

ARTEFACTS OF DISASTER RISK REDUCTION

COMMUNITY BASED INITIATIVES
TO FACE CLIMATE CHANGE IN
LATIN AMERICA AND THE CARIBBEAN



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Artefacts of Disaster Risk Reduction

Community Based Initiatives to Face Climate Change in Latin America and The Caribbean

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ABSTRACT

In times of global warming, disaster risk reduction poses a great challenge for governments and organizations in the Global South. The challenge is even greater in informal settings: that is, in contexts where housing and economic activities emerge primarily from residents' efforts. In slums, *barrios*, *favelas*, *tugurios*, *comunas*, and other low-income neighborhoods, residents must try to secure access to water, sanitation, shelter, and other services in parallel with, or without, government action. Two major obstacles to disaster risk reduction arise. First, climate policy designed by national governments rarely responds to the needs and expectations of citizens living or working in informal settings. Second, policy- and decision-makers tend to disregard people's claims for social and environmental justice, and their bottom-up initiatives, perceptions, and ways of dealing with risk.

In *Artefacts of Disaster Risk Reduction*, our team explores how to bridge the gap between inefficient top-down policymaking and the often-neglected capacities on the ground. We coined the term "artefacts of disaster risk reduction" to refer to the set of rituals, practices, events, and spaces that make it possible for people in informal settings to work together, develop trust, and reduce or manage the multiple risks they face.

This online publication results from a four-year project called ADAPTO or Climate Change Adaptation in Informal Settings: Understanding and Reinforcing Bottom-Up Initiatives in Latin America and the Caribbean ([see final report here](#)). In this action-research project, funded primarily by Canada's International Development Research Centre (IDRC), we studied the implementation of 22 bottom-up initiatives in four cities: Carahatas (Cuba), Yumbo (Colombia), Salgar (Colombia), and Concepción (Chile).

In the following sections, we explain the ADAPTO project and reflect on implementation of bottom-up initiatives in informal settings in Latin America and the Caribbean. We draw 10 key lessons from our work. The 22 local initiatives are described and explained in dedicated research reports. For each initiative, we reflect on the challenges and opportunities that emerged during the on-the-ground implementation process and stakeholder collaborations. We also highlight the main takeaways for each initiative.

Finally, we provide nine policy and practice recommendations aimed at various stakeholders involved in climate change adaptation and disaster risk reduction, including governments, community organizations, academics, and community leaders.

FACING CLIMATE CHANGE IN INFORMAL SETTINGS

By David Smith, Gonzalo Lizarralde, Lisa Bornstein, Benjamin Herazo, Trent Bonsall, and Steffen Lajoie.

Climate warming scenarios for Latin America and the Caribbean predict a mean temperature increase of roughly 4.5°C by the end of this century, as compared with pre-industrial timesⁱⁱ. Higher temperatures increase the frequency and severity of droughts, hurricanes, tropical storms, and other hazards. They also exacerbate stressors such as erosion and sea level rise. Global warming alters patterns of wet and dry seasons, creating atypical periods of intense rainfall and drought that disturb the ecosystems upon which residents depend.

Climate change is not only a meteorological problem, however. Racism, colonialism, elitism, savage capitalism, and other social injustices have created the conditions underlying the unequal impact of risk in the regionⁱⁱⁱ. In Latin America and the Caribbean, an estimated 103 million people live in informal settlementsⁱⁱⁱⁱ, and poverty and food insecurity have significantly increased since 2020. Residents in informal settings are typically more vulnerable to climate change related risks than people living in formal housing and occupying formal jobs (see article [here](#)). Low-income residents in the region generally depend on the informal economy for their livelihoods, live in settlements that are exposed to hazards (e.g., in sloped areas, near waterbeds or in coastal areas), and have limited access to credit, land tenure, infrastructure, and services. Low-income women are typically more vulnerable to natural hazards than men. They have lower incomes, are less likely to own property, and often bear the double burden of generating income all the while caring for children and elderly family members^{iv}. The combination of increased natural hazard exposure and vulnerability arguably explains why informal settlements are among the most disaster-prone areas in the world.

Informal settings refer to the times, places, and circumstances where in people (at the individual, household, or community scale) develop informal mechanisms to respond to local conditions, and informal measures to secure access to water, sanitation, shelter, income, and services in the face of marginalization and other hostile conditions. These informal mechanisms and measures are developed outside or in parallel with institutionalized procedures and standards. Informality is an attribute and a way of doing things within a system of economic activities, governance structures, and built environment production processes^{lv}.

The notion of informality in this context has, of course, subjective, and fuzzy boundaries. Informal mechanisms and measures often overlap or co-exist with formal and institutionalized plans and programs, thus blurring the formal-informal divide^{lvii}. Informal settings intersect with ideas of the vernacular, indigenous, or craftsmanship, and are highly context specific. Informal housing conditions and economic activities differ in Cuba, Colombia, and Chile.

We recognize that the term “informal settings” might convey misconceptions about illicitness or illegality. However, we emphasize that the term does not refer to a legal status but to housing and economic conditions that emerge from local agency in parallel with government action or in its absence. Excerpt from the [ADAPTO final report available here](#).

Bridging the Implementation Gap

Most scholars and international agencies now consider that adaptation to climate change effects is unavoidable^{lviii}. In fact, climate change adaptation and disaster risk reduction in Latin America and the Caribbean are a priority for United Nations agencies, the World Bank, the Organization for Economic Cooperation and Development (OECD), the International Monetary Fund (IMF), and other multilateral international organizations, national governments, and municipalities in Cuba, Colombia, and Chile. In recent years, these three countries have developed comprehensive national climate change adaptation plans and disaster risk reduction programs^{lviii}.

However, implementation of climate reaction plans and programs in Latin America and the Caribbean can be difficult—particularly in small- and medium-sized cities. Compared to large urban centers, small- and medium-sized cities have less infrastructure and capacity to offer basic services. They often operate with meagre budgets and lack technical, legal, and administrative resources to deal with housing and infrastructure deficits^[ix]. Since the 1990s, decentralization in the region (often promoted by neoliberal policy) has led to an increase in local authorities' responsibilities, including implementation of disaster risk reduction plans, infrastructure development, and housing delivery. However, adequate decision-making power, investment in administrative capacity, and financial resources have rarely accompanied these decentralization measures^[x]. Many municipalities have lost the capacity to deal with rapid urbanization patterns, infrastructure needs, and social problems.

In addition to the problem of insufficient institutional capacity at the local level, climate adaptation and risk reduction policies formulated by central governments are often at odds with local needs and economic objectives. As a result, municipal officials and planners face difficult decisions, such as implementing relocation programs that residents actively oppose, zoning agricultural land for urban development, and protecting green areas that would otherwise be available for development. Moreover, decisions about planning often create secondary effects at the local level, such as pushing urban development far from urban centers, gentrifying areas, and increasing land prices. Finally, national policy often overlooks residents' lifestyles and challenges, as well as symbolic, economic, and cultural connections with land, water, and ecosystems.

In response to structural problems and policy contradictions, residents in informal settings often initiate, plan, and execute activities that help them cope with their daily struggles and to some degree, reduce risk. Informal settings are therefore effective incubators of culturally rich and informally driven responses to disasters and risks. These strategies are often initiated and led by women, who display various forms of leadership (e.g., charismatic, communicational, and organizational) within families, communities, and civil society groups. However, these initiatives are sometimes ignored by decision- and policy-makers, who may prefer

to halt informal development, evict informal residents, and replace informal housing and commerce with green areas, master-planned urban development, infrastructure, or urban beautification initiatives^[xi]. It is often fair to say that there is a significant implementation gap between top-down policies and local initiatives on the ground. Informal and locally driven adaptation strategies emerge within a variety of governance conditions. Informality manifests differently in Cuba, Colombia, and Chile. Government responses to informality also vary within countries and over time.

