



**GLISA**  
A NOAA CAP TEAM

Supporting Local Flood Resilience:  
Next Steps for Great Lakes States

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## About GLISA

GLISA is the Great Lakes Climate Adaptation Partnerships (CAP) team, supported by the National Oceanic and Atmospheric Administration (NOAA) Climate Program Office. The NOAA CAP program is an applied research and engagement program that expands society's regional capacity to adapt to climate impacts in the U.S. The CAP program supports sustained, collaborative relationships that help communities build lasting and equitable climate resilience. In the Great Lakes, GLISA works at the boundary between climate science and decision making, striving to enhance Great Lakes communities' capacity to understand, plan for, and respond to climate impacts now and in the future. Since 2010, GLISA's team of physical and social scientists has served all eight U.S. states that border the Great Lakes and the province of Ontario, Canada. GLISA is housed at the University of Michigan School for Environment and Sustainability, with partners including Michigan State University, The College of Menominee Nation and the University of Wisconsin in Madison.

## Acronyms

<b>BIL</b> – Bipartisan Infrastructure Law	<b>GLRI</b> – Great Lakes Restoration Initiative
<b>BRIC</b> – Building Resilient Infrastructure and Communities	<b>GSI</b> – Green Stormwater Infrastructure
<b>CAP</b> – Climate Adaptation Partnership	<b>HMP</b> – Hazard Mitigation Plan
<b>CRR</b> – Community Risk and Resiliency Act (New York)	<b>IDNR</b> – Indiana Department of Natural Resources
<b>CWSRF</b> – Clean Water State Revolving Fund	<b>INFIP</b> – Indiana Floodplain Information Portal
<b>DCNR</b> – Department of Conservation and Natural Resources	<b>IRA</b> – Inflation Reduction Act
<b>DEC</b> – Department of Environmental Conservation	<b>LTAP</b> – Local Technical Assistance Program
<b>DEP</b> – Department of Environmental Protection	<b>MDARD</b> – Michigan Department of Agriculture and Rural Development
<b>DHS</b> – Department of Health Services	<b>MN DNR</b> – Minnesota Department of Natural Resources
<b>DNR</b> – Department of Natural Resources	<b>NOAA</b> – National Oceanic and Atmospheric Administration
<b>DOT</b> – Department of Transportation	<b>NOI</b> – Notice of Interest
<b>EIA</b> – Environmental Impact Assessment	<b>NPDES</b> – National Pollutant Discharge Elimination System
<b>EGLE</b> – Michigan Department of Environment, Great Lakes, and Energy	<b>ORA</b> – Office of Regulatory Assistance
<b>EJ</b> – Environmental Justice	<b>PDM</b> – Pre-Disaster Mitigation
<b>EMA</b> – Emergency Management Agency	<b>PEMA</b> – Pennsylvania Emergency Management Agency
<b>EPA</b> – Environmental Protection Agency	<b>PROTECT</b> – Promoting Resilient Operations for Transformative Efficient, and Cost-Saving Transportation
<b>ERM</b> – Environmental Resources Management	<b>RLF</b> – Revolving Loan Fund
<b>FARA</b> – Floodplain Analysis and Regulatory Assessment	<b>SHMP</b> – State Hazard Mitigation Plan
<b>FEMA</b> – Federal Emergency Management Agency	<b>STORM</b> – Safeguarding Tomorrow through Ongoing Risk Mitigation
<b>FMA</b> – Flood Mitigation Assistance	<b>WNRPC</b> – Wisconsin Natural Resources Planning Council
<b>GLEJGPs</b> – Great Lakes Environmental Justice Grant Programs	
<b>GLLC</b> – Great Lakes-St. Lawrence Legislative Caucus	

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# Introduction

Recent flood events in the Great Lakes region have had devastating impacts on local communities, including the destruction of property and economic impacts from infrastructure failures, loss of life and threats to public safety and health.<sup>1-7</sup> These events highlight the importance of increasing local resilience to flooding. Flooding challenges are likely to increase due to climate change. Researchers at GLISA, the region’s Climate Adaptation Partnership funded by the National Oceanic and Atmospheric Administration (NOAA), project increases in precipitation in all Great Lakes states.<sup>8</sup> Already, heavy rainfall events have contributed to dam failures and other catastrophic flooding outcomes.<sup>9,10</sup> Local governments often have insufficient resources and expertise for tackling flooding challenges on their own, and are looking to their state governments for guidance and support.

Previous research scored Great Lakes states on to the extent to which they had implemented “innovative” flood resilience practices, beyond standard practices.<sup>11</sup> This work organized the flood resilience state policy “Best Practices” into four categories: Funding and Financing, Regulations and Standards, Planning Guidance, and Information – highlighting where states emphasized equity criteria in implementing these practices.

In this report, we build on these assessments by creating actionable targets for states seeking to further support local flood resilience. The report includes general “how-to” guidance and suggested next steps tailored to each Great Lakes state’s context. The rest of this report: 1) Provides a checklist of best practices, targets, examples and resources for states seeking to support local flood resilience; 2) Describes the landscape of current federal funding opportunities; and 3) Suggests opportunities

for cross-state collaboration and learning on local flood resilience. Appendix A details next steps for each state, and Appendix B documents the methods we used to adapt Hughes et al.’s work.

## Best Practices, Targets, and Examples for Great Lakes States

To assist states’ efforts to improve support for local flood resilience and provide additional guidance and resources, we developed a simple check-list of steps states could take under each category; targets states could aim to achieve with these policies and programs; and examples of states that offer models for others to follow, with links to further information and other resources. States can find unique opportunities to support flood resilience and center equity in these efforts and our checklist provides a guide for getting started.

**Table 1. How-to Checklist of Best Practices, Targets, and Examples**

Information		
Best Practice	Target	Examples
<i>Provide or Support Local Vulnerability Assessments</i>	Establish a formal statewide program for providing local governments with assessment tools and guidance for conducting flood vulnerability assessments that incorporate social vulnerability measures.	<ul style="list-style-type: none"> <li>• <a href="#">New York State’s Resilient NY program</a> allocated funding and commissioned flood resilience studies of 48 high-priority flood-prone watersheds. These studies incorporate climate change forecasts and provide recommendations based on assessment of costs and benefits.<sup>12</sup></li> <li>• <a href="#">Minnesota’s Vulnerable Population Assessments Reports</a> include a Population Vulnerability Assessment and a Climate Adaptation Framework for 23 Minnesota communities across the state. These reports focus on populations most vulnerable to climate change impacts and provide a menu of adaptation strategies tailored to the target communities.<sup>13</sup></li> </ul>
<i>Provide Adaptation Case Studies</i>	Provide tangible and tailored case studies of flood risk mitigation efforts that include attention to vulnerable populations and demonstrate how equity was prioritized.	<ul style="list-style-type: none"> <li>• <a href="#">New York’s Hudson River Estuary Program Case Studies</a> document how several state-funded task forces supported flood resiliency in the Hudson River Estuary. The webpage provides examples of each task force’s aims, tools, and progress.<sup>14</sup></li> <li>• <a href="#">Wisconsin’s Mitigation Success Stories</a> provide examples of how communities leveraged state and federal funding to recover from flooding events and mitigate future flooding losses. The story map approach makes these highly accessible examples and full reports are available in the interactive map at the bottom of the page.<sup>15</sup></li> </ul> <p>Neither example fully embodies this best practice, however, as both could improve their attention to impacts on vulnerable populations and clear examples of how flood mitigation efforts prioritize those populations.</p>

