

# New Governors' Resilience Playbook



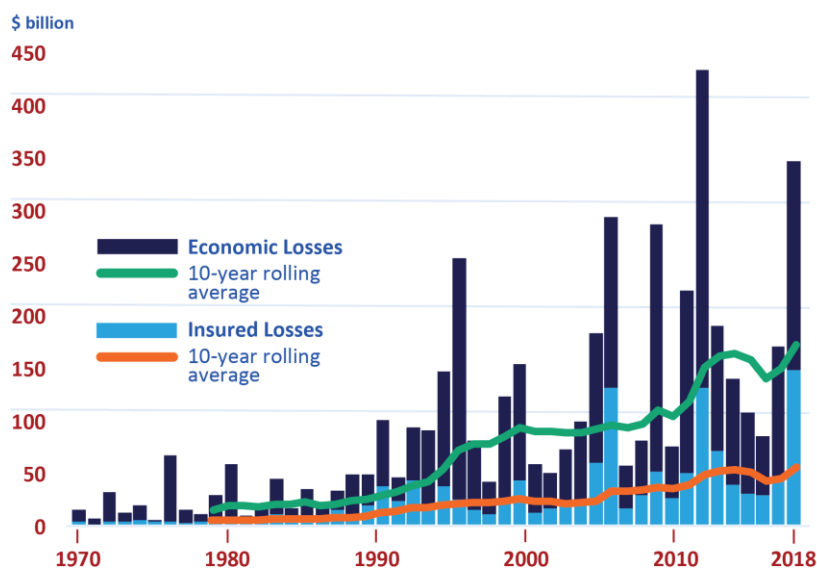
# Introduction

During the next four years, every Governor will likely grapple with critical resilience issues in their state – from extreme weather events and natural disasters to crumbling infrastructure and cyber threats. The human and economic toll of *not* being prepared is highly consequential to your state’s residents, communities, and the economy. Finding ways to mitigate these costs and threats through effective resilience and climate preparedness strategies are therefore an essential responsibility for Governors.

In 2017 and 2018 alone, the United States suffered over \$300 billion in damages from weather and climate disaster events.<sup>1</sup> September 2017 employment in places hit by Hurricanes Harvey and Irma was down 140,000 jobs and the nation lost 0.6 percent GDP growth from non-industrial sectors for that quarter.<sup>2</sup> The severity and frequency of extreme events are on the rise: of the top 20 costliest hurricanes to land on U.S. soil, all but three occurred since 2000.<sup>3</sup> In addition, many areas of the country are experiencing extreme precipitation, high temperatures, wildfires, and drought.

## The Growing Burden of Uninsured Losses

Natural Catastrophe Losses 1970-2017 (in 2017 USD billion)



Source: Swiss Re, 2018

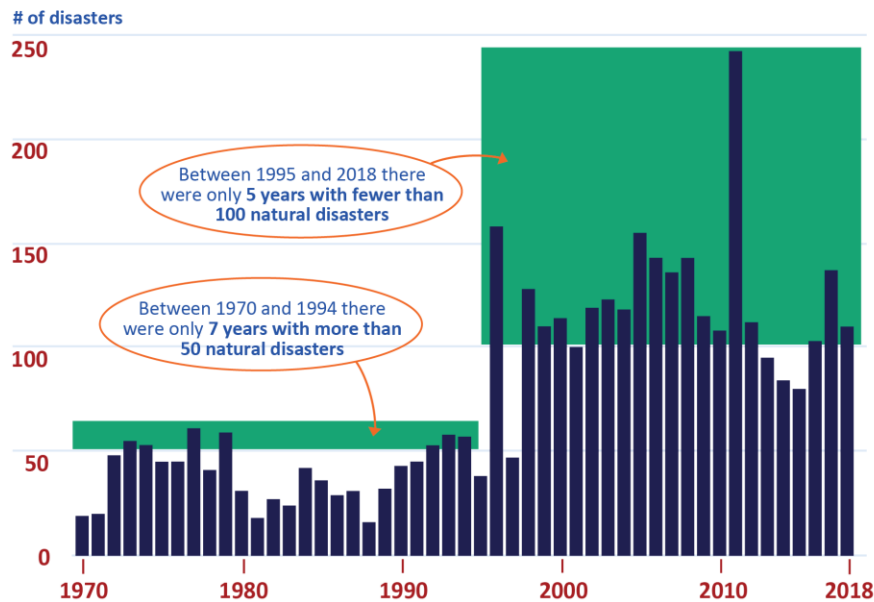
<sup>1</sup> <https://www.ncdc.noaa.gov/billions/time-series>

<sup>2</sup> <https://www.whitehouse.gov/articles/effects-hurricanes-harvey-irma-employment-industrial-production-real-gdp-growth-q3/>

<sup>3</sup> <https://www.nhc.noaa.gov/news/UpdatedCostliest.pdf>

## Natural Disasters Have Tripled Since the 1970's

FEMA Disaster Declarations: 1970-2018 (ytd)



Source: Swiss Re, 2018

To minimize climate risk, maximize clean economic growth opportunities, and reduce future costs from extreme weather and climate variability – *thereby facilitating additional investments in mitigation and critical infrastructure* – the United States Climate Alliance (USCA) established the USCA Resilience Working Group. While reducing greenhouse gas emissions is the first and most critical risk management strategy, adaptation and resiliency efforts to address ongoing risks must be part of any comprehensive approach to respond to climate change.

The USCA Resilience Working Group, co-chaired by California and Massachusetts in collaboration with resilience leaders from eight other states, has worked to create a Resilience Playbook for new governors taking office in January 2019.

The Playbook draws on resilience innovations from USCA states and governors, covering everything from program launches to implementation. It also draws on expertise and best practices from organizations like The Nature Conservancy, the National Council for Science and the Environment, the Georgetown Climate Center, the Blue Green Alliance, and Columbia Earth Sciences Center, which are doing innovative work on natural infrastructure systems, adaptation policy, university training linkages, and data development.

We hope that you find this useful as you begin to plan ahead.

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# I. What Is Resilience?

*There are many definitions of resilience.*

*Webster defines it as: “the capacity to recover quickly from difficulties; toughness.”*

Former Rockefeller Foundation President Judith Rodin, defines resilience this way in her ground-breaking book, *“The Resilience Dividend”*.