They generally range from intolerance (including evictions, decrees of illegality, and master plans to replace informal solutions) to laissez-faire approaches. Sometimes, authorities exercise too much power to be able to radically transform informal settings. In other cases, they are explicitly or implicitly absent. In all cases, however, insights from local initiatives are misunderstood by authorities, insufficiently documented, transferred, or integrated in policy.

[i] Reyer, C. P. O., Adams, S., Albrecht, T. et al. (2017). Climate change impacts in Latin America and the Caribbean and their implications for development. *Regional Environmental Change*, 17(6), 1601–1621.

[ii] Kelman, I., Mercer, J., & Gaillard, J.-C. (Eds.) (2017). *The Routledge handbook of disaster risk reduction including climate change adaptation*. Routledge; Blaikie, P. M. et al. (1994). *At risk: Natural hazards, people's vulnerability, and disasters*. Routledge; Oliver-Smith, A. (2007). Successes and failures in post-disaster resettlement. *Disasters*, 15(1), 12–23; Wisner, B. et al. (2007). *Climate change and human security*. Peace Research and European Security Studies.

[iii] United Nations. (2018). *The Sustainable Development Goals report*.

[iv] Chant, S. (2013). Cities through a “gender lens”: A golden “urban age” for women in the Global South? *Environment and Urbanization*, 25(1), 43–57; World Health Organization. (2014). *Gender, climate change, and health*.

[v] Hansen, K. T. (2001). Informal sector. In N. J. Smelser & P. B. Baltes (Eds.), *International encyclopedia of the social and behavioral sciences* (pp. 7450–7453), Pergamon; Hernández-García, J. (2013). The production of informal urban space: The barrios of Bogotá. In J. Hernández-García & P. Kellett (Eds.) *Researching the contemporary city: Identity, environment, and social inclusion in developing urban areas* (pp. 141–168), Editorial Pontificia Universidad Javeriana; Hussmanns, R. (2004). *Measuring the informal economy: From employment in the informal sector to informal employment*. Integration Working Paper No 53; Lizarralde, G. & Root, D. (2008). The informal construction sector and the inefficiency of low-cost housing markets. *Construction Management and Economics*, 26(2), 103–113; Werna, E. (2001). Shelter, employment, and the informal city in the context of the present economic scene: Implications for participatory governance. *Habitat International*, 25(2), 209–227.

[vi] Doherty, G. & Silva, M. (2011). Formally informal: Daily life and the shock of order in a Brazilian favela. *Built Environment*, 37(1), 30–41; Durand-Lasserve, A. & Selod, H. (2009). The formalization of urban land tenure in developing countries. In V.L. Somik et al. (Eds.). *Urban land markets: Improving land management for successful urbanization* (pp. 101–132). Springer.

[vii] Klein, R. J. T., et al. (2007). Inter-relationships between adaptation and mitigation. In M. L. Parry, O. F. Canziani, J. P. Palutikof, P. J. van der Linden & C. E. Hanson (Eds.), *AR4 climate change 2007: Impacts, adaptation, and vulnerability. Contribution of working group II to the fourth assessment report of the intergovernmental panel on climate change* (pp. 745-777). Cambridge University Press.

[viii] Feld, B. & Galiani, S. (2015). Climate change in Latin America and the Caribbean: Policy options and research priorities. *Latin American Economic Review*, 24(1), 1-39.

[ix] Birkmann, J., et al. (2016). Boost resilience of small and mid-sized cities. *Nature*, 537(7622), 605-608.

[x] Hardoy, J., & Romero Lankao, P. (2011). Latin American cities and climate change: Challenges and options to mitigation and adaptation responses. *Current Opinion in Environmental Sustainability*, 3(3), 158-163.

[xi] Aguilar, L. (2009). Women and climate change: Vulnerabilities and adaptive capacities. In Starke, L. (Ed.), *State of the world 2009: Into a warming world* (pp. 59-62). Worldwatch Institute.

OUR ACTION RESEARCH PROJECT

What We Wanted To Know

- 1 How do local leaders and residents formulate and execute bottom-up initiatives to deal with climate change effects in informal settings?
- 2 How do local rituals, practices, and existing (or missing) urban systems and regulations influence bottom-up initiatives?
- 3 How does local leadership emerge in informal settings? How do stakeholder collaboration and community engagement take place throughout the implementation process?
- 4 How does local leadership emerge in informal settings? How do stakeholder collaboration and community engagement take place throughout the implementation process?

In this online publication, we draw lessons from ADAPTO, one of the most ambitious action-research projects conducted to date on climate change action in informal settings in Latin America and the Caribbean ([See the final report here](#)). The artefacts of disaster risk reduction reveal the interplay between institutions, places, beliefs, and behaviors that emerged during the implementation of 22 bottom-up initiatives aimed at reducing risk. The profiles presented in this publication explain the processes that was used to select, finance, support, execute, and monitor these initiatives in Carahatas (Cuba), Yumbo (Colombia), Salgar (Colombia), and Concepción (Chile). Each profile presents the initiative's objective, implementation process, results, lessons learned, and replicability opportunities. Finally, we draw lessons that may be relevant to local leaders, residents, development practitioners, policymakers, and researchers.

How We Worked

Our team was composed of more than 20 researchers from the disciplines of architecture, urban planning, engineering, social work, and social geography—many of whom are co-editors and authors of this online publication. The researchers are based in four Latin American universities (Universidad Central Marta Abreu de las Villas in Cuba, Pontificia Universidad Javeriana and Universidad del Valle in Colombia, and Universidad del Bío-Bío in Chile) and in three Canadian universities (Université de Montréal, McGill University, and Concordia University).

The team also included senior officers from Corporación Antioquia Presente, a Colombian NGO focused on disaster response activities in the region. The team and local leaders intervened in four localities: Carahatas in Cuba, Yumbo and Salgar in Colombia, and Concepción in Chile. The four areas present different degrees of informality in housing, infrastructure, livelihoods, and access to services. Most residents of these localities have experienced firsthand the impact of natural hazards. They also face intertwined factors of vulnerability—such as poverty, unemployment, and food insecurity—that exacerbate disaster impacts and hinder reconstruction processes. Local governments in the four localities face significant dilemmas in implementing climate and risk reduction policy, since they must find a balance between economic development, preserving natural ecosystems, protecting of residents against hazards, and respecting their traditions. There are differences in the four localities in terms of government structures and institutional provision of welfare services. Because of these differences, it is possible to analyze the impact of the governance context on bottom-up initiatives.

Even before the project was launched, our team engaged with local actors and institutions. We also decided not to be passive observers of the phenomena under investigation, but to serve as active agents in the transformation process. By working closely with local leaders, we were better able to follow their activities, gain their trust, and understand the dynamics of implementation from within. For four years, we documented the development of 22 initiatives in informal settings. We discovered how local leaders seize opportunities and prioritize different challenges. We also came to appreciate the factors that lead to success and failure.

Our degree of influence on the implementation process varied. In what we called Type A or academically partnered initiatives, we played a strong supporting role. Researchers and students helped leaders and residents in the design, planning, building, and management of activities. Our team greatly influenced these initiatives, which benefitted from direct action research. In contrast, for Type B or locally driven initiatives, the research team's role and influence were more modest. These initiatives were led and coordinated by local leaders, with academics playing only a monitoring role in the initiative's development.

After a call for proposals in each informal settlement, a scientific committee selected the most pertinent initiatives. The committee prioritized initiatives led by women, but also selected initiatives with mixed or male leadership. Each initiative received CAN \$4,000 and, eventually, they all leveraged additional resources and funding from local donors, private companies, NGOs, funding agencies, and governments. In many cases, the funding we provided corresponded to less than 25% of the resources required to complete the initiatives. In all cases, researchers provided leaders and participants with training and documentation on various topics, such as climate change trends, leadership, water management, hazard-proof construction, and sustainable gardening practices. In many cases, they also facilitated networking among local leaders, municipal officers, and other relevant stakeholders.