Information		
Best Practice	Target	Examples
<p><i>Provide Climate Change-Informed Flood Risk Data &amp; Maps</i></p>	<p>Provide climate change-informed risk data and/or maps of localized flood risk that depict overlapping social vulnerability and equity concerns.</p>	<ul style="list-style-type: none"> <li>• <a href="#">Minnesota's Climate and Health Vulnerability Assessment</a>, funded by the Minnesota Department of Health, allows users to compare social vulnerability indicators with some measures of flood risk including past flooding and precipitation events and future precipitation projections. These maps can feed into more granular analysis of particular locations.<sup>74</sup></li> <li>• <a href="#">Minnesota's Climate Explorer</a> is a spatial analysis tool that includes historical and projected climate data, which users can plot by geographic unit (e.g., watersheds, counties, climate divisions) and area.<sup>16</sup></li> <li>• <a href="#">Neighborhoods at Risk</a> is a free private-sector tool funded through a number of charitable and federal sources that overlays indicators of social vulnerability with flood risk measures.<sup>17</sup> It provides similar, if not more, detail to Minnesota's Climate and Health Vulnerability Assessment, with several features that make it more user-friendly like downloadable reports and map layers.</li> </ul> <p>While none of these tools can replace localized flooding models that account for municipal-level infrastructure and adaptations, these tools can support communities for whom modeling flood risk at a local level is cost-prohibitive.</p>

Planning Guidance		
Best Practice	Target	Examples
<i>Develop State Adaptation Plan</i>	Develop a statewide resilience or adaptation plan that includes flood mitigation and resilience and is based on a vulnerability assessment, discusses climate change, and clearly prioritizes equity; State Hazard Mitigation Plan addresses the implications of climate change, especially for disadvantaged communities.	<ul style="list-style-type: none"> <li>• Pennsylvania’s Department of Environmental Protection has conducted several <a href="#">Climate Impacts Assessments</a> since 2015 with the latest published in 2021, and created Climate Action Plans since 2008 with the latest published in 2021.<sup>18,19</sup> Other state agencies have followed suit in creating their own <a href="#">Climate Action Plans</a>. The 2021 Climate Impact Assessment includes several key elements that should be included in state adaptation plans, for example county-level climate projections and discussions of environmental justice implications for inland flooding, sea-level rise and severe storms. The 2021 Climate Action Plan discusses the impacts of flooding on ‘overburdened and vulnerable populations’. The 2023 <a href="#">State Hazard Mitigation Plan</a> (SHMP) also discusses the implications of climate change on flooding hazards and includes action items focused on including underserved and disadvantaged communities as identified with the federal Climate and Environmental Justice Screening tool.<sup>20</sup></li> <li>• <a href="#">Minnesota’s SHMP</a> integrates equity considerations into climate change adaptation and mitigation approaches and investments. The SHMP web page includes an Equity and Mitigation Planning Dashboard that includes county-level data on social vulnerability, to inform decision-making around climate change mitigation planning.<sup>21,22</sup></li> <li>• <a href="#">Minnesota’s Climate Action Framework</a> – developed by the Climate Change Sub-Cabinet with input from the Governor’s Advisory Council on Climate Change, public participation and collaboration from disadvantaged communities – uses an equity lens to guide policy solutions to reduce and manage flooding, including for immediate actions toward achieving long-term goals. Each goal in the framework includes equity considerations and opportunities for addressing them.<sup>23</sup></li> </ul>



Planning Guidance		
Best Practice	Target	Examples
<i>Establish State Resilience Office(r)</i>	Create a position or unit that focuses explicitly on climate change adaptation (including flood risk mitigation), and builds a focus on equity into the governance structure (including make-up and mission).	<ul style="list-style-type: none"> <li>• Pennsylvania’s <a href="#">Climate Change Advisory Committee</a> is legislatively mandated, set up to guide the actions of the Pennsylvania Department of Environmental Protection and support the creation of the similarly legislatively mandated Climate Impact Assessments and Action Plans.<sup>24</sup> While the by-laws do not specify a focus on adaptation in addition to mitigation, the reports guided by the committee have a clear focus on adaptation recommendations. The Pennsylvania Department of Conservation and Natural Resources (DCNR) also has a <a href="#">Director for Applied Climate Science</a>, added in 2019, who directs the DCNR’s climate adaptation and mitigation plan and sits on the Climate Change Advisory Committee.<sup>24,25</sup></li> <li>• Minnesota’s <a href="#">Climate Change Subcabinet</a> and its <a href="#">Governor’s Advisory Council</a>, which succeeded the Interagency Climate Adaptation Team, support the implementation of legislated climate change mitigation goals.<sup>26</sup> The Governor’s Executive Order establishing the Subcabinet and Advisory Council explicitly charges them with promoting equity and addressing disparities and disproportionate impacts from climate change.<sup>27</sup> The subcabinet includes an ‘action team’ devoted directly to resiliency and adaptation.</li> </ul>
<i>Proactively Support or Initiate Local Flood Planning</i>	Facilitate and incentivize flood mitigation planning by engaging communities and local leaders in programs, workshops, or events, each of which contain formal mechanisms for ensuring accessibility for disadvantaged communities.	<ul style="list-style-type: none"> <li>• New York’s <a href="#">Climate Smart Communities</a> certification program incentivizes local governments to mitigate and adapt to climate change.<sup>28</sup> The state scores Climate Smart Communities higher for certain grant programs and <a href="#">provides free technical assistance</a> and training to local governments.<sup>29</sup> Actions include enacting freeboard policies, encouraging green infrastructure and nature-based shorelines, completing vulnerability assessments, adopting local climate adaptation and flood mitigation plans among other flooding-related adaptations. New York State also provides templates for completing these actions as well as <a href="#">draft ordinances</a> communities can adopt to improve climate resilience.<sup>30</sup> The <a href="#">Planning Evaluation Tool</a> also provides prompting questions for how to include vulnerable populations.<sup>31</sup></li> </ul>

Regulations and Standards		
Best Practice	Target	Examples
<i>Establish Resilience Requirements for Communities</i>	Require local governments to incorporate flood risk, social vulnerability assessments and stakeholder engagement into the flood mitigation planning processes and relevant ordinances (e.g. building codes and zoning).	<ul style="list-style-type: none"> <li>The 1978 <a href="#">Pennsylvania Storm Water Management Act</a> (Act 167) aims to control runoff by requiring each county to adopt, and revise every 5 years, a watershed-based stormwater management plan, and implement ordinances to be in compliance with their plans. The Pennsylvania Department of Environmental Protection funds 75% of costs to implement those ordinances.<sup>32</sup></li> <li><a href="#">New York's Community Risk and Resiliency Act (CRRA) of 2014</a> requires climate risks be part of the planning, permitting and funding process across the state. In order to access certain state funding, communities have to meet CRRA requirements for incorporating climate change into planning.<sup>33</sup> The state also has a <a href="#">State Smart Growth Public Infrastructure Policy Act</a> which requires demonstrated consideration of future Sea-level rise and flood risk mitigation when an agency funds or otherwise supports a public infrastructure project.<sup>34</sup></li> </ul>
<i>Enable Local Stormwater Fees</i>	Pass statutes or write administrative code that explicitly authorize local governments to levy stormwater fees that are structured to reflect service demand and reduce burdens on low-income residents.	<ul style="list-style-type: none"> <li>All Great Lakes states have at least one stormwater utility as of 2021 and Minnesota has the most stormwater utilities of any state in the nation. Five of the eight Great Lakes states (MN, OH, WI, IN, PA) have legislation that explicitly permits local governments to levy fees.<sup>35</sup> Without this legislation, local governments in other states have struggled to enact ordinances enabling local stormwater fees.<sup>36</sup> Examples of legislation can be found in <a href="#">Ohio State Code Section 6119.58</a>, and <a href="#">Indiana State Code Sections 8-1.5-5-7</a>.<sup>37,38</sup></li> </ul> <p>To further consider equity, states can include language enabling local governments to consider ability-to-pay in developing rate structures, and guidance on community education and outreach.</p>

