North African Coastal Cities Embrace a Climate-Smart Future

---Highlights from the May 30-31, 2011 Final Regional Workshop---

North African coastal cities, having analyzed the risks from natural disasters and climate change, now begin the task of formulating specific response strategies, setting priorities and mobilizing the necessary financing and technical support.

The springboard for moving from analysis to action came when 70-some experts and stakeholders gathered for the final regional workshop for the research project, held at the Marseille Center for Mediterranean Integration May 30-31, 2011. The study, *"Climate Change Adaptation and Natural Disasters Preparedness in the Coastal Cities of North Africa,"* found that three major cities—Alexandria, Casablanca and Tunis-- each face potential cumulative losses of more than $1 billion by the year 2030, unless they take various steps to lessen the risks. A fourth area—Morocco's Bouregreg Valley – is undergoing major urban development, and will address the natural vulnerabilities through climate-smart planning.

The study's overarching message for the cities is that historical coastal vulnerabilities are amplified by two trends: accelerated population increases in all four urban areas, and climate change. Population trends put more people, livelihoods and assets at risk, while climate change translates to sea-level rise, more frequent and more intense storm surges, and generally more weather-related extremes. But as part of the research effort, all four urban areas developed action plans incorporating risk-reducing programs in three spheres of response: improved urban planning, more effective institutions, and investments in strengthening infrastructures.

Setting the Stage

Opening the Marseille workshop **Mats Karlsson,** CMI's director, noted that the region's political transition translates into far greater public participation "in what kind of lives, cities and countries to create." Timely information—such as that contained in the research project—provides a necessary basis for setting priorities. **Franck Bousquet**, World Bank Urban and Social Sector Manager for the Middle East & North Africa, called for "direct dialogue with citizens" about the ways urban spaces must evolve to prepare for the impacts of climate change, and for making sure that the collective investments carried out in the preparation of the study become tools for the implementation of resilience and adaptation actions.

Eileen Murray, World Bank Tunisia Country Manager, said that at a time when the country will be setting out reforms in the financial, social, and local governance sectors, it must avoid neglecting the distinct challenges posed by climate change. She added that as it enters a new phase in its partnership with the country, the World Bank stands ready to assist in the development of a new urban strategy for

Tunis, which takes into full account newly available information on future climate-related vulnerabilities.

Key Ideas for Building Resilient Cities: Citing one of the key insights of the research, **Anthony Gad Bigio**, the World Bank urban specialist who led the study, called for experts and policymakers to integrate teams that currently focus on disaster preparedness and climate change. "The only way to come up with pragmatic solutions is by bringing these key areas together," he said. To the extent countries count on "two separate communities"—one focused on disaster preparedness and prevention, one on climate change—integration efforts are needed. Climate change impacts constitute about one quarter of the urban risks analyzed for the time horizon covered by the study, 2010-2030, but Bigio pointed out that further out into the future.

Throughout the workshop, participants underscored the enormously important role cities play as centers of economic activity, social and political organization and cultural life. **Stephan Hallegatte**, climate change specialist of the World Bank and Meteo France, presented data showing the disproportionate importance of cities: Lisbon, for example, accounts for 3.2% of Portugal's land mass but 38% of its Gross Domestic Product. Alexandria, Casablanca and Tunis are similarly crucial to the economic health of their countries and the surrounding region. Egyptian delegates, for their part, noted that Alexandria accounts for 40% of the industrial activity in the country. Thus, the stakes are increasingly high in protecting the fabric of cities, enabling them to accommodate expanding populations and attract investment. **Mohamed Nbou**, Director of Morocco's Department of Studies, Planning and Forecasting, Secretariat of State for water and environment, said the two-year project "allows us to integrate management of natural risks with other elements involving climate change." Climate-smart planning actions might include green set-aside areas, architectural standards, or zoning requirements to minimize building in low-lying, flood-prone areas. To improve institutional functioning, cities might redefine local and national responsibilities, establish early warning mechanisms, improve decision chains or draw up emergency response plans. Infrastructure investments might reinforce coastal defenses, expand city drainage systems, or address structural weaknesses in vulnerable buildings.

