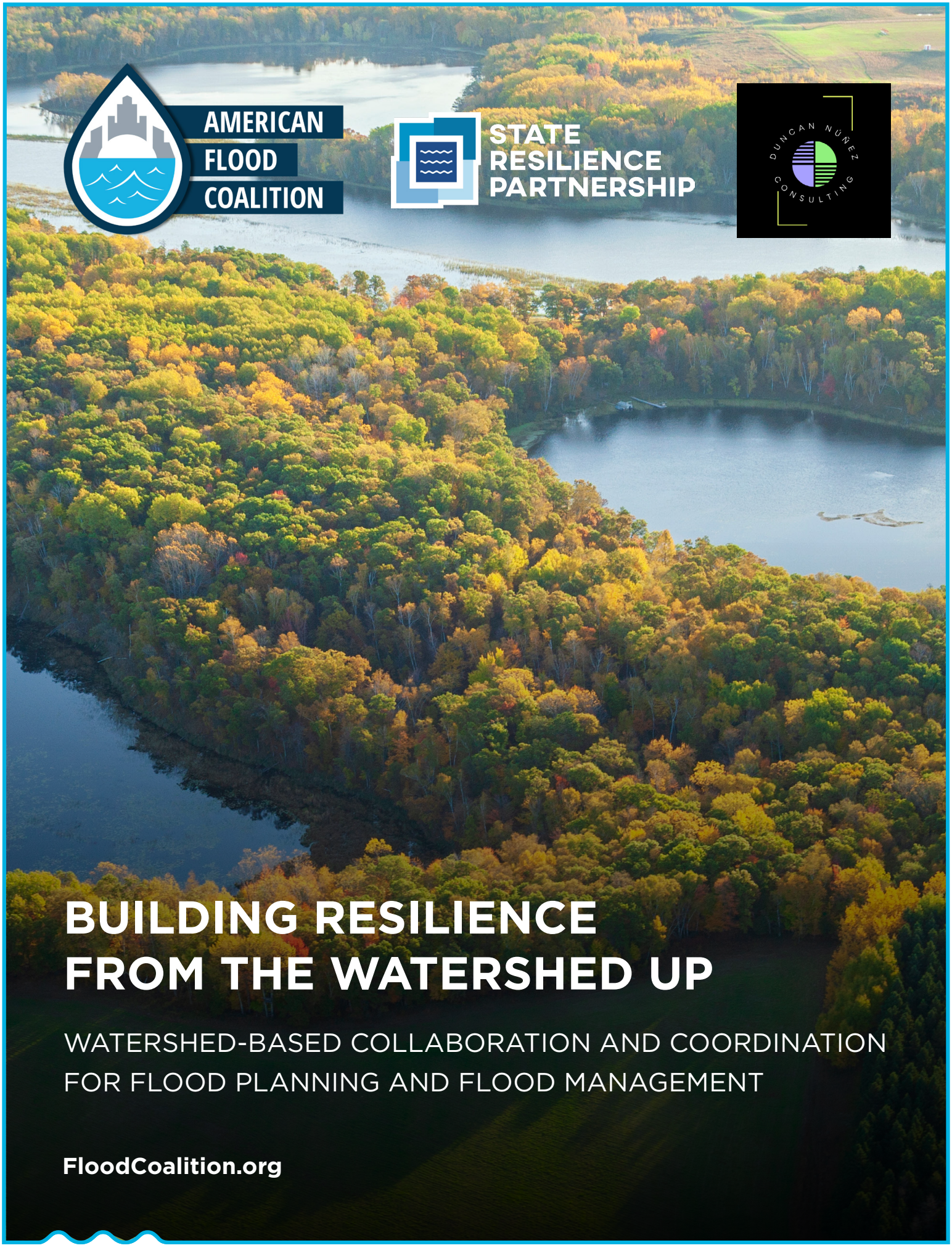

BUILDING RESILIENCE FROM THE WATERSHED UP

WATERSHED-BASED COLLABORATION AND COORDINATION FOR FLOOD PLANNING AND FLOOD MANAGEMENT

FloodCoalition.org

Acknowledgements

The American Flood Coalition thanks the following organizations and individuals who helped develop this report and continue to advance watershed-based collaboration and coordination for flood planning and management:

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Table of contents

Credit: Tim Mueller

Introduction

Water doesn't respect political or jurisdictional boundaries. When floodwaters come, they follow watershed dynamics, flowing downhill and into rivers, lakes, and streams. Despite this reality, few states have entities to devise and carry out flood solutions and strategies that fit the scale of natural systems. As flooding becomes more frequent, devastating, and costly, policymakers must manage flood risk at the watershed scale.[1]

Designed for state policymakers and community leaders, this report explains the role and purpose of watershed-based entities in planning and managing flood risk. Watershed-based entities play a key role in many activities, such as watershed and river basin modeling, regional stakeholder coordination; project fundraising, financing, and construction; and community engagement and education.

By collaborating, coordinating, planning, and funding at the watershed level, communities can do the following:

+ **Equitably pursue flood resilience strategies** between upstream and downstream communities.
+ **Save money**, as watershed-based approaches may support cost sharing; foster coordination; and reduce duplicative projects, studies, and other activities.
+ **Improve flood prediction**, with updated, localized flood models, monitors, and maps.
+ **Increase coordination** between communities and federal and state partners.
+ **Accelerate the adoption of best practices** to more effectively manage and reduce flood risk.

This report was prepared for the State Resilience Partnership — a network of organizations led by the American Flood Coalition. Included are case studies that explore how watershed-based flood planning and management entities reduce the impacts of flooding. Three case studies — **Louisiana's "watershed regions," Minnesota's "watershed districts," and Texas's "regional flood planning groups"** — reflect uniquely different communities, approaches, and challenges. Despite these differences, each case study points to the need for ongoing state and federal support for watershed-based entities.[2]

Policymakers can foster multi-jurisdictional approaches to flood risk management by:

- Authorizing watershed-based flood resilience entities in state legislation.
- Building pathways for federal and state governments and their various jurisdictions and political subdivisions to coordinate at the watershed level.
- Supporting capacity building, technical assistance, and training for watershed-based collaboratives and stakeholders.
- Allocating funding to support operational costs.

