

**Planning Climate Resilient Cities:
Early Lessons from Early Adapters**

Paper prepared for the World Bank, 5th Urban Research Symposium,
Cities and Climate Change

Marseille, France
June 2009

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Executive Summary

Climate change is expected to place increasing stress on the built and natural environments of cities as well as create new challenges for the provision of urban services and management systems. Minimizing the impacts of climate change requires that cities develop and implement adaptation plans. Despite the imperative, only a small number of cities have initiated the adaptation planning process. Drawing on theories of diffusion and capacity, and empirical assessments of initiatives in Durban, South Africa and Quito, Ecuador, this paper examines two questions: What is driving cities to initiate climate adaptation planning? What is enabling the efforts of early adapters to take root?

In recent years, scholars have argued that incentives from external sources such as regulations and funder requirements, the diffusion of international knowledge and norms, and the presence of sufficient capacity are critical drivers of sub-national change in the policy and planning arenas. While this may be the case for late adapters, these prevailing theories do not explain the efforts of cities leading the way on climate adaptation planning. Rather than being driven by external pressures, the early adapters examined in this study were motivated by internal incentives, most notably the need to protect property and residents from natural disasters, the desire to enhance their reputation by demonstrating climate leadership, and the commitment to local development goals and service provision priorities. Ideas and knowledge generated through local demonstration projects and networks were influential in both cities. While ideas from international sources also were important, these always were evaluated in light of their local relevance. The presence of resources, particularly leadership, was important in both cities. However, so too was resourcefulness. Efforts to link adaptation to ongoing programs and enlist the support of diverse stakeholders helped promote and sustain adaptation planning.

The patterns revealed by the cases offer insight into ways that cities can effectively initiate and implement adaptation planning. Specifically, the findings suggest that adaptation efforts will be enhanced if cities:

- Develop a general strategic plan that is supported by detailed sector-specific goals and targets.
- Link adaptation to local priorities and ongoing initiatives.
- Obtain or generate information about local risks and locally-relevant adaptation measures.
- Create opportunities for exchanging information, experiences, and ideas in local, regional, national, and international venues.
- Establish, endorse, and provide resources for a climate office that is not affiliated with a specific department or sector.
- Engage nongovernmental stakeholders, including NGOs, CBOs, consultants, and universities in planning and implementation.

The theoretical findings and policy recommendations advanced in this paper are based on the adaptation initiatives of two cities. Although this is a limited number of cases, they offer important insight into the challenges and accomplishments faced by early adapters and provide signposts that other cities can use to guide their adaptation planning and implementation efforts.

Part I: Introduction

Cities throughout the world have begun to experience the impacts of climate change. As temperatures and precipitation patterns continue to shift, it is expected that urban areas will encounter an even greater array of challenges (IPCC, 2007). Increases in the volume of rainfall, intensity of storms, and incidence of natural disasters, for example, will put additional stress on infrastructure, buildings, environmental conditions, and urban services and management systems. To retain their vitality and viability, cities must be prepared for the ways in which they will be affected by climate change. Since international protocols have not been advanced for adaptation planning at the local level, and most national governments are not working to address potential problems at this scale, some cities are taking independent action to initiate adaptation (Granberg & Elander, 2007; Schreurs, 2008)

Local climate adaptation efforts tend to emphasize one of three goals: accommodating, protecting, or retreating. For instance, managing the impacts of sea level rise include accommodation strategies such as beach nourishment, the installation of protective structures such as groins and seawalls, and retreat measures that restrict development and other human activity, including provisions to relocate current residents (Kirshen, Knee, & Ruth, 2008). While adaptation measures typically are aligned with one or more of these approaches, the extent to which they are being formally integrated into citywide planning efforts tends to vary. At one extreme, cities are developing comprehensive plans for adaptation. However, these efforts are the exception rather than the rule. The more common approaches are for sector-based departments to identify key threats and related measures they need to pursue or for no adaptation planning to be taking place.

What is driving cities to initiate climate adaptation planning? What is enabling the efforts of early adapters to take root? In this paper, we draw on theories of diffusion and capacity, and field research in Durban, South Africa and Quito, Ecuador, to advance our understanding of what is leading cities to engage in climate adaptation planning. Although scholars have begun to integrate issues related to climate adaptation into their research agendas, the emphasis has been on the range of adaptation options that are viable to pursue (Smit, et al., 2000), the costs and benefits of implementing different measures (Tol, et al., 2004), and the needs of vulnerable countries and populations (Adger, et al., 2006; Roberts & Parks, 2007). While these studies are important, they do not consider the preconditions for climate adaptation planning or assess adaptation in urban contexts. Therefore, in the sections that follow, we discuss drivers of urban change and present case studies of Durban and Quito to advance our understanding of the forces and factors associated with climate adaptation planning in cities.

Part II: Potential Drivers of Urban Climate Adaptation Planning

Minimizing the impacts that climate change will have on cities and their inhabitants requires that urban municipalities make concerted efforts to protect natural systems, the built environment, and human populations. For most cities, a commitment to adaptation requires adjustments in the institutional frameworks guiding their decisions and actions. There are three sets of factors associated with institutional change in cities that are relevant to the adoption of climate adaptation planning. The first two factors, incentives and ideas, often are attributed to the spread and adoption of innovation in the policy and planning arenas (Dobbin, Simmons, & Garttre, 2007). In addition, resource-based studies suggest that a third factor, capacity, affects the ability of a city to initiate and sustain a municipal program of action.

2.1 Incentives for Adaptation Planning

Incentives motivate urban change through the promise of rewards. In some instances, these rewards are predicated on meeting conditions established by external parties (DiMaggio & Powell, 1983; Dobbin, Simmons, & Garttre, 2007). This often is the case, for instance, with regulation and funding. Regulations traditionally impose requirements and use the threat of sanctions to foster compliance. Although this is one of the methods countries use to shape local behavior, regulations addressing adaptation at the local level have not emerged, even in countries that have prepared national adaptation plans. As with regulation, funding often is accompanied by requirements that must be fulfilled. At the present time, funding that is earmarked for adaptation is limited. Bilateral development assistance and foundations are common sources of project-level aid, some of which is being linked to adaptation. It is anticipated that development loans and aid channeled through international organizations will play an increasing role in supporting urban adaptation. Funding can directly support adaptation initiatives. It also can be an indirect catalyst for adaptation when it contains related requirements. For instance, a city may obtain a loan for infrastructure, but the financing may be predicated on meeting other stipulations. While conditionality in the environmental arena is common, and some funders are starting to incorporate climate-related provisions, adaptation is not a requirement in most funding streams (Gutner, 2002; Tellum, 2007; Hicks, et al., 2008).

Most scholars emphasize how external pressures promote urban change. However, for many cities, internal goals serve as incentives for initiating new programs or initiatives. Being able to demonstrate leadership or offering an environment that is conducive to business and residents is a driver of action in many locales. A further incentive that is relevant to climate protection is the presence of threats to residents, assets, and the general development goals of a city. Natural disasters and sudden events often give issues sufficient visibility to move them on to the policy agenda and, in some cases, to foster change (Kingdon 1995; Birkland, 1997). In some instances, weather events and disasters have been attributed to climatic change and contributed to a city engaging in climate action planning (Zaharan, et al., 2008a, 2008b). As these patterns suggest, the desire to protect property and local populations also may be an incentive for initiating adaptation planning.

