IMPLEMENTING CLIMATE CHANGE ADAPTATION

LESSONS LEARNED FROM TEN EXAMPLES

February 2012

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ABOUT HEADWATERS ECONOMICS

Headwaters Economics is an independent, nonprofit research group whose mission is to improve community development and land management decisions in the West.

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Introduction

Cities and counties throughout the United States and internationally are struggling to adapt to climate change. With climate change impacts already upon us, mitigation efforts are essential but not enough. Communities are facing rising sea levels, extreme weather events, hotter summers, more flooding, and rising insurance costs. Some of the main questions communities face in planning for and implementing climate adaptation are: how to begin, how best to use climate science, how to determine the right policies, how to institutionalize them, and how to budget for them.

This paper presents ten examples of cities and counties around the country. Each highlights the key lessons learned in the process of moving from planning to implementation on climate adaptation. The purpose of this report is to inform and inspire other communities in their efforts to advance climate adaptation. We also hope this report will be useful to organizations dedicated to helping communities adapt to climate change.

Headwaters Economics is conducting a wide variety of projects with community leaders, landowners, public land managers, elected officials, business owners, and other nonprofit organizations aimed at improving community development and land management decisions. We want to share with other communities and other climate practitioners compelling examples from communities that are dealing with climate change and are *moving beyond planning to doing*.

Every community is different. No single formula for climate change adaptation will work in all places. Some of the examples explored here showcase unique approaches. More often, lessons learned are shared, as the overlap in successful techniques and tools outlined in this report shows.

Adapting to climate change will only grow in importance for communities in the years to come. Our goal with this report is to assist in the development of local institutional capacity to deal successfully with these escalating climate change challenges.

Methods

Headwaters Economics talked to ten communities about their experiences with planning for and implementing climate change adaptation. Our objective was to discover the story behind how the plans came about, to learn how communities put them into practice, and to extract lessons.

The profiles in this report are based mostly on interviews with people in city and county government who were closely involved in the process of developing and implementing climate adaptation plans.

We asked:
1) What is your policy on climate adaptation?
2) What is the process whereby this policy became institutionalized?
3) Who made it happen?
4) How was the effort to develop adaptation strategies and policies funded?
5) What are the effects of institutionalizing climate adaptation?

We supplemented the insights from the interviews with information from the climate adaptation plans themselves or other documentation. We then summarized key lessons learned from each case study.

Summary: Lessons Learned

The "Lessons Learned" below offer practical advice about how to advance climate change adaptation that we hope will help local leaders and staff, as well as other organizations that are helping local government, to adapt successfully to climate change.

Focus on an immediate, recognizable threat	Start with an immediate, recognizable threat. For example, an increase in forest fires, hurricanes, heat waves, or flooding in can help spur action, particularly if the threat is something the community has already experienced in the past. It may help to start small on an issue that is immediately relevant to the community. For example, drought in Taos, heat waves in Chicago, and forest fires in Boulder helped stimulate action.
Recognize local values, and be flexible	Begin with local values. Be prepared to be flexible and respond to a community's needs. For example, if the community cares a lot about its nearby forests, then a constructive entry point may be the effect of climate change on forests and forest fires.
Start with an existing process	Start with a process that is already part of what the community does. Integrating climate change adaptation into existing emergency management, public health, and water resources plans, etc. can help with institutionalization. For example, Olympia started with improved water management to prevent flooding as sea levels rise, while Boulder's adaptation actions are integrated into existing plans, such as emergency management. Keene and Chula Vista are following the same process.
Utilize local activists	Local activists can help to get elected officials to pay attention to climate change and in the long term to make sure the issue stays relevant, regardless of who is in office. For example, Chicago created an outside advisory group, and Eugene receives both assistance and pressure from the Sustainable Business Initiative Task Force.
Look for leadership in unexpected places	Look for leadership in unexpected places. For example, leadership may come from public safety workers like firefighters, or water managers. The planning department in Taos and water managers in Olympia played effective leadership roles.

Involve elected officials early	Elected officials may not lead on climate change initially, but they appreciate being involved and their support is crucial. For example, in Boulder support from the Board of County Commissioners was essential, while in Chicago the leadership of Mayor Daley was instrumental.
Work with the right department, and dedicated staff	Find the right local government department (e.g., Public Works, or Fire Safety) and key staff there to integrate climate change adaptation into their existing responsibilities. For example, in Olympia climate change means flooding, and this puts responsibility squarely with the Public Works Department. In many places there are staff dedicated to climate change.
Reach out to the community	Provide open communication to the community. For example, annual climate discussions in Olympia and Chula Vista's open house format help instill trust and foster participation.
Facilitate peer-to-peer learning, and offer positive examples	City and county staff often learn better from their counterparts in another place that is a few steps ahead in the process of climate adaptation. Wherever possible, offer positive examples of communities dealing successfully with similar issues. For example, research conducted for Vancouver proved useful for climate planning in Olympia.
Recognize limited capacity	Don't get too complicated too soon. Lack of time and resources is a major constraint. Rather than focusing on detailed, high-level science, go easy on the science and focus on communication and community resources. For example, Chula Vista and Boulder both found that non-technical summary reports sufficed. In contrast, Chicago, with its vast resources, was able to afford detailed, downscaled climate models.
Don't get trapped by the climate debate	Recognize that for practical and political reasons, it may be better not to use the word "climate." Circumnavigate the climate debate and address issues important to the community. For example, adaptation in Taos works under the rubric of water conservation and affordable housing.

Use outside expertise that:	Bringing in outside expertise can help.
Has legitimacy with leaders	Relying on groups that have legitimacy with local elected leaders and have a track record of providing services.
Understands community organizing	Early on, community organizing is the most important skill. Also, bring in people with a keen sense for local politics.
Provides technical details	Later on, bring in technical experts who can help with specific needs of the community—specialists who know how to write an ordinance, analyze the costs and benefits of proposed actions, develop a water management plan, etc.
Don't wait for perfection	Don't wait to act until strategies are perfected. Plans can and will be revised over time. For example, Boulder decided putting a plan in place was the top priority.
Use economic and fiscal arguments	Economic and fiscal arguments can be important motivators, especially when climate change does not persuade all parties. For example, Keene's first move on climate adaptation built on the economics of energy efficiency.
Make use of regional compacts	Regional compacts are a good way for local governments to engage with state and federal authorities, and benefit from expanded technical assistance and resources. For example, Miami-Dade County's participation in a regional compact has been helpful.
Recognize mitigation can be a first step	Climate mitigation and adaptation are close cousins. Sometimes mitigation actions, such as signing the U.S. Mayor's Climate Protection Agreement, is the first step leading to adaptation planning and actions. For example, this is how progress was made in Eugene, Taos, and Chula Vista.

Local Examples and Lessons Learned

BOULDER (City and County), COLORADO
An integrated plan, without reinventing the wheel

Boulder city and county worked together to create a plan that overlays climate change onto existing emergency management and public health plans.

The information for this case study was obtained from interviews with Lisa Friend, Sustainability Planner for the County of Boulder and with Jonathan Koehn, Regional Sustainability Coordinator for the City of Boulder. It was supplemented by information provided in the Boulder County Climate Change Preparedness draft plan and the City of Boulder Climate Action Plan.

What is Boulder's policy on climate adaptation?

Boulder is located at 5,430 feet, at the base of the foothills of the Rocky Mountains. The population of the city is approximately 98,000, while the county population is approximately 294,000.

The Boulder County Climate Change Preparedness Plan came out of a joint effort between Boulder County and the City of Boulder. The goal was to address climate change by assessing the challenges, capabilities, and opportunities for the county and its municipalities in order to manage the impacts of climate change. The plan "is intended to systematically consider the potential effects of projected climate changes on city and county planning and management processes and to identify opportunities for adaptive planning efforts to proactively address the challenges and opportunities posed by changing climate conditions in Boulder County."[1]

The Climate Change Preparedness Plan focuses on four key sectors: water supply; emergency management; public health; and agriculture and natural resources. It analyzes preparedness for climate change of these sectors over the next 20 to 50 years and then makes recommendations about how to improve, where to build up resources, and how to work together across sectors. Some of the sectors addressed are managed on the county level (i.e., emergency management and public health), while the municipalities manage water resources.

The City of Boulder has included pieces of what might be considered climate adaptation in the city master plan for years, without explicitly calling them that. For example, Boulder has always been at high risk for flooding, and the city has been thinking for many years about how climate change will influence flood risk. Similarly, the Integrated Pest Management Program had already begun considering the emerging health issues around new diseases like West Nile Virus, appearing because of changes in climate and water resources. Local food production is another example of an area in which the city has been working for several years, without calling it climate change adaptation. Strategies for addressing these risks have been included in various revisions of the city master plans.

[1] Boulder County Climate Change Preparedness Plan, Draft, December 22, 2011, page 1.

What is the process whereby this policy became institutionalized?

- In May 2002, the Boulder City Council passed Resolution 906, also known as the Kyoto Resolution, setting the goal of reducing community greenhouse gas emissions to 7 percent below 1990 levels by 2012. The Office of Environmental Affairs was directed to develop an action plan in order to meet Boulder's Kyoto goal and develop a sustainable energy future for the city and county of Boulder.

- In May 2005, the Boulder County Commissioners identified environmental sustainability as a priority initiative and established a Sustainability Task Force.

- In 2006, the City of Boulder completed a Climate Action Plan, aimed at mitigation. The plan provides a framework to compare and analyze alternative strategies and policies, and includes baseline data and emissions reduction strategies for commercial, industrial, residential, transportation, and solid waste sectors. It also addresses city operations, water conservation and urban forestry.

- The city and county of Boulder came to a mutual decision that it made more sense to develop a countywide plan, due to the common issues as well as staff and resource issues. The City of Boulder, though politically it would have been able to take a more aggressive approach to adaptation strategies, wanted to support something that could be adopted countywide.

- A draft of the countywide Climate Change Preparedness Plan was released for public comment in early January 2012.

The Boulder County Climate Change Preparedness Plan is currently in the public comment stage, so it has not yet been institutionalized. However, the plan highlights how climate change concerns can be integrated into existing public health plans, emergency management plans, etc.: "County and municipal staff should view this document as setting an overall climate resilience agenda, identifying opportunities for incorporating adaptation into existing management and planning, and establishing a process for future efforts."[2]

Developing the plan was a collaborative process. Stratus Consulting formally wrote the plan, working with county and municipal level offices of emergency management and parks and open space, and with the county public health department, and municipal water resources departments (Boulder County doesn't have water resources department).

A plan developed specifically for the City of Boulder would likely have been different from the countywide plan and would have gone through a more rigorous approval process. Boulder is very progressive in terms of energy and sustainability issues; other municipalities in the county have not embraced these issues until only very recently, if at all. Given these political differences, it was difficult to come up with a plan that would work for everyone. (Geographical differences, too, created challenges: the City of Boulder, because of its location right next to the mountains, may face different situations with flooding and wildfires, for example, than other municipalities in the county.) Some in Boulder will think that the countywide plan does not go far enough. The City of Boulder continues to work hard on mitigation and does not want to be perceived as having given up on it. But the city did want to have a county foundation for an adaptation plan that they can build on, create addendums to, and operationalize through the city master plan.

[2] Boulder County Climate Change Preparedness Plan, Draft, December 22, 2011, page 1-4.

While the city and county of Boulder have perhaps the greatest concentration of climate science resources in the world available to them, including the National Oceanic and Atmospheric Administration (NOAA), the National Center for Atmospheric Research (NCAR), the University of Colorado, the U.S. Forest Service Rocky Mountain Research Station in Fort Collins and the Bureau of Reclamation and the U.S. Geological Survey (USGS) in Denver, there are few studies in the literature that apply specifically to Boulder County. The plan depends on inferences from regional studies, from general principles of climate science, or from existing downscaled datasets.

However, Lisa Friend has found that downscaled climate models have not been very helpful because they are too loose, and the challenging topography of Boulder makes it hard to rely on any model, even upscaled models. The plan calls for a summary of climate science rather than a detailed look. While public reaction has yet to be measured, the plan has been distributed to local mayors and forest service agents, who have not yet asked for more detail.

