

# Vermont State Agency Policy Options

## Smart Growth Implementation Assistance Program: Disaster Recovery and Long-Term Resilience Planning in Vermont



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## Executive Summary

Vermont experienced major damage to roads, houses, businesses, and communities due to flood impacts from Tropical Storm Irene in 2011. Shortly after the flooding occurred, the State of Vermont requested assistance from the U.S. Environmental Protection Agency (EPA) to help Vermont communities become more resilient to future flooding events. EPA and the Federal Emergency Management Agency (FEMA) partnered together through the EPA's Smart Growth Implementation Assistance Program (SGIA) to provide technical assistance to the State of Vermont and local communities in the Mad River Valley (MRV). The SGIA program helps state, local, regional, and tribal governments that need tools, resources, and other assistance to achieve their growth- and development-related goals.

One component of this project involved an assessment of state agency policies, plans, and actions in order to identify options that may further flood resilience goals using smart growth approaches to development. This document describes some of the challenges and opportunities facing the state of Vermont and lays out a series of policy options the state can consider, including initiatives that span several agencies as well as agency-specific activities.

### Prioritizing Policy Options: Best Practices and Evaluative Criteria

The executive summary highlights a select number of key, actionable policies. The full report goes into more detail on these and other policy options, including examples of similar efforts undertaken in other states. The identification of best practices is intended to assist Vermont's state agencies glean lessons from those who have experienced disasters and taken action afterwards and/or have proactively initiated steps that are similar to those proposed in this document. In order to further prioritize the policies outlined in this report, Vermont agencies may use a set of criteria provided below to help them achieve this end. It is important to note that the prioritization of state policies requires a detailed understanding of the prioritization criteria as applied in Vermont and as such, the list found in the executive summary provides a starting point from which to initiate a more extensive review that is best performed by state agency officials.

Important prioritization criteria for use in a more detailed prioritization process of potential policies may include: technical, administrative, fiscal (cost), and political feasibility; potential impact; duration; and other considerations as identified by a state agency committee.

- **Technical feasibility** involves determining if those assigned the responsibility to implement the policy or project have access to the analytical tools (e.g., Geographic Information Systems, hydrological and geomorphic analyses, financial tracking and monitoring systems, and cost effectiveness models) needed to accomplish this aim.
- **Administrative feasibility** involves determining if there are adequate numbers of qualified staff to implement and monitor the policy or project.
- **Fiscal feasibility** involves assessing the estimated cost of the policy or project and determining if the implementing agency or agencies have the necessary financial resources to carry it out.

Resources may be drawn from internal (e.g., annual operating budget or state-appropriated funds), external (e.g., pre- and post-disaster grants or loans), or a combination of both funding sources.

- **Political feasibility** refers to the political will of state agencies, the state legislature, and the Governor to take actions that may face opposition, requires taking resources from another program, or represents a bold departure from standard operations. Given that many of the policy options will require local action, the political support of local officials will prove important and influence the ultimate success of state policies.
- **Potential impact** of a policy or project refers to a number of effects such as the future losses avoided tied to hazard mitigation measures, enhancing the speed and quality of future recovery efforts, or addressing a significant need such as aiding a low-wealth/high risk community.
- The **duration** of a policy or project refers to the time required to develop and implement the recommended action. In many cases the policy will require an ongoing commitment of technical, administrative, fiscal, and political resources over time.
- **Other considerations** may be developed by a committee of state agency representatives described in this policy memo. The committee may be comprised of those participating in the development of Vermont's Inter-Agency Long-Term Flood Resiliency Goals or those who may be chosen to develop a state disaster recovery plan. Examples of other considerations include the degree to which a community or communities can leverage their resources with those of the implementing state agency or the degree to which the proposed state policy compliments existing state and local policies, such as those that address smart growth and disaster resilience.

The list of prioritized policy options listed below are offered as a starting point from which state agencies can begin a dialogue surrounding how they should proceed. Ultimately it is up to a group chosen by the state to refine this list and allocate necessary resources accordingly.

### **Inter-Agency Policy Options**

1. Develop a comprehensive pre-event recovery plan in advance of the next disaster and exercise the recovery plan over time. Agency of Commerce and Community Development (ACCD) and Division of Emergency Management and Homeland Security (DEMHS) could reach out to FEMA's recently hired Community Recovery Planning and Capacity Building personnel in Region I and discuss the development of a state and local disaster recovery planning capacity building program.
2. Implement a comprehensive state river corridor and floodplain protection program guided by the principle of No Adverse Impact. The Agency of Natural Resources (ANR), Agency of Transportation (VTrans), Agency of Agriculture, Food and Markets (AAFV), ACCD, and DEMHS could develop and maintain a statewide river corridor and floodplain mapping program supported by flood and fluvial erosion hazard risk assessments. With statewide maps in place state agencies could integrate a development standard of "no adverse impact" into their policies and programs, and could encourage the adoption of the same standards in Vermont municipalities through technical, financial, and regulatory incentives and mandates.

3. Conduct an audit of state programs, including the degree to which they directly or indirectly help or hinder the ability of the state to achieve Vermont's Inter-Agency Long-Term Flood Resiliency Goals and the policy options in this document.
4. Develop a post-disaster personnel plan that identifies agency needs as well as those resources that can be provided by the larger assistance network, including federal and local officials, non-profits, quasi-governmental organizations, consulting firms, and those groups that emerge following disasters. These personnel plans could emphasize the development of pre-event disaster reservist cadres like those employed by other states after disasters.

### **Agency of Natural Resources**

1. Incorporate ANR watershed, instream, and river corridor standards into federal, state, and local plans and policies through coordinated policy dialogue, training, and educational initiatives.
2. Balance the need for rapid post-disaster decision making with a more deliberative approach when considering how to address disaster recovery options.
3. Adopt river corridor procedures to ensure that the process used to create and adopt River Corridor Maps, including fluvial erosion hazard areas, is state supported and actively engages local partners that have a deep, locally-grounded understanding of flood hazard risk.
4. Increase the level of local government compliance with required ANR reviews of development proposals in the floodplain, in part, by training and certifying a cadre of floodplain technicians to assist ANR with both outreach and reviews.
5. Support ANR's broad network of champions of river science and river corridor planning through the development of web-based tools to assist them deliver flood hazard risk information.
6. Require Vermont communities to regulate their floodplains based on Flood Insurance Rate Maps and River Corridor Maps through a combination of setbacks, fluvial erosion hazard overlays, river corridor protection plans, best management practices, land use and hazard mitigation plans, infrastructure management initiatives, and stormwater management plans.
7. Use the Hazard Mitigation Grant Program's (HMGP) 5 and 7 % programs to expand funding for communities to develop river corridor plans and develop strategies that recognize the natural dynamism of Vermont's rivers.
8. Adopt state-wide No Adverse Impact program.
9. Based on ANR rules and procedures, provide model bylaws and create incentives for Vermont communities to regulate land use within floodplains and mitigate hazards through infrastructure investments, as well as through projects identified in stormwater management, river corridor, and hazard mitigation plans. This state-local partnership could be undergirded with an assurance that where communities demonstrate an unwillingness to protect river corridors and floodplain function the state is prepared to assume jurisdiction of development permitting within these areas.

## **Agency of Transportation**

1. Establish hazard mitigation and flood resiliency budget priorities based on natural hazard risk and other parameters.
2. VTrans could review how it designs its roadways and structures, as well as its maintenance practices, to ensure those designs account for flood hazard vulnerability and the effects of differing designs on downstream flooding and fluvial erosion. This could be achieved by integrating disaster resilient design parameters (as identified best practices in River Corridor Plans) into the appropriate VTrans standards, procedures, and practices.
3. Conduct and maintain an inventory system of state and municipal bridges and culverts in coordination with regional and municipal efforts and incorporate the results into the State Hazard Mitigation Plan.
4. VTrans could review all other infrastructure programs, including town grant programs, to look for opportunities to create local incentives and prioritize projects and maintenance strategies that will reduce the risk of future flood hazards in vulnerable areas.
5. VTrans, ANR, and DEMHS, working with local officials, could identify appropriate hazard mitigation measures, including those that may be eligible under FEMA's 406 Public Assistance program (PA 406) and the Hazard Mitigation Grant Program. Examples include increasing the size of strategically identified culverts, limiting upstream development, creating catchment areas, and conducting and implementing flood engineering studies.
6. Explore the development of protocols used to train state disaster assistance reservists. Supplement the program through an expansion of state Emergency Management Assistance Compacts that already exist among New England states and others as identified.
7. Strengthen and clarify riverine debris removal policies.

## **Division of Emergency Management and Homeland Security**

1. The Division of Emergency Management and Homeland Security, in partnership with ANR, ACCD, VTrans, and Regional Planning Commissions could host state-wide hazard mitigation workshops, emphasizing the linkage between smart growth and disaster resilience.
2. Strengthen and better operationalize state and local hazard mitigation plans.
3. Take advantage of the post-Irene window of opportunity to advance tangible hazard mitigation projects that span multiple stakeholder interests.
4. Develop a clear transition plan for the hand-off of FEMA's Public Assistance Program from VTrans to DEMHS.
5. Work with FEMA and VTrans to develop improved Public Assistance guidance and protocols that can be used in the next event. Issues could be proactively addressed in advance of future disasters and incorporated into state policy and FEMA Region I policy memos where appropriate.
6. The State could work with FEMA to develop improved selection criteria for long-term recovery planning assistance that accounts for low-capacity community needs.

7. DEMHS and ACCD could reach out to FEMA's recently hired Community Recovery Planning and Capacity Building personnel in Region I and discuss the development of a state and local disaster recovery planning capacity building program.

### **Agency of Commerce and Community Development**

1. Conduct an audit of all economic development investment decisions in the agency to determine whether they advance flood resilience goals.
2. Conduct training programs targeting local homeowners, renters, and businesses that help to inform them about steps they can take to reduce their exposure to flood hazards and better capitalize on post-disaster recovery grant and loan programs available after disasters.
3. Develop a pre-event cadre of case managers for small businesses, working in partnership with regional development corporations, small business development centers, professional associations, and Vermont colleges and universities (including law schools and business schools) that are trained in post-disaster assistance programs.

### **Agency of Agriculture, Food and Markets**

1. Develop an assistance strategy to further improve the flood resilience of agricultural lands.
2. Codify the role of non-profits in agricultural recovery through the lessons learned following Hurricane Irene.
3. Partner with the Agricultural Extension Office and Extension Disaster Education Network (EDEN) to develop a farmer's self-assessment tool to evaluate vulnerability to floods, including steps that can be taken to mitigate the impacts of these events on individual farms and downstream neighbors, including farms, communities, and vulnerable infrastructure.
4. Expand the role of Vermont agriculture extension agents to include the hosting of training programs tied to creating more disaster resilient farms before the next disaster strikes.
5. Develop and codify a mutual aid program between Vermont dairy farm co-ops and Agency of Agriculture, building on informal relationships.

### **Irene Recovery Office**

1. Consider placing the State Recovery Office within DEMHS.
2. Consider long-term staffing of a State Recovery Office and expand its duties to include the oversight of the development of a State Disaster Recovery Plan and the coordination of higher-level interagency policies.

### **Agency of Human Services**

1. Conduct an audit of state and non-state service programs, including the degree to which they help or hinder the state's long term recovery goals for supporting vulnerable individuals and households.
2. Codify the role of non-profits in community-, household-, and individual-level recovery.
3. Codify the role of Individual Assistance Officers and Agency of Human Services Field Directors to

- engage regional service providers in disaster preparedness and planning activities.
4. Amend the existing Emergency Management Assistance Compact (EMAC) in New England to improve the use of existing state disaster response and recovery personnel.
  5. Develop a pre-event cadre of case managers for individuals and families, working in partnership with Vermont Volunteer Organizations Active in Disasters (VOAD), professional associations, and Vermont colleges and universities (including schools of social work, law schools, and business schools) that are trained in post-disaster assistance programs.

### **Agency of Administration**

1. Consider the use of Emergency Response Assistance Funds (ERAF) to address unmet resource needs including capacity building among state agencies and non-profits.
2. Support preparedness activities, including DEMHS requests for plan upgrades and annual cabinet-level meetings.

### **Introduction: Enduring Strengths and Challenges**

Tropical Storm Irene struck the State of Vermont in 2011, causing significant flooding in many communities and resulting in one of the most costly disasters in the state's history. The storm heightened the state's awareness of flood hazard vulnerability and raised questions as to how Vermont can become more resilient in the face of several factors that influence vulnerability, including: 1) the alteration of rivers' natural processes due to urban development, channelization, drainage, flood control, and erosion control practices; 2) the projected occurrence of more intense and frequent rainfall events due to climate change; 3) increased hillside development that exacerbates stormwater runoff, and; 4) a long-standing history of human settlements and transportation networks adjacent to the state's dynamic river systems.

Discussions with state agency officials also noted that it can be frustrating to have discussions about resilience without developing a clear set of actions designed to achieve this sometimes elusive concept.<sup>1</sup> This document provides a set of policy options intended to help the State of Vermont link flood

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<sup>1</sup>Information used in this report was derived from interviews with state agency officials, a review of state policies and programs, archival research, and a review of existing academic and practice-based literature. "Disaster resilience is often described as the ability of a community to withstand a severe shock and quickly rebound to some post-disaster condition that represents pre-event conditions, or better yet, a 'new normal' based on lessons and improvements made that make a community less vulnerable and more adaptable to future events (Paton and Johnston 2006). While hazard mitigation represents a key theme of disaster resilience, natural hazard and planning scholar Tim Beatley argues that resilience represents a broader concept. He suggests that disaster resilience must include the ability to adapt to changing conditions while building and sustaining a greater organizational capacity to include the adoption of hazard mitigation techniques as well as the formation of enduring cooperative institutions and networks capable of supporting not only hazard mitigation, but also disaster response and recovery" (Smith and Sandler 2012, p. 12). An important but often underemphasized aspect of smart growth should be to reduce the exposure of people and property to the negative effects (e.g., injury or death and damages) of natural hazards and disasters. Some have referred to this dimension of smart growth as "safe growth" which is intended to address both life safety and the protection of property.

resilience and smart growth following Tropical Storm Irene. The policy options build on factors that make the State of Vermont unique, reflecting existing strengths as well as areas in need of improvement.

The State of Vermont has a unique and longstanding history of engaging in a number of growth management and environmental protection-related activities. The state's proactive approach is exemplified by the Land Use and Development Act (Act 250). Passed in 1970, Act 250 is intended to preserve the environmental, social, and aesthetic character of the state in the face of development pressure. In addition to environmental protection, a commitment to farmland preservation has helped maintain the agricultural industry while shielding the existing compact urban form of many Vermont communities from suburban and exurban sprawl. In fact, since 1987, nearly 600 farms comprising 143,000 acres of agricultural land have been conserved by the Vermont Housing and Conservation Board. The adoption of Fluvial Erosion Hazard maps represents another example of the innovative efforts in Vermont to protect natural resources and limit development in sensitive areas.

In addition to public policy and expenditures aimed at responsible land use and environmental protection, a land ethic persists within the state that guides many local and individual decisions to be more consistent with community and environmental values. This land ethic, paired with a rich history of public participation, contributes to a thoughtful and inclusive discussion among multiple stakeholders surrounding public policy and private development.

