Planning for Climate Resilience and Adaptation

A Compilation of Planning Process and Financial Assistance Resources for Communities in the South Central United States

SCIPP
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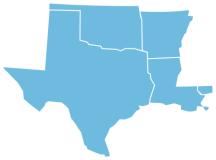

RISA
Regional Integrated Sciences and Assessments

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Planning for Climate Resilience and Adaptation: A Compilation of Planning Processes and Financial Assistance Resources for Communities in the South Central United States

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This document is intended to provide resources for climate resilience and adaptation planning. This is not an exhaustive list of all resources. Rather, it is a high-level list to aid in planning processes.

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1. Why Plan for Climate Resilience and Adaptation?

Climate change is a consideration for land use, transportation, natural hazards, and coastal management planning. It involves a two-pronged approach: mitigation and adaptation. Mitigation consists of actions taken to slow or stop climate change – to keep the problem from occurring. Responses intended to address the "cause" of human-induced climate change (e.g., production of CO2 and other greenhouse gas (GHG) emissions and deforestation) through reductions in vehicle-miles traveled, green building techniques, and reforestation are classified as mitigation measures. Adaptation refers to actions that deal with the effects of climate change, such as revising floodplain ordinances to address higher water levels. Efforts to address the "symptoms" of climate change (e.g., drought, intense precipitation, sea-level rise, and heat waves) through water resource management, stormwater control, coastal hardening, and providing shelters for at-risk populations can be considered measures of adaptation.[1] In general, there are planning strategies that can be applied to address both the causes and effects of climate change.

The need for both mitigation and adaptation responses to climate change makes planning central to any policy solution. Planners must play a key role in promoting energy efficiency in the existing built environment and changing development patterns, transportation systems, and regulations in ways that reduce GHG emissions, while simultaneously enhancing the resilience of communities to unavoidable climate impacts through adaptative responses such as stormwater management, improved hazards planning, and efficient use of climate-sensitive resources like water.

Many communities have invested considerable effort in producing smart growth and sustainability plans to encourage a more effective and efficient use of resources, to promote sound fiscal policy, and to achieve infrastructure, economic development, social equity, and environmental objectives. Virtually all of these initiatives have positive outcomes for climate change responses. For example, a more compact, interconnected development pattern reduces vehicle emissions (a climate change goal) while promoting efficient use of infrastructure, public health, and environmental stewardship (all smart growth/sustainability goals). By promoting the similarities between smart growth, sustainability and climate change mitigation and adaptation, planners can affect positive outcomes, whereby actions taken to adapt to or mitigate climate change are ones that often are taken anyway for other reasons related to smart growth and sustainability.

This guide includes *planning process*-related resources that are recommended by SCIPP. It does not cover every available resource but rather a shorter list to reduce the length of the document. If you need to access weather and climate **data** for your area or need information on how climate change is expected to impact each hazard, check out our **Simple Planning Tools (SPT) for Arkansas and Oklahoma** on the *Data Tools* tab of the SCIPP website, www.southernclimate.org. A SPT for Texas is in progress, and a version for Louisiana has not yet been created but may be if there is enough interest. If you are interested in such a version, please email scipp@southernclimate.org.

[1] "American Planning Association: Policy Guide on Planning and Climate Change."

2. Climate Variability and Change in the South Central United States

Although some climate change impacts are anticipated to be common to every region of the United States, such as more intense weather events and negative effects on ecosystems and habitats, many impacts will vary by region. Additionally, vulnerable populations, such as lower income and elderly populations, are more at risk and will bear the brunt of many climate change impacts. Indigenous populations, particularly Native Americans subsisting in traditional ways, will also face significant difficulties disproportionate to other populations as a result of climate change. Consequently, planners need to ensure that the responses they develop to address the impacts of climate change take into account the varied needs of all sectors of the community in order to equitably meet the significant challenges facing us.

Climate change consequences likely to occur in the South Central U.S. Region are:[2]

- More summer droughts and extreme heat events
- More frequent, longer, and more intense forest and grassland fires
- Greater vulnerability of forests due to insects and disease
- Water resource conflicts
- Longer and more intense allergy seasons and respiratory issues
- Decreased water quality
- Higher sea levels and more erosion in coastal areas (Texas/Louisiana)
- More frequent and harmful floods
- Increased intensity of winter storms

To avoid negative impacts now and in the future, we must both mitigate and adapt to climate change. We must try to reduce or even eliminate greenhouse gas emissions, and we must prepare and make adjustments that will be needed to meet new environmental conditions. All levels of government and society must work together on this problem.

To read more about climate change impacts to your region, visit the 2018 National Climate Assessment Southern Plains (OK/TX) and Southeast (AR/LA) Chapters. These chapters include information about changes in climate, such as precipitation and temperature, coastal impacts, infrastructure risks, economic and societal risks, and compounding stresses and constraints to adaptation in rural communities, to name a few. Also included in the NCA is a chapter for reducing risks through adaptation actions, which ties together climate change and how individuals and communities can reduce their risk and increase resilience.

The Simple Planning Tools for Oklahoma and Arkansas climate hazards are also valuable resources that provide a historical climatology with links and instructions to existing tools and future trend information for multiple hazards. In addition, hazard definitions and incentive and action programs for hazard risk reduction are included. This tool saves users time by providing multiple sources in one document that is tailored to the state.

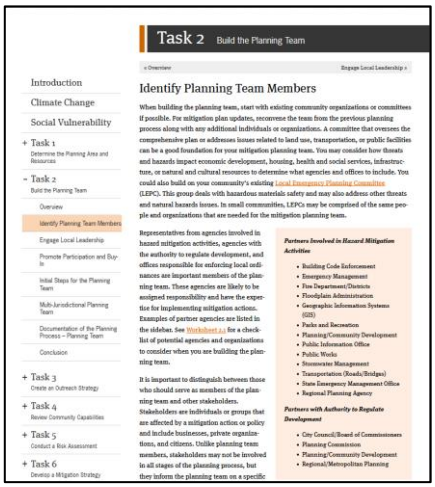
[2] USGCRP, "Fourth National Climate Assessment."

3. Documents and Websites

Multi-/All Hazards Guidance

GUIDES

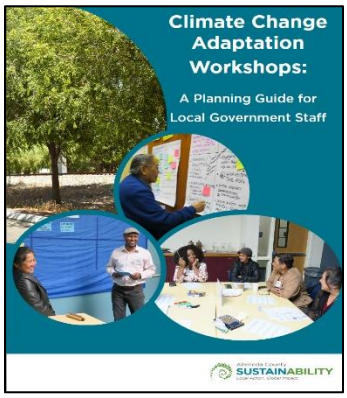
Beyond the Basics: Best Practices in Local Mitigation Planning



The website is designed to help guide communities through the process of developing or updating a local hazard mitigation plan that will meet the requirements for approval by the Federal Emergency Management Agency (FEMA). The website offers practical approaches and examples for how communities can engage in effective planning to reduce long-term risk from natural disasters. These examples of best practices were culled from some of the best local hazard mitigation plans in the U.S.

The website is based on the FEMA Handbook "Local Mitigation Planning Handbook". Like the FEMA Handbook, the website is intended to be used by emergency managers, planners, consultants, and others who are updating an existing hazard mitigation plan or preparing a new one. The website can be used to prepare a plan for a single jurisdiction or for multiple jurisdictions.

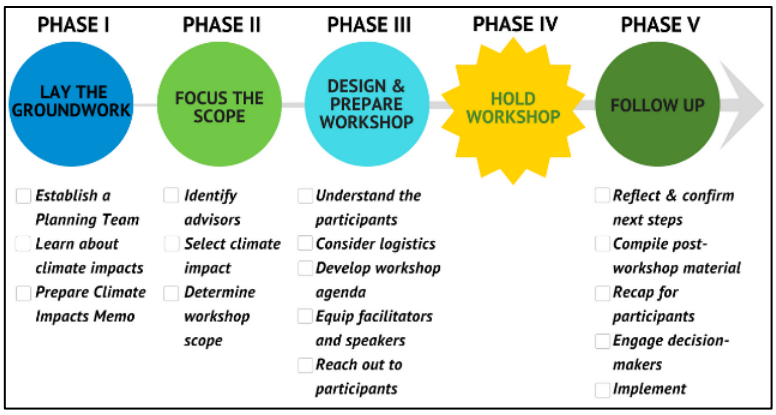
Climate Change Adaptation Workshops: A Planning Guide for Local Government Staff – 2018 (24 pages)



The Climate Change Adaptation Workshop Planning Guide was developed to support public agencies to begin identifying and implementing climate change adaptation strategies. This guide outlines a methodology to help facilitate a team toward identifying tangible adaptation initiatives and securing necessary ownership and approvals. The methodology centers on a single half-day workshop. In the guide, there are steps to plan, conduct, and evaluate a workshop for a department or program. The ideal workshop not only presents information to make a case for adaptation but also, most crucially, shrinks down what must be done next to a reasonable scope so that staff can act. The guide was developed for Alameda County, California but the framework is transferrable to other locations across the United States.

Sample Workshop Materials:

- Guidebook
- Agendas
- Presentations
- Breakout Group Worksheets
- Materials Checklist
- Evaluation



Planning for Hazards: Land Use Solutions for Colorado

PLANNING FOR HAZARDS
Land Use Solutions for Colorado

The website enables counties and municipalities to prepare for and mitigate multiple hazards by integrating resilience and hazard mitigation principles into plans, codes, and standards related to land use and the built environment. This guide provides detailed, Colorado-specific information about how to assess a community's risk level to hazards and how to implement numerous land use planning tools and strategies for reducing a community's risk. Although it is tailored for Colorado, many of the concepts and hazards are relevant to the South Central region of the U.S.

SUMMARY OF PLANNING TOOLS AND STRATEGIES

	Avalanche	Drought	Earthquake	Flood	Hazardous Material Release	Extreme Heat	Landslide, Mud/ Debris Flow, and Rockfall	Soil Hazards	Wildfire	Wind Hazards	Severe Winter Storm
ADDRESSING HAZARDS IN PLANS AND POLICIES											
Comprehensive Plan	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Climate Plan	✓	✓		✓		✓	✓		✓	✓	✓
Community Wildfire Protection Plan (CWPP)									✓		
Hazard Mitigation Plan	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Parks and Open Space Plan	✓	✓		✓			✓	✓	✓		
Pre-Disaster Planning	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
STRENGTHENING INCENTIVES											
Community Rating System				✓							
Density Bonus	✓			✓			✓	✓	✓		
Development Agreement	✓			✓	✓		✓	✓	✓		
Transfer of Development Rights	✓			✓			✓	✓	✓		
PROTECTING SENSITIVE AREAS											
1041 Regulations	✓	✓	✓	✓	✓		✓	✓	✓		
Cluster Subdivision	✓			✓			✓	✓	✓		
Conservation Easement	✓			✓			✓	✓	✓		
Land Acquisition	✓			✓			✓	✓	✓		
Overlay Zoning	✓			✓			✓	✓	✓		
Stream Buffers and Setbacks				✓			✓				
IMPROVING SITE DEVELOPMENT STANDARDS											
Stormwater Ordinance		✓		✓			✓	✓			
Site-Specific Assessment	✓			✓			✓	✓	✓		
Subdivision and Site Design Standards	✓	✓		✓	✓		✓	✓	✓		
Use-Specific Standards	✓			✓	✓		✓	✓	✓		
IMPROVING BUILDINGS AND INFRASTRUCTURE											
Building Code	✓	✓	✓	✓			✓	✓	✓	✓	✓
Critical Infrastructure Protection	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓
Wildland-Urban Interface (WUI) Code									✓		
ENHANCING ADMINISTRATION AND PROCEDURES											
Application Submittal Requirements	✓			✓	✓		✓	✓	✓		
Post-Disaster Building Moratorium			✓	✓	✓		✓	✓	✓		

Sustaining Places: Best Practices for Comprehensive Plans (Free for APA members) – 2015 (64 pages)

The document offers a framework with standards for creating livable, healthy communities in harmony with nature — communities that have resilient economies, social equity, and strong regional ties. Four steps show how to turn those principles into a plan and score the results. Insights from 10 pilot communities add the real-world perspectives of big cities, small towns, and everything in between.