To encourage communities to take up watershed-based collaboration and coordination, policymakers should ensure funds are available for watershed-based entities to construct and carry out regional projects and programs.

The case studies that follow describe the state's role in enabling and initiating watershed-based collaboration and coordination. This report aims to broaden protection and resilience for flood-affected communities.

Key Terms and Concepts

Watersheds, also known as drainage basins or catchments, encompass land that drains all streams and rainfall to a common point, such as the outflow of a reservoir, mouth of a bay, or any point along a stream. The United States Geological Survey organizes surface water drainage basins by hydrologic unit code (HUC). These identifications range from HUC-2 Regions, with an average area of 178,000 square miles, to HUC-12 Subwatersheds, with an average area of 40 square miles.

Watershed-based flood resilience entities comprise representatives from different sectors, including municipal and county governments, private enterprises, and nonprofits. The entities, engage in many activities for flood risk management, such as watershed modeling, stakeholder coordination; project fundraising, financing, and construction; and community engagement and education.

Flood resilience approaches fall into two categories: structural and nonstructural. Structural approaches reduce flood damage by reconstructing landscapes (floodwalls, levees, evacuation routes). Nonstructural approaches reduce damage by removing people and property out of risk areas (property buyouts, zoning, building codes.)[3]

Hydrologic & hydraulic (H&H) modeling simulates where water is (hydrology) and where it will go (hydraulics). Planners and engineers can use this modeling to design water infrastructure, study natural systems, regulate areas, or map floodplains.

Case Study Overview

	LOUISIANA PROVISIONAL WATERSHED REGIONS	MINNESOTA WATERSHED DISTRICTS	TEXAS REGIONAL FLOOD PLANNING GROUPS
Overview	The Louisiana Watershed Initiative established nine provisional watershed regions across the state. Since 2018, these regions bring together flood-affected communities to collectively make data-informed plans and decisions.	Codified in 1955, Minnesota watershed districts are among the oldest watershed-based flood resilience entities in the United States. They also have some of the strongest legal authorities, including the power to assess taxes and issue bonds.	Texas established 15 regional flood planning groups in 2020. Collectively, these groups are responsible for developing Texas's first regional flood plans, which will culminate in a statewide flood plan.
Responsibilities	• Flood planning • Holistic watershed management • Stormwater management • Water quality management	• Flood planning and management • Water and soil quality management • Water quantity management • Erosion and sediment control • Holistic watershed management • Hydroelectric power generation • Preservation of beneficial, public use of areas surrounding a river, stream, or lake • Improvement of stream channels for navigation	• Flood planning • Water quality management
Key authorities	• Enter into project contracts • Procure professional services • Accept state and/or federal grant funds	• Asses taxes • Take on debt and borrow from public agencies • Exercise eminent domain • Enter into project contracts • Enter joint powers agreements • Own infrastructure assets • Procure professional services • Accept state and/or fedearl grant funds • Purchase insurance to protect the watershed district	• Develop regional flood plans
Own or operate infrastructure	No	Yes	Yes
Full-time equivalents (per entity)	1	1-15	1-5
Key sources of project funding	• Community Development Block Grant - Mitigation (HUD) • Hazard Mitigation Grant Program (FEMA)	• Flood Hazard Mitigation Grant Assistance (Minnesota Department of Natural Resources) • Locally controlled funds (taxes, bonds, and other earned revenue)	• Flood Infrastructure Fund • Texas Infrastructure Resilience Fund
State partners	Louisiana Office of Community Development	Minnesota Board of Water and Soil Resources	Texas Water Development Board

Louisiana Watershed Regions

The Louisiana Watershed Initiative — a new statewide, watershed-scale approach to reducing flood risk in Louisiana — established eight provisional watershed regions across the state.[4] Each region is responsible for establishing long-term watershed coalitions, developing work plans, and recommending resilience projects for state funding. These watershed regions, funded through a $1.2 billion grant from the U.S. Department of Housing and Urban Development (HUD), have helped communities better understand their flood risk and identify cost-effective, impactful solutions. The Regions have access to $570 million to develop local and regional projects that reduce flood risk and enhance community resilience.[5] After the one-time HUD funds run out, the state will need to identify new funding sources.

WATERSHED-BASED GROUP	PROVISIONAL WATERSHED REGIONS
Responsibilities	• Flood risk management • Stormwater management • Holistic watershed management • Water quality management
Activities	• Planning • Fundraising for projects • Educating elected officials • Providing technical assistance • Watershed modeling, mapping, and monitoring • Evaluating and recommending projects for state funding
Authorities	• Enter into project contracts • Procure professional services • Accept state and/or federal grant funds
Lead State Agency	Louisiana Office of Community Development

Background: The Louisiana Watershed Initiative

With more than half of the state located in a Special Flood Hazard Area (SFHA), areas that will be inundated by a 100-year flood, Louisiana is no stranger to both coastal and inland flooding. Following disastrous floods in 2016, the state started developing a new approach to flood risk management, one that addresses all flood risk, not just coastal. The devastation of this one rain event, which caused more than $10 billion worth of damage and the displacement of 28,000 people, compelled Louisiana Governor Jon Bel Edwards to take action.[6]

Governor Edwards tasked an interagency group of state officials to assess "the feasibility of establishing a coordinated, statewide model for watershed-based floodplain management" and identify a path for implementation. The group soon concluded that the state needed a "science and engineering data-based approach to inland flood risk management," according to Pat Forbes, executive director of the Louisiana Office of Community Development.[7]

> **Communities are hydraulically and hydrologically connected within the bounds of a watershed and the decisions made in one portion of the watershed will impact floodplains in other portions of the same watershed.**
>
> **Executive Order JBE 18-16**

After Hurricanes Katrina and Rita, Louisiana saw first-hand the value of data-driven, regional approaches to managing flood risk on the coast — but the state had yet to apply this learning to inland communities. That would change in 2018 when the governor signed Executive Order JBE 18-16. The order created the Council on Watershed Management,[8] which was responsible for developing and carrying out a watershed-based floodplain management strategy for the entire state of Louisiana.