Despite the dedication to conscientious land use and environmental protection, the devastation caused by Tropical Storm Irene exposed significant vulnerabilities in Vermont, including the effects of increased development in flood-prone areas. The Governor of Vermont, state agency officials, and representatives of local communities has demonstrated a willingness to incorporate smart growth and safe growth concepts into the recovery process in order to reduce future vulnerability and increase resilience. To this end, the policy options described in this document outline strategies to more effectively link smart growth and flood resilience as part of the state's efforts to recover from Tropical Storm Irene and take action in advance of future extreme events.

### **Vermont's Inter-Agency Long-Term Flood Resiliency Goals**

State officials in Vermont came together following Hurricane Irene to formulate a set of goals to help guide actions following the storm in a way that emphasizes greater flood hazard resilience.<sup>2</sup> The Vermont Inter-Agency Long-Term Flood Resiliency Goals serve to focus the direction of this policy document. The Inter-Agency Long-Term Flood Resiliency Goals are as follows:

1. Provide greater protection of river and stream corridors and floodplains in order to enhance public safety, reduce erosion risks, maximize floodplain function, reduce the conflict with human investment, and provide reduced obstruction during flood events.

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<sup>2</sup> The Inter-Agency Long-Term Flood Resiliency Goals, which provide a good starting point for future discussions, have not been officially adopted by state agency officials.

2. Reduce the costs and risks associated with river management by managing streams and rivers toward their least erosive, equilibrium (or naturally stable) condition, especially during the response phase of a flood event.
3. Minimize hydrologic change associated with stormwater runoff. Understand and communicate the link between development patterns and the rate, timing, and magnitude of flood events.
4. Systematically improve the transportation system so that it continues to provide safe access during and after events.
5. Maintain a transportation system (and other public infrastructure) that does not exacerbate the problem or the event and helps to maintain environmental quality, including water quality and quantity.
6. Increase the mitigation and adaptation investments to existing structural elements (homes, businesses, villages, and infrastructure) in compact centers. These are areas we want to continue supporting and need to ensure that mitigation techniques are utilized to reduce risk and cost.

## **Policy Options**

The policy options described below include a section on cross-cutting strategies that may apply to multiple state agencies within Vermont, followed by a section of agency-specific policy options. The cross-cutting policy options are organized within the following broad thematic areas intended to supplement the State of Vermont's Inter-Agency Long-Term Flood Resiliency Goals:

1. Take a Watershed-Based Approach to Address Development Patterns and Flood Hazard Vulnerability;
2. Create a Clear Plan of Action to Guide Pre- and Post-Disaster Decisions;
3. Tackle Capacity Limits and Maximize Partnerships;
4. Develop Coordinative Guidance for the use of Assistance Before and After Disasters that Advance Resilience and Smart Growth Goals; and
5. Align River Science, State Goals, and Programs that Recognize Existing and Future Settlement Patterns.

It is important to note that unlike other agency-specific policy options, the Agency of Natural Resources does not have a designated section. Rather, given their central importance in addressing flood-related issues and the boundary-spanning nature of their work, the recommendations assigned to them are included throughout the text, including the next section addressing watershed-based issues.

## Take a Watershed-Based Approach to Address Development Patterns and Flood Hazard Vulnerability<sup>3</sup>

Settlement patterns in Vermont are typically characterized by compact, urban communities bound by gateway farms that are located along highly dynamic rivers. Increasingly, the hill farms of old have become reforested and new residences are springing up along Vermont's rural roads. Valley communities, which often include historic structures and infrastructure, are vulnerable to flood-related losses. Much of the best agricultural land in the state is located in the floodplain. In an effort to protect fertile agricultural lands, many farmers rely on a range of stream stabilization techniques. At the community level, local governments often adopt FEMA's minimum standards which allow for development in the floodplain, including construction in areas that face significant flood risk. Restricting the natural migration of rivers and reducing the storage capacity of floodplains due to urban and rural development, infrastructure investments, and agricultural practices has led to the worsening of flood-related losses over time.

Development trends are increasingly characterized by decentralized, incremental residential development on adjacent hillsides. Without effective setbacks and stormwater management programs to limit channelization and slow runoff, development is placed at greater risk from flooding and erosion. The effectiveness of efforts to limit or modify settlement patterns, design features, and adopt and enforce building codes in flood-prone areas is highly variable and could be improved. One option to consider includes the ***creation of local watershed standards for an agreed upon set of flood return periods (e.g., 1-, 2-, 10-, 50-, 100-, and 500-year events) and are linked to development codes and standards. Another approach to consider is encouraging or requiring local governments to adopt cumulative substantial damage ordinances while ensuring that existing ordinances are adhered to following floods or other destructive events.***

Adopting a watershed-based approach can inform the types of actions best suited to achieve more resilient communities if policymakers can create coordinated strategies and programs that recognize the cumulative effects of decisions made by multiple stakeholders in larger geographically defined areas. This approach, which is advocated by the Agency of Natural Resources, makes sense from a planning and an environmental standpoint as actions taken within the watershed affect downstream communities. It also provides an opportunity to link smart growth and flood resilience in partnership

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<sup>3</sup> Taking an aggressive stance on flood-hazard risk reduction efforts has an increased sense of urgency following the passage of the Biggert-Waters Flood Insurance Reform Act. The Act, which was signed into law in July 2012, reauthorizes the National Flood Insurance Program (NFIP) through September 2017 and introduces substantive changes to the NFIP. For example, premium discounts will no longer be given to properties that are below the base flood elevation, even if those properties were up to code when they were originally built. The Biggert-Waters Act also removes the NFIP's subsidy for: 1) newly purchased property; 2) property where NFIP coverage was deliberately allowed to lapse; 3) properties receiving an offer of mitigation assistance following a major disaster, or in connection with a repetitive loss property; 4) repetitive loss or severe repetitive loss properties; 5) businesses; 6) non-primary residences; 7) substantially damaged property; and 8) property (at least) 30% improved. The two most common subsidies that this provision will affect are properties that were built before their governing jurisdiction received its first Flood Insurance Rate Map (FIRM) and those properties that were shown by subsequent FIRMs to be at increased risk of flooding.

with other state agencies such as Agriculture, Commerce and Community Development, and Transportation. Specific actions that could help facilitate this process include the ***adoption of a state-wide No Adverse Impact program<sup>4</sup> (guidance provided by ANR and the State of Ohio<sup>5</sup>), the creation of a more comprehensive river corridor (i.e. fluvial erosion hazard) mapping program, and the incorporation of greater flood resilience measures into Act 250.*** The implementation of these policies provides an opportunity to enhance the role of Vermont's regional planning organizations. Improving watershed-based planning will require increased investments to expand capacity-building initiatives delivered by these quasi-governmental entities.<sup>6</sup> Additional capacity can be drawn from professional associations, non-profits, and other members of the larger assistance network discussed throughout this document.

The State of Vermont has begun to discuss expanding the applicability of Act 250 to better address floodplain management issues. It is important to note that the biggest limitations of the legislation in building resilience has been the historical application of state review standards that are based on NFIP minimums and the spatial area in which the provisions apply. ANR staff reviews all permit applications in mapped floodways, floodplains, and river corridors, and the standards for that review already prompt agency officials to discourage granting permits for any new structures in river corridors unless they lie in the shadow of other structures or in a town designated development zone. Thus the provisions of the Act 250 process do affect decisions based on river corridors. However, the standards ANR officials use to implement the Act 250 development provisions in FEMA mapped floodplains are not as robust because they are based on FEMA NFIP minimums. The more recent passage of Act 138, which provides a legal venue to more effectively accomplish this aim, will be discussed more explicitly later in the document.

A bigger issue that is worthy of reflection is that Act 250 only captures larger scale residential and commercial development, so a great deal of the gradual small scale encroachments are not reviewed through a state permit process at all, but rather through local permit processes guided by minimum

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<sup>4</sup> According to the Association of State Floodplain Managers, "No Adverse Impact floodplain management takes place when the actions of one property owner are not allowed to adversely affect the rights of other property owners. The adverse effects or impacts can be measured in terms of increased flood peaks, increased flood stages, higher flood velocities, increased erosion and sedimentation, or other impacts the community considers important. The No Adverse Impact philosophy can shape the default management criteria: a community develops and adopts a comprehensive plan to manage development that identifies acceptable levels of impact, specifies appropriate measures to mitigate those adverse impacts, and establishes a plan for implementation. No Adverse Impact criteria can be extended to entire watersheds as a means to promote the use of regional retention/detention or other stormwater techniques to mitigate damage from increased runoff from urban areas." (<http://www.floods.org/index.asp?menuID=460>).

<sup>5</sup> Ohio's model floodplain ordinance explicitly addresses No Adverse Impact planning. For more information see [http://www.dnr.state.oh.us/Portals/7/floodpln/OFRC\\_8\\_2006.pdf](http://www.dnr.state.oh.us/Portals/7/floodpln/OFRC_8_2006.pdf).

<sup>6</sup> Examples of regional disaster recovery initiatives include the Red River Valley Flood Recovery Action Plan and the Association of Bay Area Government's Disaster Recovery Initiative at [http://quake.abag.ca.gov/projects/resilience\\_initiative/](http://quake.abag.ca.gov/projects/resilience_initiative/).

standards that don't consider fluvial erosion. As a result, undeveloped river corridors and floodplains outside of village and town centers are being developed affecting the long-term vulnerability of downstream settlements.

The No Adverse Impact approach provides a means to address the improved protection of floodplains by addressing the incremental effects of development on watershed storage capacities. Therefore, in addition to expanding the application of ACT 250 to smaller scale development in floodplains and river corridors it is suggested that the state ***establish a No Adverse Impact standard in the State Flood Hazard Area Rules to include incentives and model language that encourages municipalities to incorporate the NAI language into local bylaws limiting development in flood-prone areas.***<sup>7</sup> The development of more stringent standards is intended to build upon the long-term capacity-building approach associated with education, technical assistance, coalition building, and incentives-based programs cited throughout this document. Undertaken in tandem, they reflect a way to address an underlying pre-event challenge found in Vermont, namely the capacity of municipal officials to implement complex flood hazard regulations, including through the development of a supporting state plan of action guiding pre- and post-event actions.

### **Create a Clear Plan of Action to Guide Pre- and Post-Disaster Decisions**

Many of the state agency officials we spoke with lamented the reactionary approach to recovery undertaken following Tropical Storm Irene and were overwhelmed with post-disaster duties such as interpreting and implementing federal programs and ensuring compliance with existing state policies. This made it difficult to influence changes in federal program eligibility criteria and develop new state policies that reflected emergent local needs. The unfortunate reality is that this largely ad hoc process is common throughout the United States, and until recently, the federal government has placed limited emphasis on the importance of developing actionable state and local pre-disaster recovery plans and building a robust state and local capacity to address the myriad challenges associated with disaster recovery.<sup>8</sup>

In order to address these challenges, the State could consider a four-pronged approach: 1) ***move forward with the implementation of an Irene-specific recovery strategy***<sup>9</sup> (guided by the state's Inter-

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<sup>7</sup> According to ANR officials, seventy percent of Vermont municipalities adhere to FEMA's minimum standards while 17 percent have adopted bylaws that use No Adverse Impact standards for Special Flood Hazard Areas and/or river corridors.

<sup>8</sup> "Disaster recovery planning provides a procedural and action-oriented vehicle to prepare in advance of a disaster for the multitude of complex challenges that follow extreme events. Planning also helps to marshal the varied resources needed in order to expedite post-disaster recovery and reconstruction activities in a thoughtful and coordinated manner. A plan, adopted by state agencies and the Governor, also enables the use of agreed-to planning and regulatory powers in the aftermath of state and federally declared disasters." (Smith and Sandler 2012, p.11).

<sup>9</sup> Three months after Hurricane Katrina, the State of Mississippi's Governor's Commission on Recovery, Rebuilding, and Renewal issued its report detailing Katrina-specific recovery strategies for the state to pursue. See

Agency Long-Term Flood Resiliency Goals and policy options described in this document), 2) build on the process (and lessons learned following Hurricane Irene) to *develop a comprehensive pre-event recovery plan in advance of the next disaster*<sup>10</sup>, 3) *exercise the recovery plan over time*<sup>11</sup>, and 4) *advocate for changes in federal policy that supports the aims of Vermont to achieve the flood resiliency goals and policies described in this and other state documents.*

A primary intent of this policy document is to assist with the formulation and implementation of an Irene recovery strategy while laying the groundwork for a more comprehensive disaster recovery plan and set of actionable policies. The development of both the Irene recovery strategy and pre-disaster recovery plan coincides with a greater federal commitment to disaster recovery planning. The passage of the Post-Katrina Emergency Management Reform Act tasked FEMA with the development of the National Disaster Recovery Framework (NDRF). As part of this federal initiative, guidance is being developed for states and local governments to assist them with the development of pre-disaster recovery plans.<sup>12</sup> FEMA is also building a cadre of officials, based in each FEMA region, to assist states and local governments build partnerships and create recovery plans. In support of this recent federal initiative, *the State of Vermont could work with FEMA to develop a robust state pre-disaster recovery plan as well as begin to work with local governments to develop local pre-disaster recovery plans.*<sup>13</sup> Given the lessons associated with Tropical Storm Irene, *the state could offer to serve as one of the first states in FEMA Region I to undergo the development of a state recovery plan that meets NDRF standards.* This would enable Vermont to shape the federal guidance and create a recovery plan that other states could emulate. The process could draw on the disaster recovery exercise conducted in December of 2010 and the recovery framework (including the 10 focus areas) developed by the State of Vermont prior to the creation of the National Disaster Recovery Framework. Building on these efforts, *the State of Vermont, could further advocate for changes in federal policies that link disaster assistance and improved state and local efforts to advance disaster resilience.* Thomas and Conrad, for example, propose reforms to the federal role in disaster assistance. Specific examples include: 1) incentivize and otherwise implement higher disaster-resistant development standards for any type of federal support tied to new or reconstructed public and private housing, industry, and infrastructure

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[http://mississippirenewal.com/documents/Governors\\_Commission\\_Report.pdf](http://mississippirenewal.com/documents/Governors_Commission_Report.pdf).

<sup>10</sup> Florida, a national leader in recovery planning, requires local governments to update their recovery plans “following major incidents.” See <http://www.floridadisaster.org/documents/Recovery%20Plan%202011-2008.pdf>.

<sup>11</sup> In accordance with the state’s Comprehensive Exercise Program policy, Illinois exercises their disaster recovery plan biennially as a “table-top” or full-scale exercise. See [http://www.state.il.us/iema/legal/pdf/29\\_301.pdf](http://www.state.il.us/iema/legal/pdf/29_301.pdf).

<sup>12</sup> FEMA is in the process of completing local disaster recovery guidance. State-level guidance has been developed by the writers of this policy document and is titled *State Disaster Recovery Planning Guide (September 2012)*. A copy of the guide is available at [http://coastalhazardscenter.org/dev/wp-content/uploads/2012/05/State-Disaster-Recovery-Planning-Guide\\_2012.pdf](http://coastalhazardscenter.org/dev/wp-content/uploads/2012/05/State-Disaster-Recovery-Planning-Guide_2012.pdf).