Resilience is the ability of people, communities and institutions to prepare for, withstand, and bounce back more rapidly from acute shocks and chronic stresses.

Catastrophe is not always preventable, but the degree of destruction and devastation can be mitigated, and building resilience is also a key economic development strategy. The benefits can be seen in the state’s budget lines, its economy and in greater opportunity for the residents.

It’s not just infrastructure construction that creates jobs. Resilience is becoming part of the criteria companies take into consideration when determining where to invest or locate operations. And in today’s global economy cities and states are competing for people as well as companies. Resilience should be a positive selling-point that cities and states volunteer to attract the best and the brightest, just as they might promote their livability scores, vibrant arts scene or new transportation investments.

By pursuing the resilience dividend, cities and states can get an economic leg up and better prepare for what’s next. Because no matter if the next shock hits tomorrow or 10 years from now, resilience is something a city and state can realize the benefits of each and every day.

## II. Launching a Resilience Initiative: The Ten Step Program

Whether you're responding to the effects of climate change or planning to withstand the next big natural disaster or utility cyber-attack, effective resiliency and preparedness efforts must be part of any governor's comprehensive plan to *protect their state's residents, economy, and critical infrastructure assets*.

A resilient state can mean many things depending on the particular risk factors for a given state – from hurricanes, atmospheric rivers, and floods to heat waves and wildfires. But while there is no one-size-fits-all solution, there are some general best practices that can be adapted for any state.

Below are the 10 key steps that any new governor should consider taking early in his or her first year in office to kick start long-term resiliency outcomes **throughout** the state, both through implementation and partnerships inside and outside of government.

This section outlines the basic plays for busy policy advisors and features innovative examples along with links to resources and experts to help you and your team proceed through each step.

### 1. Take Stock During the Transition

No state starts from zero when it comes to resilience, climate preparedness, and critical infrastructure planning. First, take some time to **assess whether your state has already completed a comprehensive resilience plan and/or a climate risk assessment (we've given you a head start in appendix A)**. If a previous administration commissioned a robust resilience or adaptation plan, consider building on this effort by developing a priority work plan to accelerate its actual implementation. There's no need to reinvent the wheel if the planning has already been adequately completed – the sooner you can move towards implementing results on the ground, the better.

In 2014, Virginia Governor Terry McAuliffe convened a Climate Change and Resiliency Update Commission, which included local elected officials, business leaders, environmental advocates, faith leaders, and industry representatives, to provide recommendations for updating the state's adaptation strategy and identify sources of funding to support implementation. More here: <https://www.naturalresources.virginia.gov/initiatives/climate-change-and-resiliency-update-commission/>



## 2. Make the Case and Set the Tone in Your State of the State

Resilience can either be a big or small part of your Governor's first state of the state. But it's wise to **plant a flag on this issue from the get-go**. If you want to start slow, creating a **task force** to tap the insights and perspectives of state and local leaders, business, utilities and other key stakeholders is a great way to tee up action recommendations for year two.

Or if you don't want to call out the resilience issue now, ask the business community or other key leaders to set the tone by doing an *economic study* designed to frame the long-term scale of the problem. Here's a report on making the business case for financing resilience: <http://www.globalpolicy.science/econ-damage-climate-change-usa/> along with a series of case studies that demonstrate the potential return on investments that can be achieved through natural hazard mitigation: [https://cdn.ymaws.com/www.nibs.org/resource/resmgr/docs/MSv2\\_Uilities\\_and\\_Tra nsport.pdf](https://cdn.ymaws.com/www.nibs.org/resource/resmgr/docs/MSv2_Uilities_and_Tra nsport.pdf).



In 2018, the Bay Area Council Economic Institute released an infrastructure resilience report documenting how California local and state infrastructure needs will fall short by \$1 trillion by 2050. This study is expected to drive 2019-2020 discussions in the California legislature about how to fund and finance resilient infrastructure in the state.

## 3. Create a Center of Gravity to Drive the Work

Creating a resilient state is a massive undertaking and crosses all the agency silos, from **environmental to emergency services**, and new governors should quickly move to create space for a dedicated group of experts who will be working on the issue even as more immediately pressing concerns begin taking up the Governor's time. This sort of office or position could be created through legislation or executive action, and there are various options to create this center of gravity, such as creating a **resilience cabinet, designating a lead agency, or appointing a chief resilience officer**.

In 2016, Colorado developed the CO-Resiliency Resource Center to provide local government officials, the private sector, and communities with technical resources to help them understand, plan for, and become more resilient to natural hazards, climate change, and other challenges. The Resource Center includes planning guidance, case studies, templates, training modules, and links to a broad range of technical information from across the United States and Colorado and an interactive story map: Colorado's Resiliency Story, <https://www.coresiliency.com/storymap/>

Rhode Island recently appointed a Chief Resilience Officer, who was tasked with developing a Statewide Climate Resilience Action Strategy to help the state be better prepared for climate change and natural hazards. The position was created in 2017 by Governor Raimondo's Executive Order 1710: Action Plan to Stand up to Climate Change.

#### 4. Develop Good Data

**Collect data on state disasters, threats, hazards, funding needs, and avoided costs for being prepared.** You can't mitigate what you don't measure — so find out exactly what your state's climate future looks like. Therefore, it is important for states to assess the exposure of public facilities, infrastructure and natural resources to natural hazards and how climate change will further exacerbate that exposure. It is also important to understand how much money the state is spending on post-hazard recovery, and how much money the state is spending on pre-hazard resilience.

Important note: States will not continue to look the way they do right now and climate research can help inform “no regrets” strategies. Resilient infrastructure will need to withstand future threats, not just those risks that are clear today (See Cal-Adapt.org for an example of how local communities can use visualizations and tools about how climate change might affect them).