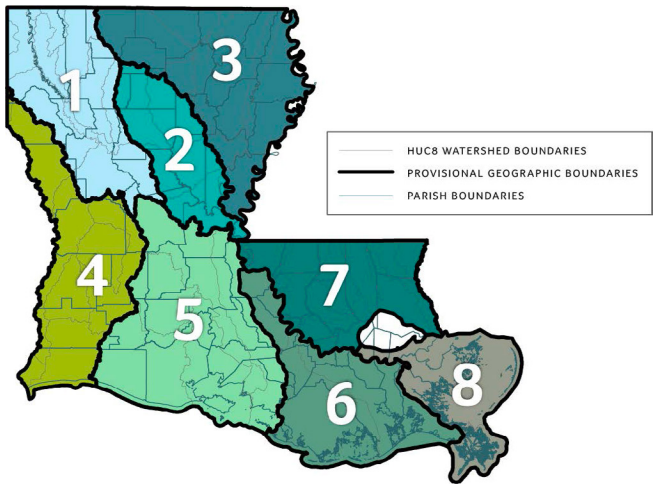
The council is made up of leaders from several state agencies, including the Office of Community Development, the Department of Transportation and Development, the Coastal Protection and Restoration Authority, the Governor's Office of Emergency Management and Homeland Security, and the Department of Wildlife and Fisheries. The council was tasked with responsibilities including:

- Facilitating watershed-based floodplain management by creating watershed-bounded entities across the state.
- Promoting legislative, administrative, and regulatory actions to enhance watershed and floodplain management.
- Creating a path for the state, as well as its various jurisdictions and political subdivisions, to coordinate at a statewide and watershed level.
- Promoting a unified effort, built on a solid foundation of scientific and engineering principles, to address flooding across the state.

Following the executive order, the council developed *A Long-term Vision for Statewide Sustainability and Resilience*, underscoring that "proper flood risk management requires a coordinated, coherent and long-term vision for sustainability and resilience." The vision laid the groundwork for what would become the Louisiana Watershed Initiative[9] — a new statewide, watershed-scale approach to reducing flood risk in Louisiana. The Louisiana Watershed Initiative is funded by a $1.2 billion Community Development Block Grant Mitigation (CDBG-MIT) grant awarded from HUD to Louisiana's Office of Community Development.

Provisional watershed regions and watershed coalitions

The Louisiana Watershed Initiative called for the creation of eight provisional watershed regions across the state. Following a statewide listening tour, the Council recognized eight provisional watershed regions; each region is made up of multiple HUC-8-level watersheds, which collectively cover the entire state.



The Council initially set up the provisional watershed regions to serve "'point[s] of beginning' to address the geographic scale and boundary for watershed-based planning, modeling and management in Louisiana."[10] Regional and local stakeholders used these provisional watershed regions to determine more permanent watershed regional boundaries and governance structures (i.e., watershed coalitions).

The Council made up to $570 million available for flood projects to incentivize regional stakeholders to work together across jurisdictions. Applicants could only compete for these funds if their projects were recognized as a priority by their provisional watershed region steering committee.

Simultaneously, the Council directed $10.6 million toward a Regional Capacity Building Grant Program to help form Watershed Coalitions and build regional resources and skills to reduce current and future flood risk.[11] The first round of this $10.6 million supported provisional watershed regions to form temporary regional steering committees, which reflected the demographic diversity and interests of the region. These committees were tasked with developing work plans, recommending long-term watershed coalitions, and creating watershed models for project planning.[12]

The state also offered support to provisional watershed regions to do the following:

- Prioritize key issues and challenges that cannot be addressed at a local or state level or that face unique hurdles that require regional support.
- Explore and review approaches used and analyses completed that weigh the pros and cons of regional approaches to watershed management.
- Review the existing entities that manage water resources, as well as potential implications for any new models of regional governance.
- Identify gaps and opportunities in responsibility and authority for watershed management.
- Develop recommendations for how to establish regional entities.[13]

The second round of funding from the Regional Capacity Building Grant Program provided up to $800,000 to each provisional watershed region to do the following:

- Establish long-term watershed coalitions for regional watershed management.
- Support higher development standards on a regional scale for flood risk reduction.
- Maintain a regional inventory of mitigation projects/develop regional plans, informed by cross-jurisdictional impact analysis.
- Establish long-term capacity and funding to continue watershed coordination beyond the life of the Louisiana Watershed Initiative.[14]

A closer look at watershed-based collaboration and coordination: Provisional Watershed Region 5

The 2016 floods devastated Louisiana's Cajun Country. At its crest, the Vermilion River reached over 17 and a half feet — seven and a half feet greater than the river's flood stage (the height at which the river will flood). In one parish, the National Flood Insurance Program paid out nearly $200 million in flood insurance claims.[15]

Flooding from a particularly severe thunderstorm in 2016 motivated stakeholders across 16 parishes and five HUC-8 watersheds to participate in the Provisional Watershed Region 5. Guy Collier, who then was president of St. Martin Parish, said that "watershed planning is not the politically right thing to do, but it's the right thing to do."[16]

The Acadiana Planning Commission volunteered to serve as Region 5's fiscal agent, meaning the Commission could handle various financial and administrative duties on behalf of the region. The Commission applied for a Regional Capacity Building Grant, which allowed it to do the following: develop an action plan and governance structures, establish a regional steering committee, strategize how to build a regional Community Rating System (CRS), and prioritize capital projects for the region. The provisional watershed region is led by a 19-person regional steering committee, which includes one representative from each of the 16 parishes in the watershed and three non-voting members appointed by the Commission.[17] Encouragingly, as of June 2023, the state legislature recognized the Acadiana Watershed District as a political subdivision. The newly created district has authority to levy a tax to promote drainage and reduce flood risk.[18]