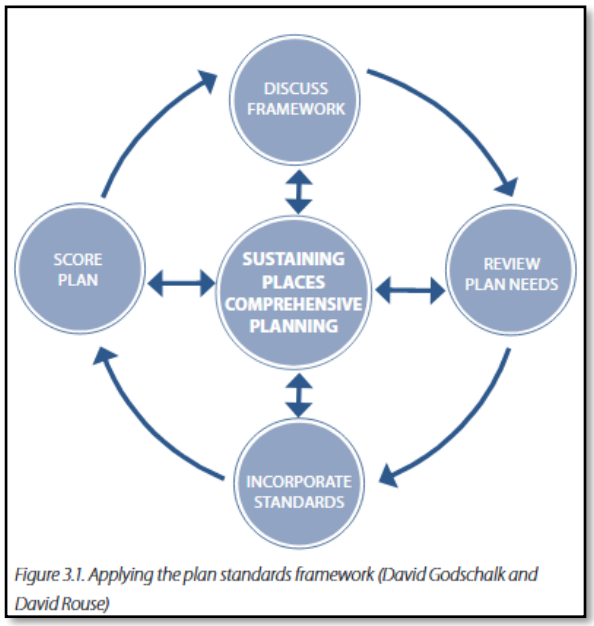
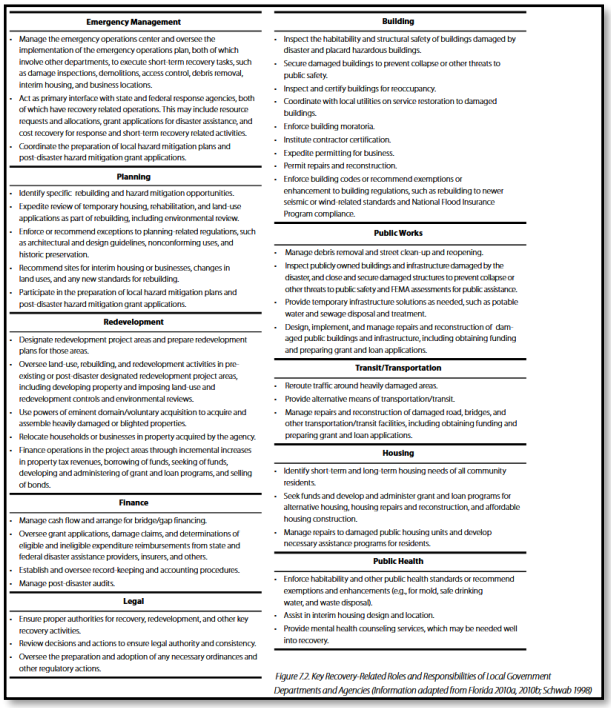


Figure 3.1. Applying the plan standards framework (David Godschalk and David Rouse)



Emergency Management
- Manage the emergency operations center and oversee the implementation of the emergency operations plan, both of which involve other departments, to execute short-term recovery tasks, such as damage inspections, demolitions, access control, debris removal, interim housing, and business locations.
- Act as primary interface with state and federal response agencies, both of which have recovery related operations. This may include resource requests and allocations, grant applications for disaster assistance, and cost recovery for response and short-term recovery related activities.
- Coordinate the preparation of local hazard mitigation plans and post-disaster hazard mitigation grant applications.

Planning
- Identify specific rebuilding and hazard mitigation opportunities.
- Expedite review of temporary housing, rehabilitation, and land-use applications as part of rebuilding, including environmental review.
- Enforce or recommend exceptions to planning-related regulations, such as architectural and design guidelines, nonconforming uses, and historic preservation.
- Recommend sites for interim housing or businesses, changes in land uses, and any new standards for rebuilding.
- Participate in the preparation of local hazard mitigation plans and post-disaster hazard mitigation grant applications.

Redevelopment
- Designate redevelopment project areas and prepare redevelopment plans for those areas.
- Oversee land-use, rebuilding, and redevelopment activities in pre-existing or post-disaster designated redevelopment project areas, including developing property and imposing land-use and redevelopment controls and environmental reviews.
- Use powers of eminent domain/voluntary acquisition to acquire and assemble heavily damaged or blighted properties.
- Relocate households or businesses in property acquired by the agency.
- Finance operations in the project areas through incremental increases in property tax revenues, borrowing of funds, seeking of funds, developing and administering of grant and loan programs, and selling of bonds.

Finance
- Manage cash flow and arrange for bridge/gap financing.
- Oversee grant applications, damage claims, and determinations of eligible and ineligible expenditure reimbursements from state and federal disaster assistance providers, insurers, and others.
- Establish and oversee record-keeping and accounting procedures.
- Manage post-disaster audits.

Legal
- Ensure proper authorities for recovery, redevelopment, and other key recovery activities.
- Review decisions and actions to ensure legal authority and consistency.
- Oversee the preparation and adoption of any necessary ordinances and other regulatory actions.

Building
- Inspect the habitability and structural safety of buildings damaged by disaster and placard hazardous buildings.
- Secure damaged buildings to prevent collapse or other threats to public safety.
- Inspect and certify buildings for reoccupancy.
- Coordinate with local utilities on service restoration to damaged buildings.
- Enforce building moratoria.
- Institute contractor certification.
- Expedite permitting for business.
- Permit repairs and reconstruction.
- Enforce building codes or recommend exemptions or enhancement to building regulations, such as rebuilding to newer seismic or wind-related standards and National Flood Insurance Program compliance.

Public Works
- Manage debris removal and street clean-up and reopening.
- Inspect publicly owned buildings and infrastructure damaged by the disaster, and close and secure damaged structures to prevent collapse or other threats to public safety and FEMA assessments for public assistance.
- Provide temporary infrastructure solutions as needed, such as potable water and sewage disposal and treatment.
- Design, implement, and manage repairs and reconstruction of damaged public buildings and infrastructure, including obtaining funding and preparing grant and loan applications.

Transit/Transportation
- Reroute traffic around heavily damaged areas.
- Provide alternative means of transportation/transit.
- Manage repairs and reconstruction of damaged road, bridges, and other transportation/transit facilities, including obtaining funding and preparing grant and loan applications.

Housing
- Identify short-term and long-term housing needs of all community residents.
- Seek funds and develop and administer grant and loan programs for alternative housing, housing repairs and reconstruction, and affordable housing construction.
- Manage repairs to damaged public housing units and develop necessary assistance programs for residents.

Public Health
- Enforce habitability and other public health standards or recommend exemptions and enhancements (e.g., for mold, safe drinking water, and waste disposal).
- Assist in interim housing design and location.
- Provide mental health counseling services, which may be needed well into recovery.

Figure 7.2. Key Recovery-Related Roles and Responsibilities of Local Government Departments and Agencies (Information adapted from Florida 2010a, 2010b; Schwab 1998)

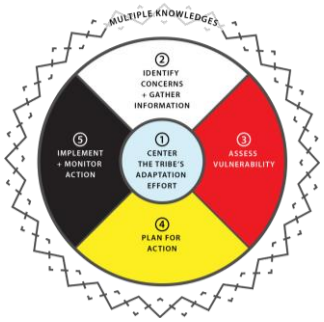
Playbook 1.0: How Cities Are Paying for Climate Resilience – 2019 (60 pages)

This document by the Innovation Network for Communities and Climate Resilience Consulting describes eight strategies for cities to develop financial capacity for building a response for climate change and provides eight case studies of how U.S. cities have developed funding for climate-resilience plans. Strategies and case studies are described in depth. The eight strategies include:

1. Generate local revenue.
2. Impose land-use costs.
3. Embed resilience standards into future infrastructure investments.
4. Leverage development opportunities.
5. Exploit federal funding niches.
6. Tap state government.
7. Develop financial innovations.
8. Pursue equity in resilience.

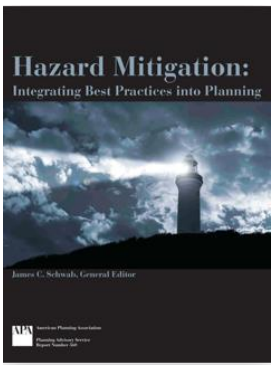
Tribal Climate Adaptation Guidebook – 2018 (124 pages)

This guide, created by the Oregon Climate Change Research Institute and Adaptation International, provides a framework for climate change adaptation while taking tribal priorities, Traditional Knowledge, and current climate-related work into account. It was intended to help tribes at multiple stages of planning, levels of funding, and staff capacity.



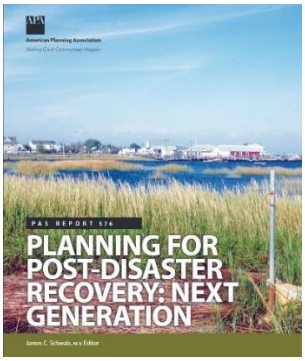
REPORTS AND INFORMATION/TOOL RESOURCES

Hazard Mitigation: Integrating Best Practices into Planning – 2010 (156 pages)



The report, prepared by the American Planning Association and supported by the Federal Emergency Management Agency, seeks to close the gap that often exists between hazard mitigation planning and other local planning and regulatory land-use processes. It introduces hazard mitigation as a vital area of practice for planners, provides guidance on how to integrate hazard mitigation strategies into comprehensive, area, and functional plans, and shows where hazard mitigation can fit into zoning and subdivision codes.

Planning for Post-Disaster Recovery: Next Generation – 2014 (200 pages)



The American Planning Association issued a report with the latest policies and procedures for local planners confronting all types of natural disasters: flood, earthquake, tornado, wildfire, and hurricane. The updated manual offers a no-nonsense explanation of the benefits — and limitations — of planning for unpredictable events. Case studies from big cities and smaller towns show what it takes to come back stronger from a natural disaster.

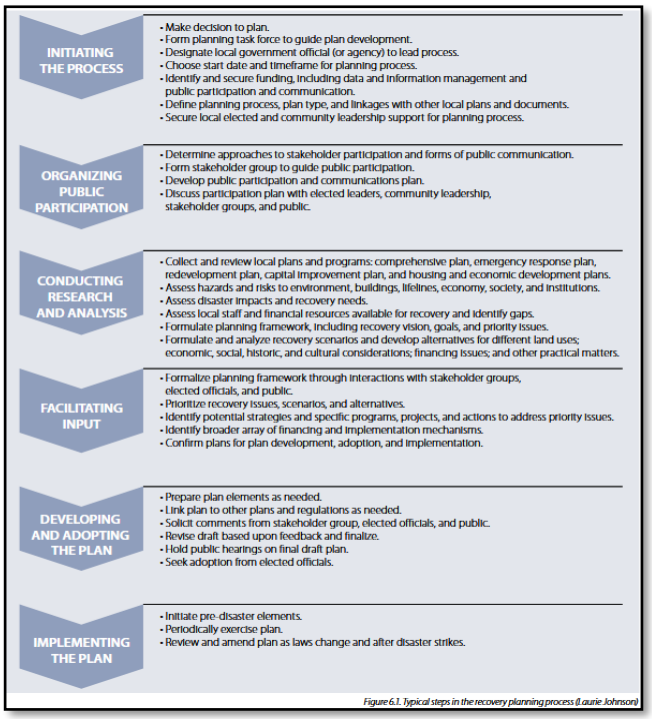


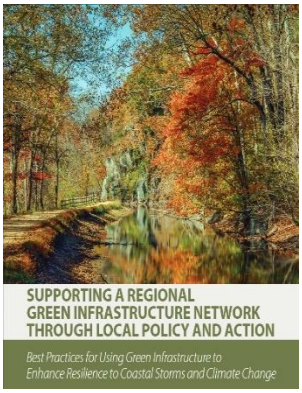
Figure 6.1. Typical steps in the recovery planning process (Laurie Johnson)

APPENDIX C: PLAN SCORING MATRIX

BEST PRACTICES FOR PLAN PRINCIPLES	N/A	0	1	2	3	Source
1. LIVABLE BUILT ENVIRONMENT—Ensure that all elements of the built environment, including land use, transportation, housing, energy, and infrastructure, work together to provide sustainable, green places for living, working, and recreation, with a high quality of life.						
1.1. Plan for multimodal transportation.						
1.2. Plan for transit-oriented development.						
1.3. Coordinate regional transportation investments with job clusters.						
1.4. Provide complete streets serving multiple functions.						
1.5. Plan for mixed land-use patterns that are walkable and bikeable.						
1.6. Plan for infill development.						
1.7. Encourage design standards appropriate to the community context.						
1.8. Provide accessible public facilities and spaces.						
1.9. Conserve and reuse historic resources.						
1.10. Implement green building design and energy conservation.						
1.11. Discourage development in hazard zones.						
TOTAL SCORE: 1. LIVABLE BUILT ENVIRONMENT						
2. HARMONY WITH NATURE—Ensure that the contributions of natural resources to human well-being are explictly recognized and valued and that maintaining their health is a primary objective.						
2.1. Restore, connect, and protect natural habitats and sensitive lands.						
2.2. Plan for the provision and protection of green infrastructure.						
2.3. Encourage development that respects natural topography.						
2.4. Enact policies to reduce carbon footprints.						
2.5. Comply with state and local air quality standards.						
2.6. Encourage climate change adaptation.						
2.7. Provide for renewable energy use.						
2.8. Provide for solid waste reduction.						
2.9. Encourage water conservation and plan for a lasting water supply.						
2.10. Protect and manage streams, watersheds, and floodplains.						
TOTAL SCORE: 2. HARMONY WITH NATURE						

N/A – Not applicable; 0 – Not present; 1 – Low achievement; 2 – Medium Achievement; 3 – High Achievement; Source (indicate where in the plan each best practice is discussed)

Supporting a Regional Green Infrastructure Network Through Local Policy and Action (Coastal Focus) – 2016 (15 pages)



The document outlines numerous potential green-infrastructure tools localities can use to enhance resilience to coastal storms and climate change. It includes noteworthy examples from within the Coastal Resilience for Greater Baltimore project area and across the country to illustrate each tool.

The five fundamental strategies identified are:

Natural Resource Protection: Preserve lands with valuable and vulnerable resources providing hazard mitigation and other co-benefits, including floodplains, wetlands, forest, stream systems, steep slopes, hydric and highly erodible soils, and important habitat areas.