The [Connecticut Institute for Resilience and Climate Adaptation \(CIRCA\)](#) is a multi-disciplinary center of excellence that brings together experts in the natural sciences, engineering, economics, political science, finance, and law to provide *practical* solutions to problems arising as a result of a changing climate. A critical success of this partnership was the adoption of sea level projections refined for the Connecticut coast line. The analysis supporting this recommendation is available in the draft report entitled *Sea Level Rise in Connecticut* by James O'Donnell, available online at: <https://circa.uconn.edu/2018/03/27/sea-level-rise-projections-for-the-state-of-connecticut-webinar-recording-available/>

#### 5. Drive the Shift from *Data & Planning to Implementation.*

Once the risk assessment has been completed, it's time to get serious about implementation and execution to turn state plans into on-the-ground results. Much of the important resilience work will ultimately happen at the local level, but the governor has an important role to play in articulating a resilience vision for the state as a whole. GHG mitigation should be woven into the state's resilience plan as much as possible. State and local community stakeholders should be actively engaged in this process. Once a plan has been developed, it is important to provide all relevant agencies the resources necessary to implement it.



Massachusetts MVP program: The Municipal Vulnerability Preparedness grant program (MVP) provides support for cities and towns in Massachusetts to plan for resiliency and implement key climate change adaptation actions for resiliency. The state awards communities with funding to complete vulnerability assessments and develop action-oriented resiliency plans. For help completing their assessment and resiliency plan, communities can choose from a list of MVP certified providers trained on The Nature Conservancy's Community Resilience Building Framework. Communities who complete the MVP program become certified as an MVP community and are eligible for MVP Action grant funding and other opportunities. There are currently 74 designated MVP communities in Massachusetts, with another 83 communities currently completing MVP planning grant.

Resilient Rhody: An Actionable Vision for Addressing the Impacts of Climate Change in Rhode Island is another example to draw from. This strategy prioritizes 61 actions across key sectors and builds on efforts that are well underway, including published reports, and established, effective tools to guide the state toward a more resilient future.

## 6. Leverage State Dollars to Promote Resilience

Capitalize on the investments your state is already making every day. Whether local assistance dollars, direct infrastructure expenditures, or permitting, every budget decision has the potential to support your state's resilience goals. While there will be the need to strategically invest in specific, potentially large-scale adaptation and resilience projects, don't miss the opportunity to incentivize resilience through day-to-day investments as well. There is also a secondary benefit here. State funding can offer incentives for contractors and service providers to develop skills and expertise around resiliency, which has spillover effects. This makes it easier and more cost-effective for other actors – local governments or private companies – to demand similar standards.

New York Governor Andrew Cuomo signed the Community Risk and Resiliency Act (CRRRA), in September 2014. CRRRA requires applicants in certain state permitting and funding programs to consider sea-level rise and flooding in their program designs. CRRRA also requires consideration of these hazards in decisions regarding public infrastructure and siting of solid and hazardous waste facilities.

The Minnesota Department of Transportation Flash Flood Vulnerability and Adaptation Assessment Pilot Project assessed two MnDOT districts and provided adaption options and financial and social costs for the 216 bridges, 521 large culverts, 902 pipes, and approximately 45 miles of road segments paralleling streams; <http://www.dot.state.mn.us/climate/pilotproject.html>.

## 7. Incentivize Bottom Up Community Action by Local Governments, Utilities, & Businesses.

Successful implementation of climate adaptation and resilience efforts requires local action. The state can provide guidance and funding to help the process along, but implementation must happen at the local level. The particular distribution of power of the state vis-à-vis local governments will vary based on the state. (For example, New York is a home rule state, meaning local governments are granted tremendous constitutional power.) By recognizing the reality of local power, the state can focus on incentivizing local action that will help further its resilience goals. States can, for example, make grants available to municipalities on the condition that they undertake some sort of climate adaptation and mitigation plan or improve capital planning and asset management processes. The best of these programs, developed in concert with Governors and state legislatures, provide local governments with the support they need to complete these plans, and then offer money on the back end for implementation.

Maryland provides grants to help local governments incorporate consideration of sea-level rise and changing precipitation into local plans, ordinances, and local programs, through its CoastSmart Community Resilience Program. The state also created a Scorecard to help local governments identify best practices for reducing climate risks.

## 8. Don't Waste Your First Crisis

When your state gets hit with its first resilience crisis or natural disaster, be ready to not just respond, but to also build state resilience for the next disaster with an action plan in your bottom drawer. Plan ahead to implement reforms to address development in high-hazard areas and promote new resilient micro-girds. Review state insurance and re-insurance practices to support rapid re-building efforts after resilience shocks and align private financial incentives to state resilience objectives.

In New Jersey, The Green Acres, Farmland, Blue Acres, and Historic Preservation Bond Act of 2007 authorized \$12 million for acquisition of lands in the floodways of the Delaware River, Passaic River or Raritan River, and their respective tributaries, for recreation and conservation purposes. An additional \$24 million was approved by the voters in the Green Acres, Water Supply and Floodplain Protection, and Farmland and Historic Preservation Bond Act of 2009. Properties (including structures) that have been damaged by, or may be prone to incurring damage caused by, storms or storm-related flooding, or that may buffer or protect other lands from such damage, are eligible for acquisition. For further information on this program, and for useful links regarding current emergency management efforts and guidance, please see our [Blue Acres Floodplain Acquisition page](#). You may wish to review our [Frequently Asked Questions](#) for more information.

## 9. Champion Procurement and Budgeting Reforms for Resilience

Building state-wide resilience requires not just integrating the changing climate into planning but also adjusting how we invest using resilience principles.

In the case of infrastructure, this means incorporating climate risk considerations across the entire asset lifecycle - from planning, procurement, and contracting to development and service delivery. It also means investing in natural or green infrastructure that can provide resilience benefits that complement hard or gray infrastructure systems. Investing in natural resources provides additional critical ecosystem services such as water and food security, public health and safety, wildlife habitat, and carbon sequestration.

In California, Executive Order B-30-15 requires state agencies to incorporate climate considerations in all planning and investment decisions. The EO also includes a series of guiding principles, including: prioritize actions that promote integrated climate action; prioritize actions that promote equity and foster community resilience; coordinate with local and regional agencies; prioritize actions that utilize natural and green infrastructure solutions and enhance and protect natural resources; base all planning and investment decisions on the best-available science, including utilization of Life-Cycle Cost Accounting (LCCA). The Governor's Office of Planning and Research developed implementation guidance for state agencies with support for a multi-agency and stakeholder Technical Advisory Group. Parts of this EO were codified through AB 2800.