In developing the plan, the climate adaptation planning committee—composed of about ten members in addition to the city liaisons and paid consultants—met regularly to discuss climate adaptation. Two public meetings were held at the end of January 2012 to comment on the draft plan. The importance of organized, community-wide discussions of climate adaptation to gaining support from local elected officials is still unknown, as officials have yet to voice support or rejection. In independent meetings with Lisa Friend, Republican officials have expressed concern about the focus of the plan being on climate change; and while they support taking steps to protect the health and safety of local residents in the face of climate change, they want to do it without too much government involvement.

Who made it happen?

At the county level, the Board of County Commissioners was key. Their direction and support was extremely important in completing the adaptation plan. The Boulder City Council was also important.

How was the effort to develop adaptation strategies and policies funded?

The city contributed $25,000 from the Climate Action Tax (a city tax on electricity use, which funds all the sustainability issues in the city). The county contributed $50,000 from the general fund.

As county Sustainability Planner, Lisa Friend devotes approximately 12 percent of her job to working on the plan.

What are the effects of institutionalizing climate adaptation?

Lisa Friend says that the designed the Boulder County Climate Change Preparedness Plan to be institutionalized. She reiterates that the idea behind the plan was not to duplicate existing plans, but rather to analyze them (emergency preparedness, public health, etc.), assess their adequacy, and make suggestions on how to integrate what is missing into the existing plans. The county plan states that it is "intended to serve as a resource for county and municipal planners as they integrate climate change, in addition to other concerns, into their ongoing planning efforts…. This plan is not meant to stand on its own. It addresses multiple issues within multiple departments and across multiple jurisdictions."[3]

The City of Boulder has incorporated many adaptive actions into the city's master plans, institutionalizing them without the label of climate change adaptation. In addition to concrete actions like improving

[3] Boulder County Climate Change Preparedness Plan, Draft, December 22, 2011, page 1-3.

preparedness for wildfires, flooding, vector-borne illnesses, and urban wildlife encounters, Jonathan Koehn reflects that the progress the City of Boulder has made on implementing adaptive measures for climate change has also opened up the conversation about climate change. It has helped Boulder residents make more connections between problems they are confronting and climate change. For example, a couple of serious wildfires very close to town have generated discussions about fire preparedness and defensible space, in addition to generating talk about why more destructive fires are occurring. Similarly, people are making connections between changes in the snowpack, warmer temperatures, and flood events; likewise with changing weather patterns, standing water, and new types and species of mosquitos; and also with drought, early snowmelt, lack of forage in the mountains, and increased incidence of urban wildlife like bears and mountain lions.

The City of Boulder is planning what steps it will take towards climate change adaptation over the next few years and dedicating funds from the Climate Action Plan tax.

According to Lisa Friend, the plan has not yet been incorporated into the budget planning process. The county first will have to determine what the costs are of moving forward, and then the different departments charged with implementing various recommendations will likely contribute a patchwork of funding.

Lessons learned

- Don't reinvent the wheel—the best plans are designed to be integrated into existing plans for emergency management, public health, flood control, etc.
- Don't wait to act until the strategies are perfect. They can always be revised.
- Circumnavigate the climate debate and address the issues. It makes sense to plan for emergencies, whether or not everyone agrees about if they can be attributed to climate change.
- Assign staff. A staff member who dedicates a good deal of time to the plan can be key to its creation.
- Don't worry too much about detailed, downscaled climate prediction modeling. General descriptions can be enough to spur action.
- Allow time and provide resources (meeting space, coffee) to build bridges between departments that don't traditionally work together. Cooperation between water resource managers, natural resource managers, emergency operations personnel, economic development agencies, health departments and others—both on the ground and in elected office—is crucial.

Resources

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Jonathan Koehn, Regional Sustainability Coordinator, City of Boulder. (303) 441-1915. koehnj@bouldercolorado.gov

Boulder County Climate Change Preparedness Plan, December 22, 2011 Draft, Stratus Consulting, Inc., Boulder, CO. http://bit.ly/C2P2BoulderCounty

City of Boulder Climate Action Plan, Office of Environmental Affairs, 2006. http://www.bouldercolorado.gov/index.php?option=com_content&task=view&id=1058&Itemid=396

CHIGAGO, ILLINOIS
Success—and a template for other cities

The donations of non-profit leaders and the cultivation of thought leaders in key city departments ensure the continued implementation of adaptation efforts.

The information for this case study was obtained from interviews with Olivia Cohn, Sustainability Officer with the City of Chicago's mayor's office and with Adele Simmons, President of the Global Partnership for Philanthropy. It was supplemented by information provided in the Chicago Climate Change Adaptation Plan and related city plans and documents.

What is Chicago's policy on climate adaptation?

Chicago is the third most populous city in the U.S. It is located at the southwestern tip of Lake Michigan, and two rivers—the Chicago River and the Calumet River—flow through the city.

Chicago has been widely recognized in the national media as a flagship city for action on climate change.[4] The city adopted the Chicago Climate Action Plan (CCAP) in September 2008. The CCAP has an overarching goal of reducing Chicago's greenhouse gas emissions by 80 percent below 1990 levels by 2050, with an interim goal of 25 percent below 1990 levels by 2020. Adaptation is one of the CCAP's five components.

Chicago residents are familiar with many of the anticipated impacts of climate change, such as flooding and extreme summer heat waves. The adaptation strategies that the CCAP outlines seek to build resilience to these impacts and numerous others. The strategies include:

1. Manage Heat: Update the heat response plan, focusing on vulnerable populations; complete further research into urban heat island effect and pursue ways to cool hot spots.

2. Pursue Innovative Cooling: Launch an effort to seek out innovative ideas for cooling the city and encourage property owners to make green landscape and energy efficiency improvements.

3. Protect Air Quality: Intensify efforts to reduce ozone-precursors through mitigation programs that reduce driving and emissions from power plants.

4. Manage Stormwater: Collaborate with the Metropolitan Water Reclamation District on a Chicago Watershed Plan that factors in climate changes and uses vacant land to manage stormwater.

5. Implement Green Urban Design: Implement key steps in Chicago's Green Urban Design plan to manage heat and flooding. These steps will enable Chicago to capture rain where it falls and reflect away some of the intensity of the sun on hot days.

[4] "Greening the Concrete Jungle," The Economist, Sept. 3, 2011. http://www.economist.com/node/21528272/print; "A City Prepares for a Warm Long-Term Forecast." *New York Times.* May 22, 2011.

6. Preserve Our Plants and Trees: Publish a new plant-growing list that focuses on plants that can thrive in altered climates. Also draft a new landscape ordinance to accommodate plants that can tolerate the altered climate.

7. Engage the Public: Share climate research findings with groups most affected—social service agencies, garden clubs, etc. Help individual households to take their own steps to reduce flooding and manage heat waves, such as installing rain barrels and back-up power for sump pumps and planting shade trees.

8. Engage Businesses: Work with businesses to analyze their vulnerability to climate change and take action.

9. Plan for the Future: Use the Green Steering Committee of City Commissioners to oversee City implementation efforts and the Green Ribbon Committee of business and community leaders to assess how the plan is being implemented, recommend revisions, and report to the Mayor and all Chicagoans on our progress.

A number of city programs have been successful in implementing climate change adaptation strategies:

- **Stormwater management**. Flooding is an existing problem in Chicago. It is predicted to increase with more frequent extreme precipitation events as a result of climate change. The city overhauled the stormwater ordinance in 2007 and has since updated it further, focusing on increasing resilience to pollution from flood and storm events. Key actions have concentrated on both gray and green infrastructure approaches to minimizing damaging overflow events—including structural changes to the sewer system as well as mitigation-oriented efforts in the planning and design aspects of city infrastructure.

  In 2009, the Chicago Department of Water Management (DWM) finished a computerized model of the city's large-diameter sewer system (more than 775 miles) that allows the city to evaluate surface and basement flooding problem areas and analyze the most cost beneficial solutions, including green infrastructure, while helping Chicago to plan for future extreme rain events.

  In addition, many elements of the city's Green Urban Design comprehensive plan (described below) address the need for stormwater management.

- **Green Urban Design**. In 2008, the Chicago Plan Commission adopted the comprehensive plan "Adding Green to Urban Design: A City for Us and Future Generations." The plan includes 21 key action items that will improve the design of important green infrastructure areas in the city, such as rooftops, building facades, landscaping around buildings and in parking lots, sidewalks, parkways, and streets. Improved design of areas will increase the ability of parking lots to reflect heat, create places for stormwater storage and create tree canopy and green roofs throughout the city. The plan reflects a mix of approaches from mandates to recommended best practices to voluntary projects. Key policies include:

  1. *Chicago's Sustainable Development Policy.* The policy, effective in 2007, mandates a series of green codes (including green rooftops) for all building permits, with especially rigorous codes mandated as a condition of building permit for any project that receives city financial assistance. For example, any building project receiving financial assistance is

required to construct a 100 percent green roof.[5] Chicago's Green Urban Design approach emphasizes leading by example. Mayor Daley launched a pilot project to test green rooftop designs with an elaborate green rooftop atop City Hall.[6]

2. *Department of Transportation Green Alleys Program.*[7] Green Alley standards are important in climate change adaptation because they help ensure stormwater mitigation and reduction in potential heat islands. The standards apply to any city-initiated new alley or alley renovation work. Since 2006, more than 100 green alleys have been installed in the city.

3. *Urban Forest Agenda 2009 and the Chicago Trees Initiative***.** Trees are central to the city's approach to eliminating dangerous urban heat islands. Specific policy efforts addressing Chicago's tree and forested landscapes include:

- The Urban Forest Agenda resulted from a planning effort to evaluate existing logistical and policy barriers to stewardship and expansion of forested areas in the city.

- The Chicago Trees Initiative is a specific program designed to implement the Urban Forest Agenda goals. It is managed by a partnership of city departments and other area non-profits.

- **Invasive Species Ordinance**. The City of Chicago originally developed an Invasive Species Ordinance to target invasive aquatic species that pose a threat to the health of Lake Michigan and related waterways. The ordinance passed city council in 2007 and made it unlawful to possess certain invasive species on the regulated list. As a result of the city's engagement in climate change planning, the list was updated in 2009 to include the land-based invasive plants recognized to pose increasing threats under changing weather patterns. The code is enforced primarily at point of sale by making it illegal for vendors to sell prohibited plants.

- **Extreme Weather Operations Plan**. To help prepare for upcoming climate changes, the Office of Emergency Management and Communications put together a comprehensive Extreme Weather Operations Plan, with a separate extreme precipitation plan section. AlertChicago, the outreach arm of the Office of Emergency Management and Communications, issued a flood readiness brochure warning that scientists predict more heavy rains and more frequent winter and spring snows, which could cause dangerous flooding.

  Although the evidence remains anecdotal, city officials have been encouraged by the fact that the city's vulnerable population appeared to fare much better in the recent 2011 heat wave than Chicago's infamous 1995 heat wave, in which over 700 people perished. Despite similar intensity as the 1995 event, the 2011 heat wave was far less devastating (with 14 confirmed heat-related

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[5] The city uses a policy matrix to outline the requirements of the Sustainable Development Policy: http://www.chicagodevelopmentfund.org/documents/New_Sustainable_Development_Policy_Matrix.pdf. As stated in the matrix, the policy, "applies to all new Redevelopment Agreements, Planned Developments, Site Plan Approvals and Amendments to existing Planned Developments reviewed by the Department of Planning and Development's weekly Design Review Committee after December 1, 2007."

[6] According to the ICLEI write up of the City Hall project, the results have been promising in terms of adaptation measures and cost savings. In addition, the visibility of the project is thought to have played a role in the successful spread of the approach to many other city buildings

[7] Components of the standards are the inclusion of permeable areas to allow for stormwater absorption and the use of a custom paving mix that recycles materials and features a high albedo to combat heat retention.

deaths). City officials hope that strategies in the Extreme Weather Operations Plan, such as designating and operating over 900 cooling centers city-wide and using city agencies to attend to vulnerable populations, may be part of the reason the city weathered the 2011 heat wave more smoothly.

What is the process whereby the policies became institutionalized?

Chicago's climate change planning began in 2006 under Mayor Richard M. Daley. The city devoted significant effort to downscaling climate change models. The models predicted stark impacts for the city, especially regarding a significant increase in extreme heat events in summer.