Regulations and Standards		
Best Practice	Target	Examples
<i>Establish Preference for Green Infrastructure Under NPDES Permitting</i>	Publish NPDES guidance that explicitly defines green infrastructure as the highest preference and best management practice; Consider co-benefits of green infrastructure investments (GSI) to vulnerable populations in approving permits; Require education and outreach on green infrastructure that discusses co-benefits of GSIs to vulnerable populations.	<ul style="list-style-type: none"> <li>Illinois identified green infrastructure as a best management practice, requires public education about green infrastructure under its NPDES permitting program, and requires applicants to justify selecting less-preferred management practices.<sup>36</sup></li> </ul> <p>To further consider equity, Illinois and other states can require applicants to analyze impacts to vulnerable populations and discuss co-benefits of GSIs in public education.</p> <ul style="list-style-type: none"> <li>Wisconsin Sea Grant’s <a href="#">“Tackling Barriers to Green Infrastructure: Local Codes and Ordinances”</a> report provides examples of public outreach and education strategies, which could inform development of criteria for green infrastructure awards.<sup>39</sup></li> </ul>
<i>Establish Preference for Green Infrastructure in CWSRF Awards</i>	Pass legislation to authorize the use of CWSRF for GSI; Set green infrastructure goals in Intended Use Plans; Prioritize green infrastructure in project application ranking criteria; Build equity into project ranking criteria for GSI. <sup>1</sup>	<ul style="list-style-type: none"> <li>In 2014, Illinois passed legislation and <a href="#">allows the criteria for loans to encourage green infrastructure</a>.<sup>40</sup> The state has since <a href="#">adopted a scoring system</a> that prioritizes and <a href="#">provides more favorable interest rates to projects</a> that contain green infrastructure, as well as serving communities with low median household income, high unemployment, and where the user fees will be a higher percentage of the community’s median household income.<sup>41,42</sup></li> </ul>

<sup>1</sup>This could include prioritizing GSIs that consider social vulnerability in project design, using equity-relevant criteria in contractor selection, and/or building partnerships with community-based organizations; providing grants rather than loans to disadvantaged/economic hardship communities and/or offering principal forgiveness.

Funding and Financing		
Best Practice	Target	Examples
<p><i>Establish a Well-Resourced Community Grant/Loan Program for Flood Resilience Projects</i></p>	<p>Ensure flood resilience-related grant/loan programs are adequately funded; Disburse a meaningful percentage of project funding to disadvantaged communities; Prioritize grant/loan applications that address social vulnerability and equity concerns.<sup>43,44</sup></p>	<ul style="list-style-type: none"> <li>Minnesota created a <a href="#">Flood Hazard Mitigation Grant Assistance Program in 1987</a>.<sup>45</sup> The <a href="#">fund provides cost-share funding</a> which enables local governments to access larger amounts of federal funding than they otherwise would.<sup>46</sup> The program also funds some flood mitigation projects directly. The <a href="#">Department of Natural Resources' report of allocations to the fund each year</a> show that in 2023 over \$61 million was awarded to local governments for a variety of flood mitigation and resilience projects which amounts to over \$10/per resident for flood resilience from this fund alone.<sup>47</sup> <a href="#">The fund includes a range of criteria</a> for prioritizing projects including the financial capability of local governments, as well as economic, social and environmental benefits including improving environmental equity.<sup>48</sup></li> <li><a href="#">Minnesota's Clean Water Fund</a> allocates 33% of sales tax revenue to water management protection, restoration, and monitoring activities, towards fulfilling the goals of the Clean Water, Land and Legacy Act, passed by voters in 2008. Funds are appropriated to seven state agencies involved in water management, in partnership with local governments, by the Legislature and Governor on the advice of the Clean Water Council, which includes representatives from multiple state agencies.<sup>43,44</sup></li> </ul>

Funding and Financing		
Best Practice	Target	Examples
<p><i>Leverage Available Federal Funding</i></p>	<p>Leverage available federal funding for flood mitigation and resilience, such as long-standing federal hazard mitigation funding programs as well as more recent programs disbursing Bipartisan Infrastructure Law (BIL) or Inflation Reduction Act (IRA) funding, and prioritize disadvantaged communities in distribution of these funds.</p>	<ul style="list-style-type: none"> <li>Two Great Lakes states, Michigan and New York, received BIL money through FEMA's STORM program in FY 2023 and FY 2024.<sup>49,50</sup> The application requires states to submit a list of proposed projects from local governments and tribal authorities and continually update this list with the actual projects funded in Intended Use Plans. The STORM program is funded through fiscal year 2026 and requires a 10% non-federal match; however, the loans from this program can be “used for non-federal cost sharing for other Hazard Mitigation Assistance grant programs” which enables local governments to leverage multiple federal sources at once. Because the program application incentivizes states to submit project lists that prioritize disadvantaged communities and requires local entities to have FEMA-approved Hazard Mitigation Plans, states can improve the likelihood of award through by proactively supporting disadvantaged communities in developing approved plans. States can also leverage these funds by providing assistance to communities in crafting projects that also leverage other Hazard Mitigation Assistance.<sup>51</sup></li> <li>All Great Lakes states have received BIL funding for their CWSRFs for fiscal years 2022 and 2023.<sup>52</sup> <ul style="list-style-type: none"> <li>Minnesota and Ohio lead the pack in using BIL and IRA funds as disbursed through the EPA to address flooding concerns directly at \$8.4 million (\$1.46/capita) and \$7.4 million (\$0.63/capita) respectively; New York and Michigan are spending the most BIL/IRA money on green infrastructure investments explicitly at \$4.5 million (\$0.23/capita) and \$3.3 million (\$0.33/capita) respectively.<sup>53</sup></li> <li>Wisconsin, Pennsylvania and New York all have individual projects funded by EPA-disbursed BIL/IRA money that address flooding through green infrastructure in ways that account for environmental justice concerns.<sup>53</sup></li> </ul> </li> <li>In the 2022-2023 funding cycle, Great Lakes states received \$224 million of the \$830 million Discretionary Grants available through the DOT's PROTECT program. Most of the fifteen Great Lakes projects addressed flooding impacts to infrastructure.<sup>54</sup></li> </ul>

Funding and Financing		
Best Practice	Target	Examples
<i>Further Utilize CWSRF Resources</i>	Further capitalize the state's CWSRF; Prioritize state water infrastructure grant funding to local governments beyond the CWSRF; Allocate a significant portion of assistance to economic hardship communities.	<ul style="list-style-type: none"> <li>Michigan is the only Great Lakes state that has contributed to its CWSRF in excess of the match funding in the last 8 years. It did so in 2018, 2019 and 2020.<sup>55</sup></li> <li>In an analysis of CWSRF data from 2016-2020, Minnesota, New York, Wisconsin and Michigan disbursed over 95% of CWSRF funding as grants rather than loans. Over the same time period, Wisconsin, Minnesota, Indiana and Pennsylvania all distributed more than 25% of CWSRF funding to economic hardship communities.<sup>11</sup></li> <li>Pennsylvania, Michigan and Minnesota leveraged CWSRF resources to fund green infrastructure investments at higher rates than other states with 12%, 6% and 4% of CWSRF funding spent on GSIs for stormwater management respectively.<sup>56</sup></li> </ul>

## Tailoring Next Steps for Great Lakes States

Based on the general checklist, we developed tailored “Next Steps” for each Great Lakes state (Appendix A). Each state’s Next Steps section begins with recent progress on support for local flood resilience, highlighting relevant updates in order to give context for those areas of opportunity selected for suggested next steps. These updates are not meant to comprehensively describe a state’s approach to flooding, but rather are selections of relevant progress related to the best practices.

