

Climate Change Adaptation Policies

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Abstract

In the second decade of the 21st century, adaptation to anthropogenic climate change in the United States is occurring at local, state, tribal and federal levels of government, reflecting where adaptation needs are matched by existing policy-making opportunities. This has resulted in an uncoordinated and diverse patchwork of adaptation policies to date. Common approaches to adaptation at state, local and tribal levels are described and illustrated with selected examples. General opportunities for, and examples of, federal adaptation policy-making efforts are also discussed. Examples of self-organization among different stakeholders at the regional level as well as a discussion of likely challenges to future U.S. adaptation policy-making conclude the entry.

Introduction

The early years of the 21st century have seen a significant number of disastrous climatic events across the U.S. – including severe hurricanes and storms, droughts, extreme heat events, floods and wildfires, costing tens of billions of dollars in damages, too many lives, and significant impacts on the day-to-day activities, well-being, and livelihoods of Americans ^[1]. Such devastating occurrences bring attention not only to the emerging evidence of a changing climate, but to past failures in disaster preparedness, land use, environmental, economic and social policy. They reveal a deficit in society between the adaptation needed to adequately meet the challenges of a variable climate and that which is being implemented ^[2].

This is clearly articulated in the Third U.S. National Climate Assessment, which includes, for the first time, a chapter on adaptation efforts across the country. The chapter's main conclusion states that, "Substantial adaptation planning is occurring in the public and private sectors and at all levels of government; however, few measures have been implemented and those that have appear to be incremental changes" ^[3, p.671]. The lack of or limited implementation of climate change adaptation is explained by barriers related to limited funding, policy and legal impediments, difficulties in projecting future changes, as well as other social, political and other challenges. This state of affairs makes apparent the need for more effective adaptation policy.

After decades of climate change mitigation (greenhouse gas emission reductions) dominating the climate policy debate, adaptation has become firmly recognized as a necessary and complementary part of climate policy in recent years ^[4, 5]. It is far from clear, however, what exactly adaptation policy should entail. This stems from confusion over what goals are to be pursued, what types of policies are needed, and at which level of governance and exactly how they should be formulated and implemented. This lack of clarity is magnified by climate change uncertainties and other concurrent dynamic changes in society and the environment that are difficult or impossible to predict^[6]. Furthermore, adaptation policy is not developed as one neatly circumscribed and well integrated bundle of laws, programs, and regulations, but consists of a broad portfolio of partial, sector- or jurisdiction-specific policies, strategies, guidance, and assistance programs that aim to address current needs and future climate change impacts. This reflects the fact that adaptation policy must meet many different demands created by already apparent or expected climate changes, which vary across regions, sectors and time, and often also non-climatic goals^[7,8].

Not surprisingly, and consistent with the history of how environmental policies more generally, and climate responses in particular, have emerged in the U.S.^[9,10], adaptation policies are being developed at all levels of governance – local, state, tribal, federal, as well as by special districts and newly created governance entities – reflecting where adaptation needs are matched by existing policy-making

opportunities. To date, this has resulted in an uncoordinated and diverse patchwork of adaptation policies, the outlines of which are sketched below.

What adds to this diversity of adaptation policies is ambiguity about what counts as "adaptation." Humans have been engaged in deliberately manipulating, and consciously or unconsciously adapting to, the particularities and vagaries of their environment, since time immemorial. That makes the distinction of current climate change adaptation from historical adaptation difficult. In this chapter, "climate change adaptation policy" refers to any government-led effort explicitly (or cognizant but not explicitly) undertaken in response to or in preparation of impacts of contemporary, anthropogenic climate variability and change. Such adaptation policy-making is typically codified in some type of plan (thus policy and plan are used interchangeably here). Sometimes adaptation policies/plans are called preparedness, resilience, sustainability or simply climate action plans. All of these are included here, whereas policies (e.g., disaster preparedness or recovery) without recognition of a changing climate are excluded from the discussion.