OUR MAIN RESULTS

The 22 bottom-up initiatives served simultaneously as a research method and as a way to produce tangible change in informal settings. They created what we coined “artefacts of disaster risk reduction”: tangible objects and intangible spaces rooted in a deep understanding of the territory, local customs, and culturally relevant practices and rituals. These objects and spaces generated opportunities for open dialogue and established trust among citizens, local leaders, academics, business owners, and government officials. Most importantly, they allowed people in informal settings to reduce and manage the multiple risks they face.

	Code	Bottom-up initiative	Location	Type	Type of risk / Type of response / View of disaster													
					Flood	Sea level rise	Landslides	Droughts	Air/soil/water pollution	Food insecurity	Deforestation	Crime and violence	Urban agriculture	Sports and recreational activities	Art and cultural events	Education and training activities	Infrastructure/urban	Anthropogenic
Cuba, U. Central	MP-CU-01	Resilient housing through community self-management	Carahatas, Cuba	A														
	MP-CU-02	Community group <i>Mujeres del Mar</i> (Women of the Sea)	Carahatas, Cuba	A														
	MP-CU-03	Circle of interest <i>Yo me adapto</i>	Carahatas, Cuba	A														
	MP-CU-04	Coastal marine festival	Carahatas, Cuba	A														
	MP-CU-05	Community social networking group <i>Voces de Carahatas</i>	Carahatas, Cuba	A														
Concepción, Chile U Bio-Bío	MP-CH-01	Vertical community garden	Concepción, Chile	A														
	MP-CH-02	Pottery workshop	Concepción, Chile	A														
	MP-CH-03	Natural mitigation and irrigation barrier	Concepción, Chile	A														
	MP-CH-04	Botanical illustration workshop	Concepción, Chile	A														
	MP-CH-05	Classrooms in natural environments	Concepción, Chile	B														
	MP-CH-06	Forest therapy	Concepción, Chile	B														
	MP-CH-07	Plaza Nonguen	Concepción, Chile	A														
	MP-CH-08	Estuary dome	Concepción, Chile	A														
	MP-CH-09	Water recovery demonstrations	Concepción, Chile	B														
Cali, Colombia U Valle	MP-CO-01	Sustainable urban drainage system (SUDS) (I and II)	Yumbo, Colombia	A														
	MP-CO-02	Water management system	Yumbo, Colombia	A														
	MP-CO-03	Community gardens	Yumbo, Colombia	A														
	MP-CO-04	Reforestation Yumbo	Yumbo, Colombia	A														
	MP-CO-05	Family garden (I and II)	Yumbo, Colombia	B														
	MP-CO-06	Reforestation Guanabitas (I and II)	Yumbo, Colombia	B														
Salgar	MP-CO-07	Ecosystem adaptation	Salgar, Colombia	B														
	MP-CO-08	Managing the risk	Salgar, Colombia	A														

Table 1. Local initiatives, including type of risk addressed and response deployed.

Local leaders and stakeholders designed and implemented the initiatives in response to multiple risks, including floods, food insecurity, sea level rise, landslides, erosion, water pollution, soil pollution, air pollution, heat waves, drought, deforestation, crime, and violence (see Table 1). They dealt with risk through culturally relevant activities in collective spaces, including construction, urban agriculture, recreational activities, art, education, and training. The initiatives focused on:

- Environmental protection and responses to the fragile relationships between people, the built environment, and ecosystems;
- Water management and consumption, including infrastructure for potable water, drains, reservoirs, and water collection;
- Protection of humans and the built environment from water-related hazards (floods, landslides, cyclones, tsunamis, droughts, and sea level rise); and
- Urban agriculture and food security.

Carahatas: The Search for Continuity Despite Risk

Cuba has a comprehensive climate policy called Tarea Vida that sets guidelines for intervention in risk-prone areas and establishes conditions for the relocation of settlements affected by sea level rise^[i]. In addition, a national law bans new construction of houses, facilities, and infrastructure in flood-prone areas. However, residents in Carahatas and other coastal villages prefer to live with water-related risks since their livelihoods are tied to the sea. Consequently, authorities in coastal cities in Cuba now face a dilemma: whether to relocate coastal villages or allow them to remain there and be reconstructed when needed,

As in other nearby coastal settlements, there is a high risk of sea level rise. The settlement of about 600 people is situated near the Cayos (the Keys), a well-known tourist destination. It is part of a larger maritime ecosystem protected by the Cayos del Pajonal, Frago, and (further east) Cayos de Santa Maria. Carahatas is located 100 km from the inland city of Santa Clara (250,000 inhabitants), the largest city and regional center of the Villa Clara province, where the Universidad Central Marta Abreu is located.

It is estimated that 50% of the houses in Carahatas will be under water by 2050, and that by 2100 that figure could be as high as 90%. In the past few years, Carahatas has been hit by several hurricanes and tropical storms. In 2017, Hurricane Irma damaged more than 60% of the houses in the village. Residents largely depend on fishing for their livelihoods, so inland relocation, advocated by the government, is particularly contentious. Many residents fear the experience of Nueva Isabela, a fishing community that was partially moved to prefabricated five storey apartment blocks located 15 km from the coast. Carahatas residents prefer to stay near the sea and learn to live with the risks while maintaining their livelihoods, traditions, and culture^[ii].



Settlement: Carahatas	Main city, Region: Santa Clara, Villa Clara
Country: Cuba	Population: 600
Main source of livelihoods: Fishing	Partnered university: University Central las Villas
Academically partnered (type A) initiatives: Resilient Housing Through Community Self-Management, Community Group Mujeres del Mar (Women of the Sea), Circle of Interest Yo me Adapto (I Adapt), Coastal Marine Festival, Community Social Networking Group Voces de Carahatas (Voices of Carahatas)	

Carahatas is not an informal settlement per se. Its local governance is largely institutionalized, and residents have access to all public services offered by the Cuban state. However, the village is relatively remote and transportation to other cities is sometimes difficult, which renders access to food and goods cumbersome. Residents have very low incomes and have developed their own set of community practices and traditions. Most build and repair their own houses and collective infrastructure. Community members are in charge of running the school, local library, fishing activities, and other local services.

In the initiative Resilient Housing Through Community Self-Management, researchers from the Universidad Central brought together the local Community Architect Organization (a strong institution and in housing development in Cuba)^[iii], builders with specialized knowledge and skills, residents, and local and national government officers. This collaboration made it possible to share traditional practices, technical expertise, and scientific knowledge, with a view to reinforcing local construction methods and providing better protection against climate hazards.

As many as 67 houses were repaired using appropriate materials and disaster-proof techniques. The initiative served as an example of how knowledge exchange can lead to efficient hazard-proofing of buildings. This type of collaboration and approach to self-help construction contrasts with other top-down approaches to housing development adopted in Cuba, where the government typically builds turnkey apartment blocks that are then assigned to beneficiaries. The initiative has become a source of inspiration for Cuban policymakers looking for alternatives to the expensive provision of fully finished apartment units.

Three initiatives in Carahatas combined cultural events with education on climate change and awareness of environmental challenges. The initiative Women of the Sea builds on a strong cultural tradition in Carahatas: the annual Coastal Marine Festival. This event, which celebrates life close to the ocean, is now used by women to create awareness regarding environmental challenges in the region. Here, women explore culturally relevant strategies for disaster risk reduction and environmental protection. They also educate young children about ongoing and future environmental challenges. Leaders explore vernacular narratives of risk based on local knowledge and past experiences with hurricanes and other hazards, and compare them with scientific knowledge and data. By bridging the gap between vernacular and academic concepts, locals have been able to better assess risk reduction options and influence local policymakers for appropriate climate action in Carahatas. The second initiative, the Coastal Marine Festival, also uses the coastal festival as a foundation for promoting risk awareness. Here, researchers and organizers facilitated painting and literature contests, speeches, games, and performances by children geared toward the exploration of environmental and climate challenges. These activities increased awareness of the causes and effects of global warming, as well as their repercussions in Carahatas.