Kelia Fontenot Bingham, watershed coordinator for Region 5, acknowledged that "we need all levels of government to think about the watershed-scale" and highlighted the state's training programs and modeling tools.[19] The state designed these programs and tools to build local understanding of flood risk and of HUD's role in funding the initiative. By coordinating flood risk planning across the region, the Acadiana Planning Commission[20] helped the region raise nearly $27 million for flood resilience projects in the watershed.[21]

Key insights

Louisiana's watershed regions reflect the state's deep commitment and comprehensive approach to watershed-scale flood risk management. The regions provide a model for how to bring multiple levels of government (local, state, and federal) into watershed-scale planning.

But the long-term success of provisional watershed regions is not guaranteed because state statute fails to recognize most provisional watershed regions, meaning such regions have no legal authorities.

To raise funds for local projects, Louisiana's watershed regions also need recurrent funding or taxing authority to raise funds for local projects. Without either, watershed-based collaboration and coordination is not likely to continue or advance. States looking to replicate Louisiana's provisional watershed Regions must consider long-term options to fund, authorize, and incentivise this work at the regional level.

Minnesota Watershed Districts

Minnesota's watershed districts are a powerful example of watershed-level governance. Organized voluntarily through local petitions, watershed districts engage in many activities, including flood planning, public education, and project funding. Because they can levy taxes and issue bonds, these districts can swiftly carry out regional solutions, saving taxpayers millions in construction costs. Today, 46 watershed districts cover roughly 30% of the state.

WATERSHED-BASED GROUP	MINNESOTA WATERSHED DISTRICTS
Responsibilities	• Water quality management • Soil quality management • Water quantity management • Holistic watershed management • Erosion and sediment control • Hydroelectric power generation • Preservation and beneficial public use of riparian environments • Stream channel improvement for navigation and any other public purpose
Activities	• Educating elected officials • Educating the public • Assessing regional flood risk and collecting data • Carrying out regional planning • Analyzing and mapping flood hazards • Planning and designing projects • Financing regional projects • Providing technical assistance • Fundraising for regional projects
Authorities	• Assess taxes • Take on debt and borrow from public agencies • Exercise eminent domain • Provide fiscal sponsorship • Enter into project contracts • Enter joint powers agreements • Own infrastructure assets • Procure professional services • Accept state and/or federal grant funds • Contract for or purchase insurance for the protection of the watershed district
Lead State Agency	Minnesota Board of Water and Soil Resources

Background: Watershed districts

Authorized by the state legislature in 1955, Minnesota's watershed districts represent one of the earliest watershed-based approaches to managing flood risk.

The watershed districts are particularly unique, as they are multi-jurisdictional, special-purpose units of government with considerable authority. The model is owed in part to the state's participation in the U.S. Department of Agriculture's 1953 Pilot Watersheds Program; this program allowed local agencies that managed secondary watersheds to exercise eminent domain and levy taxes.[22]

The watershed districts have the power to do the following:

- Levy taxes.
- Borrow funds from government agencies or financial institutions.
- Issue bonds and warrants.
- Exercise eminent domain.
- Accept grant funds.
- Provide fiscal sponsorship.
- Enter into project contracts.
- Own, construct, and maintain infrastructure assets.
- Hire consultants.
- Purchase, lease, or acquire land or other property in adjoining states.
- Enter into joint power agreements.
- Acquire insurance for the protection of the watershed district.
- Manage land use/development in the floodplain, greenbelt, and open space areas.

The following rules apply only in the absence of county or municipal ordinances regulating the above items.[23]

- Prepare an open space and greenbelt map of the lands of the watershed district; this map should be preserved and used as a reference to adopt, amend, or repeal rules.
- Establish rules to control encroachments, changing land contours, the placement of fill and structures, and the placement of encumbrances or obstructions.
- Require landowners to remove fill, structures, encumbrances, or other obstructions and restore the previously existing land contours and vegetation.

Watershed districts can perform many resilience activities, including:

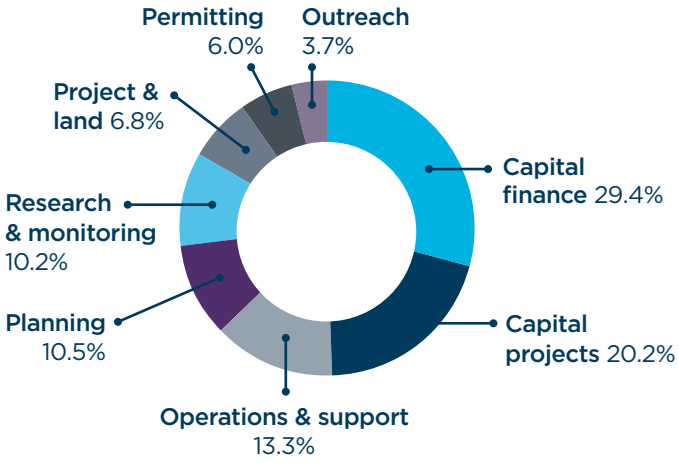
- Improving stream channels for drainage, navigation, and any other public purpose.
- Reclaiming/filling wet or overflowed land.
- Regulating the flow of streams to conserve the streams' water.
- Diverting/changing watercourses.
- Providing or conserving water supply for domestic, industrial, recreational, agricultural, or other public use.
- Repairing, improving, relocating, modifying, consolidating, and abandoning all or part of drainage systems within a watershed district.
- Controlling or alleviating soil erosion and siltation of watercourses or water basins.
- Controlling or alleviating damage from floodwaters.
- Regulating improvements by riparian property owners of beds, banks, and shores of lakes, streams, and wetlands for preservation and beneficial public use.[24]