2.2 Ideas and Adaptation Planning

Ideas in the context of adaptation planning refer to the ways in which knowledge alters local behavior (Dobbin, Simmons, & Garttre, 2007). While incentives rely on the promise of benefits, ideas promote change by transmitting information and norms, both within and across countries (Strang & Meyer, 1993). The diffusion of ideas, such as best practices, standards, and conventional wisdom, influence behavior in cities by generating an awareness and understanding of activities that are most appropriate and likely to achieve a desired outcome (DiMaggio & Powell, 1983; Scott, 1995). Diffusion in the climate arena is not limited to knowledge related to planning processes and techniques, but includes the transmission of scientific knowledge and information that can affect perceptions of risk. While diffusion can take place within and across countries, most scholarly work focuses on how international and global ideas shape action in sub-national arenas (e.g., Stone, 2004; Dobbin, Simmons, & Garttre, 2007)

Diffusion can be initiated from a variety of sources. Professional networks and associations often transmit ideas and information to their participants and members. In the climate arena, the International Council for Local Environmental Initiatives (ICLEI-Local Governments for Sustainability), United Cities and Local Governments (UCLG), C40 Cities, and Cities Alliance are among the many formal networks and umbrella organizations that provide information about climate change to member cities through electronic media, publications, and the meetings they convene. The diffusion of technical expertise and managerial know-how also can occur when representatives from a city participate in governmental and intergovernmental initiatives such as domestic and international commissions and in events such as conferences and training programs. Incentives are not the only tool used by international organizations to promote change. The UN, OECD, World Bank, and others foster the transfer of norms and ideas through publications, workshops, meetings, training programs, and technical assistance (Stone, 2004).

NGOs and consultants are further sources of diffusion in the urban context since many provide services and support the efforts of local governments. In the climate arena, environmental, development, and humanitarian aid organizations are among the NGOs that have the potential to be most influential. While some of these organizations conduct their own research, others maintain their expertise in their respective policy domains by staying current in the relevant literature and attending conferences and training sessions. As they interact with local governments, be it through in person contact as they collaborate, advocate, and protest, or through policy papers and reports, NGOs can diffuse ideas and practices they believe will be effective (Princen, 1994; Boli and Thomas, 1999). In the climate arena, natural scientists and engineers also are important sources of diffusion as they disseminate knowledge about the potential impact of climate stressors as well as the ability that a city has to withstand these impacts (Jasanoff, 2005).

2.3 Capacity for Climate Adaptation

Local capacity, including financial, technological, human, political, and social resources, provide a foundation for initiating and sustaining change (Clemens & Cook, 1999). From a practical standpoint, the financial stability and security of a city will affect its ability and willingness to tackle new initiatives as some adaptation measures, such as infrastructure upgrades and residential resettlements, require major investments. Technology also will affect a city's adaptation planning. Those that have advanced capabilities are able to conduct spatial analyses of vulnerabilities and develop models and scenarios, all of which make it possible to assess a variety of options before making decisions and taking action.

Human resources are not limited to personnel dedicated to working on climate issues, but extend to the presence of leadership. Time and again, a change or new initiative has been attributed to the efforts of a local champion, including those in the climate arena. Leadership in these instances has been demonstrated by elected officials, government employees, and local residents (Mukheibir & Ziervogel, 2007; Roberts, 2008; Schreurs, 2008). Leadership can manifest at the city level. For instance, programs that demonstrate a commitment toward protecting the environment and enhancing sustainability, including those dedicated to smart growth, green building, and open space conservation, suggest that a city is environmentally proactive. They also provide a resource on which adaptation efforts can be built. Leadership further extends to the presence of political will to promote the ideas advanced by champions and sustain existing programs and initiate those that are new.

Transnational and national NGOs, as well as local NGOs, CBOs, and residents, contribute to the human and social dimensions of urban adaptation capacity (Few, Brown, & Tompkins, 2007). A variety of transnational and national environmental, humanitarian aid, and international development NGOs have initiated programs and projects that advance preparedness for the impacts of climate change in cities. These include preserving ecosystems as a means to minimize the impacts of natural disasters, ensuring that poor communities have flood defenses and early warning systems in place, and improving stores of food, water, and medical provisions (Reeve, Anguelovski, & Carmin, 2008). In some cities, particularly those in developing countries that are highly vulnerable, communities are extending local capacity by participating in risk assessments (van Aalsta, Cannon, & Burton, 2008) and taking steps to ensure they are prepared for climate impacts (Jones & Rahman, 2007; Sabates-Wheller, Mitchell, & Ellis, 2008). While these locally-initiated efforts are being made by vulnerable communities to address issues they are facing, they contribute to urban capacity and promote and sustain city adaptation planning.

Part III: Urban Climate Adaptation Planning in the Global South

As the previous discussion suggests, incentives, ideas, and capacity can foster institutional change in cities. Incentives create imperatives. In some instances they are a response to external pressures stemming from sources such as regulation and funder requirements. In other instances they are based on internal goals such as developing a competitive advantage or protecting environmental quality. Ideas transmit information and knowledge about relevant, appropriate, efficient, and effective initiatives for a city to pursue. Collectively, incentives and ideas serve as catalysts that alter the institutional field by establishing room for new actors to emerge and for entrepreneurial efforts to influence existing rules and norms (Greenwood, Suddaby, & Hinings, 2002). Alternatively, financial, technological, human, and social resources affect the extent to which the status quo can be maintained and new initiatives adopted and implemented (Clemens and Cook, 1999).

Incentives, ideas, and capacity will be present in all cities in one form or another. However, our understanding of how these factors shape the earliest phases of policy formation and implementation is limited. Therefore, we studied two cities that are early leaders in climate adaptation planning: Durban, South Africa and Quito, Ecuador. In addition to both cities engaging in adaptation planning, they are experiencing natural disasters and natural resource depletion and wrestling with longstanding challenges associated with poverty alleviation, infrastructure upgrading, and basic service provision.

The narratives that follow were primarily developed from semi-structured interviews and participant observation. The Quito case is based on in-person and telephone interviews with staff members and managers from departments working on climate adaptation and local elected officials who played a central role in the adaptation planning process. Since one of the authors (Roberts) was instrumental in the adaptation planning process in Durban, this case initially was based on her observations and experience. To minimize bias and verify factual information and interpretations, we conducted additional interviews with city employees. In both cases, we engaged in follow-up email exchanges to confirm or clarify important information with respondents. To further validate our understanding of the chronology and drivers of planning, the cases were reviewed by individuals from each city who were involved in the planning process.

We begin each narrative with overview of the city and its adaptation initiatives. We then examine the types of incentives, ideas, and resources that were present and the ways in which they shaped urban adaptation planning.

3.1 Climate Adaptation in Durban, South Africa

The city of Durban covers an area of 2,300 kilometers and has a population of approximately 3.5 million people. This expansive municipality has varied terrain that ranges from a flat coastal plain in the east to steep escarpments and undulating hills in the west. Durban's climate is subtropical with an annual average rainfall in excess of 1000mm. The variety of landforms and climatic conditions within the municipal area, along with it being located within a biodiversity hotspot of national and international significance, have produced a wide range of terrestrial and aquatic ecosystems. Within the city's boundaries are three terrestrial biomes (savanna, forest, and grassland), 18 major river catchments, 16 estuaries, and 97km of coastline. Durban also is a culturally and racially diverse city with African, Asian, and European influences. The Black African community makes up the largest sector of the population (68%) followed by the Indian community (20%), the White community (9%) and the Colored community (3%). Spatially Durban is still affected by the legacy of apartheid development with a racially structured, highly fragmented, sprawling, and poorly integrated urban form.

The advent of democracy in South Africa in 1994 brought with it enormous development pressures and expectations. Most of these were linked to the need to address the socio-economic imbalances of the country's past. Racially-based apartheid development policies created high levels of structural unemployment and large numbers of underinvested and un-serviced households. Addressing these shortfalls poses an ongoing challenge to local governments throughout South Africa. Even though Durban is an important economic center in South Africa, 34.4% of the working age population currently is unemployed. This has contributed to high levels of poverty and crime in the city. Further, many government institutions are inefficient and ineffective. While efforts are being made to address service backlogs, at present there are 140,000 urban households that do not have access to services such as water, electricity, and sanitation.

Durban is planned and managed by the eThekweni Municipality. Politically eThekweni Municipality is overseen by a non-executive Mayor and an Executive Committee. The Executive Committee is the principle committee of the municipality. There are 200 councilors and one hundred wards. The Administration is headed by a City Manager and is divided into six functional clusters, each with their own dedicated deputy City Manager. Given the immediacy of many problems, the city has placed a priority on traditional forms of economic development and basic service provision. The development objectives for the city are summarized in the Integrated Development Plan (IDP). The IDP outlines the need for development that balances social, economic and environmental needs. The vision articulated in the IDP is that "By 2020, eThekweni Municipality will be Africa's most caring and livable city." To achieve this vision, a number of key developmental choices have been made. These include improving the port and logistics infrastructure, using land use management to increase densities and to reduce sprawl, improving the public transport system, developing ecological tourism, and ensuring ecological integrity.