Finally, the third initiative, a national extracurricular program at the elementary school in Carahatas, became an opportunity to teach children about risks and disasters. In the Circle of Interest Yo me Adapto, children acquired hands-on knowledge of the impact of hazards on their community and participated in recreational and cultural activities aimed at understanding environmental challenges. Following the activities,

discussions at home among family members are often powerful spaces for generating awareness and influencing attitudes toward climate risk. In these three cases, we found that building on existing institutions, such as the Marine Festival and school programs, can maximize community participation, facilitate partnerships with governmental institutions, and contribute to sustaining the initiatives in the future.

A fourth initiative in Carahatas adopted a different approach. Broad access to mobile data is recent (and still rare) in Cuba. Most communications with and within Carahatas take place through conventional phone calls or in person. Therefore, communication became particularly problematic when the COVID-19 pandemic hit.

Researchers and local leaders established Voices of Carahatas, a group of women who received financial support and social media training to use the newly available mobile data technology. After a few weeks, communication between the academics and local residents was not only re-established but improved. Women became very active on social media, accessing information and generating discussions on their aspirations and needs. The initiative demonstrated how access to digital communication can empower isolated communities.

[i] Nachmany, M., et al. (2015). *The 2015 global climate legislation study*. The Grantham Research Institute on Climate Change and the Environment and the London School of Economics and Political Science.

[ii] Aragón-Duran, E., et al. (2020). The language of risk and the risk of language: Mismatches in risk response in Cuban coastal villages. *International Journal of Disaster Risk Reduction*, 50, 1-11.

[iii] Valladares, A. (2013). The community architect program: Implementing participation-in-design to improve housing conditions in Cuba. *Habitat International*, 38, 18-24; Lizarralde, G. (2014). *The invisible houses: Rethinking and designing low-cost housing in developing countries*. Routledge.

Yumbo: The Challenge of Dealing with Climate Risk in Conditions of Marginalization and Violence

In Colombia, climate-related policy builds on disaster resilience and sustainability narratives. Formal businesses and residents are expected to take action to prevent and mitigate disasters^[ii], while government invests in risk mitigation infrastructure^[iii].

The government often sees informality as a form of illegality and urban disarray and avoids collaboration with leaders and residents of informal settlements. Low-income residents, however, see informal living and working conditions as the de facto option in the face of social injustices enacted or tolerated by political and economic elites. For these residents, climate change hinders development and increases their vulnerability due to its impacts on health^[iii], food security, access to water, and agriculture. In addition, residents generally recognize that corruption hampers the creation of healthier relationships between people and their territories.

The industrial city of Yumbo has rapidly urbanized over the past 20 years and is home to thousands of citizens displaced by the 50-year-long war between the government, paramilitary groups, and leftist guerrillas. Yumbo plays a vital role in the national economy as a hub of medium- and high-skilled labor, and as a crucial transition zone between the rural communities of the Cauca and Buenaventura regions and Colombian major urban centers. While the city has a rich social and cultural fabric, it is affected by violence and crime linked to drug trafficking.

In Yumbo, thousands of informal dwellers face extreme heat exacerbated by the La Niña and El Niño phenomena and by the significant pollution caused by more than 1,000 heavy-industry plants located in the area. It is estimated that pollution in Yumbo has created a microclimate in which average temperatures are as much as five degrees (Celsius) higher than in wealthy neighborhoods in Cali, the main city located 20 km away.



Settlement: Yumbo	Main city, Region: Cali, Valle del Cauca
Country: Colombia	Population: 100,000
Main source of livelihoods: Industries and informal economic activities	Partnered university: Universidad del Valle
Academically partnered (type A) initiatives: Sustainable Urban Drainage System (SUDS), Water Management System, Community Gardens, Reforesting Yumbo	
Locally driven (type B) initiatives: Family Garden, Reforesting Guanabitas	

Informal settlements, including Las Américas, are located in areas prone to floods and landslides. In the rainy season, houses and businesses are periodically destroyed, erosion is common, and health-related problems increase.

The residents of Las Américas identified the creation of a public recreational park as a top priority. To bring the PoliPark to fruition, government approvals, materials, and labor from inside and outside the community were needed. Several initiatives were coordinated with the support of the Universidad del Valle to design, build, and equip this open space (see [Sustainable Urban Drainage System](#), [Water Management System](#), and [Community Gardens](#)). Women sought contributions of time, labor, and money by local businesses, organizations, and governmental institutions. Their outreach efforts helped them overcome logistical and financial barriers, as well as bureaucratic procedures, paperwork, and all-too-common corruption—all of which had made it difficult to obtain project approval. The women also organized many complementary social activities to maintain momentum and interest in the project.

In contrast to the experience of partners in Cuba and Chile, some residents of Las Américas were initially reluctant to participate. However, social activities helped restore trust among residents and between them and other stakeholders. The women's leadership and tireless work brought positive results: the park was built, and a wide-reaching partnership was forged among civil society organizations, the business sector, several governmental units, and community-based organizations.

Two initiatives—the Sustainable Urban Drainage System (SUDS) and the Water Management System—aimed to protect the new park and the communities living downstream from flooding and to provide water for the new Community Gardens in Yumbo. The two initiatives developed low-cost prototypes that compensate for the lack of stormwater infrastructure in Las Américas. The very fact that these two initiatives were needed shows that when governments fail to act or do not have the capacity to act, communities must take the initiative themselves.

The initiatives in Yumbo led to the publication of construction manuals that are accessible online, and that residents can consult for step-by-step instructions on how to implement the solutions. In addition, Colombian authorities have copyrighted the low-cost technology developed in these two initiatives. In this way, the solutions can now be implemented at a larger scale to help reduce flood risks in informal settlements located on hilly terrain. This copyright prevents private companies from exploiting the solutions commercially, making it possible for residents and academics to implement them and gain open access information about it.

The early stages of the SUDS initiative, the first to be implemented in Yumbo, were affected by tensions between neighborhood groups, local leaders, politicians, and youth gangs. The initiatives also exposed the fragility of female leadership within patriarchal systems. A few women took leadership roles initially, but stepped back when projects became political and when it became necessary to manage resources and relationships with politicians.

In response, researchers from Universidad del Valle and social workers from Corporación Antioquia Presente mobilized partnerships and worked to rebuild trust with local leaders. Efficient communication between project partners and training and support for women eventually

contributed to the success of the initiatives. Researchers were also helpful in finding compromises and resolving conflicts.

Accessing fresh food is difficult in Las Américas, Panorama and other informal settlements in Yumbo. The Community Gardens initiative sought to reduce food insecurity and increase environmental protection awareness through culturally relevant food production. Similarly, the Family Garden initiative encouraged residents to develop food autonomy through a series of training sessions and workshops, as well as the construction of prototypes for home gardening, composting, and solid waste sorting. Initially, leaders struggled to engage community members.

But after several meetings where opportunities and ideas were shared, larger numbers of residents started to engage in planting and gardening. It became apparent that the initiative provided an opportunity for personal and collective development and this resulted in a high level of engagement. This experience reminds us that typical climate projects may not always be in line with the community's needs, desires, and agency. Deforestation caused by urbanization and industrial activities is a major concern for residents and leaders in Las Américas and Panorama. Two initiatives sought to raise awareness regarding ecosystem protection and tackle environmental injustices.

In Reforesting Yumbo, participants created an agroforestry nursery where trees and plants could be germinated for planting throughout the neighborhoods. In Reforesting Guabinitas, participants sought to improve environmental conditions and reforest land around the water stream Guanabitas. They also offered training sessions on environmental action, and launched a communication campaign on social media to encourage residents to protect the water stream. Unfortunately, some activities in Yumbo were affected by the pandemic. However, participants continued planning, training, and networking online.

They sowed plant and tree seeds at home so they could install the community garden and reforest as soon as the conditions allowed. Moving online gave local leaders an opportunity to create reusable audiovisual training and dissemination materials, while maintaining momentum on various initiatives and sustaining hope in their success.

[i] Peralta-Buriticá, H. A., Velásquez-Peñaloza, A. & Enciso-Herrera, F. (2013). *Territorios resilientes: Guía para el conocimiento y la reducción del riesgo de desastre en los municipios colombianos*. Federación Colombiana de Municipios.