## 10. Rinse, Repeat and Revise

Engage in regular monitoring, revision and ongoing research to inform future decisions, policies, and investments. The future climate is full of many unknowns, and the implementation of any resilience strategy must be understood as a first step in a constantly evolving process. Successful resilience strategies are also dependent on our success in reducing greenhouse gas emissions. States should engage in rigorous monitoring of their programs against carefully selected metrics, and be willing to make regular changes if things are not working the way they should be. One strategy to consider: use regional partnerships to share best practices.

To address a new era of ocean challenges and opportunities, the Governors of New York, New Jersey, Delaware, Maryland, and Virginia in 2009 signed the [Mid-Atlantic Governors' Agreement on Ocean Conservation](#). The Agreement established the Mid-Atlantic Regional Council on the Ocean (MARCO) to address shared regional priorities and provide a collective voice. In April 2018, MARCO released a first-of-its-kind report at the Mid-Atlantic scale that examines the vulnerabilities of several critical economic sectors to climate change; <http://midatlanticocean.org/report-assesses-mid-atlantic-coasts-economic-vulnerability-to-climate-change/>.

## III. Experts and Additional Resilience Resources

*Here is a list of key experts and resource organizations you can contact directly to learn more about all aspects of resilience.*

*The USCA has also created a google drive housing detailed resilience technical assistance memos provided by the Georgetown Climate Center, Blue Green Alliance and other experts. Please contact Kristin Igusky, Senior Associate ([kigusky@usclimatealliance.org](mailto:kigusky@usclimatealliance.org)) to access these resilience resources and other technical guidance on other state implementation areas including Short-Lived Climate Pollutants and Reducing Solar Soft Costs, among others.*

*Note: The inclusion of links to any private sector or non-profit organization below does not imply a specific endorsement of their services by USCA.*

### Experts & Organizations

#### **American Flood Coalition**

*Resources for states to conduct flood vulnerability assessments*

Website: [FloodCoalition.org](http://FloodCoalition.org)

[info@floodcoalition.org](mailto:info@floodcoalition.org)

#### **American Society of Civil Engineers**

*State level infrastructure condition and resilience*

Contact: [bpallasch@asce.org](mailto:bpallasch@asce.org)

#### **Autocase**

*New design tools for sustainable infrastructure and procurement*

<https://autocase.com/>

Contact: [john.williams@impactinfrastructure.com](mailto:john.williams@impactinfrastructure.com)

#### **Beeck Center on Social Innovation**

*Rules of the road for innovative procurement and life-cycle infrastructure*

<http://beeckcenter.georgetown.edu/wp-content/uploads/2017/03/NEX-Master-March-7-FINAL-1.pdf>

**Blue Green Alliance**

*Resilient energy grid infrastructure*

Contact: Jessica Eckdish [jeckdish@bluegreenalliance.org](mailto:jeckdish@bluegreenalliance.org)

**California Department of Insurance**

*Working to assess the impacts of climate change on the insurance industry, and identify climate risk to insurance companies*

Contact: Dave Jones, Insurance Commissioner

[Insurancecommissionerdavejones@gmail.com](mailto:Insurancecommissionerdavejones@gmail.com) / 916-804-2499

**Columbia Earth Sciences Center/Climate Assessment**

*Actionable climate and resilience data*

Contact: [rmoss@climateassessment.org](mailto:rmoss@climateassessment.org)

Also see: <http://www.measuringresilience.org/about/>

**Georgetown Climate Center**

*Resilience and adaptation policy guidance*

Contact: Jessica Grannis, Adaptation Program Director, [jcg68@georgetown.edu](mailto:jcg68@georgetown.edu)

<https://www.adaptationclearinghouse.org>

**Global Resilience Institute at Northeastern University**

*Focusing on shared dependencies that fuel the risk cascading failures that affect communities and energy networks.*

[globalresilience.northeastern.edu](http://globalresilience.northeastern.edu)

Contact:

[s.flynn@northeastern.edu](mailto:s.flynn@northeastern.edu)

M: 617-470-7675

**Hoover Institution/Stanford University**

*Focused on cyber and climate resilience*

Contact: Alice Hill

[ahill2@stanford.edu](mailto:ahill2@stanford.edu)

**Institute for Sustainable Infrastructure**

*Best practices for sustainable infrastructure and Envision planning tools*

<https://sustainableinfrastructure.org/>

Contact: 202-218-6747

**Mckinsey**

*Performance-based infrastructure best practices*

<https://www.mckinsey.com/industries/capital-projects-and-infrastructure/our-insights/bridging-global-infrastructure-gaps>

Contact: [Aaron\\_Bielenberg@mckinsey.com](mailto:Aaron_Bielenberg@mckinsey.com)

**National Council on Science and the Environment**

*Linking universities to states to work on resilience*

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

Contact: [mwyman@ncseglobal.org](mailto:mwyman@ncseglobal.org)

**Pew Center on the States**

*Flood preparedness and pre-disaster resilience*

Contact: [lighthouse@pewtrusts.org](mailto:lighthouse@pewtrusts.org)

**Resilience National Partnership Network (RNPN)**

*Best practices network on resilience*

Contact: [Ashely.solivan@ogilvy.com](mailto:Ashely.solivan@ogilvy.com)

**Swiss Re**

Resilience re-insurance policies, parametrics and products

Alex Kaplan, Sr Vice President

[Alex\\_Kaplan@swissre.com](mailto:Alex_Kaplan@swissre.com)

**The Nature Conservancy/NatureVest**

*Investments and policy for natural infrastructure and resilience*

Policy contacts: Nate Noiwoode, [nwoiwoode@tnc.org](mailto:nwoiwoode@tnc.org)

Investment contact: [naturevest@tnc.org](mailto:naturevest@tnc.org)

**100 Resilient Cities**

*Technical assistance focused on resilience by design*

<http://www.100resilientcities.org/>

## Additional Resources on Resilience

**Natural Infrastructure – The Nature Conservancy**

*Natural Infrastructure Overview-*

<https://tnc.box.com/s/o6vx8qxd2x0zku72fhmcr59kjhn6qom>

“Making the Case for Natural Infrastructure” white paper -

<https://tnc.app.box.com/s/9vj168g1hsvsgjs7y8fufxh36jwc9e2b>

“The Role of Natural Infrastructure in Hurricane Recovery” two pager -

<https://tnc.box.com/s/zrfqpuinjaewsxau531c2sf74r0s5xyr>

“How to communicate successfully regarding nature-based solutions” polling memo and communications guidance –