The “Next Steps” table in each of these sections includes actions that may be relevant for state legislators and agency staff. Some actions may be easily incorporated into existing programs without significant legislative action whereas others may require the introduction of or support for major legislative changes.



# Financing Local Flood Resilience

Based on the general checklist, we developed tailored One of the most pressing challenges for states and local governments is finding the financial resources to support local flood resilience, including advancing the actions we recommend. Several of the targets we propose explicitly and implicitly require states to allocate additional funds for local flood resilience projects, adjust funding prioritization processes to allow flood resilience projects to better serve disadvantaged communities, or enable communities to levy fees to fund stormwater management. Another target calls for states to leverage federal funding opportunities on behalf of local governments.

Large waves of federal funding, mostly appropriated through the Bipartisan Infrastructure Law (BIL) and the Inflation Reduction Act (IRA), have become available in the last several years and are distributed through a number of federal agencies, which publish yearly funding notices to which state governments can apply (Table 2).



*Image: Waves on the breakwalls at Point Betsie Lighthouse.*

**Table 2. Federal Financing for Local Flood Resilience**

Agency	Program	Description
FEMA	Pre-Disaster Mitigation (PDM)	Formerly part of the suite of FEMA hazard mitigation programs, PDM was revived in 2022 as a Congressional Direct Spending initiative administered by FEMA, to which local governments apply through congressional representatives. Congress chooses individual projects for funding through a Joint Explanatory Statement in each year’s Consolidated Appropriations Act, at which point FEMA implements these funding decisions through a more detailed application and implementation process. <sup>57</sup>
	Building Resilient Infrastructure and Communities (BRIC)*	Replaced the original PDM program in 2020. Like the original PDM program, BRIC provides funding towards preventative projects in areas susceptible to disasters with a focus on capacity building projects, mitigation projects and management costs. <sup>58</sup> States, territories and federally recognized tribal governments submit applications which include local government entities as suplicants. Funding for the program also comes from the BIL. <sup>59</sup>
	Flood Mitigation Assistance (FMA)*	Falls under the umbrella of FEMA’s Hazard Mitigation Assistance program. The FMA funds states, U.S. territories, federally recognized Tribal governments, and local governments as sub applicants, with the aim of reducing or eliminating “repetitive flood damage to buildings insured under the National Flood Insurance Program (NFIP), and within NFIP-participating communities.” <sup>60</sup>
	Safeguarding Tomorrow Revolving Loan Fund (RLF)	Authorized by the Safeguarding Tomorrow through Ongoing Risk Mitigation Act (STORM Act), the program allows FEMA to give capitalization grants for revolving funds using money appropriated through BIL. The program is funded through fiscal year 2026. <sup>61</sup>

\* Programs covered under the Justice40 initiative.<sup>67</sup>



Agency	Program	Description
EPA**	Clean Water State Revolving Fund (CWSRF) Program*	The CWSRF program has been channeling federal funding to states for over 36 years. States then provide low-cost loans or grants to local governments for clean water projects. Projects focus on improving water quality through wastewater treatment, nonpoint source pollution control, stormwater runoff mitigation and water reuse programs. Flood mitigation can be a co-benefit of many of these projects, especially those that include green infrastructure or aim to control stormwater. The BIL provided supplemental funding to the CWSRF program which enabled states to provide additional funding to local governments. <sup>62</sup>
	Great Lakes Restoration Initiative (GLRI) <sup>63</sup> including the Great Lakes Environmental Justice Grant Programs (GLEJGPs) <sup>64</sup>	The GLRI has channeled federal funds toward the restoration of Great Lakes ecosystems for several decades. One billion dollars of BIL funding was set aside for GLRI use between FY 2020 and 2026 and some of that funding will be channeled through the GLEJGPs programs which focus on managing stormwater runoff and improving water quality in disadvantaged communities. <sup>65</sup>
DOT	Promoting Resilient Operations for Transformative Efficient, and Cost-Saving Transportation (PROTECT) Discretionary Grants*	Channels BIL funding for climate adaptation and natural disaster mitigation projects through competitive funding awarded to states, local governments or tribes, local or regional planning organizations, special purpose districts or multi-jurisdictional groups. <sup>66</sup>

\*\* There are many other specifically named programs on the EPA’s website tracking BIL and IRA disbursements. Here we highlight a few of the major programs.

In revolving loan programs (CWSRF and Safeguarding Tomorrow SRF) and programs where the state is the applicant (BRIC, FMA), the state’s role in leveraging federal funding for local flood resilience is clear. States are explicitly responsible for soliciting and supporting local projects and can incorporate best practices through focusing on equity and green infrastructure. In programs that solicit applications directly from local governments (PDM CRS, GLRI/GLEJGPs, and PROTECT Discretionary Grants), funded projects tend to be ‘shovel-ready’, with background work including assessment of local needs, design solutions, and arrangement for matching funds and loan repayment mechanisms already completed. However,

this preparation work can be challenging for capacity-limited local governments. States can play a critical role in supporting local governments in accessing these funds by providing funding for the cost-share portion of the project funding or providing technical assistance in project design and notifying local governments of this funding avenue.

The EPA’s CWSRF, FEMA’s BRIC and FMA programs, and DOT’s PROTECT program, among other funding sources for flood resilience efforts, are all covered by the Justice40 Initiative, established by President Biden via Executive Order in 2021.<sup>67</sup> The Justice40

Initiative directs 40% of federal investments in clean energy and energy efficiency, clean transit, affordable and sustainable housing, training and workforce development, the remediation and reduction of legacy pollution, and the development of clean water infrastructure toward disadvantaged communities. States seeking to take advantage of federal funds need to proactively consider how their uses of the funds will align with Justice40 guidance and requirements.

We acknowledge that states may not be able to rely on continued authorization of these or similar federal programs. State and local governments may need to experiment with flood resilience financing mechanisms

beyond those we recommend in the “Next Steps” sections. In addition to stormwater management fees, dedicated tax districts authorized to issue environmental impact bonds may be another source of local funding that can serve as loan repayment mechanisms or fulfill federal and state match requirements on grants. The Great Lakes Impact Investing Platform highlights several key examples of these mechanisms, like the green bond issued by the Milwaukee Metropolitan Sewerage District in 2020.<sup>68,69</sup> States can support the use of these local funding mechanisms by removing any barriers preventing local governments from levying additional taxes for flood resilience, and providing examples and technical assistance in constructing these mechanisms.



## Opportunities for Cross-State Learning

The checklist in this report (Table 1) highlights areas where some Great Lakes states have excelled and provides examples that other states may reference as they seek to implement the Next Steps for States (Appendix A).

There are multiple potential venues for sharing best practices and resources for state support of local flood resilience efforts. Several networks and communities of practice convene local government practitioners engaged in urban sustainability or flood resilience-related initiatives, including the Urban Sustainability Directors Network and the American Society of Adaptation Professionals. One recent initiative designed specifically with state-level practitioners in mind is the State Resilience Partnership, convened by the American Flood Coalition and Pew Charitable Trusts.<sup>70</sup>

The Association of State Floodplain Managers and its conferences could also convene local- and state-level

flood resilience practitioners from multiple states. For example, Minnesota and Iowa state floodplain associations held a joint conference in 2024, which Great Lakes states could use as a model.<sup>71</sup> Great Lakes specific venues might include the Midwest Climate Resilience Conference last hosted in October 2023 which brought together adaptation professionals from public and private sectors to discuss the resilience challenges unique to the region.<sup>72,73</sup> The Great Lakes-St. Lawrence Legislative Caucus (GLLC) provides a forum for state and provincial legislators to exchange knowledge around strategies and legislation. Any of these venues could bolster networking, collaboration and cross-state learning among state and local flood resilience practitioners from multiple Great Lakes states.