Per state statute, watershed districts are required to submit watershed management plans to the Minnesota Board of Water and Soil Resources. The plans should describe water-related challenges and solutions under BWSR's watershed management plan guidelines.[25] The districts should also submit annual reports that describe "the financial conditions of the watershed district, the status of all projects, the business transacted by the watershed district, [and] other matters affecting the interests of the watershed district."[26]

Budgeting and raising local revenue

Minnesota requires watershed districts to maintain a general fund, a bond fund, an organizational expense fund, and construction and local implementation funds. By statute, Minnesota's watershed districts can levy taxes to fund initial and ongoing project expenses, as well as operational expenses associated with regional planning, data acquisition, and debt repayment.[28] Watershed districts can also raise funds by issuing bonds and taking on debt. The state also limits how the districts can collect and use tax funds. The chart below describes state rules governing the taxing ability of Minnesota watershed districts.[29]

Sample expenses for a Minnesota watershed district[27]



ALLOWABLE USES OF TAX FUNDS	ADDITIONAL REQUIREMENTS
Organizational expenses and preparation of the watershed management plan for projects.	Watershed districts can assess an ad valorem levy not to exceed 0.01596 percent of estimated market value, or $60,000 (whichever is less).
General administrative expenses for the construction or implementation and maintenance of projects.[30]	Watershed districts can assess an ad valorem levy not to exceed 0.048 percent of estimated market value, or $250,000 (whichever is less).
Survey and data acquisition.	Watershed districts can assess a levy not to exceed 0.02418 percent of estimated market value and can be levied once every five years.
Costs attributed to basic water management features of projects initiated by petition.	The levy is not to exceed 0.00798 percent of estimated market value.
Costs associated with watershed district projects, including debt repayment.	N/A

A closer look at watershed-wide collaboration and coordination: Red River Watershed Management Board

Minnesota's watershed districts laid the ground for other innovative watershed-based approaches to flood risk planning and management, such as the Red River Watershed Management Board (RRWMB). In 1976, the Minnesota legislature passed a law that established the board, which provides a watershed-scale approach to flooding.[31] After widespread and severe flooding throughout the Red River Basin in the 1960s and 1970s, local leaders met with state legislators.

Within four months of the bill being introduced, the state passed legislation to enable existing watershed districts to come together under a joint powers agreement. The legislation gave the board power to develop, construct, and maintain flood control projects and programs of "common benefit." It also allowed member watershed districts to levy up to two mills ad valorem tax (i.e., $2 tax per $1000 of assessed property value) for flood water retention projects. One-half of the tax collected is retained by the individual member watershed district for projects within the district, while the other half is transferred to the watershed management board.[32]

Today, the RRWMB's jurisdiction and authority encompasses significant farmland, where more than 80 percent of the land is devoted to agriculture. The area is managed by 11 individual watershed districts over 21 counties and 150 cities; seven of those watershed districts are members of the RRWMB.

Over nearly 50 years, the RRWMB has coordinated and financed more than 60 projects to store water and reduce flooding. RRWMB Executive Director Rob Sip estimates that the RRWMB has helped leverage $65 million for flood projects in the region. When state or local funds are unavailable or a match is required, the RRWMB can help its members raise funds. Because the board can directly fund projects, the region can design and construct projects quickly, which helps reduce additional costs incurred from inflation.

The RRWMB develops tools, studies, and measures to better understand flood risk; educates and engages communities about flood solutions; and coordinates and assists in private, local, state, interstate, federal, and international water management.

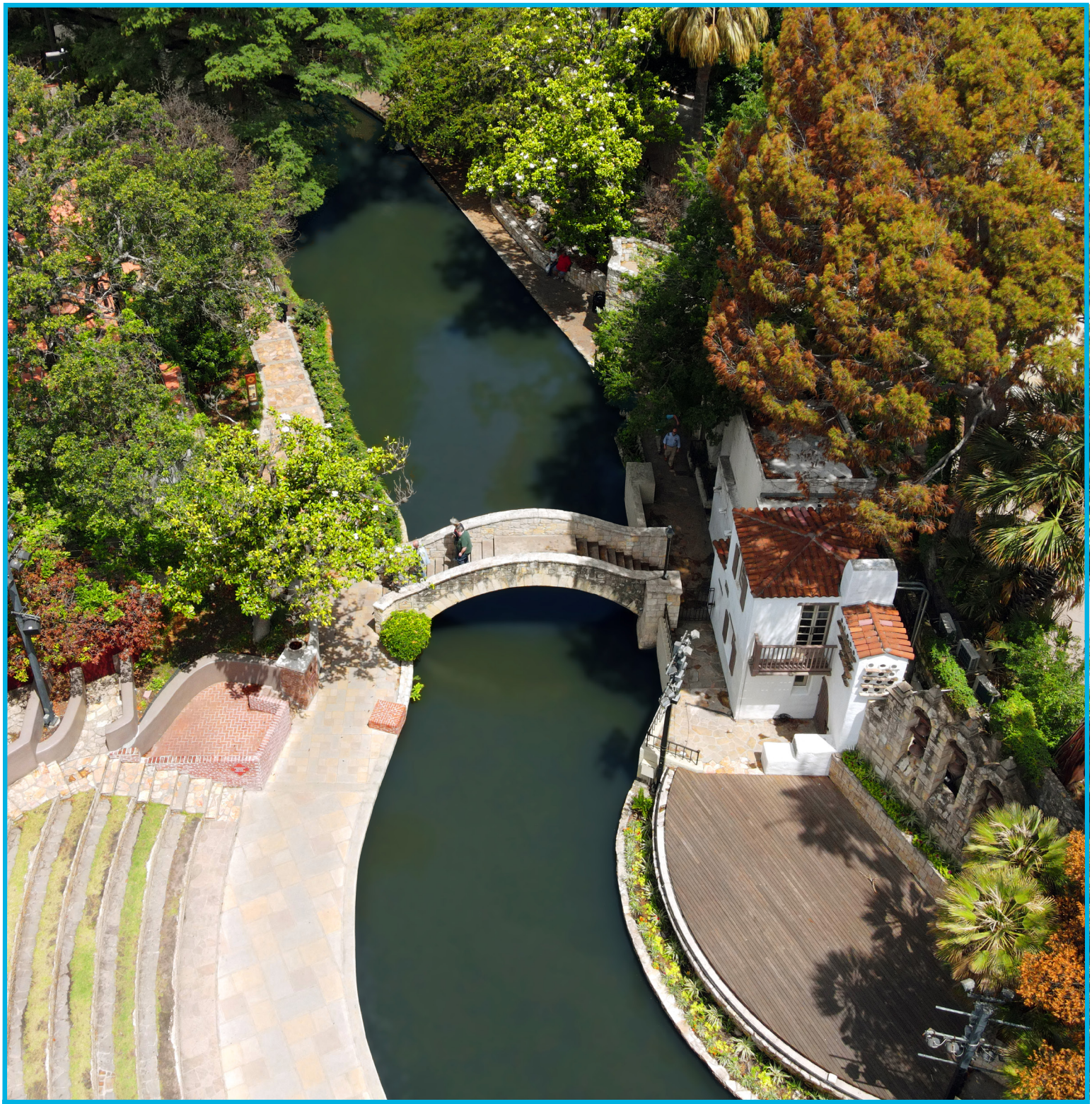
The RRWMB also ensures environmental health is prioritized within its member districts' flood plans. Mandated by the state to participate in a mediation process with the Minnesota Department of Natural Resources, the RRWMB convened a stakeholder group, the Red River Basin Flood Damage Reduction Work Group, to agree on long-term solutions to reduce flood damage and protect and enhance natural resources.[33] Work group participants developed guides for watershed planning, project development, and permit processes.[34]