A private risk assessment firm, Oliver Wyman, worked with the city to evaluate the potential impacts of changes predicted in the downscaled models as well as the costs of inaction. They interviewed agency heads from across city government to understand where climate change impacts and agency priorities intersected. According to a *New York Times* chronicle of the planning process, "the resulting report read like an urban disaster film minus Godzilla." Using the risk assessment, the city then undertook a process of prioritizing adaptations based on feasibility "in the light of tight budgets and public skepticism [about climate change]."[8]

Mayor Daley then directed city departments and agencies to develop their own climate action work plans. This effort was undertaken by what came to be known as the city's "Green Staff." Green Staff are mid-level managers in city agencies and departments with the personal commitment and appropriate job description to champion sustainability and adaptation initiatives within their departments. The Green Staff have continued to meet on a monthly basis sharing their progress and experiences since 2009.

As a result of their initial engagement with the risk assessment study, Green Staff produced work plans involving more than 450 initiatives with a direct benefit towards the goals of the Chicago Climate Action Plan. Five working groups were established to tackle various aspects of adaptation by identifying those initiatives within departmental work plans with benefits for particular adaptation priorities. Since that time, the working groups have been reorganized and currently reflect three major themes—Built Environment, Natural Environment, and People.

Key to the progression from plan to implementation have been the individual agency and department work plans, which have been supported by a network of "Green Staff" and additional avenues of support from the leaders of the CCAP, Department of Environment.

Mayor Rahm Emanuel eliminated the Department of Environment when he took office in 2011. He created a Chief Sustainability Officer in his office that works with her staff to oversee ongoing work on the CCAP. Many of the staff from the Department of Environment that originally supported the Green Staff in other departments have moved on, but the Green Staff and Green Steering Committee continue to function. The mayor's Sustainability Officer and her staff fill the support and facilitation roles previously furnished by the Department of Environment.[9]

[8] "A City Prepares for a Warm Long-Term Forecast." *New York Times*. May 22, 2011.
[9] The description of process offered here comes from an Interview with Olivia Cohn, Sustainability Specialist at the City of Chicago mayor's office, 1/24/12.

Who made it happen?

Mayor Daley was a strong supporter of moving the CCAP forward and insisted that city departments develop climate work plans. The Department of Environment led the charge on the CCAP, and under Daley, the department supported the CCAP with several staffers and concerted attention from the commissioner (the department head).[10]

Both external and internal supervisory groups provided authority to help maintain momentum for implementation. Internally, a Green Steering Committee made up of agency and department heads reports to the mayor and meets quarterly, sharing a "show and tell" of achievements in their domains (as reported by Green Staff).

In addition, the Green Ribbon Committee, a group of Chicago civic, business, and organization leaders, has also been a part of the CCAP since its inception. The roles of the committee are to:

- Provide an independent review of the Chicago Climate Action Plan performance;
- Recommend areas where adjustments are needed;
- Report progress and problems to the mayor at least annually and more often if needed;
- Provide problem solving and thought partnership; and
- Commit to action in supporting CCAP.

Comprised of people with the stature to influence city leadership, the Green Ribbon Committee provides an important source of support to climate change thought leaders in the city when and if commitment to the larger process flags within city bureaucracy.

How was the effort to develop adaptation strategies and policies funded?

As mentioned above, a key feature of Chicago's approach is the inclusion of supporting non-city entities in the overall approach to creating and implementing a climate change plan. Chicago has a long-standing tradition of private sector support for city initiatives. As reported in the *New York Times*, the belief on the part of non-profit leaders that Chicago could be a template for other municipalities encouraged the non-profit sector to invest heavily in supporting the city's planning efforts. This included raising over $1.5 million in direct funding to support the city's process as well as the recruitment, through the Chicago Civic Alliance, of extensive pro-bono services. According to Adele Simmons, President of the Global Philanthropy Project, the engagement of highly qualified private firms in pro bono work on behalf of the community is a unique dynamic in the city, "it's just something that happens in Chicago."[11] Key partners are:

Global Philanthropy Partnership (GPP): A non-profit partner, the GPP provides staff to manage communications, outreach, and retrofit projects.

Civic Consulting Alliance (CCA): For over twenty years, CCA has been working with the city, providing oversight to make sure CCAP projects are moving forward and helping find pro-bono partners to assist in research, implementation, and evaluation.

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[10] The organizational chart for early CCAP efforts is provided on page 36 of the "Lessons Learned" report, http://www.chicagoclimateaction.org/filebin/pdf/LessonsLearned.pdf

[11] Interview with Adele Simmons, 1/24/12.

The importance of such external entities in keeping the CCAP momentum has grown with the change in mayoral administrations and the exigencies of a $675 million budget shortfall facing the city commission in 2011. The commitment of partners in the non-profit and private sector will bring institutional memory and continued engagement to the CCAP during this period of major transition within the city bureaucracy.

What are the effects of institutionalizing climate change adaptation?

A list of achievements in the May 2010 Progress Report included:

- Since January 2008, 265 development projects were addressed by the stormwater management ordinance, resulting in a 20 percent increase in permeable area per site and an overall increase of 55 acres of permeable surface area.

- 120 green alleys had been installed by May 2010, resulting in the conversion of over 32,000 square feet of impervious surfaces to pervious surfaces.

- Green roof and tree progress as of early 2010 included more than four million square feet of green roofs planned or completed since 2008; and more than 9,000 acres of tree canopy added since 1993.

The transition from the Daley to the Emanuel administration has shifted implementation priorities. As noted in the *New York Times* article on Chicago's climate change planning, Mayor Emanuel's administration has prioritized adaptation initiatives with job creation benefits. An example is a massive overhaul of the city's water infrastructure funded by an increase in water and sewer fees. The effort is projected to create about 1,800 jobs a year and is charted to last about 10 years. The city's sewer infrastructure is so dated that its upgrade is critical regardless of climate change—it is not clear from published reports if the CCAP contributed any momentum or strategic direction to this decision.[12]

Lessons learned[13]

- Significant support from private-public partnerships provided critical financial capacity for climate change science and reports. External resources were also critical in the next phase, when experts worked with city staff to help prioritize responses to impacts identified by climate change studies.

- Participation of private and non-profit sector leaders in an external steering committee provides additional assurance that the CCAP will be implemented.

- Chicago's focus on championing and empowering leaders in key departments and agencies adds momentum to adaptation initiatives, independent of mayoral leadership. As a current staffer in the mayor's office put it, "The Green Staff have the passion and will push for [adaptation and other work] goals whether or not support comes from above, although obviously that support can move things ahead more quickly."

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[12] "City Inaugurates Costly Plan to Prepare Aged Water Mains." *New York Times*, December 17, 2011. http://www.nytimes.com/2011/12/18/us/chicago-inaugurates-costly-plan-to-replace-aged-water-mains.html?pagewanted=all

[13] An early "Lessons Learned" report was developed in 2009. It provides a comprehensive description of the process of initiating planning, preparing a climate impact report, and initial steps of implementation. At the time of writing, no specific policies had been implemented. http://www.chicagoclimateaction.org/filebin/pdf/LessonsLearned.pdf

Resources

Karen Weigert, Chief Sustainability Officer, City of Chicago, Office of the Mayor. (312) 744-5000.

Adele Simmons, President, Global Philanthropy Project. Contact through April Donnellan, Executive Director. (312) 213-3793. http://www.global-philanthropy.org

Alert Chicago: Flood Preparedness
http://www.cityofchicago.org/content/dam/city/depts/oemc/general/Brochures/FloodBrochure.pdf

Chicago Climate Action Plan
http://www.chicagoclimateaction.org

Chicago's Urban Forest Agenda.
http://www.cityofchicago.org/content/dam/city/depts/doe/general/NaturalResourcesAndWaterConservation_PDFs/UrbanForestAgenda/ChicagosUrbanForestAgenda2009.pdf

Green Alleys Project
http://www.cityofchicago.org/city/en/depts/cdot/provdrs/alley/svcs/green_alleys.html

ICLEI, "City of Chicago Rooftop Garden Pilot Project." http://www.iclei.org/index.php?id=2743

Stormwater Ordinance
http://www.cityofchicago.org/content/dam/city/.../2012StormManual.pdf

Natural Resources and Water Quality: Invasive Species
http://www.cityofchicago.org/city/en/depts/bacp/supp_info/invasive_species.html

CHULA VISTA, CALIFORNIA
Adaptation planning with no budget and no experience

Chula Vista's long-time partnership with ICLEI, relationship with the San Diego Foundation, and committed staff made adaptation possible without a dedicated budget.

The information in this case study was obtained primarily from an interview with Brendan Reed, Environmental Resource Manager for the City of Chula Vista. The Climate Adaptation Knowledge Exchange (CAKE) website, as well as the City of Chula Vista website, including the report on Climate Adaptation Strategies Implementation Plans and the Progress Report for 2011, provided supplementary information.

What is Chula Vista's policy on climate adaptation?

The City of Chula Vista is the second largest city in the San Diego metropolitan area with a population of about 230,000. It is located between San Diego Bay and the coastal mountain foothills.

Chula Vista's climate change adaptation plan was developed in 2011. It recommended 11 strategies in seven focus areas to help the city adapt to the impacts of climate change. The focus areas are: infrastructure and resources; energy management; public health; business and economy; water management; wildfires; and ecosystems and biodiversity. Some of the measures include: planting shade trees; requiring all new coastal development to assess vulnerability to sea level rise; ensuring that the public health system is prepared for more frequent heat waves and that the public is educated about the consequences of excess heat; and expanding efforts to encourage low water use in home landscaping.

What is the process whereby this policy became institutionalized?

The City of Chula Vista has a history of proactive work on sustainability and climate change. Long-time environmental concern among community members and elected officials led to action on climate mitigation as awareness about climate change grew in the 1990s. Chula Vista has participated in the United Nations Framework Convention on Climate Change, the California Climate Action Registry, and the U.S. Conference of Mayor's Climate Protection Agreement. The city became an ICLEI Charter Member in 1994 and developed their first climate mitigation plan (CO_2 reduction) in 1996. It included greenhouse gas emission inventories, free business and energy evaluations, energy efficiency and conservation policies, and alternative transportation.

When Brendan Reed came on board in 2006 as Environmental Resource Manager, the first thing he did was to conduct a greenhouse gas emissions assessment to evaluate progress on the emissions reduction plan. The city had grown in both population and land area since the 1990s, and emissions had also increased. To address the increase, a stakeholder group was set up, charged with creating new climate mitigation measures. After a yearlong process, the group came up with seven new measures and developed an implementation plan, presented in 2008, including what ordinances needed to be changed in order to reach the new goals.

In 2008, the San Diego Foundation commissioned a study called Focus 2050, modeled on the study by the same name undertaken for King County, Washington. The study uses climate change projections, generated by scientists at the Scripps Institution of Oceanography, to explore what the San Diego region

will be like in 2050 if current trends continue. The report provided both the impetus for the city to start thinking about adaptation as well as essential information about the likely effects of climate change in the San Diego area.

In 2010, Chula Vista began to work on developing an adaptation plan. The stakeholder process undertaken for the climate mitigation measures served as the model. The Climate Change Working Group (CCWG) was formed, comprised of residents, businesses, nonprofits, and community organization representatives.

In 2011, the CCWG recommended 11 strategies in seven focus areas to help the community adapt to the impacts of climate change.

The Conservation Department, a branch of the Department of Public Works, has spearheaded the process of institutionalization. Brendan Reed, Resource Manager in the Conservation Department says that every city department is involved and the City Manager's Office meets with all of the departments every other month. Elected officials are very supportive. Brendan stresses that sustainability has become the *culture* of city operations.

The San Diego area benefits from several important research and academic institutions (Scripps Institution of Oceanography and University of California at San Diego) that generate research on climate science. The Focus 2050 report was vital because it distilled the technical information about climate change impacts in the region and made it digestible for a broader readership. Brendan thinks that while it is essential that the technical reports exist, people have been satisfied with a summary and most would not read the more detailed information.