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*Image: The Mackinac Bridge.*



# Appendix A: Next Steps for States

## Illinois: Recent Progress and Next Steps

### Recent Progress in Illinois

In August 2024, the Illinois Environmental Protection Agency (EPA)'s announced its [Green Infrastructure Grant Opportunities \(GIGO\) Program](#),<sup>1</sup> made possible with a \$5 million allocation from the Rebuild Illinois capital plan [announced](#) by Governor Pritzker in June 2024.<sup>2</sup> The program will fund stormwater management projects that implement green infrastructure best management practices (BMPs). Grants require at least 25% match from grantees, which is reduced to 15% for projects in approved disadvantaged communities.

Also in August 2024, the State Senate passed [SB2628](#), requiring the state's Department of Natural Resources to enforce all state agencies' compliance with the National Flood Insurance Program requirements, including in relation to permitting.<sup>3</sup>

### Next Steps for Illinois

The following table offers potential next steps the state could take to support flood resilience among local governments. These next steps are adapted from the best practices and targets in the "How-to Checklist" and tailored to the state's context. Additional resources and examples can be found in the "How-to Checklist."

Practice to improve	Possible next steps
Provide Climate Change-Informed Flood Risk Data & Maps	<ul style="list-style-type: none"> <li>Develop a Memorandum of Understanding for formally integrating University of Illinois's <a href="#">Coordinated Hazard Assessment and Mapping Program (CHAMP)</a><sup>4</sup> into Office of Water Resources programming to ensure long-term support for the program.</li> <li>Work with CHAMP researchers to develop and maintain equity-focused resources.</li> </ul>
Develop State Adaptation Plan	<ul style="list-style-type: none"> <li>Publish a dedicated State Adaptation Plan, consolidating and building on relevant goals and recommendations from the <a href="#">Climate Action Plan</a>,<sup>5</sup> <a href="#">State Water Plan</a>,<sup>6</sup> and <a href="#">CHAMP's Flood Risk Assessments</a>.<sup>7</sup></li> </ul>



Practice to improve	Possible next steps
Establish State Resilience Office(r)	<ul style="list-style-type: none"> <li>Leverage existing <a href="#">State Water Plan Task Force</a><sup>8</sup> to create a permanent, dedicated Resilience Office within on of the Task Force member departments (e.g., Illinois Environmental Protection Agency, Illinois Emergency Management Agency or Illinois Department of Natural Resources) to enact and track progress on the goals and recommendations set forth in the <a href="#">State Water Plan</a>.<sup>6</sup></li> </ul>
Proactively Support or Initiate Local Flood Planning	<ul style="list-style-type: none"> <li>Incentivize participation in workshops and webinars, such as the DNR’s <a href="#">Substantial Damage and Substantial Improvement workshops</a><sup>9</sup> and Illinois-FEMA Floodplain Management Workshops, especially for disadvantaged communities (e.g., provide funding for local government employees to attend).</li> <li>Publish and widely disseminate resources from workshops.</li> <li>Develop mechanisms and protocols for continued engagement beyond one-off workshop attendance.</li> </ul>
Establish a well-resourced community grant/loan program	<ul style="list-style-type: none"> <li>Consider creating a credit-based mechanism within the <a href="#">Green Infrastructure Grant Opportunities Program</a> to expand access for lower-resourced localities (as the program is currently reimbursement only).<sup>10</sup></li> </ul>

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## Indiana: Recent Progress and Next Steps

### Recent Progress in Indiana

Progress in Indiana mainly pertains to advancement of data tools and training resources. Indiana University’s [Environmental Resilience Institute \(ERI\)](#)<sup>1</sup> houses the [Hoosier Resilience Index \(HRI\) and Readiness Assessment](#),<sup>2</sup> a tool for local governments to assess their community’s climate vulnerability, risks, and preparedness for confronting those potential impacts. The ERI offers webinars, training, and instructional materials to guide local government employees in using the Index. Though the HRI and other ERI resources are targeted to local governments, they offer useful data and analyses that the state government could leverage to approach support for local flood resilience.

In 2022, Indiana’s Department of Natural Resources (IDNR) released the revised [Indiana Floodplain Information Portal \(INFIP\)](#).<sup>3</sup> The most significant change is that INFIP 2.0 [allows users to generate](#) a Floodplain Analysis and Regulatory Assessment (FARA) instantly. As a FARA is required for local permitting and some FEMA applications, this new generator expedites the process of completing these requirements.<sup>4</sup>

[FEMA commended the state on INFIP](#) as an outreach tool, noting that it provides “easy, public access to data that was previously unavailable” to expedite permitting processes and ensure that they are considering the “best available” floodplain data.<sup>5</sup> However, in 2023, the state repealed the requirement to use this “best available” data by passing [Senate Bill 242](#) into law.<sup>6</sup> [Backed by realtors and landowners](#), the bill sought to [reduce the risk of lowering](#)

[property values](#) by eliminating the requirement to use IDNR’s data.<sup>7,8</sup> The INFIP maps are more up-to-date, more complete, and more “restrictive” than FEMA flood maps - placing some properties in floodplains whereas FEMA does not.

Also in 2022, Purdue Research Foundation’s Local Technical Assistance Program published [Model Stormwater Ordinance and Technical Standards](#), intending for local communities to customize them.<sup>9</sup> The Ordinance includes language on stormwater management requirements for new developments and permitting procedures. It mentions the impacts of climate change and related need to adopt higher standards, but does not include guidance specific to lower-resourced communities.

The State Department of Homeland Security’s [2024 Standard Multi-Hazard Mitigation Plan \(MHMP\)](#) includes vulnerability and risk assessments for flash and riverine floods, robust discussion of the impacts of climate change, and places flood mitigation as a high priority.<sup>10</sup> The Plan identifies the counties most at risk, and information on the status of county-level MHMPs.

### Next Steps for Indiana

The following table offers potential next steps the state could take to support flood resilience among local governments. These next steps are adapted from the best practices and targets in the “How-to Checklist” and tailored to the state’s context. Additional resources and examples can be found in the “How-to Checklist.”

Practice to improve	Possible next steps
Local Vulnerability Assessments	<ul style="list-style-type: none"> <li>Develop MoU with the <a href="#">Environmental Resilience institute (ERI)</a> to collaborate on or provide support for their ongoing assessment initiatives.<sup>1</sup></li> </ul>
Provide Climate Change-Informed Flood Risk Data & Maps	<ul style="list-style-type: none"> <li>Incorporate social vulnerability data layers and climate change projection data into <a href="#">Indiana Floodplain Information Portal</a>.<sup>11</sup></li> <li>Consider mechanisms for reinstating the use of INFIP as standard practice among practitioners including training, education and outreach on the INFIP to local governments, contractors, and other relevant stakeholder groups.</li> </ul>

Practice to improve	Possible next steps
Proactively Support or Initiate Local Flood Planning	<ul style="list-style-type: none"> <li>• Offer incentives for local government personnel to participate in <a href="#">Silver Jackets Flooding and Flood Tools Awareness Workshops</a> planning workshops (attendance is free, but incentives could be stronger).<sup>12</sup></li> <li>• Fund or incentivize a flood risk management working group within the Accelerate Indiana Municipalities (Aim) organization. This group should contribute to Aim’s future policy platforms (adding flood risk planning as a key issue, whereas <a href="#">Aim’s 2024 Policy Platform</a> does not specifically outline flood risk planning goals).<sup>13</sup></li> </ul>
Establish Resilience Requirements for Communities	<ul style="list-style-type: none"> <li>• Provide resources for local governments to invest in efforts to customize <a href="#">Local Technical Assistance Program</a><sup>14</sup> (LTAP) <a href="#">Model Stormwater Ordinance and Technical Standards</a>,<sup>15</sup> and include additional guidance for application to disadvantaged communities.</li> </ul>

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*Image: The Indiana Dunes by Safura Syed.*

## Michigan: Recent Progress and Next Steps

### Recent Progress in Michigan

In the last several years Michigan has seen significant movement in addressing local flooding concerns including the introduction of relevant legislation, changes within state agencies and prompted by the executive office, as well as through the acquisition of several major federal grants.

