

Rockefeller Foundation White Paper

Building Climate Change Resilience

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In August of 2007, the Rockefeller Foundation launched its [Building Climate Change Resilience initiative](#). Most of the global attention on climate change has been focused on reducing greenhouse gases. We, however, chose to tackle building resilience, because we realize that the impacts of climate change have already begun to manifest and despite any headway made by reducing greenhouse gas emissions, there are irreversible impacts that will continue and worsen within our lifetimes. Current and future consequences of climate change will result in significant human misery and suffering.

As a foundation that has been dedicated for nearly a century to improving the lives of poor and vulnerable people globally, we see the need to build climate change resilience—the ability to plan for, survive, recover from, and even thrive in changing climatic conditions—as a core part of achieving our mission. Climate change resilience will be especially critical in the places where vulnerability is high, such as the developing world.

The Rockefeller Foundation's five-year, \$70-million climate change initiative invests in catalyzing attention, funding, and action in three primary areas:

- Experimenting with and testing local approaches to building climate change resilience for institutions and systems serving poor and vulnerable communities
- Promoting, demonstrating, and disseminating knowledge about these and other viable approaches
- Increasing awareness among funders, practitioners, and policy makers on the need to invest in building climate resilience

What is Climate Change Resilience?

In the field of ecology, resilience means building the capacity of a system to withstand shocks and to rebuild and respond to change, including unanticipated change¹.

Climate change resilience is the capacity of an individual, community, or institution to dynamically and effectively respond to shifting climate impact circumstances while continuing to function at an acceptable level. Simply put, it is the ability to survive and recover from the effects of climate change. It includes the ability to understand potential impacts and to take appropriate action before, during, and after a particular consequence to minimize negative effects and maintain the ability to respond to changing conditions.

¹ The Resilience Alliance defines resilience as the capacity of a system to absorb disturbance, undergo change and still retain essentially the same function, structure, identity, and feedbacks.
<http://www.resalliance.org/560.php>

Historically, the term *adaptation* has been used to describe the individual actions required to respond to climate change. The Intergovernmental Panel on Climate Change defines adaptation as an adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, an adjustment that moderates harm or exploits beneficial opportunities.² Resilience, on the other hand, refers to the *capacity over time* of a system, organization, community, or individual to create, alter, and implement *multiple* adaptive actions. We believe that resilience is a more accurate, positive, and comprehensive term, describing the dynamic, systemic transformation that is needed to respond to the consequences of climate change, especially future impacts that are difficult to predict.

Climate change resilience requires the following elements:

Flexibility at an individual, organizational, and systemic level, with each level able to respond and contribute to each situation, and to respond to shifting and unpredictable circumstances.

A multi-faceted skill set, including abilities that enable thorough preparation, such as comprehensiveness and detail-orientation; survival, such as quick decision-making and resourcefulness; or rapid recovery, such as innovation and diligence.

Redundancy of processes, capacities, and response pathways within an institution, community, or system, to allow for partial failure within a system or institution without complete collapse.

Collaborative multi-sector approaches to planning, execution, and recovery, since no one sector has a monopoly on a particular impact and thus understanding the overlaps and gaps between sectors is critical.

Planning and foresight to prepare for identified impacts and risks. While it is impossible to plan for every possible set of impacts, and in many cases the cumulative effect of impacts is unknown, the process of planning brings learning, builds skills, and helps to create resilience.

Diversity and decentralization of planning, response, and recovery activities. A diversity of options has greater potential to match the particular scenario of impacts that occurs, while decentralization allows for parts of the system to continue operations even if other parts of the system are down.

Plans for failure so that break-downs happen gracefully, not catastrophically—for example, when flood gates break, they do so in a way that channels floodwaters to uninhabited flood zones, perhaps damaging property, but

² **Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change** M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, Eds. **Cambridge University Press**, Cambridge, UK, 976 pp, 2007. <http://www.ipcc.ch/pdf/assessment-report/ar4/wg2/ar4-wg2-app.pdf>

protecting human lives. Accepting that the unpredictability and uncertainty of climate risks and responses will ultimately lead to failure of some element of the system allows for failure-planning. In some cases returning to a pre-existing state will not be possible or will not be appropriate. Incremental failures and planning for failures will allow for real-time response and revision and will limit social, environmental, and economic costs. Total system failure limits response options and results in greater suffering.

What Activities Create Resilience?

Resilience is a combination of activities that reduces risks and vulnerability to those risks, and provides a safety net or recovery path.

A resilient system for storm events might include stronger building codes for homes (a risk reduction strategy), an evacuation plan (a risk reduction strategy), and catastrophe-bond insurance (a recovery strategy). In other cases, resilience might be possible only by increasing the overall strength of a system by removing or reducing other stressors—unrelated to climate change. For example, a coral reef might be able to recover from high-temperature related bleaching events faster if it is not stressed by polluted water. While it might be impossible to prevent coral bleaching events, it could be possible to reduce the level of pollution in the water (vulnerability reduction strategy).