Relative to other more immediate and clearly defined challenges that the city faces, climate change has not received significant attention, mainly because its impacts are viewed as more remote and uncertain. However, an initial vulnerability assessment commissioned by the Environmental Management Department (EMD) in 2004 suggested that there are many imminent threats posed by climate change and that these will affect the city's economic stability and development. The assessment indicated that in the years to come, Durban will likely experience temperature increases of 2-3°C in maximum temperatures and 3-4°C in minimum temperatures. There is some indication that the total amount of rainfall may increase and that the seasonal distribution will change. Current measurements suggest that sea level is rising, on average, by 2.7 cm each decade. The predicted changes in temperature, precipitation, and sea level will likely be accompanied by a host of impacts. These range from heightened frequency and intensity of floods and droughts to increased rates of coastal erosion and levels of stress on existing infrastructure, to decreased water availability and food security. Changes such as these affect most municipal functions and undermine the city's stated goal of achieving a more sustainable development path, including its potential to address the needs of previously disadvantaged communities.

3.1.1 Adaptation Planning Process in Durban

Climate-related action in Durban was initiated in 2000 when international funding was made available for a small number of South African local governments to participate in ICLEI's international Cities for Climate Protection (CCP) campaign. Among the achievements resulting from participation in the program were the development of a municipal Greenhouse Gas emissions inventory and the initiation of an energy efficiency program for select municipal buildings. Despite these gains, very little knowledge of climate science or the impacts of climate change on municipal functions was learned in the process. As a result, the CCP campaign generated only minimal levels of interest and momentum with respect to climate action in the municipality.

The situation began to change in 2004 after Debra Roberts, Head of the EMD, returned from a semester-long environmental management program at Brown University in Rhode Island (USA). The course she attended was designed for professionals in leadership positions in the global South and included in-depth engagement with climate science. Roberts' new understanding of climate change and its implications for the city were critical factors in her initiation and development of the Municipality's Climate Protection Programme (MCP) upon her return. At that time, she also commissioned consultants through the EMD to conduct an initial climate change vulnerability assessment. The completed assessment was published in 2006 as a report entitled, *Climatic Future for Durban*. This report provided the first real opportunity to engage diverse municipal stakeholders in discussions about climate change. The presentations she gave to city councilors highlighted the fact that there was nascent political interest in understanding how the city could respond and adapt to anticipated changes.

The assessment and report generated sufficient interest that Roberts, working through the EMD, initiated development of an adaptation strategy for the city in 2006. This involved having extensive discussions with municipal line departments to ascertain the extent that municipal sectors were vulnerable to climate change impacts, the ways that various departments of the municipality could engage with climate adaptation, and the types of departmental options and

initiatives already in place that would facilitate adaptation. The process resulted in the publication of a summary document later that same year called the *Headline Municipal Adaptation Strategy* that highlights the relevance of climate-change issues for virtually all departments within the municipality and presents broad strategic targets for each sector.

The *Headline Adaptation Strategy* was integral to advancing adaptation planning in Durban. However, since this document is limited to general guidelines, it has become clear that most departments are not using it as a point of reference or taking concerted action to consider climate impacts in their decisions or actions. Once again taking the lead, the EMD is in the process of developing sector specific Municipal Adaptation Plans (MAPs). While all sectors ultimately will be included, in this early phase, the water and health sectors are the focus since they have been identified as two areas that face the greatest risk of being directly affected by climate change. Rather than emphasizing broad strategic targets, the intention with the MAPs is to ensure that adaptation is fully integrated into the planning, activities, and decisions of the affected line functions. The MAPs, which are expected to take approximately 12 months to develop, will include detailed action plans that will maintain or improve the functioning of municipal systems, departments, services, and infrastructure as the local climate changes (ERM, 2008). They also will contain clear target dates for the roll-out of action plans, be developed with and approved by affected municipal departments and key stakeholder groups responsible for plan implementation, and be approved by the city council.

3.1.2 Drivers of Adaptation Planning in Durban

Addressing climate change at the city scale in South Africa is challenging due to the administrative structure of the country. Although South Africa has ratified the UNFCCC, it has not yet converted the relevant elements into national law and therefore, addressing climate change is not yet mandatory (DEAT/UNDP, 2008). As a result, municipalities must take independent action if they want to pursue climate mitigation and adaptation agendas. The preparation of the *Climatic Future for Durban* and *Headline Adaptation Strategy* were influential reports that helped set the adaptation planning process in motion. While these reports can be traced to the early efforts Roberts made to initiate climate initiatives in the city, a number of incentives and ideas influenced her activities as well as the acceptance of climate change by city officials as an issue worthy of being placed on the municipal agenda.

Incentives for Planning in Durban

A view often advanced about policy and planning is that change is motivated through mandates, such as requirements stemming from national laws or donor funding. However, this form of pressure was not a driver of Durban's adaptation action. When climate adaptation planning was initiated, there were no national or provincial policies or laws that required cities in South Africa to pursue adaptation planning. There also have not been any pressures to pursue adaptation associated with direct foreign investment and official development assistance. At the time Durban was initiating its planning process, most funders had not started to support adaptation-related initiatives. Even in subsequent years, financial support from governments and foundations has not been earmarked for adaptation or contained adaptation requirements.

Durban has been highly successful in obtaining grants and using them to support its climate-related efforts. In other words, rather than external funders establishing an adaptation agenda,

Durban has found ways to link international funding to their adaptation program and use them to realized their ideas. For example, when it became clear that the *Headline Adaptation Strategy* was not leading to changes in the way that sectors and departments were going about their work, Roberts wanted to find a way to initiate more detailed adaptation planning as a way to catalyze action. Coincidentally, she was invited by the Rockefeller Foundation to attend a meeting and present her work. That was followed by an invitation to sit on the Advisory committee for their Asian Cities Climate Change Resilience Network (ACCCRN). Because time spent on the network would take her away from her local work from time to time, Rockefeller offered to compensate her either through an honorarium or by allocating money for local projects. She elected to use those funds to jumpstart the MAP work.

As in other parts of Africa, storms have come to be accepted as normal weather patterns in Durban. There is no concrete evidence that they are related to climate change. However, as awareness of climate risks grow, and as Durban experiences frequent floods and significant coastal damage, the storms reinforce claims that climate change is real and that the city needs to pursue adaptation planning in order to protect its residents and property and to make progress on the development path elaborated in the IDP. The IDP elaborates the city's development objectives and is a point of reference for many of its decisions. The IDP not only emphasizes improving infrastructure and the provision of municipal services, it also stresses the importance of promoting equity by attending to the needs of vulnerable populations. Engaging in adaptation activities are seen by some as a means of protecting vulnerable populations while supporting the projected development path.

Ideas and Adaptation Planning in Durban

The first phase of the MCPP, the vulnerability assessment, focused on understanding how climate change would affect Durban and municipal operations more broadly. Since information on the ways in which global environmental trends would play out in the city were not available, this was an important first step in ascertaining the city's vulnerabilities and the implications of changing climatic conditions for security and stability over the long term. The potential severity and cross-cutting nature of the impacts highlighted by the vulnerability assessment underscored the urgent need to ensure climate change issues were considered in all aspects of city planning and development.

International networks often are attributed with being sources of influential ideas. Durban has developed ties to some of these types of networks and they have had some impact on adaptation planning. For instance, Durban developed an affiliation with ICLEI in 1994. At that time, ICLEI was focusing on Local Agenda 21 rather than climate change and Durban participated in the network in order to become integrated into the international environmental community. Although ICLEI did not have any impact on adaptation planning per se, it did help representatives from the city build their environmental networks and sources of information. Training sessions often can diffuse ideas and information that shape actions. This was the case when senior managers from several municipal departments in Durban participated in programs led by international agencies to help them prepare for emergencies. For instance, the United Nations invited Debra Roberts from the EMD and Billy Keeves from the Disaster and Risk department to participate in Awareness and Preparation for Emergency at Local Level (APELL) workshops to better prepare the city for emergencies that could impact industrial and technical sectors.

