Climate & Development Knowledge Network

INSIDE STORIES on climate compatible development

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Key messages

- Cartagena is the first coastal city in South America to produce its 'Guidelines for Adaptation to Climate Change', which assess the city's vulnerabilities and identify adaptation options that will support socioeconomic development.
- These guidelines lay the foundation for forthcoming municipal plans, including a full climate change adaptation plan and zoning policies.
- The Government of Colombia is closely watching the progress of this municipal process, which will influence the implementation of the National Adaptation Plan and similar approaches in other coastal cities and towns in Colombia.
- Planning for climate resilience is an ongoing process that requires constant and sustained capacity building of local stakeholders.
- Despite several recent changes in the political leadership of Cartagena, key city leaders remain committed to adaptation planning.
- The city considers adaptation as an important opportunity to build resilience, improve the life of its citizens and avoid long-term costs from inaction.

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Embedding climate change resilience in coastal city planning: Early lessons from Cartagena de Indias, Colombia

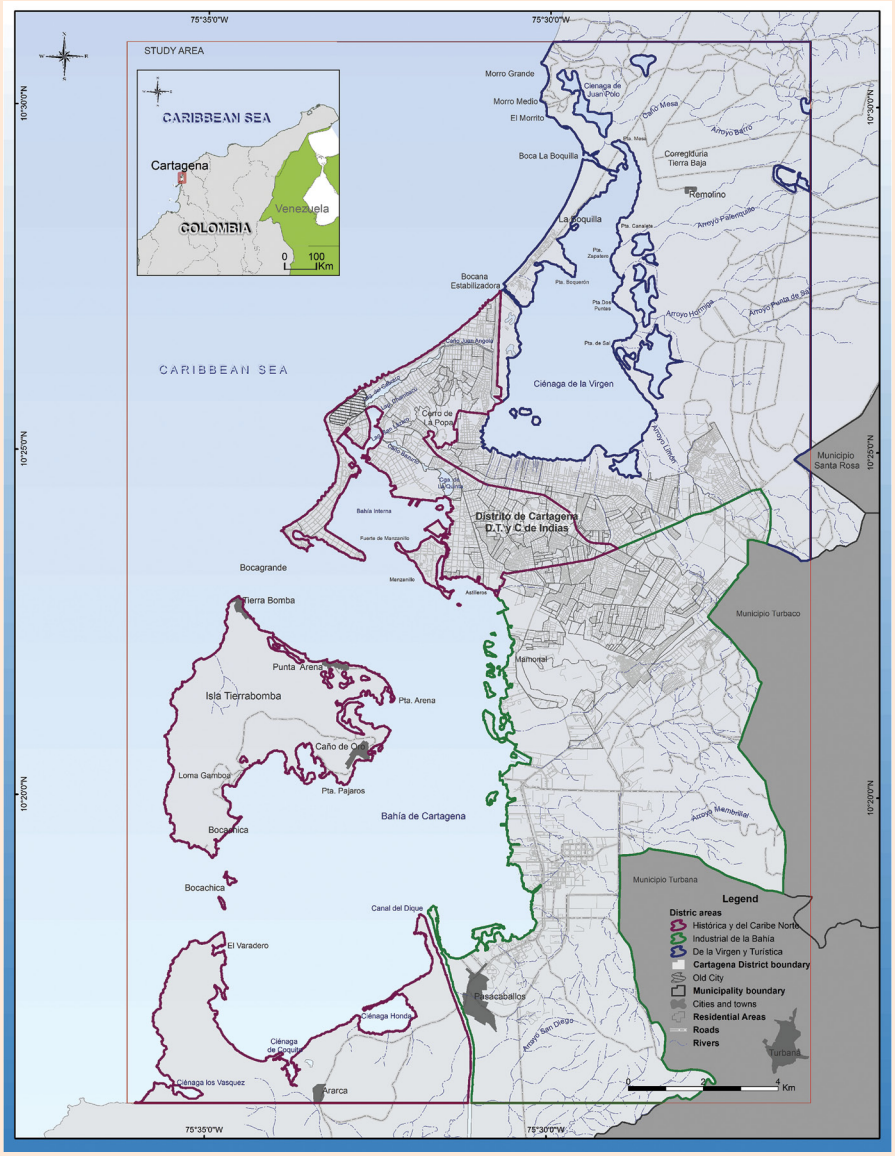
Cartagena's fortunes and perils have long been tied to the sea. With the release of its adaptation guidelines, the Colombian coastal city is preparing to manage sea level rise, extreme weather, flooding and disease resulting from a changing climate. This report's vulnerability assessment, summarised in 'Guidelines for Adaptation to Climate Change in Cartagena de Indias', is the most comprehensive of its kind yet developed in Colombia, with adaptation actions paired to emerging challenges. The guidelines methodically situate scientific knowledge and adaptation planning within the context of Cartagena; a city that encompasses both wealthy and impoverished communities, together with a heavy reliance on several climate-sensitive industries, such as tourism and transportation. This brief summarises the process that led to the guidelines' creation, and highlights how they lay the foundation for a full municipal adaptation plan.