The San Diego Foundation went on the road with the Focus 2050 report, presenting the information to city officials and elected councils and commissions throughout the county. Brendan thinks that it was important that the information came from a trusted third party—rather than himself, as resource manager, for example.

All CCWG meetings were public, and community members were invited to sit down at the table with the working group and participate in the discussion. There were 15 working group members, and about five to ten community members usually joined them. Brendan emphasizes that educating themselves about climate change was an integral part of the process for the working group members, so everyone was learning together.

After developing the strategies, the working group hosted a public forum where they presented information about climate change on poster boards, and the public could ask questions and give feedback. Brendan says that this was a great experience for the working group: it helped them take ownership of the process and move into the implementation phase. Brendan regularly sent listserv information about the process to about 200 people. At the end of the process, he says, no one complained that they weren't invited to participate.

Who made it happen?

The Resource Conservation Commission (RCC)—a standing, city-council-appointed committee—played a key role in institutionalizing the adaptation plan. The CCWG was formed as a subcommittee of the RCC and two members of the RCC were part of the working group. The CCWG recommendations went to the RCC before going to the city council, which helped bring them to the fore.

Brendan facilitated the process. Involvement on the part of department staff was also important. They were engaged and always ready to answer questions.

How was the effort to develop adaptation strategies and policies funded?

Internal funding supported climate change adaptation work in Chula Vista, mainly staff time. "This is what it looks like with no experience, no money, and no outside consultants," says Brendan. The San Diego Foundation and ICLEI provided in-kind research and technical support.

The estimated cost for initial implementation of all 11 strategies is $554,000. Existing funding sources will allow at least eight of the 11 strategies to be fully or partially implemented and will partially cover ongoing implementation of the 11 strategies, costing approximately $337,000 annually.

What are the effects of institutionalizing climate change adaptation?

Chula Vista has implemented a majority of the adaptation strategies outlined in the plan. According to the Climate Action Plan Progress Report of October 2011, "Of the more recent 11 climate adaptation strategies and their 30 associated implementation components, only one component dealing with storm water pollution prevention and reuse…and two components dealing with biological monitoring…have been delayed due to funding shortages."

The goal is to integrate climate adaptation into business as usual and not create new impacts to the General Fund. For example, for every new development project, consideration of sea level rise is now integrated into the analysis and design, rather than being a separate item. Extreme heat events, likewise, are being integrated into the updated hazard plan.

Lessons learned

- Engage stakeholders—Chula Vista's open house format (inviting the public to CCWG meetings and holding a public forum to present findings) worked well.
- Emphasize the importance of being prepared for potential climate change impacts.
- Avoid analysis paralysis.
- Integrate climate adaptation planning into existing plans and programs.
- Adaptation planning is possible without on a low budget. Make use of existing regional studies and in-kind support from partner organizations.
- Staff and committee members dedicated to the task help move the process forward and give it oversight and longevity.

Resources

Brendan Reed, Environmental Resource Manager, City of Chula Vista. (619) 549-5690. breed@ci.chula-vista.ca.us

Kershner, J. (2010). *Climate Change Adaptation Planning in the City of Chula Vista, California.* [Case study on a project of the City of Chula Vista]. Retrieved from CAKE: http://www.cakex.org/case-studies/2725 (Last updated May 2011)

Climate Action Plan—Implementation Report 2011

Climate Adaptation Plans (2011)
http://www.chulavistaca.gov/clean/conservation/Climate/ccwg1.asp

EUGENE, OREGON
Staff dedicated to climate change adaptation

Eugene's decision to create a full-time position dedicated to implementing climate change adaptation projects has been key to the city's success.

The information in this case study was obtained from an interview with Matt McRae, the Climate and Energy Analyst in the City Manager's Office, and from the City of Eugene's Climate and Energy Action Plan (CEAP) and CEAP Progress Report, both available on-line at www.eugene-or.gov/sustainability.

What is Eugene's policy on climate adaptation?

Eugene is located in the Willamette Valley, about 50 miles inland from the coast, near the confluence of the McKenzie and Willamette rivers. Its population is approximately 157,000.

In 2010, the Eugene City Council unanimously endorsed a Climate and Energy Action Plan (CEAP) with three overarching goals: 1) reduce community-wide greenhouse gas emissions to 10 percent below 1990 levels by 2020; 2) reduce community-wide fossil fuel use 50 percent by 2030; and 3) identify strategies that will help the community adapt to a changing climate and increasing fossil fuel prices. The plan outlines six categories (buildings and energy use, food and agriculture, land use and transportation, consumption and waste, health and social services, urban and natural resources) that include 33 multi-part objectives. Each objective is ranked by the relative GHG reduction, fossil fuel reduction, and adaptation value. For each objective, financial costs and savings are estimated in three classes ($0-$99k, $100k-$999k, and $1M plus), and leaders, partners, and goals for timing are identified. The plan also includes an appendix with clearly identified "High Priority Action Items."

Each year the city releases a Climate and Energy Action Plan (CEAP) Progress Report. The 2011 Progress Report Summary states that roughly three-quarters of the plan's recommendations are moving forward.

What is the process whereby this policy became institutionalized?

The timeline described below summarizes steps taken toward climate adaptation. Generally, all of the events were in response to increasing concern about global climate change and the potential for volatile and rising fuel prices.

- In 2005, Eugene Mayor Kitty Piercy signed the U.S. Conference of Mayors' Climate Protection Agreement, pledging to locally strive to meet or beat the Kyoto Protocol targets. Piercy was one of the first signatories and was a major player in terms of leadership (but not voting power) for subsequent steps.

- Also in 2005, the City of Eugene created a greenhouse gas inventory for internal municipal operations.

- In 2006, the mayor's Sustainable Business Initiative Task Force (composed of business leaders) recommended creation of: 1) a sustainability commission and 2) a metropolitan climate action plan.

- In 2007, the Eugene Sustainability Commission was established.

- Also in 2007, the City of Eugene completed a community greenhouse gas inventory.

- In 2009, the Climate Leadership Initiative and the National Center for Climate and Policy created the report "Preparing for Climate Change in the Upper Willamette Basin of Western Oregon," which highlights impacts of climate change to Eugene and surrounding area. The report did not so much generate buy-in or political will (these were already present) as supply critical information that fed directly into the adaptation strategies.

- In 2009, the Eugene City Council asked staff to develop Eugene's first Community Climate and Energy Action Plan.

- In 2009, the City of Eugene created the first Internal Climate Action Plan for City Operations.

- In 2010, the city endorsed the Climate and Energy Action Plan.

Implementing the CEAP has been more challenging than creating it. One challenge is that implementation responsibilities are shared among city staff and resources from several programs—including Solid Waste Management, Green Building, Stormwater Management, Urban Forestry, Land Use Planning, and Transportation Planning. Another hurdle is that existing programs will need to expand their duties in order to adapt to climate change. For example, the existing Stormwater Program provides guidance for new development, but not for retrofitting existing sites, which is important for climate adaptation. The CEAP highlights places where existing programs should add functions.

While detailed climate models are becoming increasingly important for disaster mitigation and flood planning, they may not be as important for public awareness. The scientific report prepared by the Climate Leadership Initiative and the National Center for Climate and Policy was essential for providing background information in Eugene, but public buy-in already existed.

Both locally elected officials and the community provided initial leadership for climate adaptation. For example, the Sustainable Business Initiative Task Force (composed of business leaders) recommended creating both the sustainability commission and the climate action plan. The mayor has provided important leadership, but there was certainly existing interest, pressure, and awareness in the community about making the plan. Another example of community involvement is the CEAP's advisory team and the public engagement process. (See pages 8 and 9 of the CEAP for a description.)

Who made it happen?

Many people in Eugene have been instrumental in progress toward climate adaptation. Mayor Kitty Piercy has shown consistent leadership, and individual members of the Sustainable Business Initiative Task Force have been influential, as have individual members of the city council. Babe O'Sullivan, in the City Manager's Office, has been resourceful in securing continued funding for Matt's position of Climate and Energy Analyst. Matt works full time on climate adaptation special projects and to promote coordination among city programs, so his position is particularly important to moving the plan toward implementation.

The Office of Sustainability in the City Manager's Office played a major part in producing the CEAP. Matt and his supervisor, Babe O'Sullivan, did the majority of the organizing and writing. The planning department lent resources for meeting facilitation, and contributions from public meetings and discussions helped to refine the plan.

Matt's position as full-time Climate and Energy Analyst has been an critical in advancing Eugene's climate adaptation work, because his job responsibilities include both project specific work (for example,

reducing internal waste) as well as generating awareness to move the plan forward (for example, through assessments such as the 20-minute neighborhoods). Matt dedicates 30 to 50 percent of his time to working with members of those programs on priorities, reminding staff of state and city climate adaptation goals, and working with staff groups to push parts of the plan forward. The job is extremely political, due to limited resources and disagreement over the importance of climate adaptation.

Matt identifies three additional factors as helping communities make progress toward implementation: 1) community members who hold the city responsible; 2) a proactive city manager; and 3) a city council who has reprioritized how money is spent.

How was the effort to develop adaptation strategies and policies funded?

The city council and city manager allocated money for the development of the CEAP. They allocated one time funding of $100,000, which Matt believes came out of general fund. This money funded the position of Climate and Energy Analyst for the City Manager's Office, which was originally an 18-month temporary position; it also funded university assistance on documentation.

In the 2011 fiscal year budget, one-time funding of $200,000 was earmarked for use in implementing both the Community Climate and Energy Action Plan and the City's Diversity and Equity Strategic Plan.

The general fund has also contributed on-going funding for the position of Climate and Energy Analyst (in addition to the $200K). The decision to continue funding the Climate and Energy Analyst position was made at the executive management level, not the city council level. Staff in existing city programs, including Solid Waste management, the Green Building program, Stormwater Management, and Urban Forestry, will likely be tapped to implement the CEAP in their respective areas.

What are the effects of institutionalizing climate adaptation?

The City of Eugene has instituted the following climate adaptation projects as a result of the high priority action recommendations in the CEAP.

The Natural Hazards Mitigation Plan: The city is editing the plan to adjust assumptions of frequency of fire, flooding, and heat stress.

*The Cross-Walk***:** Eugene is comparing different plans and identifying where they conflict and where there are gaps. The Natural Hazards Mitigation Plan, the Comprehensive Land Use Plan, and the Climate Action Plan are currently being compared for consistency in objectives.

Envision Eugene: Over the past year the city has been involved in a comprehensive land use planning effort called Envision Eugene. One of the foundations of the draft proposal includes planning for climate change and energy uncertainty. The proposal contains multiple strategies that will reduce greenhouse gas emissions and fuel consumption and improve community resilience. Additional details, including a complete draft proposal, are at: http://www.envisioneugene.org.

20-Minute Neighborhoods: The CEAP aims to create neighborhoods in which a significant number of trips to the grocery store, to school, and to social and recreational activities can be made in 20 minutes without using a car. One of the CEAP goals is for 90 percent of Eugene residents to live in these 20-Minute Neighborhoods by 2030. In the early half of 2011, the City of Eugene completed an assessment that will help residents, planners, and policymakers prioritize actions to improve walkability and access to services throughout Eugene. Complete details of the assessment are online at http://www.eugene-or.gov/twentyminuteneighborhood.

Climate Communication Strategy: In late spring 2011, the City of Eugene began to develop a public outreach campaign centered on climate change. The first part of this campaign focuses on the relationship between consumption and greenhouse gas emissions.

Pedestrian Bicycle Master Plan: One of the CEAP's objectives is to create a Pedestrian and Bicycle Master Plan. A draft is available at www.eugenetsp.organd contains a list of recommended improvements in every neighborhood of the city.

Commercial Food Composting: In spring 2011, the Oregon Department of Environmental Quality approved permits for two composting businesses in Eugene to begin composting food waste from Eugene restaurants and businesses. Composting large amounts of food waste will reduce the amount of methane, a potent greenhouse gas, being released from landfills, while also extending the life of the Short Mountain landfill and producing a product that can be used to enrich local soils.