<sup>13</sup> Regarding the interplay between state and local governments in recovery planning, Florida’s post-disaster redevelopment plan focuses on delivering assistance to local governments. See <http://www.floridadisaster.org/Recovery/IndividualAssistance/pdredevelopmentplan/Index.htm>

investments; 2) require greater private and local cost-sharing of disaster costs; and 3) further reform the NFIP.<sup>14</sup>

An important part of pre-event recovery planning should include the incorporation of hazard mitigation measures into recovery as a number of hazard scholars and practitioners suggest. ***This could be accomplished through the development of joint state-led hazard mitigation and disaster recovery planning programs, including the creation of policies that advance education, training, and outreach initiatives that assist local governments develop integrated / joint hazard mitigation and disaster recovery plans.***

One project, the Vermont Economic Resiliency Initiative (VERI), will bring together the Agencies of Commerce and Community Development, Natural Resources, Transportation and the Regional Planning Commissions to identify where areas of risk intersect with areas of economic activity and associated infrastructure. Five locations will undergo further study to determine how best to reduce or eliminate the risk and be used as a template for other areas around the state. One outcome will be an improved state and local hazard mitigation planning process so that the resulting plans identify robust strategies for reducing flood risk that state and local governments will implement as part of their pre-event or post-disaster mitigation activities.

The state believes that recommendations coming out of the VERI project could be used to help towns strengthen their pre-event recovery plans. In addition, the state's work to increase on-the-ground technical assistance to help communities make good pre- and post-event decisions about emergency stream alterations to avoid the type of in-stream measures that increase vulnerability during the next flood represent a policy that serves to link hazard mitigation and disaster recovery, thereby expanding the capacity of local governments by working in partnership with state officials.

### **Tackle Capacity Limits and Maximize Partnerships**

In interviews with state agency officials and a review of existing program responsibilities, it was clear that state agencies were understaffed relative to the challenges and associated responsibilities following Tropical Storm Irene. In addition, it was clear from a number of conversations that hiring large numbers of additional staff seemed unlikely. Thus an important question becomes how can state agencies attain the capacity necessary to facilitate the creation of more flood resilient communities, when local governments face their own capacity constraints?

*In order to ascertain existing capabilities, the state could **conduct an audit of state programs, including the degree to which they directly or indirectly help or hinder the ability of the state to achieve Vermont's Inter-Agency Long-Term Flood Resiliency Goals and the policy options in this document.***<sup>15</sup>

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<sup>14</sup> A copy of the report, Reforming Federal Support for Risky Development (2013) can be found at <http://www.brookings.edu/research/papers/2013/02/reform-federal-support-risky-development>.

<sup>15</sup> Smart Growth America offers a free policy audit tool to "review the land use and development policies in [a] community, to see if they help [that] community achieve its vision for smarter growth." See <http://www.smartgrowthamerica.org/leadership-institute/implementation-tools/policy-audit-tool/>.

The results of this audit could be used to inform a dialogue among stakeholders who play a role in watershed management, flood resilience, and smart growth. A capability assessment involves the identification of state agency programs and associated policies as well as helping to foster a broader view of existing technical, administrative, and fiscal capabilities available to implement identified policies. An assessment should also consider the political will of state agencies, the legislature, and the Governor to enact specific policies related to smart growth and flood resilience. ***Once existing capabilities are determined, the state could develop specific tasks, resource reallocation strategies, procedures, and policies to address identified gaps in state capabilities.*** An initial place to start the recovery capability assessment may include a review of the State of Vermont's Hazard Mitigation Plan, which includes an assessment of state agency capabilities related to hazard mitigation.<sup>16</sup> Another option could be to ***expand the advocacy role of Agency of Administration leadership to support preparedness activities, including increased support for DEMHS requests for plan upgrades and annual cabinet-level meetings.***

The state may choose to bolster their capability by hiring additional staff in the aftermath of a presidentially declared disaster. In many cases, federal grants include administrative funds that can be used for this purpose. Or the state could strive to maximize the level of coordination present among a broader set of existing stakeholders. ***Vermont could pursue a hybrid approach to increase capacity by selectively hiring additional state staff and maximizing the coordination of stakeholders across the larger Vermont Disaster Recovery Assistance Network.***<sup>17</sup> Assessing state capabilities and developing coordinative strategies in the aftermath of a disaster can prove difficult, but not insurmountable to achieve. In order to proactively prepare for the next event, the state could ***develop a post-disaster personnel plan that identifies agency needs as well as those resources that can be provided by the larger assistance network, including federal and local officials, non-profits, quasi-governmental organizations, consulting firms, and those groups that emerge following disasters.***<sup>18</sup> Further, these ***personnel plans could emphasize the development of pre-event disaster reservist cadres like those employed by other states after disasters.*** Specific issues to address include how to become a reservist, creating a set of job descriptions, establishing rates of pay and types of eligible benefits, and involving the state's temporary staffing office.<sup>19</sup> This cadre may include professional retirees (e.g., former

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Additionally, individual state agencies can engage in more thorough evaluations of state policies with Smart Growth America staff or through the review of previous work led by EPA on this topic. For instance, EPA worked with the State of Iowa and a number of communities in 2009 to integrate smart growth principles into disaster recovery following a series of floods and tornadoes. For more information see [http://www.epa.gov/smartgrowth/iowa\\_texasst.htm](http://www.epa.gov/smartgrowth/iowa_texasst.htm).

<sup>16</sup> For more information associated with conducting a disaster recovery plan capability assessment, please see *Planning for Post-Disaster Recovery: A Review of the United States Disaster Assistance Framework*, pp. 285-287.

<sup>17</sup> See the State of Mississippi's post-Katrina report *Building Back Better* at [http://www.mississippirenewal.com/documents/Governors\\_Commission\\_Report.pdf](http://www.mississippirenewal.com/documents/Governors_Commission_Report.pdf) for an example of a state-led recovery assistance network.

<sup>18</sup> While few plans exist at the state level, there are strong examples of personnel plans at the county level. See Hillsborough County (FL), whose personnel plan represents 17 county agencies and major non-governmental organizations like the Red Cross. <http://www.hillsboroughcounty.org/index.aspx?nid=1795>.

<sup>19</sup> See the following state disaster reservist programs: North Carolina ([www.ncdps.gov](http://www.ncdps.gov)), Florida (<http://www.floridadisaster.org/Recovery/documents/disasterreservistfieldoperationsmanual.pdf>), New Jersey

building officials, planners, engineers, public works directors, grants managers, social service personnel, state agency employees, and agricultural extension agents) and those drawn from watershed organizations, Conservation Districts, and existing professional associations (e.g., Association of Vermont Floodplain Administrators, Vermont chapter of the American Planning Association, and Extension Disaster Education Network). The reservist cadre could also supplement pre-disaster related activities, including capacity building efforts (e.g., education, outreach, and training), the identification of additional resources needed to assist with pre-event hazard mitigation and recovery planning, engaging in advocacy measures intended to shape national and state policy discourse, and strengthen working relationships across state agencies.

Reservist cadres could also serve to address existing local conditions that affect pre- and post-disaster capabilities, such as the lack of county government and the reliance on volunteer town select boards. In order to supplement state efforts, ***reservists could engage in pre-event capacity building initiatives that target local communities, farmers, and others working with regional planning organizations, community development corporations, and other partners as appropriate.*** For instance, a reservist cadre comprised of retired floodplain administrators and building officials could supplement local officials who may struggle with assessing compliance with local flood ordinance requirements and permit requests during reconstruction.<sup>20</sup> In order to help achieve these aims, ***the Agency for Administration could consider the use of the Emergency Response Assistance Funds (ERAF) to address unmet resource needs, including capacity building among state agencies and non-profits.***

Another important group of stakeholders involved in disaster recovery are private contractors. The reliance on contractors is expected to increase over time as the profession of emergency management is becoming increasingly privatized. Private sector organizations help write and implement grants, manage debris, provide policy counsel, write disaster recovery and hazard mitigation plans, and staff post-disaster state and local operations. As such, the State of Vermont could ***develop pre-disaster contracting templates and scopes of work in advance of the next disaster, expanding on the needs and issues identified following Tropical Storm Irene.***<sup>21</sup> Pre-existing private sector contracting vehicles could target state needs that may exceed current capabilities and expertise while addressing problems identified as part of Irene-related contracts via codified language and required actions on the part of the contractor.

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(<http://www.state.nj.us/njoem/programs/njdrp.html>), and Washington Public Assistance Reservist Cadre (<http://mil.wa.gov/jobs/documents/PublicAssistanceReservist.pdf>).

<sup>20</sup> This option is similar to the idea expressed by state officials to create a cadre of “flood response regulators within the ANR who would be trained to assist the River Management Engineers during larger disasters” (State of Vermont, January 2013).

<sup>21</sup> Several states, including North Carolina, Georgia, Wyoming, and Texas, for instance, post FEMA templates and other guidance regarding pre-disaster contracting online. See the North Carolina School of Government Emergency Management website at [www.sog.unc.edu/ncem](http://www.sog.unc.edu/ncem) and the Texas Emergency Management website at <http://www.txdps.state.tx.us/dem/documents/debrisCntrctGuidance.pdf>.

## **Develop Coordinative Guidance for the use of Assistance Before and After Disasters that Advances Resilience and Smart Growth Goals**

Most state agency officials expressed some level of difficulty with the administration of federal disaster assistance programs, which is a common refrain nationwide following extreme events. Most states and local governments are largely unprepared to effectively manage the influx of post-disaster assistance in advance of a disaster. In an effort to help address these challenges, the State developed the Irene Recovery Office which focused on the coordination of state agency activities and the search for additional federal assistance. Based on a review of the Recovery Office, it appeared to be understaffed and tended to focus on FEMA programs that are traditionally the responsibility of emergency management agencies. To maintain continuity with disaster recovery operations, the State of Vermont may ***consider the long-term staffing of a Flood Recovery Office and expanding its duties to include the oversight of the development of a State Disaster Recovery Plan and the coordination of higher-level interagency policies.***<sup>22</sup> This policy option coincides with the Vermont Division of Emergency Management and Homeland Security assuming additional responsibilities as described later in this document.

The roles of non-profit organizations and foundations are often critical after disasters as their funds and assistance may not be constrained by narrowly defined rules and can be used to target identified unmet needs. In many cases, this was evident in Vermont following Hurricane Irene. ***The Vermont Community Foundation (VCF) could take the lead in working with other non-profits (including the Vermont Disaster Relief Fund), the Agency of Human Services, and local officials to develop guidance focused on assisting those in need while simultaneously advancing disaster resilience goals.***<sup>23</sup> This can be accomplished by investing in projects that focus on reducing future flood hazard risk, particularly among socially vulnerable populations like the poor and elderly who live in flood-prone areas.<sup>24</sup> It is recommended that as part of the state agency audit mentioned earlier in this document, ***state and non-state service programs could be assessed to determine the degree to which they help or hinder the states long-term recovery goals for supporting vulnerable individuals and households. In addition, the state could work with Vermont Voluntary Organizations Active in Disaster (VOAD) to expand their coordinative role among non-profits and foundations to explore how they can play a greater role in***

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<sup>22</sup> The State of Vermont will need to determine where the Flood Recovery Office is located. Options to consider include the Governor's Office, the Vermont Division of Emergency Management and Homeland Security or the Secretary's Office for the Agency of Administration. See the strategic plan of the Louisiana Recovery Authority, the state's 33-member body tasked with identifying and obtaining funding for disaster recovery activities and other coordinative tasks (<http://lra.louisiana.gov/assets/docs/searchable/StrategicPlan0809.pdf>).

<sup>23</sup> Organizations like the Greater New Orleans Foundation require applicants to indicate the ways that their work promotes resilience in order to receive financial support. See <http://www.gnof.org/nonprofit>.

<sup>24</sup> The Flood Resilience and Land Conservation Initiative co-led by ANR and the Vermont Land Trust (VLT) are exploring how to expand funding for conservation of lands that reduce flood vulnerability. This recommendation dovetails with that goal and could be taken up in that forum with ACCD's participation. With recovery costs winding down, Vermont Community Foundation could be a natural partner in funding land conservation and flood-proofing of development serving socially vulnerable populations.

***achieving more flood resilient communities.<sup>25</sup> The Agency of Commerce and Community Development (ACCD), working with its partners, could strengthen, expand, and codify the roles of the economic development network in Vermont to include disaster resilience as part of all smart growth initiatives.<sup>26</sup>***

Following Tropical Storm Irene, the ACCD reached out to a number of stakeholders with whom they had ongoing relationships. These included community development corporations, Vermont Economic Development Authority, downtown managers, chambers of commerce, regional economic development personnel, and the state business development center. At the federal level, ACCD was able to obtain grants from the Small Business Administration (used to fund outreach efforts in Wilmington and Waterbury) and the Economic Development Agency to support the Vermont Economic Development Authority. Yet the ability of these organizations to work together collectively varied and the resources needed to meet the needs of business owners, address economic development and reconstruction-related issues, and tackle the myriad housing issues after Tropical Storm Irene left the state overwhelmed and understaffed.

***Recognizing that the likelihood of hiring additional staff in this economic climate is small, we suggest revisiting the specific tasks undertaken by various stakeholders following Irene, assessing the needs that remained unmet, and developing a pre-disaster recovery plan for future events that clarifies***

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<sup>25</sup> National Voluntary Organizations Active in Disasters is a nation-wide consortium of non-profit organizations that provide a number of post-disaster services to assist communities and individuals recover from disaster. NVOAD was initially created following Hurricane Camille, which struck the State of Mississippi in 1969, in order to better coordinate the distribution of non-profit assistance following disasters. For more information on NVOAD, including a list of participating members see [www.nvoad.org/](http://www.nvoad.org/). In 2004, NVOAD published its Long-Term Recovery Manual which describes how to create a long-term recovery committee and identifies the roles NVOAD members play in recovery, including case management, donations management, and reconstruction-related activities. For a copy of the Recovery manual see <http://www.arvoad.org/NVOADLTRRecovery.php>. Similar efforts to that suggested in the above policy option are already underway. For example, long term recovery committees (LTRCs) are working with Vermont VOAD, DEMHS and regional planning commissions to develop Regional VOADs, in order to incorporate issues such as the improved delivery of social services and the linkage of recovery planning initiatives with existing regional plans. Additionally, LTRCs and VOAD are included in all DEMHS preparedness activities. For instance, Vermont VOAD now sits as a member of the State Support Function (SSF) 7 at the Emergency Operation Center in order to more effectively provide/receive supplemental resource support for area voluntary agencies.

<sup>26</sup> In response to flooding near Nashville in 2010, long-term recovery teams used FEMA's Recovery Support Functions to conduct impact assessments, identify local needs, and coordinate the participation of other federal agencies. See [http://www.fema.gov/pdf/rebuild/ltrc/2011\\_report.pdf](http://www.fema.gov/pdf/rebuild/ltrc/2011_report.pdf). "As part of their regular duties FEMA's LTRC teams sought to foster greater inter-agency coordination at the state level. One of the most effective state partnerships forged was that between Tennessee Emergency Management Agency and the Department of Community Development. FEMA, working with TEMA helped train state agency staff versed in community economic development to assist local communities identify disaster recovery strategies" (Smith and Sandler 2012, p. 72). Another lesson derived from this experience was the eventual discontinuation of the program due to the release of state planning staff following the election of a new governor. The State of Iowa developed an enduring agreement addressing smart growth post-disaster through the creation of new state policy. According to Jim Schwab, who works at the American Planning Association, "One example of smart growth planning that was able to withstand political challenges because of the broad-based support it garnered is the Iowa Smart Planning Act, which was championed by Governor Chet Culver in 2008 but has managed to maintain its relevance despite less sympathetic political administrations. The Act, which represents Iowa's first attempt at defining an effective comprehensive plan, persists despite the future governor's dismantlement of the Rebuild Iowa Office, which initially proposed and drafted it" (Jim Schwab, phone interview 2013).

