Empowering Efforts to Make Communities Stronger & More Secure

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Empowering Efforts to Make Local Communities Stronger & More Secure

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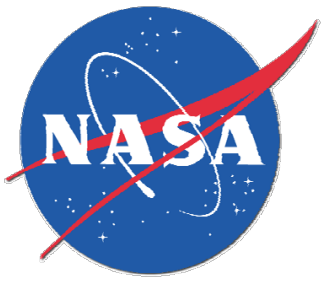

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About the AMS Policy Program

The AMS Policy Program has two primary goals. The first is ensuring that policy choices take full advantage of information and services relating to weather, water, and climate. The second is helping policy makers understand the ways that the broader society's welfare depends on information and services relating to weather, water, and climate. Meeting these two goals will help ensure that the scientific community receives the support and resources it needs to be able to make critical information and services available and, most importantly, will help the nation, and the world, avoid risks and realize opportunities related to the Earth system.

The Policy Program uses three primary approaches to help meet these two goals.

- We develop capacity within the AMS community for effective and constructive engagement with the broader society.
- We inform policy makers directly of established scientific understanding and the latest policy-relevant research.
- We help expand the knowledge base needed for incorporating scientific understanding into the policy process through research and analysis.

Through these activities, we create new ways to reduce society's vulnerability to weather and climate events by sharing our resources and information with policy makers and the public.

Executive Summary

Weather, water, and climate create risk and opportunity for every community throughout the country and the world.

Virtually every social and economic sector and every institution underlying modern civilization is dependent on and vulnerable to weather, water, and climate. As a result, communities need accessible and reliable weather, water and climate information to save lives and property; boost the economy; protect biological systems and the goods and services they provide; and enhance homeland and national security.

Earth system observations, science, and services (OSS) characterize, communicate, and help guide local, regional, and national efforts to manage weather, water and climate risks and opportunities. The benefits to the United States from OSS are substantially enhanced by a rich web of public-private partnerships. These are rapidly evolving in response to social and climate change and the potential for interdisciplinary collaboration and advancement.

This study reaffirms six areas of emphasis for strengthening communities: 1) to improve the information available to communities through observations, science, model capability, and computational resources, 2) to enable more effective use of this information for societal benefit through improved collaboration and communication among stakeholders, scientists, and service providers, 3) to provide an effective policy framework for enhancing information and society's ability to use it, 4) to create, strengthen, and evolve partnerships among public, private, academic, and NGO communities, particularly as opportunities, needs, and capabilities evolve over time, 5) to continuously expand the potential of the current and future workforce to deliver critical information and services, and 6) to empower the public to participate throughout the entire value chain to the maximum extent possible.

In addition, the study identifies four overarching findings that can further efforts to strengthen communities:

1. Communities have both common needs and unique characteristics. This combination creates a need for place-based approaches and powerful opportunities for leverage from centralized efforts.
2. Communities often face highly complex challenges that do not have clear solutions but that are broadly similar to challenges faced by other communities. Therefore, progress will depend on: having many local pilot projects at a range of scales (e.g. local, state, regional, national, and international); objective monitoring of those pilot projects for the early detection of success and failure; and rapid dissemination of lessons learned so that other communities can emulate successes and avoid failures.
3. There is a wide range of potential federal roles for empowering and promoting community resilience. These are not mutually exclusive and comprehensive strategies almost certainly involve a diverse combination of approaches.

4. Managing weather, water, and climate risks and opportunities depends on effective working relationships among public, private, academic, and NGO sectors and across levels of organization (local, state, national, and international).

Advances in Earth system observations, science, and services create an enormous opportunity for communities throughout the country to become stronger and more secure in the face of existing vulnerabilities and emerging risks due to climate change. Such efforts are most likely to be successful when they: focus on practitioner-defined challenges and opportunities; help create and sustain partnerships; develop, test, and refine practices; examine how knowledge is used and create or support the tools for doing so; and bring together a wide range of organizations in collaboration (e.g., local, state, and federal governments; academic institutions; the private sector; the NGO community).