Energy Performance Score: Energy Performance Scores help buyers, sellers, and builders know how much energy a building uses before it is bought or sold. It provides a measure of energy use for a building very much like a miles per gallon rating does for a car, allowing comparison of energy use among buildings. EWEB now offers an Energy Performance Score (EPS) for new construction and EWEB plans to pilot the Energy Trust of Oregon's model for existing buildings as soon as it is available. The City of Eugene Waste Prevention and Green Building Program is also assessing the possibility of including an Energy Performance Score in its Green Building Incentive program.

University Of Oregon Building Standards: In August 2011, the University of Oregon committed to a unique approach to reducing energy use in buildings. The university set a cap on energy use so that all new development built on the 295-acre campus will result in a net-zero increase in energy use. New projects will be required to meet LEED Gold certification standards and must produce 35 percent greater energy savings than the state's building code requires.

BRING RE:think Program: Since 2009, BRING recycling has operated a RE:think business program that has helped more than 67 individual businesses cut energy use, conserve water, reduce waste, improve stormwater quality, and "green up" their purchasing practices. Over the last year, the lighting and refrigeration upgrades alone have resulted in an estimated savings of 120,000 kWh per year, equivalent to the electricity used to operate six average homes for one year. The RE:think business program is operated by BRING recycling and funded by multiple partners including the City of Eugene, Lane County, EWEB, and Springfield Utility Board. More information can be found at http://www.bringrecycling.org.

City of Eugene Internal Climate Action Plan: The City of Eugene continues to implement its Internal Climate Action Plan, improving practices to reduce energy used throughout municipal operations. As part of this effort, a staff group is updating the city's Internal Greenhouse Gas Inventory in order to measure changes in energy use over the past several years. The Internal Climate Action Plan can be found on the "Climate change and energy use" page at http://www.eugene-or.gov/sustainability.

Willamette Valley Compact: With leadership from the Resource Innovation Group (http://www.theresourceinnovationgroup.org), staff members from county and municipal governments throughout the Willamette Valley are developing a Willamette Valley Compact. The compact will help local governments address common valley-wide climate related impacts by facilitating cross-border collaboration, leveraging partnership resources, improving efficiency in climate related planning and research, and strengthening requests for state and federal resources.

While Eugene is certainly making progress toward climate adaptation, it has not been well incorporated into the city budget. Ultimately, more work and leadership will be needed to integrate budget planning into the adaptation process.

Lessons learned

- A full-time employee dedicated to moving adaptation plans toward implementation is valuable. In Eugene, this position is responsible for promoting coordination among city programs and working on climate adaptation special projects.

- Implementing plans is more challenging politically than creating them. Several factors can help communities make progress toward implementation: community members who hold the city responsible, a proactive city manager, reprioritization by the city council of how money is spent.

- Citizen groups, such as the Sustainable Business Initiative Task Force, can help provide pressure and resources.

Resources

Matt McRae, City Manager's Office, Climate and Energy Analyst. (541) 682-5649. matt.a.mcrae@ci.eugene.or.us

The Climate and Energy Action Plan. http://www.eugene-or.gov/portal/server.pt?open=17&objID=20331&DirMode=1&parentname=Dir&parentid=3&mode=2&in_hi_userid=2&cached=true

The Climate and Energy Action Plan Progress Report. http://www.eugene-or.gov/portal/server.pt/gateway/PTARGS_0_321_370860_0_0_18/CEAP.ProgressReport.2011.WEB.pdf

KEENE, NEW HAMPSHIRE
The economics of energy efficiency

Economic arguments initially persuaded Keene city officials to take action on energy use, which soon segued into climate mitigation and adaptation efforts.

The information in this case study comes from Keene's climate adaptation plan and personal communication with Rhett Lamb, Keene City Planner.

What is Keene's policy on climate adaptation?

Keene is located in the southwestern corner of New Hampshire, with a population of approximately 24,000.

Keene first developed a climate mitigation plan in 2004. It was followed in 2007 by a climate adaptation plan. The city worked with ICLEI–Local Governments for Sustainability to produce both of the plans.

The climate adaptation plan has been incorporated into Keene's master plan and, by extension, into other key plans and decisions that tier from the master plan. Projects included in the capital improvements plan must show how they further the master plan's climate change goals and strategies. For example, upgrading the city's sewer treatment plant, located in the floodplain, has initiated discussions of the costs and benefits of making the facility more resilient to larger floods associated with climate change. (See below for more details.)

What is the process whereby this policy became institutionalized?

In the late 1990s, a citizen petition urged Keene to support federal action on climate mitigation. The planning director, Rhett Lamb, brought the letter to the elected officials, but the idea did not gain traction at the time. The effort did, however, get Rhett thinking about ways the city could be proactive on climate change.

Keene's membership in ICLEI proved instrumental: after the city decided not to act on the initial petition, Rhett attended an ICLEI training course and sought out resources on climate mitigation that helped him craft an approach to climate mitigation focused on the city's ability to improve energy efficiency to become more resilient in the face of rising energy prices.

The economic arguments in favor of energy efficiency ultimately persuaded the city's elected officials to take action, and the city made significant investments to reduce its energy use and to look for alternative energy sources.

The timing of these efforts coincided with increasing awareness of climate change, so there was an easy transition to discussions of climate mitigation and eventually to adaptation and community sustainability. Keene began working with ICLEI in 2000 on a greenhouse gas emissions study, setting a greenhouse gas emissions target, and ultimately adopting a climate change action plan in 2004. When ICLEI began looking for communities to work with to develop a climate adaptation planning process, Keene was ready to go.

Since working with ICLEI, Keene has made progress towards institutionalizing adaptation planning. Most importantly, the city's master plan was developed around the concept of sustainability, which includes

mitigating and adapting to climate change. Because adaptation strategies are incorporated into the master plan, all city plans and ordinances that tier from the master plan must also consider climate change.

For example, every year the city revisits its capital improvements plan that projects major capital facilities needs six years out. Typically, each department will come up with its needs and submit them to the board of commissioners. Keene requires that every capital improvements project has to show how it will further the goals in the master plan, and therefore, requires each department to think about climate change when they plan and propose capital facilities. The operating budget process is similar: each department's operating budget must have a tie back to the master plan, forcing a conversation around sustainability and climate adaptation.

Who made it happen?

Rhett Lamb, the planning director, initiated the original focus on energy efficiency that led to greenhouse gas study and targets. ICLEI provided training, assistance, and a long-term partnership that supported the city's commitment to planning as it evolved from energy efficiency to greenhouse gas reduction efforts, to climate adaptation, and then to institutionalizing sustainability in its master plan and city culture.

Keene's long-time relationship with ICLEI and the breadth of resources ICLEI has to offer were important in helping Keene take action on climate adaptation.

What is the effect of institutionalizing climate adaptation?

One of the first examples of institutionalization is the upgrade of the city sewer plant, currently located in the floodplain. Discussions of how to improve the system have included economic assessments and discussions of how to make the facility more resilient to larger floods associated with climate change.

Lessons learned

- Issues need to be important locally and the process must be suited to the culture of the community.
- Integrating adaptation strategies directly into overarching planning documents (the master plan) and integrating operating and capital budget planning into master plan goals are good ways to propel institutionalization.
- Economic arguments (costs of inaction and efficiencies of acting) can be important motivators.
- Dedicated people in local government are critical.
- Partnerships with other organizations, like ICLEI, are important. ICLEI has several decades of experience of working with local governments and can assist localities on a wide range of planning and implementation steps across a range of sustainability measures. This breadth and depth of knowledge and the lasting relationships ICLEI can offer are valuable in taking communities from an initial leadership commitment through an adaptation plan, to implementation and institutionalization.

Resources

Rhett Lamb, Planning Director, Keene, New Hampshire. (603) 352-5474. rlamb@ci.keene.nh.us

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Towards a Climate Resilient Community. Climate Adaptation Training for Local Governments in Northeastern Illinois, September 21, 2011. Rhett Lamb, Planning Director City of Keene, NH.
http://www.ci.keene.nh.us/sites/default/files/RL to NOAA adaptation training chicago 9_22_11.pdf

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MIAMI-DADE COUNTY, FLORIDA
The benefits of dealing with disasters

Miami-Dade County's experience with hurricanes provided a solid base of knowledge, skills, and relationships for climate change adaptation planning.

The information below was obtained from an interview with Nichole Hefty, the coordinator of Miami-Dade County's Climate Change Program in the Department of Sustainability, Planning, and Economic Enhancement, and from materials available on the Miami-Dade County website GreenPrint: Our Design for a Sustainable Future.

What is Miami-Dade County's policy on climate adaptation?

Miami-Dade County is located in the southeastern part of Florida. It is the most populous county in the state (approximately 2,500,000 residents), and includes several of the principal cities of south Florida. Much of the coastline is heavily urbanized; other parts of the county are agricultural. The county also encompasses Everglades National Park.

Florida is considered one of the most vulnerable areas to climate change, with Southeast Florida especially susceptible to impacts of rising sea levels. Miami-Dade's experience with hurricanes meant that the county already had knowledge about and skills for preparing for extreme events, as well as strong working relationships with state and federal agencies. These relationships proved to be important to developing climate adaptation plans.

Miami-Dade County is involved in a wide array of programs and projects that are directly related to climate adaptation but pre-date most climate change discussions. For example, efforts to restore the Everglades wetland system have been ongoing for decades, and Miami-Dade County has been actively engaged with the South Florida Water Management District, the National Park Service, and the U.S. Army Corps of Engineers. A healthy Everglades will be more resilient to climate change, so restoration is now more important than ever.

In 2006, the Board of County Commissioners established the Miami-Dade County Climate Change Advisory Task Force (CCATF) to focus on specific areas of climate change mitigation and adaptation. In addition to the appointed members, various county and municipal liaisons as well as representatives from numerous universities, local businesses, and environmental and regional organizations participated in CCATF meetings and associated committee meetings. Periodic oral reports are provided to the Budget, Planning, and Sustainability Committee.

A significant achievement in climate adaptation has been Miami-Dade's participation in the Southeast Florida Regional Climate Change Compact, executed by Broward, Miami-Dade, Palm Beach, and Monroe counties in December 2009 to coordinate mitigation and adaptation activities across county lines. The compact represents a new form of regional climate governance designed to allow local governments to set the agenda for adaptation while providing an efficient means for state and federal agencies to engage with technical assistance and support.

What is the process whereby this policy became institutionalized?

- In 1991 Commissioner Harvey Ruvin sponsored a resolution authorizing the county's participation the "Cities for Climate Protection Campaign" program, sponsored by ICLEI–Local

Governments for Sustainability, an international organization that provides technical consulting, training, and information services to further the implementation of sustainable development for local governments. Prior to this, there had been no discussion among elected officials of climate change adaptation.

- In 2005, Commissioner Ruvin put together an ad-hoc committee to discuss ways that Miami-Data could prepare for climate change.

- In 2006, an ordinance was passed in which the Board of County Commissioners established the Miami-Dade County Climate Change Advisory Task Force (CCATF).

- In 2008, a resolution was passed endorsing Miami-Dade's participation in the U.S. Cool Counties Program, with the goal of reducing the current carbon emissions by 80 percent by 2050.

- In 2009, a resolution established the Southeast Florida Regional Climate Change Compact, committing Miami-Dade, Broward, Palm Beach, and Monroe counties to develop joint policy positions and legislative policy statements about climate change, including a climate change action plan. The Department of Sustainability, Planning, and Economic Enhancement, the Department of Permitting, Environment, and Regulatory Affairs, and regional partners continue to work on these issues.

- In 2010, the Board of Commissioners accepted the CCATF's annual report and released *GreenPrint: Our Design for a Sustainable Future*, an overarching vision for sustainability in Miami-Dade County. The plan aims to bring together utilities, municipalities, schools, governmental organization, business and residents to reach various targets including emission reductions. It includes goals for water and energy efficiency, land use and transportation, community health, the economy, the environment, and leadership, as well as the Climate Change Action Plan.

- In 2011, the Board passed a resolution accepting invitation to participate in the ICLEI–Local Governments for Sustainability "Climate Resilient Communities Program" and to use the program's five milestones for both local and regional climate adaptation planning. Also in 2011, the CCATF came to an end.

- A *GreenPrint* Implementation Advisory Task Force is likely to be created in 2012.