[ii] Páez, H., et al. (2019). Coping with disasters in small municipalities – Women’s role in the reconstruction of Salgar, Colombia. *Journal for Planning and Building in a Global Context*, 3(1), 9-13.

[iii] Corporación Antioquia Presente. (2019). *Foro internacional: Cambio climático y desafíos en salud 2019*.

Salgar: The Role of Bottom-Up Action After a Major Disaster and During a Politized Reconstruction Process

Salgar, a community of 18,000 residents in the Antioquia region in Colombia, relies mainly on agriculture. The region, located in the Andes mountains, is well known for coffee production and local entrepreneurship. The town is built along the Libordiana river as well as several streams, which regularly overflow in the rainy season. In 2015, a major landslide and rockslide, triggered by days of heavy rain, killed 104 people, and destroyed hundreds of houses. Since then, a comprehensive reconstruction and vulnerability reduction plan has been put in place, including the construction of 308 new housing units in safe locations. Authorities have also put an early warning system in place, and after consulting with local residents, they have introduced programs designed to provide them with economic, psychological, and administrative support.

The reconstruction process was shaped by competition between two opposing political leaders and parties that run separate reconstruction initiatives. The process became highly politicized, and several housing and infrastructure initiatives were overtaken by partisan interests, even as attempts were made to integrate participatory approaches. Reconstruction was achieved relatively quickly in comparison with other similar processes in Colombia. But it has not prevented new rural migrants from settling in areas close to water bodies at risk of flooding. Several residents who used to live in single storey houses and were provided with new apartment units have had to adapt to a more urban type of housing, where they have less privacy, must respect condominium rules, and are not allowed to establish home-based economic activities. Salgar residents often have emotional connections to their land and rely on the territory and its ecosystems for their livelihoods. However, land, water, and ecosystems are increasingly destabilized by climate change. In the Ecosystem Adaptation initiative, a woman leader created a local “incubator” for environmental innovation.



Settlement: Salgar	Main city, Region: Medellín, Antioquia
Country: Colombia	Population: 18,000
Main source of livelihoods: Agriculture (notably coffee harvesting and production)	Partnered university: Pontificia Universidad Javeriana and Corporación Antioquia Presente
Academically partnered (type A) initiatives: N/A	
Locally driven (type B) initiatives: Ecosystem Adaptation and Managing the Risk	

The goal was to boost the implementation of a series of activities aimed at increasing awareness of the natural environment and encouraging residents to take care of it. The project was a great success.

In fact, most local leaders and residents find that restoring more positive relationships between people and their surrounding ecosystems can serve as the foundation for future climate change mitigation and environmental justice activities. Another initiative, Managing the Risk, seeks to promote initiatives that are already underway in the municipality but are often unknown or poorly run. Instead of designing an initiative from scratch, local leaders provided support to existing projects and networked with people and organizations to bring existing activities and expertise to light. These two cases exemplify how small, targeted initiatives, acting like acupuncture treatment, can produce significant impact on reducing risk.

Concepción Region: The Importance of Creating Social Alliances for Change

The long Chilean coast, where several large cities are located, is prone to several hazards, including earthquakes, tsunamis, sea level rise, and floods. In Chile, climate change action and urban upgrading are primarily governed by national policy and institutions^[ii]. The Chilean Ministry of Housing and Urban Planning runs a program, *Quiero mi Barrio*, aimed at upgrading neighborhoods and housing. However, the political polarization and social unrest that emerged between 2018 and 2020 hindered the implementation of climate action and disaster risk reduction.

Several community leaders and low-income residents of the Bío-Bío region (near the center of the country) see neoliberalism and extractivism as the source of problems in informal settlements and denounce the environmental injustices that result from savage capitalism. They see global warming, deforestation, pollution, uncontrolled urbanization, and the destruction of ecosystems by industrial and mining activities as man-made hazards that make them vulnerable to risks^[iii].

Concepción is located in a complex natural water system that includes the Bío-Bío River (one of the largest waterways in Chile), the smaller Andalién River, streams descending from Mount Caracol, a series of lakes, one water channel, and bays and peninsulas on the Pacific Ocean. The city has economic relationships with the neighboring cities of Talcahuano (a large international port on the ocean), Hualpén, San Pedro de la Paz, Coronel, Chiguayante, Penco, and Hualqui.

The city makes a significant contribution to the national economy thanks to its intense port activity on the Pacific Ocean and to industrial activities, including forestry, metallurgy, and paper and energy production. Concepción has a valuable heritage of pottery production by local craftswomen and is home to top-quality universities, including the Universidad del Bío-Bío.



Settlement: Tomé, Quinchamali, Valle del Nonguen	Main city, Region: Concepción, Bío-Bío
Country: Chile	Population: 53,200 (Tomé) 1,300 (Quinchamali)
Main source of livelihoods: Commerce and industries	Partnered university: Universidad del Bío-Bío
Academically partnered (type A) initiatives: Vertical Community Garden, Pottery Workshop, Natural Mitigation and Irrigation Barrier, Botanical Illustration Workshop, Plaza Nonguén, Estuary Dome	
Locally driven (type B) initiatives: Classrooms in Natural Environments, Forest Therapy, Water Recovery Demonstrations	

The city is prone to floods (such as the 2006 Andalién flood), earthquakes (such as the 8.8 Mw-scale earthquake in 2010), landslides, and tsunamis. While its population doubled between 1970 and 1992, the infrastructure in many parts of the city is deficient and most informal settlements are located in flood-prone areas.

Several initiatives in the Concepción region were linked to the creative work conducted in architectural studios at Universidad del Bío-Bío. They involved asking students to prepare innovative and technical solutions, with professors and mentors acting as facilitators for interactions between leaders, residents, and university students. With input from residents and local leaders, students designed a pavilion for collective gardening (see [Vertical Community Garden](#)), craft workshops for artisans and visitors (see [Pottery Workshop](#)), a public space and a wood structure that serve as a meeting point, landscape feature, and sightseeing platform

(see [Plaza Nonguén](#)), and an educational space immersed in the natural environment of a water stream (see [Estuary Dome](#)). In these initiatives, the students were invited to challenge their preconceived ideas and traditional design methods and to engage in dialogue with residents to identify women's real needs. Several climate change initiatives were then directed toward finding solutions to enhance food autonomy, secure livelihoods, and increase environmental awareness. Training a new generation of architects in social and political subjects, including gender, is an important step toward greater social responsibility and sensitivity in architectural practice.

When the Vertical Community Garden initiative was at an advanced stage of implementation, local authorities withdrew their commitment to supply water to the garden. The built, but non-operational structure became a source of discord: community members lost trust in the initiative and tensions arose between local leaders and authorities. Thanks to dedicated social work, stakeholders agreed to dismantle the structure for a later reinstallation at another location where water could be supplied thanks to their own bottom-up initiative, Water Recovery Demonstration. These cases show that trust among stakeholders can be fragile and breaking a commitment can have major effects on local initiatives. They also show how neutral actors, such as NGOs, may help resolve conflicts that can arise in the implementation process. These initiatives built upon a novel work strategy adopted by academics, government officers, and community members—stakeholders who rarely work together in informal settings. The approach engaged the different stakeholders in learning from each other in a process locals called *conversación disciplinada* (or structured dialogue). The initiatives highlighted the benefits of such collaboration—especially in the eyes of public authorities—to address the effects of climate change and disaster risks in ways that are culturally sensitive and contextually appropriate.

During implementation, it was imperative to maintain communication channels between stakeholders in order to avoid misunderstandings and dissipate tension. These forms of alliances became not only an innovative work strategy but also a governance precedent. This approach has already produced tangible results: academics are already working on new initiatives with authorities, the Housing and Urban Development Service (SERVIU) and the national program *Quiero mi Barrio*.

In most initiatives implemented in Chile, local leaders wished to establish a new social contract and better relationships with nature following decades of neoliberal policies and industrialization. The Plaza Nonguén initiative created an outdoor educational space for teaching children about ecology and environmental issues. In the Forest Therapy initiative, local leaders organized environmental awareness activities in the forest to meet the youth's strong desire to escape the polluted and stressful urban environment.