**roles, reduces duplication of effort, and maximizes available resources.** Those responsible for the development of the state recovery plan could review available pre- and post-disaster federal, corporate, and foundation support that may help fund the development and implementation of the plan as well as additional staffing needs that are identified.<sup>27</sup>

### **Align River Science, State Goals, and Programs that Recognize Existing and Future Settlement Patterns**

The following conditions frequently result in conflicts between human investments and the natural function of rivers in Vermont: 1) a highly dynamic riverine environment, 2) the presence of long-standing communities adjacent to these river systems, and 3) an agricultural economy rooted in the floodplains of the state. The Agency of Natural Resources (ANR) has developed a fluvial geomorphic-based River Corridor Planning Program to help inform discussions surrounding these issues within each watershed and identify river and floodplain restoration, mitigation, and protection opportunities that have broad support. The following policy options represent an effort to implement River Corridor Plans and more effectively manage preconditions that influence flood hazard vulnerability.

**Incorporate ANR river standards into federal, state, and local plans and policies through coordinated policy dialogue, training, and educational initiatives.** Following Tropical Storm Irene it became clear that ANR river management strategies did not always mesh with FEMA policies and eligibility criteria. FEMA Public Assistance reimbursements have thus far only supported the post-disaster repair of damaged infrastructure to pre-event conditions which does not always meet the State of Vermont's river management standards. One way to help address these issues is by incorporating state river standards into the State Hazard Mitigation Plan. This also requires working closely with other state agencies like VTrans and Agriculture so that there is a clear plan moving forward. These proposed actions compliment processes being undertaken to rewrite river management policies, including for instance, the stream alteration and emergency rule making granted to ANR by the state legislature, integrating river management actions with an Incident Command System, and linking river science policies with programs administered and decisions made at the Emergency Operations Center and Joint Field Office following a disaster. Another vehicle to accomplish this aim is through Act 138 which represents a collective response to Tropical Storm Irene focused on rule making, water quality, and flood hazard resiliency. Model bylaws that include the adoption of higher river corridor and floodplain development standards represent another tool that local governments could use.<sup>28</sup> As noted by a state official, however, **model bylaws could better address resilient reconstruction standards as most of the**

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<sup>27</sup> This assessment may be conducted as a formal Resource Gap and Network Analysis. Some funding sources could include the James L. Knight Foundation and the Canaday Family Charitable Trust.

<sup>28</sup> Local governments may wish to adopt a minimum two foot freeboard for new development in the floodplain to reduce flooding risk. At the state level, Vermont may want to consider the adoption of a state-wide building code that further advances flood resilient design measures.

**40 or so towns that have adopted higher standards have not dealt with reconstruction-related issues.**<sup>29</sup>

**Incorporate flood resilience data layers into pre-existing decision making tools.**<sup>30</sup> ANR staff noted that they and others were investigating the possibility of undertaking this policy option. For instance, flood resilience data is being integrated into the State Hazard Mitigation Plan while a number of new efforts done in partnership with VTrans are underway, demonstrating emerging and ongoing partnerships across state agencies. ANR could continue to pursue this effort in coordination with members of the larger disaster assistance, smart growth, and flood hazard resilience communities. New initiatives could include the incorporation of river corridor plan and mapping recommendations into transportation and community development planning that could lead to further limiting development in vulnerable areas.<sup>31</sup> The failure to do so may result in diminished floodplain function and therefore greater erosion rates on state road and bridge assets, and increased flood hazard exposure of housing and economic developments funded by ACCD.

**Develop the Flood Resilient Communities Program.**<sup>32</sup> ANR staff suggested that the Flood Resilient Communities Program could include a community-level hazard resilience scorecard that can be used to

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<sup>29</sup> Georgia used a grant from US Housing and Urban Development (HUD) to fund a task force to “look for opportunities to improve any code provisions relating to damage from hurricane, flood, and tornado disasters.” The results of the assessment have been included in the Disaster Resilient Construction Appendix of the state’s International Building Code ordinance. In addition, this grant helped the state develop a tool to assist enforcement officials implement disaster resilient construction techniques. See <http://www.dca.ga.gov/development/constructioncodes/programs/DRBCWorkshop.asp>. In Vermont, potential code changes could consider incorporating techniques described in the book *Design for Flooding: Architecture, Landscape, and Urban Design for Resilience to Climate Change* (Watson and Adams, 2011).

<sup>30</sup> North Carolina’s Integrated Hazard Risk Management (IHRM) program blends processes, data, methodologies, and communication tools associated with natural hazard identification, risk assessment, risk communication, and mitigation. See <http://www.ncihrm.com> for more information.

<sup>31</sup> New rules under Act 16 require that municipalities include a flood resilience element in new or adopted town plans. The existence of this requirement creates an important opportunity for state agencies to assist municipalities incorporate flood hazard maps and the results of river corridor planning into local community development and transportation planning discussions and documents.

<sup>32</sup> Act 138, which was signed into law in 2012, called for the creation of a Flood Resilient Communities Program (FRCP) to provide financial and technical assistance to communities that adopt river corridor and floodplain protections. State or federal grant programs associated with infrastructure and community development could be explored to see if they could be leveraged with FRCP resources to provide assistance to communities that regulate development in river corridors and floodplains in accordance with higher standards. This approach could be coupled with necessary capacity-building efforts. The failure to do so will likely result in low participation rates as evidenced by the Community Rating System (CRS). Currently, Vermont only has 3 communities that participate in FEMA’s CRS. The low level of participation is due to the high administrative burden relative to the level of local capacity found in many Vermont jurisdictions. Many of the NFIP participating communities are small with scarce government resources and very few flood insurance policies. According to state officials, CRS in its current form is a poor fit for many small New England towns. However, through Act 138, opportunities exist to augment and complement CRS as currently practiced in Vermont. Municipalities that have adopted river corridor and floodplain protections and are actively working to implement their river corridor plans will become increasingly competitive for pre- and post-disaster mitigation funding through a flood resilient community scoring system that is being developed by the state. The DEC applied for and received a FEMA Hazard Mitigation Grant to coordinate the development of a “Focus on Floods” web page that will serve as the primary portal for communities to glean flood-

see how well they are achieving flood hazard resilience goals. One such tool is the *Community Checklist to Improve Long-Term Flood Resilience*, which is being developed through another part of this Smart Growth Implementation Assistance project. An additional option includes working with the University of North Carolina at Chapel Hill as researchers at the Coastal Hazards Center are exploring the development of a resilience index/scorecard that could be tested in participating Vermont communities. ***The development of a scorecard could be incorporated into local hazard mitigation plans, thereby providing a tangible way to achieve monitoring and implementation procedures as required under FEMA guidance.***

***Balance the need for rapid post-disaster decision making with a more deliberative approach when considering how to address disaster recovery options.***<sup>33</sup> ANR staff pointed out this important issue, recognizing that the ability to incorporate smart growth and flood attenuation principles into recovery activities may require assessing multiple options and their implications, including the degree to which these choices fit with smart growth and disaster resilience goals set forth in state-level plans and programs.

***Pursue federal protection under the National Scenic and Wild Rivers Act for river systems.***<sup>34</sup> In addition to galvanizing riverine protection at the local level, the designation as a National Scenic and Wild River qualifies those applying on behalf of rivers for significant federal resources, including technical support for affected agricultural uses and funding to implement enhancement projects. The Upper Missisquoi and Trout Rivers are currently in the midst of a congressionally authorized study to determine their eligibility for this designation. Vermont could explore opportunities for other rivers to receive this federal designation.<sup>35</sup> As part of seeking future designations, the state could include in this proposed selection process an evaluation of flood hazard risk as defined by erosion rates, development pressures, and other factors tied to flood hazard resilience and smart growth. Further, potential resources tied to this designation may be leveraged with Hazard Mitigation Grant Program and designated state funds to

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related information and track their progress in meeting river corridor planning, hazards mapping, and floodplain protection standards. Incentives tied to meeting recognized standards associated with river corridor and floodplain protection are being compiled, and communities will become eligible based on a rating system that considers a suite of mitigation activities, including implementation of Standard River Management Practices. Revised Emergency Relief and Assistance (ERAF) rules are the latest example of a state funding formula that will recognize towns that have improved river corridor and floodplain protection through an increased state cost share for emergency relief funding. Focus on Floods will include testimonials, success stories, videos, and training opportunities for local and regional organizations to learn about best practices and how other communities are benefitting from their use. Once developed, the goal of the state is to approach FEMA and request consideration and formal recognition of the FRCP as a surrogate for CRS in Vermont, whereby communities would not only qualify for state incentives to benefit municipal coffers, but also receive flood insurance discounts for policy holders in participating communities.

<sup>33</sup> See Chapter 8, Planning for Disaster Recovery in Planning for Post-Disaster Recovery: A Review of the United States Disaster Assistance Framework (Smith 2011), for a discussion of the value of deliberative and inclusive decision-making processes.

<sup>34</sup> See <http://www.vtwsr.org> for more information on Vermont's ongoing efforts in this area.

<sup>35</sup> The state may explore whether designations can result in meaningful amounts of federal funding for conservation/restoration of floodplains.

assist making agricultural lands more flood resilient, including those areas that are upstream and/or adjacent to developed areas.

***Ensure that the process used to create and adopt River Corridor Maps, including fluvial erosion hazard areas, is state supported and actively engages local partners that have a deep, locally-grounded understanding of flood hazard risk.***<sup>36</sup> As mandated in Act 138, ANR is preparing for the adoption of River Corridor Procedures which will define the technical and administrative methods for delineating river corridors and a schedule for engaging communities and regional planning commissions in the adoption of river corridor maps. Those involved in this process could include local officials, farmers and other riverine property owners, non-profits (including land trusts), foundations, professional associations, and others as identified. Actively engaging broad stakeholder groups over time can assist in refining maps where appropriate, gaining political support and buy-in to the process, and identifying locally derived hazard mitigation solutions. These actions could be closely linked to local and state hazard mitigation plans, Local Flood Damage Prevention Ordinances, areas targeted for agricultural best practices, and land suitable for acquisition by land trusts or other groups.<sup>37</sup>

***Develop an information exchange program through existing and emerging venues where appropriate.***<sup>38</sup> This approach could involve the use of state-level professional associations (e.g., Vermont Association of Floodplain Managers and the Northern New England chapter of the American Planning Association). New and emerging partners could include the Vermont Resilient Neighbors Network and the Vermont Silver Jackets Program. Working with professional associations allows for the transfer of information to practicing professionals who as individuals can incorporate these lessons into new standards as part of their daily activities and influence policy change by acting with a collective

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<sup>36</sup> See Hazard Mitigation: Integrating Best Practices into Planning (2010), pp. 74-86 for a description of the Charlotte-Mecklenburg County, North Carolina case study which describes an inclusive process-oriented approach to assess flood hazard risk.

<sup>37</sup> One of the challenges faced by the State of Vermont is getting FEMA to recognize and accept the value of river corridor maps to include, for instance, an accepted recurrence interval that can be used as part of benefit cost calculations required to determine eligibility of FEMA-sponsored hazard mitigation projects like the acquisition or elevation of housing at risk to flooding.

<sup>38</sup> Vermont's role as the first state in the Natural Hazard Mitigation Association's resilient neighbor's network could be instrumental in facilitating this kind of peer-to-peer information exchange. The Resilient Neighbors Network, a partnership between the National Hazard Mitigation Association and FEMA, provides a forum for participating communities to share resources and ideas regarding hazard mitigation programs at the local "grassroots" level. Additionally, the network of communities across the U.S. provides feedback to FEMA and other federal partners on how the federal government can better enable communities to be more resilient to natural hazards. Vermont is one of 10 pilot communities (and the only state) in the Resilient Neighbors Network. The State of Vermont is also in the process of creating a Silver Jackets program. Silver Jackets programs are developed at the state-level and represent an interagency team that includes the U.S. Army Corps of Engineers and FEMA. The intent of the program is to collaboratively address risk management issues and provide a range of hazard mitigation-related assistance. For instance, the Silver Jackets program is currently conducting new hydrology, hydraulics, and inundation flood hazard mapping along the Ottauquechee River in Southeast Vermont. Once officially established, the Vermont Silver Jackets could help develop and implement new standards by leveraging information and resources, providing access to a variety of national informational tools such as FEMA's Risk MAP program, and identifying gaps among agency programs and barriers to implementation. For more information on the Silver Jacket Program, see <http://www.nfrmp.us/state/about.cfm>.

voice in concert with other association members. This effort could be linked to the River Management Practices Training and the Focus on Floods initiatives, which are funded through the Hazard Mitigation Grant Program.

***Increase the level of local government compliance regarding the review of permits in the floodplain.***

According to ANR staff approximately 30% of communities that participate in the National Flood Insurance Program (NFIP) actively seek ANR's review of municipal permits, which is required by Vermont statute. This percentage could be increased through more active enforcement at the local level and through state-level oversight. ***The use of a "circuit rider" approach, performed by certified floodplain technicians and trained members of professional associations could bolster existing state agency capacity.*** This approach could prove useful after disasters as well in order to review the influx of permit requests and to help ensure that local governments are complying with existing standards such as substantial damage ordinances, freeboard requirements, and others as identified. The cadre of professionals could also convey the merits of adopting post-disaster reconstruction standards that account for the projected effects of a changing climate such as those standards that recognize new, albeit estimated flood return periods.<sup>39</sup>

***Identify a broad network of champions of river science and river corridor planning and establish a cadre of trusted groups to deliver flood hazard risk information.*** The effective delivery of risk-based information benefits from a well-informed public. This issue was echoed by several agency officials. For instance, an official stated that "One of the most critical things we need to do is to help folks understand what are the right kinds of land use decisions we need to be making in the context of safe and smart growth and how to do that when we're topographically challenged. The more people understand the science and the more we can help land use planners use that science to make informed decisions, the better we're going to be. Our biggest challenge to rebuilding strong and safe is helping people understand and live by this science." This effort will require identifying suitable groups that are sufficiently trained and trusted to deliver technical information to a wide audience.

For instance, the agriculture extension service has a long-standing history of delivering information to farmers in Vermont and other states. ***The Vermont Extension Service could be used to help convey information to farmers, including how river science information can be addressed through recognized conservation techniques and existing agricultural programs.*** Other trusted groups may include neighborhood organizations, religious leaders, regional planning agencies, business leaders, local land trusts, university officials, and others as identified. Gaps in program assistance could be highlighted and explored with state agencies, non-profits, local officials, and others.<sup>40</sup> These groups could be invited to

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<sup>39</sup> Communities are beginning to develop climate change plans based on scenario-based planning techniques. For more information on these techniques, see the *City of Punta Gorda Adaptation Plan* (2009) and "Robust Plans and Contingent Plans Scenario Planning for an Uncertain World" (Chakraborty, Kaza, Jan-Knaap, and Deal 2011).