The earliest climate work in Durban was due to the efforts of an individual who was committed to the cause and willing to explore unfamiliar terrain such as developing vulnerability assessments. This started to change as more targeted opportunities arose. For instance, in addition to the ACCCRN providing links to others in the international community who also were thinking about climate adaptation and resilience, she also forged ties with the Tyndall Centre for Climate Change Research in the UK while attending a conference in Mexico. This led to an informal partnership between the Tyndall Centre and eThekweni Municipality to develop an integrative assessment tool. As with international networks, this partnership has allowed Durban to engage others thinking about similar issues and to share and test ideas that support their climate work.

Durban is not the only city in South Africa that has been pursuing climate adaptation. Other major metropolitan areas such as Cape Town and Johannesburg as well as smaller centers such as Potchefstroom have emerged as climate leaders. At the present time, there is no structured coordination or communication between these different communities and therefore, no domestic efforts to promote joint learning or sharing of best practices. Instead, Durban and other local governments are obtaining information about adaptation from reading reports, scanning the Internet, and talking to people at conferences and meetings. Working with consultants also is an important source of learning. In many instances, consultants are hired to assist or prepare reports. In the process, they often bring new knowledge and ideas to the municipality. This was the case with the preparation of the *Climatic Future for Durban* report which summarized, for the first time, locally relevant climate change research being undertaken in South Africa in a single, accessible document. By engaging consultants, local government officials were able to obtain information that they would not have the time or resources to obtain for themselves.

Rather than adaptation initiatives following a predetermined course, many ideas and activities tend to be the result of unexpected opportunities. For instance, Roberts gave a lecture on climate change at a public seminar. At the conclusion of the event, an individual with a passion for green roofs spoke with her about their potential and she realized that this could be an interesting idea to test in the city. The city has an extensive stock of large, flat, and empty rooftops on its buildings (Greenstone, 2008). These spaces are ideal locations to create green roofs and could be used to develop a network of green spaces in the inner city environment that could provide a range of adaptation benefits such as reducing urban heat island effects, slowing runoff, and improving food security. Roberts was able to allocate modest funds and provide institutional support to start testing this idea. The only way to get access to the city's building stock was to forge a partnership with the Architecture Department. The result is that the EMD and the municipality's Architecture Department are developing a green roof on an existing municipal building within the central business district. This project will test the methodology and measure the effectiveness of the installation in terms of temperature amelioration and storm water management. Should this pilot prove to be successful, the potential exists to roll out the project to other municipal buildings and proposed new developments. In the process, it also may mean that ideas about climate adaptation will be diffused internally in the city.

Capacity for Adaptation in Durban

Much of the climate work in eThekweni Municipality has been undertaken by the EMD on a part-time basis and implemented with department funding that was able to be reallocated from core biodiversity projects to adaptation. Despite limited financial and human resources, the initiatives undertaken by the EMD have achieved local, national, and international recognition. In 2007, these efforts were formally acknowledged and institutionalized by the municipality with the creation of a dedicated Climate Protection Branch within the EMD. Although this is an important step forward, as is the case with municipal jobs in Durban in general, it has been difficult to find someone willing to fill the new post due to its low level grading and salary package. The result is that in the short-term, the climate work undertaken by the EMD continues to be done in an *ad hoc* manner, as time and resources permit. Although efforts are not widespread, other departments ranging from health, to disaster management, to food to coastal management, have begun to address adaptation. Since internal capacity is limited, departments rely on their personnel to the extent it is feasible to do so and outsource the remainder of the work to consultants.

Previous research suggests that cities with ongoing environmental initiatives are likely to be early adopters in the climate mitigation arena. If Durban is a reflection of other cities, then this also appears to be the case when it comes to adaptation. A variety of environmental programs in Durban created the foundation on which current adaptation efforts are being built. In addition to drawing on some of its existing programs, the municipality has been able to engage members of local communities and other stakeholders in their adaptation efforts. In this regard, a number of projects have been initiated under the banner of Community Adaptation Planning (CAPs). For instance, the Climate-Smart Local Communities project aims to improve adaptive capacity in poor communities. The two communities participating in this program will be involved in conducting vulnerability and risk evaluations, and then using this information to develop and implement sustainable cross-cutting adaptation measures. The local participants in the program include formal community leadership, such as ward Councilors, civil society representatives, women's groups, communal garden committees, and school groups. If the program is successful, then it will be initiated in other communities in the city (Golder Associates, 2008).

Pilot projects implemented by consultants on behalf of the municipality also assist local government better target its efforts. For example, research undertaken within the MCPPP indicated that rural and peri-urban low-income groups in Durban grow approximately 50% of their food, and purchase the remainder. The predominant food purchased is maize and costs families in excess of 50% of their monthly income. This poses significant challenges as the predicted changes in weather and temperature Durban indicate that the productivity of agricultural land, particularly for maize, will decrease in the future. Alternative food production will therefore be required to ensure food security for the city's low-income groups. The municipality has initiated field trials in different climatic zones that simulate conditions projected by various climate change scenarios. At each testing station, a variety of crops will be planted and yields will be measured at the end of the growing season. In parallel to the field trials, the social acceptability of the new crops will be tested to determine the ability of the average household to prepare the new foods, the palatability of the food, and its acceptability as a substitute for maize (Golder Associates, 2008). The findings of this project will inform the development of food security plans and strategies in the city.

A number of local NGOs are working collaboratively with the city to support its climate and development goals. This is evidenced, for instance, with a successful community reforestation project. The project site selected for this intervention is the regional Buffelsdraai landfill to the north of the city where the municipality has extensive land holdings. This land was once forested and wooded, but is currently under sugar cane cultivation. Working in collaboration with the NGO, Wildlands Conservation Trust, the city is promoting the Indigenous Trees for Life (ITFL) program as it provides a platform for the development and implementation of the Buffelsdraai Community Reforestation Project. The objective of ITFL is to establish sustainable livelihoods that contribute to the restoration of the region's forest ecosystems and to the sequestration of carbon dioxide. The program draws on a network of 'treepreneurs,' often orphaned and vulnerable children, who grow indigenous trees and then barter the trees for food, clothes, bicycles and other necessities that the Trust secures through corporate donations. The trees are then replanted in urban greening projects or forest restoration carbon sinks (Diederichs, 2008).

Informal networks exist across most municipal departments and among many individuals. These relationships have provided a foundation for advancing adaptation planning. This was the case, for instance, in the creation of the MAPs. Roberts targeted the most vulnerable sectors and invited key individuals to a meeting to discuss their involvement. Since she knew that some individuals in these sectors were beginning to consider adaptation, she was able to engage them in the MAP process. However, it is important to acknowledge that networks alone do not ensure participation or commitment to adaptation planning. Some departments maintain that they do not have the capacity to address adaptation. Others believe that adaptation measures will compete with their priorities. For instance, some individuals working in the area of economic development are concerned that adaptation policies requiring retreat from the coastline would undermine their efforts to promote tourism. As a result, while networks foster communication and can facilitate coordination, there are varying views of the value of adaptation relative to the economic and social priorities in the city.

3.2 Climate Adaptation in Quito, Ecuador

Quito, home to approximately 2.1 million people, is situated 2,800 meters above sea level in the Central Andes of South America. While the natural mountain barriers create a spectacular setting, they have forced urban development to follow a linear trajectory and urban growth to be highly chaotic. The result is that the city is approximately 40 to 50 km in length from North to South, but only between four and ten kilometers wide from West to East (World Bank, 2008). As is the case with other Latin American cities such as Bogota and Curitiba, Quito has made strides in protecting environmental quality. This is exhibited in the presence of electric bus systems that run along dedicated corridors and have the potential to be upgraded to a light rail system. It also is reflected in the preservation of over 50% of the metropolitan region as green space and in initiatives ranging from slope protection to the creation of formal parks to air quality monitoring systems.

