



Resilience Roadmap

The Urgent Need for Climate Resilience Action

Building our nation's resilience is an urgent priority. Our vulnerability to the stresses and shocks of climate change threatens US food, energy, water, transportation, and health security, imperiling our economy and our very well-being as a nation.

Our economy has never been more vulnerable to climate disasters such as droughts, flooding, storms, wildfires, and extreme weather like hurricanes and arctic storms. Consider, for example, the fate of too many small businesses, the lifeblood of the American economy: More than 90 percent of small businesses fail within two years of being struck by a disaster, [according to](#) the United States Small Business Administration. Farms face similar issues of survival in the face of increasingly frequent and severe weather events and challenges.

The consequences of this fragility disproportionately affect those already vulnerable or marginalized by structural economic, social, racial, and environmental inequities. The Biden-Harris Administration's ambitious commitment to tackle the climate crisis offers a timely and unprecedented opportunity to address this need—mobilizing the government and the American people to build greater climate resilience through new, high-quality jobs, guided by principles of equity and environmental justice to fuel lasting economic growth and national security.

The *Resilience Roadmap* project seeks to seize upon this opportunity by offering actionable recommendations to inform the federal government's national resilience efforts.

The harmful consequences of a changing climate are hitting home with destructive impacts that will only continue to increase and intensify. Last year set an [annual record](#) with 22 US climate disasters, each wreaking damages of over one billion dollars. The US has experienced 285 such “billion-dollar” events since the National Oceanic and Atmospheric Administration (NOAA) began tracking them in 1980. Nearly half of these events have occurred since 2010. From Florida to Alaska, the Midwest to the South, every state in America has been devastated by such disasters. Texas alone has been hit by more than 100 of these events.

States have to shoulder not only the post-disaster rebuilding expenses but also the costs of putting in place post-disaster safety nets: increased unemployment benefits, eviction assistance, and food assistance, among others. Even with such assistance, disaster survivors are frequently left with unmet needs not covered by either state or federal aid. And far too many people face devastating financial, social, and mental health challenges during disaster recovery.

In addition to extreme weather events, climate change threatens communities through chronic, dispersed threats related to air quality, water supply and sanitation, infectious diseases, food insecurity, coastal inundation, and the loss of natural ecosystems and wildlife. These slower moving and longer-lasting, cross-sectoral challenges have serious and lasting implications. Communities across the US are not prepared to withstand, recover from, or build resilience to severe natural disasters and to the dangerous, chronic impacts of climate change.

About the Resilience Roadmap Project

In Executive Order 14008, President Biden set climate resilience as a critical, whole-of-government priority. Much work is needed to translate that ambitious vision to action, but the American people have the expertise, ingenuity, and capability to do so. In this spirit, and with the aim of providing practical and useful insights to tackle our resilience challenge, the *Resilience Roadmap* project has convened leading resilience experts from states, local and Tribal communities, civil society, academia, and the private sector. These experts, many of whom formerly worked in the federal government or on the frontlines of the climate change battle, have volunteered their time and knowledge to offer support for our national effort. The recommendations below present our initial, high-level guidance for the Administration.

The *Resilience Roadmap* is a non-partisan, independent project. It has not been commissioned by the federal government.

The project is hosted by the Duke University Nicholas Institute for Environmental Policy Solutions and Susan Bell & Associates.

More information on the project is available at nicholasinstitute.duke.edu/resilience-roadmap.

Principles

The *Resilience Roadmap* is guided by three overarching principles that frame our recommendations and are important for all resilience efforts:

- (1) Central to a comprehensive, climate change strategy, ***resilience-building can and should deliver tangible, on-the-ground benefits***: creating jobs, safeguarding public health and safety, stewarding natural resources, protecting and revitalizing our economy, investing in long-term restorative solutions, and reducing property risks.
- (2) ***Resilience-building efforts must prioritize vulnerable communities, especially those marginalized by structural targeting and historical divestment***. These efforts should recognize that impacts from the stresses and shocks of climate change act as a threat multiplier, falling most heavily on marginalized people and communities, often those that already suffer disproportionately from economic, social, racial, and environmental inequities.
- (3) ***Resilience building requires a vertically integrated, “whole-of-government” approach***, fostering alignment (including coordination of programs, information, and funding) among federal government agencies, states, local communities, Tribal Peoples, and regional entities, as well as with community groups, civil society, and the private sector.