<sup>40</sup> The delivery of technical assistance to farmers to help them come into compliance with Vermont's water quality regulations for farms may increase in the next few years as a result of the new Lake Champlain Total Maximum Daily Load (TMDL) requirements. As outreach and technical assistance is scaled up, there is an opportunity to include information about land management practices that enhance flood resilience and reduce point- and non-point source pollutants.

help identify potential solutions and the organization(s) best suited to implement these ideas. These ideas and solutions, drawn from a range of river science champions, ***could be compiled by the state, an identified organization, or a collective body and consolidated into a best practices manual for training and educational purposes.***

***Incorporate river science into elementary, middle school, high school, and college curricula.***<sup>41</sup>

Developing enduring support for the sound management of river systems in Vermont benefits from a population that has a better understanding of these systems, including their dynamic nature and the effects of human actions on the natural function of rivers. This could be accomplished through a joint effort between Agricultural Extension, Vermont Agency of Education, and the University of Vermont.<sup>42</sup> River science could be incorporated into curricula addressing the state’s natural history, ecology, biology, geology, hydrology, and geography among other topics. Additional educational focus areas may include planning, law, and natural resources management.

***Involve stakeholders in policy discussions surrounding river science and seek to develop agreed upon solutions.*** The state could consider the use of mediation techniques coordinated by the Vermont Law School or other trained mediators to engage stakeholders in a meaningful policy dialogue addressing a number of issues in river corridor planning linking river science to floodplain management, economic development, natural resource management, agricultural best management practices, and other topics. Lessons may be drawn from the process used in Charlotte/Mecklenburg, North Carolina where a wide range of stakeholders (including developers, floodplain administrators, and environmental groups) were involved in the process of developing what is widely considered one of the most progressive floodplain mapping and management programs in the country (Smith 2011, pp. 269-271; Schwab et. al 2012, pp. 74-86). This process resulted in the creation of “future conditions” maps that delineate the expected depth and breadth of the floodplain in the future, assuming a build-out scenario of developable land. The significant rise in projected flood elevations was mapped and the results were used to regulate the floodplain today using these projections. After a lengthy and sometimes heated debate, the maps were adopted as the city’s Flood Insurance Rate Maps, in large part due to the support of developers who were invited to participate in the process from the beginning. These lessons could be used to assist ANR explore ways to better integrate River Corridor Maps and Flood Insurance Rate Maps (FIRMs) as part of a larger floodplain management strategy.

***Develop and maintain a river corridor and floodplain mapping program supported by statewide flood and fluvial erosion hazard risk assessments.*** Floodplain and river corridor mapping are fundamental to the adoption of a consistent statewide approach to flood hazard mitigation in Vermont. Creating an expectation that the State will broadly apply floodplain and river corridor protections will depend on maintaining a mapping program to systematically update, revise, and amend maps on a statewide basis. To overcome the difficulty of mapping both existing and future floodplain functions the State could use

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<sup>41</sup> Project WET (Water Education for Teachers) provides training workshops on river science and water management—including fluvial erosion and flood safety—to educators across the country. For more information on this program see <http://projectwet.org>.

<sup>42</sup> In order to implement this idea a point person within ANR could be identified who would be responsible for engaging the Agency of Education and the University of Vermont.

river corridors to delineate the minimal floodplain area necessary to maintain vertically stable streams in equilibrium condition. In support of this policy, river corridor maps could be updated on a more consistent basis in order to account for the dynamic nature of the state's rivers and floodplains. As part of Vermont's participation in FEMA's RiskMAP (Risk Mapping Assessment and Planning) program, the state could encourage FEMA to fund the statewide mapping of River Corridors identifying floodplain function and fluvial erosion hazard areas. Provisional maps prepared for all of Vermont streams and rivers could be continually refined (utilizing the public process described above) based on a prioritization plan focusing on those areas that are adjacent to developed areas, significant transportation corridor investments, or subject to significant erosion.<sup>43</sup>

***Based on ANR rules and procedures, provide model bylaws and create incentives for Vermont communities to regulate land use within floodplains and mitigate hazards through infrastructure investments as well as through projects identified in stormwater management, river corridor, and hazard mitigation plans.*** The drafting of ANR rules and procedures creates an opportunity to establish incentives, best practices, and model bylaws that Vermont communities may use to regulate land use within floodplains and mitigate hazards through infrastructure initiatives, as well as through projects identified in stormwater management and river corridor plans.<sup>44</sup> At the present time, the state's Rivers Program encourages communities to manage their floodplains based on Flood Insurance Rate Maps as well as River Corridor Maps. The recent passage of Act 16 by the Vermont Legislature provides the impetus to give communities the guidance and incentives to implement local flood resiliency plans that draw upon the mitigation measures outlined in stormwater management and river corridor plans. ***As ANR adopts and implements Flood Hazard Area Rules and River Corridor Procedures (as promulgated in Act 138), it could demonstrate methods that overcome the deficiencies of the NFIP by using development standards such as freeboard, no adverse impact, and river corridor protection measures. In addition to technical, financial, and regulatory incentives, the state could also adopt a policy that demonstrates a tangible commitment to flood hazard mitigation; whereby, in those communities that do not act to protect floodplains and river corridors, the state would assume the authority to regulate any development in these areas.***

***Use the Hazard Mitigation Grant Program's (HMGP) 5 and 7% initiatives to expand funding for communities to develop river corridor plans and develop strategies that recognize the natural dynamism of Vermont's rivers.*** A 2011 ANR report concluded that nearly 75% of the state's river miles are unstable, subject to eroding their beds, creating deeper channels, eroding the riverbank, and ultimately posing greater risk to Vermont communities. The Vermont State Hazard Mitigation Plan (2011) categorizes "River Corridor Protection, Management and Restoration" as a high priority hazard mitigation action. Vermont Emergency Management and Homeland Security could consider using HMGP funds to implement river corridor planning, management, and restoration. This may require a review

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<sup>43</sup> The prioritization plan could be developed in partnership with ANR, VTrans, and DEMHS as well as other stakeholders including local government representatives, land trusts, and others.

<sup>44</sup> Local governments can choose to implement stormwater management regulations that incorporate green infrastructure approaches. The State of Vermont regulates stormwater for developments exceeding one acre of impervious surface. The state may wish to revisit this designation, altering permit requirements to include smaller areas.

and possible modification of HMGP eligibility requirements. The development of river corridor plans should be eligible under the HMGP 5 % Initiative category.<sup>45</sup>

***ANR, the Vermont Environmental Board, and the District Environmental Commissions could encourage communities to consider using geomorphological, River Corridor (fluvial erosion) Maps in addition to Flood Insurance Rate Maps to review developments under Act 250.***<sup>46</sup> In the past, proposed development has been restricted because it was found in violation of Criterion 1(D) of Act 250, which requires that qualifying subdivisions do not “result in undue water or air pollution...” from sources “...including stormwater...floodways, streams, [and] shorelines.” Typically, this determination has been made based on the proposed development’s location in relation to the floodplain as determined by Flood Insurance Rate Maps. However, in cases such as the Woodford Packers, Inc. appeal, ANR has used fluvial geomorphology to determine the extent to which proposed development is vulnerable to flood hazards. This methodology, which “more accurately depict(s) hazards due to erosion,” could be more widely used (i.e. applied to riparian corridors) to further encourage more flood resilient development, while operating within the established legal limits of Act 250.<sup>47</sup>

***Consider the expansion of the River Corridor Easement Program through the development of a land banking or transfer of development rights (TDR) program.*** The existing River Corridor Easement Program, a partnership between ANR, Agency of Agriculture, the Vermont Land Trust, the Vermont River Conservancy, and the US Department of Agriculture (USDA) has been successful in protecting river corridors from development encroachments and channelization. ANR and the Agency of Agriculture may consider a supplemental program to expand corridor easements by allowing these rights to be banked or transferred to more suitable locations that are located outside of floodplains and/or river corridors. Such a program could help address the action in the Irene Recovery Report - “Coordinate Efforts to Protect Farmland” - which discusses the need to protect agricultural fields while allowing rivers to access floodplains.

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<sup>45</sup> The State of Vermont could consider the development of a repository of relevant funding sources tied to hazard mitigation, smart growth, and disaster resilience. A number of states have developed similar lists. For example, see Arizona ([www.dem.azdema.gov/operations/docs/mitplan/chapter6.5.pdf](http://www.dem.azdema.gov/operations/docs/mitplan/chapter6.5.pdf)). Another useful guide developed in partnership between the Natural Hazard Mitigation Association and the Association of State Floodplain Managers is called Planning and Building Livable, Safe & Sustainable Communities: The Patchwork Quilt Approach. See [http://www.floods.org/ace-files/documentlibrary/Best\\_Practices/Patchwork\\_Quilt\\_USACE-HUD-FEMA-NHMA-7-11.pdf](http://www.floods.org/ace-files/documentlibrary/Best_Practices/Patchwork_Quilt_USACE-HUD-FEMA-NHMA-7-11.pdf).

<sup>46</sup> The State of California’s planning and zoning law requires the incorporation of earthquake hazards mapping in comprehensive plans as part of what is called the “seismic safety element.” For more information see Western States Seismic Policy Council at <http://www.wsspc.org/policy/California.shtml>.

<sup>47</sup> ANR does use river corridor maps when it conducts its review of Act 250 projects under criteria 1D. However, Act 250 only captures larger scale development (in communities without permanent bylaws, proposed projects must equal or exceed 10 acres for commercial development and 10 units for residential development). ***One option to consider is the adjustment of thresholds to ensure that more small scale development in floodplains is reviewed under Act 250. For instance, the reach of Act 250 could be expanded in undeveloped floodplains and river corridors so that it covered more of the small scale development or the standards that guide local land use decision making could be strengthened and made more consistent.***

## Agency-Specific Policy Options

The policy options that follow represent those actions that may be led by a particular state agency. In order to be most effective, recommended actions are often framed as a collaborative effort spanning additional state and federal agencies, non-profits, quasi-governmental organizations, and members of the private sector. The following state agencies are discussed: ANR; ACCD; VTrans; Division of Emergency Management and Homeland Security (DEMHS); and Agency of Agriculture, Food and Markets (AAFM).<sup>48</sup>

### Agency for Commerce and Community Development (ACCD)

**Conduct an audit of all economic development investment decisions in the agency to determine whether they advance flood resilience goals.**<sup>49</sup> The Agency of Commerce and Community Development could assess the degree to which state programs and policies like the investment of Community Development Block Grant funds (obtained pre- and post-disaster) and programs addressing community revitalization, historic preservation, tourism, business, and economic development increase or decrease flood hazard resilience. This could, for instance, include the proposed market studies planned for the Mad River Valley and could address how to grow the market in a sustainable way that does not increase flood hazard vulnerability.

**Conduct training programs targeting local homeowners, renters, and businesses that help to inform them about steps they can take to reduce their exposure to flood hazards and better capitalize on post-disaster recovery grant and loan programs available after disasters.** Discussions with ACCD officials emphasized the value of conducting business surveys and associated case management initiatives with small businesses, homeowners, and renters after Tropical Storm Irene. This process helped to prepare documentation needed by FEMA to determine eligibility and process applications. However, state agency officials noted that these assessments and case study outreach efforts were insufficient relative to the needs of business owners, individuals, and families. **ACCD staff could seek financial assistance to develop and conduct training programs from larger state businesses like Green Mountain Coffee and Sugarbush. ACCD could also consider building on work started by Small Business Champion Teams.**

Specific aspects of training could include: 1) Understand your risk; 2) Undertake a Business Impact Analysis; 3) Check your insurance coverage; 4) Protect your building and contents; 5) Protect your vital records; 6) Protect yourself, your employees, and your customers; 7) Anticipate disruptions from your suppliers and other indirect impacts; 8) Know what to do immediately after a disaster; 9) Prepare a business relocation plan; and 10) Promote business preparedness in your community. Additional questions to ask include: What are your most critical and time sensitive business functions? What business functions are you most dependent on to stay in business? What specialized equipment is used in your business and how is it used? How long could your business function without this equipment?

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<sup>48</sup> See previous section titled “Addressing River Corridor Planning and State Programs” for a discussion of Agency for Natural Resources policy options.

<sup>49</sup> **ACCD could coordinate with VTrans, who is engaged in a similar audit with Smart Growth America.**

What special procedures would be necessary if computer systems are not available? What functions can be performed from the homes of employees who can log into the computer system? What would be the lost revenue for your business if you were shut down for one day, a week, or an entire revenue period? What are possible contractual fines or penalties? What are your dependencies on third party vendors, suppliers, and service providers? What are your business recovery priorities? The following information was taken directly from *Managing Your Business to Minimize Disruption: A Guide for Small Businesses in North Carolina*.<sup>50</sup>

***Develop a pre-event cadre of case managers, working in partnership with regional development corporations, small business development centers,<sup>51</sup> Vermont VOAD, professional associations, and Vermont colleges and universities (including schools of social work, law schools, and business schools) that are trained in post-disaster assistance programs, including those addressing human services and businesses.***<sup>52</sup> To more effectively identify the needs of individuals, families, and business owners, case managers can help wade through the often confusing grant program eligibility requirements, fill out pertinent forms, and cobble together multiple sources of assistance. The ability to identify a cadre of sufficiently trained individuals benefits from a well thought out strategy grounded in observations and lessons following Irene, including the identification of those with experience in various fields such as post-disaster housing, business programs, and legal and contractual agreements for post-disaster services (e.g., home repair and debris removal).

Key participants could include small business development centers (that proved to be the “go-to” group for case management after the storm, but were quickly overwhelmed) and regional development corporations (that understand the needs of many businesses, but were less familiar with the needs of restaurants, inns, and stores that were disproportionately impacted by the storm). Additional lessons include the value of finding the funds needed to increase staffing as was done in some of the regional economic development corporations; the ability to offer ongoing assistance rather than provide a one-time consultation; and the importance of developing a tracking system to identify, counsel, and monitor progress once assistance was offered. To create this type of program the state could seek funding support from foundations such as the Annie E. Casey Foundation, the John S. and James L. Knight Foundation or federal assistance from the Economic Development Administration. Once formed, this group could be included within the larger State of Vermont reservist cadre discussed earlier in this document.

***ACCD and DEMHS could reach out to FEMA’s recently hired Community Recovery Planning and Capacity Building personnel in Region I and discuss the development of a state and local disaster***

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<sup>50</sup> A copy of *Managing Your Business to Minimize Disruption: A Guide for Small Businesses in North Carolina* can be accessed at: <http://www.accts.com/Trust-Factors/SmallBusinessBrochure.pdf>.

<sup>51</sup> See the North Carolina Small Business Technology Development Center at [www.sbtcdc.org](http://www.sbtcdc.org) for more information on training programs targeting small businesses following disasters.

<sup>52</sup> This policy option is very similar to that proposed by the Agency of Human Services, which states: ***Develop a pre-event cadre of case managers for individuals and families, working in partnership with Vermont Volunteer Organizations Active in Disasters (VOAD), professional associations, and Vermont colleges and universities (including schools of social work, law schools, and business schools) that are trained in post-disaster assistance programs.***

**recovery planning capacity building program.** FEMA is in the process of hiring federal disaster recovery planning coordinators in each of their Regional offices, including Region 1 (New England). As part of their responsibilities they are expected to assist states and local governments develop pre-disaster recovery plans. Thus it is a good time for the state to solicit FEMA's assistance in the development of an improved state recovery plan and the development of improved disaster recovery implementation strategies at the local level.