Overview of U.S. Adaptation Policies

Generally speaking, adaptation is still in the early stages in the U.S. in the first two decades of the 21st century^[3]. While first adaptation policy initiatives date back to the late 1980s (e.g., Maine's Sand Dune Rules, the California Coastal Commission's and San Francisco Bay Conservation and Development Commission's initial sea-level rise policies), the U.S. saw a rapid rise among local and state policy-makers viewing climate change impacts as a policy concern after the release of the IPCC's Fourth Assessment Report^[8]. Growing acceptance of the necessity to develop adaptation strategies, given slow progress on greenhouse gas emissions reductions, continuous awareness raising efforts by scientists and advocates, observation of the early impacts of climate change, and a series of damaging extreme weather events led to pioneering efforts in adaptation policy.

Progress in U.S. adaptation policy-making is tracked by various organizations (e.g., the Georgetown Climate Center, <http://www.georgetownclimate.org/adaptation/overview>), suggesting that about one third of U.S. states had completed an adaptation plan by 2014, predominantly coastal states (including Alaska and Hawai'i). It is impossible to estimate how many local communities have begun to develop local adaptation plans as there is at present no nationwide mandate to do so or report on local adaptation activities. Moreover, local adaptation policies may cover only selected sectors or avoid the climate change language for political expediency. While motivations differ, adaptation planning tends to entail climate risk assessments, frequently undertaken in collaboration with NGOs, academic institutions, other jurisdictions, or with the help of consultants. Much adaptation activity to date is focused on mobilizing for action by building adaptive capacity (e.g., understanding risks, creating institutional enabling environments, gathering necessary expertise, financial resources, and political will). Despite this diversity and difficulty in tracking ongoing efforts, some trends and policy principles are described below.

State, Local and Tribal Adaptation Policies

Adaptation policy-making in the U.S. did not originate at, nor was it mandated from, the federal level. Instead local, state and tribal jurisdictions pioneered it. A variety of guidebooks on adaptation described ideal-type planning or risk and vulnerability assessment approaches, yet the independent authority of these jurisdictions, differences in climate change risks faced, different political contexts, and the fact that early adaptation policy-making had few precedent or models to emulate resulted in significant variation in the approaches states and communities have taken to adaptation policy-making. Structurally, these jurisdictions have chosen to either develop standalone adaptation plans or to build climate change considerations into existing policies, programs, plans and processes (an approach known as "mainstreaming")^[11, 12, 13].

Standalone Adaptation Policies

Particularly in states and communities that previously already developed climate action plans (almost always singularly focused on mitigation only, with a placeholder for future development of adaptation policies), and where political support for climate action is strong, adaptation plans are often standalone documents (e.g., California, Maine; Punta Gorda, FL; Santa Cruz, CA). Typically requested by a governor (through executive order), legislature (by law) or local elected officials (by resolution), some have been developed under the leadership of a specially appointed council or commission (e.g., Alaska; Miami-Dade County), others are developed "in-house", i.e., under the leadership of a particular agency, department, or existing commission (e.g., Washington; Baltimore, MD; Keene, NH), while yet others are developed through a joint mechanism (e.g., Connecticut, Maryland; City of Chula Vista, CA; New York City).

Typically such standalone adaptation plans address key sectors perceived as particularly exposed to climate risks for the jurisdiction, and involve extensive expert and stakeholder consultation. The degree of cross-sectoral integration, with explicit assessment of potential synergies and trade-offs among proposed adaptation strategies, varies considerably and is generally lacking to date. Standalone adaptation plans typically gain concerted momentum and public attention, but clear links to agency/departmental annual work plans, policies and budgets need to be established to ensure that adaptation policies are integrated and implemented in day-to-day management.

Adaptation Integrated into Existing Policies

A common alternative to standalone adaptation plans are policy approaches that aim to build climate change consideration into existing policies and procedures. Common arenas targeted for mainstreaming include shoreline/coastal management (e.g., Louisiana; Maui Co., HI; Buzzards Bay, MA; City of Ft. Lauderdale, FL), disaster preparedness and hazard mitigation (e.g., Connecticut; City of Lewes, DE; Dane County, WI), general planning (e.g., Marin County, CA; City of Virginia Beach, VA), smart growth and urban redevelopment (e.g., Florida; New York City), conservation or wildlife management (e.g., Alaska;

Iowa; Kentucky; Oregon), public health (e.g., Michigan), transportation (e.g., Maine; New York); water resources planning (e.g., Arizona; City of Phoenix, AZ; Santa Clara Valley Water District, CA); utility planning (New York City); economic development (Homer, AK), and so on.