PRESIDENTIAL COMMITMENTS

"The United States will ... move quickly to build resilience, both at home and abroad, against the impacts of climate change that are already manifest and will continue to intensify according to current trajectories."

Executive Order 14008, "Tackling the Climate Crisis at Home and Abroad" (January 2021)

"Building back better requires that the investments in this historic plan make our infrastructure more resilient in the face of increasingly severe floods, wildfires, hurricanes, and other risks. Every dollar spent on rebuilding our infrastructure during the Biden administration will be used to prevent, reduce, and withstand the impacts of the climate crisis."

American Jobs Plan (March 2021)

Recommendations

Challenge: The federal government lacks the interagency coordination, leadership, and systems needed to successfully confront the expansive, interconnected, and systemic challenges of climate resilience.

1 Elevate resilience as a core element of the Biden-Harris Administration's climate responsibilities by empowering a Resilience Lead.

In order to provide strategic guidance and a framework for coordinated resilience planning across all levels of government (federal agencies, state, local, and Tribal governments), the Biden Administration should **immediately empower a Resilience Lead** that is housed in the White House and works closely with the Office of Domestic Climate Policy and the White House National Climate Advisor, in alignment with the National Climate Task Force. The Lead must be adequately staffed and empowered with an interagency mandate, authority, and structures to direct strategy, planning, and coordination for resilience efforts across the federal government. The Resilience Lead should guide and coordinate interagency planning, agency workplans, and budgets focused on resilience, and lead the development of a National Climate Resilience Strategy.

Challenge: Our current federal disaster strategy is ill-equipped to deal with the accelerating nature of climate-related disasters and chronic impacts. We have yet to develop a national resilience strategy to address the impacts of future climate stressors and natural disasters.

2 Advance a National Climate Resilience Strategy.

To ensure that every dollar spent builds national resilience and protects marginal and vulnerable populations, the Administration should commit to a whole-of-government National Climate Resilience Strategy. This unified approach would ensure that federal spending effectively builds back better by:

- (1) Communicating and adhering to clear and consistent standards mandating resilience to extreme weather, and the needs of current and future communities;
- (2) Coordinating the resilience activities of all federal agencies to increase efficiency and effectiveness while reducing delays and redundancies;
- (3) Engaging directly with states, local governments and communities, and Tribal Peoples to support their resilience planning and implementation to improve investment outcomes;
- (4) Aligning federal regulations and financial instruments so that they incentivize building resilient natural and built infrastructure through investments;
- (5) Prioritizing investments that build resilience for marginalized, vulnerable, and low-income communities;
- (6) Creating training and high-quality, resilience-related jobs for low-income and marginalized communities.

Such an approach would assure that the US identifies and invests in cost-effective and “shovel-worthy” (rather than “shovel-ready”) projects.

The National Climate Resilience Strategy should build on the foundations already established in past administrations, including the 2016 Council on Climate Preparedness, Response, Recovery, and Resilience *“Opportunities to Enhance the Nation’s Resilience to Climate Change, the 2014 Recommendations of the President’s State, Local and Tribal Leaders Task Force on Climate Preparedness and Resilience,”* and upon executive actions by the Biden-Harris Administration. The Resilience Lead should immediately implement elements of the strategy that are ready to execute while continuing to refine and incorporate other necessary elements and foster innovation. The Lead should look to the Hurricane Sandy Rebuilding Task Force as a good example of interagency collaboration and resilience rebuilding, and ensure that coordination continues throughout implementation of the National Climate Resilience Strategy. This strategy needs to itself be resilient to competing demands for resources, disruptive events (like the pandemic), and changes in political priorities, and it should employ a long-time horizon in order to anticipate resilience needs far into the future.