Key Ideas for Building Resilient Cities: A number of participants focused on vulnerable communities and areas that are vulnerable because they are flood-prone, cheaply constructed or both. Often – though not always – vulnerable people settle in vulnerable areas and structures because they can afford nothing else. Morocco's Mr. Nbou noted that some 267,000 housing structures in Casablanca are crowded, poorly built, and as a consequence are more vulnerable during a variety of natural disasters. Population growth translates to more shantytowns and slums for all three cities. Participants pointed out that relocation into sturdier housing isn't sufficient if people are placed at greater distance from their work or from essential services.

A Region At Risk. All the Mediterranean Prepares for Climate Extremes

The Mediterranean, and the countries along its northern and southern shores, constitutes a critical point in the global challenge of adapting to climate change, according to **Hugues Ravenel** of Plan Bleu. More heat-waves and droughts, along with more frequent floods and sea surges combine in ways that create particular stresses in the region. For the North African countries, current water stresses are likely to worsen, entering a phase of physical water scarcity by 2025. Warming trends are particularly pronounced in southern Spain and Portugal and along the North African coast—particularly in the summer months. The region accounts for 33% of global tourism, but visitors may shift their travel patterns if conditions make the Mediterranean less attractive.

Lower rainfall by 2020 could translate to a 10% reduction in cereal crops in Morocco in a normal year, with a 50% falloff in the drought year. Grazing areas, critical to herds, would be less productive.

City by City: Addressing Local Risks

Under Phase Two of the study, the cities drew up action plans for lowering each city's risks up to 2030. Accompanying data in the studies can assist decision-makers in understanding the costs and benefits of particular elements of their action plans. For Egypt, said **Nisreen Lahham**, Executive Manager of Egypt's Information and Decision Support Center, "climate change is one of the most serious challenges in years to come," with far-reaching social and economic impacts. A national committee for crisis and disaster management has been tasked with designing policies for limiting risks arising from natural disaster *and* climate change.

Tamer Abougharara, Program Manager, Arab Academy for Science, Technology and Maritime Transportation , based in Alexandria, cited trends that will combine to increase risks for Alexandria and its citizens by 2030: the population will grow by 40% to about 6 million; 54% of the coastline around Alexandria will be at high risk of erosion; systems for handling wastewater and runoff will be at greater risk of being overwhelmed. Significant storms, sea surges, or events like tsunamis will pose a greater risk for the city than in the past. **Noureddine Kaabi**, Tunisia's General Director for Infrastructure in the Ministry of Development and International Cooperation, said that Tunis began to focus on the evolving severity of weather-related risks after the floods of 2003, which caused multiple deaths and injuries along with the collapse of significant structures in Tunis.

Key Ideas for Building Resilient Cities: Tunisia's Mr. Kaabi expressed strong concerns about compounded and cumulative risks where two or more risk factors combine to imperil more people, livelihoods and structures. "We have threats of coastal erosion, and floods, the frequency of which is increasing," he said. For all the cities, risks begin to multiply when seaboard protections deteriorate, sea levels rise, and storm surges become more frequent. With an anticipated sea level rise of only 20 cm, Tunis would see "a significant rise in areas that could be flooded," Kaabi said, adding that flooding risks will worsen as another trend— urbanization—continues

apace, with Tunis moving from about 30% of its surface area being impermeable to nearly 50% in 2030. For Tunis, the additional factor of land subsidence within the cities expands the vulnerabilities.

Morocco's Mohamed Nbou said the study has pointed to various risks for which the country still needs strategic solutions—including growing coastal erosion along the littoral between Casablanca and Mohammedia. Currently, he added, Morocco has no program to limit the associated risks of increasing erosion, loss of beaches and threats of marine submersion, which are pronounced around Mohammedia.

Rachid Afirat, Director of Urban Planning, Agency for the Development of the Bouregreg Valley, reviewed the area's evolving risks of erosion, flooding, and submersion, noting that seal level rise and more frequent storms could weaken coastal defenses. He emphasized the central importance of the planning function in the case of Bouregreg, which will include 30,500 new housing units, as well as industrial and commercial structures. He said that structures will be mostly situated on more elevated areas, and that reinforced protections at the coast and elsewhere, will offer added security against submersion and landslides. He added that the new development will benefit from modernized surveillance and early warning systems, as well as streamlined structures for command and control in emergency situations.