Urban Forest Enhancement and Restoration: Maintain, enhance, and restore tree canopy in urban and suburban communities to reduce stormwater runoff, ameliorate the urban heat island effect, and improve air quality.

Multi-Benefit Green Stormwater Infrastructure: Retrofit developed areas to reduce impervious surface and incorporate best management practices such as bioretention areas, green streets, and green roofs to reduce vulnerability to flooding.

Critical Infrastructure Protection: Use green infrastructure to reduce extreme weather risks to critical infrastructure, including key transportation corridors, power production and transmission facilities, hospitals, and emergency management centers.

Coastal Defense: Preserve/restore natural habitat and introduce nature-based practices (e.g., living shorelines) to protect against coastal flooding, storm surge, and sea level rise.

U.S. Climate Resilience Toolkit Steps to Resilience

The U.S. Climate Resilience Toolkit provides a useful five-step process with detailed videos that outlines steps that communities can take to identify, assess, and confront their climate vulnerabilities. The site also provides resources (e.g., data, tools, case studies, training) from across the federal government to help communities put the process into action.

CAKE – Climate Adaptation Knowledge Exchange

The Climate Adaptation Knowledge Exchange (CAKE) is managed by EcoAdapt. It aims to build a shared knowledge base for managing natural and built systems in the face of rapid climate change. Just as importantly, it is intended to help build an innovative community of practice. It helps users to get beyond the limitations of their time and the unwieldy thicket of books, papers, and articles by:

- Vetting and clearly organizing the best information available,
- Building a community via an interactive online platform,
- Creating a directory of practitioners to share knowledge and strategies, and
- Identifying and explaining data tools and information available from other sites.

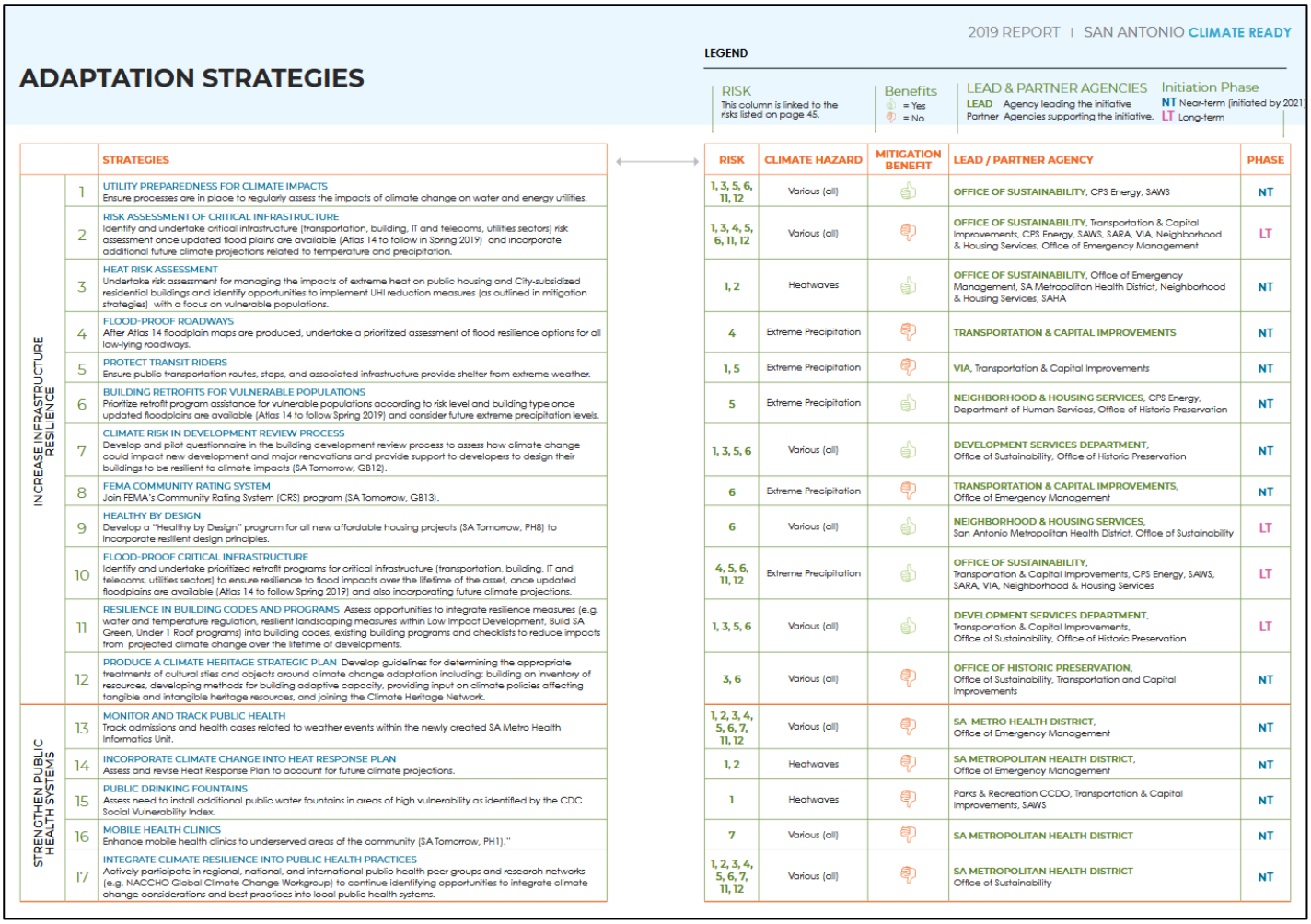
APA's Resiliency Book Collection

The expanded Resiliency Collection in the American Planning Association's E-book Library now offers almost 40 e-books and audiobooks about climate change, disaster resiliency, sustainability, and related topics. Only APA members may check out and get free, instant access to these online resources.

Jurisdiction-Specific Plan Examples

San Antonio Climate Ready – 2019 (43 pages)

SA Climate Ready is a community-driven plan to guide San Antonio's efforts to reduce its greenhouse gas contributions to climate change and prepare for current and future impacts. Along with its partners and members of the community, the City of San Antonio is developing a Climate Action and Adaptation Plan (CAAP). The CAAP will lay a roadmap to reduce carbon emissions, adapt to a changing climate, and ensure San Antonio remains a healthy, vibrant place for generations to come. At its core, the plan is about clean air, water quality, good jobs, transportation choices, clean and secure energy, emergency preparedness, and current and long-term quality of life.



2019 REPORT | SAN ANTONIO CLIMATE READY

ADAPTATION STRATEGIES

LEGEND

RISK: This column is linked to the risks listed on page 45.

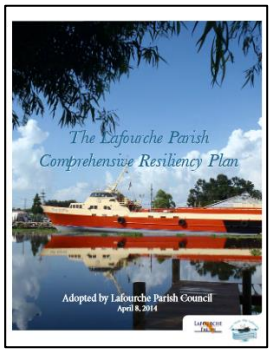
Benefits: = Yes, = No

LEAD & PARTNER AGENCIES: LEAD Agency leading the initiative; Partner Agencies supporting the initiative.

Initiation Phase: NT Near-term (initiated by 2021), LT Long-term

		STRATEGIES	RISK	CLIMATE HAZARD	MITIGATION BENEFIT	LEAD / PARTNER AGENCY	PHASE
INCREASE INFRASTRUCTURE RESILIENCE	1	UTILITY PREPAREDNESS FOR CLIMATE IMPACTS Ensure processes are in place to regularly assess the impacts of climate change on water and energy utilities.	1, 3, 5, 6, 11, 12	Various (all)	👍	OFFICE OF SUSTAINABILITY, CPS Energy, SAWS	NT
	2	RISK ASSESSMENT OF CRITICAL INFRASTRUCTURE Identify and undertake critical infrastructure (transportation, building, IT and telecoms, utilities sectors) risk assessment once updated flood plains are available (Atlas 14 to follow in Spring 2019) and incorporate additional future climate projections related to temperature and precipitation.	1, 3, 4, 5, 6, 11, 12	Various (all)	👎	OFFICE OF SUSTAINABILITY, Transportation & Capital Improvements, CPS Energy, SAWS, SARA, VIA, Neighborhood & Housing Services, Office of Emergency Management	LT
	3	HEAT RISK ASSESSMENT Undertake risk assessment for managing the impacts of extreme heat on public housing and City-subsidized residential buildings and identify opportunities to implement UHI reduction measures (as outlined in mitigation strategies) with a focus on vulnerable populations.	1, 2	Heatwaves	👍	OFFICE OF SUSTAINABILITY, Office of Emergency Management, SA Metropolitan Health District, Neighborhood & Housing Services, SAHA	NT
	4	FLOOD-PROOF ROADWAYS After Atlas 14 floodplain maps are produced, undertake a prioritized assessment of flood resilience options for all low-lying roadways.	4	Extreme Precipitation	👎	TRANSPORTATION & CAPITAL IMPROVEMENTS	NT
	5	PROTECT TRANSIT RIDERS Ensure public transportation routes, stops, and associated infrastructure provide shelter from extreme weather.	1, 5	Extreme Precipitation	👎	VIA, Transportation & Capital Improvements	NT
	6	BUILDING RETROFITS FOR VULNERABLE POPULATIONS Prioritize retrofit program assistance for vulnerable populations according to risk level and building type once updated floodplains are available (Atlas 14 to follow Spring 2019) and consider future extreme precipitation levels.	5	Extreme Precipitation	👍	NEIGHBORHOOD & HOUSING SERVICES, CPS Energy, Department of Human Services, Office of Historic Preservation	NT
	7	CLIMATE RISK IN DEVELOPMENT REVIEW PROCESS Develop and pilot questionnaire in the building development review process to assess how climate change could impact new development and major renovations and provide support to developers to design their buildings to be resilient to climate impacts (SA Tomorrow, GB12).	1, 3, 5, 6	Various (all)	👍	DEVELOPMENT SERVICES DEPARTMENT, Office of Sustainability, Office of Historic Preservation	NT
	8	FEMA COMMUNITY RATING SYSTEM Join FEMA's Community Rating System (CRS) program (SA Tomorrow, GB13).	6	Extreme Precipitation	👎	TRANSPORTATION & CAPITAL IMPROVEMENTS, Office of Emergency Management	NT
	9	HEALTHY BY DESIGN Develop a "Healthy by Design" program for all new affordable housing projects (SA Tomorrow, PH8) to incorporate resilient design principles.	6	Various (all)	👍	NEIGHBORHOOD & HOUSING SERVICES, San Antonio Metropolitan Health District, Office of Sustainability	LT
	10	FLOOD-PROOF CRITICAL INFRASTRUCTURE Identify and undertake prioritized retrofit programs for critical infrastructure (transportation, building, IT and telecoms, utilities sectors) to ensure resilience to flood impacts over the lifetime of the asset, once updated floodplains are available (Atlas 14 to follow Spring 2019) and also incorporating future climate projections.	4, 5, 6, 11, 12	Extreme Precipitation	👍	OFFICE OF SUSTAINABILITY, Transportation & Capital Improvements, CPS Energy, SAWS, SARA, VIA, Neighborhood & Housing Services	LT
	11	RESILIENCE IN BUILDING CODES AND PROGRAMS Assess opportunities to integrate resilience measures (e.g. water and temperature regulation, resilient landscaping measures within Low Impact Development, Build SA Green, Under 1 Roof programs) into building codes, existing building programs and checklists to reduce impacts from projected climate change over the lifetime of developments.	1, 3, 5, 6	Various (all)	👍	DEVELOPMENT SERVICES DEPARTMENT, Transportation & Capital Improvements, Office of Sustainability, Office of Historic Preservation	LT
	12	PRODUCE A CLIMATE HERITAGE STRATEGIC PLAN Develop guidelines for determining the appropriate treatments of cultural sties and objects around climate change adaptation including: building an inventory of resources, developing methods for building adaptive capacity, providing input on climate policies affecting tangible and intangible heritage resources, and joining the Climate Heritage Network.	3, 6	Various (all)	👎	OFFICE OF HISTORIC PRESERVATION, Office of Sustainability, Transportation and Capital Improvements	NT
STRENGTHEN PUBLIC HEALTH SYSTEMS	13	MONITOR AND TRACK PUBLIC HEALTH Track admissions and health cases related to weather events within the newly created SA Metro Health Informatics Unit.	1, 2, 3, 4, 5, 6, 7, 11, 12	Various (all)	👎	SA METRO HEALTH DISTRICT, Office of Emergency Management	NT
	14	INCORPORATE CLIMATE CHANGE INTO HEAT RESPONSE PLAN Assess and revise Heat Response Plan to account for future climate projections.	1, 2	Heatwaves	👎	SA METROPOLITAN HEALTH DISTRICT, Office of Emergency Management	NT
	15	PUBLIC DRINKING FOUNTAINS Assess need to install additional public water fountains in areas of high vulnerability as identified by the CDC Social Vulnerability Index.	1	Heatwaves	👎	Parks & Recreation CCDO, Transportation & Capital Improvements, SAWS	NT
	16	MOBILE HEALTH CLINICS Enhance mobile health clinics to underserved areas of the community (SA Tomorrow, PH1)."	7	Various (all)	👎	SA METROPOLITAN HEALTH DISTRICT	NT
	17	INTEGRATE CLIMATE RESILIENCE INTO PUBLIC HEALTH PRACTICES Actively participate in regional, national, and international public health peer groups and research networks (e.g. NACCHO Global Climate Change Workgroup) to continue identifying opportunities to integrate climate change considerations and best practices into local public health systems.	1, 2, 3, 4, 5, 6, 7, 11, 12	Various (all)	👎	SA METROPOLITAN HEALTH DISTRICT Office of Sustainability	NT

Lafourche Parish (Louisiana) Comprehensive Resiliency Plan – 2014 (207 pages)



The plan is a strategic document meant to maximize opportunities, reduce risks, and ensure that the Parish remains a great place for current and future generations. The Plan seeks to look comprehensively at coastal issues along with other important issues facing the Parish, such as the need for diverse jobs and housing, a desire for improved transportation facilities, and improving the quality of life of current and future residents. It reflects the knowledge, expertise, and aspirations of the Parish's residents and is a blueprint for how the community will grow and change over time.