Key insights

Minnesota's watershed districts are some of the strongest regional flood management entities in the country. By levying taxes, water districts can swiftly construct flood resilience projects; however, watershed districts are limited in the scale of projects that they can complete.

Flood infrastructure projects, which typically do not generate revenue like other forms of infrastructure, are costly and complicated. Without adequate or consistent funding from the state, water districts cannot carry out larger-scale flood projects. States looking to replicate Minnesota's watershed districts should explore how to use state and federal funds to support regional flood resilience.

In states with large low-income regions and communities, the self-financing approach of Minnesota's watershed districts may be unfeasible, as an additional tax burden may be too cumbersome.



Texas Regional Flood Planning Groups

Texas's 15 regional flood planning groups, based on major river basins, play a key role in developing Texas's first state flood plan. The regional groups represent diverse backgrounds, with members from state and local government, small businesses, utilities, nonprofits, and the agricultural and environmental sectors.

WATERSHED-BASED GROUP	REGIONAL FLOOD PLANNING GROUPS
Mandates	• Holistic watershed management • Water quality management • Water quantity/supply management
Activities	• Regional flood risk assessments and other data collection • Regional planning • Watershed modeling, mapping, and monitoring • Educating elected officials
Authority	Develop regional flood plans
Lead State Agency	Texas Water Development Board

Background: Texas statewide flood planning

After Hurricane Harvey, which affected nearly a third of Texans, state leaders began viewing flood resilience as a core function of state government.[35] In seeking ways to reduce vulnerability, the legislature tasked the Texas Water Development Board (TWDB) to develop a state flood assessment. The TWDB reached out to floodplain administrators and stakeholders, whose views formed the basis of this assessment.

The board found that flood risks, impacts, and costs of mitigation have never been assessed at the statewide level and that the state lacks a statewide strategic plan to manage flood risk. The board also found that statewide flood mitigation would cost more than $31 billion over the next decade, with communities likely experiencing significant shortfalls in local funding. Additionally, Texas — much of which is unmapped — uses decades-old rainfall data and outdated maps to inform community planning and design.

Stakeholders expressed how sound science and data are key to effective planning and flood mitigation and also how they need more resources for floodplain management and mitigation.[36] Based on these findings, the board recommended that the state develop policies and goals that support three key pillars of investment:

+ Improving and updating flood mapping and modeling.
+ Coordinating watershed-based planning.
+ Carrying out mitigation efforts, such as policy enhancements, increased technical assistance, and financial assistance, for project implementation.[37]

In early 2019, the Texas Legislature passed a series of bills to support disaster relief, flood protection, and flood planning. The legislation greatly expanded the Texas Water Development Board's role in flood planning and financing and tasked the board to establish and administer the state's first flood mitigation plan.

To fund resilience projects, studies, and federal match requirements, the legislature also established the Flood Infrastructure Fund. Voters overwhelmingly supported a constitutional amendment that would establish the fund, allowing for $793 million to be transferred from the state's economic stabilization fund.[38] To date, more than $70 million from the Flood Infrastructure Fund has been distributed to local authorities to study watersheds larger than a HUC-10 to better inform resilience strategies.[39]

Another $685 million was appropriated for the newly created Texas Infrastructure Resilience Fund. This fund, also administered by the TWDB, provides $23.7 million for the TWDB's flood science and mapping across the state and nearly $30 million for flood planning among the 15 regional flood planning groups.[40]

In 2023, the Texas legislature approved an additional $625 million in funding for the Flood Infrastructure Fund.

Texas's regional flood planning groups

As part of the new state flood planning process, the Texas Water Development Board designated 15 regional flood planning groups, based on major river basins. Each group must complete a regional flood plan, which the TWDB will review and incorporate into the statewide flood mitigation plan.