Resilience Must Be Systemic and Multi-Sectoral

The complexity of resilience requires the integration of strategies into a variety of *existing* activities and institutions. It is difficult to imagine a network of specialized institutions that could direct and manage the extent of complex changes required for climate change resilience without the involvement of existing institutions. Indeed, climate change resilience must be a part of the plans, infrastructure, and day-to-day operations of existing institutions and systems.

Resilience is not simply the result of adding up resilient individuals. The uncertain nature of climate impacts means that no one individual or institution can possibly prepare for or recover from all of the potential scenarios. Therefore, resilient *systems* are required. Systems are combinations of resources, institutions, individuals, and processes that combine to accomplish a set of specific functions. To achieve resilience, systems build redundancies of resources, multiple response paths, and safety nets. Resilient systems survive a greater range of situations and for extreme or unexpected impacts fail gracefully, giving time to recover key functions.

New Orleans and Katrina: A Different Outcome?

What would have been required for New Orleans to be resilient to Hurricane Katrina? It would not have been enough for every citizen to have a car or money for evacuation transportation. It would not have been enough for the government to issue an earlier evacuation order. It would not have been enough for New Orleans to have a surrounding network of intact wetlands to absorb the storm surge. Resilience would have required *all* of the above actions, *as well as* other elements, such as the ability of community-based networks to find and evacuate those incapable of evacuating themselves, strong

relationships with national government agencies to ensure a swift and robust response, and local planners who could rapidly reach a consensus to develop a rebuilding strategy.

Effective response to climate change impacts will require action from multiple sectors.

- *Financial services and insurance companies will need to develop and distribute products that insure against new combinations and permutations of risk, as well as products that hedge against new types of risk.*
- *Agriculture, water, tourism, and energy businesses, to name a few, will need to understand the risks and impacts of climate change on business sustainability, and be prepared to react accordingly—including capitalizing on new business opportunities.*
- *Infrastructure will need to accommodate new standards and incorporate a new flexibility that can respond to climate change uncertainty.*
- *Health workers will need to build local response capacity for widespread events such as heat waves, while simultaneously extending the reach of efforts to mitigate climate-related diseases such as malaria, dengue, or schistosomiasis.*
- *Disaster relief organizations will need to plan for new types of disasters on a larger scale.*

What Does Resilience Look Like?

Communities across the world are responding to climate change and beginning to build climate resilience. There are expensive infrastructure strategies: Australia’s west coast city, Perth, built a massive desalinization plant to manage declining precipitation and increasing drought; the Netherlands has developed extensive dikes, dams, and even floating houses to cope with increased flooding and a higher sea level; and London has improved the Thames River barrier system to manage flooding and sea-level increases and is considering using green infrastructure along the river banks that will allow for flooding while also retaining visual and physical access for the public to the river, and protecting people and property.

There are also very low-cost community-based strategies: Bangladesh’s early warning and evacuation system for cyclones has resulted in declining deaths, even as the severity and frequency of cyclones increases. Smallholder farmers in Limpopo Province, South Africa, use seasonal climate and market information to **help determine what crops to grow and when and how to plant them, reducing their vulnerability to year-to-year variations in rainfall.** Policy changes have also spurred resilience building: in the United Kingdom, rapidly eroding coastlines have led to a “coastal retreat” policy, which invests funds that had been used for coastal rehabilitation into moving individual homes and communities as their land becomes untenable. Individuals and communities across the globe are starting to take action to build climate resilience. The Rockefeller Foundation’s Building Climate Change Resilience initiative has supported many of these early adapters:

Durban, South Africa

Given its coastal location, Durban, South Africa, faces multiple challenges from climate change, including increased coastal erosion and storm surges. Precipitation patterns are changing with immediate consequences for agricultural productivity, water supplies, and biodiversity. As temperatures rise, biodiversity is increasingly threatened, and the large HIV-positive population faces increased opportunistic infection rates and greater susceptibility to heat-stress.

Durban has launched a comprehensive effort to build climate change resilience. The local government developed a risk map for the city, outlining the different risks of climate change and their potential impacts on each sector of the city. Then, they defined resilience-building activities. This includes broadening water catchment basins and reservoirs to help supplement declining precipitation, adding additional services for the HIV-positive population, changing coastal development plans, and developing alternative agricultural and livestock management strategies to strengthen food security. They have new strategies to reduce stresses (such as pollution) on biodiversity areas, so these areas can better handle the increased heat and water impacts. And they have also changed the structure of city government, adding several positions to focus on resilience-building activities and are working to integrate climate resilience into all city functions.

New York City

New York City Mayor Michael Bloomberg released PLANYC: A Greener, Greater New York, in April 2007. In this plan, the mayor addresses resilience, recognizing that the results of climate modeling indicate that New York faces significant economic and human health risks from storm surges, hurricanes, and flooding, in addition to heat waves, wind storms, and water contamination. Resilience actions are already being taken to protect the city's water supply and sewage and wastewater treatment systems, and a comprehensive resilience planning process has begun.