***Drawing on lessons from post-Irene recovery planning efforts in Vermont (e.g., planning efforts undertaken too soon after the event, or plans that seemed to emphasize unattainable goals/comprised of "project wish lists") the state, led by ACCD, DEMHS, and regional planning agencies could co-host and develop a pre-disaster recovery planning workshop in partnership with FEMA.*** This workshop would utilize state and local disaster recovery guidance that is nearing completion with the intent of focusing on the development of operational disaster recovery plans.

### **Agency of Transportation**

Conversations with VTrans officials highlighted a number of existing programs that have the potential to help increase flood resilience. These include coordination with regional planning commissions about land use and the development of flexible design solutions, including context sensitive design.<sup>53</sup> Yet these tools have not been assessed relative to achieving smart growth and resilience objectives. According to one official: "It's hard to wrap your head around what we're doing relative to smart growth and flood resilience. We're keenly aware of the environmental side and how we behave in rivers." Incorporating smart growth and flood hazard resilience can be accomplished through an earlier policy option which is to first take stock of existing VTrans programs and assess the degree to which they address the State of Vermont's Inter-Agency Long-Term Flood Resiliency Goals. Second, VTrans, working with ANR and DEMHS could develop agreed-upon flood resilience metrics and incorporate these measures into state policies, plans, and other decision-making processes. A similar approach is discussed in an earlier policy option titled "Develop a flood hazard resilience progress report for communities" and both could be undertaken as part of a multi-agency effort. The development of metrics will take time and first require assessing the science, engineering, and planning parameters associated with varied policy options.

***Establish hazard mitigation and flood resiliency budget priorities based on natural hazard risk and other parameters.***<sup>54</sup> Many existing road segments, bridges, and culverts are particularly vulnerable to flooding and fluvial erosion due to their close proximity to Vermont's waterways which are often located in narrow river valleys. If bridges and roads are not planned, designed, and maintained appropriately, they could fail, prove costly to repair, and cause significant damages to nearby and/or downstream public infrastructure, private property, and natural resources. VTrans uses a technical prioritization system that guides decisions about capital programming for both roadway and bridge rehabilitation and reconstruction projects that use state and federal funds. The scoring methodology for bridges and roads

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<sup>53</sup> Suggested improvements in context sensitive design should incorporate the results of the Vtrans Smart Growth Study. see [http://smartgrowthamerica.org/documents/vtrans-working-paper-4\\_5-2013.pdf](http://smartgrowthamerica.org/documents/vtrans-working-paper-4_5-2013.pdf).

<sup>54</sup> See the Handbook of Emergency Management for State-Level Transportation Agencies at: [http://transweb.sjsu.edu/MTIportal/research/publications/documents/COOP%20COG%20I\\_Vince\\_022410.pdf](http://transweb.sjsu.edu/MTIportal/research/publications/documents/COOP%20COG%20I_Vince_022410.pdf).

is generally based on structural condition, consistency with design standards, safety, the importance of the roadway relative to the statewide network, cost, and regional priority. ***VTrans could review how it designs its roadways and structures, as well as its maintenance practices, to ensure those designs account for flood hazard vulnerability and the effects of differing designs on downstream flooding and fluvial erosion. This could be achieved by further integrating disaster resilient design parameters (as identified best practices in River Corridor Plans) and investment priorities based on risk into the Vermont State Design Standards.***<sup>55</sup> A change in the current prioritization system will help address vulnerable assets in the project development process, and in the long run will save money and improve overall system resiliency and thus, functionality. This approach may also work to increase system resiliency by recognizing the interdependencies of infrastructure and the role of redundant systems. Additional features of infrastructure resilience include robustness (inherent strength/resistance), resourcefulness (capacity to mobilize needed resources), and rapidity (speed with which disruptions can be overcome and services restored).<sup>56</sup> In addition, ***VTrans could review other programs, including town grant programs, to look for opportunities to create local incentives and prioritize projects and maintenance strategies that will reduce risk of future flood hazards in vulnerable areas.***<sup>57</sup> In order to accomplish this aim VTrans could work with partners such as ANR, towns, Vermont League of Cities and Towns, Vermont Local Roads, and regional planning commissions.

***Conduct and maintain an inventory system of state and municipal bridges and culverts.***<sup>58</sup> VTrans has access to good data for bridges but not culverts. State transportation officials, who estimate that approximately one third of these inventories are accurate or up to date, are in the process of trying to improve the link between the assessment of culverts and adjacent stream geomorphology. While an inventory of interstate culverts is underway, the assessment of state culverts remains incomplete. In our conversations with state officials it was noted that more than 2,000 culverts were damaged in towns and a similar assessment of state roads has not been completed. Given the differing strategies and priorities employed by municipalities and VTrans regarding the inventory and assessment of bridges and culverts, ***municipal and state agency officials may consider the development of a unified approach regarding inventory and assessment, particularly as it relates to flood resilience and the interdependence of networked infrastructures.***

***Incorporate culvert and other road design (i.e. ANR stream alteration) standards into an updated hydraulics manual.*** State officials have described the need to proactively address potential areas that

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<sup>55</sup> The timing of this proposed policy option is good as VTrans has been discussing the need to update the Vermont Design Standards for some time. The vulnerability criterion used to shape resilient design parameters could be developed in coordination with ANR and regional planning agencies.

<sup>56</sup> For more information on the “four r’s of resilience” see [http://mceer.buffalo.edu/research/resilience/resilience\\_10-24-06.pdf](http://mceer.buffalo.edu/research/resilience/resilience_10-24-06.pdf).

<sup>57</sup> An example of a town grant program that could be used for this purpose includes the Flood Resilience Community Program being led by ANR.

<sup>58</sup> Both New York <https://www.dot.ny.gov/divisions/operating/oom/transportation-maintenance/repository/CulvertInventoryInspectionManual.pdf> and Ohio [ftp://ftp.dot.state.oh.us/pub/Districts/D12/Production/Consultant\\_Programmatic/87470/CFN%20283221959/Inspection%20Report/283221959Inventory.pdf](ftp://ftp.dot.state.oh.us/pub/Districts/D12/Production/Consultant_Programmatic/87470/CFN%20283221959/Inspection%20Report/283221959Inventory.pdf) offer manuals and checklists for inspecting and inventorying state culverts.

can exacerbate flooding such as inadequately sized culverts or the location and type of bridge repairs following flood events. Officials also noted that in some cases damaged roads could be moved to more appropriate (i.e., less risky) locations. Attempting to make these decisions in the aftermath of a disaster when there is intense pressure to rebuild damaged roadways and culverts quickly is not the optimal time to make these choices.

The primary guidebook that engineers use for sizing bridges and culverts on public highways is the Vermont Agency of Transportation's Hydraulics Manual. The principles of the Manual are based on various flood levels and statistical analysis of Vermont's historic precipitation data. Since its initial publication in the 1990s, designers now consider additional factors not found in the Manual. These include changes in Vermont's landscape, increased knowledge of fluvial geomorphology (drawn from ANR's geomorphic assessment database), and the recognition of aquatic organism passage.

With the establishment of ANR Stream Alteration Standards, VTrans and local communities are now required to utilize the previously discussed considerations when sizing stream crossing structures. The adoption of these standards may encourage FEMA to fund increased structure sizing when a damaged bridge or culvert is replaced using Public Assistance funds.<sup>59</sup> VTrans has included the stream alteration standard and the VTrans hydraulic manual as a recommended standard for municipal "codes and standards." VTrans and ANR are working with Vermont Local Roads and other partners to help educate and train municipal officials so that they adopt the recommended "codes and standard for culverts" as well as side slopes, ditches, and other aspects of transportation infrastructure potentially affected by flooding. This additional training should help inform municipal officials so that an accepted sizing of culverts and other best practices becomes standard operating procedures.

***Once the inventory of state and local culverts is complete, the results could be incorporated into the State Hazard Mitigation Plan.*** Culvert information coupled with an evaluation of local conditions, downstream effects, costs, technical feasibility, and other factors could be linked to flood hazard risk and increased levels of flood resilience, drawing on the work of the river science team at ANR and the risk assessment found in the State Hazard Mitigation Plan. ***Based on this assessment, VTrans, ANR, and DEMHS, working with municipal officials, could identify appropriate hazard mitigation measures, including those that may be eligible under FEMA's 406 Public Assistance program (PA 406) and the Hazard Mitigation Grant Program. This may include increasing the size of strategically identified culverts, limiting upstream development, creating catchment areas, and conducting and implementing flood engineering studies.***<sup>60</sup> In order to improve the use of PA 406 and Hazard Mitigation Grant Program

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<sup>59</sup> In guidelines published by VTrans, culverts on town roads should withstand at least a 25-year flood, a standard known as Q-25. The Agency of Natural Resources recommends a larger culvert design that can handle 1.2 times the full width of a stream. However, FEMA will typically reimburse towns for the minimum design, or to replace culverts to the pre-event size. In addition to preventing future flood damage, larger culvert design can be an important strategy to protect fish habitat. For instance, the White River Partnership in Vermont received a \$100,000 grant from the U.S. Fish and Wildlife Service to help towns replace culverts with ones that are more fish-friendly and more flood resilient. At the same time, increased culvert sizing can negatively affect downstream communities thus requiring an integrated approach like that expressed in No Adverse Impact guidance.

<sup>60</sup> VTrans has submitted a HMGP application to develop the methods and approaches necessary to create watershed based transportation plans that address the issues noted in this state policy document.

(HMGP) funds after a disaster, VTrans, ANR, and DEMHS could work with FEMA to clarify policy issues that surfaced after Tropical Storm Irene and seek ways to improve the degree to which they address local conditions and needs. For instance, 406 mitigation funds should be used more frequently following disasters to replace inadequately sized culverts that were damaged during this and future extreme events. The HMGP eligibility criteria could be expanded to include the funding and implementation of flood engineering studies and stormwater management plans as this has been done in other FEMA regions following past disasters.

***Draw lessons from the process used to hire temporary VTrans officials and incorporate these lessons into improved state agency personnel plans*** (see *Tackle Capacity Limits and Maximize Partnerships* section). VTrans was one of the few state agencies that hired a number of temporary staff to supplement existing employees. While the hiring of additional staff represents an important way to bolster capacity, one employee characterized the process as “an administrative nightmare and our second flood.” The hiring process also proved contentious due to the difficulty of getting the approval to proceed in a timely manner. The lessons learned could be used to inform the selective expansion of both VTrans and other state staff in future events by identifying potential pitfalls and altering policies and procedures accordingly. In addition, ***VTrans and other state agencies could explore the development of protocols used to develop and train state disaster assistance reservists. This program could be supplemented by an expansion of state Emergency Management Assistance Compacts that already exist between New England states and may include others as identified.*** The Agency for Human Services, for instance, suggests the following policy option: ***Amend the existing Emergency Management Assistance Compact (EMAC) in New England to better make use of state disaster response and recovery personnel.***

***Maximize training opportunities.*** VTrans, like many other state agencies, has recognized the need to expand the training of local and state officials as well as other stakeholders including locally hired contractors. Among the most promising initiatives is the river management training being conducted in coordination with ANR. This effort could be continuously updated and improved and include maintenance workers, regional planners, and local transportation officials as appropriate.

***Strengthen and clarify riverine debris removal policies.***<sup>61</sup> Prior to Hurricane Irene, the state did not have in place clear riverine debris removal policies. Specific issues to address in an improved set of debris management policies include, but are not limited to, identifying FEMA eligible costs and the party responsible for paying for removal, clarifying the definition of debris versus fish habitat, defining eligible boulder removal policies, and pre-identifying debris management staging areas. Improved policies developed in partnership with FEMA, VTrans, ANR, DEMHS, and Agriculture as well as local government representation, to include those who have the authority to designate state and local debris

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<sup>61</sup> Florida’s recovery guidance includes information on the debris management process; reviewing debris management plans, contracts, and private property ordinances; and documenting eligible expenses. This information is fully covered in a debris operations course. For more information, see <http://www.floridadisaster.org/Recovery/EDS/debris/debris.html>.

management staging areas, would help address this challenge. Debris management plans could then be developed and incorporated into state and local disaster recovery plans as an appendix.<sup>62</sup>

### **Division of Emergency Management and Homeland Security**

***The Division of Emergency Management and Homeland Security, in partnership with ANR, ACCD, VTrans, and Regional Planning Commissions could host state-wide hazard mitigation workshops, emphasizing the linkage between smart growth and disaster resilience.***<sup>63</sup> These workshops could include the involvement of federal agencies such as FEMA, EPA, Corps of Engineers, Economic Development Agency, U.S. Department of Transportation, and U.S. Department of Housing and Urban Development. Additional participants could include local officials (e.g., public works, planning, economic development, town leaders), land trusts, farmers, agricultural extension agents, local foundations and non-profits (e.g., Friends of the Mad River and others), housing authorities, community development corporations, and small business owners. These workshops could target a prioritized list of flood-prone towns and involve an evaluation of existing plans, ordinances, Flood Insurance Rate Maps, River Corridor Maps, drainage studies, and other relevant materials that can be used as part of a multi-day systematic evaluation of community-level risk and the development of tangible risk reduction strategies. The workshops could evaluate the specificity and strength of the local hazard mitigation plan and make necessary improvements, based in part on vulnerabilities exposed during Tropical Storm Irene and other events. Workshops could also evaluate each town's land use plan (if it exists) and consider how well it limits future development and public investments in flood-prone areas.<sup>64</sup> The *Community Checklist to Improve Long-Term Flood Resilience*, also developed through this Smart Growth Implementation Assistance project, represents one tool that could be used in such workshops. In addition, ***efforts could be made to identify mitigation strategies that achieve the principles as outlined in No Adverse Impact and Low Impact Development (LID)***. Low Impact Development is a design approach to managing stormwater runoff that emphasizes conservation and the use of on-site natural features to protect water quality and reduce flood risks.

It is critical that members of ANR's River Program provide technical assistance and inform members of the workshop about varied aspects of the National Flood Insurance Program, fluvial erosion, and other floodplain management issues, including recent policies adopted after Tropical Storm Irene. ***ANR representatives or others with expertise in LID techniques should be available to assist community***

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<sup>62</sup> The state may consider providing communities and individual property owner's information regarding the deconstruction of properties in order to reduce the amount of debris sent to the landfill. Deconstruction is the process of disassembling a building to recover and reuse materials used in its construction. For more information about the deconstruction process see [www.deconstructioninstitute.com](http://www.deconstructioninstitute.com).

<sup>63</sup> See [http://www.epa.gov/smartgrowth/iowa\\_techasst.htm](http://www.epa.gov/smartgrowth/iowa_techasst.htm) for a discussion of the efforts undertaken following the 2008 floods in Iowa linking smart growth and disaster resilience. Wisconsin hosts an all-hazards workshop, covering topics such as how to get grants, mitigation ideas, and plan review tools. For more information see [http://emergencymanagement.wi.gov/mitigation/Mitigation\\_Workshop/toc.asp](http://emergencymanagement.wi.gov/mitigation/Mitigation_Workshop/toc.asp).