Within Miami-Dade County government, the Department of Sustainability, Planning, and Economic Enhancement and the Department of Permitting, Environment, and Regulatory Affairs are primarily responsible for coordinating and implementing the sustainability plan. Staff in departments focused on infrastructure, utilities, water, and sewage systems will continue to play a major role in assessing vulnerabilities and planning for resilience.

Miami-Dade County has fostered partnerships with Federal Emergency Management Agency (FEMA), U.S. Geological Survey (USGS), the National Park Service, the U.S. Army Corps of Engineers, the National Oceanic and Atmospheric Administration (NOAA), and the South Florida Water Management District to work on issues related to climate change. These agencies have been working with local governments on water resources, stormwater management, and emergency management for many years, predating climate adaptation discussions.

The Institute for Sustainable Communities and ICLEI have also been key partners. Many non-governmental organizations (for example, a faith-based organization) participated in the task force. They

boosted outreach and helped communicate with the public. The Kresge Foundation helped fund administration and coordination of the regional compact. Having a neutral party facilitating coordination has been very beneficial.

Planners have relied on technical science and modeling for years in south Florida. For example, the zone's substrate is very porous and susceptible to sea level rise, so restoration and water management in the Everglades have major cascading effects. If more water is allowed to flow through the Everglades, saltwater intrusion into the county water supply can be slowed. However, more water flowing in the Everglades also leads to a higher water table and more susceptibility to flooding. Scientific models are critical to planning the most advantageous balance.

Both the Miami-Dade and the Regional Compact climate adaptation plans are careful to state that exact local impacts are extremely difficult to predict, given the complex drivers and dependencies among temperatures, sea levels, rainfall, storms, and ecological conditions. Both reports provide summaries of general trends that have been modeled. The Regional Climate Change Action Plan provides several scientific appendices on greenhouse gas emissions, sea level rise, and flooding vulnerability.

Making climate science meaningful for elected officials, administrators, and the public has been more difficult than doing so for planners. One attempt has been the Internet-base Mapping, Modeling, and Analysis for the Greater Everglades (IMMAGE) project (http://lcat.usgs.gov/immage/). This is a joint effort by the USGS's Florida Water Science Center and the Eastern Geographic Science Center intended to help non-scientists visualize impacts of sea level rise, but it is likely still too technical for the public and elected officials.

Community-wide discussions on climate adaptation have been important. For example, development of *GreenPrint* and the associated Climate Action Plan was a fully collaborative process among the diverse stakeholders of the Miami-Dade community: county staff, community groups, experts from the business community and academia, and a wide range of Miami-Dade residents. During the course of 2011, nearly 100 public meetings were held, and approximately 360 new and existing initiatives were evaluated. Community discussions, however, were not necessary to get support or buy-in from elected officials. A combination of the obvious vulnerability of the region and the leadership of a few key commissioners were the most important motivators.

Who made it happen?

Harvey Ruvin has been instrumental in providing leadership for climate adaptation. In his 20-plus years as county commissioner, Ruvin has sponsored ordinances and supported projects for water conservation, recycling, bay protection, and energy management.[14]

Mayor Carlos Alvarez and County Manager George Burgess, who created the Office of Sustainability, also played important roles in furthering climate adaptation planning. Miami-Dade commissioners Natacha Seijas and Katy Sorenson sponsored key pieces of climate adaptation-related legislation.

ICLEI provided technical assistance in writing *GreenPrint*, the sustainability plan. Nichole Hefty, coordinator of Miami-Dade County's Climate Change Program in the Department of Sustainability, Planning, and Economic Enhancement was a key member of the committee developing the plan.

[14] See Harvey Ruvin, Clerk of the Courts: http://www.miami-dadeclerk.com/clerk_biography.asp

There has been major turnover in elected officials since the housing market crash in 2007. Many elected positions, including Seijas and Sorenson, were recalled in the fall of 2011 after they joined a majority of the county commissioners in approving Mayor Alvarez's proposed budget, which raised the property-tax rate to make up for the collapse in property values. The current administration is focused on other priorities right now, like balancing the budget and reorganizing the county government. The staff are educating the new administration about the sustainability plan and engaging them when possible. Some staff positions that were key in implementing *GreenPrint* have already been terminated. Nicole's position may also change if she replaces the manager of the Office of Sustainability. The climate adaptation initiatives are "less visible" at the moment, and there is some uncertainty about what positions will be terminated due to continuing budget cuts.

How was the effort to develop adaptation strategies and policies funded?

All efforts to develop adaptation strategies and policies have been funded with existing resources. Partnerships with government agencies and non-governmental organizations have been critical. For example, the Regional Compact work has garnered so much attention and engagement that federal agencies (NOAA, USGS, Army Corps, etc.) are lending a lot of staff time and expertise.

What are the effects of institutionalizing climate adaptation?

The goal of the *GreenPrint*, the sustainability plan, is to integrate it into standard operating procedures. During the first five-year phase of Miami-Dade's Climate Change Action Plan (CAP), the majority of adaptation planning efforts will revolve around gaining a better understanding of the potential changes in climate the region may experience in the future.

Lessons learned

- Experience with natural disasters is beneficial for a city when it comes to preparing for climate change. Among other things, established cooperation with state and federal agencies on issues related to climate change, such as water management, is helpful.

- Participation in regional compacts, like the Southeast Florida Regional Climate Change Compact, helps local governments set a unified agenda for adaptation and allows state and federal agencies to efficiently provide technical assistance and support, reaching several counties at once.

- Turnover in elected officials can create obstacles to the implementation of climate change action plans, even if it is simply because energy is redirected to other concerns.

- Economic recession can also present obstacles to climate change action plans, as counties terminate positions dedicated to the climate plans, restructure departments, and shift priorities.

Resources

Nichole Hefty, Manager, Office of Sustainability, Miami-Dade Sustainability, Planning and Economic Enhancement Department. (305) 375-5593. heftyn@miamidade.gov

GreenPrint: *Our Design for a Sustainable Future*. http://www.miamidade.gov/greenprint/

Climate Change Action Plan. http://www.miamidade.gov/greenprint/climatechange.html

Draft Regional Climate Action Plan.
http://www.southeastfloridaclimatecompact.org/index_files/Page648.htm
http://www.southeastfloridaclimatecompact.org/documents/AppH_Recs.pdf

Summary of Sustainability-Related Legislation Enacted by Miami-Dade County organized into seven categories: (1) Leadership, Connections, and Commitment, (2) Water and Energy Efficiency, (3) The Environment, (4) Responsible Land Use and Smart Transportation, (5) Vibrant Economy, (6) Healthy Communities, and (7) Climate Change.
http://www.miamidade.gov/greenprint/planning/library/resolutions.pdf

Climate Change Advisory Task Force Recommendations and Status.
http://www.miamidade.gov/DERM/climatechange/library/ccatf_recommendations_oct10.pdf

NEW YORK, NEW YORK
"Mainstreaming" climate adaptation

New York City aims to mainstream climate adaptation by incorporating it into the activities of the public agencies and private businesses that control the city's critical infrastructure.

The information for this case study comes from interviews with Leah Cohen in the Mayor's Office for Long Term Planning and Sustainability and with Mary Kimball, a planner in the Department of City Planning Waterfront and Open Space Division. It was supplemented by information provided in the New York Panel on Climate Change report and city plans and documents.

What is New York City's policy on climate adaptation?

New York is the most populous—and most densely populated—city in the U.S., with approximately eight million residents. It is located in a sheltered bay where the Hudson River meets the Atlantic Ocean. Most of the city is built on three islands.

New York City is addressing climate change adaption with a suite of policies targeting different aspects of the city's infrastructure. Efforts to increase the resilience of the city's built and natural environments are focused on several core areas:

- **Increase the resilience of buildings.** In December 2009, the New York City Council passed the *Greener, Greater Buildings* legislation, which will significantly increase the energy efficiency of the city's existing large building inventory. In addition to creating a New York City Energy Conservation Code, the suite of bills requires: annual benchmarking of buildings' energy use; energy audits and retro-commissioning of building systems; lighting upgrades; energy efficiency retrofits in city buildings; and sub-metering of commercial tenant spaces.

- **Protect critical infrastructure through green infrastructure.** The city's long-term plan, PlaNYC, emphasizes the use of "green infrastructure" to manage storm runoff. Increased runoff is a key concern emerging in climate change models for the city because the city's existing sewer systems are already overburdened. The green infrastructure solution—focusing on adding permeable surfaces through the construction and enhancement of swales and green rooftops and tree planting in a manner that maximizes stormwater retention—offers an efficient, practical approach that complements plans to upgrade the conventional "grey" infrastructure. An example of a green infrastructure program with multiple benefits to climate change adaptation is *MillionTreesNYC***.** It is a citywide, public-private program that aims to plant and maintain one million new trees across the city's five boroughs over the next decade.

- **Identify and evaluate citywide coastal protective measures.** The New York City Waterfront Revitalization Program (WRP) is the city's principal coastal zone management tool and reflects state and federal coastal zone protection laws. As originally adopted in 1982 and revised in 1999, it establishes the city's policies for development and use of the waterfront and provides the framework for evaluating the consistency of all discretionary actions in the coastal zone with those policies.

  The Department of City Planning's Waterfront and Open Space Division has evaluated the WRP in light of climate change adaption and has initiated the process of public review of proposed

revisions. The major change in the way the WRP is implemented in the planning review process will be the requirement that projects include a risk assessment identifying current and future risks from flooding.[15] A mitigation plan is not required.

The Department of City Planning's Waterfront and Open Space Division is also working on efforts to reduce impediments to effective planning for climate change through a close look at the city building code. An example of a proposed change is adjusting the base elevation at which building heights are measured. By allowing height measurements to begin at a new "design flood elevation" that reflects climate change science, the process can encourage the use of freeboard[16] as a flood adaptation strategy for new building.

- **Integrate climate change projections into emergency management and preparedness.** The New York City Office of Emergency Management (OEM) maintains a GIS database that informs disaster responses. The database includes the most recent flood plain maps. The OEM also focuses heavily on public outreach to increase public preparedness for events like heat waves, hurricanes, and winter storms.

- **Work with the insurance industry to develop strategies to encourage the use of flood protections in buildings.** Participation in a new federal flood insurance study has important implications for many city-planning efforts. (New York City has not had a flood insurance study since 1983.) Updated flood maps (expected out in 2012) provided by FEMA, constitute the basis for all flood insurance and are necessary to move building codes and other city regulations (namely flood protections) closer in line with climate change projections. The accuracy of the maps is critical to providing information on how high to elevate the built environment.

- **Include climate change adaptation in PlaNYC, NYC's comprehensive planning process and associated long-term plan.** Released in 2007[17] and updated in 2011, PlaNYC addresses both climate change mitigation and adaptation. Mayor Bloomberg's office describes it as an attempt "to prepare the city for one million more residents, strengthen our economy, enhance the quality of life for all New Yorkers, and deal with climate change." The plan PlaNYC summarizes the following as "Our plan for climate change:"[18]

  - *Reduce and track greenhouse gas emissions*

    1. Release an annual inventory of greenhouse gas emissions.
    2. Assess opportunities to further reduce greenhouse gas emissions by 80 percent by 2050.

  - *Assess vulnerabilities and risks from climate change*

    3. Regularly assess climate change projections.
    4. Partner with the Federal Emergency Management Agency (FEMA) to update Flood Insurance Rate Maps.
    5. Develop tools to measure the city's current and future climate exposure.

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[15] Risk assessments will utilize the NYC Panel on Climate Change's sea level rise projections appropriate to the project life span. Mary Kimball, Department of City Planning Waterfront and Open Space Division, personal communication, 1/14/12.
[16] Freeboard means to elevate a building's lowest floor above predicted flood elevations by a small additional height (generally 1 to 3 feet above National Flood Insurance Program [NFIP] minimum height requirements). See http://fl.stormsmart.org/before/regs/using-freeboard-to-elevate-structures-above-predicted-floodwaters/
[17] For a presentation on New York City's approach to climate change adaptation, see http://www.c2es.org/docUploads/Panel7 Freed_0.pdf
[18] Reproduced from PlaNYC 2011, p. 151.