Climate change could put New York at greater risk of being hit by a severe hurricane. Given New York's density and scarce land mass, the typical post-disaster housing (e.g., mobile homes) would not be suitable. The Office of Emergency Management held an international design competition for new transitional post-disaster housing. The design competition produced a number of feasible options for the city; prototypes and implementation plans are now being developed for the best solutions.

New York City's climate resilience efforts and those of Chicago, King County, Washington, Los Angeles, Miami Dade, and five other cities in the United States are supported by the *Urban Leaders Adaptation Program of the Center for Clean Air Policy*. This organization, serving as a resource for local governments as they face important infrastructure and land-use decisions that affect local climate resilience efforts, helps guide and empower local communities to develop and implement climate resilient strategies. The Urban Leaders Adaptation Program is working to insure that lessons learned from local level initiatives are shared broadly to accelerate and improve resilience-building efforts, and translated into recommendations for the Federal government level to better support local-level actions.

[Asian Cities Climate Change Resilience Network](#)

The Asian Cities Climate Change Resilience Network is a network of cities and partners that are working together to test and demonstrate a range of actions that build climate change resilience in cities in the developing world in order to create a replicable base of lessons learned, successes, and failures that also builds the capacities of cities to continue climate change resilience building activities independently.

Partner cities currently include Indore, Gorakpur, and Surat in India and Da Nang, Quy Nhon, and Can Tho in Vietnam; cities in Indonesia and Thailand will be added. Through the actions of the Asian Cities Climate Change Resilience Network, it is expected that by 2012, a network of cities in Asia will have developed robust plans to prepare, withstand, and recover from climate change impacts.

In addition to supporting these models of climate resilience, the Rockefeller Foundation is investing in several other key elements that will help enable climate resilient development in the United States and other countries:

Research: The Foundation is supporting researchers at [Stanford University's Food Security and the Environment Program](#) who are 1) developing linked climate and crop models to examine the impacts of climate change on African crops and 2) evaluating options for adapting crops to changing temperature and precipitation patterns. This information has already influenced prioritization of investments in agricultural adaptation, such as seed collection and conservation.

Method Development and Key Analytics: The Economics of Adaptation working group, a partnership between the Global Environment Facility, McKinsey & Company, Swiss Re, ClimateWorks, the European Union, Standard Chartered Bank, and the Rockefeller Foundation, have created a replicable decision-making framework that will allow national and local decision-makers to assess the total climate risk facing their economies, identify and evaluate risk reducing measures, and minimize the cost of adapting to the risk. The methodology has been tested through eight case studies; the results of this analysis will be released in the fall of 2009.

Partnerships: The [Alliance for a Green Revolution in Africa](#) (AGRA) is a partnership of African countries working across the continent to help millions of small-scale farmers and their families lift themselves out of poverty and hunger. AGRA programs develop practical solutions to significantly boost farm productivity and incomes for poor communities while safeguarding the environment. AGRA advocates for policies that support its work across all key aspects of African agricultural “value chains”—from seeds, soil health, and water to markets and agricultural education. The Rockefeller Foundation, which founded AGRA through a partnership with the Bill and Melinda Gates Foundation, is now working with AGRA to support their development of a climate change resilience strategy so that the investments made today in boosting farm productivity in African countries continue to be effective in the future despite the changing climate system.

Policies: Seizing upon increasing U.S. Federal attention on climate change issues, the Foundation is working with multiple partners to understand what policies are needed to insure that the United States is ready to face the impacts of climate change. For instance, the [Pew Center on Global Climate Change](#) is exploring how the Federal roles need to shift to better serve climate change decision support needs, and how the Federal government can better coordinate to support inter-agency, state, and local adaptation measures; [CNA Analysis and Solutions](#) and [Oxfam America](#) are examining how the military and humanitarian organizations will need to rethink their roles and resources in light of increasing frequency and urgency of humanitarian missions; and the [Bipartisan Policy Center](#) is considering how our national transportation infrastructure can be more resilient in the face of current and future climate threats.

The Rockefeller Foundation's Current Funding Priorities

The Rockefeller Foundation's funding priorities for the Building Climate Change Resilience initiative are three-fold:

- 1) Continuing support for the Asian Cities Climate Change Resilience Network, which is entering an implementation phase in 2010;
- 2) Integrating climate change information and concerns into agricultural development practice in African countries through work with African agricultural research and development organizations, and
- 3) Developing policy support for U.S. adaptation policies and funding of domestic and international adaptation measures.

Additional investments will be made in developing the networks required to disseminate and sustain resilience building, taking lessons learned from early experiments in climate resilience and building capacity to replicate these leanings at a larger scale. It is expected that these early investments will develop practices, processes, and networks that will be crucial to building climate change resilience, and will lay the groundwork for increased awareness and action toward building the resilience of poor and vulnerable communities worldwide.

For more information, contact climate@rockfound.org.