<sup>64</sup> While hazard mitigation plans are designed to address all natural hazards prevalent in a plan's study area, focusing on areas that are particularly flood-prone may be most useful as flooding is the greatest threat facing the State of Vermont. The state could also encourage or require local governments to incorporate climate change adaptation measures into hazard mitigation plans, particularly those policies addressing increased natural hazards risks tied to a changing climate.

***officials with issues tied to the design of stormwater management systems that increase infiltration and reduce runoff thereby reducing the risk of flooding while offering environmental benefits.***

The workshop would also benefit from the use of planning and design professionals, perhaps drawn from the University of Vermont (including faculty and students), regional planning organizations, professional associations (e.g., American Planning Association, American Institute of Architects), or volunteers from private sector planning and architectural firms.

***Strengthen and better operationalize state and local hazard mitigation plans.*** State and local hazard mitigation plans provide a potentially important vehicle to integrate flood hazard resilience and smart growth initiatives. Mitigation plans can emphasize complementary policies and identify funding sources that can achieve multiple aims such as flood hazard risk reduction, improved water quality, and effective land use management in and adjacent to floodplains. These plans are also intended to identify hazard mitigation projects that may be eligible for FEMA funding pre- and post-disaster. Key items to consider in this process include the improved utilization of land use policies, adding change-related effects (e.g., increased rainfall and more intense storms) to the suite of hazard threats, the improved identification of pre-event hazard mitigation projects, and the development of pre-event project applications that are ready to submit to potential funders in advance of a disaster.<sup>65</sup>

***Take advantage of the post-Irene window of opportunity to advance tangible hazard mitigation projects that span multiple stakeholder interests.***<sup>66</sup> Prior to Tropical Storm Irene, many local hazard mitigation plans did not adequately identify pre-event hazard mitigation projects, including those that address flood resilience and smart growth goals. The vulnerabilities highlighted by Irene could be used to develop targeted hazard mitigation projects in conjunction with other relevant stakeholders like land trusts, recreational interests, non-profits, community development organizations, and Regional Planning Commissions.<sup>67</sup> Examples include those projects that not only reduce future flood hazard vulnerability but also help to alleviate sprawl, improve water quality (e.g., reduced sedimentation and non-point source pollution), create or expand greenways and river access points, and preserve farmland.

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<sup>65</sup> For more information about how to incorporate land use planning and climate change adaptation into local hazard mitigation plans see the State of California's Community Planning and Hazard Mitigation Guidebook at [www.calema.ca.gov/hazardmitigation/](http://www.calema.ca.gov/hazardmitigation/) and the Local Hazard Mitigation Planning Program at [http://hazardmitigation.calema.ca.gov/plan/local\\_hazard\\_mitigation\\_plan\\_lhmp](http://hazardmitigation.calema.ca.gov/plan/local_hazard_mitigation_plan_lhmp). For more information about the value of creating pre-event hazard mitigation grant applications see Smith 2011, p. 65.

<sup>66</sup> Through its Recovery and Mitigation Joint Field Office Standard Operating Procedures, Virginia's Department of Emergency Management seeks to "maximize the effectiveness of mitigation and recovery activities," promoting mitigation projects related to housing, infrastructure, economic development, and social and community services. For more information on the approach taken by the State of Virginia, see: [http://www.vaemergency.gov/webfm\\_send/513/COVEOP\\_2012\\_ESF\\_14\\_Recovery\\_&Mitigation.pdf](http://www.vaemergency.gov/webfm_send/513/COVEOP_2012_ESF_14_Recovery_&Mitigation.pdf).

<sup>67</sup> DEMHS has done a great deal of outreach in an effort to solicit HMGP proposals following Tropical Storm Irene. During the time this policy document was being written, DEMHS was in the process of reviewing the fourth and last round of applicants. The potential projects identified throughout this process (not all of which may have resulted in an application), as well as the local players who are engaged in securing funding and advancing local projects, represent one step toward implementing the policy option noted in the body of the text.

***Develop a clear transition plan for the hand-off of FEMA's Public Assistance Program from VTrans to the Vermont Division of Emergency Management and Homeland Security.*** Shifting responsibility for administering the Public Assistance Program from VTrans to DEMHS will require the transfer of experiential knowledge and lessons, the continued utilization of transportation engineers and hydrologists housed in VTrans, and the building of internal capacity within DEMHS to manage the program.

***Work with FEMA and VTrans to develop improved Public Assistance guidance and protocols that can be used in the next event.***<sup>68</sup> State officials remarked that they struggled with: 1) the interpretation of federal policy, 2) staying abreast of what FEMA staff was doing in the field, and 3) maintaining federal-state relationships forged over time due to continued FEMA staff rotations. These issues could be proactively addressed in advance of future disasters and incorporated into state and FEMA Region I policy. One option to consider includes developing an agreed upon protocol with FEMA to hold transition meetings between incoming and outgoing FEMA staff to include state and local officials.

***Codify the State Recovery Office within the Vermont Division of Emergency Management and Homeland Security.*** The Governor has expressed his desire to institutionalize some manifestation of the Irene Recovery Office. A Flood Recovery Office could serve as a quasi-governmental entity that is stood up following major disasters and is supported by a larger State Disaster Recovery Committee comprised of state agency officials, non-profits, foundations, regional planning committee representation, small business owners, corporation representatives, members of the insurance industry, professional association leadership, and others.<sup>69</sup>

***The State Disaster Recovery Committee could be tasked by the Flood Recovery Office with the development, maintenance, and implementation of the State Disaster Recovery Plan.*** In order to address the many issues surrounding disaster recovery in future events, DEMHS and select state agencies could consider hiring additional staff focused on disaster recovery and resilience. Implementing the State Disaster Recovery Plan will also benefit from the use of post-disaster administrative funds to hire staff and contractors, the creation of a robust Emergency Management Assistance Compact program (that includes nearby states that are trained in specific long-term recovery tasks), and the development of a pre-event state-level disaster assistance cadre modeled on other state reservist programs.

***Work with FEMA to develop improved selection criteria for long-term recovery planning assistance that accounts for low-capacity community needs.*** Following Tropical Storm Irene, FEMA's long-term recovery assistance selection criteria emphasized the level of impact sustained by communities (e.g., number of homes damaged, the amount of infrastructure affected, and the extent of business-related

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<sup>68</sup> In Iowa, working closely with FEMA facilitated increased 406 HMGP funding; nearly 25% of all public assistance funds for permanent recovery work following the 2008 floods include a 406 hazard mitigation component. For more information see <http://www.fema.gov/mitigationbp/brief.do?mitssid=7129>.

<sup>69</sup> The State of Vermont and DEMHS may consider incorporating the cost of standing up this type of organization in their Public Assistance administrative plan. Other options may include the use of state funds or those provided by a foundation or donations procured through a Governor's relief fund.

impacts). Smaller communities, many of which do not have full-time staff, did not meet this criterion even though they had limited resources to begin recovery efforts. The state, in partnership with FEMA, could develop modified post-disaster assistance selection criteria that better address the unique conditions found in Vermont communities. This dilemma could also be addressed in the State Disaster Recovery Plan by identifying ways to assist communities with limited staff capacity before a disaster strikes through capacity-building programs that draw on members of the larger disaster recovery assistance network.

***Work with FEMA and local governments to develop more realistic pre-and post-disaster local recovery plans that are implementable and reflect local conditions and capabilities.***<sup>70</sup> A common concern expressed by state and local officials was the development of local recovery plans that more accurately reflected a “wish list” of potential projects rather than a well-constructed recovery plan with attainable policies and projects tied to clear implementation procedures. The development of effective recovery plans means working with broader coalitions of supporting organizations that possess the resources needed to implement locally derived goals, policies, and projects (A similar policy option is discussed in the ACCD section). At the same time, local governments should lead the development of these plans with support provided by the state and FEMA. In order to achieve this end, ***DEMHS and ACCD could reach out to FEMA’s recently hired Community Recovery Planning and Capacity Building personnel in Region I and discuss the development of a state and local disaster recovery planning capacity building program.***<sup>71</sup>

#### **Agency of Agriculture, Food, and Markets**

***Develop an assistance strategy to further improve the flood resilience of agricultural lands.*** The Agency of Agriculture, Food, and Markets could consider expanding the states longstanding commitment to farmland preservation by more explicitly tying agricultural preservation and flood resilience. This could be accomplished by a dual funding and educational strategy. ***The strategy could leverage Hazard Mitigation Grant Program<sup>72</sup> and other hazard mitigation grants, National Scenic and Wild Rivers Act funding (should proposed rivers be designated), Natural Resource Conservation Service funding, and state-designated funding (e.g., Vermont Housing and Conservation Board) to pay for varied river protection strategies (e.g., land acquisition, creating vegetative buffers, land transfer) and***

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<sup>70</sup> The University of Oregon’s Partnership for Disaster Resilience helps coastal communities prepare post-disaster redevelopment plans guided by frameworks that explicitly encourage resilience. For more information on a recovery plan developed in Coos County, Oregon, see <http://csc.uoregon.edu/opdr/sites/csc.uoregon.edu.opdr/files/Coos%20Recovery%20Framework.pdf>.

<sup>71</sup> A number of state agency officials noted the limited capacity of local governments to develop multiple plans. ***We suggest that as part of a review of existing plans at the local level, relevant state agencies (e.g., DEMHS, ACCD, and ANR), working with regional planning organizations and local government representatives consider developing a process that would allow local governments to create plans that meet multiple needs and criteria found in differing planning requirements.*** For example, local comprehensive plans could be created in such a way that they also meet the requirements specified by FEMA Region I for hazard mitigation and disaster recovery plans.

<sup>72</sup> ***Local governments, working with interested farmers could include eligible projects in their hazard mitigation plans in order to increase the likelihood of funding following a federally declared disaster.*** Other hazard mitigation grants, such as the Hazard Mitigation Assistance Program and Pre-Disaster Mitigation Program may also provide potential sources of funding.

**educational initiatives such as those proposed in partnership with Agricultural Extension and Agency of Natural Resources.**

**Codify the role of non-profits in agricultural recovery through the lessons learned following Tropical Storm Irene.** Agricultural-related losses are often difficult to recoup following disasters. Gaps in federal and state assistance are often addressed by non-profits and foundations that attempt to fill the void. In Vermont this was evidenced by the Community Foundation and the WaterWheel Foundation, which worked together to develop a comprehensive grant-making strategy.<sup>73</sup> Grant recipients included the Vermont Farm Disaster Relief Fund and the Vermont Farm Fund Emergency Loan Program to support farmers who were affected by the flood, the Vermont Irene Flood Relief Fund to support small businesses, the Special and Urgent Needs - Irene Recovery Fund to support nonprofit and public sector organizations, and the Vermont Foodbank. In order to capture these lessons and apply them in future events, this process could be codified in the proposed state disaster recovery plan.

**Partner with the Agricultural Extension Office and Extension Disaster Education Network (EDEN) to develop a farmer's self-assessment tool to evaluate vulnerability to floods, including steps that can be taken to mitigate the impacts of these events on individual farms and downstream neighbors such as farms, communities, and vulnerable infrastructure.**<sup>74</sup> The tool could assess the vulnerability of: 1) land, outbuildings, livestock, and crops; 2) providers and distributors on which farmers depend; and 3) downstream farms, communities, and infrastructure to the effects of flooding and fluvial erosion. The tool could also describe resources the farmer may draw on over time to include information on specific flood hazard risk reduction techniques, their costs, ease of installation, and possible benefits (e.g., amount of risk reduction provided by the technique). This information could be made available through on-line sources, written documents, and verbal communications with DEMHS, ANR, and agricultural extension agents. For instance, the storage of hay bales in the floodplain led to many of them being washed downstream and damaging structures located downriver, including historic wooded bridges that span many of Vermont's waterways. **One policy to consider involves working with farmers in the valleys to develop a strategy that guides where hay bales can be stored.** Emphasis could be placed on storing hay bales out of riverine floodways or the larger floodplain, if practicable. Given the effects of flood-generated debris on transportation infrastructure, VTrans could be involved in these discussions and the development of proposed policies and training programs.

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<sup>73</sup> More than \$1.25 million was raised and over \$1.21 million in grants had been distributed when this document was completed. Grants awarded from the fund have ranged from \$4,000 to \$150,000 and have supported over 50 organizations across the state, including family centers, Community Action Agencies, and regional long-term recovery groups.

<sup>74</sup> The Florida Cooperative Extension Service developed the document "Special Considerations for Agricultural Producers-Preparing for a Flood or Flash Flood." See <http://disaster.ifas.ufl.edu/PDFS/CHAP09/D09-07.pdf>. Though it does not specifically address agriculture, the Coastal Resilience Index ([http://research.fit.edu/sealevelriselibrary/documents/doc\\_mgr/434/Gulf\\_Coast\\_Coastal\\_Resilience\\_Index\\_-\\_SeaGrant.pdf](http://research.fit.edu/sealevelriselibrary/documents/doc_mgr/434/Gulf_Coast_Coastal_Resilience_Index_-_SeaGrant.pdf)) could help inform the creation of a farmer's self-assessment tool in Vermont.

***Expand the role of Vermont agriculture extension agents to include the hosting of training programs tied to creating more disaster resilient farms before the next disaster strikes.***<sup>75</sup> The creation of forms for use by farmers after Irene, assessing damages, and determining the needs of farmers by the University of Vermont's Extension Service was cited by the Secretary of Agriculture as an example of something done well. These positive post-disaster activities could be carried forward and institutionalized by developing additional proactive capacity-building measures, including a regularly scheduled series of training programs. This information could be incorporated into the Agency of Agriculture's best management practices regulations, thereby linking flood resilience and agricultural non-point source pollution. Specific educational initiatives could include alternatives to channel management, the use of wider vegetative buffers, and the adoption of cultivation choices that support flood storage. This has the potential to enable access to Natural Resource Conservation Service funding through cost sharing agreements as well as state financial assistance. The training programs, once developed, could be incorporated into the proposed state recovery plan.

***Develop and codify a mutual aid program between Vermont dairy farm co-ops and Agency of Agriculture, building on informal relationships.*** Post-disaster assistance, whether delivered after ice storms or floods has been largely an ad hoc process, implemented after a disaster strikes with little pre-event planning. Developing and codifying these informal relationships could be done in close coordination with co-op members and other relevant stakeholders in order to get their buy-in to the process. Care should be taken to not make the process too onerous and bureaucratic, emphasizing the power of these informal relationships. Duties may include coordinating delivery/distribution schedules, establishing road clearance procedures and assignments, and other activities as identified. State agencies such as VTTrans may provide support by mapping dairy farms and associated road networks (including the real-time identifications of routes closed due to snow or floodwaters).

## **Conclusions**

### **Made in Vermont: Building on Enduring Strengths**

Vermont is in the unique position of having in place public values and associated state policies that can be used to support disaster resilience and smart growth. The state possesses a strong land ethic and a rich history of participatory decision making. Tropical Storm Irene adds an important third dimension - an increased awareness of the state's vulnerability to floods and a greater understanding of how choices made by a number of stakeholders can lead to a disaster. These values, coupled with a greater awareness of flood hazard vulnerability provide an opportunity to build on a progressive floodplain management program and other state policies advancing greater resilience. Important challenges remain, including limits to stakeholder capacity, national policies that conflict with state and local needs and conditions, and a highly dynamic river system adjacent to established communities. Bridging existing strengths and identified challenges requires expanding the collaborative preconditions already

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<sup>75</sup> The Texas Extension Disaster Education Network provides information related to disaster mitigation and recovery. For more information, see <http://texashelp.tamu.edu>.

present while fostering new partnerships across a larger governance network dedicated to the complimentary aims of disaster resilience and smart growth.