The Botanical Illustration Workshop initiative took the form of an outdoor workshop designed to reveal and illustrate the flora of the Nonguén Valley in Chile. Unfortunately, the pandemic severely complicated the implementation of these three initiatives, which were situated in natural environments. A core goal in all these initiatives was and is to generate a moment of care, appreciation, and contemplation while in the forest—something impossible to accomplish through online activities. As a result, the local leaders put the initiatives on hold until it is appropriate to return to the outdoor locations.

The fact that all the initiatives were strongly rooted in local knowledge, practices and skills is one of the main reasons why leaders and participants, young and old, maintained a high level of interest, despite the numerous obstacles they faced during implementation.

[i] Nachmany, M., et al. (2015). *The 2015 global climate legislation study*. The Grantham Research Institute on Climate Change and the Environment and the London School of Economics and Political Science.

[ii] Inostroza, L., Palme, M., & de la Barrera, F. (2016). A heat vulnerability index: Spatial patterns of exposure, sensitivity and adaptive capacity for Santiago de Chile. *PLoS One*, 11(9), 1-26.

LESSONS LEARNED

1 Adapting to global warming is not enough: Comprehensive disaster risk reduction, based on recognition of social and environmental injustices, is required in informal settings in the region.

The choices and actions of leaders and residents in informal settings show that the climate agenda in the region must address both social and environmental injustices. In fact, the 22 initiatives had remarkably diverse objectives, responding to specific needs and the cascading effects of multiple local threats. This observation challenged our initial conception of the types of projects that enhance “adaptation” to climate change. We concluded that the scope of climate action must be expanded, from hazard-focused approaches (e.g., focusing on sea level rise alone) to approaches aiming to respond to people’s daily struggles, such as crime, unemployment, and lack of food and water.

A few local initiatives focused on reducing people’s physical vulnerability to hazards (see for instance [Resilient Housing Through Community Self-Management](#) and [Sustainable Urban Drainage System](#)). However, local leaders and community members often wanted to do more than just adapt to global warming. They wanted to reveal and redress social injustices, reduce economic vulnerability, and preserve natural ecosystems. As such, they often widened the scope of initiatives beyond what might be considered a typical “climate response.”

Residents and leaders connected climate risks with their daily struggles. They linked their vulnerability to climate risks with social injustices, such as inequality, poverty, and food insecurity. In fact, many initiatives in Colombia and Chile aimed at reducing unemployment and food insecurity (see [Pottery Workshop](#) and [Community Gardens](#)). Residents believe that such initiatives will allow them to achieve more in the long run than immediate actions dealing only with a specific hazard^[3].

Furthermore, local leaders and residents find that protecting fauna and flora from human activities is as important as protecting human settlements from natural hazards. In keeping with their vision of environmental justice, they advocate for protecting and restoring natural ecosystems affected by human actions (see [Reforesting Yumbo](#), [Forest Therapy](#), and [the Coastal Marine Festival](#)). Residents believe that preserving ecosystems is key to reducing risks and working toward ecosystem restoration helps mitigate extreme climate variations^{liii}.

2 Trust between stakeholders is often the basis for positive change. However, trust between governments and people living in informal settings is often elusive and fragile. Facilitative, structured dialogue, among other participatory approaches, takes time but can help break implementation barriers and establish common ground.

Establishing trust and finding common ground between residents in informal settings, local leaders, government representatives, researchers, and other partners is a prerequisite for effective climate action. However, these stakeholders are often unaccustomed to working together and may not trust one another. In some cases, internal division, and suspicion within the local population hamper engagement. In other cases, citizens in informal settings are wary of participatory activities, having often suffered from the indifference and manipulative behaviors of political and economic elites. In Cuba, top-down decision-making by the state typically leaves little space for community input. In Colombia, patronage, clientelism, and corruption are hallmarks of local governance culture. This culture is despised by residents and local researchers alike.

Finally, in Chile, political polarization, demonstrations, and political repression hinder community engagement. These problems are often rooted in racism, patriarchal structures, elitism, systemic marginalization, and other social injustices. All are real obstacles for climate action in informal settings. During implementation, local leaders and researchers developed and tested new methods for stakeholder engagement that were specific to local governance conditions. The participatory approaches we adopted, brought under the umbrella term “structured dialogue” by our Chilean partners (*conversación disciplinada*

in Spanish), sought to establish trust, develop empathy, and generate lasting relationships. Structured dialogue also helped us create common meanings, break down systemic barriers, and consolidate partnerships between stakeholders who normally do not work together. Structured dialogue and other participatory approaches are demanding. In almost all cases, local leaders and project partners spent a lot of time fostering relationships with authorities and business networks.

These efforts were necessary to establish trust, mobilize resources, and initiate local action. In some cases, this work took more than two years (see for instance [Sustainable Urban Drainage System](#) in Yumbo). This duration contrasts with the typically short project timeframes used by funding agencies, usually in the aim of showing results quickly and seizing opportunities^[iii]. But we found that acting fast may erode local leaders' trust and alienate local representatives (see for instance [Vertical Community Garden](#)). Solid partnerships are more likely to continue producing change after external funding is finished than those that have been quickly constructed. Alliances between academia, civil society groups, government, businesses, and community actors are key to transformative action in informal settings.

3 Understanding people's emotions in response to long-term risk, daily struggles, socio-economic concerns, disaster experiences, and climate change is key to recognizing behaviors and social injustices, engaging in dialogue, mobilizing resources, and driving change.

Many local initiatives are rooted in a strong desire to change the status quo, following sudden losses or daily struggles over food and income. Emotions regarding places, socio-economic concerns, and disaster experiences are a driving force behind citizens' engagement in climate change adaptation and disaster risk reduction. Emotions such as pride, awe, anxiety, and anger often inspire change among leaders. Agency in the face of tragedy or injustice is not only about capacity—a term used in disaster management and academia to refer to the knowledge, skills, networks, and resources people use to deal with risk^[iv]. Agency also springs from people's hopes, emotions, attitudes, aspirations, and

visions for a better life. Local leaders are often keenly attuned to people's emotions. They use them as points of reflection, drivers of dialogue, and tools to mobilize action. Emotions are also an important component of structured dialogue between citizens and government representatives. They can be useful to inspire creative work and help develop empathy for others.

To be clear, emotions and attitudes are not simply a component of an individual's character or behaviour. They are shaped by social codes and have a political component too. Anger, frustration, annoyance, and distrust, for instance, are key components of people's reactions to social injustices. These emotions influence and are influenced by perceptions of inequality, marginalization, racism, and elitism. As such, they are neither politically neutral nor simply an individual reaction to the environment. Aggregated, they create the social conditions in which problems are understood and possible solutions are created.

After acknowledging the significance of emotions, including suffering and distress, several stakeholders focused on activities that sought to restore or heal conflicting relationships with nature (see for instance [Forest Therapy](#)). Playful and educational activities involving children became channels for formulating aspirations and discussing a collective vision of positive change (see for instance the Cuban initiatives Circle of Interest – [IAdapt](#), and [Coastal Marine Festival](#)).

4 Supporting and building on existing practices and activities, including those seemingly not linked to climate action per se, increases effectiveness and innovation in disaster risk reduction.

Leaders and residents of informal settings create novel and effective disaster risk reduction practices by taking advantage of existing and convenient entry points. Pottery, soccer, a cultural festival, and other activities, practices, and spaces may not seem to have any connection to climate change action to the external observer. Yet they have social and cultural value within communities and provide a solid foundation for experiments and creative solutions that can produce long-lasting transformation in informal settings.

In many cases, local leaders and researchers expanded existing activities, such as cultural celebrations or gardening, to add a climate change or disaster risk component (see [the Coastal Marine Festival](#) in Cuba and the garden initiatives in Colombia and Chile). Initiatives often deployed existing local knowledge and skills that were unknown to external observers (see for instance [Resilient Housing Through Community Self-Management](#) and [Managing the Risk](#)). By building on local skills, addressing multiple risks, and consolidating existing relationships and alliances, leaders optimized resources and avoided opposition.