Average GDP per capita in Quito is low, with 30% of the people living in poverty. Most of the poor are concentrated in upgraded informal settlements to the south of the metropolitan area (World Bank, 2008). There is a long history of migrants moving from agricultural areas to the edges of the city. In the past, these migrants would create illegal settlements. However, this is increasingly rare due to a greater number of shelters and city-owned housing in conjunction with

tough sanctions against squatting. Just as the poor have their enclaves, so too do the wealthy. While some live in the urban core, many have moved to the suburban areas in the northeastern hills that surround the city center. In contrast to settlements in the south, the wealthy neighborhoods in the northeast are populated by well-tended homes that boast high levels of amenities and easy access to shopping centers, offices, and recreation areas.

The Municipality of Quito, which is situated within the broader Metropolitan District, is governed by a Metropolitan Mayor and a Municipal Council. As a result, most of the planning and regulatory power for the Municipality lies in the hands of the Metropolitan Council for the District of Quito. The Metropolitan Council approves ordinances, resolutions, agreements, and leads broader projects for the whole metropolitan area, including the Municipality of Quito.

Although Quito is flourishing, it faces a wide range of challenges as it slowly emerges from a national economic crisis that accumulated and worsened with the dollarization in 2000. Among the city's highest priorities are the construction of a viable waste treatment system, the creation of new suburban centers and affordable housing, and the promotion of nature and cultural tourism. Transportation also is a pressing issue. There is a strong need to develop new arterial roads and tunnels as well as implement the proposed light rail system. Even though the municipality is projecting a rapid increase in revenues and public expenditures, they do not expect to have sufficient resources over the next decade to address all of the major issues identified in the Metropolitan Structural Plan.

The impact of global climate change is among the challenges that Quito is working to address. In the Andean region where the city is located, the temperature has been increasing by about 0.11°C per decade against a global increase of 0.06°C per decade (Gobierno del Ecuador, et. al, 2008). As with the rest of Ecuador, because of its geographic position and mountainous topography, Quito's water resources are highly vulnerable to these changes in temperature (Comité Nacional sobre el Clima, 2001). The city relies on melt and water resources in glacial basins and páramos ecosystems for about 50% of its water supply. For instance, Quito receives part of its potable water provision from the Antisana Glacier and its páramos ecosystems. Changes in climatic conditions are associated with the size of this glacier decreasing about 7 or 8 times faster in the 1990s than in the previous decades (Francou, et al., 2000, Maisinchi, et al., 2005). As temperature rises, and the rate of glacial melt increases, the long term availability of water to the city is decreasing.

The impacts of climate change are not limited to water availability. Public officials also anticipate that changes in temperature will contribute to the destruction of endemic habitat and biodiversity, the release of carbon from páramo soils, increased likelihood of fires and desertification, and lower agricultural yields (World Bank, 2006; Dirección Metropolitana Ambiental y Fondo Ambiental, 2008). The intensification of extreme rainfall in Quito also will place additional stress on down slope habitats, including primary rainforests, exacerbate flooding, and lead to increased occurrences of landslides and mudslides (Dirección Metropolitana Ambiental y Fondo Ambiental, 2008).

3.2.1 Adaptation Planning Process in Quito

In fall 2006, the mayor at the time, Paco Moncayo, and the Metropolitan Council decided host a one-time regional conference of the Andean Community of Nations called Clima Latino. The conference, scheduled for October 2007, was designed to bring representatives from local and national governments together to start thinking about the impacts of climate change in the Andean Community and identify measures they could take to promote mitigation and adaptation. Given the significance of the event, and the desire to demonstrate that they were a proactive municipality, Mayor Moncayo and the Metropolitan Council thought the conference would be a good platform for highlighting climate initiatives taking place in Quito.

The decision to host the conference immediately initiated discussions about climate planning, but the process did not gain momentum for a few more months. In January of 2007, Gonzalo Ortiz gave a presentation to his fellow members of the Metropolitan Council about the importance of designing a climate strategy for Quito based on scientific information about rising temperatures and the shrinking of the Andean glaciers. He argued that it was imperative for Quito to establish both mitigation and adaptation strategies. This presentation generated wide and warm support from the Council and Mayor Moncayo. Based on these approvals, less than a month later, Ortiz initiated the formal planning process when he and Carmen Elena De Janón, another Metropolitan Councillor, asked the Directors of the municipal water and sewage corporation (EMAAP-Q), the municipal air monitoring corporation (CORPAIRE), the Metropolitan Office for the Environment, and the Strategic Research Unit to establish an Inter-Institutional Commission and prepare a draft climate change strategy for the city. Their charge was to summarize the best available knowledge on climate adaptation and mitigation and propose concrete measures that the city could follow.

In September 2007, the Inter-Institutional Commission shared its draft strategy with key technical representatives from different municipal agencies and received their approval in October 2007. This draft document was presented at the Clima Latino conference a few weeks later. Discussions that took place at the conference helped improve the quality of the draft, especially the sections on objectives and guidelines for climate adaptation and mitigation. Once this preliminary stage in planning was complete, Quito engaged in a metropolitan-wide consultation about the plan. The Commission decided to hire an environmental NGO, ECOLEX, to formally lead the consultation process. ECOLEX was charged with engaging the local population, especially vulnerable communities living on the hillsides of the Pichincha Volcano, the Valle de Los Chillos, and other poor neighborhoods in the Southern part of Quito, as well as key social and community development organizations. Four workshops were held by ECOLEX in October and November 2007 to gather concerns and suggestions so that they could be addressed in the climate strategy. While many issues and suggestions were raised, the major concerns voiced by the general population were the need for access to public transportation as well as better waste management, hillside protection, and improvements to the potable water system.

After making revisions based on the concerns and suggestions voiced by residents, a formal document called the *Quito Strategy for Climate Change* (EQCC) was finalized in February 2008. The EQCC, which is presently pending formal adoption and integration into local regulations of the Metropolitan District, addresses activities in four Strategic Areas: (1) Communication, education and citizen participation in climate change efforts; (2) Institutionalization and capacity

building for climate change in the Metropolitan District of Quito; (3) Ensuring adequate information to decrease vulnerability and promote adaptation; and (4) Use of technology and good environmental practices to reduce and capture GHGs in five sectors (energy, industrial processes, agriculture and farming, waste, and land use and forestry). The plan maps out activities across sectors with varying degrees of specificity, but does not establish concrete deadlines and targets.

An entire Strategic Area of the EQCC is dedicated to elaborating measures that will guide Quito towards being prepared for the impacts of climate change. Among the adaptation measures included in the plan are the development of an Environmental Information System that will inform citizens of the most important current and future climate risks and impacts. It also establishes broad guidelines for developing Early Warning Systems and a Climate Risk Management System (Dirección Metropolitana Ambiental y Fondo Ambiental 2008). The strategy is designed to be flexible, with provisions for ongoing monitoring and evaluation so that the city can readjust its adaptation measures over time as appropriate. It also is oriented toward broad stakeholder engagement. Not only does it consider the role of government agencies in preparing the city for climate impacts, but also the ways in which university engagement, civil society participation, and public-private cooperation can support and sustain adaptation initiatives (Dumas, 2007).

3.2.2 Drivers of Adaptation Planning in Quito

National climate efforts in Ecuador stretch back to the early 1990s when the country ratified the UNFCCC. Over the years, efforts have been made to implement mitigation projects and develop a national plan. Working under the auspices of the Ministry of the Environment and the National Climate Change Committee, Ecuador developed its *National Policy and Strategy for Climate Change* in 1998 and currently is in the process of constructing a National Climate Change Adaptation Strategy. However, most national climate policies do not extend their reach in a concrete way to cities or other local areas.