Uptake and use of Earth system observations, science, and services by communities often depends on their having access to trusted sources. What constitutes a "trusted source" often depends on the specific audience. As a result, developing a diverse group of credible sources is helpful for reaching the full range of audiences within a community.

This AMS Policy Program study is part of an ongoing effort to build a community of practice that can help ensure that all people have information and services to manage risk and realize opportunities from weather, water, and climate. It is based primarily on a working group discussion that occurred on November 13, 2018 that focused on NOAA's Regional Integrated Sciences and Assessments (RISA) network. The RISA network provides research and engagement mechanisms that promote the co-creation and co-application of scientific knowledge in order to strengthen local communities.

1. Introduction

Communities across America need accessible and reliable weather, water and climate information to: save lives and property; boost the economy; protect biological systems and the goods and services they provide; and enhance homeland and national security. Earth system observations, science, and services (OSS) characterize, communicate, and help guide local, regional, and national efforts to manage weather, water and climate risks and opportunities. With respect to weather, the benefits to the United States from OSS are substantially enhanced by a rich web of public-private partnerships, which are rapidly evolving in response to social technological, and environmental change.

Providing current and future generations with sufficient water, food and energy, while building societal resilience to natural hazards, and protecting and maintaining vital ecosystem services, will require large investments in critical infrastructure over the upcoming decades. Maximizing the societal benefits of these investments will be a crucial task of environmental policy in the future.

Communities have common needs & unique characteristics. This creates a need for both place-based approaches & centralized efforts

The urgency of these efforts is substantially increased by the effects of climate change, which will have impacts throughout the world on the physical characteristics of the Earth (e.g., weather patterns, water resource availability, where oceans and coasts meet, and the timing and location of ice and snow); biological systems and the goods and services they provide; and social institutions on which people depend. Coastal communities are already being impacted by rising sea levels. The impacts to water resources (precipitation amount, location, and intensity or seasonal changes in snowpack) will be broadly distributed, often in ways that will be hard to predict. Mismatches in the design of long-lived infrastructure with future environmental conditions will become more common. Every social and economic sector is sensitive to and dependent on weather. As a result, climate change (i.e., shifts in the characteristics of weather) will create serious and broadly distributed challenges for every community, everywhere.

The role of government in enabling, establishing, and promoting the use of weather and climate-related information is complex and evolving, but critically important. Federal agencies like NOAA and USGS have provided information and services to local communities for decades. As weather and climate science has progressed and human development increased, the number of state, local, non-governmental and private organizations providing and using information and services has grown dramatically. It is a good time to examine how the federal weather, water, and climate research and service networks could promote more effective partnerships to meet emerging needs and evolve in the future given the changing landscape and the emergence of new actors.

Information and services over a wide range of timescales (from minutes to hours, days, weeks, months, seasons, years and decades) hold promise for even greater benefit. Public-private-academic collaborations exist across all of these timescales but are most advanced for information and services on weather timescales (up to a week or two). Partnerships across all timescales can be increased in number, reach, and geographic distribution.

The American Meteorological Society held a pilot dialog among providers and users of environmental information. The small group (roughly 20 people) met to explore opportunities and challenges in empowering place-based resilience across the United States through collaboration in research, information systems, service provision, and societal engagement. Participants were drawn from Federal agencies, local government, the private sector, academic research, and the NGO community.

Progress depends on: having many pilot projects; early detection of success & failure; & rapid dissemination of lessons learned

The discussion focused on eight questions: 1) What are the key challenges and opportunities that different stakeholders face?, 2) What products do stakeholders need (e.g. for public health, national security, economic vitality, etc.)?, 3) How can the value of information and services be increased within and beyond NOAA?, 4) What are key information and service needs that, when met, empower a wide array of sectors (i.e., keystone sectors/services)?, 5) What national roles/responsibilities can provide most leverage to local and regional efforts (i.e., ensuring the whole exceeds the sum of the parts)?, 6) How can diverse groups of information users and service providers share information and resources most effectively?, 7) What opportunities exist to share knowledge and understanding more effectively among regions?, 8) What are the respective roles of Regional Integrated Science and Assessments (RISAs) within NOAA and with respect to its external partners? How might these roles evolve over time and what approaches can most effectively take advantage of evolving opportunities (i.e., adaptive management)?