<https://tnc.box.com/s/iw0bsujrhrbrsnb4ka407zkqf2fft9ox>

Naturally Resilient Communities two pager - [http://nrcsolutions.org/wp-content/uploads/2017/07/NRC\\_Fact\\_Sheet.pdf](http://nrcsolutions.org/wp-content/uploads/2017/07/NRC_Fact_Sheet.pdf)



## The Law of Adaptation – Columbia Law School

The Law of Adaptation to Climate Change: U.S. and International Aspects - <https://www.americanbar.org/products/inv/book/215094/>

## Building Resilient States: A Framework for Agencies – Smart Growth America

*Tips for building resilience states.*  
<https://www.smartgrowthamerica.org/app/legacy/documents/building-resilient-states.pdf>

## Insurance Issues

*California Department of Insurance: actions to consider*  
<https://www.insurance.ca.gov/01-consumers/180-climate-change/index.cfm>  
Sustainable Insurance Forum- <https://www.sustainableinsuranceforum.org/>  
Climate-related Financial Disclosures (TCFD)- <https://www.fsb-tcf.org/>

## Cal Adapt and Related Resources

Cal Adapt provides a view of how climate change might affect California. Find tools, data, and resources to conduct research, develop adaptation plans and build applications: <https://cal-adapt.org/>

To support local implementation of this vision, ICARP also works to develop resources that respond to local needs, including the development of the Adaptation Clearinghouse ([resilientca.org](http://resilientca.org)) and an Adaptation finance guide: [http://opr.ca.gov/docs/20181106-Keenan\\_Climate\\_Adaptation\\_Finance\\_and\\_Investment\\_in\\_California\\_2018.pdf](http://opr.ca.gov/docs/20181106-Keenan_Climate_Adaptation_Finance_and_Investment_in_California_2018.pdf)

## Federal adaptation resources:

USDA: <https://www.climatehubs.oce.usda.gov/>  
FHWA: <https://ops.fhwa.dot.gov/publications/fhwahop15026/>  
NOAA: <https://coast.noaa.gov/czm/media/adaptationguide.pdf>  
NOAA: <https://www.noaa.gov/stories/climate-change-in-your-county-plan-with-new-tool>  
NOAA: <https://coast.noaa.gov/czm/media/adaptationguide.pdf>  
FEMA: [https://www.fema.gov/media-library-data/1468328601382-aaa5a22169a3c04c795edda845f36708/UPDATED\\_Benefit\\_Cost\\_CRMA\\_Projects\\_508.pdf](https://www.fema.gov/media-library-data/1468328601382-aaa5a22169a3c04c795edda845f36708/UPDATED_Benefit_Cost_CRMA_Projects_508.pdf)

**Additional sources:**

National Institute of Building Sciences

<https://www.nibs.org/>

Integrated Resilient Design Program- <https://www.nibs.org/page/irdp>

Multihazard Mitigation Council- <https://www.nibs.org/page/mmc>

FEMA Hazard Mitigation Planning

<https://www.fema.gov/hazard-mitigation-planning>

Georgetown Climate Center

<https://www.georgetownclimate.org>

Adaptation Clearinghouse (an online database of adaptation resources) -

<https://www.adaptationclearinghouse.org>

State Adaptation Tracking Tool -

<https://www.georgetownclimate.org/adaptation/plans.html>

Geos Institute

Climate Ready Communities- <https://climatereadycommunities.org/>

US Green Building Council

Delivering Urban Resilience- <https://www.usgbc.org/sites/default/files/delivering-urban-resilience-2018.pdf>

Urban Land Institute

<https://uli.org/>

Public Development and Infrastructure Council- <https://americas.uli.org/public-development-infrastructure-council-pdic/>

Resilient Communities Council (MN Chapter only)-

<https://minnesota.uli.org/product-councils/resilient-communities-council/>

National Network of Statewide-Local Sustainable Organizations

<http://nnsso.com/>

National League of Cities

<https://www.nlc.org/topics/environment-sustainability/resilience>

National Association of Counties

Resilient Counties Initiative

<https://www.naco.org/resources/signature-projects/resilient-counties-initiative>

Antioch University New England

Center for Climate Preparedness and Community Resilience

<http://www.communityresilience-center.org/>

Climate Adaption Knowledge Exchange

<https://www.cakex.org/>

US Global Change Research Program

National Climate Assessment- <https://nca2018.globalchange.gov/>

Development Advisory Committee- <https://www.globalchange.gov/ncadac>

**Center for Climate and Energy Solutions**

<http://www.c2es.org/category/climate-basics/>

**NRDC**

Ready or Not: An Evaluation of State Climate and Water Preparedness Planning-

<https://www.nrdc.org/resources/ready-or-not-evaluation-state-climate-and-water-preparedness-planning>

**American Society of Civil Engineers**

America's Infrastructure Report Card- <https://www.infrastructurereportcard.org/>

**Risky Business**

<https://riskybusiness.org/>

# Appendix A

## Initial State Resilience Assessments for Non-USCA States

No state starts from scratch on resilience. As noted, Virginia Governor Terry McAuliffe convened a Climate Change and Resiliency Update Commission in 2014, which included local elected officials, business leaders, environmental advocates, faith leaders, and industry representatives, to provide recommendations for updating the state's adaptation strategy and identify sources of funding to support implementation. More here:

<https://www.naturalresources.virginia.gov/initiatives/climate-change-and-resiliency-update-commission/>

Here are some examples of prior work done on resilience in non-Alliance states:

### Alaska

Administrative order 289 established an Alaska Climate Change Strategy, and a Climate Action for Alaska Leadership Team to advise on adaptation, mitigation, and other actions to help safeguard Alaska from climate impacts. The Leadership Team also developed an initial action plan including recommendations for statutory and regulatory changes.

<https://gov.alaska.gov/admin-orders/289.html>

### Florida

An executive order in 2007 established a Governor's Action Team on Energy and Climate Change to create a comprehensive Energy and Climate Change Action Plan which was released in 2008. The 2011 Florida Legislature passed the Community Planning Act (CPA - HB 7207) making significant changes to the state's growth management laws, including the addition of optional adaptation planning for coastal hazards and the potential impacts of sea level rise. In 2015, Florida Senate Bill 1094, "An Act relating to the peril of flood" was passed which requires consideration of future flood risk from storm surge and sea level rise in certain portions of local government comprehensive plans.