The *Quito Strategy for Climate Change* was set in motion when the Mayor and members of the Metropolitan Council decided to host the Clima Latino conference and then formalized in response to the call for action made by Gonzalo Ortiz. Since his presentation to the Metropolitan Council in January 2007, Ortiz has served as a champion for climate change planning and has encouraged local agencies and offices to adapt concrete measures. However, he has not been alone in his quest. Other municipal leaders and officials initially supported the creation of the climate strategy and continue to be proactive in advocating for programs that strengthen the resilience of Quito against changing climatic conditions. Rather than wait for the national government to pass legislation, provide structural guidance on adaptation priorities and measures, or offer support for their efforts, local officials realized that they should not delay further adaptation planning and elected to take independent action. Collectively, their awareness and ability to initiate adaptation efforts was shaped by a number of different incentives, ideas, and the overall capacity within the city to support and sustain adaptation planning and implementation.

Incentives for Planning in Quito

Institutional change often is associated with the presence of incentives, either in the form of regulations or funder pressures. However, this was not the case with respect to adaptation planning in Quito. As mentioned earlier, the city was not pressured by the national government to pursue particular projects or planning measures. Further, while Quito recently has been able to avail itself of support from international funding agencies, this was sought out by officials to advance adaptation work that was being planned, rather than funders imposing their requirements on Quito. For instance, the Andean Regional Project for Adaptation to Climate Change studies and monitors the environmental conditions and ecosystems around the micro-basins of the Antisana Volcano. In this project, the EMAAP-Q receives funding from the GEF and World Bank to collaborate with scientists from the Project. The goal is for EMAAP-Q to better understand how changing conditions in the micro-basins will impact water provision and ascertain what adaptation measures are required to ensure adequate potable water distribution in Quito.

A motivating force for the city's adaptation planning efforts is its aim to be regarded as a leader in the Andean region and in Ecuador. This vision, and related efforts to enhance the visibility of innovative initiatives within the city, led Quito to organize international climate conferences such as Clima Latino. The conference gave them an opportunity to learn from others in the region about their experiences with climate change and get feedback on their draft proposal. While the event was used to legitimize and validate their climate adaptation initiatives, climate initiatives also were a way the city could demonstrate it is taking a leadership role on geopolitically and environmentally important issues.

In addition to organizing conferences, Quito has maintained a presence at international climate conferences to ensure that its accomplishments gain recognition and to bring more visibility to its initiatives. For instance, Guido Mosquera, the head of the Inter-Institutional Commission in charge of the climate change strategy for Quito, wanted to present Quito's climate change strategy at a regular meeting of the Inter-American Network of Cities (Red Ibero-Americana de Ciudades) that was being held in Medellín, Colombia in November 2007. Local officials and members of the Inter-Institutional Commission knew other "competitor" cities would present their climate change work and, once again, they wanted to demonstrate that they were taking a leadership role. By having a draft of their climate strategy in place, they believed that they would be able to show that they were being proactive in protecting the city and its resources against climate threats and extreme weather events. By taking the lead on adaptation planning, they further believed they would reinforce their position as an innovative municipality and would be imitated for their climate and political leadership and autonomous policy-making relative to the national government.

A further incentive for engaging in adaptation planning was an increase in natural disasters and the desire to protect the city from future incidents. A number of early reports suggested that as the climate changed, Quito would be prone to increased periods of rainfall and that these were likely to trigger extreme events such as landslides and floods in the hillside areas around the city. As these predictions came to pass, the need for adaptation planning became evident as weather events affected city functions, particularly public transportation and roadway accessibility. For instance, in May 2006, intense rainfall led to landslides in several residential neighborhoods,

damaging houses, obstructing roads, and halting the flow of traffic for several hours (Sánchez, 2006). The impacts of severe storms have not been limited to property damage and city functions as earlier that same year a landslide in the Carapungo district resulted in the death of a young man (El Universo, 2006).

Ideas and Adaptation Planning in Quito

Awareness of the risk of a changing climate has been influential in Quito. Some of the earliest climate studies date back to the mid-1990s when the French Institute for Development Research (IRD) brought the issue of changing temperatures and its likely impacts to the attention of the Mayor and members of the Municipal Council. One of those reports was based on the results of monitoring of the Antisana glacier. The researchers found that the size of the glacier had significantly shrunk between 1994 and 1997 (Semiond, et al., 1998) and therefore, that 80% of the water supply for the city was being threatened. In 2000, a study conducted by local university researchers indicating that the population of Quito would double by 2025 caught the attention of EMAAP-Q managers and engineers. Growing sensitivity to the rate of glacial melt, along with population information, served as catalysts for the City Council and the General Manager of the EMAAP-Q to start making provisions to secure the city's water supply.

International workshops and events related to specific sectors, particularly water resources, advanced awareness and understanding of the need to initiate climate adaptation measures in Quito. For instance, over the years, managers from EMAAP-Q and several members of the Municipal Council have been invited to participate in regular meetings of the Inter-American Development Bank, the Corporación Andina de Fomento, and the World Bank related to long-term water security. In the course of exchanging experiences, representatives have learned about some of the problems and the social and political conflicts that have emerged in other locales as a consequence of not being proactive in ensuring adequate water provision. This heightened their sensitivity to the importance of taking action to in Quito. In other international meetings in which the EMAAP-Q participated, such as *the IVth Water Forum in Mexico* and the *First Annual Megacity Water Congress* in 2006, representatives from the water company were able to learn about innovative techniques and approaches for clean, safe, and efficient water supply and management, and water sanitation in large cities. They also become aware of best practices and knowledge management tools from both developed and middle-income countries.

International climate networks and programs also have been influential sources of ideas for the city officials and representatives. Since 2004, Mayor Moncayo has played a leadership role in United Cities and Local Governments (UCLG), contributing to the efforts of this international network and learning from his participation. One example dates to March 2006 when Moncayo served as a member of a delegation from UCLG that participated in the World Water Congress in Beijing. During the congress, debates were centered on the importance for increasing sustainable access to water and sanitation services for urban populations and improving the capacity of local governments and cities to protect and manage water resources. This meeting created a heightened sense of urgency to engage in climate adaptation planning in Quito. Through his involvement in UCLG more broadly, Moncayo has learned how other cities are being affected by climate impacts and the ways they are responding. He has brought these lessons back to Quito where they are shared with members of the Municipal Council and others involved in planning for climate change.

Capacity for Adaptation in Quito

Capacity refers to resources that provide a foundation for adaptation planning and sustain implementation. In Quito, the city's existing environmental commitment and programs planted the seeds for mitigation and adaptation planning. Since the beginning of the 1990s, the mayors of Quito have placed a priority on environmental quality and established a variety of environmental and planning programs. These initiatives include the creation of new parks, river clean-up and restoration, and reforestation. In 2005, Quito's Mayor presented a formal long-term environmental plan (*Plan Equinoccio 21, Quito hacia el 2025*) that encompasses a series of strategic objectives related to recycling, development of clean production technology, control of environmental contamination, and restoration of natural resources in and around Quito. This plan not only serves as guide for programs and projects of relevant metropolitan agencies, but indicates which environmental initiatives should be prioritized. Since these include efforts to protect and restore fragile ecosystems and promote adequate use and conservation of water resources, they establish a basis on which climate adaptation planning in the Metropolitan District is being built.

City offices and departments are important foundations for adaptation initiatives in Quito. For example, knowing that ecological health is essential to water security, the Office for the Environment has been promoting a policy to protect a series of natural areas in the Metropolitan District. In 2006, staff from the environmental office played a strong role in pushing for a municipal ordinance that preserves biodiversity and protects fragile areas and ecosystems around the district since these areas are often sources of water for the population. A number of relevant programs and activities also are situated within the Metropolitan Office for Territorial Planning. Over the years, staff members from this office have been conducting research to identify vulnerable areas of the city and using land use planning measures, such as soil conservation, green space preservation, and forest protection, to reduce exposure to natural hazards.

The presence of disaster management plans has bolstered adaptation planning. Managers from the Risk Management Unit of the Metropolitan Office for Citizen Security, working together with the Meteorology Institute, have been following weather patterns for two decades in Quito. Through this collaboration, they became aware that severe storms were increasing the vulnerability of people living on the hillsides and slopes to flooding and landslides. In 1999, they developed the Rain Plan to prepare the city for extreme weather events and establish disaster response measures. More recently, the Risk Management Unit has been working to ensure that the city is prepared for the impacts that extreme weather events will have on the local transportation, water, electricity, and, beyond all, housing infrastructure. This includes implementing the Hillside Project, which seeks to help inhabitants living in these areas improve soil protection by reforesting fragile landscapes and preventing further housing construction through community policing.