In April 2023, State Representative Christine Morse and Representative Curtis VanderWall respectively introduced House Bills [4382](#) and [4383](#) of 2023, tie-barred together, to amend the Drain Code of 1956.<sup>1,2</sup> The bills “would establish procedures for the creation of a water management program, which would require the creation of a water management district and plan via a petition process, and for the creation of apportionments between and within counties for assessments to finance the program,” meaning that each drainage basin area, or water management district, would be subject to a water management plan.<sup>3</sup> The plan may provide recommendations and cost estimates for activities including, for example, stormwater ordinance feasibility studies and education projects, or changes in property rights around stormwater control facilities.

[Conservation Districts](#) (CDs) are addressing flooding and stormwater issues through restoration and maintenance of wetlands, which absorb water and reduce flooding.<sup>4</sup> Michigan’s Department of Agriculture and Rural Development (MDARD) oversees the state’s 75 CDs: local units of government, generally organized along county lines, that provide natural resource management services such as water and soil quality improvement, creation and management of green spaces, and environmental education initiatives.

In November 2023, State Senator Rosemary Bayer and co-sponsors introduced [Senate Bill 660 of 2023: Stormwater Management Utility Act](#), which would allow local governments to levy stormwater fees.<sup>5</sup> In the past, judicial precedent has posed hurdles for municipalities to collect stormwater fees (*Bolt v City of Lansing*); if SB 660 passes, it would represent significant progress.

Michigan’s [State Hazard Mitigation Plan](#) (HMP) published in 2024 mentions climate change, but not necessarily as central to planning efforts.<sup>6</sup> It includes information about current and historical trends in temperature and

precipitation, and projected future trends in global greenhouse gas emissions (in Appendix 3 of the HMP), and a section on climate migration – suggesting that localities in Michigan, among other Great Lakes states, should consider potential population increases due to climate migration in future planning efforts.<sup>7</sup>

In [April 2024](#), the U.S. Department of Transportation announced that “three Michigan infrastructure projects will receive a total of about \$51 million in federal funds to bolster resilience to the effects of climate change and extreme weather events.”<sup>8</sup> The projects respond to the 2018 flooding in central and southwest Michigan, aiming to mitigate economic and mobility impacts of future similar catastrophic events.

In [2023](#) and [2024](#), Michigan received \$5.1 million dollars and \$17.4 million respectively in competitive grants through FEMA’s Safeguarding Tomorrow Revolving Loan Fund Program (The STORM program).<sup>9,10</sup> This funding enables Michigan State Police to provide local governments with low-interest loans for hazard mitigation including flooding. The Fund’s project selection criteria prioritize disadvantaged communities and projects employing nature-based solutions, and offers vulnerable communities with a lower interest rate.<sup>11</sup>

### Next Steps for Michigan

The following table offers potential next steps the state could take to support flood resilience among local governments. These next steps are adapted from the best practices and targets in the “How-to Checklist” and tailored to the state’s context. Additional resources and examples can be found in the “How-to Checklist.”

Practice to improve	Possible next steps
Develop State Adaptation Plan	<ul style="list-style-type: none"> <li>Center climate change impacts in the 2030 update of the <a href="#">Hazard Mitigation Plan</a> (published April 2024).<sup>12</sup></li> <li>Update and release a final <a href="#">Climate Change Implementation Plan</a> that demonstrates how it incorporates public comments, and explicitly prioritizes and accounts for impacts to vulnerable populations (last updated August 2023).<sup>13</sup></li> </ul>
Establish State Resilience Office(r)	<ul style="list-style-type: none"> <li>Create a cross-agency task force or working group that focuses on climate adaptation and on flooding in particular. This group could integrate or build upon existing initiatives or working groups across agencies, for example: the Department of Environment, Great Lakes, and Energy (EGLE)'s <a href="#">Office of Climate and Energy, Water Resources Division</a>,<sup>14</sup> and <a href="#">Catalyst Communities Program</a>,<sup>15</sup> and Michigan Department of Health and Human Services' <a href="#">Climate and Health Adaptation Program</a>.<sup>16</sup></li> </ul>
Enable Local Stormwater Fees	<p>In relation to pending <a href="#">Stormwater Management Utility Act (SB 660 of 2023)</a>:<sup>17</sup></p> <ul style="list-style-type: none"> <li>Proactively plan to give guidance to local governments for how to reduce burden on low-income households.</li> <li>Include language enabling local governments to consider ability to pay in developing rate structures.</li> </ul>
Establish Preference for Green Infrastructure in CWSRF Awards	<ul style="list-style-type: none"> <li>Expand equity-relevant criteria beyond disadvantaged community status, e.g., for prioritizing or selecting projects and contractors.</li> </ul>

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## Minnesota: Recent Progress and Next

### Recent Progress in Minnesota

Minnesota started with a relatively high baseline assessment of state support for local flood resilience.<sup>1</sup> As such, recent advances are mainly updates to existing policies and programs.

In 2023, the Board of Water and Soil Resources (BWSR) released updated [requirements](#) for comprehensive water management plans developed through the BWSR’s “[One Watershed, One Plan](#)” program originally adopted in 2013.<sup>2,3</sup> They also updated [procedures](#) for developing plans and plan [content requirements](#).<sup>4,5</sup>

Minnesota’s Department of Natural Resources (MN DNR) developed a series of [Shoreland and Floodplain Education and Training](#) events taking place between December 2023 to June 2024, in addition to their existing [monthly virtual Floodplain Management office hours](#).<sup>6,7</sup>

In November 2024, the Minnesota Association of Floodplain Managers held a [joint Annual Conference](#) with the Iowa Floodplain & Stormwater Management Association.<sup>8</sup> At the conference, MN DNR hosted training on navigating floodplain requirements and hosted a plenary session on floodplain management progress in Minnesota, Iowa, and at the national level. The conference also brought together representatives of FEMA, Minnesota’s Department of Transportation (MN DOT), municipal governments, the US Army Corps of Engineers, National Weather Service, and non-profit or university-based research centers.

### Next Steps for Minnesota

The following table offers potential next steps the state could take to support flood resilience among local governments. These next steps are adapted from the best practices and targets in the “How-to Checklist” and tailored to the state’s context. Additional resources and examples can be found in the “How-to Checklist.”

Practice to improve	Possible next steps
Proactively Support or Initiate Local Flood Planning	<ul style="list-style-type: none"> <li>Create short summary documents to complement <a href="#">MN DNR Floodplain Training</a> course recordings.<sup>9</sup></li> <li>Add training on resilience planning to <a href="#">MN DNR Shoreland and Floodplain Education</a>.<sup>10</sup></li> <li>Create incentives for local government officials to attend training.</li> </ul>
Establish State Resilience Office(r)	<ul style="list-style-type: none"> <li>Develop guidance around incorporating social vulnerability and risk analyses into <a href="#">Model Floodplain Ordinance</a> and consider programs to incentivize adoption.<sup>11</sup></li> </ul>

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*Image: Black Beach, Silver Bay, Minnesota by Brandon Cormier.*

## New York: Recent Progress and Next Steps

### Recent Progress in New York

New York continues to build on its strong history of support for local flood resilience including through updated hazard mitigation resources and new legislation. New York’s hazard mitigation planning platform, [MitigateNY](#), houses the 2023 update of the State Hazard Mitigation Plan.<sup>1</sup> This update includes a “comprehensive focus on climate change” and “new data visualizations to support state and local hazard mitigation planning and implementation efforts.” The platform includes sections organized by hazard type. The flooding section includes information on the state’s flood risk to people and infrastructures, including in relation to both coastal and inland flooding, and the projected impact of climate change, alongside a mitigation strategy. The MitigateNY platform also includes a Local Hazard Mitigation Action Database, a repository of community-identified risk reduction opportunities and cost estimates for each.