This AMS Policy Program study is based, primarily, on the working group discussion that occurred during that workshop in November, 2018 along with off-line discussions with experts and practitioners, and additional analysis. The participants and discussion drew heavily on the NOAA's Regional Integrated Sciences and Assessments (RISA) network and its partner sectoral research investments, which provide research and engagement mechanisms that promote the co-creation and co-application of scientific knowledge in order to strengthen local communities.

2. Findings, opportunities, challenges, & needs

Opportunities to strengthen communities and to make them more resilient abound.

Previous analysis identified six areas of emphasis that are particularly critical to strengthening communities (Higgins et al. 2018): 1) to improve the information available to communities through observations, science, model capability, and computational resources, 2) to enable more effective use of this information for societal benefit through improved collaboration and communication among stakeholders, scientists, and service providers, 3) to provide an effective policy framework for enhancing information and society's ability to use it, 4) to create, strengthen, and evolve partnerships among public, private, academic, and NGO communities, particularly as opportunities, needs, and capabilities evolve over time, 5) to continuously expand the potential of the current and future workforce to deliver critical information and services, and 6) to empower the public to participate throughout the entire value chain to the maximum extent possible.

U.S. Federal efforts empower & promote community resilience

The analysis here reaffirms the central importance of these six areas of emphasis. In addition, we identify four overarching findings that can further efforts to strengthen communities:

1. Communities have both common needs and unique characteristics. This combination creates a need for place-based approaches and powerful opportunities for leverage from centralized efforts.

2. Communities often face highly complex challenges that do not have clear solutions but that are broadly similar to challenges faced by other communities. Therefore, progress will depend on: having many local pilot projects; objective monitoring of those pilot projects for the early detection of success and failure; and rapid dissemination of lessons learned so that other communities can emulate successes and avoid failures.

3. There is a wide range of potential federal roles for empowering and promoting community resilience. These are not mutually exclusive and comprehensive strategies almost certainly involve a diverse combination of approaches.

4. Managing weather, water, and climate risks and opportunities depends on effective working relationships among public, private, academic, and NGO sectors and across levels of organization (local, state, and federal).

Communities have both common needs and unique characteristics. This combination creates a need for place-based approaches and powerful opportunities for leverage from centralized efforts.

Communities have specific priorities, needs, opportunities, resources, and values. This makes every community unique in critical ways. This uniqueness ensures that efforts to make communities stronger and more secure are inherently place-based.

Communities also include diverse sets of people and organizations. Decision-making often involves multiple levels of government (state, local, and federal); organizations from different sectors (public, private, academic, and NGO); and individuals with an enormous range of interests, needs, and perspectives. This makes it challenging but necessary to self-sufficiently: set priorities; develop strategies; and implement beneficial actions to achieve community priorities (i. e. to self-determine what matters; to learn what tools and resources are available; to develop strategies for advancing their needs and objectives; and to access and use effectively all resources available).

Collaboration among stakeholders, scientists, & service providers enables the more effective collection & use of scientific information

At the same time, communities face many broadly similar challenges and needs. Every community depends on information to understand: its situation; its response options and their pros and cons; and best practices. All communities also need financial resources; access to expertise; sustained partnerships; and constructive working relationships among stakeholders and service providers. Communities can learn from each other and collaborate to meet common information and resource needs. Meeting these common needs empowers distributed efforts.

Efforts to strengthen local communities must simultaneously recognize the unique attributes of the community and tap external resources (information, expertise, people, money, etc.). Efforts that promote and empower community-lead efforts have the greatest chance to succeed and enable simultaneous progress in multiple communities.