Throughout much of its almost 500-year history, Cartagena attracted marauders and imperial armies who fought to seize the strategically located port city. Today, this trading hub instead lures beach-bound tourists, and faces new threats: from sea level rise, powerful storms, erosion, flooding and other symptoms of a rapidly changing climate. If left unaddressed, these events could set back recent gains in economic development, ecological resilience and human welfare. For instance, projections of sea level rise of one metre by 2100 highlight the vulnerability of the coastal zones of Colombia: an estimated 51% of urban areas along the country's Caribbean coast are expected to suffer detrimental consequences from erosion, flooding and saline intrusion.[1]

In response, Colombia has formulated a national plan of action to address vulnerability and enhance the adaptation capabilities of its coasts. Building upon initial studies from 2008[2] and responding to the socioeconomic significance and environmental complexities of

CDKN helps developing countries to design and deliver climate compatible development. When decision-makers in government, business and civil society speak to us about their aims and needs, they often ask about 'best practice' in other countries or, indeed, mistakes to avoid. What are the leading innovations in integrating climate change planning with economic growth strategies and poverty reduction? What are the biggest challenges faced along the way: institutional, financial, political, technical? This paper is one of a series of policy briefs that explore the 'Inside stories on climate compatible development': briefing papers that aim to answer these questions.

Figure 1. Map of Cartagena (INVEMAR)



Cartagena, a revision of the city's Land-use Plan was proposed as a method of dealing with climate challenges. This strategy has the support of the Climate and Development Knowledge Network (CDKN) and is coordinated by the Institute of Marine and Coastal Research (INVEMAR) in partnership with Cartagena's municipal government, the Ministry of Environment and Sustainable Development, and other local authorities and sectors.

The strategy's first goal is to integrate climate change adaptation into the Land-use Plan of the city, as well as other planning instruments and policies, to increase resilience to the impacts of climate change.[3] The report 'Guidelines for Climate Change Adaptation for Cartagena de Indias' was released in June 2012 and is the partnership's first major output. It presents the results of engagement initiatives and defines the guidelines for adaptation.

Climate and weather-related risks to Cartagena

The modern city of Cartagena de Indias encompasses everything from a necklace of seaside skyscrapers to a well-preserved colonial core (a UNESCO World Heritage Site) and sprawling informal settlements, where hundreds of thousands live in poverty. Cartagena's history and scenic harbours make it a popular tourist destination, while its commercial ports remain as busy as they have for centuries. However, high poverty rates and rapid rural-to-urban migration mean that economic development remains a pressing issue in Colombia's fifth largest city. A changing climate is likely to exacerbate problems already facing poor neighbourhoods, many of which are located in low-lying areas susceptible to flooding and erosion. Addressing human risks along with threats to livelihoods and industries, notably tourism and shipping, are of critical importance to Cartagena and to Colombia.[4]

Cartagena faces immediate and future threats from a changing climate. Flooding is increasingly common in low-lying areas, even after normal rainfall, due to sea level rise and inadequate urban drainage systems. Large storms are also occurring with greater frequency and intensity.[5] Flood-related impacts threaten housing, transportation and key

industries, as roads that bring goods to ports are cut off and storms disrupt port operations, leading to economic losses that are felt beyond the city. Sections of the historic colonial city and popular tourist beaches are also forecast to see increased flash flooding.[6]

Major coastal and marine ecosystems are at risk, including coral reefs, which are susceptible to bleaching and to ocean acidification as sea-water temperatures increase. Mangroves, already threatened by the encroachment of development, will be further impacted by sea level rise.[7] Mangrove protection is not only imperative for conserving biodiversity, but also for providing important services to the city by reducing the impact of hurricanes and erosion of beaches. Mangroves also facilitate the development and maintenance of fisheries, a source of food and local livelihoods. Losing the mangroves may exacerbate many of the most damaging climate impacts for the city.