The National Climate Resilience Strategy should focus specifically on building climate resilience into communities, services, built infrastructure, and natural and working lands. Below are eight additional recommendations on fundamental elements of the National Climate Resilience Strategy.

Challenge: Siloed policy, programs, processes, and budgets are ineffective and create barriers to addressing the enormity, urgency, and novel nature of the resilience-building need.

3 Coordinate government policy, planning, processes, and programs for disaster and resilience at all levels.

Use existing interagency structures where they exist (e.g., National Drought Panel) and build new ones where needed in order to coordinate funding, standards, and programs, to avoid duplication and to streamline processes.

For example:

- Require a resilience review of all federally funded projects and federal grants programs, through the Office of Management and Budget (OMB) and/or the sponsoring department. Backlogged projects should not be grandfathered, as they were planned under different conditions and may not have sufficiently imagined the future;
- Coordinate funding programs across agencies, especially if they can be leveraged through one-to-one matching programs, to allow grantees to maximize the use of one-time funding through concessional and no-interest loans, guarantees, and equity-based financing vehicles;
- Harmonize and simplify adaptation and resilience planning requirements to allow local communities to more easily access federal programs and funding;
- Clarify eligibility criteria for hazard mitigation projects permitted in the Federal Emergency Management Agency's (FEMA) Hazard Mitigation Grant Program in order to assist applicants access pre-disaster risk mitigation funding;
- Encourage federal grantees to use funds for non-structural, nature-based disaster mitigation solutions that are known to adapt to as well as mitigate flood risk and provide multiple co-benefits;
- Build partnerships with communities and across agencies to devise resilience strategies that include natural and nature-based approaches that utilize landscape-level ecosystem planning to address drought, flooding, wildfire risk, and other disasters that affect rural and urban communities;
- Ensure that resilient codes, when available, are used for federal investments in buildings. Where codes are not available, develop standards that account for future risks. Develop a process for selecting a common set of climate scenarios across local, state, and federal programs when collaboration on projects.

Challenge: To date, the federal government's efforts to help communities build resilience have focused almost exclusively on preparing for and adapting to new climate conditions where they live. For those cases where relocation is the more resilient and beneficial option, the federal government does not have coherent tools or processes to facilitate such moves.

4

Develop a framework for equitable climate relocation.

Create an interagency process to address federal buyouts, climate relocation, and managed retreat through legal, financial, and regulatory approaches. The interagency process must support free will and mobility of communities to determine their own futures. It should also have sufficient funding to support proactive planning and action. Potential approaches include purchasing at-risk private property and transferring it to the public sector, offering financial incentives for relocation, and constructing affordable housing in less risky areas.

For example:

- Emphasize household and community relocation in fund allocations to FEMA, the Department of Housing and Urban Development (HUD), and the Small Business Administration (SBA);
- Ensure that HUD and the Economic Development Agency (EDA) work with local and state governments to prioritize housing development for relocation in safer locations that meet community needs and minimize loss to the local tax base;

- Increase the capacity of the US Department of Agriculture (USDA) to offer buyouts to farms at risk of chronic and irreversible climate impacts (e.g., saltwater intrusion, increased susceptibility to flooding) and work with farmers to identify relocation options or alternative income-producing land uses;
- Increase ability of FEMA to promote buyout programs that return high-risk property to open space that can provide additional benefits, including flood and coastal protection;
- Develop components of FEMA, HUD, US Environmental Protection Agency (EPA), and NOAA programs that fund restoring open-space land remaining after buyout or acquisition to provide tangible benefit to communities through natural and nature-based approaches to risk reduction.

Challenge: Current federal spending is not targeted to produce resilient communities or natural and built infrastructure.