- *Increase the resilience of the city's built and natural environments*
    6. Update regulations to increase the resilience of buildings.
    7. Work with the insurance industry to develop strategies to encourage the use of flood protections in buildings.
    8. Protect New York City's critical infrastructure.
    9. Identify and evaluate citywide coastal protective measures.
- *Protect public health from the effects of climate change*
    10. Mitigate the urban heat island effect.
    11. Enhance our understanding of the impacts of climate change on public health.
- *Increase the city's preparedness for extreme climate events*
    12. Integrate climate change projections into emergency management and preparedness.
- *Create resilient communities though public information and outreach*
    13. Work with communities to increase their climate resilience.

What is the process whereby this policy became institutionalized?

New York's Climate Change Adaptation Task Force was formed as the result of an initiative in the PlaNYC. The task force included city and state agencies as well as private stakeholders such as utility and transportation companies. The comprehensive nature of the task force and the commitment of both public and private members has been a key element in "mainstreaming" climate change planning and adaptation throughout the city.

To support the task force, the mayor's office assembled a technical advisory panel of scientific, planning, risk management, and legal experts. The New York City Panel of Climate Change (NPCC) was tasked in 2008 with providing New York City and the Climate Change Adaptation Task Force specifically "with the most up-to-date and comprehensive scientific, technical, and socioeconomic information about climate change and its impacts on the city and environs." The Rockefeller Foundation provided a $350,000 grant to support the NPCC's work.

The NPCC released its first report, *Climate Change Adaptation in New York City: Building a Risk Management Response*, in 2010. The report, which was published in a leading scientific journal, outlines policies and suggested implementation strategies to adapt the city's critical infrastructure to the changing climate.

In addition to addressing specific policy options and implementation strategies, the report also provided detailed risk analysis and supporting climate models along with a key set of benchmarks that can be used by planners. Specifically, the NPCC provided Climate Protection Levels (CPLs) "climate-based, expert-determined benchmarks that are achieved through the implementation of design and performance standards with the express purpose of limiting the climate change risk exposure of critical infrastructure."[19]

Who made it happen?

The key agency tasked with coordinating the implementation of the report's recommendations is the city's Office of Long-Term Planning and Sustainability (OLTPS), established by the mayor's office through local law in 2006. The agency has a critical role in moving climate change adaptation into

[19] The benchmarks are included as a full appendix to the NPCC's report *Climate Protection Levels: Incorporating Climate Change into Design and Performance Standards New York City Panel on Climate Change* (pages 293–352).

practice: "The Office coordinates with all other City agencies to develop, implement, and track the progress of PlaNYC and other issues of infrastructure and the environment which cut across multiple City departments.... In addition to producing PlaNYC, the Office of Long-Term Planning and Sustainability promotes the integration of sustainability goals and practices into the work of City agencies and the lives of New Yorkers."[20] The office has the support of the mayor and a staff of four or five dedicated professionals focused wholly on implementing PlaNYC through coordination with city departments and key infrastructure owners and operators in the state and private sector.

OLTPS reconvened the city's Climate Change Task Force in late 2011 to take a second look at the specific implementation of NPCC findings and recommendations. Originally the task force identified high-risk infrastructure and created an initial list of 300 different adaptation strategies necessary to protect it. The second round of task force engagement, which will end in 2012, will focus on refining the list of strategies and moving forward. A report released in December 2012 will detail a set of strategies that all task force members—again, all owners and operators of critical city infrastructure and city agencies—agree to implement within their own institutions.

So while the OLTPS is critical to implementing PlaNYC, the key agents in realizing the actual implementation of adaptation measures are those forty agencies and private sector businesses that own and operate the city's critical infrastructure.

OLTPS staff view their objective in terms of "mainstreaming" adaptation—meaning that success comes when agents incorporate climate change adaptation planning into their own activities. This approach has led to some exciting results. For example, the New York Power Authority, after participating in the first task force, went on to use a similar process to do an independent audit of statewide operations. The OLTPS estimates that within the city bureaucracy, their support activities have helped to create 15 "thought leaders" on adaptation in their individual agencies and are pushing that agenda on their own.

Planners from the city have had to push FEMA for particulars and technical information in order to ensure that the flood insurance study and associated maps will be meaningful to the process of implementing climate change flood projections into building codes.[21]

What are the effects of institutionalizing climate adaptation?

The city's *Greater Greener Buildings* legislation is expected to reduce New York City's greenhouse gas emissions by nearly 5 percent, save New Yorkers an estimated $700 million annually in energy costs, and create over 17,000 jobs in the coming years.

The *Million Trees NYC* initiative would increase the city's urban forest by 20 percent. The benefits of an enhanced urban forest include better flood resilience, reduction in heat island effects, and improvements in air quality.

The city projects in the Green Infrastructure Program could cost up to $1.5 billion over the next 20 years. Immediate capital investments are estimated at $187 million. The city was prepared to make this commitment, but had to work hard to gain approval by the state Department of Environmental Conservation and the U.S. Environmental Protection Agency for these expenditures, as they represent an adjustment of the existing "all-grey" infrastructure plan hinge over which those agencies share authority.

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[20] PlanNYC web site: http://www.nyc.gov/html/planyc2030/html/home/home.shtml

[21] The city plans to release a web portal into the FEMA flood insurance study in June 2012, but there is little public information at this time. Information provided in an interview with Leah Cohen, Mayor's Office of Long-Term Planning and Sustainability, 1/20/2012.

Pilot projects were critical to demonstrating the cost effectiveness of green infrastructure versus conventional gray infrastructure, according to the OLTPS.

Lessons learned

- Where climate change risks are not disputed, adaptation planning for climate change can be addressed directly. Gaining the participation and attention of private sector businesses and non-city public entities is not difficult because they recognize adaptation as critical to the success of their enterprises and come to the table prepared to work.

- The commitment of agencies and enterprises to adaptation encourages the "mainstreaming" approach, which minimizes the long-term role of intervening agencies like the mayor's office in favor of maximizing intra-institutional capacity.

- Mayoral leadership and key city departments like the New York OLTPS can be key to implementing climate adaptation measures. This is evident in the successful updates of the PlaNYC and in the reconvening of the task force to tackle strategic implementation that was stalled or not adequately detailed in the original NPCC report.

Resources

Mary Kimball, Department of City Planning, Waterfront and Open Space Division. (212) 720-3626. mkimball@planning.nyc.gov

Mary Barber, New York Region Program Director, Environmental Defense Fund. (212) 505-2100.

Leah Cohen, Mayor's Office for Long Term Planning and Sustainability. (212) 788-1457. lcohen@cityhall.nyc.gov

Climate Change Adaptation in New York City: Building a Risk Management Response. New York City Panel on Climate Change 2010 Report. Annals of the New York Academy of Sciences. Volume 1196, May 2010.

Million Trees NYC. http://www.milliontreesnyc.org/html/about/about.shtml

City of New York's Waterfront Revitalization Program. http://www.nyc.gov/html/dcp/pdf/wrp/wrp_full.pdf

New York City's approach to climate change adaptation. http://www.c2es.org/docUploads/Panel7 Freed_0.pdf

Green Infrastructure Plan. http://www.nyc.gov/html/dep/pdf/green_infrastructure/NYCGreenInfrastructurePlan_ExecutiveSummary.pdf

PlaNYC. http://www.nyc.gov/html/planyc2030/html/home/home.shtml

Office of Emergency Management. http://www.nyc.gov/html/oem/html/hazards/hazards.shtml

OLYMPIA, WASHINGTON
Vulnerable to sea level rise from climate change

The threat of flooding from sea level rise was a tangible, understandable threat that served to catalyze action on adaptation.

The information in this case study was obtained from an interview with Andy Haub of the Public Works Department for the City of Olympia, from resources available on the city's website (see resources, below), and from EcoAdapt's *case study about Olympia.*

What is Olympia's policy on climate adaptation?

The City of Olympia has a population of approximately 47,000. It is located at the southern end of Puget Sound; some of the city is built in landfill. Downtown Olympia sits at only 18 to 20 feet above sea level, making it vulnerable to rising sea levels.

The City of Olympia has developed a variety of strategies to reduce its vulnerability to flooding of the downtown area due to sea level rise. Specific policies include:

- In the early 1990s, the city council passed a resolution for the city to mitigate and prepare for climate change.
- Maps and simulation models were produced to show the effects on the city of rising sea levels due to climate change. They showed flooding of the downtown area and possible challenges to the capacity of the wastewater pipes and the wastewater treatment plan.
- In order to do so, the city council created an interdepartmental Global Warming Task Force.
- The task force recommended short-term actions including: modifying stormwater outfalls on the shorefront park; enacting requirements for new buildings to raise elevations of floors that house critical resources, for example heating and cooling systems; installing water pumps and tide gates; consolidating stormwater systems; and raising the shoreline height, among others. Long-term plans include, among others: updating the comprehensive plans to address the impacts of sea level rise; increasing the height of the seawall; and developing an institutional framework for addressing climate change.

What is the process whereby this policy became institutionalized?

According to the City of Olympia's web site, early in 1990, a representative from the Greenhouse Action Group asked the city council to address climate change. In 1991, the council passed a resolution calling for the city to reduce greenhouse gas emissions, increase tree cover, and prepare for climate change. The resolution also authorized city departments to work toward climate mitigation and adaptation. (This story is explained in more detail under question 3).

The Global Warming Task Force's first assignment was to prepare a background report on the implications of climate change for Olympia. The task force relied on a major report produced by the city of Vancouver, British Columbia and received technical guidance from the Washington State Department of Ecology. The final report identified where the City of Olympia had authority to act, steps the city had already taken, and possible future actions. It highlighted sea level rise as one of the key concerns for Olympia.

This finding prompted the city to undertake a follow-up report, released in 1993, called "Preliminary Assessment of Sea Level Rise in Olympia, Washington: Technical and Policy Implications," which more specifically identified rising sea levels and potential flooding as a problem. More recently, in 2009, the Climate Impacts Group released "The Washington Climate Change Impacts Assessment," with updated regional sea level rise predictions for 2100. The predictions varied, from an increase of 2 inches to 50 inches.

Who made it happen?

According to most popular accounts, the city council played the key role in institutionalizing the climate adaptation policies, with some encouragement from a local member of the Greenhouse Action Group. According to a description by someone from the city's Public Works Water Resources Department: "Early in 1990, a local citizen from the Greenhouse Action Group approached Olympia's City Council to ask what the city was doing to address the issue of global warming. This prompted the Council to make action on global warming one of its target issues for the next year."[22]

Andy Haub reveals a more detailed "creation story." According to him, Olympia's work on climate change started in 1990 when the city decided to form a long-range planning group. The city hired a new director for the Public Works Department who was a planner rather than an engineer, which helped bring the focus on planning. One of the first things the department did, in 1992, was write the above-mentioned report—"Preliminary Assessment of Sea Level Rise in Olympia, Washington: Technical and Policy Implications." The report, released in 1993, identified the dangers of a sea level rise and the possibility of the downtown area flooding. However, it languished until the issue came up of where to locate a proposed new City Hall. At the city council meeting, a citizen brought in the 1992 study, held up the flooding maps, and pointed out that the proposed new site downtown would be a bad choice because of flooding that could come about as a result of climate change. This spurred the city to revisit the issue of climate change.

One of the first things Olympia did was join ICLEI (http://www.iclei.org/). Al Gore's slide show and talks (An Inconvenient Truth), frequently in the news at the time, drew the interest of city leaders and helped reinvigorate city discussions on climate change. The city organized a public forum and invited the author Terry Tempest Williams and Andrew Revkin, the *New York Times* reporter who frequently covers climate issues and the environment. More than 1,000 people attended. Ever since, Olympia has had a community forum every January and has allocated $250,000 per year for climate related work.

According to Andy Haub, one of the reasons city leaders and community became readily involved with climate change was because the targeted issue (flooding) was easy to understand and was something the city has been dealing with for many years. Andy says that he gives a presentation in which he holds up historic photos of flooding in the 1950s and 1970s, and says, "I don't know much about climate change, but I do know a lot about flooding." His advice is to keep the information very simple and use lay terms. "It has to be tangible." He says, "Climate change is overwhelming, but the first step locally is easy. Our first task was simply to measure the elevation of the land and estimate the risk of flooding."