The state approved [Disadvantaged Communities Criteria](#)<sup>2</sup> in March 2023 after a series of public hearings across the state; these criteria guide the implementation and funding allocation for the [Climate Act](#) and other statewide climate-related legislation.<sup>3</sup>

In September 2023, the Governor signed two resilience-related bills into law: [Senate Bill S5186](#),<sup>4</sup> requiring the Department of Environmental Conservation (DEC) to implement shoreline management permitting regulations centered around nature-based solutions, and [Assembly Bill A1967](#),<sup>5</sup> which requires real estate sellers and lessors to disclose flood risk, history, and insurance.

In January 2024, State Senator Pete Harckham introduced [State Senate Bill S8158](#): Climate Resilient New York Act.<sup>6</sup> If enacted, the Bill would establish a statewide Office of Resilience and require the Governor to appoint a Chief Resilience Officer. Under the new law, the Office would create an interagency task force to develop a statewide resilience plan, which would undergo public consultation before its enactment. In line with federal Justice40 guidelines and existing state laws, the [law would require](#) 40 percent of funding to go to disadvantaged communities; it also would establish metrics for tracking progress and a 5-year update cycle.<sup>7</sup> As of October 2024, the bill remains active in the State Senate’s Finance Committee.

In February 2024, the state published its [Climate Impacts Assessment](#) which provides data, models, and projections of both climate hazards and impacts, to inform resilience planning across sectors statewide.<sup>8</sup> Beyond state-level planning, the Assessment provides information that municipalities, businesses, landowners, and advocates can use in their own planning and goal-setting processes.

### Next Steps for New York

The following table offers potential next steps the state could take to support flood resilience among local governments. These next steps are adapted from the best practices and targets in the “How-to Checklist” and tailored to the state’s context. Additional resources and examples can be found in the “How-to Checklist.”

Practice to improve	Possible next steps
Establish a State Resilience Office(r)	<ul style="list-style-type: none"> <li>Pending <a href="#">Climate Resilient New York Act</a> of 2023 (S8158A) establishes Office of Resilience and a Chief Resilience Officer; once established, create statewide targets and actively update progress indicators on an accessible web page.<sup>9</sup></li> </ul>
Enabling local stormwater fees	<ul style="list-style-type: none"> <li>As the Assembly Bill is stricken, revive efforts to pass Water Bill Fairness Act <a href="#">S4169/A4019</a> or a similar piece of legislation.<sup>10, 11</sup></li> </ul>

Practice to improve	Possible next steps
Establish a Well-resourced Community Grant/Loan Program	<ul style="list-style-type: none"> <li>Consider appropriating additional funds through the existing community grant and loan programs (e.g. Green Innovation Grant Program; Climate Smart Communities; Local Waterfront Revitalization Program; NY Rising Buyout and Acquisition Programs) and conduct outreach on the programs to communities identified in Resilient NY program as high flood risk and highly socially vulnerable.</li> </ul>

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## Ohio: Recent Progress and Next Steps

### Recent Progress in Ohio

In March 2024, Ohio’s Emergency Management Agency (EMA) released an updated Hazard Mitigation Plan which received [FEMA approval as an Enhanced Hazard Mitigation Plan](#).<sup>1</sup> This status unlocks additional funds under the Hazard Mitigation Grant Program following disaster declarations. The EMA also houses a Mitigation Information Portal: a database of local mitigation actions and examples of “success stories” in different communities across the state. Over 1,500 properties in Ohio have benefitted from its mitigation planning and programming, which statewide has saved an estimated \$47 million in damages.<sup>2</sup>

The state’s Department of Natural Resources (ODNR) and Ohio Floodplain Management Association co-coordinated the annual [Ohio Statewide Floodplain Management Conference](#), last held in August 2024.<sup>3</sup> The conference

featured panels and training events on various areas of floodplain management, including preparing for and managing climate change impacts, and was attended by floodplain management professionals in state and local governments as well as the private and nonprofit sectors.

### Next Steps for Ohio

The following table offers potential next steps the state could take to support flood resilience among local governments. These next steps are adapted from the best practices and targets in the “How-to Checklist” and tailored to the state’s context. Additional resources and examples can be found in the “How-to Checklist.”

Practice to improve	Possible next steps
Provide Adaptation Case Studies	<ul style="list-style-type: none"> <li>Incorporate social vulnerability metrics into <a href="#">Mitigation Reports</a> and <a href="#">Success Stories</a>.<sup>4,5</sup></li> </ul>
Provide Climate Change-Informed Flood Risk Data & Maps	<ul style="list-style-type: none"> <li>Partner with the <a href="#">State Climate Office of Ohio at Ohio State University</a><sup>6</sup> to develop state-level climate change-informed flood risk data and maps that depict overlapping social vulnerability and equity concerns <a href="#">rather than exclusively relying on federally-provided FEMA flood maps</a>.<sup>7</sup> Provide training on the use of these maps via existing education and outreach channels to floodplain managers.</li> </ul>
Develop a State Adaptation Plan	<ul style="list-style-type: none"> <li>Provide implementation guidance, and create and update progress reports for flood-specific <a href="#">mitigation actions</a> included in the <a href="#">2024 State of Ohio Hazard Mitigation Plan (SOHMP)</a>.<sup>8, 9</sup></li> </ul>
Establish a State Resilience Office(r)	<ul style="list-style-type: none"> <li>Convene a task force specifically on climate change adaptation and flood mitigation, consulting personnel from relevant Ohio EPA Divisions. This group could serve as an interim Resilience Office until an official unit can be created and could support the development of a program for conducting local vulnerability assessments.</li> </ul>

Practice to improve	Possible next steps
Proactively Support or Initiate Local Flood Planning	<ul style="list-style-type: none"> <li>• Develop mechanisms for tracking <a href="#">Local Hazard Mitigation Plan (LHMP)</a> implementation and identifying areas where counties need implementation support.<sup>10</sup></li> <li>• Improve floodplain manager education and outreach program by providing a publicly available archive of content from the <a href="#">existing webinar series</a> and additional resources for floodplain managers and practitioners.<sup>11</sup> Ensure the webinar series includes information about assessing social vulnerability to flooding and addressing the concerns of disadvantaged communities.</li> </ul>

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## Pennsylvania: Recent Progress and Next Steps

### Recent Progress in Pennsylvania

In September 2023, Pennsylvania’s Department of Environmental Protection (DEP) adopted an interim [Environmental Justice \(EJ\) Policy](#),<sup>1</sup> two years after then-Governor Wolf’s [Executive Order](#) establishing a permanent Office of Environmental Justice.<sup>2</sup> The EJ Policy [updates](#) the state’s previous EJ Public Participation Policy, from 2004, adding significant new sections on EJ criteria, community engagement, and how EJ can be integrated into the climate action plan, among others.<sup>3</sup> The policy and the PennEnviroScreen mapping tool released with it help identify most vulnerable communities to prioritize for flood preparation and mitigation. Among other useful features, PennEnviroScreen allows layering FEMA flood risk data with EJ indicators.