Many reasons lead jurisdictions to choose this path for adaptation policy-making, including that institutions to plan and implement sector-specific actions already exist, existing ones are unlikely to be abolished and new ones would be difficult to create; enabling legislation, staff expertise and established funding mechanisms lower cost and effort, while establishing clear responsibility, authority and accountability; and in some contexts, the approach enables adaptation to progress even though anthropogenic climate change may be politically contentious.

Existing approaches have also been modified in innovative ways. For example, the Florida Community Planning Act of 2011 established for the first time so-called Adaptation Action Areas. Building on the common approach to designate certain areas in a general plan as special zones to which a particular set of policies, benefits or obligations apply, Adaptation Action Areas constitute an optional designation for areas that may experience coastal flooding and that are at risk of impacts from sea-level rise. Such areas may be prioritized for infrastructure and adaptation planning. In the context of adaptation planning by the Southeast Florida Regional Climate Change Compact Counties (a consortium of Broward, Miami-Dade, Monroe and Palm Beach counties), several pilot studies are underway to explore possible adaptation approaches^[14].

There are, however, also drawbacks to this mainstreaming approach. By the same token that existing laws, authorities and institutions can be used with relative ease to launch or integrate adaptation efforts, they also create path dependencies that may be difficult to overcome. Thus public expectations, procedural requirements, statutory limits and other inherited institutional features can create barriers to more substantial (transformative) adaptations^[15,16].

Commonalities

Despite different approaches to adaptation policy-making across localities, there are a number of commonalities among existing state, local and tribal adaptation plans to date, including:

- Assessment of statewide and/or sector-specific climate change impacts and vulnerabilities under various possible future climate change scenarios;
- Use of best available science in decision-making;
- Articulation of a set of principles that should guide adaptation (e.g., maintaining flexibility in light of uncertainties, adaptive management of land, bodies of water, and natural resources; cost-effectiveness; risk-based management; environmental justice and support for the most needy; cooperation and coordination; active and effective stakeholder engagement);
- Preference for "no-regrets" management options, i.e., actions that are thought to be beneficial regardless of future climate change (e.g., improved disaster preparedness, habitat preservation);
- A general bias toward low-cost and synergistic solutions (e.g., actions that simultaneously meet mitigation and adaptation needs; or climatic and non-climatic policy goals);
- Calls to raise public awareness and understanding of the need for adaptation; and
- Explicit calls (at least in some plans) for cross-sectoral coordination and encouragement of cross-scale alignment of adaptation policies.

Commonly, state, local and tribal adaptation plans are vague in goal setting yet rich in their description of adaptation options. Only in exceptional cases (e.g., King County, WA; Swinomish Tribe, WA; City of Chula Vista, CA), however, do they identify clear priorities, milestones, or measurable targets and outcomes. While many adaptation plans call for adaptive adjustments over time, built on monitoring, evaluation and learning, the lack of clear goal setting, capturing of baseline conditions, and clear targets makes evaluation of effectiveness difficult^[3].

A variety of means and mechanisms are available – consistent with general responsibilities and authorities of state, local and tribal jurisdictions – to enable adaptation planning and implementation, including planning and/or implementation grants, incentive programs, mandates, requirements and standards (used only to a very limited extent to date), building codes, land-use policies, risk disclosure requirements, and technical assistance. Very few examples exist, where states have mandated adaptation planning (e.g., New York State's 2014 Community Risk Reduction and Resiliency Act, which requires all state-funded projects to factor climate change and extreme weather events into their planning and implementation). Other states (e.g., the California Coastal Commission) provide impactful guidance to local governments as to how to develop or update local coastal plans, whereby the state-level approval of local plans is contingent on having followed the guidance.

Tribal authorities are sovereign in making their own policies, but often dependent on federal government support (similar to, and often more acutely than, state and local authorities). In addition, all jurisdictions – individually and collectively (e.g., through institutions such as the Conference of Mayors, the National Governors Association, or various professional societies) – lobby federal policy-makers for the support they need.

Current Federal Adaptation Policy-Making Efforts

In a federal system such as that of the U.S., there are a variety of obligations, opportunities and mechanisms for the federal government to develop adaptation policy or support the development of adaptation by other governance entities:

- (1) Related to its own operations, the federal government is obligated to serve as adaptive steward of the facilities, lands, waters, and resources under its direct jurisdiction (such as military/defense installations, national parks, terrestrial and marine preserves, monuments etc.). Management of public areas and resources is guided by agency or subdivision-specific plans, which are now obligated to show adaptation strategies (see below).