There are also a number of climate-related risks to human health, with flood events and higher temperatures increasing water-borne, sanitation- and heat-related illnesses, such as dengue and diarrhoeal diseases, particularly among the large population without basic sanitary infrastructure and reliable waste collection.

In Cartagena, such impacts of climate change are occurring within the context of a highly stratified socio-economic structure. Of the nearly one million inhabitants, over half require state assistance to cope with poverty. While the city has made progress in fighting poverty in recent years, notably decreasing the percentage of poor people even while the population grew,[8] many impoverished neighbourhoods are located in marginal or low-lying areas highly susceptible to inundation, flash flooding and erosion. Cartagena has seen temporary camps in the city swelling with people displaced by weather disasters, yet development continues in low-lying areas at high risk of flooding. City leaders face a challenge in ensuring that communities are protected and services and infrastructure function effectively in the face of a changing climate.

Officials in Colombia have been considering the risks of climate change for over a decade. In particular, INVEMAR's regional environmental expertise has been directed at building a wide research foundation and valuable baseline datasets since 2002. In the Second National Communication on Climate Change, completed in 2009, coastal regions, and Cartagena in particular, were shown to be highly vulnerable to climate change.[9] This report laid out several main areas of concern, including a rise in sea level at a rate of at least 5.6 mm per year, though in an accelerated scenario this could increase to 100 mm annually by 2100.[10] A complementary report published by INVEMAR in 2008 provides projections of the potential severity of such impacts: for instance, 13.3 km^2 of mangroves could be lost, regular flooding is likely across 21.6 km^2 of the city and a third of the city's population could be directly affected by these and other impacts by as early as 2019.[11]

Cartagena's vulnerability assessment and adaptation guidelines

To manage challenges from climate change while also addressing socioeconomic development, an alliance was formed between CDKN, INVEMAR, the City of Cartagena, the municipal Chamber of Commerce, national ministries, universities and other local stakeholders. Under the CDKN-funded project 'Integrating adaptation to climate change into local planning and sectoral management in Cartagena', the first phase includes the vulnerability assessment and preparation of adaptation guidelines. Phase I, on which this paper focuses, ran from August 2011 to June 2012 and covered mainland areas of the city; a second phase (2012–2013) covers a greater geographic area, including the city's Islas del Rosario and San Bernardo.

Coastal flooding in Cartagena

Along with highland agriculture, the Ministry of Environment and Sustainable Development identified Cartagena early on as an important focal point for studying vulnerability and adaptation. The city's civic leaders have given their full support to the project and are relying on the partnership's vulnerability assessment to lay a foundation for integrating climate compatible development into municipal policy.

The 'Guidelines for Adaptation to Climate Change in Cartagena de Indias' was conceived as a planning support tool and is the result of extensive scientific research, workshops, focus groups and interviews with the involvement of 64 different civil society stakeholder groups in Cartagena. Its results will be published in different publications, for use by stakeholders groups including academic and political audiences.

An expert involved in the initiative stressed that "the local priorities of stakeholders should guide the vulnerability assessment, as well as the data available". This spirit has directed much of the process that led to the creation of the guidelines. Workshops began in late 2011, giving interested parties an opportunity to help prioritise sectors and neighbourhoods, as well as discuss the local impacts of climate change. INVEMAR coordinated a scientific research team composed of internal and external personnel, including experts in information systems, biology, geology and other technical areas, most of whom were based in Colombia.[12]

The adaptation guidelines are based on an extensive vulnerability assessment that updates and expands the results of INVEMAR's 2008 report. A major addition was research into how different neighbourhoods and environments around the city, such as the historic centre or mangroves, are vulnerable to various impacts of climate change. Another area of emphasis was poor communities. Many are located in high-risk areas vulnerable to climate impacts including flooding, erosion and increasing prevalence of health problems. Representatives from poor communities and at-risk livelihoods, such as fishermen, have been consulted and updated throughout the process.

Following the summary of the vulnerability assessment, the report concludes with a short section on adaptation actions connected to specific risks, like coastal erosion or flooding. Six municipal categories are covered: urban and rural development; infrastructure and investment;

Cartagena. Aerial view of the walled colonial city

citizens; ecosystems; storm water and sewers; and institutional organisations. A range of 'priority actions' or 'possible considerations' is listed for each category. Though the recommendations, gleaned from workshops and expert knowledge, are specific and actionable, they are only guidelines to lay a foundation for possible future measures.