5

Allocate and target federal expenditures for the greatest resilience benefit.

Embed resilience considerations into existing spending for all programs that affect the nation's ability to build climate-resilient housing, health systems, farming, forestry, coastal zones, water and energy systems, ecosystems, transportation, broadband connectivity, and infrastructure. Plan and prioritize within these programs to provide the greatest resilience benefit, particularly for vulnerable communities. Ensure that these programs address the needs of our nation's historically under-resourced communities. Allocate resources to enhance protection and resilience of natural infrastructure to reduce forest fire, extreme urban heat, and inland and coastal flooding risk at a proportionate level.

For example:

- All federal funds invested in physical projects must demonstrate that they will address the knowable risks and shifts in community needs through 2050;
- Recipients of all federal infrastructure grants should be required to spend a fixed percentage of their grant on climate resilience planning;
- Reform the Community Reinvestment Act (CRA) to require financial regulators to assess and address climate change risks, build climate resilience, and avoid environmental injustice in their CRA investments;
- A higher proportion of funding from FEMA's Building Resilient Infrastructure and Communities (BRIC) program should be allocated for resilience planning and design and prioritize allocation to vulnerable low-income communities who are disadvantaged under the current rules;
- Evaluate and revise traditional benefit-cost analyses to allow for longer-than-usual time horizons to demonstrate resilience benefits over project lifetimes and to incorporate non-financial criteria such as ecological benefits and social equity, consistent with Biden's executive order "Modernizing Regulatory Review";
- USDA should waive cost share limits on conservation practices aimed at increasing resilience on agriculture and forest lands so as not to force rural landowners to choose between resilience practices and other cost share needs.

Challenge: Decisions made at the federal level often appear divorced from the needs and realities of local communities.

6 Directly advance meaningful engagement with local, rural, and Tribal communities to gain their knowledge and input on needs, learn from their experience, and create a forum for outreach and education on resilience risks and avoidance.

Use existing community-based networks as well as regional, Tribal, and state-level federal structures (e.g., NOAA's Sea Grant programs, USDA's Climate Hubs, and state climate offices¹⁾) throughout the country to engage directly with the public, both listening to and responding to local cultural and economic issues, as well as sharing knowledge and educating on climate risks, resilience-building options, and their many benefits.

For example:

- Create a team of advisors (navigators) that will help state, local, and Tribal governments navigate federal programs and requirements and use federally supported planning tools;
- Establish networks to document best practices in resilience, monitor resilience project implementation success, test the transferability of resilience projects, programs, and policies beyond the locations of their initial deployment, and disseminate information on best practice across the United States.

Challenge: Many infrastructure and natural resource management decisions are made at the state and local level, yet these entities do not have the right incentives or sufficient support to plan for and build resilience.

7 Provide financial and technical support and incentivize states, regional entities, Tribes, and localities to implement pre-disaster and risk planning.

Through federal programs, incentivize pre-disaster and risk planning and support state, local, and Tribal governments to develop climate change adaptation and resilience plans. Support capacity needs, technical assistance, and costs for vulnerability assessments, resilience planning, and design for state, local, and Tribal governments. Assess and address inequities in project budgeting and selection by fixing benefit cost analysis methods and adapting project matching requirements that unfairly disadvantage underrepresented and rural communities. Build partnerships with the private sector that incentivize resilience commitments, investment, and innovation. Build partnerships with the non-profit sector that increase civic engagement and democracy.