- (2) An important support and enabling function is federal investment in science, which in the U.S. is mandated under the Global Change Research Act of 1990 and which establishes interagency mechanisms for coordination of research and assessment activities. Closely related is the provision of technical assistance from federal agencies, including information, best practices, and trainings (as provided, e.g., by the federal Climate Data Initiative (<https://www.data.gov/climate/>); the National Oceanic and Atmospheric Administration's Coastal Services Center (<http://www.csc.noaa.gov/>) or Regional Integrated Science and Assessment Program (<http://cpo.noaa.gov/>); or the U.S. Department of Agriculture's extension service (<http://www.csrees.usda.gov/Extension/>) or regional "climate hubs" (http://www.usda.gov/oce/climate_change/regional_hubs.htm)).
- (3) Federal agencies also have made efforts in public education and raising climate literacy. Both research and education priorities related to climate change and adaptation are highlighted in the latest USGCRP Strategic Plan^[17].
- (4) For decades, several federal institutions have provided weather- related disaster insurance (for droughts and floods), as well as financial incentives, loans and grants to aid with hazard mitigation planning, disaster preparedness and responses. These tools not only aid in better preparedness for, and ability to cope with, emerging climate change impacts, but can be adjusted to aid in adaptation.
- (5) Similarly, the federal government invests significantly in infrastructure construction and maintenance, which is and can be used for purposes of adaptation (the Department of Transportation's Transportation Investment Generating Economic Recovery (TIGER) funding opportunity is one example).
- (6) The federal government also has standard-setting authorities (e.g., the National Institute for Standards and Technology has statutory responsibilities to set construction standards that increase protection against such hazards as windstorms and wildfires, and in 2014 has launched an initiative which attempts to establish measurable standards for community disaster resilience (<http://www.nist.gov/>)).
- (7) In support of state and local-level adaptation, federal policy-makers also have the opportunity to change existing federal policies, once established under assumptions of a stable climate, so as to

allow for more flexible adaptive responses and ensuring that individual federal policies do not incentivize maladaptive behavior or contradict each other.

- (8) Finally, the federal government (e.g., through its Department of State and U.S. Agency for International Development) has the opportunity to support adaptation overseas through technical assistance, capacity building, and financial means. While directly aiding countries less capable of developing and implementing their own adaptive measures, such efforts can pay double dividend in a globalized world, as climate-related disruptions elsewhere can negatively affect domestic activities and economic sectors^[18].

While these federal mechanisms have existed in some instances for decades, they have only been activated for climate adaptation policy-making since the second term of the Obama Administration. In 2009, the White House Council on Environmental Quality, the Office of Science and Technology Policy, and the National Oceanic and Atmospheric Administration created an Interagency Climate Change Adaptation Task Force, involving representatives from more than 20 federal agencies, to develop principles to guide adaptation at the federal level^[19]. Executive Order 13514^[20] then required federal agencies to develop adaptation plans. Since then, federal agencies have delivered initial adaptation strategies and are required to regularly report on implementation progress (<http://archive-sustainability.performance.gov/>). Executive Order 13653^[21] renamed the interagency task force as the Council on Climate Preparedness and Resilience) and called, among other things, for the modernizing of federal programs to support climate resilient investments, managing lands and waters for climate preparedness and resilience, and the creation of a State, Local, and Tribal Leaders Task Force on Climate Preparedness and Resilience (see below).

Policies initiated and enacted via executive order are vulnerable to shifts in political leadership and priorities. A future administration less inclined to support adaptation efforts could easily end or alter these existing initiatives. Federal policy can be stabilized through legislative action, i.e., by Congress either

enacting its own policies or codifying existing efforts as law. Given the political polarization around climate change, the Republican majority-led House of Representatives in the first two decades of the 21st century has tended to reject, weaken or refuse to fund adaptation policies by the Obama administration, while minority Democratic legislators have attempted to introduce various adaptation-related bills (www.thomas.gov).