[https://drought.unl.edu/archive/plans/Climate/state/FL\\_2008.pdf](https://drought.unl.edu/archive/plans/Climate/state/FL_2008.pdf)

<http://www.flsenate.gov/Session/Bill/2011/7207>

<https://www.flsenate.gov/Session/Bill/2015/1094/BillText/Filed/PDF>

### Georgia

The Georgia Climate Research Roadmap is an initiative of the Georgia Climate Project, a state-wide consortium founded by Emory University, the Georgia Institute of Technology, and the University of Georgia to research climate impacts and solutions in Georgia. It is an interactive platform built around a list of 40 key research questions for policymakers

and practitioners to better address climate change in Georgia. Additionally, a semester-long graduate planning studio at the Georgia Institute of Technology, developed a report on 'Tracking the Effects of Sea Level Rise in Georgia's Coastal Communities' to provide residents, decision-makers, and researchers with information that can help to proactively plan for future sea level rise (SLR).

<http://roadmap.georgiaclimataproject.org/>

<https://smartech.gatech.edu/handle/1853/48711>

### **Illinois**

An Update to the Illinois Wildlife Action Plan (WAP) was released in 2011 by the Illinois Department of Natural Resources (IDNR) in order to incorporate climate change considerations into the 2005 WAP. The update involved conducting climate vulnerability assessment of species and habitats, identify conservation strategies, outline adaptation management and recommend changes to existing monitoring programs. The Illinois Emergency Management Agency's Illinois Mitigation Program identifies hazards that affect Illinois, assess how vulnerable Illinois is to each hazard, and then implement a strategy for mitigating the effects of the hazard.

<https://www.dnr.illinois.gov/conservation/iwap/documents/tncs%20il%20wap%20cc%20vul%20assessment.pdf>

<https://www2.illinois.gov/iema/Mitigation/Pages/default.aspx>

### **Iowa**

A report on "Climate Change Impacts on Iowa" was produced by the Iowa Climate Change Advisory Council in 2010. The report includes an overview of potential climate change impacts to the state of Iowa and policy recommendations for responding to these threats. The Council was discontinued in 2011. The Iowa Climate Change Adaptation and Resilience Report from 2011 presents the findings of a pilot project initiated by the U.S. Environmental Protection Agency to work with stakeholders and governments in Iowa to investigate regional effects of climate change in hazard mitigation planning and other community planning processes.

<http://www.water.iastate.edu/sites/www.water.iastate.edu/files/iowawatercenter/Climate%20Change%20Impacts%20on%20Iowa%202010.pdf>

[https://web.archive.org/web/20170127214802/https://www.epa.gov/sites/production/files/documents/iowa\\_climate\\_adaptation\\_report.pdf](https://web.archive.org/web/20170127214802/https://www.epa.gov/sites/production/files/documents/iowa_climate_adaptation_report.pdf)

### **Kansas**

The Kansas Hazard Mitigation Team at the Adjutant General's Department assesses hazard mitigation needs, develops and implements statewide hazard mitigation policies, promotes coordination of mitigation programs at all levels of government and pursues alternate mitigation funding strategies. The Team also develops the Hazard Mitigation Plan.

<http://kansastag.gov/kdem.asp?PageID=188>

**Maine**

The 2010 “Resolve, To Continue Evaluating Climate Change Adaptation Options for the State” - Maine SP0733, LD 1818 resolution directed Department of Environment Protection to continue to evaluate adaptation measures available to the people and businesses of Maine. The ‘Maine’s Climate Future 2015’ assessment by DEP focused on past, present, and future trends for key climate change impacts in Maine including temperature, precipitation, ocean temperature, ocean acidification, and sea level rise.

[http://www.mainelegislature.org/legis/bills/bills\\_124th/billpdfs/SP073301.pdf](http://www.mainelegislature.org/legis/bills/bills_124th/billpdfs/SP073301.pdf)

[http://cci.siteturbine.com/uploaded\\_files/climatechange.umaine.edu/files/Maines\\_Climate\\_Future\\_2015\\_UpdateFinal-1.pdf](http://cci.siteturbine.com/uploaded_files/climatechange.umaine.edu/files/Maines_Climate_Future_2015_UpdateFinal-1.pdf)

**Michigan**

Michigan Climate and Health Adaptation Program Strategic Plan Update: 2016-2021 provides the foundation for moving climate and health adaptation planning forward in Michigan. The Plan developed by Michigan Department of Health and Human Services has monitored the magnitude and distribution of these climate related health impacts, identified key vulnerabilities, and characterized the current and projected changes in climate across Michigan. The program then conducted a statewide vulnerability assessment by mapping the distribution of the socioeconomic and biophysical indicators of priority health risks identified.

[https://www.michigan.gov/documents/mdch/MDCH\\_climate\\_change\\_strategicPlan\\_final\\_1-24-2011\\_\\_343856\\_7.pdf](https://www.michigan.gov/documents/mdch/MDCH_climate_change_strategicPlan_final_1-24-2011__343856_7.pdf)

**Nevada**

Developed by the Nevada Department of Wildlife (NDOW), Nevada’s State Wildlife Action Plan (SWAP) revision was published in 2013. The revision was completed to incorporate the potential impacts of emerging and expanding stressors - including climate change - on the state’s fish and wildlife species, and habitats in greatest need of conservation. The Nevada Hazards Mitigation Planning Committee advises the Nevada Division of Emergency Management concerning hazard-mitigation planning, activities and policies.

[http://www.ndow.org/Nevada\\_Wildlife/Conservation/Nevada\\_Wildlife\\_Action\\_Plan/](http://www.ndow.org/Nevada_Wildlife/Conservation/Nevada_Wildlife_Action_Plan/)

<http://dem.nv.gov/boards/nhmpc/>

**New Mexico**

The New Mexico Department of Homeland Security and Emergency Management’s Mitigation Unit coordinates and administers statewide floodplain management, hazard mitigation planning and project programs. Silver Jackets New Mexico was formed to raise awareness of flood risks in NM Tribal communities. Silver Jackets NM is a collaboration



between the US Army Corps of Engineers, FEMA Region VI and NM – Department of Homeland Security and Emergency Management.