NGOs have been an important resource for city officials. In general, NGOs in Ecuador have greater visibility and are regarded more highly by the government than is the case in many other countries in Latin America. Although many development and humanitarian aid NGOs have initiated climate adaptation campaigns, they have limited presence in Quito as most have focused their work on rural areas in the Andes and Amazon. Instead, at the present time, adaptation work

generally appears to be the domain of environmental NGOs that focus on technical and scientific work. Organizations such as Fundación Natura, Ecociencia, Forum for Hydraulic Resources, SESA, the local office of The Natural Conservancy are all highly respected for their research, projects to protect fragile ecosystems around the páramos, and efforts to promote improved water management. These organizations have published a number of studies on how the páramos around Quito are affected by different climate and industrial threats. They also supported the efforts of scientists working in government agencies as well as helped to implement government environmental initiatives.

The availability of financial resources and technical assistance have advanced and sustained adaptation-related initiatives in Quito. One of these, the Environmental Fund, was created in 2005 within the Environmental Office to protect and conserve the natural resources and environmental quality of the district. At present, the Fondo Ambiental is financing dozens of projects around the district with the objective of improving the economic conditions of local populations, creating greater social cohesion, and protecting fragile areas around Quito's water basins. While some projects are implemented by the city, others are implemented by local environmental NGOs. The Fund for Water Protection (Fondo para la Protección del Agua - FONAG), created in 2000 through support from the EMAAP-Q, the Nature Conservancy, and local corporations, is another key financial resource that serves as a platform for climate adaptation. As with the Environmental Fund, projects supported by FONAG are not officially deemed as climate adaptation. However, they support related efforts since the FONAG's mission is to protect the basins used by Quito for water provision, as well as to raise awareness about the need to improve the management and conservation of water resources around the city.

Existing resources provide a foundation on which Quito is building its climate adaptation program. At the same time, new resources are being dedicated to institutionalize and implement the EQCC. As a first step, at the end of 2008, the Metropolitan Office for the Environment decided that it should create a Climate Change Unit. Since this decision has not yet been approved by the Metropolitan Council, financial resources have not been allocated and staffing is limited to two people who are responsible for implementing the EQCC. If the Unit is approved, it will work to improve the sustainability of the climate change strategy, manage available funds, coordinate the initiatives and projects of metropolitan agencies and offices, and give the strategy greater visibility. To ensure that the EQCC has support from agencies across the city, the Unit is planning to organize regular workshops and meetings with key staff from the EMAAP-Q, the Planning Office, and the Risk Management Unit. As the process moves forward, the Unit will be in charge of implementing the climate strategy and monitoring whether it is achieving its mitigation and adaptation goals.

Part IV: Comparative Analysis of Factors Shaping Adaptation Planning

The cases of Durban and Quito demonstrate that while incentives, ideas, and resources all are relevant to urban change, the specific ways in which these factors shape adaptation planning do not fully conform to the patterns predicted by prevailing theories. For instance, contemporary theories emphasize how external pressures, particularly regulations and financial incentives will motivate action (e.g., DiMaggio & Powell, 1983; Dobbin, Simmons, & Garttre, 2007). However, this was not the case in either city. Regulations pertaining to adaptation have not been established at the national level. Further, even though both cities face resource constraints,

neither funding or pressures from funders shaped decisions to initiate adaptation planning. In both instances, the cities elected to pursue adaptation and then sought financial support for specific projects or worked to integrate adaptation objectives into their currently funded activities. To some extent, this approach likely reflects where these cities are on the adaptation curve. As early adapters, they are pursuing a course of action that is just gaining international recognition and that is not widely funded at the present time. Consequently, rather than serving as an incentive, funding provided support for their visions and efforts in this domain.

Table 1: Incentives, Ideas, and Resources Related to Adaptation Planning

	Durban	Quito
Incentives	<ul style="list-style-type: none"> • Protect against natural disasters • Secure development path 	<ul style="list-style-type: none"> • Protect against natural disasters • Enhance reputation
Ideas	<ul style="list-style-type: none"> • Awareness of potential climate impacts • Information from international networks • Ideas from demonstration projects 	<ul style="list-style-type: none"> • Awareness of potential climate impacts • Information from international networks • Information from domestic networks
Resources	<ul style="list-style-type: none"> • Government employee as champion • Formation of dedicated climate division • Strong environmental programs • Community-based adaptation initiatives • Environmental NGO engagement • Specialist input from consultants 	<ul style="list-style-type: none"> • Public official as champion • Formation of dedicated climate division • Strong environmental programs • Capacity of municipal water corporation • Environmental NGO engagement • University research

As summarized in Table 1, rather than being influenced by external pressures, it appears that locally-determined goals and values were critical drivers of adaptation planning in both cities. One influential incentive was ensuring the safety of local populations and protecting the natural and built environments from natural disasters. Both cities were aware of projected changes in whether patterns. For Durban, this point was reinforced by severe storm and flood events. In Quito, floods and landslides that affected city services and infrastructure affirmed predictions about climate change and provided a cogent rationale for initiating adaptation planning.

Although there were similarities in the general types of incentives shaping adaptation planning in both cities, there were differences in the underlying goals motivating action. In Durban, the projected development path as delineated in the IDP structures all local action. From the start, adaptation was viewed as a means to advance sustainable development and therefore, it was seen as integral to achieving this broader set of goals. For Quito, maintaining a competitive advantage is an important goal. Climate planning was viewed as a way to enhance the city’s reputation in the region as innovative, forward thinking, and politically important. It also was regarded as a way to maintain visibility and a favorable profile in the international arena.

The diffusion of international knowledge and norms, and ties to international networks, are recognized by scholars as having significant impacts on local behavior (e.g., Stone, 2004; Dobbin, Simmons, & Garttre, 2007; Schreurs, 2008). In contrast, adaptation planning in both cities was primarily influenced by locally-relevant, and often locally-generated, ideas and information. For instance, the vulnerability analysis conducted in 2006 in Durban generated political and administrative interest in understanding in how the city was going to be affected by climate change and how it could respond to the predicted impacts. Membership in global networks and attendance at international conferences were important sources of ideas and

information for both cities. However, rather than being influenced by global norms or best practices being advocated by representatives from the North, participation in networks and events were valued as opportunities for two-way exchange and for identifying ideas and activities that could advance local goals and priorities.

The presence of human and political resources was essential to initiating and sustaining change in both cities. Adaptation planning was catalyzed by an individual from within the government, either an employee or elected official, who was compelled by the science and served as a champion to raise awareness and initiate action. In both cases, these individuals had environmental orientations, understood the implications of the science for city management, and were able to communicate these insights to others in positions within city government. While these individuals were influential, they had different levels of success in generating short term support for climate initiatives within their cities. In Durban, adaptation planning took root early, relative to most other cities. Although the assessment sparked interest and the MCPP was established, and some Councilors immediately recognized the importance of climate impacts on the city, adaptation planning has been slow to gain widespread political support. In contrast, in Quito, Mayor Moncayo initiated informal efforts and, subsequently, Councilor Ortiz was able to mobilize support around his proposal to create an official strategy to address climate change after his presentation at the Metropolitan Council. The continued engagement and monitoring of this process by Ortiz and other councilors motivated the Environmental Office to move quickly to develop a strategy. The differences in political support seem to be associated with broad city uptake of the climate change idea in Quito while in Durban it still is a “niche” concept associated with a limited number of actors.

Resources are important for initiating a program of action, but so too is resourcefulness. Both cities faced notable capacity limitations. Rather than wait until they had additional funding or personnel, they found innovative ways to draw on and extend their capacity so that they could initiate climate planning and action. For instance, both cities were able to build on existing environmental programs, draw on networks, and find ways to link adaptation to ongoing initiatives. In addition, while the specific approaches varied in each city, both were able to engage NGOs, CBOs, consultants, and universities.