Priority Strategic Action	Timing	Responsibility	Funding
1. Create an umbrella Economic Development Organization that coordinates the many Economic Development organizations, and interacts with state, national and international economic development initiatives.	Now!	Lafourche Parish Economic Development and Administration	No additional funding required
2. Certify one properties through the Louisiana Economic Development certification system.	1-2 years	New Economic Development Organization	Property owners and economic development/ parish
3. Develop and adopt access management and complete streets standards for existing and new roadways.	1-2 years	Lafourche Parish Public Works	Explore grants for transportation programs
4. Adopt resiliency design standards for residential construction. Develop prototype plans for resilient development that can be used off the shelf by developers and residents. Include prototypes for market rate and affordable housing. Prototypes should be flexible enough to be modified with changing FEMA and NFIP standards.	1-2 years	Lafourche Parish Planning and Permitting	Explore grants for resiliency programs
5. Partner with the Port Authority to support diversification of the port and airport and development of the industrial park around the airport	Now!	New Economic Development Organization and Port Authority	No additional funding required
6. Coordinate with Parish municipalities and adjacent parishes. Create annexation and development agreements with municipalities to coordinate long-term development and the provision of services. Coordinate with Terrebonne Parish to develop service agreements along boundaries and to address drainage and resiliency issues in a regional context.	Now!	Lafourche Parish Administration	No additional funding required

adaptOKC (Oklahoma City) – 2020 (174 pages)

adapt**OKC** is the City of Oklahoma City's first sustainability plan. It is an implementation element of plan**OKC**, the City's comprehensive plan. The purpose of the plan is to strengthen the community in the face of economic, environmental, and social challenges. Three principles are at its core. 1. Position Oklahoma City to lead by example as a steward of public resources. 2. Adapt infrastructure, services, and communities to Oklahoma City's changing climate. 3. Identify how to use technological innovations to the city's advantage.

Policies

Natural and Built Environment

NB-11: Work with Historic Preservation Office to map historic properties in areas vulnerable to flooding.

Start By: 2026
Type: Program/Partnership
Participating Parties: Development Services, Planning, Public Works

NB-12: Discourage alterations to the floodplain with 1% annual chance of flooding (100-year).

Start By: 2026
Type: Development Review, Ordinance/Subdivision Regulation, Policy Decision
Participating Parties: Development Services, Planning, Public Works

NB-13: Conduct historical flood damage assessment and inventory of properties in flood plains.

Start By: 2026
Type: Program/Partnership
Participating Parties: Planning, Public Works

NB-14: Update municipal code to increase elevation requirements for new construction and substantially-improved structures in the 500-year floodplain.

Start By: 2023
Type: Ordinance/Subdivision Regulation, Policy Decision
Participating Parties: Development Services, Planning, Public Works

NB-15: Determine methods to measure, monitor, and report local urban heat island conditions.

Start By: 2026
Type: Program/Partnership
Participating Parties: Information Technology, Planning, Public Information & Marketing

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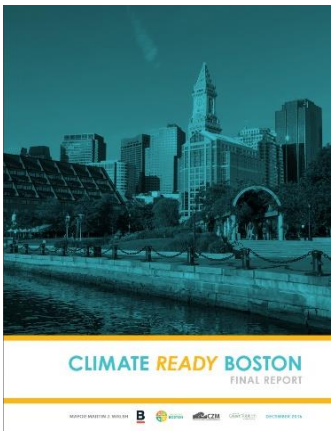
Shoshone-Bannock Tribes Climate Change Assessment and Adaptation Plan – 2017 (45 pages)

The climate change vulnerability assessment and adaptation plan outlines a collaborative 12-month project wherein a Climate Change Core Team of Tribal Staff worked collectively with outside consultants to assess climate vulnerability and identify adaptation actions for critical plant and animal species and their habitats. The project laid a foundation for building resilience among the Shoshone-Bannock Tribes and enhancing the resilience of natural resources that are an integral part of their culture. The report includes a summary of downscaled future climate projections for the project area, a detailed description of the vulnerability assessment process and outcomes, discussion of the Tribes' adaptation planning processes, and a listing of the adaptation actions developed for the plant and animal species assessed.

Table 2: Select adaptation actions for Sagebrush Steppe habitat, which supports both Sage Grouse and Wyoming Sage, two species important to the Shoshone-Bannock Tribes.

Climate Concern	Select Adaptation Action	Timeframe
Wildfire	Incorporate climate change into fire-management plans (include wildfire projections if possible); anticipate more opportunities to use wildfire for resource benefit.	Immediate
Wildfire	Identify areas important for Wyoming Sage in situ gene conservation to provide a baseline for measuring fire impacts and informing post-fire planting/rehabilitation.	Medium-Term
Species Range Shifts	Coordinate among/across states and their federal counterparts to protect habitat core areas to promote large-scale, continuous sage grouse habitat that would be protected from further development.	Immediate
Increase in Invasive Species	Rehabilitate burned areas for using native plant materials or introduced materials, that encourage the long-term sustainability of native species, and as approved by Resource Managers.	Immediate
Reduce Non-Climate Stressors	Install fence markers or remove fences where sage-grouse mortality due to collision with fences is documented or likely to occur due to new fence placement (avoid new fences within 0.5 mile of a lek).	Immediate
Outreach and Education	Develop and expand education efforts for the public regarding invasive species impacts, such as improving identification of non-native species, encouraging the use of native species, and promoting the use of strategies to prevent and remove invasive species.	Immediate

Climate Ready Boston – 2016 (199 pages)



Climate Ready Boston - Municipal Vulnerability to Climate Change anticipates climate impacts to, and vulnerabilities for, the city of Boston. The Climate Ready Boston Adaptation Plan projects how climate change is expected to lead to impacts ranging from sea level rise to extreme weather events. The report utilized existing research and analysis to identify potential municipal infrastructure and other city services that could be impacted by climate change. Boston used the knowledge gained from Climate Ready Boston to integrate the climate risks and vulnerabilities within their Natural Hazard Mitigation Plan.

Strategy 1.
Maintain up-to-date projections of future climate conditions to inform adaptation.

WHY Knowledge is the foundation for action. As global energy use and greenhouse gas emissions become clearer and as more data on the response of the Earth becomes available, climate projections will change. Bostonians need to remain informed to plan for the future.

WHAT The City should establish a Greater Boston Panel on Climate to update climate projections every five years. These projections should inform plans, policies, and regulations and be translated into readily accessible reports and maps.

Strategy 2.
Expand education and engagement of Bostonians on climate hazards and action.

WHY Climate adaptation cannot occur without an informed, engaged, and active public. Community members can provide deeper insight into how climate change is affecting their neighborhoods and businesses and create innovative and sensitive responses.

WHAT The City should work with partners from all sectors to inform and engage the Boston community on the risks from climate change and actions to reduce those risks. Different campaigns—targeting the general public, building owners, community facilities, businesses, and vulnerable populations who are more susceptible to the impacts of climate change—should promote short-term actions to reduce current risks while building support for larger-scale and longer-term measures.

Strategy 3.
Leverage climate adaptation as a tool for economic development.

WHY Over the coming decades, climate adaptation will require significant investments in the city's infrastructure, buildings, and other areas. The community can leverage this activity to promote equitable economic development, leaving Bostonians better prepared to thrive and face climate and other challenges.

WHAT The City should help train workers for jobs that will arise from climate adaptation projects and ensure that these projects follow the City's guidelines for local hiring, living wages, and employment of minority- and women-owned businesses

Strategy 4.
Develop local climate resilience plans to coordinate adaptation efforts.

WHY Some effects of climate change, such as increased temperatures, are spread across the city. Other, particularly coastal and riverine flooding, are more localized. Everywhere, these risks will interact with each other and with the social and economic needs of the neighborhood in particular ways. Coordinated adaptation actions can advance multiple community priorities simultaneously and use resources more effectively.

WHAT The City should develop local plans to address climate adaptation along with other community priorities. Through in-depth community engagement, the plans should include district-scale flood protection, infrastructure adaptation, and land-use planning, all in coordination with Imagine Boston 2030, 100 Resilient Cities, GoBoston 2030, and other planning efforts.

Strategy 5.
Create a coastal protection system to address flood risk.

WHY Coastal and riverine flooding poses a major and increasing threat to communities along Boston's waterfront and to the vitality of the city itself.

WHAT The City and its regional partners should investigate major "gray" and "green" infrastructure investments to address flood risk. The City should ensure that development in flood-prone areas does not prevent the future implementation of flood protection. The flood protection system should incorporate building-scale, district-scale, and harbor-wide measures.

Strategy 6.
Coordinate investments to adapt infrastructure to future climate conditions.

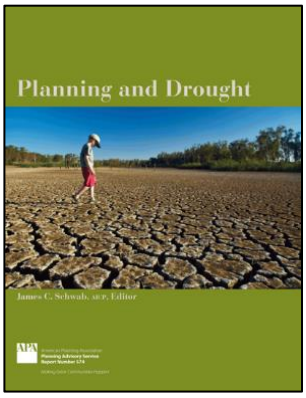
WHY Boston's infrastructure for power, water, transportation, communication, and more is a complex network with many public and private owners, operators, and regulatory authorities. As climate change presents new risks of failure, all stakeholders need to better understand the totality of vulnerabilities and to coordinate action to address them.

WHAT The City should establish an Infrastructure Coordination Committee with the region's major infrastructure organizations. The committee would develop planning and design standards aligned with up-to-date climate projections, identify cascading vulnerabilities, establish coordination mechanisms, and align adaptation efforts with other planning priorities.

Hazard- and Sector-Specific Guidance

DROUGHT

Planning and Drought – 2013 (94 pages)



Planning and Drought helps planners, public agencies, and local officials see the crisis on the horizon and get ready to meet it. This resourceful guide connects the dots between drought and land-use planning, water management, public health, and the local economy. The field's top researchers show how drought leaves communities vulnerable to wildfires, soil erosion, air pollution, and more. Experts with hands-on experience share checklists, case studies, and the pros and cons of various approaches to drought planning. Readers will come away with the tools to act against a threat that creeps in and leaves a legacy of dust.

This Planning Advisory Service (PAS) report from the APA was produced in conjunction with the University of Nebraska's National Drought Mitigation Center and the National Integrated Drought Information System.

TABLE 3.1. DROUGHT MITIGATION AND RESPONSE ACTIONS

Mitigation and Response Actions	Long-Term Mitigation	Short-Term Response Actions
Elements of a Drought Management Plan		
Establish drought response principles, objectives, and priorities	X	
Establish authority and process for declaring a drought emergency	X	
Develop drought stages, trigger points, and response targets	X	
Prepare ordinances on drought measures	X	
Evaluate historical drought impacts	X	
Monitor drought indicators (e.g., snow pack and stream flow)	X	X
Monitor water quality	X	X
Track public perception and effectiveness of drought measures	X	X
Improve accuracy of runoff and water supply forecasts	X	
Emergency Response		
Declare a drought emergency		X
Establish water hauling programs	X	X
Restrict/prohibit new taps		X
Identify state and federal assistance	X	X
Provide emergency water to domestic well users		X
Import water by truck/train		X
Public Education and Relations		
Establish a public advisory committee during drought planning and/or drought response efforts	X	X
Develop drought public education campaign with long-term and short-term strategies	X	X
Educate provider/municipal staff on how to save water	X	X
Provide instructional resources to businesses on developing business-specific drought mitigation and response plans	X	X
Provide acoustical meters to assist customers in identifying leaks	X	X
Water Supply Augmentation		
Establish drought reserves	X	
Draw from drought reserves		X
Increase groundwater pumping		X

Source: Colorado Drought Mitigation and Response Plan, Annex B

TABLE 1.1. ENVIRONMENTAL IMPACTS OF DROUGHT

Loss or destruction of fish and wildlife habitat
Lack of food and drinking water for wild animals
Increase in disease in wild animals because of reduced food, water supplies,and water quality
Increased competition and vulnerability to predation
Conflict with humans from migration and concentration of wildlife
Increased stress on endangered species
Loss of wetlands and estuaries
More intense wildfires
Wind and water erosion of soils, poor soil quality, and increased desertification
Weakened ecosystems more susceptible to invasive species, disease, and pests
Decreased air quality from dust and particulates
Degraded estuaries and riverine habitat caused by low river flows
Saltwater intrusion in tidally influenced sections of rivers
Loss of biodiversity
Decrease in landscape quality in urban areas from loss of trees and other vegetation

The 10-Step Drought Planning Process – 2005 (44 pages)

The 10-Step Drought Planning Process, first published by the National Drought Mitigation Center (NDMC) founding director Dr. Donald A. Wilhite in 1990, has been applied and modified by states, tribes, and countries around the world. Since then, Wilhite and others have revised and updated it to incorporate recent experiences and the growing awareness of the need for drought planning and mitigation. Its most recent update appeared as "Drought Preparedness Planning: Building Institutional Capacity," by Donald A. Wilhite, Michael J. Hayes, and Cody Knutson, which was published as a chapter in *Drought and Water Crises: Science, Technology, and Management Issues*, edited by Wilhite (CRC Press, 2005).