To select initial members of the regional flood planning groups, the TWDB conducted public outreach, receiving more than 600 nominations over two months. The TWDB selected members from this pool, complying with the state statute that each regional flood planning group includes representation from 12 sectors: agriculture, counties, electric generating utilities, environment, flood districts, industry, municipalities, small business, public, river authorities, water districts, and water utilities in the river basin.[41]

Additionally, a representative from each of the following offices is to serve as a non-voting member: TWDB, Texas Commission on Environmental Quality, General Land Office, Texas Parks and Wildlife Department, Texas Department of Agriculture, State Soil and Water Conservation Board, and Texas Division of Emergency Management.[42] Some members have technical flood experience, but many do not and "are valued for their unique local perspective related to flood-related issues."[43]

Texas's regional flood planning groups build on the state's regional approach to water supply management — specifically, the state's regional water planning groups, which also center local knowledge and experience. TWDB Director of Flood Planning Reem Zoun noted why local participation at the watershed-scale is important: "[It] allow[s] entire regions with a shared hydraulic connection to plan together and address their flood risk in a way that focuses on their unique needs."[44]

The ins and outs of Texas's regional flood plans

The regional flood plans, completed in January 2023, evaluate existing and future flood risk, set regional goals for flood protection, and estimate expected costs. The flood plans also provide recommendations on Flood Management Projects that reduce flood risk, mitigate flood hazards to life or property. These recommendations must include the following:

- Metrics on flood severity, flood risk/damage reduction.
- Estimated capital and operations and maintenance costs, benefit-cost ratios, environmental benefits/impacts.
- Potential for natural flood mitigation.
- Implementation constraints.
- Water supply benefits.

Regional flood planning groups must ensure that their proposed projects do not contribute to "a negative effect on any neighboring area."[45] If there is insufficient data to assess whether a project has a negative impact, the regional flood planning group can recommend Flood Management Evaluations — studies to identify flood risk or flood solutions.

Additionally, regional flood plans include recommendations on Flood Management Strategies — long-term flood risk reduction solutions that haven't been developed. Regional flood plans should also include legislative, regulatory, and administrative recommendations to manage floodplains, as well as plan and carry out flood projects.

PROJECT CATEOGRY	PROJECT TYPES
Flood management projects	**Structural** • Low water crossing or bridge improvements • Infrastructure (channels, ditches, ponds, stormwater pipes, etc.) • Regional detention • Regional channel improvements • Storm drain improvements • Reservoirs • Dam improvements, maintenance, and repair • Flood walls/levees • Nature-based projects — living levees, storage increases, channel roughness, peak-flow desynchronization, dune management, riparian restoration, run-off pathway management, wetland restoration, low-impact development, playas improvements • Comprehensive regional project — a combination of projects that work together

PROJECT CATEOGRY	PROJECT TYPES
Flood management projects (continued)	**Non-structural** • Property or easement acquisition • Elevation of individual structures • Flood readiness and resilience • Flood early warning systems, including stream gages and monitoring stations • Floodproofing • Regulatory requirements for reduction of flood risk
Flood management evaluations	• Watershed planning • Hydrologic and hydraulic modeling • Flood mapping updates • Regional watershed studies • Engineering project planning • Feasibility assessments • Floodproofing • Preliminary engineering • Property or easement acquisition • Regulatory requirements for reduction of flood risk • Studies on flood preparedness projects
Flood management strategies	• Flood mitigation education and outreach • Area-wide low water crossing flood mitigation studies and projects • Buyout program identification and funding • Regional flood warning measures • Flood management regulation

A closer look at watershed-based collaboration and coordination: San Antonio Flood Planning Region 12

Securing funds for flood resilience is challenging on any scale. San Antonio Flood Planning Region 12 (SAFPR) sought to understand local funding barriers and the funding needs of entities sponsoring the recommended flood management projects, evaluations, and strategies. As part of its regional planning, SAFPR conducted a flood infrastructure financing survey, which included in-person meetings, phone calls, and emails with project sponsors. SAFPR made four recommendations for how the state could best support local sponsors in raising capital funds.

SAFPR recommended that the state allow the regional flood planning group to establish funding priorities in its basin to encourage grassroots, 'bottom-up' planning."[46] Despite the years it took to develop the regional plan, the planning group has no assurance that any projects will be funded or that regional planning will even continue. The regional flood planning group suggested several ways to continue funding and planning, including allowing regional flood planning groups to recommend projects, develop funding studies, create cooperative agreements, and apply for federal funding.

SAFPR also encouraged the state to consider establishing a recurring source of funding to carry out recommendations in the regional flood plan, increase grant funds, and establish favorable loan terms.[47] The Texas Water Development Board will consider these suggestions during the next cycle of regional and state flood planning.

Key insights

Texas's regional flood planning groups provide a model for inclusive watershed-based collaboration and coordination. By including stakeholders from different backgrounds — an approach demonstrated by the state's regional water planning groups as effective — Texas better understands communities' flood risks and how to improve resilience and equity. States wishing to replicate this membership structure should explore expanding stakeholder groups to include other local perspectives, such as from young people, education professionals, environmental leaders, and Indigenous communities.

Texas's regional flood planning groups also emphasize the importance of adequate funding for ongoing watershed-scale planning and implementation. Without consistent funds for ongoing collaboration and coordination, most communities revert to traditional flood resilience approaches, instead of watershed-scale planning that emphasizes natural features and processes.

Conclusion

For most communities, watershed-based flood resilience entities represent a novel approach. Most communities engage in flood planning and management at the municipal, county, or state level. But as we know, when it comes to flooding and sea level rise, water doesn't respect political or jurisdictional boundaries. As flood risk intensifies and infrastructure ages, states will increasingly need watershed-based and watershed-scale approaches to flood management and planning.

With Louisiana's watershed regions, Minnesota's watershed districts, and Texas's regional flood planning groups, states can explore new examples of flood risk management and planning. States can model these approaches in four ways:

Authorize watershed-based flood resilience entities statewide.

Watershed-based flood entities need statutory authority to advance watershed collaboration and coordination. State leaders should grant entities authorities to do the following:

- Engage local, state, and federal partners.
- Provide technical assistance to local governments.
- Develop watershed-scale flood risk assessments and models.
- Lead regional planning and identify project needs.
- Implement flood resilience initiatives and capital projects.