The report also emphasises a number of entry points for climate vulnerability and adaptation knowledge to be assimilated into municipal planning policy, particularly in land-use and zoning policy. This approach will assist the broader effort to harmonise development imperatives with adaptation, and could offer a useful model to other governments interested in ways of codifying climate research into existing policy.

Next steps

Dialogue among stakeholders is ongoing, with the aim of continuing to receive insights and suggestions for the next phases as Cartagena pushes towards becoming the first coastal city in Colombia to integrate vulnerability and adaptation into municipal policy.[13]

Despite the city's having recently passed through an unstable political period with successive mayors, it has nonetheless managed to create a governmental action plan with climate action at the centre. Furthermore, the planning office of Cartagena intends to have its own group dedicated to managing climate change risks. By nurturing participatory processes and coordinating climate change with development issues, climate policy is more likely to be effectively mainstreamed at the local level and shared between regions.

The national government is carefully watching this municipal process, and may assimilate insights into the implementation of its National Adaptation Plan and in other coastal assessments around Colombia. The organisers have also shared their hope that other coastal cities around the world will look to the processes piloted in Cartagena.[14] However, stakeholders recognise that the guidelines require further specific recommendations and look forward to more detailed advice. The guidelines lay the foundation of the full adaptation plan, which is expected to be released in 2014. Other supporting outputs include an interactive tool that aids decision-making by assembling results from the study in an easy-to-use and query map-based format,[15] as well as a published summary booklet for sharing adaptation guidelines.[16]

Lessons and implications

- **Robust scientific underpinning is a key element of adaptation policy.** Time horizons for climate change are distant and the benefits of adaptation strategies are often not directly visible. However, scientific research can provide the best information available and help decision-makers take into account the uncertainties of these time horizons, establishing baselines and assessing options.

- **Manage expectations and cross-cutting interactions.** Considering broad impacts and integrating diverse sectors inherently involves a range of stakeholders with different backgrounds and priorities. However, one project leader noted that it took a long time to get all stakeholders on the same page in terms of expectations. For example, several groups narrowly interpreted 'adaptation' to mean only large engineering projects and not a wider set of hard and soft measures. "Adaptation is evolving in terms of practice and what it means on the ground to [different stakeholders]" according to one expert. Recognising and harmonising such differences takes time and effort, and should be anticipated as much as possible. Conducting a vulnerability assessment and preparing an adaptation plan takes time and requires buy-in and approval from all stakeholders. Experts interviewed for this report agreed that it was necessary to get everyone on the same page and satisfied, even if it took an extended amount of time, effort and occasional reboots.

- **Balance the opportunity costs of adaptation.** Integrating climate change into land-use policy means accepting that almost all kinds of development will face new hurdles or costs associated with newly identified risks. These disincentives have diminished the enthusiasm of some key stakeholders. For example, real estate developers may

What Cartagena can share is experience, not lessons. There may not be models that can be shared, but frameworks that are transferable.

Cartagena's communities try to mitigate the impacts of a rising ocean

be forced to deal with new restrictions or lengthened approval processes. An official tied to the process said that "it's really hard to make people and investors understand the risk of climate change projections. If they don't see the seas rising, they don't believe it will ever happen." Overcoming such hesitations was aided by significant buy-in from key officials, including the Mayor of Cartagena and national officials, but nevertheless took time and effort to manage. Convincing sceptics has also been effectively aided by connecting recent weather disasters and signs of sea level rise with climate projections, supplemented by an ongoing emphasis in many of the workshops on assessing the potential costs of inaction against the relatively smaller costs of proactive adaptation.

- **Involve officials.** A key ingredient of success has been ongoing and active support from municipal and national government officials. They have been involved throughout the process, with the Ministry of Environment first identifying Cartagena as an area of focus for a CDKN initiative. The mayor's office has taken on a supervisory role with four successive incumbents, keeping the involvement of their administrations high. Meanwhile, ongoing attention from the government in Bogota, as well as effective two-way communication between stakeholders and officials, has helped keep the process on track and provided valuable mid-term feedback.