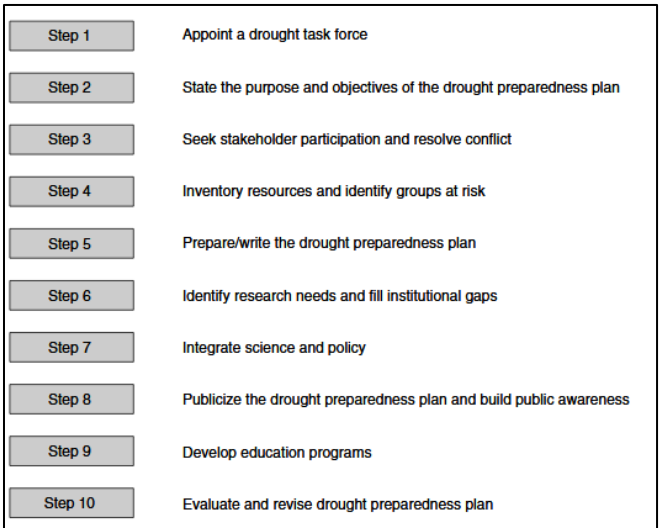
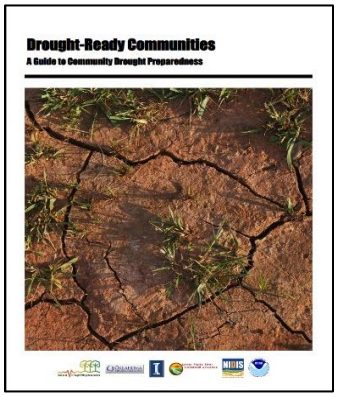
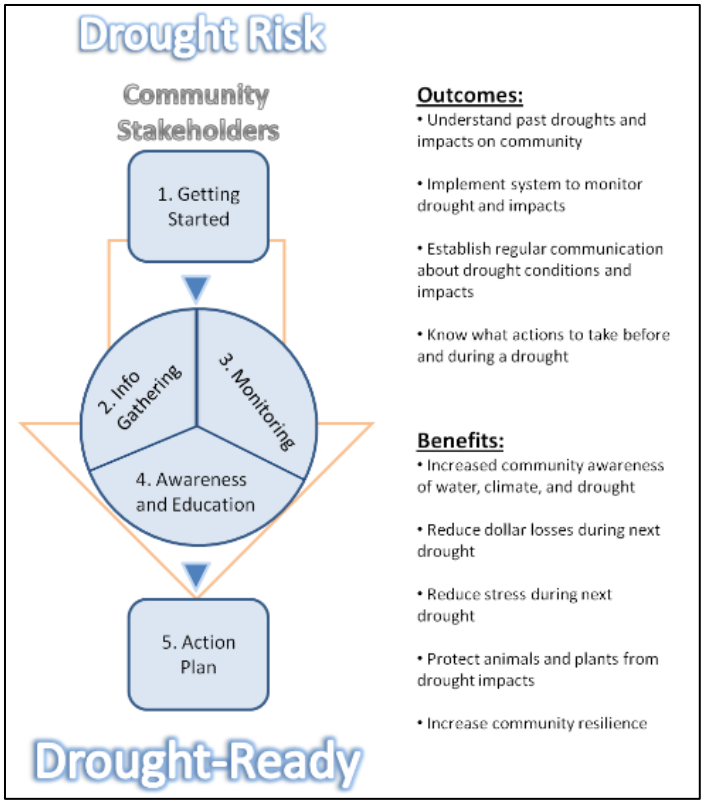


Figure 2 Ten-step planning process. (*Source*: National Drought Mitigation Center, University of Nebraska, Lincoln, Nebraska, USA.)

Guide to Community Drought Preparedness – 2011 (55 pages)

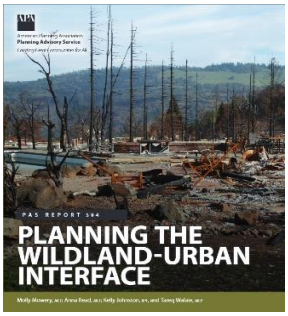


The process outlined in the Guide is broad-based, recognizing that drought creates problems that go beyond the scope of what water suppliers alone can address. Worksheets and other exercises can help communities see how drought has affected water supplies and overall community well-being in the past. The Guide can also help communities identify their drought monitoring resources so they can spot emerging drought. A planning section helps communities determine steps they can take to reduce their drought risk ahead of time. It also recommends planning responses to drought before the next one happens. The Guide includes case studies and an extensive resource collection on how other municipalities have planned for drought, including both processes and solutions.

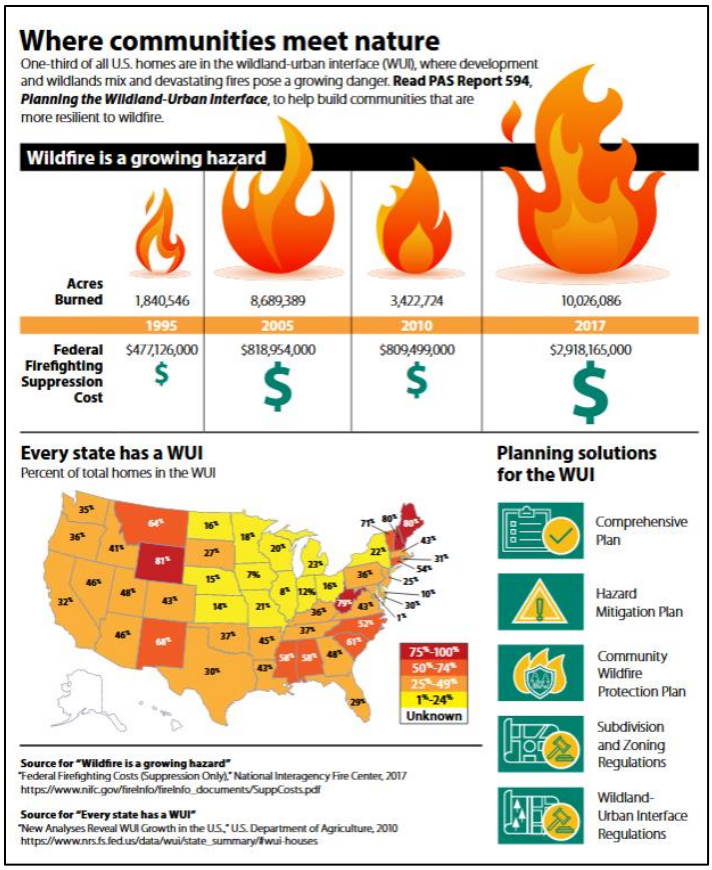


WILDFIRE

Planning the Wildland-Urban Interface – 2019 (144 pages)



Planning the Wildland-Urban Interface (WUI) offers planners an in-depth introduction to the WUI and wildfire basics, covering challenges, trends, and historical context along with the latest wildfire science. It then moves to solutions, providing a holistic planning framework and practical guidance on how to address WUI and wildfire challenges in plans, policies, and regulations. It highlights opportunities for collaboration with fire departments, federal and state agencies, and other key stakeholders. Case study examples show how communities across the country are already planning for the WUI.



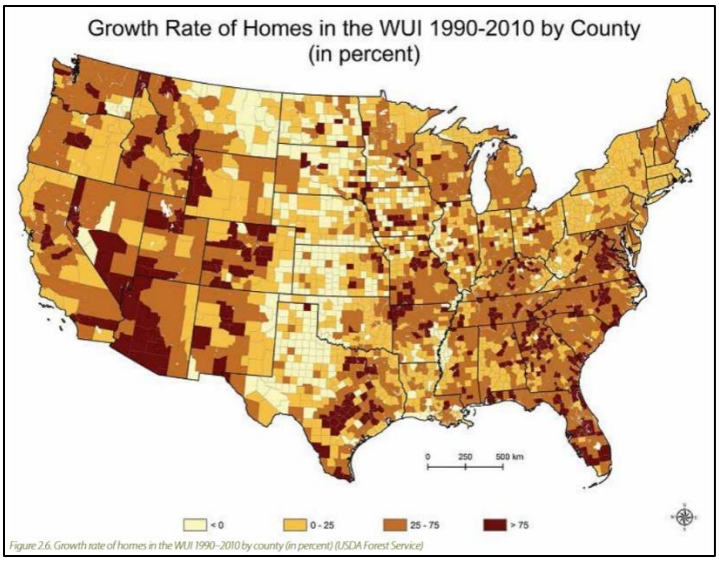
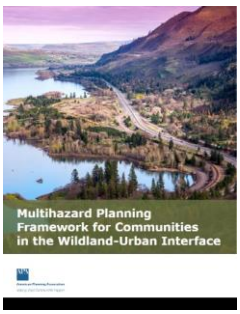


Figure 2.6. Growth rate of homes in the WUI 1990–2010 by county (in percent) (USDA Forest Service)

Multihazard Planning Framework for Communities in the Wildland-Urban Interface – 2018 (33 pages)



The *Multihazard Planning Framework for Communities in the Wildland-Urban Interface* lays out a comprehensive framework that:

- Addresses risk from wildfire and other hazards;
- Encompasses scales from site to neighborhood, community, and region;
- Identifies a range of planning interventions that can be used to reduce risk and maximize the benefits that forests provide across the scales of concern.

It includes a planning system audit tool which can be used by regions and the communities within them to identify strengths, gaps, and potential areas for improvement in the jurisdiction's planning system (plans, codes, public investment, and other programs) as they relate to multihazard risk.

Table 2. Planning Interventions Across Scales

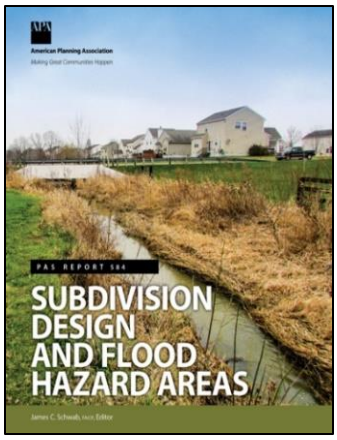
Scale *Planning Intervention*	Regional Scale	Community Scale	Neighborhood Scale	Site Scale
Plans	Regional Green Infrastructure Plan	Comprehensive Plan	Neighborhood Plan	Site Plan
	Watershed Management Plan	Community Wildfire Protection Plan		
		Hazard Mitigation Plan		
	Regional Growth Management Plan	Climate Adaptation Plan		
		Parks and Open Space Plan		
Land-Use/ Development Regulations		Overlay zoning	Cluster subdivision	Landscape standards or guidelines
		Wildland-Urban Interface Code		Defensible space regulations
		Transfer of development rights	Open space requirements	Site plan review for high hazard areas
				Conditional use standards
Public Investments	Land acquisition		Neighborhood Risk Assessment	Financial assistance to home owners and businesses
		Public outreach and education programs		
			Firewise USA™ Recognition Program	

Comprehensive Plan. The comprehensive plan, also called the general plan or the master plan, is the foundational local policy document. The comprehensive plan has a 20- to 30-year planning horizon and a broad scope. It looks at existing conditions within the community and analyzes trends. It defines a vision for the community, and includes goals, objectives, and policy statements to address future growth and change.