In December 2023, Governor Shapiro signed into law [House Bill 735](#),<sup>4</sup> establishing the [Flood Insurance Premium Assistance Task Force](#), to research and form

recommendations on flood insurance coverage and affordability.<sup>5</sup> The group [focused on](#) developing recommendations around potential programs for offering discounts, incentivizing local governments’ flood mitigation efforts, and resident education around flooding risks, mitigation, and insurance options.<sup>6</sup> The Task Force published its [Final Report](#) in July 2024, incorporating information from a public comment period, multi-agency and expert input.<sup>7</sup> One of the recommendations is to “incorporate flood resiliency in building codes” in both residential and commercial settings.

### Next Steps for Pennsylvania

The following table offers potential next steps the state could take to support flood resilience among local governments. These next steps are adapted from the best practices and targets in the “How-to Checklist” and tailored to the state’s context. Additional resources and examples can be found in the “How-to Checklist.”

Practice to improve	Possible next steps
Provide or Support Local Vulnerability Assessments	<ul style="list-style-type: none"> <li>Engage local governments in vulnerability assessments through developing a partnership with the DEP’s flood protection programming, leveraging existing relationships and administrative infrastructure set by the <a href="#">Local Climate Action Program</a>.<sup>8</sup></li> </ul>
Provide Adaptation Case Studies	<ul style="list-style-type: none"> <li>Leverage the existing <a href="#">list of flood protection projects</a> completed by the DEP Flood Protection Program to create a select list of flood protection and adaptation case studies, paying special attention to projects in disadvantaged or environmental justice communities.<sup>9</sup> Publish these on the DEP Flood Protection Program website.</li> </ul>
Provide Climate Change-Informed Flood Risk Data & Maps	<p><a href="#">PennEnviroScreen</a> allows layering flood risk with environmental justice indicators.<sup>10</sup> To improve usability of the tool:</p> <ul style="list-style-type: none"> <li>Add a layer that uses data that incorporates climate change projections.</li> <li>Produce guidance on using PennEnviroScreen, and how it can be used for flood risk mitigation in particular.</li> </ul>
Proactively Support or Initiate Local Flood Planning	<ul style="list-style-type: none"> <li>Explicitly incorporate equity-focused flood mitigation planning into <a href="#">Local Climate Action Program</a> training.<sup>11</sup></li> </ul>

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## Wisconsin: Recent Progress and Next

### Recent Progress in Wisconsin

In Wisconsin, state-level progress around supporting local flood resilience includes development of new tools and guidance for local governments to assess and develop resilience programs and initiatives, and a major legislative win.

The Wisconsin Department of Natural Resources (WI DNR) developed a [Model Zoning Ordinance](#), which took effect in April 2022.<sup>1</sup> The ordinance guides and sets standards for communities developing or revising floodplain ordinances. The DNR also provides step-by-step guidance and timeline to support ordinance development.

In March 2023, the Wisconsin Department of Health Services (WI DHS) published a [Flood Resilience Scorecard](#) which guides local governments toward improving flood-related health outcomes.<sup>2</sup> The scorecard includes three modules – environmental, institutional, and social – each covering information about different lenses through which to approach flood resilience, geared toward different audiences and target actors.

In April 2024, Wisconsin's State Senate enacted [2023 Senate Bill 222](#) creating a pre-disaster flood resilience grant program.<sup>3</sup> State legislators [collaborated](#) with the Wisconsin Wetlands Association, Wisconsin Towns Association, and Wisconsin Council of Trout Unlimited in drafting the bill, receiving endorsement from all three groups.<sup>4</sup> The legislation gives the state's Emergency Management Division (WEM) the authority to establish evaluation criteria for project prioritization, and [allocates \\$2 million](#) of the state 2023–2025 budget to fund grants for local flood resilience projects; communities may receive up to \$300,000 for an assessment project or up to \$250,000 for an implementation project.<sup>5</sup>

### Next Steps for Wisconsin

The following table offers potential next steps the state could take to support flood resilience among local governments. These next steps are adapted from the best practices and targets in the “How-to Checklist” and tailored to the state's context. Additional resources and examples can be found in the “How-to Checklist.”

Practice to improve	Possible next steps
Provide or Support Local Vulnerability Assessments	<ul style="list-style-type: none"> <li>Incentivize local governments to complete <a href="#">Flood Resilience Scorecard</a> and provide assistance for doing so.<sup>6</sup></li> </ul>
Provide Adaptation Case Studies	<ul style="list-style-type: none"> <li>Build out additional “<a href="#">Emergency Management Mitigation Success</a>” case studies and add emphasis on mitigation efforts in disadvantaged communities.<sup>7</sup></li> </ul>
Provide Climate Change-Informed Flood Risk Data & Maps	<ul style="list-style-type: none"> <li>Update the Department of Public Health's <a href="#">Risk Assessment Flood Tool (RAFT)</a> to include projected impacts of climate change on flooding and related health impacts.<sup>8</sup></li> <li>Complete development of <a href="#">Wisconsin Environmental Equity Tool (WEET)</a> and provide training for local government personnel on using the tool. In the final product, include details on how the tool integrates feedback from public comments and reflects communities' values.<sup>9</sup></li> </ul>



Practice to improve	Possible next steps
Establish Resilience Requirements for Communities	<ul style="list-style-type: none"> <li>In addition to providing the <a href="#">model floodplain ordinance</a>, provide guidance for meaningful engagement with stakeholders and rights holders (beyond holding required public hearings - i.e., during the development process).<sup>10</sup></li> </ul>
Establish a Well-Resourced Community Grant/Loan Program for Flood Resilience Projects	<ul style="list-style-type: none"> <li>In developing evaluation criteria for assessment and implementation grant applications under the new State Pre-Disaster Flood Resilience Grant program (created by <a href="#">SB 222: 2023 Wisconsin Act 265</a>), Wisconsin Emergency Management Division (WEM) should include specific equity-focused metrics.<sup>11</sup></li> <li>Consider allocating additional funding for the new State Pre-Disaster Flood Resilience Grant program to support local governments in matching requirements for federal funding programs like the FEMA's Federal Hazard Mitigation program or Building Resilient Infrastructure and Communities.</li> </ul>

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## Appendix B: Methods

First, we adapted Hughes et al.'s scoring criteria to define new targets within each of the Best Practice categories. The adapted targets combine the original criteria for states to earn the highest score for any given Best Practice with the original criteria for earning a designation of attention to equity. We combined them in this way so as to centralize equity considerations and integrate them more holistically into the targets themselves. We departed from Hughes et al.'s original scoring model (0-3) and rather used these scores as guidance for understanding each state's weak and strong areas, so that we could identify the most impactful action areas and opportunities each state could take to achieve those targets.

For example, for the best practice of Providing or supporting local vulnerability assessments, Hughes et al. scored states highest if they met the criterion "State conducts statewide flood risk assessments" and added a designation for attention to equity if "States deliver vulnerability assessments using a social vulnerability-informed method." Our combined criteria for this practice reads: "Establish a formal state-wide program to partner with local governments to provide assessment tools and guidance for conducting flood vulnerability assessments that incorporate social vulnerability measures" - demonstrating how we adapted Hughes et al.'s original methodology to develop each target.

For each best practice and target, we then used high-scoring examples identified by Hughes et al., or initiatives implemented since that research was completed, to demonstrate how some states have achieved each target. Where state examples are the best in their class, but still do not meet the target as defined, we provide external examples or concrete steps

toward meeting the full criteria. The examples serve as a resource for other states seeking to understand what fully achieving the target looks like; some of these state examples appear throughout the report in sections providing state-level recommendations. The best practices, targets and examples comprise a general "how-to" checklist for states seeking to support local flood resilience.

To develop the state-level recommendations for each state's areas of opportunity for improvement, we started with any information that Hughes et al. provided in their article and its supplemental materials, and did additional research to identify any relevant updates. In some cases, we found no update; in others, we found new or revised policies or initiatives, which we then treated as a baseline for our "Next Step" recommendations.