We live in the age of climate change. There is increasing evidence that with this changing climate new weather patterns are emerging including those that will dramatically impact the State of Vermont. Tropical Storm Irene, and more recently Superstorm Sandy, provides powerful reminders of just how vulnerable Vermonters and other states in the region are to such events.

The people of Vermont have a number of important choices to make. The policy options presented here are intended to spur action among state agencies and the number of stakeholders that have a role to play in both pre-event planning and post-disaster actions that advance the complementary aims of smart growth and flood resilience.

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## Appendix: Policy Options and Best Practices

Below is a list of links cited in the Vermont State Agency Policy document. The links, which are listed in the order in which they appear in the document, are referenced to the topical area, best practice or policy to which they correspond.

<u>Topical Area, Policy Option or Best Practice</u>	<u>Page Number</u>
<p><b><i>"...adoption of a state-wide No Adverse Impact program."</i></b></p> <p><a href="http://www.floods.org/index.asp?menuID=460">http://www.floods.org/index.asp?menuID=460</a></p>	13
<p><b><i>"Ohio's model floodplain ordinance explicitly addresses No Adverse Impact..."</i></b></p> <p><a href="http://www.dnr.state.oh.us/Portals/7/floodpln/OFRC_8_2006.pdf">http://www.dnr.state.oh.us/Portals/7/floodpln/OFRC_8_2006.pdf</a></p>	13
<p><b><i>"Examples of regional disaster recovery initiatives..."</i></b></p> <p><a href="http://quake.abag.ca.gov/projects/resilience_initiative/">http://quake.abag.ca.gov/projects/resilience_initiative/</a></p>	13
<p><b><i>"...move forward with the implementation of an Irene-specific recovery strategy."</i></b></p> <p><a href="http://mississippirenewal.com/documents/Governors_Commission_Report.pdf">http://mississippirenewal.com/documents/Governors_Commission_Report.pdf</a></p> <p><a href="http://coastalhazardscenter.org/dev/wp-content/uploads/2012/05/State-Disaster-Recovery-Planning-Guide_2012.pdf">http://coastalhazardscenter.org/dev/wp-content/uploads/2012/05/State-Disaster-Recovery-Planning-Guide_2012.pdf</a></p>	14
<p><b><i>"...develop a comprehensive pre-event recovery plan in advance of the next disaster."</i></b></p> <p><a href="http://www.floridadisaster.org/documents/Recovery%20Plan%2011-2008.pdf">http://www.floridadisaster.org/documents/Recovery%20Plan%2011-2008.pdf</a></p>	15
<p><b><i>"...exercise the recovery plan over time."</i></b></p> <p><a href="http://www.state.il.us/iema/legal/pdf/29_301.pdf">http://www.state.il.us/iema/legal/pdf/29_301.pdf</a></p>	15
<p><b><i>"...advocate for changes in federal policy that supports the aims of Vermont to achieve the flood resiliency goals and policies described in this and other state documents."</i></b></p> <p><a href="http://www.brookings.edu/research/papers/2013/02/reform-federal-support-risky-development">http://www.brookings.edu/research/papers/2013/02/reform-federal-support-risky-development</a></p>	15
<p><b><i>"FEMA is in the process of completing local disaster recovery guidance."</i></b></p> <p><a href="http://coastalhazardscenter.org/dev/wp-content/uploads/2012/05/State-Disaster-Recovery-Planning-Guide_2012.pdf">http://coastalhazardscenter.org/dev/wp-content/uploads/2012/05/State-Disaster-Recovery-Planning-Guide_2012.pdf</a></p>	15
<p><b><i>"the State of Vermont could work with FEMA to develop a robust state pre-disaster recovery plan as well as begin to work with local governments to develop local pre-disaster recovery plans."</i></b></p> <p><a href="http://www.floridadisaster.org/Recovery/IndividualAssistance/pdredevelopmentplan/Index.htm">http://www.floridadisaster.org/Recovery/IndividualAssistance/pdredevelopmentplan/Index.htm</a></p>	15

**Topical Area, Policy Option or Best Practice**

**Page Number**

***“the State of Vermont, could further advocate for changes in federal policies that link disaster assistance and improved state and local efforts to advance disaster resilience.”*** 15-16

<http://www.brookings.edu/research/papers/2013/02/reform-federal-support-risky-development>

***“...conduct an audit of state programs, including the degree to which they directly or indirectly help or hinder the ability of the state to achieve Vermont’s Inter-Agency Long-Term Flood Resiliency Goals...”*** 16

<http://www.smartgrowthamerica.org/leadership-institute/implementation-tools/policy-audit-tool/>

[http://www.epa.gov/smartgrowth/iowa\\_texasst.htm](http://www.epa.gov/smartgrowth/iowa_texasst.htm)

***“Vermont could pursue a hybrid approach to increase capacity by selectively hiring additional state staff and maximizing the coordination of stakeholders across the larger Vermont Disaster Recovery Assistance Network.”*** 17

[http://www.mississippirenewal.com/documents/Governors\\_Commission\\_Report.pdf](http://www.mississippirenewal.com/documents/Governors_Commission_Report.pdf)

***“...develop a post-disaster personnel plan that identifies agency needs as well as those resources that can be provided by the larger assistance network, including federal and local officials, non-profits, quasi-governmental organizations, consulting firms, and those groups that emerge following disasters.”*** 17

<http://www.hillsboroughcounty.org/index.aspx?nid=1795>

***“Further, these personnel plans could emphasize the development of pre-event disaster reservist cadres like those employed by other states after disasters”*** 17

NC: [www.ncdps.gov](http://www.ncdps.gov)

FL: <http://www.floridadisaster.org/Recovery/documents/disasterreservistfieldoperationsmanual.pdf>

NJ: <http://www.state.nj.us/njoem/programs/njdrp.html>

WA: <http://mil.wa.gov/jobs/documents/PublicAssistanceReservist.pdf>

***“...develop pre-disaster contracting templates and scopes of work in advance of the next disaster, expanding on the needs and issues identified following Tropical Storm Irene.”*** 18

<http://www.sog.unc.edu/ncem>

<http://www.txdps.state.tx.us/dem/documents/debrisCntrctGuidance.pdf>

***“...consider the long-term staffing of a Flood Recovery Office and expanding its duties to include the development of a State Disaster Recovery Plan and the coordination of higher-level interagency policies.”*** 19

<http://lra.louisiana.gov/assets/docs/searchable/StrategicPlan0809.pdf>

**Topical Area, Policy Option or Best Practice**

**Page Number**

***“The Vermont Community Foundation could take the lead in working with other non-profits (including the Vermont Disaster Relief Fund), the Agency of Human Services, and local officials to develop guidance focused on assisting those in need while simultaneously advancing disaster resilience goals.”*** 19

<http://www.gnof.org/nonprofit>

***“...the state could work with Vermont Voluntary Organizations Active in Disaster (VOAD) to expand their coordinative role among non-profits and foundations to explore how they can play a greater role in achieving more flood resilient communities.”*** 20

[www.nvoad.org/](http://www.nvoad.org/)

<http://www.arvoad.org/NVOADLTRecovery.php>

***“The Agency of Commerce and Community Development (ACCD), working with its partners, could strengthen, expand, and codify the roles of the economic development network in Vermont to include disaster resilience as part of all smart growth initiatives.”*** 20

[http://www.fema.gov/pdf/rebuild/ltrc/2011\\_report.pdf](http://www.fema.gov/pdf/rebuild/ltrc/2011_report.pdf)

***“...model bylaws could better address resilient reconstruction standards...”*** 21-22

<http://www.dca.ga.gov/development/constructioncodes/programs/DRBCWorkshop.asp>

***“Incorporate flood resilience data layers into pre-existing decision making tools.”*** 22

<http://www.ncihrm.com>

***“Pursue federal protection under the National Scenic and Wild Rivers Act for river systems.”*** 23

<http://www.vtwsr.org>

***“Develop an information exchange program through existing and emerging venues where appropriate.”*** 24

<http://www.nfrmp.us/state/about.cfm>

***“Incorporate river science into elementary, middle school, high school, and college curricula.”*** 26

<http://projectwet.org>

Topical Area, Policy Option or Best Practice

Page Number

**“Use the Hazard Mitigation Grant Program’s (HMGP) 5 and 7% initiatives to expand funding for communities to develop river corridor plans and develop strategies that recognize the natural dynamism of Vermont’s rivers.” (centralized hazard mitigation/smart growth/disaster resilience funding list)** 27-28

<http://www.dem.azdema.gov/operations/docs/mitplan/chapter6.5.pdf>

[http://www.floods.org/ace-files/documentlibrary/Best\\_Practices/Patchwork\\_Quilt\\_USACE-HUD-FEMA-NHMA-7-11.pdf](http://www.floods.org/ace-files/documentlibrary/Best_Practices/Patchwork_Quilt_USACE-HUD-FEMA-NHMA-7-11.pdf)

***“ANR, the Vermont Environmental Board, and the District Environmental Commissions could encourage communities to consider using geomorphological, and River Corridor (fluvial erosion) Maps in addition to Flood Insurance Rate Maps to review developments under Act 250.”*** 28

<http://www.wsspc.org/policy/California.shtml>

**Business resilience training programs (Managing your Business to Minimize Disruption: A Guide for Small Businesses in North Carolina)** 30

<http://www.acctts.com/Trust-Factors/SmallBusinessBrochure.pdf>

***“Develop a pre-event cadre of case managers, working in partnership with regional development corporations, small business development centers, Vermont VOAD, professional associations, and Vermont colleges and universities (including schools of social work, law schools, and business schools) that are trained in post-disaster assistance programs, including those addressing human services and businesses*** 30

[www.sbtcd.org](http://www.sbtcd.org)

**“Conversations with VTrans officials highlighted a number of existing programs that have the potential to help increase flood resilience. These include coordination with regional planning commissions about land use and the development of flexible design solutions, including context sensitive design”** 31

[http://smartgrowthamerica.org/documents/vtrans-working-paper-4\\_5-2013.pdf](http://smartgrowthamerica.org/documents/vtrans-working-paper-4_5-2013.pdf)

**“Establish hazard mitigation and flood resiliency budget priorities based on natural hazard risk and other parameters.”** 31

[http://transweb.sjsu.edu/MTIportal/research/publications/documents/COOP%20COG%20I\\_Vince\\_022410.pdf](http://transweb.sjsu.edu/MTIportal/research/publications/documents/COOP%20COG%20I_Vince_022410.pdf)

**Topical Area, Policy Option or Best Practice**

**Page Number**

***“VTrans could review how it designs its roadways and structures, as well as its maintenance practices, to ensure those designs account for flood hazard vulnerability...” This approach may also work to increase system resiliency by recognizing the interdependencies of infrastructure and the role of redundant systems. Additional features of infrastructure resilience include robustness (inherent strength/resistance), resourcefulness (capacity to mobilize needed resources), and rapidity (speed with which disruptions can be overcome and services restored.***

[http://mceer.buffalo.edu/research/resilience/resilience\\_10-24-06.pdf](http://mceer.buffalo.edu/research/resilience/resilience_10-24-06.pdf)

***“Conduct and maintain an inventory system of state and municipal bridges and culverts.”*** 32

NY: <https://www.dot.ny.gov/divisions/operating/oom/transportation-maintenance/repository/CulvertInventoryInspectionManual.pdf>

Ohio:

[ftp://ftp.dot.state.oh.us/pub/Districts/D12/Production/Consultant\\_Programmatic/87470/CFN%20283221959/Inspection%20Report/283221959Inventory.pdf](ftp://ftp.dot.state.oh.us/pub/Districts/D12/Production/Consultant_Programmatic/87470/CFN%20283221959/Inspection%20Report/283221959Inventory.pdf)

***“Strengthen and clarify riverine debris removal policies.”*** 34-35

<http://www.floridadisaster.org/Recovery/EDS/debris/debris.html>

[www.deconstructioninstitute.com](http://www.deconstructioninstitute.com)

***“The Division of Emergency Management and Homeland Security, in partnership with ANR, ACCD, VTrans, and Regional Planning Commissions could host state-wide hazard mitigation workshops, emphasizing the linkage between smart growth and disaster resilience.”*** 35

[http://www.epa.gov/smartgrowth/iowa\\_techasst.htm](http://www.epa.gov/smartgrowth/iowa_techasst.htm)

[http://emergencymanagement.wi.gov/mitigation/Mitigation\\_Workshop/toc.asp](http://emergencymanagement.wi.gov/mitigation/Mitigation_Workshop/toc.asp)

***“Strengthen and better operationalize state and local hazard mitigation plans.”*** 36

State of California’s Community Planning and Hazard Mitigation Guidebook:

[www.calema.ca.gov/hazardmitigation/](http://www.calema.ca.gov/hazardmitigation/)

Local Hazard Mitigation Planning Program:

[http://hazardmitigation.calema.ca.gov/plan/local\\_hazard\\_mitigation\\_plan\\_lhmp](http://hazardmitigation.calema.ca.gov/plan/local_hazard_mitigation_plan_lhmp)

***“Take advantage of the post-Irene window of opportunity to advance tangible hazard mitigation projects that span multiple stakeholder interests.”*** 36

[http://www.vaemergency.gov/webfm\\_send/513/COVEOP\\_2012\\_ESF\\_14\\_Recovery\\_&\\_Mitigation.pdf](http://www.vaemergency.gov/webfm_send/513/COVEOP_2012_ESF_14_Recovery_&_Mitigation.pdf)

**Topical Area, Policy Option or Best Practice**

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***“Work with FEMA and VTrans to develop improved Public Assistance guidance and protocols that can be used in the next event.”*** 37

<http://www.fema.gov/mitigationbp/brief.do?mitsslId=7129>

***“Work with FEMA and local governments to develop more realistic pre-and post-disaster local recovery plans that are implementable and reflect local conditions and capabilities.”*** 38

<http://csc.uoregon.edu/opdr/sites/csc.uoregon.edu.opdr/files/Coos%20Recovery%20Framework.pdf>

***“Partner with the Agricultural Extension Office and Extension Disaster Education Network (EDEN) to develop a farmer’s self-assessment tool to evaluate vulnerability to floods, including steps that can be taken to mitigate the impacts of these events on both individual farms as well as downstream neighbors, such as farms, communities, and vulnerable infrastructure.”*** 39

<http://disaster.ifas.ufl.edu/PDFS/CHAP09/D09-07.pdf>.

[http://research.fit.edu/sealevelriselibrary/documents/doc\\_mgr/434/Gulf\\_Coast\\_Coastal\\_Resilience\\_Ind ex\\_-\\_SeaGrant.pdf](http://research.fit.edu/sealevelriselibrary/documents/doc_mgr/434/Gulf_Coast_Coastal_Resilience_Ind ex_-_SeaGrant.pdf)

***“Expand the role of Vermont agriculture extension agents to include the hosting of training programs tied to creating more disaster resilient farms before the next disaster strikes.”*** 40

<http://texashelp.tamu.edu>