<http://www.nmdhsem.org/Mitigation.aspx>

### **Ohio**

Cleveland, Ohio has an updated Climate Action Plan (2018) with priorities that address social and racial equity, “good jobs, green jobs,” climate change resilience, and business leadership. The Ohio Emergency Management Agency develops the Hazard Mitigation Plan to identify risks and vulnerabilities associated with natural hazards and to develop long-term strategies for protecting people and property from the effects of future hazard events.

[https://www.sustainablecleveland.org/climate\\_action](https://www.sustainablecleveland.org/climate_action)

[https://ema.ohio.gov/Mitigation\\_OhioPlan.aspx](https://ema.ohio.gov/Mitigation_OhioPlan.aspx)

### **Pennsylvania**

Pennsylvania Climate Change Act of 2008 called for development of a climate impacts assessment and development of a climate change action plan. The Act also established a state Climate Change Advisory Committee (CCAC) for advising the Pennsylvania Department of Environmental Protection (DEP) to implement the Act’s requirements. The most recent update of the Pennsylvania Climate Assessment was in 2015. In 2011, CCAC released the Pennsylvania Climate Adaptation Planning Report: Risks and Practical Recommendations (“2011 Plan”).

<https://www.pennfuture.org/Files/Admin/Pennsylvania-Climate-Impacts-Assessment-Update---2700-BK-DEP4494.compressed.pdf>

[https://drought.unl.edu/archive/plans/Climate/state/PA\\_2014.pdf](https://drought.unl.edu/archive/plans/Climate/state/PA_2014.pdf)

### **South Dakota**

The South Dakota Office of Emergency Management develops plans, programs and services to reduce or eliminate loss due to disasters. The South Dakota Office of Emergency Management also offers mitigation grants to help communities eliminate or lessen the impact of a recurring event upon life and property. In 2016, the Office released a State Hazard Identification and Risk Assessment report.

<https://dps.sd.gov/emergency-services/emergency-management/mitigation>

### **Wisconsin**

In 2007, Executive Order 191 created a Global Warming Task Force charged with developing a strategy for reducing greenhouse gas emissions. In July 2008, the Task Force published its report to the Governor — Wisconsin’s Strategy for Reducing Global Warming. The report mainly focused on reducing emissions from critical sectors (utilities, transportation, agriculture, and industry), but also recommends that the state take action to prepare for the impacts of climate change and take advantage of opportunities created by a changing climate. The Wisconsin Emergency Management (WEM) agency identifies

the major hazards Wisconsin faces, and recommends actions to reduce vulnerability in the Wisconsin Hazard Mitigation Plan.

<http://www.climatestrategies.us/library/library/download/313>

### Additional Resources

Georgetown Climate Center's State Adaptation Tracking Tool

(<https://www.georgetownclimate.org/adaptation/plans.html>) tracks progress on state adaptation work, with access to local adaptation plans and additional resources.

## Appendix B

### Climate Impacts in Your State

Every state is already experiencing a range of climate impacts and natural hazards. Climate Central and ICF, International analyzed the preparedness actions that each of the 50 states are taking in relation to their current and future changes in climate threats, which can be found here: <http://reportcard.statesatrisk.org/>.

Additional information on current and future climate impacts and hazards from the U.S. Environmental Protection Agency and the 2018 National Climate Assessment can be found below:

#### Alaska

Over the past 60 years, Alaska has warmed more than twice as rapidly as the rest of the U.S., a temperature rise of three degrees (F) on average and six degrees during winter. As a result, Arctic sea ice is retreating, shores are eroding, glaciers are shrinking, permafrost is thawing, and insect outbreaks and wildfires are becoming more common. In the coming decades, these effects are likely to accelerate. Increasing ocean acidity threatens fishing, which is Alaska's third largest industry and a key source of food for many native communities.

<https://19january2017snapshot.epa.gov/sites/production/files/2016-09/documents/climate-change-ak.pdf>

<https://nca2018.globalchange.gov/chapter/26/>

#### Florida

The Florida peninsula has warmed more than one degree (F) during the last century. The sea is rising about one inch every decade, and heavy rainstorms are becoming more severe. In the coming decades, rising temperatures are likely to increase storm damages, harm coral reefs, increase the frequency of unpleasantly hot days, and reduce the risk of freezing to Florida's agriculture. Cities, roads, railways, ports, and water supplies in Florida are vulnerable to the impacts of storms and sea level rise. Greater wind speeds and the resulting damages can make insurance for wind damage more expensive or difficult to obtain. Coastal homes and infrastructure will flood more often as sea level rises, because storm surges will become higher as well. Changing climate is also likely to increase inland flooding.

<https://19january2017snapshot.epa.gov/sites/production/files/2016-09/documents/climate-change-fl.pdf>

<https://nca2018.globalchange.gov/chapter/19/>

## Georgia

In the coming decades, Georgia will become warmer, and the state will probably experience more severe floods and drought. Even today, more rain is falling in heavy downpours, and sea level is rising about one inch every decade. Higher water levels are eroding beaches, submerging lowlands, and exacerbating coastal flooding. Like other southeastern states, Georgia has warmed less than most of the nation during the last century. But during the next few decades, the changing climate is likely to harm livestock, increase the number of unpleasantly hot days, and increase the risk of heat stroke and other heat-related illnesses.

<https://19january2017snapshot.epa.gov/sites/production/files/2016-09/documents/climate-change-ga.pdf>

<https://nca2018.globalchange.gov/chapter/19/>

## Illinois

Most of the state has warmed by about one degree (F) in the last century. Floods are becoming more frequent, and ice cover on the Great Lakes is forming later or melting sooner. In the coming decades, the state will have more extremely hot days, which may harm public health in urban areas and corn harvests in rural areas. Northern cities like Chicago are vulnerable to heat waves, because many houses and apartments lack air conditioning, and urban areas are typically warmer than their rural surroundings.

<https://19january2017snapshot.epa.gov/sites/production/files/2016-09/documents/climate-change-il.pdf>

<https://nca2018.globalchange.gov/chapter/21/>

## Iowa

Iowa's climate is changing. Most of the state has warmed one-half to one degree (F) in the last century, and floods are becoming more frequent. In the coming decades, the state will have more extremely hot days. Although springtime in Iowa is likely to be wetter, summer droughts are likely to be more severe. Higher evaporation and lower summer rainfall are likely to reduce river flows.