For example:

- Engage local, rural, and Tribal communities when developing federal guidance and standards for climate change adaptation and resilience plans;
- Develop and financially support scientifically robust and regularly updated infrastructure and natural resource planning tools (e.g., transportation, housing, water, energy, forestry, agriculture, and fisheries) that meet the needs of state, local, and Tribal governments with aligned and integrated information and requirements across federal agency programs;
- Develop equitable metrics to reduce or waive cost share on federal resilience grants for low- and moderate-income communities who have historically been less able to apply for federal programs that assist with planning, designing, and building resilient projects so as not to force local governments to choose between resilient projects and other cost share needs;
- Include resilience as part of technical assistance delivery and grants to farming and forestry sectors;
- Modeled after the FEMA Hazard Mitigation Plans and other FEMA funding programs, include criteria in federal grants that prioritize state and local applicants who can demonstrate that resilience planning standards have been met;
- Leverage public universities, HBCUs, land-grant colleges, community colleges, and other qualified non-profit training institutions to provide support for community resilience planning, research, and workforce development.

Challenge: Impacts from the stresses and shocks of climate change fall most heavily on marginalized people and communities, yet they have historically received little support in building resilience.

8

Prioritize federal actions that build resilience in marginalized, low-income, and Tribal communities while also addressing adverse health and environmental effects to these communities.

Increase funding for federal and matching programs that build resilience in communities made vulnerable by structural targeting and historical divestment. Create structures within federal agencies to strengthen and coordinate enforcement of health, environmental, and civil rights laws with an emphasis on protecting marginalized communities. Employ meaningful community engagement to understand needs and concerns regarding climate risks. Build a diverse and equitable resilience workforce.

For example:

- Utilize an environmental justice screening tool that fully incorporates income levels and vulnerability to climate risks to help direct resilience assistance to disadvantaged and marginalized communities;
- Prioritize funding for proactive resilience planning and projects for marginalized and low-income communities within programs such as HUD's Community Development Block Grant – Disaster Recovery (CDBG-DR), and HUD's Office of Native American Programs;
- Re-invest in resilience programs like the HUD National Disaster Resilience Competition;
- Improve the accessibility of proactive programs that can be used to improve resilience and reduce disaster risk, like FEMA's BRIC program or the National Fish and Wildlife Foundation Coastal Resilience Program;
- Increase community resilience grant programs focused on technical assistance to communities and community-based organizations to enhance their ability to understand their risks and implement effective, resilience-building responses;
- Increase funding for financial assistance for marginalized and low-income communities within programs such as HHS's Low-Income Home Energy Assistance Program, which can help households be resilient to extreme weather;
- Undertake a national public jobs program ("Conservation and Resilience Corps"), resilience training programs, and resilience certification programs to create career paths for workers from underserved communities. Ensure that these programs are tightly linked to workforce needs.

Challenge: Public expenditures and private investments are often knowingly risk-blind.

9

Realign financial and regulatory incentives to price and reduce climate risk of all infrastructure spending.

Ensure that federal and private sector mortgage lenders, accounting standards boards (SASB and GASB), banks, bond-rating agencies, insurance providers, utilities, and other regulated entities fully incorporate climate change risk into investments in a manner that addresses systemic inequity.

For example:

- Government secured equities (Fannie Mae and Freddie Mac) should develop a standardized risk tool that measures flooding and other risks and is incorporated into mortgage rates;
- Establish a national green bank to support nature-based resilience;
- Build financial instruments and mechanisms for rural stakeholders to invest in innovative resilient infrastructure—such as development of distributed and/or emergency power and fuel resources created from biomethane—to create back-up power sources that protect against costly power outages disproportionately harming rural and Tribal communities.

Challenge: *The federal government has unmatched capacity and data to employ science when addressing resilience, but its tools and resources are fragmented and not well targeted to user needs.*

10

Make scientific decision-making tools and data available, actionable, meaningful, and coordinated.

Coordinate scientific resources, tools, and data on climate across federal agencies so that they are consistent, accessible, and responsive to the needs of user communities. Ensure that equity considerations are incorporated into climate resources and tools. Create feedback loops with users and decision makers to ensure federal scientific resources are continually improved and adapted in order to meet their needs. Harmonize regional climate services of different federal agencies and improve their client focus. Establish research grants that encourage contributions and research from universities and other partners.

