inflow protocols in reservoirs

**Question 3: How can the state better support communities in addressing climate hazards and impacts?**

### **Financial Assistance**

- Grants for local adaptation education and planning

### **Technical Assistance**

- Resiliency training for local governments
- Assistance with local basin and watershed planning

### **Education, Training, and Outreach**

- Outreach and collaboration with other local governments more experienced in resilience planning
- Translation of educational materials to other languages
- Outreach to rural farmers

## Local Planning

**Question 1: How has your community been impacted by natural hazards and long-term stressors?**

### **Landslides and Wildfires**

- Aftermath of wildfires is costly
- Urbanization leading to landslides

### **Flooding, Runoff, and Drought**

- Infrastructure damage
- Recovery slows economic development
- Pest intrusion

**Question 2: What steps have you already taken to reduce future climate hazards and risks? What actions would you like to take and what are the barriers?**

### **Current Actions**

- Upgrades to the stormwater system
- Culvert studies
- Infrastructure mapping
- Floodplain studies and mapping
- Hazard Mitigation Planning
- 

### **Potential Actions**

- K-12 education outreach
- Flood risk analyses
- Land use planning policies
- Best Management Practices for floodplain management
- Impervious Surface limits
- Development of easement programs

### **Barriers**

- Lack of state funding
- Loss of local trust in government
- Lack of local capacity/staffing
- Community regulations
- Maintenance costs

### Question 3: How can the state better support communities in addressing climate hazards and impacts?

#### Financial Assistance

- Incentives for sustainable land use planning
- Considering flood risk for state investment and permitting

#### Technical Assistance

- Mandated training for local governments

#### Education, Training, and Outreach

- Floodplain modeling for local planners

#### Resources

- Comprehensive Watershed Maintenance Plans

## People and Community

### Question 1: How has your community been impacted by natural hazards and long-term stressors?

#### Landslides and Wildfires

- Limited long-term capacity
- Pollution and runoff

#### Flooding, Runoff, and Drought

- Impacts to water quality and public health
- Disproportionate effects on low income and vulnerable communities
- Blocked corridors on single access roads
- Displaced families
- Mortality of livestock
- Lost revenue for businesses
- Loss of cultural assets and landmarks
- Decreased tax base for schools and infrastructure

### Question 2: What steps have you already taken to reduce future climate hazards and risks? What actions would you like to take and what are the barriers?

#### Current Actions

- Relocation of emergency facilities
- Local level resiliency planning
- River basin collaboration
- Community stormwater education programs
- Updating infrastructure

#### Potential Actions

- Land use planning
- Creation of Regional Councils along watersheds

- Stakeholder engagement
- Implementing hazard mitigation plans
- Economic diversification

#### Barriers

- Lack of local knowledge
- Economic stress in rural communities
- Difficulties with understanding FEMA processes
- Unsustainable resiliency plans
- Long-term funding for projects

### Question 3: How can the state better support communities in addressing climate hazards and impacts?

#### Financial Assistance

- Grants for local adaptation education and planning

#### Technical Assistance

- Resources for watershed level resiliency planning
- Assistance with FEMA application processes

#### Education, Training, and Outreach

- Outreach to federal partners
- Communication between rural and urban planners

## Public Health

### Question 1: How has your community been impacted by natural hazards and long-term stressors?

#### Landslides and Wildfires

- Limited long-term capacity
- Pollution and runoff

#### Temperature Changes

- Outdoor worker exposure to heat

#### Flooding, Runoff, and Drought

- Nuisance flooding
- Erosion
- Removed vegetation
- Access to public safety in rural areas
- Damaged crops affect rural livelihood
- Electrical power interruptions
- Slow assistance timing
- Displacement from flooding events

**Question 2: What steps have you already taken to reduce future climate hazards and risks?  
What actions would you like to take and what are the barriers?**

**Current Actions**

- Local watershed cleanup efforts

**Potential Actions**

- Education and Outreach to K-12
- Additional debris cleanup resources
- Sustainable watershed engineering

**Barriers**

- Lack of state funding
- Lack of political identity in rural communities
- Limited staff trained in resiliency

**Question 3: How can the state better support communities in addressing climate hazards and impacts?**

**Financial Assistance**

- Grants for local adaptation education and planning

**Technical Assistance**

- Resiliency training for local governments

**Education, Training, and Outreach**

- Outreach and collaboration with other local governments more experienced in resilience planning
- Translation of educational materials to other languages
- Outreach to rural farmers
- Risk disclosure to new residents moving into flood plains

**Data and Research**

- Well water quality testing after large flooding events
- Quantitative analysis of hazard impacts across geographic barriers

## Transportation

**Question 1: How has your community been impacted by natural hazards and long-term stressors?**

**Landslides and Wildfires**

- Drought causing wildfires

**Flooding, Runoff, and Drought**

- Impacts to freight transport
- Sinkholes appearing during droughts



**Question 2: What steps have you already taken to reduce future climate hazards and risks?  
What actions would you like to take and what are the barriers?**

**Current Actions**

- Encouraging Greenway projects
- Public transit acting as evacuation transport

**Potential Actions**

- Alternative fuel planning
- Relieve lane closures during evacuation
- Create a formalized list of needs to submit to DOT for support
- Planning for response vehicle access during floods

**Barriers**

- Lack of infrastructure for alternative fuel vehicles

**Question 3: How can the state better support communities in addressing climate hazards and impacts?**

**Financial Assistance**

- Grants for alternative fuel planning during evacuations

**Resources**

- Raising and maintaining bridges and culverts
- Scoring infrastructure based on long-term resilience
- Alternative fuel infrastructure in rural communities

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