As a result, decision-making that incorporates information and expertise in the service of community priorities and needs is most likely to enhance a community's receptiveness to centralized efforts and the ultimate success of projects. True partnerships (i.e., co-production and co-application of information) are vital. Information and service providers contribute most effectively by recognizing the centrality of community focused issues and concerns. Doing so almost always includes consideration of:

1. What matters to the community?
2. How a community's priorities align with the needs of other communities, the state, and the nation?
3. What science is useful for what matters to the community (and others that may be impacted)?
4. How to help communities use the science available most effectively for advancing what matters to them and for reconciling any potential for misalignment of priorities and needs among stakeholders in other locations?
5. Where gaps exist, how can scientists and practitioners work together with the public to co-create knowledge to inform local decision making?

Communities often face highly complex challenges that do not have clear solutions but that are broadly similar to challenges faced by other communities. Therefore, progress will depend on: having many local pilot projects; objective monitoring of those pilot projects for the early detection of success and failure; and rapid dissemination of lessons learned so that other communities can emulate successes and avoid failures.

Resources that communities may need include: tools that provide specific information or services that enable management of risk or realization of opportunity; people and relationships; laws and regulation (e.g., building codes); resources (financial or expertise); convening discussions and deliberation processes; the advancement of information and understanding; and workforce development.

Pilot projects can be powerful experiments and demonstrations of effective action. However, communities cannot afford to wait their turn for external (e.g., centralized) efforts to step in and provide needed information and services. Instead, communities need to be empowered to initiate and complete beneficial action and, when possible, to purchase tools and services from the private sector. There is great need to transition pilot-demonstration projects and centralized implementation efforts to distributed tools that equip non-experts to make progress without waiting.

What information is most useful?

Similarly, new tools that require minimal subject matter expertise to use can promote distributed efforts that communities can lead themselves. Artificial intelligence (AI) and information technology (IT) are potentially powerful avenues for empowering such decentralized efforts. So too is the provision of goods and services by the private sector.

There is a diverse range of potential federal roles for empowering and promoting community resilience. These are not mutually exclusive and comprehensive strategies almost certainly involve a combination of approaches.

Federal roles in strengthening local communities may include: providing information (observations and science) and services; setting of standards; identifying best practices; providing a repository of case studies and/or lessons learned; helping to ensure and enhance public goods; regulation; building relationships; identifying and correcting market failures; the establishment or alteration of social mores (i.e., 'name and shame' or 'encourage and laud'); workforce development; and the direct provision of resources (financial or people) to local and regional efforts.

Communities vary with respect to need and receptivity to federal efforts. In most cases, no single approach can eliminate all risk or ensure the realization of opportunity. Instead, comprehensive strategies that combine approaches are most likely to be effective.

A fellows or extension program is one potentially powerful mechanism for embedding subject matter experts in local communities. The role for such fellows might be to work with communities to understand and communicate what resources are available, the response options, and the unique needs, opportunities, and priorities of the community. These individuals would be well positioned to integrate the unique needs of a community with the knowledge base. They would also be charged with helping to aggregate and disseminate the lessons learned through distributed pilot projects and local efforts.

What matters most to the community?

Resource constraints and opportunity costs ensure that there will be challenging trade offs with investment decisions. These trade offs can involve overarching goals (e.g. whether to help the largest number of people; support the most vulnerable populations; or maximize economic returns on investments) and with how success is measured (e.g., the return on investment and whether it is measured in dollars; area impacted; habitat protected; lives protected; etc.).

Managing weather, water, and climate risks and opportunities depends on effective working relationships among public, private, academic, and NGO sectors and across levels of organization (local, state, and federal).

Partnerships may include those within individual federal agencies; across agencies; and among the many organizations inside and outside of the federal government.

Public, private, academic, and NGO sectors each contribute to local communities. The ways they do so may be different (i.e., by providing humanitarian aid; establishing

policies and regulations that seek to promote public well-being; advancing knowledge and understanding; and providing desirable goods and services that can be exchanged through market transactions) and may involve different motivations. Enhancing public good most effectively depends on the effective collaboration among these sectors. Roles among the sectors almost certainly will shift as capabilities, resources, opportunities, and needs shift over time.