For example:

- Direct federal science agencies to create or make available actionable and downscaled climate science and projections that communities can use for their own planning;
- When collaborating on projects federal agencies should use sea level rise projections that are consistent to facilitate multiagency projects;
- Fund federal staff and resources to assist communities in their use of iterative processes to deploy resources for creating resilience plans, prioritizing projects, programs, and policies; funding priority projects and programs; evaluating progress; and adapting programs for greater effectiveness in achieving resilience goals.

Endnote

¹ Additional examples of federal programs include, NOAA's RISA program and Coastal Zone Management Programs; DOI's Climate Adaptation Science Centers; NRCS county-level offices; DOE national labs; FEMA Coastal Resilience Centers of Excellence; state climate offices; and other agency advisory boards.



The Blue & Green Corridors Project is designed to reduce urban flooding in a section of New Orleans while envisioning numerous other benefits for city residents, such as recreation, pedestrian- and bicycle-friendly streets, and economic development. The project is supported by HUD's National Disaster Resilience Competition and the City of New Orleans.

Contributors

Steering Committee members participated as individuals lending their personal expertise. Their professional affiliations do not imply organizational endorsement of these recommendations. Steering Committee members do not necessarily endorse every individual recommendation of the *Resilience Roadmap* project.

Steering Committee

Yoca Arditi-Rocha, The CLEO Institute

Jainey Bavishi, New York City Mayor's Office of Resiliency, former Associate Director for Climate Preparedness at the White House Council on Environmental Quality (CEQ)

Colette Pichon Battle, Gulf Coast Center for Law & Policy

Mike Connor, WilmerHale, former Deputy Secretary of US Department of Interior

Karen Diver, Native Nations Institute, former Special Assistant to the President for Native American Affairs on the Domestic Policy Council (DPC)

Sally Ericsson, former Associate Director for Natural Resources, Energy and Science at the White House Office of Management and Budget (OMB), former Associate Director for Natural Resources at the White House Council on Environmental Quality (CEQ)

Alice Hill, Council on Foreign Relations, former Special Assistant to the President and Senior Director for Resilience Policy on the National Security Council

Bob Perciasepe, Center for Climate and Energy Solutions (C2ES), former Deputy Administrator of the US Environmental Protection Agency

Laurie Schoeman, Enterprise Community Partners and Co-Facilitator of Resilience 21 Coalition

Nancy Sutley, Los Angeles Department of Water and Power, former Chair of the White House Council on Environmental Quality (CEQ)

Harriet Tregoning, New Urban Mobility alliance (NUMO), former Principal Deputy Assistant Secretary for the Office of Community Planning and Development of the US Department of Housing and Urban Development

Tatjana Vujic, Nicholas School of the Environment at Duke University

Jessica Whitehead, Institute for Coastal Adaptation and Resilience (ICAR) at Old Dominion University, former Chief Resilience Officer of the North Carolina Office of Recovery and Resiliency

Roy Wright, Insurance Institute for Business & Home Safety, former Deputy Associate Administrator for Insurance and Mitigation of the Federal Emergency Management Agency (FEMA)

Co-Conveners

Jennifer Kurz, Susan Bell & Associates

Tim Profeta, Nicholas Institute for Environmental Policy Solutions at Duke University and Sanford School of Public Policy at Duke University

Advisory Team

Fred Boltz, Resolute Development Solutions

Elizabeth Losos, Nicholas Institute for Environmental Policy Solutions at Duke University

Lydia Olander, Nicholas Institute for Environmental Policy Solutions at Duke University

Jeremy Symons, Symons Public Affairs

External Advisors

Kate Gordon, Governor's Office of Planning and Research, Chair of the California Strategic Growth Council and Senior Advisor to the Governor on Climate

Tim Male, Environmental Policy Innovations Center, former Associate Director for Conservation at the White House Council on Environmental Quality (CEQ)

Lara J. Hansen, Chief Scientist and Executive Director of EcoAdapt

Cover photo courtesy of South Carolina National Guard