Audit Questions	Yes	No	NA	Comments
1. Does your jurisdiction have a locally adopted comprehensive plan? (If "no" or "NA" skip to Functional Plans Section)	○	○	○	
2. Does this plan address natural hazards or hazard mitigation? (If "no" or "NA" skip to Functional Plans Section)	○	○	○	
a. Does the plan include a Natural Hazards or Hazard Mitigation element?	○	○	○	
b. Does this plan include any of the following policy recommendations?	○	○	○	
i. Discourages development in areas of natural hazard risk (e.g. high wildfire hazard, floodplains)	○	○	○	
ii. Incentivizes development outside of hazard risk area	○	○	○	
iii. Discourages development in environmentally sensitive areas (e.g. steep slopes, highly erodible soils)	○	○	○	
iv. Limits or discourages extension on infrastructure (e.g. roads, water, sewer) in high-hazard areas	○	○	○	
v. Protects or enhances natural systems (e.g. floodplains, wetlands, forests)	○	○	○	
vi. Limits or discourages construction of public facilities in high-hazard areas (e.g. schools, police and fire stations)	○	○	○	
vii. Addresses transportation routes for evacuation during a disaster event	○	○	○	
c. Does the plan include any of the following maps?	○	○	○	
i. Observed natural hazard events	○	○	○	
ii. Areas of natural hazard risk	○	○	○	
iii. Areas of natural hazard risk on the Future Land Use Map	○	○	○	
iv. Future land use scenarios and how they overlap with natural hazard risks	○	○	○	
v. Environmentally sensitive areas	○	○	○	
vi. Green infrastructure assets or networks	○	○	○	
d. Are policy recommendations in the plan linked to the capital improvements program?	○	○	○	
e. Has your jurisdiction adopted the Community Wildfire Protection Plan or Hazard Mitigation plan by amendment to the comprehensive plan?	○	○	○	

FLOODING/WATER RESOURCES

Subdivision Design and Flood Hazard Areas – 2016 (113 pages)



Today, sustainability, resilience, and climate change are top of mind for planners and floodplain managers. But for subdivision design, those ideas have not yet hit home. The results? Untold damage from Hurricanes Sandy and Katrina as well as floods in places like Colorado and Atlanta. This updated report is out to end the cycle of build-damage-rebuild. Editor James C. Schwab, FAICP, manager of APA's Hazards Planning Center, gives communities sound guidance to bring subdivision design into line with the best of floodplain planning.

Six planning and design principles help put subdivisions on the right footing. Standards for review, inspection, and maintenance cover all types of terrain and infrastructure. Nine concrete recommendations lay out steps to keep subdivisions safe and dry. Readers will get the tools they need to save lives, protect property, and build a better future.

This report was produced in partnership with the Association of State Floodplain Managers, with funding from FEMA, which makes it available for free to all.

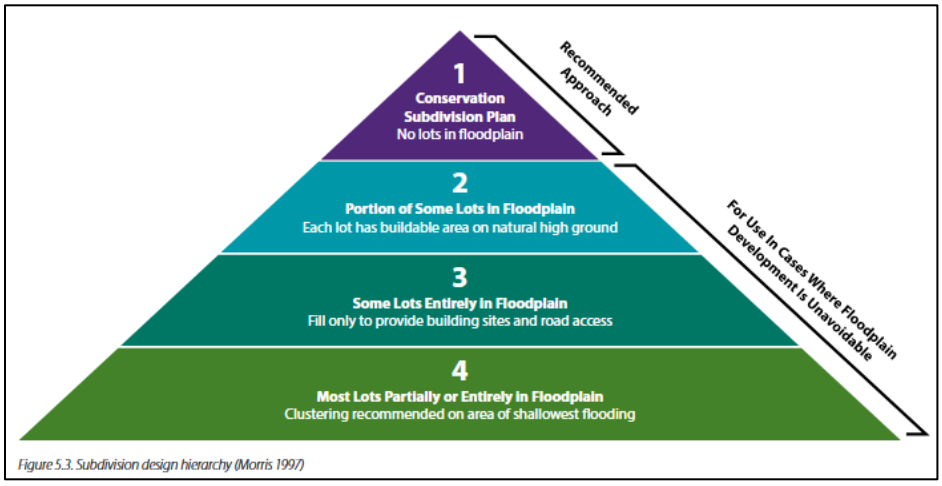
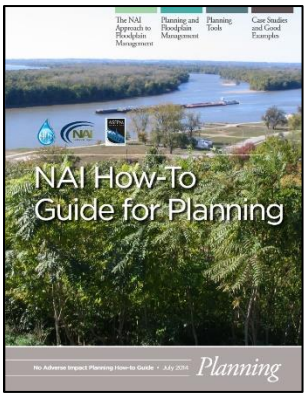


Figure 5.3. Subdivision design hierarchy (Morris 1997)

No Adverse Impact Planning How-to Guide for Floodplain Management – 2014 (88 pages)



This Guide is one of seven how-to guides that expand on the knowledge base within the No Adverse Impact Toolkit, a 108-page document prepared by the Association of State Floodplain Managers (ASFPM). The Toolkit is ASFPM's reference on implementing the No Adverse Impact (NAI) approach. It identifies tools for incorporating NAI floodplain management into local regulations, policies, and programs; while the How-To Guides break down, by subject matter, that information into compact, usable information communities can apply. This Guide reviews only five tools, but there are many more NAI tools for planning, and for each of the other building blocks found in the NAI Toolkit. The guide is divided into five sections: The NAI Approach to Floodplain Management, Planning and Floodplain Management, Planning Tools, Case Studies and Good Examples, Resources and Fact Sheet. The How-to Guides' ultimate goals are to have communities take a different approach to managing development that prevents increasing flood risk, and to incorporate NAI concepts into other community activities.

EPA Green Infrastructure Modeling Toolkit

EPA has developed innovative models, tools, and technologies for communities to manage water runoff in urban and other environments. The resources in this toolkit incorporate green or a combination of green and gray infrastructure practices to help communities manage their water resources in a more sustainable way, increasing resilience to future changes.

Planners and Water – 2017 (156 pages)

Planners and Water uses one model for water management: One Water. This model sweeps away the old silos of planning for water. Instead, it looks at water supply, water quality, and stormwater as a single resource for planners to manage. Much of this PAS Report draws from the work of APA's Water Task Force. Seven chapters cover current thinking about water cycles and systems. Early material offers a primer on the basics. A deeper dive reveals the ripple effects of local needs and global trends. A section on financing suggests ways to prime the pump for capital projects and innovative systems. Five strategic points of intervention show the best places for planners to jump in and make an impact. Case studies map out some of the steps planners are taking today, while best practices add to the pool of solutions.

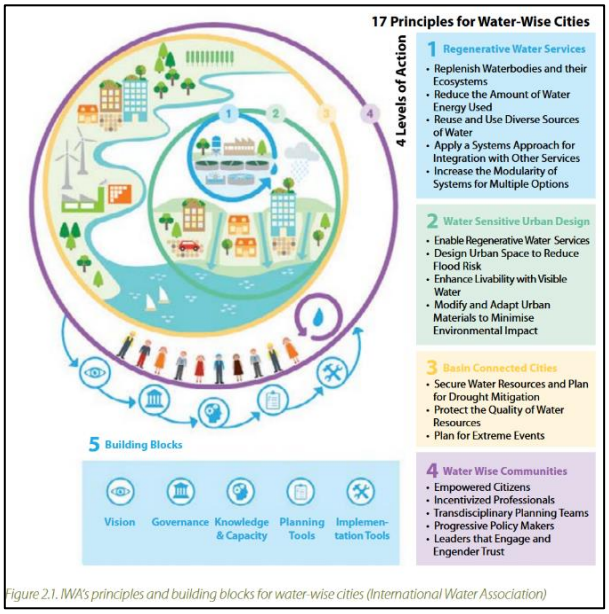


Figure 2.1. IWA's principles and building blocks for water-wise cities (International Water Association)

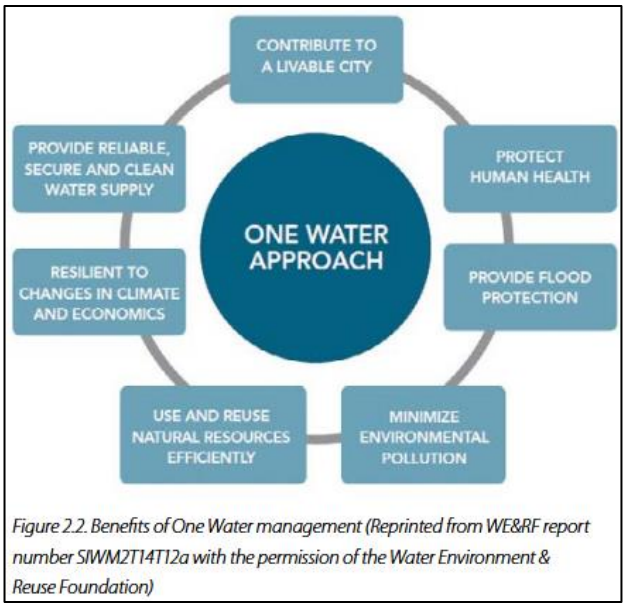


Figure 2.2. Benefits of One Water management (Reprinted from WE&RF report number SIWM2T14T12a with the permission of the Water Environment & Reuse Foundation)

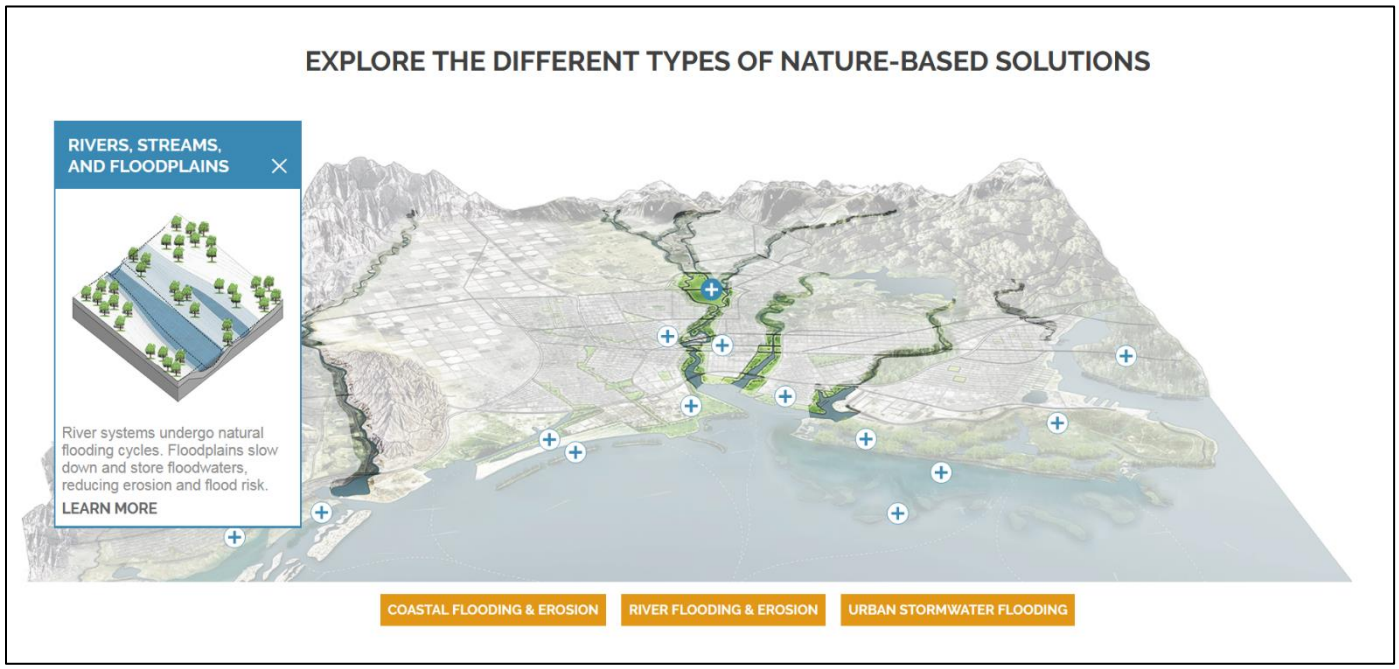
Naturally Resilient Communities (NRC)

NRC promotes the role nature-based solutions can play in helping reduce flood risk for communities while providing other benefits, such as improved water quality, enhanced recreational opportunities, and wildlife habitat — all of which positively impact local economies. NRC collectively represents county governments, professional engineers, community planners, floodplain managers, and conservationists.

NRC created a guide of nature-based solutions and related case studies of successful projects to help communities learn more and identify those solutions that might work best for them. This tool:

- Enables end users to be able to understand and consider the suite of nature-based infrastructure options available at given locations based upon the type of issue to be addressed (e.g., stormwater, flooding, or erosion control/reduction).
- Describes how projects, such as wetland restoration, oyster reef construction, or beach dune restoration, can be used to address flooding issues facing these communities.

- Provides an understanding of the ability of natural infrastructure to contribute to reducing risks and to provide a suite of other benefits.
- Provides real world examples of success stories related to the implementation of natural infrastructure projects.
- Broadens the understanding of when such projects may be appropriate so they can be considered as part of the many regular and ongoing planning and project development activities undertaken by communities.
- Provides funding solutions for nature-based solutions.



EPA Creating Resilient Water Utilities (CRWU)

EPA United States Environmental Protection Agency

EPA's CRWU initiative provides drinking water, wastewater, and stormwater utilities with practical tools, training, and technical assistance needed to increase resilience to extreme weather events. Two helpful tools are:

- Resilient Strategies Guide for Water Utilities- This Guide outlines the resilience planning process and helps you to identify potential strategies and promote a better understanding of resilience strategies. At the end of the Guide, you can download a report containing all of your selections and submitted information.
- Case Study and Information Exchange- These maps provide links to brief stories of planning efforts being conducted by water utilities across the United States to build resilience to natural hazards and water management challenges.

4. Webinar Series and Podcasts

APA's Planning Information Exchange Webinars (PIE)

The American Planning Association conducts a series of quarterly webinars for practitioners that includes tools, best practices, and strategies on hazard mitigation planning and its connections with recovery planning and preparedness. The webinars focus on all hazards and mitigation planning but also its connections with recovery planning and preparedness.