<https://19january2017snapshot.epa.gov/sites/production/files/2016-09/documents/climate-change-ia.pdf>

<https://nca2018.globalchange.gov/chapter/21/>

## Kansas

Kansas's climate is changing. In the past century, most of the state has warmed by at least half a degree (F). The soil is becoming drier. Rainstorms are becoming more intense, and floods are becoming more severe. Warming winters and changes in the timing and size of rainfall events have altered crop yields. In the coming decades, summers are likely to become increasingly hot and dry, creating problems for agriculture

and possibly human health. By 2050, Kansas is likely to have four times as many days above 100°F.

<https://19january2017snapshot.epa.gov/sites/production/files/2016-09/documents/climate-change-ks.pdf>

<https://nca2018.globalchange.gov/chapter/23/>

## **Maine**

Maine's climate is changing. The state has warmed about three degrees (F) since the year 1900. Throughout the northeastern United States, spring is arriving earlier and bringing more precipitation, heavy rainstorms are more frequent, and summers are hotter and drier. Sea level is rising, and severe storms increasingly cause floods that damage property and infrastructure. In the coming decades, changing the climate is likely to increase flooding; harm ecosystems; disrupt fishing, agriculture, and winter recreation; and increase some risks to human health.

<https://19january2017snapshot.epa.gov/sites/production/files/2016-09/documents/climate-change-me.pdf>

<https://nca2018.globalchange.gov/chapter/18/>

## **Michigan**

Most of the state has warmed two to three degrees (F) in the last century. Heavy rainstorms are becoming more frequent, and ice cover on the Great Lakes is forming later or melting sooner. Warmer winters are likely to shorten the season for recreational activities like ice fishing, snowmobiling, snowboarding, and skiing, which could harm the local economies that depend on them. Increasingly hot summers are likely to reduce yields of corn and possibly soybeans.

<https://19january2017snapshot.epa.gov/sites/production/files/2016-09/documents/climate-change-mi.pdf>

<https://nca2018.globalchange.gov/chapter/21/>

## **Nevada**

Nevada's climate is changing. The state has warmed about two degrees (F) in the last century. Throughout the southwestern United States, heat waves are becoming more common, and snow is melting earlier in spring. Higher temperatures and drought are likely to increase the severity, frequency, and extent of wildfires in Nevada, which could harm property, livelihoods, and human health. On average, about 5 percent of the land in Nevada has burned per decade since 1984. Warmer and drier conditions also make forests more susceptible to pests. Increasing droughts and higher temperatures are likely

to interfere with Nevada's farms and cattle ranches. Less water is likely to be available for ranches or farmers who irrigate crops.

<https://19january2017snapshot.epa.gov/sites/production/files/2016-09/documents/climate-change-nv.pdf>

<https://nca2018.globalchange.gov/chapter/25/>

## **New Mexico**

Most of the state has warmed at least one degree (F) in the last century. Throughout the southwestern United States, heat waves are becoming more common, and snow is melting earlier in spring. In the coming decades, our changing climate is likely to decrease the flow of water in the Colorado, Rio Grande, and other rivers; threaten the health of livestock; increase the frequency and intensity of wildfires; and convert some rangelands to desert.

<https://19january2017snapshot.epa.gov/sites/production/files/2016-09/documents/climate-change-nm.pdf>

<https://nca2018.globalchange.gov/chapter/25/>

## **Ohio**

Ohio's climate is changing. Most of the state has warmed by about one degree (F) in the last century. Changing the climate is likely to increase the frequency of floods in Ohio. Over the last half century, average annual precipitation in most of the Midwest has increased by 5 to 10 percent. During the next century, spring rainfall and average precipitation are likely to increase, and severe rainstorms are likely to intensify. Ice cover on the Great Lakes is forming later or melting sooner. In the coming decades, the state will have more extremely hot days, which may harm public health in urban areas and corn harvests in rural areas.

<https://19january2017snapshot.epa.gov/sites/production/files/2016-09/documents/climate-change-oh.pdf>

<https://nca2018.globalchange.gov/chapter/21/>

## **Pennsylvania**

The commonwealth has warmed more than half a degree (F) in the last century, heavy rainstorms are more frequent, and the tidal portion of the Delaware River is rising about one inch every eight years. In the coming decades, changing the climate is likely to increase flooding, harm ecosystems, disrupt farming, and increase some risks to human health. Sea level is rising more rapidly along Pennsylvania's shoreline than in most coastal areas because the Delaware Valley is sinking. If the oceans and atmosphere continue to warm, the tidal portion of the Delaware River is likely to rise one to four feet in the next century. Extraordinarily high river flows occasionally cause problems for commercial navigation along the Ohio and Allegheny rivers, and riverfront communities



along the Susquehanna River and smaller tributaries occasionally flood. Heavier storms and greater river flows could make these problems worse.

<https://19january2017snapshot.epa.gov/sites/production/files/2016-09/documents/climate-change-pa.pdf>

<https://nca2018.globalchange.gov/chapter/18/>

### **South Dakota**

South Dakota's climate is changing. In the past century, most of the state has warmed by one to two degrees (F). Rainstorms are becoming more intense, and annual rainfall is increasing. Within 70 years, the frequency of days above 100°F is likely to double. Even where ample water is available, higher temperatures would reduce yields of corn in the warmest parts of the state.

<https://19january2017snapshot.epa.gov/sites/production/files/2016-09/documents/climate-change-sd.pdf>

<https://nca2018.globalchange.gov/chapter/22/>

### **Wisconsin**

In the past century, most of the state has warmed about two degrees (F). Heavy rainstorms are becoming more frequent, and ice cover on the Great Lakes is forming later or melting sooner. In the coming decades, the state will have more extremely hot days. During the next century, spring rainfall and annual precipitation are likely to increase, which will tend to increase the risk of flooding. The changing climate may reduce the output of Wisconsin's multi-billion-dollar dairy industry, which generates more than half of the state's farm revenue. Higher temperatures cause cows to eat less and produce less milk.

<https://19january2017snapshot.epa.gov/sites/production/files/2016-09/documents/climate-change-wi.pdf>

<https://nca2018.globalchange.gov/chapter/21/>