Part V: Early Lessons from Early Adapters

A number of lessons can be learned from the adaptation planning processes in Durban and Quito. In general, these experiences suggest that cities may need to develop general strategies as well as sector-based plans in order to have successful adaptation programs. Once Durban became aware of the impacts that climate change was projected to have on the city through their vulnerability assessment, they developed a general adaptation strategy. However, relatively quickly they discovered that they needed more concrete measures to guide action, so they now are in the process of developing more detailed planning protocols for each sector. Quito has had a detailed water plan in place for many years, but the city found that it needed to have an integrated climate action plan. As the experiences in Quito and Durban suggest, a strategy provides a general framework that can integrate citywide action and offers opportunities for public input. However, strategic plans need to be augmented with sector plans that include specific goals and implementation targets.

The cases of Durban and Quito demonstrate the importance of linking adaptation planning and implementation to city priorities and existing initiatives. While local governments generally seek to provide basic services and ensure a good quality of life for their citizens, most have limited resources. Climate change frequently generally is perceived as being a distant threat and therefore, regarded as less important and often in conflict with immediate priorities. Helping cities see how adaptation can support their goals and priorities, and how adaptation measures can be connected to ongoing activities, may be a way to facilitate planning and implementation. For instance, Durban is encountering ongoing issues related to water scarcity. While the water sector is proactive in its efforts to stabilize service provision by engaging in efforts such as repairing leaks and upgrading pipes, they do not regard these initiatives as being motivated by adaptation needs. In Quito, large areas have been set aside as greenspace. Although these initiatives contribute to adaptation by helping reduce the impacts of storms by slowing runoff and limiting heat island effects, they mainly are viewed as ways to beautify the city, improve the quality of life for local populations, and build tourism. As these examples suggest, there are many ongoing activities that can contribute to urban resilience. Acknowledging the presence of climate impacts and then building on and extending existing work is a way to promote adaptation in the context of departmental work routines and goals.

Efforts need to be made to ensure that cities have access to reliable information and opportunities to share experiences and ideas through local, regional, national, and international networks, seminars, and conferences. While there are abundant materials on the internet and in print, it appears that interpersonal exchange, including informal discussions of new activities and initiatives are ways that cities learn from others and extend their adaptation programs. Scientific information about climate impacts is vital, but so too is knowledge sharing around sector specific issues and climate governance more broadly. As the cases suggest, seminars and workshops within cities can be just as influential as international conferences. The import of information obtained through different types of networks and events suggests that forums for exchange should be established and participation in diverse types of climate-related events should be supported. This includes forums within cities so that information is shared across departments, as well as fostering participation in events in the regional, national, and international arenas.

The trends across both cities suggest that it is important to have a dedicated climate team that is working within a centralized office. This office needs to be appropriately staffed and funded. It also needs to have sufficient authority to enlist cooperation from upper and mid-level staff members of sector offices and to foster intergovernmental coordination and communication. Climate change frequently is assumed to be an environmental issue as individuals within the environmental sector tend to be first to make efforts to promote adaptation and initiate this work by building on existing environmental programs. While this provides an important foundation, it can lead to climate offices being situated within environmental departments. This can be problematic since environmental functions in local government frequently are weak and marginalized. The impact is that climate change is labeled “green” before there is a chance to understand its crosscutting nature and significance to development more broadly. Rather than relegate adaptation to a single sector, an alternative would be to create a Climate Protection Department within the office of the City Manager or Mayor. This would reinforce the interdepartmental character of climate impacts while demonstrating that the adaptation has status and political support.

The engagement of NGOs, CBOs, consultants, and universities can enhance municipal adaptation efforts. The cases suggest that initiation and success of adaptation planning rest on the commitment of government actors and departments. While government support is essential, cities can extend their capacity by engaging a variety of stakeholders. For instance, an environmental NGO is working collaboratively with the EMD in Durban. In addition, the city has begun to draw on its existing Ward structure to engage communities and community groups and to build their adaptation capacity. In addition to these civil society actors, Durban engaged consultants to conduct studies and assist with projects. Similar to Durban, NGO adaptation work in Quito appears to be limited to organizations with an environmental focus. For the most part, rather than working directly on projects, these NGOs have conducted research that has provided important information to governments. Quito also has relied on university scholars, centers, and programs to provide it with research in support of its initiatives.

Part VI: Conclusions

Minimizing the impacts that climate change will have on cities and their inhabitants requires that urban municipalities make concerted efforts to protect natural systems, the built environment, and human populations. City plans and planning processes are guided by the beliefs and goals that local public officials, representatives, and communities seek to advance. More often than not, these individuals and institutions are inclined toward maintaining the status quo. However, as transitions in Durban and Quito suggest, even highly resource-constrained cities are able to alter their practices.

The cases suggest that specific types of incentives and ideas can foster institutional change and promote adaptation planning in cities. Dedicated regulations and financial incentives are not yet influential in the adaptation arena and therefore, do not shape the activities of early adapters. Instead, these cities tend to be driven by their existing goals and priorities and influenced by the recognition that taking action in the short term is likely to ensure the viability of their cities in the long term. With respect to ideas, awareness of local vulnerabilities stemming from scientific information and assessments had a notable influence on climate decisions and actions. More generally, both cities benefited from personal interactions and participation in diverse forums as these fostered an exchange of information and ideas that generated locally-relevant insights.

The findings demonstrate the ways in which capacity serves as a complement to incentives and ideas in the adoption and mainstreaming of new urban initiatives. A critical resource that emerged in both cases was the presence of a local champion. These individuals can help raise awareness of the risks and importance of adaptation planning, identify ways to link adaptation to existing programs, and seize new opportunities that emerge in order to extend and mainstream adaptation efforts. Political support also emerged as an important resource. The support of public officials in both cities determined whether adaptation was viewed as a legitimate issue and affected the rate at which planning and implementation took place. Resources are important, but so too is resourcefulness. Efforts in both cities to link adaptation to ongoing initiatives and to engage the support of diverse stakeholders provided a means for extending capacity and creating a foundation for adaptation planning.

The trends and accomplishments in Durban and Quito provide insight into steps cities can take to initiate and sustain climate adaptation programs. First, while general strategies and broad guidelines are central to establishing a vision, action is predicated on the creation of sector-specific adaptation plans that include goals and intermediate targets. Second, the mainstreaming of climate adaptation may be most readily achieved when initiatives are linked to local priorities and ongoing activities. Third, it is essential to ensure that there are multiple ways for cities to gain access to reliable information. This includes locally-relevant scientific information about risks as well as information on pertinent adaptation measures. Fourth, cities need opportunities to share experiences and ideas through local, regional, national, and international networks, seminars, and conferences. Fifth, cities should be encouraged to establish climate offices that are not affiliated with a specific department or sector. These offices also need to be given adequate visibility and resources so that they can initiate and implement change. Finally, while local governments need to make a commitment to adaptation and work to coordinate intergovernmental efforts, they should extend their capacity by engaging nongovernmental stakeholders, including NGOs, CBOs, consultants, and universities.

The findings presented in this paper are based on the activities of two cities with similar administrative structures. It is likely that as more cities pursue adaptation planning, and we have opportunities for comparison across those with diverse forms of administration and management, we will uncover new trends and experiences in the adaptation planning process. In addition, the two cities studied here had relatively limited engagement with NGOs and moderate levels of institutional and financial capacity. Cities with alternative civil society relationships or different levels of capacity may follow different trajectories as different drivers may take on greater significance in these settings. Finally, it is important to acknowledge that as the adaptation context changes, and national governments develop regulations and dedicated adaptation funds and funder requirements emerge, late adapters will encounter different circumstances than the early adapters described in this paper.

Prevailing theories emphasize the ways in which external pressures and the diffusion of global knowledge and norms drive local change. However, the trends in Durban and Quito suggest that for early adapters, local change is shaped by an ability to link new initiatives to local priorities, to identify and generate locally-relevant knowledge, and to build on ongoing routines and existing programs. These patterns not only offer a counterpoint to the dominant theories, but offer practical lessons for policymakers and other cities seeking to engage in adaptation planning and implementation.

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