Center for Climate Preparedness and Community Resilience Webinars – Antioch U. New England

Antioch's Center for Climate Preparedness and Community Resilience delivers applied research, consulting, education, and training. Their approach is solutions-oriented, pragmatic, participatory, and inclusive, and based on best practices in change-leadership theory, and systems thinking. With an explicit awareness of social and climate justice, they focus on stakeholder capacity-building at the local scale.

Climate Adaptation Knowledge Exchange (CAKE) Webinars

The Climate Adaptation Knowledge Exchange (CAKE) aims to build a shared knowledge base for managing natural and built systems in the face of rapid climate change. Its website lists past and upcoming webinars that focus on climate adaptation-related topics.

National Adaptation Forum Webinars

The National Adaptation Forum was created by a diverse group of professional adaptation practitioners from the private and public sectors concerned about the need to anticipate and prepare for the potential impacts of climate change. It represents a collective effort to enhance the resilience of the Nation's communities, natural systems, and economy in the face of a changing climate, through open participation from actors across the country. The Forum also hosts webinars that can be accessed via the link above.

Natural Hazards Center Making Mitigation Work Webinar Series

The Natural Hazards Center, in partnership with the Federal Emergency Management Agency, presents the Making Mitigation Work Webinar Series. These free one-hour webinars feature innovative speakers and highlight recent progress in mitigation policy, practice, and research.

Security and Sustainability Forum Webinars

The Security and Sustainability Forum (SSF) is a public interest organization that produces learning events about climate security, which are defined as the threats to society from a changing climate and related disruptions to natural systems. Their main products are free webinars that convene global experts on food, water and energy security, public health, economic vitality, infrastructure, governance, and other impacts that must be solved in meeting climate security challenges. Visit the SSF Archives for free access to their audio interview and webinar video library.

America Adapts Podcast

America Adapts focuses on our adaptation to climate change. Featuring a range of interviews with experts of all levels who are in the field of adaptation and are doing amazing work to identify potential avenues of progress in society and the environment.

Climate One Podcast and Videos

Climate One is changing the conversation on energy, economy, and the environment by offering candid discussion from climate scientists, policymakers, activists, and concerned citizens. By gathering inspiring, credible, and compelling information, Climate One provides an essential resource to change-makers looking to make a difference. The organization offers live events, a podcast, and videos of all past events.

FEMA Podcast

An audio series available to anyone interested in learning more about the Federal Emergency Management Agency, hearing about innovation in the field of emergency management, and listening to stories about communities and individuals recovering after disasters.

Resilience Roundtable Podcast Series

The APA Podcast series Resilience Roundtable talks with planners and allied professionals who make resilience their mission, even in the face of devastating natural hazards. Guests who faced flooding, hurricanes, wildfires, and more discuss how they worked to lessen each disaster's impact and how they and their colleagues seek to prevent further disasters from taking the same toll on their communities. Listen to their stories and learn strategies for making your community more resilient.

5. Consulting Services

Consulting Agencies (Free to $$$)

American Planning Association Community Planning Assistance Teams (CPAT) – (Free/Application Required)

The American Planning Association (APA), through its professional institute, the American Institute of Certified Planners (AICP), organizes volunteer planning teams tailored specifically to a community's needs. Members offer their time and expertise to people and places where additional resources are needed. This program is supported by volunteer professionals, community contributions, and grant funding. By pairing a multidisciplinary team of expert planning professionals from around the country with community members, key stakeholders, and relevant decision makers, the place-based initiative seeks to foster community education, engagement, and empowerment. Each team member is selected for the specific expertise needed on the project to offer pro bono assistance in developing a framework or vision plan that promotes a sustainable, livable, economically vibrant, and healthy community.

GEOS Institute - Climate Ready Communities - (Free - $2,499/year)

Office Location: Ashland, OR

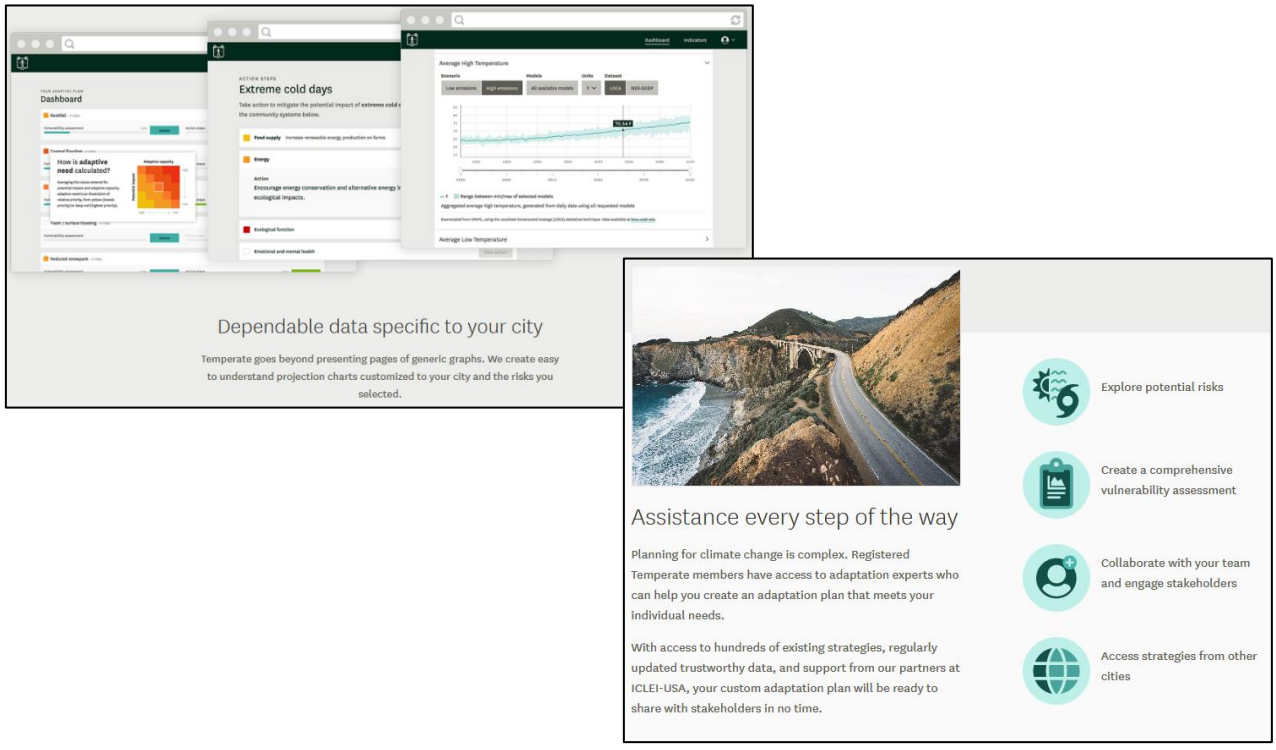
This program enables small to mid-sized communities to create climate resilience plans using an "assisted Do-It-Yourself" approach. The entire planning process takes approximately 6-18 months. The program consists of:

- A downloadable, comprehensive *Practical Guide to Building Climate Resilience* **(Free)** which provides a framework that is based on Whole Community Resilience. The guide is structured as a step by step approach that includes many on-the-ground ideas and free resources for implementing each step. Most local governments find themselves facing difficult climate resilience challenges with few financial resources or help from state or federal governments. The guide will help break down the process into manageable steps.

- Annual Support for assistance utilizing the Guide **($2,499 for year one and $1,500 for subsequent years)** which includes:
    - Templates for most of the Tasks under each Step in the Guide
    - Tutorials for key concepts in the Guide
    - 3 hours of phone consulting per year
    - Monthly 60-minute live call-in forum
    - Email support and on-line community forum
    - On-line community forum
    - A web portal to access Annual Support resources
- Other Services that supplement the Guide and Annual Support but may also be used independently **(À la carte pricing, annual subscribers receive a 5% discount)** and include consulting hours, climate Projections, workshop facilitation, final report writing, and training webinars.

Temperate: Your Climate Adaptation Planning Companion – (15-day free trial; $1,500-$4,200/year)

Temperate provides capacity building and technical assistance to local governments in climate adaptation and resiliency planning. The fee-for-service package includes expert guidance annually from staff for developing a climate adaptation plan, providing preliminary climate impact analysis and resources to conduct a comprehensive risk and vulnerability assessment, planning guidance for setting adaptation objectives and targets, implementation assistance, progress reports and check-ins, and recognition throughout their network of more than 1,500 local governments globally. Additional services are available for local government staff training, equitable community outreach and stakeholder engagement, performance-based resilience planning, and climate science research.



Adaptation International – (Contact for Pricing)

Office Location: Austin, TX

Adaptation International helps communities and organizations around the world build resilience to climate change related risks. The firm tailors to a community's needs and matches those needs with the expertise and services provided by their network of collaborators. They can assist in project management, workshop development, data analysis, mapping and analysis, implementation support, and communication and design.

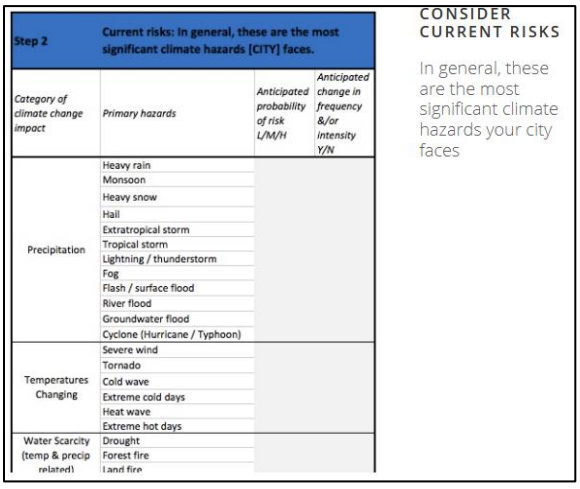
Adaptation International offers services from basic scoping and mapping to more advanced vulnerability assessments and mitigation strategies. At a basic level, they can help a city scope their concerns, point them in the direction of climate projections that are relevant for their needs, or host a workshop, but they work much more collaboratively with a community to develop workshops and conduct assessments. They prefer a conversation with the city to see what they are looking for and help them scope the work. The deeper levels of engagement cost more money and take more time but creates a foundation that the city can use to build resilience over the long-term, long after an individual project is completed.

Climate Resilience Consulting – (Contact for Pricing)

Office Location: Chicago, IL

Climate Resilience Consulting works with clients to create resilience success. They build resilience measurement tools, define resilience finance frameworks, and craft resilience-focused institutions.

They work with clients to prioritize resources, enhance investments and build resilient institutions. Additionally, they offer their 5 Step Climate Adaptation Action Tool for free. The tool supports a two-hour city staff download of current knowledge that creates a one-page inventory of



Step 2	Current risks: In general, these are the most significant climate hazards [CITY] faces.		
Category of climate change impact	*Primary hazards*	*Anticipated probability of risk L/M/H*	*Anticipated change in frequency &/or intensity Y/N*
Precipitation	Heavy rain		
	Monsoon		
	Heavy snow		
	Hail		
	Extratropical storm		
	Tropical storm		
	Lightning / thunderstorm		
	Fog		
	Flash / surface flood		
	River flood		
	Groundwater flood		
	Cyclone (Hurricane / Typhoon)		
Temperatures Changing	Severe wind		
	Tornado		
	Cold wave		
	Extreme cold days		
	Heat wave		
	Extreme hot days		
Water Scarcity (temp & precip related)	Drought		
	Forest fire		
	Land fire		

CONSIDER CURRENT RISKS

In general, these are the most significant climate hazards your city faces

progress to date, climate change hazards, assets at risk, and most vulnerable populations. The tool provides a framework for a simple climate adaptation action plan, using City knowledge to save lives and improve livelihoods in the face of physical climate change risks.

ICF International – (Contact for Pricing)

Offices: Texas, Oklahoma, Louisiana, Arkansas, Nationwide

ICF International is a global consulting and technology services company that specializes in several sectors, to include disaster management, government, and environment. Their disaster management sector supports across the disaster lifecycle: 1. Prepare and mitigate, 2. Respond, and 3. Recover. Their climate sector helps public- and private-sector clients worldwide develop climate change policy, interpret and comply with regulations, reduce greenhouse gas (GHG) emissions, evaluate risks, and identify opportunities.

Navigant Consulting – (Contact for Pricing)

Offices: Texas, Nationwide

Navigant's climate resilience consulting team supports cities and international private and public sector organizations with climate goals at varying scales. They combine climate impacts, projections, and adaptation expertise with their knowledge in mitigation, environmental policy, and regulation. By taking a holistic approach, they focus on delivering inclusive climate action with solutions that are low carbon, climate resilient, and linked to mitigation policy.

Geosyntec Consultants – (Contact for Pricing)

Offices: Baton Rouge, Houston, Austin, The Woodlands (TX) and more

Geosyntec is a consulting and engineering firm that works with private and public sector clients to address new ventures and complex problems involving the environment, natural resources, and civil infrastructure. The company brings a team of professionals together to assist their clients with all areas needed for successful resilience and adaptation. Example projects include comprehensive studies of coastal flooding risks and design solutions, county-wide flood mapping, cloud based predictive and adaptive stormwater management applications, backflow prevention strategies for stormwater sewers, and risk assessments of individual facilities, processes, or communities. Geosyntec has also worked with municipalities to improve their resiliency to extreme weather events and impacts from climate change.