Given that they built on knowledge, partnerships, and resources that local leaders and residents control or have access to, we believe these bottom-up initiatives are more sustainable in the long term than projects that are built from scratch.

5 Women typically lead change in informal settings, notably by creating the social fabric that allows disaster risk reduction initiatives to emerge. Yet women in the region also face violence, unwelcoming governance mechanisms, and patriarchal structures that are hard to eliminate. Supporting women in leadership roles is key to reducing social tensions and facilitating implementation.

Women living in informal settings are typically more vulnerable to climate change effects than men. Paradoxically, many of them also play crucial roles as leaders, engaging with local communities and convincing other stakeholders to commit time, money, and resources to implement change. However, leadership by local women can also be fragile. They must generally work within patriarchal systems that hinder their leadership.

In places of widespread crime and bloody violence, like Colombia, women often live under physical and psychological threat. Some women abandoned their leadership roles when bottom-up initiatives reached a political level or a higher degree of formalization, or when financial resources had to be managed (see for instance [Sustainable Urban Drainage System](#)). Engaging with politicians (often men) was arduous for

some women leaders, who didn't want their activities to be associated with a particular political party. Many women also had to deal with the indifference of male technocrats and politicians, with meetings endlessly rescheduled and calls never returned. The gap between women's efforts and official recognition is one of the main hurdles limiting their decision-making power. Patriarchal structures are "resilient" and hard to eliminate. Challenging deep-rooted structures takes time. Given the short timeframe of our action research project, we were not able to change them to any significant degree.

In response to these multiple challenges, many women leaders preferred to work toward incremental changes from within their communities rather than adopt more confrontational approaches with authorities, which would expose them to greater risks. The extent to which such preferences are socially constructed is an open question, meriting further reflection and work.

The approaches adopted by local leaders and researchers aimed at empowering women and youth through adequate training, leadership support, tools, funding, and direct involvement in planning and implementation activities.

In the short term, initiatives focused on training women on climate trends, risk management, project management, and leadership (see for instance [Women of the Sea](#)). In the longer term, several initiatives focused on raising awareness among the younger generation about gender inequalities, fostering generational change in groups ranging from elementary pupils (for instance, in the Circle of Interest [I Adapt](#)) to university students (as in Chilean architectural studios, such as the [Vertical Community Garden](#) and the [Pottery Workshops](#)).

Academics and practitioners can play an important role in facilitating the work of women in informal settings. The support women received from researchers and social workers helped them to engage with climate action further, and in a few cases, influence policy (see [Women of the Sea](#)). When social tensions arise (as in the [SUDS](#) and [Vertical Community Garden](#) initiatives), researchers and social workers can help establish new partnerships, rebuild trust, and support women in their leadership roles, enabling them to continue leading positive change.

6 Academic and policy jargon—often articulated around sustainability, resilience, adaptation, and other abstract notions—rarely resonates with the needs and desires of people living in informal settings. Narratives grounded in local knowledge, ideas, and practices do.

The climate and disaster risk jargon that policymakers and academics often use hardly resonates with the needs and aspirations of people living in informal settings.

Government documents and politicians often adopt abstract notions that fail to consider socio-economic and cultural specificities. In Cuba, for instance, residents of Carahatas contest the relocation policy adopted in the name of climate change adaptation and sustainability. Villagers contend that relocation has negative impacts on their livelihoods and ways of life. Citizens living in informal settings often find that academic terms such as resilience, adaptive capacity, and sustainability^M are too abstract. They find these terms confusing and feel they are disconnected from their daily realities. In contrast, narratives embracing local experiences and perspectives resonate more with people's needs and claims.

Initiatives formulated and prioritized according to local perceptions of risk and disaster can better mobilize citizens and sustain their interest (see for instance [Forest Therapy](#)). It is therefore crucial to reconcile scientific knowledge with local narratives in both research and policy. To break that communication barrier, it is fruitful to build meetings and workshops around local narratives, and to complement them with academic and professional insights. In this way, local leaders and community members can formulate their climate and disaster responses by building on their experiences, vernacular practices, and local concepts. Researchers can then avoid jargon when offering training and technical support (see for instance [Women of the Sea](#)). By mobilizing local narratives, leaders and researchers can more effectively engage in climate activism and connect long-term objectives with short-term interests and everyday challenges.

7 Let emotions speak, drive, and maintain climate action momentum. Informal settings are particularly unstable grounds for climate change action. Red tape, contradictions in policy, and deficiencies in infrastructure render implementation difficult—even when there is well-written policy in place.

Residents and local leaders can face significant barriers when implementing bottom-up initiatives in informal settings. National policy often targets climate action and adaptation. But deficiencies in local urban systems (such as lack of water infrastructure) abound in informal settings, rendering policy implementation difficult. For instance, obtaining authorizations and permits for local initiatives can be challenging due to complex bureaucracy and contradictions in policy (for example, construction ban policies for fishing communities coexisting with authorizations to build beach resorts and hotels for tourists). Resolving implementation barriers often requires pressuring governments to provide the necessary infrastructure and official approvals. These efforts require significant time (months of negotiation in some cases), as residents must lobby and build partnerships with relevant government and business stakeholders (see for instance [Vertical Community Garden](#) and the park-related initiatives in Yumbo).

Despite extensive lobbying efforts, governments might not build the infrastructure needed for the initiatives to be viable or they might not facilitate implementation protocols or procedures. In the face of governmental inaction, local leaders and communities are left to compensate for the lack of infrastructure with their own labor and community-driven actions. Several initiatives are in fact low-cost prototypes of more traditional infrastructure (see [Sustainable Urban Drainage System](#), [Water Management System](#), and Water Recovery Demonstrations). The impact of bureaucratic structures and the efforts required to compensate for deficiencies create both financial and project implementation risks. As a result, several initiatives took more time to implement than expected, and a few stalled, foundered, or failed to produce physical long-term results (see for instance [Vertical Community Garden](#)). Whether or not these “failed efforts” will have positive benefits in the long run—in the form of new alliances, understandings, or interest in renewed efforts—remains to be seen.

8 Government investment and support are often fragile in informal settings. Universities and non-governmental organizations can play a crucial role in climate action as intermediaries between authorities and citizens.

Even when community groups succeed in securing institutional investment and partnerships with government representatives, generally through extensive lobbying and dialogue, support for local initiatives can diminish or even be revoked. Fragile governance mechanisms and changing political agendas can also have a strong impact on implementation. Policymakers' interest in supporting local initiatives can dissipate, creating tensions between or within communities (see for instance [Vertical Community Garden](#)). In some cases, politicians also try to exploit new projects to their advantage, instead of supporting bottom-up agency. Despite continuous efforts to solidify partnerships (including efforts based on structured dialogue), relationships between politicians and residents in informal settings may not be sustainable in the long run.

Local and national political agendas can also change during the implementation process. In Colombia and in Chile, for instance, leadership change after elections and social unrest resulted in the replacement of institutional representatives in existing partnerships. New institutional partners can bring different political visions and priorities, forcing local leaders to realign and renegotiate project objectives.

As a result, bottom-up initiatives may take a different direction than initially planned and discussed with the original local leaders. These political factors are often beyond the local leader's control. As stable and neutral partners, academics and non-governmental organizations can help local leaders and residents maintain partnerships with politicians. It is important, however, to be transparent with the original leaders and partners about new or changed collaborations. Social workers and academics can also help local leaders and politicians find a new common ground after social and political unrest (see [Sustainable Urban Drainage System](#) and [Vertical Community Garden](#)). These practices help reduce misunderstandings and maintain a sustained sense of ownership in local initiatives.

9 Limited means of communication and lack of information are major barriers to producing change in informal settings, particularly during crises. Mobile technology allows local leaders and residents to connect, share knowledge, and promote risk awareness.