Andy expresses concern and frustration about how academics and scientists communicate about climate change to the public. He fears scientists overwhelm the public with information that is scary and difficult to understand, "You should build on the issue slowly and every year, incrementally, add to your knowledge base."

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[22] South Sound Green Pages. 2008. "Climate Change and Seal-Level Rise in Olympia." http://www.oly-wa.us/greenpages/Article.php?id=2007;08;200708c

What are the effects of institutionalizing climate adaptation?

The effect for Olympia has been to take seriously the possibility of rising sea levels and subsequent flooding and property damage to private buildings and public resources.

Lessons learned

- Action is more likely if there is an imminent, easily understandable, and quantifiable threat.
- Sometimes it is not necessary to first have community-wide discussions and buy-in, or detailed scientific information, in order to convince elected officials to act.
- Detailed research on the effects of climate change (e.g., the study on sea level rise for Vancouver, BC) can be useful, particularly if tied to a recognizable local climate related threat.
- Start small on an issue that is immediately relevant to the community.
- Find an existing institutional niche. As Andy Haub says, "Find a place to land this issue that is part of their responsibility." In Olympia, climate change means flooding, and this puts responsibility squarely with the Public Works Department.

Resources

Andy Haub, Planning and Engineering Manager, Public Works Dept., Water Resources, City of Olympia. (360) 753-8475. ahaub@ci.olympia.wa.us

City of Olympia, Climate Change: http://olympiawa.gov/community/sustainability/climate-change.aspx

History of climate involvement by the city council: http://olympiawa.gov/community/sustainability/climate-change/climate-change-olympia-is-concerned.aspx

The 1991 city resolution: http://olympiawa.gov/~/media/Files/PublicWorks/Department wide/annex/Resolution-1306.ashx

Map of potential flooding: http://olympiawa.gov/~/media/Images/PublicWorks/technicalservices/Olympia SLR Graphic jpg.ashx

A slide presentation to city council in 2011: http://olympiawa.gov/community/sustainability/~/media/Files/PublicWorks/Water-Resources/2011_SeaLevelRise_Presentation_Final.ashx

2007 report: http://www.ci.olympia.wa.us/documents/PublicWorks/Climate_Change/Climate_%20Change_1.pdf
(Note: a good climate change 101 on page 3; see interesting figure on rising sea level rise on page 24)

Feifel, K. (2011). Planning for Sea Level Rise in Olympia, Washington [Case study on a project of the City of Olympia's Public Works Department]. Product of EcoAdapt's State of Adaptation Program. In "The State of Marine and Coastal Adaptation in North America: A Synthesis of Emerging Ideas." http://www.cakex.org/case-studies/683

PORTLAND, OREGON
"The city that plans"

Portland's culture of planning, beginning with land use planning laws in the 1970s, prepared the city for climate change adaptation.

Most of the information in this case study comes from an interview with Kat West in the Multnomah County Office of Sustainability. It is supplemented by the City of Portland and Multnomah County Climate Action Plan (which focuses on mitigation, but also calls for the development of an adaptation plan) and the Year One Progress Report.

What is Portland's policy on climate adaptation?

Portland is the county seat of Multnomah County. It is located in near the confluence of the Willamette and Columbia rivers. The city's population is approximately 585,000; approximately 735,000 people live in Multnomah County.

The City of Portland and Multnomah County are currently developing a climate change adaptation plan, due to be completed in 2012. The plan is a recent outgrowth of the city's successful efforts on climate mitigation. Since the plan is not yet finalized, no direct implementation actions have resulted.

The adaptation plan will focus entirely on governmental strategies and actions, unlike earlier efforts (including the 2001 climate mitigation plan), which also involved citizen strategies. The citizen strategies, however, were largely ignored and nobody tracked progress. As a result, the climate adaptation plan will focus on government buildings and infrastructure, ecosystem services, and social services (health, poverty, etc.). The plan has significant engagement components, but it is meant to be strategically focused on government actions.

What is the process whereby this policy became institutionalized?

The process of institutionalization of climate change plans in Portland has a long history. Both mitigation and adaption planning in Portland are extensions of existing successful land use and transportation plans and programs that have achieved significant reductions in greenhouse gas emissions and have implemented actions that will help the region adapt to climate change:

- The state's land use planning laws adopted in 1973 were a critical step towards climate mitigation. They led to the establishment of the city's urban growth boundary, light rail public transit, and a series of other transportation and land use policies that have collectively reduced Portland's greenhouse gas emissions to just above 1990 levels. Importantly, these actions were not the result of a climate mitigation plan, but were initially passed and are supported today largely on a quality of life basis.

- In 1993, the City of Portland developed the first local government climate mitigation plan in the nation, largely due to one commissioner who successfully convinced his colleagues to get started. The initial climate mitigation strategy and subsequent updates piggyback to a large extent on the already extensive planning successes.

- The Climate Action Plan—the 2009 update to the mitigation strategy—in addition to setting in motion a plan to achieve a 40 percent reduction in carbon emissions by 2030 and an 80 percent reduction by 2050, recommended that Portland and Multnomah County develop a climate

adaption plan. The county hired Kat West as the climate change lead in the Office of Sustainability and the city concurrently assigned staff to develop the adaptation plan.

In developing the current climate adaptation plan, the city and county "campaigned" to encourage public engagement: they appointed a steering committee, held town meetings all over the city, solicited public comment, and then made extensive revisions based the input these provided.

Linking the climate adaptation plan to existing and ongoing government plans and programs is an important part of institutionalizing the adaptation plan in Portland. The planning process is integrated with other ongoing planning processes including land use, transportation, and food security. (Kat described Portland as "the city that plans.")

Who made it happen?

As described above, a city commissioner was key in spurring the first climate mitigation plan. Subsequently, the city partnered with the county, and each has hired staff to develop and implement climate plans.

Even with climate planning institutionalized in the county's Office of Sustainability, the turnover of elected officials creates a constant challenge. Newly elected commissioners did not craft the plan and have less incentive to see it implemented. Generating buy-in is an ongoing process.

Kat believes that the threat of climate-refugees may be a rallying point for Portland as, unfortunately, it can be described as an outside force that will have negative impact on the community.

How was the effort to develop adaptation strategies and policies funded?

The City of Portland and Multnomah County have dedicated staff time and resources to the efforts.

What are the effects of institutionalizing climate adaptation?

The climate adaptation plan will not be complete until the end of 2012, so there are not yet any effects of institutionalization. However, Portland is a national leader in institutionalizing land use and transportation planning in ways that indicate that the strategies recommended by the adaptation plan will be integrated into ongoing government activities and processes.

Lessons learned

- Places with a culture of planning are more likely to be successful at initiating climate planning and integrating strategies directly into existing governmental activities and processes.

- Citizen strategies (recommendations for community or individual action outside the purview of the local government) are more difficult to institutionalize because they are difficult to monitor and enforce.

- Turnover of elected officials is a constant challenge, even in a city where planning is deeply ingrained in the culture.

Resources

Kat West, Director, Multnomah County Office of Sustainability. (503) 988-4092.
kathleen.s.west@multco.us

City of Portland and Multnomah County Climate Action Plan, 2009.
http://www.portlandonline.com/bps/index.cfm?c=49989

TAOS, NEW MEXICO
Climate adaptation by another name

Taos has made significant progress towards climate change adaptation through policies directed at other concerns.

Most of the information in this case study is from a conversation with Matthew Foster, Long Range Planner for the town of Taos.

What is Taos's policy on climate adaptation?

Taos does not have an explicit climate change adaptation plan, but several policies that were developed for other reasons have relevance for climate change. One such policy is the 2011 Water Conservation Ordinance (11-11) for the town of Taos. This ordinance has enforceable standards that include, for example, prohibiting car washing or designating certain days for watering lawns (for example, the east side of the street on even days of the week, the west side on odd numbered days). The standards are based on key indicators, such as the water level in the wells (as opposed to rainfall, for example). At certain levels, different water conservation policies become active and mandatory.

Other policies that have implications for climate adaptation are those that promote affordable housing (2011 Ordinance 11-03). Many houses in Taos are old and occupied by low-income residents. The city decided to insulate these homes so that a smaller portion of residents' income would go towards heating and cooling. In addition to helping reduce costs for the residents, the city's action on insulation contributes to climate change *mitigation* by reducing energy use, and it contributes to climate change *adaptation* by insulating homes, although neither was the original intent.

Another local policy that is climate-relevant but was not developed for that purpose is the Bicycle Master Plan. The plan encourages people to ride bikes instead of driving by requiring that new road projects include bike lanes and/or bike paths. However, although the town formally adapted the plan, the Director of Public Works is ignoring it, and to date not a single new roadway project has followed the plan. This highlights that it is not enough to have a well-intentioned plan that is adopted by local leaders. The leadership of the community also has to make sure staff follows the plan.

What is the process whereby this policy became institutionalized?

There was no official process whereby the Water Conservation Ordinance came into effect. According to Matt Foster, Taos Long Range Planner: " My boss [the Director of Planning and Zoning] one day decided that this is what we needed to do. There was no public outcry asking for this, no catalytic event like a major drought, and no crisis. It was just one person who did it."

A few years before this decision two water-related studies were conducted. One was a state-funded regional water plan that addressed climate change (it was never formally adapted). Another was a 40-year water plan—which did not address climate change—for the town. However, Matt does not think that these influenced the water conservation plan and doubts that many people read them.

Matt was also hired by the Rocky Mountain Youth Core to participate in developing a climate adaptation plan with the Climate Solutions University (CSU). Through this experience, a group of local residents were trained in how to communicate climate concerns and climate adaptation ideas. Some of the recommendations in the plan developed with CSU may end up in the community's comprehensive land use plan. However, Matt will add the recommendations to the Taos land use plan without mention of the

word “climate,” instead working them in under the “Natural Resources Conservation” element of the plan.

Though Taos hasn’t developed mitigation or adaptation plans specifically focused on climate change, the town has been aware of climate change. The mayor signed the U.S. Conference of Mayors’ Climate Protection Agreement and the town has agreed to seek assistance from the U.S. Environmental Protection Agency to develop two carbon neutral neighborhoods. In spite of this, Matt believes that mention of the word “climate” is counter-productive in planning documents and ordinances.

Who made it happen?

Regarding the Water Conservation Ordinance, the Director of Planning and Zoning made the decision to design and implement the plan.

Matt Foster will attempt to integrate the climate adaptation strategies that came out of the CSU effort into the comprehensive plan. He will have to downplay the link to climate change in order to do so.

How was the effort to develop adaptation strategies and policies funded?

No outside funding was used for the Water Conservation Ordinance.

CSU provided funding to develop the CSU adaptation plan, some of which may be incorporated into the comprehensive plan.

What are the effects of institutionalizing climate adaptation?

There has been no formal effort to institutionalize climate adaptation. Water conservation and affordable housing policies that have been implemented are relevant to climate change, but were put into place for other reasons. They have, however, resulted in reduced water and energy use, both of which can be considered climate adaptation.

Lessons learned

- Many “smart growth” solutions are also climate solutions.
- Sometimes the best way to proceed locally is to avoid the words “climate change.”
- A good plan—one that has climate adaptation relevance—can arise without a great deal of public involvement, a catastrophic catalyzing event, or outside guidance. Sometimes all that is needed is a local leader who takes charge.
- People may not read plans, no matter how well they are put together, and local leaders or department heads may ignore even the most basic land use or transportation plan.

Resources

Matthew Foster, Long Range Planner, Town of Taos. (575) 751-2037. mfoster@taosgov.com

Town of Taos endorsement of U.S. Mayors’ Climate Protection Agreement
http://www.taosgov.com/legalordinances/resolutions/2007/07-04.pdf

Ordinance 11-11: Authority to Impose Drought Restrictions and Water Rationing. Town of Taos Town Council Resolutions. http://www.taosgov.com/clerk/ordinances.php

Ordinance 11-03: Affordable Housing Program. http://www.taosgov.com/clerk/ordinances.php

Resolution in 2009 by Town of Taos approving application of a grant from EPA's Climate Showcase Communities Grant Program to create a master plan for two "carbon neutral" neighborhoods within the Town of Taos. http://www.taosgov.com/legalordinances/resolutions/2009/09-38.pdf


HEADWATERS
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