Cities Set Programs and Priorities Assuming Uncertainties

All climate change strategies are forged amid uncertainties, with ever widening ranges of possible temperature increases, sea-level rises and storm frequencies. Stephane Hallegatte, of the World Bank and Meteo-France, stressed that cities can't escape climate-related uncertainties, but still must embrace climate-smart planning to minimize potential losses. Every climate-related projection provides ranges of temperatures, sea-level rise and storm frequency, with the ranges widening the further the time frame stretches into the future. That said, cities have no choice but to plan for the future, since water management systems, transportation infrastructures and natural disaster protections often need to last as long as 200 years. "A building designed today needs to work under very different climate scenarios in 2070," he said. The uncertainties don't justify inaction, but call for a different approach to decision- making—one that allows for adjustments, mid-course corrections, and strategies that are helpful under different climate scenarios. What's risky is locking into one approach that would be optimal under only one set of circumstances. "Strategies can be revised over time as a function of new information and knowledge," he said.

Maryse Gautier, Operations Director with CMI, said that variations and uncertainties surround not only possible mitigation actions that may materialize among carbon-emitting nations, but also "social, biological and organizational systems that will have to react to the impacts of climate change" over time. After identifying, financing and putting into place risk-reducing adaptation measures, governments will have to evaluate their impacts, making adjustments as necessary.

Putting Specific Action Strategies in Place

The workshop focused on specific prevention and adaptation measures. All recommended actions fall into three identified spheres of response: urban planning, institutional strengthening and infrastructure improvement.

Key Ideas for Building Resilient Cities. In a panel discussion on the priorities the cities will be putting in place, **Christine Kessides**, urban practice manager at the World Bank Institute, said that the three spheres of action "were like a triangle, with the institutional side as the base." She went on to say that "the institutional question determines who makes the decisions, how consensus is reached, how information is gathered and disseminated, and how policies are made and enforced." In sum, institutional functioning significantly influences the ways that planning and infrastructure investment are carried out.

Fabrizio Ferrucci, institutional specialist with Egis International, the lead consulting firm for the two-year study, noted that Alexandria, Casablanca and Tunis all count on civil defense structures to respond to urgent natural disasters, with environmental ministries taking responsibility for issues related to climate change.

He emphasized that slow-onset risks, such as droughts, heat waves, extreme water stress and sea-level rise differ from emergencies such as earthquakes or flash floods, but he nonetheless called for shared structures and systems. He said that all three cities need improved coordination among agencies, particularly with respect to early warning systems. He called for simplified systems for decision-making and chain-of-command in times of emergency, as well as insurance and reinsurance facilities to manage risks, whether or not they relate to climate change.

Monique Terrier, a seismology and tsunami expert with BRGM, underscored the importance of managing and preparing for fast-onset risks as well as the gradual shifts associated with climate change. Her remarks reminded participants that the Mediterranean is subject to seismic risks and has experienced tsunamis in the past. Modern early-warning equipment, together with effective communications can save lives and limit physical damage, she said. Urban planning—critical to keeping people and structures away from low-lying, vulnerable urban areas—is central to the capacity of all three cities and the Bouregreg Valley to manage changing risk scenarios, said **Victor Said**, Urban Planning Specialist with IAU-IDF, one of the principal consulting firms on the project. Climate-smart planning can be a high-return investment if it cuts future vulnerabilities, particularly with respect to areas slated for expansion. For Casablanca, coastal segments subject to a strong erosion risk increase significant by 2030, with inundation risks also increasing in identified areas of the city. Planning for additional protection along the coastline, plus zoning expansion and development away from areas identified as flood prone can lead to significant savings for Morocco according to the research findings discussed at the workshop.

For the Bouregreg Valley, planning becomes still more crucial since it provides a way to lower risks before streets are paved and buildings constructed. Urban plans

must include provisions for addressing specific vulnerabilities—such as reinforcing land that overhangs valley areas slated for concentrated building.

Turning to Tunis, the planning specialist noted the rising risk of flooding and marine submersion in the city. Subsidence in central Tunis and soil instability add to the threats. Alexandria, with high risks of coastal erosion, and a number of low-lying crowded slum areas, planning take on special urgency.