Cross-Scale Integration of Adaptation Policy-Making

In light of distributed authorities, responsibilities and capabilities, as well as the expressed needs for support from the federal level by state, local and tribal jurisdictions, a number of efforts have been made to date to integrate adaptation policy across levels of governance. For example, several crosscutting national adaptation strategies have been developed, which explicitly focus on integrating various federal, and often state, local, and tribal efforts on adaptation. One concerns freshwater management^[22], a second, highlighting the considerable responsibilities of the federal government for conservation, is an adaptation strategy for fish, wildlife and plants^[23]; a third sets resilience and adaptation-related priorities for ocean management^[24]; and a fourth constitutes a cohesive national wildfire strategy^[25].

In June 2013, the Obama Administration presented its Climate Action Plan^[26], which aims – as one of its key priorities – to build nationwide resilience and enhance preparedness for climate change impacts. In support, the Obama Administration convened a State, Local, and Tribal Leaders Task Force on Climate Preparedness and Resilience to better coordinate adaptation efforts across levels of government, identify and remove barriers to implementation, define standards and model guidelines to harmonize the diverse adaptation approaches across the U.S. These efforts have not led to adaptation mandates to date (such as planning and reporting requirements, standards for best practice, accountability mechanisms, or rules and regulations pertaining to government, private sector or individual adaptive behaviors), but Administration budget proposals aim for a steep increase in federal financial support for state and local adaptation planning and implementation^[27].

At the local and regional level, numerous examples exist, where local, state and relevant federal entities collaborate with non-governmental organizations and academic experts to develop adaptation strategies (e.g., the strategy for San Diego Bay (California) to adapt to sea-level rise; the partnership of the Southern Oregon Forest Restoration Collaborative with the Rogue River Siskiyou branch of the U.S. Forest Service to develop a local climate adaptation plan, New York City restoration and resilience building efforts after Hurricane Sandy in 2012). This self-organization of relevant governance partners at regional levels are examples of polycentric governance^[28, 29].

Challenges and Outlook for U.S. Adaptation Policy-Making

U.S. adaptation policy-making is rapidly spreading across the nation. These efforts can be understood as policy experimentation in the early period of experiencing and expecting climate change impacts, and are likely to spread and change significantly in years to come. Looking ahead there are a number of opportunities and challenges that policy-makers at all levels are likely to face.

First, the need to continue to build a movement to promote reforms that enable adaptation and resilience will persist, and may be more difficult in rural, small city, and politically conservative areas because of limited adaptive capacity and political will. Closely related will be the growing need at all levels of government, and in all regions and sectors, to find creative ways to finance adaptation planning, and particularly implementation. A third challenge, already alluded to in the discussion above on mainstreaming versus institutional barriers to adaptation is the fundamental challenge to "becoming adaptive", i.e., to build institutional mechanisms not merely to normalize and stabilize societal proceedings, but to build them for change, to increase or retain flexibility, and build the mechanisms and organizational culture to learn and adjust over time.

Closely related, fourth, is the need to develop nationally comparative mechanisms and evaluative frameworks – in the face of continued climate and societal uncertainty – to track what adaptation activity is occurring, whether it results – cumulatively and in any one location – in greater preparedness and resilience, and whether it meets associated societal goals (such as economic opportunity and stability, social justice, human health and well-being, continued ability to rely on environmental goods and service)^[31].

These goals are unlikely to be met without facing two further challenges. One relates to achieving greater policy integration, consistency, and mutual synergies and efficiencies across sectors and scales of governance whenever possible^[30, 31]; the other addresses all those cases, when such integration cannot be achieved, namely the establishment of mechanisms to assess trade-offs and resolve conflicts that will inevitably arise in building resilience^[32].

To the extent existing policy mechanisms and governance institutions impose unacceptable barriers to adaptation, or if climate change becomes so significant that societal objectives cannot be met (an adaptation limit^[33]), governments will continue to struggle with whether to adapt using existing institutions or whether to abolish those mechanisms in favor of more fundamental innovation in U.S. governance systems. Such transformative adaptation is barely on the policy horizon in the early years of the 21st century^[15], but may well become a reasonable prospect in years and decades to come. Such transformational adaptation may not only involve major structural, economic, and policy changes, but challenge communities and society as a whole in fundamental ways to reckon with historical legacies and with public expectations about what the role of governments, private individuals and organizations ought to be in adaptation to continual climate change.

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