- **Build local capacity.** INVEMAR's status as a preeminent climate change research institute in Colombia and their coastal expertise made them obvious leaders for this process, which has benefited from their long-term involvement in the region. INVEMAR's extensive research experience enabled rapid results in this initiative and helped stakeholders accept adaptation imperatives, according to experts involved in the project. This success emphasises the benefit of taking action sooner rather than later, and points to the fact that the 'rapid' gains made so far are the result of the painstaking years of work that came before.

- **Involve experts.** Despite the obvious strengths of INVEMAR, many officials contacted for this brief agreed that the process would have benefited from bringing in more experts, particularly those with experience

on comparable projects. Balancing the imperative to harness and develop local talent and engage local stakeholders, while also recognising the advantages that international experts practised in these processes can offer, is a common challenge among such large and pioneering projects. A process of this scope and without national precedence requires expanded, deepened interaction with practiced experts to complement local knowledge and expertise. Nevertheless, a clear strength of the study is the breadth and diversity of the national team, and the extent of local support. This has surmounted many hurdles and contributed to the rapid identification of major problems.

- **Entry points into local policy.** Land-use and zoning policy offer innovative and cost-effective entry points for introducing results into municipal policy. One official working on the initiative stated that it was the "best instrument we have to insert adaptation into the development and planning of cities". However, other officials expressed confusion as to why a land-use approach was emphasised over others, such as looking at livelihoods, or at least why more dimensions were not incorporated simultaneously. However, adaptation through land-use planning may prove to be cost effective through the implementation of soft adaptation measures that take advantage of coastal ecosystem services. A typical example is the rehabilitation and maintenance of mangrove habitats, a soft barrier that protects the coast from erosion and destructive storm surges, and acts as natural infrastructure.[17]

- **Share results.** INVEMAR staff and officials interviewed for this brief repeatedly stated that they want the adaptation work in Cartagena to be an example for Colombia (and coastal cities beyond) of how stakeholders are addressing climate change and development. However, the challenge of transferring insights from Cartagena to other cities will be significant, as impacts and adaptations are always local in nature. In the words of an expert involved in the process, "what Cartagena can share is experience, not lessons. There may not be models that can be shared, but frameworks offering relevant questions can be transferable." These can help other cities conduct their own assessments. Much work remains before this goal can be met, however, particularly in connecting this new research with existing planning processes. Nevertheless, this in-progress initiative is already offering valuable insights into climate compatible planning, especially in terms of stakeholder mobilisation and organisation.

High waves flood roads on the Cartagena sea front

- **Communicate and share knowledge.** A variety of communication tools are allowing knowledge to be shared to a number of key stakeholder groups, empowering them with the necessary information in a relevant format to tackle adaptation in their fields. Targeted communication tools are vital to the short- and long-term success of the project.

Interviewees

- **Francisco Arias**, Director General, INVEMAR
- **Fabián Navarrete Le Bas**, Ecoversa
- **Sarah Opitz-Stapleton**, Research Scientist, Staplets Consulting
- **Ximena Rojas Giraldo**, Researcher, INVEMAR
- **Sandra Lorena Santamaria Rojas**, Climate Change Group Advisor, Ministry of Environment and Sustainable Development, Housing and Territorial Development, Colombia

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16. www.youblisher.com/p/369025-lineamientos-de-adaptacion-al-cambio-climatico-para-cartagena-de-indias/
17. Using mangrove systems as natural protective barriers was identified and implemented as an ecosystem-based adaptation in the INAP (2006-2011) by the International Union for Conservation of Nature (IUCN) in San Andrés and Providencia, showing how this can be a successful initiative in other parts of Colombia. The full case study can be found at: http://data.iucn.org/dbtw-wpd/edocs/2010-050.pdf

About CDKN

The Climate and Development Knowledge Network (CDKN) aims to help decision-makers in developing countries design and deliver climate compatible development. We do this by providing demand-led research and technical assistance, and channelling the best available knowledge on climate change and development to support policy processes at the country level.

About Acclimatise

Acclimatise is a specialist advisory and digital application company providing world-class expertise in climate change adaptation and risk management (www.acclimatise.uk.com).

About Ithaca Environmental

Ithaca Environmental is an independent consulting group on climate change providing advice to private companies, governments, NGOs and multilateral organisations (www.ithacaenvironmental.com).

About INVEMAR

The Marine and Coastal Research Institute INVEMAR conducts basic and applied research on coastal, marine and oceanic systems of national interest in Colombia. It provides scientific knowledge to the Ministry of Environment and Sustainable Development and other public and private entities.

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