Strikes, social unrest, and the COVID-19 pandemic severely affected the implementation of 11 initiatives. They disrupted access to information, communications between stakeholders, and visits to the locations of the bottom-up initiatives. In response, many local leaders and researchers turned to mobile technology to stay informed, communicate with others, and participate in implementation activities. In Colombia and Chile, the use of mobile technology is widespread, even in remote, marginalized, and informal settings. In Cuba, access to technology is more limited but is rapidly increasing.

Researchers, local leaders, and residents have various means of connecting with one another: they may use their own computers and cellphones, or those of neighbors or institutions. In such settings, technology is essential in periods of crisis. The ability to share stories, exchange experiences and strategies, and continue working despite disruptions was key in the implementation process.

In the ADAPTO project, the use of technology was also transformative. The use of mobile technology created unexpected opportunities for training and networking. People who could not travel could still participate in disaster risk reduction activities. In some initiatives, the participation of a large regional audience generated awareness of the cascading effect of multiple hazards (see [Managing the Risk](#)).

In other cases, mobile communications allowed researchers, local leaders, and residents to exchange knowledge and approaches with the community as well as with regional, national, and international audiences (see Community Social Networking Group [Giving a Voice to Carahatas](#)). The online exchange of vernacular and scientific knowledge, together with the exchange of local experiences in addressing specific problems, helped bridge the urban-rural and North-South divides.

There are however limitations to reliance on mobile technology for implementing bottom-up initiatives in informal settings. Local social and support networks remain important. Initiatives such as the [Coastal Marine Festival](#) in Cuba and the [Botanical Illustration Workshop](#) in Chile relied on relationships between people and nature, and therefore could not have been implemented without in-person collaborative work. The use of technology also requires additional support for participants, such as financial help for low-income participants to buy data packages, and training for those who are unfamiliar with mobile technology.

10 A clear ethical framework that considers issues of legitimacy, appropriate governance, trust, and transparency is required for scaling impact. Bottom-up initiatives are difficult to replicate because they respond to local specificities. They require attention to detail and careful and sustained efforts over long periods of time.

Scaling impact by amplifying, replicating, or transferring good practices on a larger scale is often important for funding agencies, governments, and non-governmental organizations. However, given the complex specificities of each locality, it is crucial to frame impact within clear ethical principles that respect local capacities and values, prioritize a transparent process, and legitimize the role of local actors.

Scaling impact is rarely the most pressing issue for local leaders or residents. They are primarily concerned with immediate needs and conditions, and thus base their initiatives on local practices and traditions. They typically engage in delicate planning and execution, respecting local knowledge and specific political dynamics. The time they take to establish partnerships is often as long as the time needed to build trust between stakeholders. In this sense, the implementation of bottom-up initiatives in Cuba, Colombia, and Chile had more in common with the practice of craftsmanship than with approaches driven by a market economy logic. Implementing initiatives was already quite demanding for local leaders. Conducting similar activities in other neighborhoods, in ways that were locally relevant, meant developing new partnerships with unfamiliar actors. Within this project's four-year timeframe, there

was not enough time to build many additional partnerships or start replicating existing ones in other locations. In addition, some women leaders showed less willingness to assume more visible roles or have their work publicized in their wider communities, reflecting both personal preferences and fears of too much exposure.

Instead of the traditional “scaling up” model, a kind of “scaling out” and “scaling in” occurred in some cases. Local initiatives generated interest within localities and regions. The training sessions and other activities generated new connections and helped mobilize new stakeholders. These collaborations remain strong in most cases. Local initiatives are now emerging in the three countries, thanks to the initial experiences and collaborations (see [Women of the Sea](#), for instance). As the initiatives progressed, local leaders and researchers gained visibility and legitimacy in the eyes of policymakers at different levels of government. Initiatives also had an impact on local and regional policy documents (and in a few cases on national policy). Local leaders and researchers developed expertise in climate change mitigation and disaster risk reduction in their informal settlements. The fact that they are now invited to sit on planning committees and influence policy suggests that the 22 initiatives served as a step towards better disaster risk reduction action and policy in the region.

[i] United Nations & World Bank (2010). *Natural Hazards, UnNatural Disasters: The Economics of Effective Prevention*.

[ii] Pörtner, H.O. et al. (2021). *Scientific outcome of the IPBES-IPCC co-sponsored workshop on biodiversity and climate change*.

[iii] See for instance: Hamdi, N. (2004). *Small change: About the art of practice and the limits of planning in cities*. London: Routledge.

[iv] United Nations Office for Disaster Risk Reduction. (2017). Terminology. <https://www.undrr.org/terminology>

[v] United Nations Office for Disaster Risk Reduction. (2017). Terminology. <https://www.undrr.org/terminology>

LOCAL INITIATIVES

You can click on the title of each micro-project to access the documents.

Chile

- [Outdoor classrooms: Recognition and care for ecosystems in the Nonguén Valley.](#)
- [Forest therapy: Caring for youth and nature.](#)
- [Building partnerships and preparing an urban garden in Nonguén Chile.](#)
- [Botanical illustration workshop: A tool for environmental education in the Nonguén Valley.](#)
- [A worm filter for recycling greywater.](#)
- [Prototypes of craft workshops: Enlarging productive spaces in Quinchamalí.](#)
- [From natural to political barriers: The challenges of providing water for a community garden.](#)
- [Dome of the river: Strengthening our relationship with the heart of the Nonguén Valley.](#)
- [Our seeds are life: The recovery of a community space through the construction of a vertical garden in Concepción, Chile.](#)

Cuba

- Coastal marine festival: Cuban culture and traditions as the foundation for climate change action.
- The women from the sea: A community action group to facilitate climate change action in Cuba.
- Giving a voice to Carahatas: Consolidating internet use to facilitate communication toward climate change adaptation.
- I adapt: Educating future generations on climate change risks.
- Building on popular knowledge: Triggering housing adaptation to climate change with technical support and a tool library.

Colombia

- Returning to green: From Guabinitas Creek reforestation to home gardening.
- Sharing a family tradition: Training neighbours in home gardening.
- Sowing the first seeds: The ecological restoration of La Estancia Hill in Yumbo.
- Low cost stormwater collector: Reducing flood risks and channeling water to the urban garden.
- An urban vegetable garden to sow a community.
- Place making and place protecting: A low cost drainage system for a park in Yumbo.
- Incubator for community and ecosystem based adaptations in Salgar, Colombia.
- Let's manage risk! A network of community leaders for disaster risk prevention.

POLICY BRIEFS

The following policy and practice briefs are aimed at various stakeholders involved in climate change adaptation, including governments, non profit organizations, community organizations, academics, community leaders, and citizens. They are the result of analyzing publications and reports from 22 local initiatives conducted by ADAPTO researchers in Latin America and the Caribbean They were created by an interdisciplinary team from McGill University, including Camila Flórez Bossio (Em Walsh) Sayana Sherif (Urban Planning), Talha Awan (Urban Planning), and Tapan Dhar (Urban Planning), under the supervision of Dr Lisa Bornstein (Urban Planning). You can access the policies by clicking on titles below:

- 1 [Acknowledging Community Risk Perception in Disaster Risk Reduction Policies in Latin America Three Key Lesson.](#)
- 2 [Challenges of Settlement Upgrading and Climate Risk Management in Informal Settings Considering Dwellers' Multidimensional Wellbeing.](#)
- 3 [Closing the Infrastructural Gap in Marginalized Urban Communities.](#)
- 4 [Cultural Practices to Build Trust and Overcome Barriers Lessons for Policymakers.](#)
- 5 [Local Traditions and Existing Initiatives as Anchors for Adaptation.](#)
- 6 [Sustaining Momentum Emotions as an Element in Project Implementation for Climate Change Adaptation.](#)
- 7 [To Act On Climate, Empower Women Lessons on Supporting Women Leading Climate Action.](#)
- 8 [Turning the Tide Climate Change, Emotions, and Policy.](#)
- 9 [Collaborative Climate Action in Informal Settings Who are the Stakeholders and What are Their Roles?](#)



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