For example, there is increasing interest in augmenting existing scientific assessments with new efforts that engage civil society (Moss et al. 2019). The goal of such efforts is to provide increasingly actionable information for decision-making.

Extension fellows could integrate the unique needs of a community with the existing knowledge base

Scientific assessments are most likely to be successful when they: focus on practitioner-defined challenges and opportunities; help create and sustain partnerships; develop, test, and refine practices; examine how knowledge is used and create or support the tools for doing so; and bring together a wide range of organizations in collaboration (e.g., local, state, and federal governments; academic institutions; the private sector; the NGO community).

The AMS Policy Program is developing a project focused on key information needs for specific social and economic sectors in society (e.g., agriculture, energy, water resource management, public health, transportation, etc.). The approach would differ from traditional assessments by beginning with the identification of key weather- and climate-relevant decision points. These would then drive the assessment of existing scientific information (i.e., that is relevant to those decision points) and the need for scientific advancement. Existing stakeholder network organizations (e.g., NOAA's RISAs) will likely be particularly crucial for facilitating these dialogues.

Fellows could also help aggregate lessons learned through local efforts

Notably, the private sector is already heavily involved in efforts to promote community resilience in two ways: 1) providing services in the marketplace that reduce or distribute risk; and 2) strengthening the resilience of their own operations. The increased capabilities of the private sector lead to greater need for enabling regulation and quality control to help promote effective, efficient, and fair markets for products and services relating to climate change adaptation. This new role could be shared between the public sector and the NGO community.

Managing weather, water, and climate risks & opportunities depends on effective working relationships among public, private, academic, & NGO sectors

3. Additional opportunities & challenges

Often the recognition of positive opportunities for advancement creates a more powerful incentive for uptake and use of information and services than does the avoidance of negative outcomes. For example, parents hope for their children to be resilient--to be unfazed by minor challenges and to be capable of overcoming significant setbacks--while also wanting them to thrive broadly--to enthusiastically engage with their peers; to create opportunities; to find new pathways for success; to pursue happiness as they choose to define it. Earth system OSS help communities become more resilient and enable a wide range of new opportunities.

Strong positive narratives help communicate opportunities and needs and inspire the uptake of information and subsequent action. What constitutes a powerful narrative may depend on specific interests and needs of stakeholders. This implies that a range of narratives may be needed to reach the full range of stakeholders and audiences, which are often highly diverse.

Similarly, what constitutes a "trusted source" often depends on the specific audience or community. As a result, developing a diverse group of credible sources is helpful for reaching the full range of audiences.

Weather, water, and climate create risk and opportunity for every community throughout the country and the world. Virtually every social and economic sector and every institution underlying modern civilization is dependent on and vulnerable to weather, water, and climate (AMS Policy Program 2012).

For example, crop losses result from floods, droughts, frosts and weather related pest infestations. Temperature heavily influences heating and cooling needs. Weather forecasts enable the energy sector to anticipate and avoid potential energy disruptions due to high-impact events or insufficient resource availability (e.g. water for cooling needs). Temperature, precipitation, humidity, soil moisture, and stream flow influence water resource availability. Advanced warning of impending high-impact events (e.g., winter storms, droughts, hurricanes, tornadoes, floods, and heat waves) helps in the anticipation and avoidance of natural disasters. Weather influences public health directly (e.g., due to floods, heat waves, and high-impact events) and creates environmental conditions that are suitable for disease outbreaks. Strategic and tactical decisions involving military operations and the provision of resource needs for troops depend on weather conditions.

Advances in Earth system observations, science, and services create an enormous opportunity for communities throughout the country to become stronger and more secure.

The American Meteorological Society's Policy Program intends a series of follow-on activities to continue the discussion and to build the community of practice. That community of practice will necessarily include public, private, academic and NGO sectors that will work to provide the information and services needed for managing risks and realizing opportunities associated with weather, water, and climate challenges.

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