Additionally, these entities must collectively cover the full state to ensure adequate coordination and flood protection.

Dedicate funding and resources to launch and maintain watershed-based collaboration and coordination.

Before developing watershed-based flood planning and management practices, communities must consider flood risk beyond political boundaries. To effectively carry out this approach to flood resilience, watershed-based entities need financial support, including for staff time, partners and community engagement, data analysis, and policy research.

Set a vision for how watershed-based entities interact with and advance state flood resilience priorities.

It is essential for state leaders to support watershed-scale approaches to flood risk planning and management. Such support signals the importance of collaborative and coordinated action and provides legitimacy for new ways of working at the local, regional, and state scale.

Include representation from non-governmental entities, including civic groups and Indigenous communities, in the leadership of watershed-based flood resilience entities.

By including the whole community in watershed-based flood planning and management, states can build resilient communities that address past injustices and equitably protect upstream and downstream communities.

Sources

[1] By 2100, the number of NFIP policies may increase by 100 percent. AECOM, The Impact of Climate Change and Population Growth on the National Flood Insurance Program. NOAA, 2022 U.S. Billion-dollar Weather and Climate Disasters in Historical Context.

[2] Case studies were selected for inclusion on the basis that the watershed- or river basin-based approach is currently ongoing, has funding to implement projects, and has demonstrated community impact.

[3] National Congress of State Legislators, Flood Mitigation.

[4] To date, there are nine watershed regions.

[5] Louisiana Watershed Initiative, Local and Regional Projects.

[6] The Advocate, Catastrophe Modeler Estimates Louisiana Flood Damage at $8.5 Billion to $11 Billion.

[7] Interview, Pat Forbes, March 1, 2023.

[8] In April 2022, introduced Senate Bill 414 which would establish the Watershed Management Council within the Division of Administration, Office of Planning and Budget.

[9] Office of Governor John Bell Edwards, A Long-term Vision for Statewide Sustainability and Resilience.

[10,11] State of Louisiana Office of Community Development, Louisiana Master Action Plan for the Utilization of Community Development Block Grant Mitigation Funds.

[12] Louisiana Watershed Initiative, Regional Capacity Building Grant Program.

[13] Louisiana Watershed Initiative, Regional Watershed Management, Governance Exercises Briefing Book.

[14] Louisiana Watershed Initiative, Regional Capacity Building Grant Program.

[15] Lafayette Consolidated Government, Know Your Food Risk.

[16] Shona M. Gibson (FEMA), A Regional Watershed Approach to Disaster Recovery.

[17] Acadiana Planning Commission, LWI Region 5 Committees. Acadiana Planning Commission, LWI Region 5 Action Plan.

[18] Louisiana State Legislature, Senate Bill No. 102: Act No. 323.

[19] Interview, Kelia Fontenot Bingham, March 1, 2023.

[20] Louisiana Watershed Initiative, Resources Library.

[21] Acadiana Planning Commission, LWI Funded Projects.

[22] Ramsey-Washington Metro Watershed District. Minnesota Watershed History. Thomas W. Christensen (USDA), The U.S. Department of Agriculture's Role in America's Private Lands Conservation Movement.

[23] Minnesota Legislature, 2022 Minnesota Statutes: District and Managers' Powers.

[24] Minnesota Legislature, 2022 Minnesota Statutes: Watershed District Purposes.

[25] Minnesota Legislature, 2022 Minnesota Statutes: Watershed Management Plan.

[26] Minnesota Legislature, 2022 Minnesota Statutes: Annual Report.

[27] Minnehaha Creek Watershed District, 2023 MCWD Budget & Workplan.

[28] A small number of watershed-based flood planning and management entities, including the Southwest Florida Water Management District, have taxing authority. For more information, see American Flood Coalition, Living Digital Watershed: A Case Study of the Southwest Florida Water Management District.

[29] Minnesota Legislature, 2022 Minnesota Statutes: Funds of the Watershed District.

[30] Allowable use of tax funds includes building and maintenance of reservoirs, ditches, dikes, canals, channels, stormwater facilities, sewage treatment facilities, wells, and other works, and the expenses incident to and connected with their construction or implementation.

[31] The RRWMB was originally named the Lower Red River Watershed Management Board.

[32] Red River Watershed Management Board, Enabling Legislation, Red River Watershed Management Board.

[33] In addition to the DNR and RRWMB, the work group ultimately included representation for federal and state agencies, public interest environmental groups, municipalities, and a range of citizens from the basin. One Native American tribe elected to participate as a special observer, however, is no longer a participant.

[34] RRWMB, 1998 Mediation Agreement: 2020 Mediation Agreement, 2020 Addendum, 2021 Partner Recommitment.

[35] Jeff Walker (Texas Water Development Board), Overview of Texas Flood Planning.

[36,37] Texas Water Development Board, State Flood Assessment.

[38] Ballotpedia, Texas Proposition 8, Flood Infrastructure Fund Amendment (2019).

[39] Texas Water Development Board, Flood Infrastructure Fund (FIF) Project Reporting Dashboard.

[40] Jeff Walker (TWDB), Overview of Texas Flood Planning. State of Texas Legislative Budget Board, Flood Planning and Infrastructure Funding.

[41] Texas Legislature, Senate Bill 8.

[42] Representatives from these state agencies also develop guidance principles for regional and state flood planning.

[43] R. Zoun, J. Bronikowski, & T. Olsen (TWDB), Update on the TWDB's Texas-Sized State and Regional Flood Planning Effort.

[44] R. Zoun (TWDB), Update on the TWDB's Texas-Sized State and Regional Flood Planning Effort.

[45] Texas Legislature, Senate Bill 8.

[46, 47] San Antonio Regional Flood Planning Group, 2023 San Antonio Regional Flood Plan.