Consulting firm experts and policymakers alike underscored the need to increase attention on preparation, prevention and early warning systems. Tunisia's Mr. Kaabi noted that after the catastrophic floods of 2003, the city government has strengthened prevention policies. But he added: "We're still not doing what we should be in terms of preparedness. We still tend to act after the fact."

North Africa's coastal cities all need to manage carefully any expansion in low-lying, flood-prone areas or those subject to seismic risks, Said stressed. Breaking up paved over areas with open green spaces can improve drainage and protect biodiversity. Planning also needs to take account of another climate change element—worsening water stresses and shortages. New building and population growth will increase water demand, requiring cities to adapt thorough water use plans that reflect the realities of relative shortage. Building sizes, architectural forms, and densities would all need to vary in the future. Said stressed, adding that such a mix would maximize flexibility in the context of variable climate scenarios in the future.

Yves Ennesser, Program Leader of Egis International, discussed the best approaches for infrastructure improvements. The urban risks assessments contained in the studies show the specific risks that will materialize over the next two decades, detailing the ways that climate change could increase the vulnerabilities.

Key Ideas for Resilient Cities: Choosing a time frame for adaptation isn't simple, according to the World Bank's Mr. Bigio. Climate experts often focus on the years in the middle and end of the 21st century when the most dramatic and perilous impacts of climate change would be evident, with ever warmer temperatures, ever-greater ice cap melting, and ever-higher sea levels. However, he points out that policymakers are most likely to engage in addressing risks that will show themselves within their lifetimes, leaving future threats to the next generation. He urged the country officials to fashion "no-regret" investments and reforms that would be helpful in different scenarios, even if they require augmentation later. Experts also stressed the importance of mid-course adjustments: for example, infrastructures built in 2015 may need reinforcement in 2025 to withstand pressures expected to emerge after 2030.

He noted that all three cities face problems of coastal erosion, vulnerability to flooding, and marine submersion. All three cities, he said, would benefit from shoring up seawalls, beaches and other protective elements along the seaboard. Since the studies identify specific weak spots in the urban fabric of each city, the challenge for policymakers will be to identify the most urgent improvements and set

up a timeline for funding the changes and bringing in any needed technical assistance. For example, Casablanca has set a high priority on the construction of a "Super Collector West," which would direct excess water away from the city center, making people and buildings less vulnerable in time of flooding or torrential rains, as occurred in December 2010.

Moving to Implementation

In a final discussion about moving forward in the three countries, Egypt's Nisreen Lahham said that the country delegation had met to discuss the questions: "How can we benefit from this action that has lasted two years? How to start the next steps?" For their part, the Egyptian delegation is in the process of identifying priority actions in each of the three spheres of response—urban planning, strengthening institutions, and investing in infrastructure. Tunisia's Mr. Kaabi stressed the need to develop an urban plan that recognizes spatial constraints and emphasizes sound land-use practices. "We cannot expand cities indefinitely," he said, adding that he will push for a streamlined process for planning land-use frameworks. "Currently, it is spread across too many organizations."

Morocco's Mr. Nbou said that Casablanca has an improved planning process for the extended city, but he said that this would need to begin incorporating the impact of climate change. Some actions, such as the construction of a Super Collector West drainage canal, are already in the pipeline.

Meanwhile, the tools for assessing risks and fashioning cost-effective solutions can be applied beyond the three countries covered in the research. CMI's Maryse Gautier said the Center would function as a platform for exchange for the entire region, bringing together experiences and best practices as cities move forward to lower their risks. The World Bank's Franck Bousquet reiterated the willingness of the institution to support the countries and cities participating in the study with moving from the urban risk assessments and the preparation of action plans to investments and actions to make the cities more resilient and adapted to natural disasters and climate change. The assistance of the World Bank can be technical and financial, depending on the requests that are going to be formulated by the responsible authorities.

Interest and commitment extends beyond the three focus countries. Officials from Lebanon and Jordan said that disaster preparedness and climate change adaptation are priority concerns in their countries as well and that the focus on urban planning, institutional strengthening, and infrastructure would be applied there too, even if the specific risks differed.