The following URL links to a resilience planning example from Stow, MA that was produced by Geosyntec: https://www.geosyntec.com/projects/item/6144-municipal-climate-change-and-natural-hazard-vulnerability-assessment.

Community Planning Assistance for Wildfire (CPAW) – (Free/Application Required)

CPAW is a grant-funded program providing communities with professional assistance to integrate wildfire mitigation into the development planning process. The CPAW consulting team consists of foresters, land use planners, economists, and wildfire risk modelers who collaborate with community leaders and city officials to reduce wildfire risk.

Selected communities receive free, customized technical consulting services and training over the course of one year from CPAW's team of professional land use planners, foresters, risk modelers, and researchers. Specific services may include risk assessments, development of community planning policies and regulations to address wildfire, guidance on wildfire mitigation, and other recommendations to address local wildfire risk to the built environment. CPAW services come at no cost to the community.

A city in the SCIPP region that participated in this program includes Austin, TX.

Wildfire Planning International – (Contact for Pricing)

WPI works with communities across the United States and Canada to help address challenges associated with the wildland-urban interface (WUI) — the area where homes or other structures meet or mingle with wildland vegetation. WPI helps communities find creative ways to address their wildfire risk in the WUI through land use planning tools and strategies. WPI works closely with select forestry, fire, and hazard mitigation professionals to deliver skills and services that uniquely fit client needs. WPI offers in-person and remote consulting services for homeowners, neighborhoods, development professionals, community and industry leaders, emergency responders, land managers, and policy makers so they can make informed decisions about wildfire planning.

U.S. EPA Technical Assistance

Creating Resilient Water Utilities (CRWU)
Provides water utility managers with tools, training, and technical assistance needed to adapt to climate change. Additionally, they provide a clear understanding of climate science and adaptation options for the water sector.

Brownfields Technical Assistance
Provides technical assistance and resources to help small, rural, environmental justice, and other community stakeholders with the necessary technical assistance to aid in the assessment and cleanup of brownfield properties.

Smart Growth Technical Assistance Programs
Offers technical assistance to help communities learn about and implement smart growth approaches, some of which can be used to adapt to a changing climate.

Tools & Resources for Sustainable Communities
Helps communities develop and support neighborhoods that provide transportation choices and affordable housing, increase economic competitiveness, and direct resources toward places with existing infrastructure.

Building Blocks for Sustainable Communities
Technical assistance program delivers quick, targeted assistance to give communities tools to implement smart growth approaches.

College/Underserved Community Partnership Program (CUPP)
CUPP provides technical assistance to small, underserved communities from local colleges and universities at no cost to the communities. The application cycle is typically open each fall. Communities submit a brief written application and qualified communities will be invited to interview with the CUPP team. Communities are typically selected by December of each year.

6. Financial Assistance Resources

Federal Grant Programs

DOE State Energy Program Competitive Financial Assistance Program
This program provides funding and technical assistance to states and territories to enhance energy security, advance state-led energy initiatives, and decrease energy waste.

DOT Better Utilizing Investments to Leverage Development (BUILD) Transportation Grants
BUILD funding is for capital investments in surface transportation infrastructure as well as the planning, preparation, or design of projects. This grant is available to local, state, and tribal governments including U.S. territories, transit agencies, port authorities, metropolitan planning organizations, and other political subdivisions of state or local government. Multiple jurisdictions can submit joint applications. BUILD provides up to 80% of costs for urban projects and up to 100% for rural projects.

DOT Bicycle Related Funding Opportunities
The Federal Transit Administration offers multiple grant programs throughout the year to help cities, towns, and rural areas invest in bicycle infrastructure.

DOT Congestion Mitigation and Air Quality Improvement (CMAQ) Program
The CMAQ program provides flexible funding to local and state governments for transportation projects and programs to reduce congestion and improve air quality for areas that do not meet the National Ambient Air Quality Standards (nonattainment areas) or maintenance areas.

DOE Energy Efficiency and Renewable Energy Funding Opportunity Exchange
This website provides funding opportunity announcements related to bioenergy, buildings, carbon capture, geothermal, solar power, weatherization, wind power, and more. Announcements vary in eligibility, grant amount, frequency of grant, and deadline.

DOT Infrastructure for Rebuilding America (INFRA) Grants
INFRA provides funding for projects that address critical issues facing highways and bridges. This grant is available to local, state, and tribal governments including U.S. territories, transit agencies, port authorities, metropolitan planning organizations, and other political subdivisions of state or local government. Multiple jurisdictions can submit joint applications. INFRA provides up to 60% of project costs. Funding is available annually.

DOT Recreational Trails Program (RTP)
The RTP provides funds to the States to develop and maintain recreational trails and trail-related facilities for both non-motorized and motorized recreational trail uses. Each state administers its own program, so local governments must contact their state RTP administrator.

DOT Surface Transportation Block Grant Program (STBG)
The STBG program provides flexible funding that can be used by local and state governments to preserve and improve the conditions and performance of any Federal-aid highway, bridge, and tunnel project on any public road, pedestrian and bicycle infrastructure, and transit capital projects.

DOT Transportation Alternatives Program
The Transportation Alternatives program provides funding to local and state governments to pursue smaller-scale transportation projects such as pedestrian and bicycle facilities, recreational trails, safe routes to school projects, community improvements such as historic preservation and vegetation management, and environmental mitigation related to stormwater and habitat connectivity.

EPA Environmental Justice Small Grants Program
This program helps communities with localized strategies to avoid, lessen, or delay the risks and impacts associated with the changing climate. Environmental Justice Small Grants fund projects up to $30,000, depending on the availability of funds each year. All projects are associated with at least one qualified environmental statute. Governmental entities are not eligible to apply as the lead applicant but can serve as a partner organization. The Environmental Justice Small Grants Program offers funds annually.

EPA Grant Competition Forecast
This is the calendar of upcoming USEPA competitive grant opportunities.

EPA Tribal General Assistance Program Guidance
This Guidance provides a consistent national framework for building tribal environmental program capacity and strengthening management of General Assistance Program resources. The Guidance allows Tribes to use General Assistance Program funds to support development of climate change adaptation plans.

EPA Understanding, Managing and Applying for USEPA Grants
This resource provides best practices for writing and submitting grants to the USEPA.

FEMA Flood Mitigation Assistance Grant Program
Local and state governments, territories, and federally-recognized tribes can apply to this program for projects and planning that reduces or eliminates long-term risk of flood damage to structures insured under the National Flood Insurance Program. Funding is also available for management costs. Governments are eligible sub-applicants that can sponsor applications on behalf of homeowners. Funding is available annually, usually in the fall.

FEMA Hazard Mitigation Grant Program
Local and state governments, territories, and federally-recognized tribes can apply to this program to enact mitigation measures that reduce the risk of loss of life and property from future disasters. Governments are eligible sub-applicants that can sponsor applications on behalf of homeowners. FEMA provides up to 75% of the funds for mitigation projects.

FEMA Building Resilient Infrastructure and Communities (BRIC) Program
This program support states, local communities, tribes, and territories as they undertake hazard mitigation projects, reducing the risks they face from disasters and natural hazards. BRIC is a new FEMA pre-disaster hazard mitigation program that replaces the existing Pre-Disaster Mitigation (PDM) program. The BRIC program aims to categorically shift the federal focus away from reactive disaster

spending and toward research-supported, proactive investment in community resilience. Local and state governments, territories, and federally-recognized tribes can apply to this program for planning and project grants that seek to reduce future losses before disaster strikes. Funding is available annually, usually in the fall.

FEMA Environmental and Historic Preservation Grant Preparation Resources
FEMA provides funding for culvert upgrades under their HMA programs.

HUD Community Development Block Grant – Disaster Recovery Program
The CDBG-DR program, administered by HUD, is intended to provide funding for low- and moderate-income communities to help recover from disasters. The funding is only available after a Presidential disaster declaration has been issued, however it is highly flexible and can be used in a few ways to promote more resilient communities. In the aftermath of Superstorm Sandy, and through the National Disaster Resilience Competition, HUD has been more permissive with these funds, allowing them to be used for a wide array of activities from buy-outs of homes to watershed protection and restoration to planning activities. HUD has additional resources available for promoting community resilience.

National Park Service Land and Water Conservation Fund
This program provides matching grants to states and local governments for the acquisition and development of public outdoor recreation areas and facilities.

NOAA Regional Coastal Resilience Grants Program
The NOAA Regional Coastal Resilience Grants Program helps communities increase preparedness and improve coastal resiliency measures. This program is applicable to nonprofit organizations, higher education institutions, regional organizations, private entities, and local, state, and tribal governments that work toward resiliency strategies for land and ocean use, disaster preparedness, environmental restoration, and hazard mitigation projects benefiting coastal communities.

Resilient Communities Program
The National Fish and Wildlife Federation and Wells Fargo run this program which aims to fund projects that take advantage of natural features like wetlands, resilient shorelines, urban tree canopies, natural forests, and healthy upstream watersheds to accrue quality of life benefits today, enhance fish and wildlife resources, and help prepare for foreseeable resilience challenges. The program places special emphasis on equity, social inclusion, and helping traditionally low- and moderate-income communities build capacity for resilience planning and investments in "greener" infrastructure. A 1:1 match is highly recommended. Eligible applicants include non-profit 501(c) organizations, local governments, and Native American tribes. Ineligible applicants include U.S. federal and state government agencies, businesses, educational institutions, unincorporated individuals, and international organizations. Grants will be offered once a year, usually in January.

USEPA Smart Growth Grants
This website occasionally offers grants to support activities that improve the quality of development and protect human health and the environment. Announcements vary in eligibility, grant amount, frequency of grant, and deadline.

USDA Solid Waste Management Grants
This program provides funding for organizations that provide technical assistance or training to improve the planning and management of solid waste sites. Local and state governments, nonprofits, federally-

recognized tribes, and academic institutions may apply if they are in a rural area with a population of 10,000 or less. A match is not required; however, it is recommended. Funding is announced annually.

DOI Fish and Wildlife Service, Coastal Program
The USFWS's Coastal Program utilizes tax revenue from hunting, boating, and fishing to reinvest in conservation and coastal wetland ecosystems. A primary goal of the program is centered on seeking to help mitigate flooding and increase water quality. Grants opportunities are offered for restoration and protection of coastal wetlands, amongst other things.

Non-Federal Grant Programs

Kresge Foundation's Climate Change, Health and Equity Initiative
The community-based strategy of The Kresge Foundation's Climate Change, Health & Equity initiative is a multi-year effort that seeks to strengthen the leadership and effectiveness of community organizations working to implement policies and practices that improve climate resilience and reduce health risks equitably. Projects funded will advance the adoption and implementation of climate mitigation, climate adaptation, and climate resilience policies and programs at the local, regional, and/or state levels that improve public health outcomes and drive investments to improve quality of life. Governmental entities are not eligible to apply as the lead applicant but can serve as a partner organization. The second phase of the initiative will provide multi-year project implementation grants.

Partners for Places
Partners for Places is a matching grant program for U.S. (and Canadian) cities and counties provided by Funders' Network. The funds are used to foster partnerships between local government, sustainability offices, and place-based foundations. The grant assists in projects for the environment, economy, and communities. A 1:1 match is required, and grant investments range from $25,000 to $150,000. One or two funding rounds are announced each year.

Resources that Describe Finance Options

APA Disaster Recovery Program List
List of federal and national non-profit resources that can help fund disaster mitigation, response, and recovery projects.

Getting to Green: Paying for Green Infrastructure
This document offers a useful summary of the different types of funding sources, their advantages and disadvantages, and examples of several municipal programs that have employed them.

Georgetown Climate Center's Federal Funding Compendium for Urban Heat Adaptation
This resource collects and analyzes federal programs with potential to pay for state and local government adaptation to urban heat islands.

USEPA's Environmental Finance Centers
This network of Environmental Finance Centers, established by the U.S. Environmental Protection Agency, helps communities consider funding and financing options that provide innovative solutions to help manage the costs of environmental protection programs and activities.

USEPA Water Infrastructure and Resiliency Finance Center
This resource provides financial expertise to communities that are financing drinking water, wastewater, and stormwater infrastructure.

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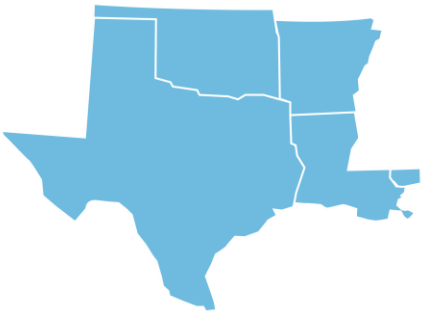

Southern Climate Impacts Planning Program

University of Oklahoma • Louisiana State University • University of Nebraska • University of Kansas • Texas Sea Grant

www.southernclimate.org

SCIPP
A NOAA RISA TEAM

RISA
Regional Integrated Sciences and Assessments