

City of Bogor, Indonesia

Building disaster resilience through better understanding of urban systems and climate change

As the global climate changes, the ability of cities to cope with and thrive through extreme weather impacts depends on how well critical urban systems perform: understanding the links between urban systems, climate change and disaster vulnerability is fundamental to reducing risk.

195 ICLEI Case Studies

December 2016

Summary

The City of Bogor on the island of Java is a rapidly growing city less than 60 km from the country's capital, Jakarta. As the city expands it is experiencing the effects of inappropriate development, such as traffic congestion and the growth of informal settlements in highly vulnerable areas. Issues of increasing urban heat, flooding, poor sanitation and associated health impacts are already occurring throughout the city, and city officers are aware that these will be further exacerbated by climate change. Bogor City recognizes it plays an important role in helping its community to prepare for and adapt to the challenges of climate change. Building the capacity of both staff and community to adapt was a key reason for the City joining the ICLEI-ACCRN project, however, what resulted was the embedding of climate change risk into the City's emerging Disaster Risk Reduction strategy, as well as better coordination with efforts to reduce their greenhouse gas emissions.

Introduction: The importance of considering climate change risks when preparing for disaster resilience

In the last 10 years, Bogor like many Asian cities, has experienced several disasters linked to weather anomalies. These include landslides, floods, fires, drought and severe dengue outbreaks. Climate change combined with socio-economic projections suggest the frequency and severity of the impacts are only going to get worse unless the City and its community understand how risks will change under future scenarios, and begin to prepare for them now in a holistic, integrated manner.

Bogor is experiencing rapid urbanization. The removal of natural vegetation and increase in built environment has led to noticeably higher temperatures in the urban areas of the city. Additionally, rapid urbanization is leading to inappropriate development in areas increasingly exposed to flooding and landside risks. The transport congestion is an increasing problem and Bogor is also experiencing sanitation and water quality issues, along with the associated health impacts such as dengue, diarrhea and gastroenteritis. Residents can no longer reliably predict the "wet and dry" seasons, and during the dry seasons, water scarcity is now an issue for Bogor, the "City of Rain".



Facts & Figures

Name of Municipality
Bogor City Government

Municipal budget
Approx. \$9.17 USD / € 8.3 million
Euros (2011)

Population
1.04 million (2014)

Box 1: ICLEI-ACCRN Process

The ICLEI-ACCRN process (IAP) consists of 6 phases as outlined in Figure 1.

Phase 1. Engagement: Initial meeting and political commitment, setting up organisational arrangements including formation of a Working Group on Climate Change Adaptation and stakeholder group, identification of current threats, past practices and opportunities, establishing communication mechanisms for the project.

Phase 2. Climate Research and Impact Assessment: Assessing baseline and projected climate trends, identifying existing fragile urban systems, expected impacts of climate projections on fragile systems, focused discussions.

Phase 3. Vulnerabilities Assessment: For each impact, identification and mapping of vulnerable areas, vulnerable social groups, adaptive capacities of people and urban systems.

Phase 4. Resilience Strategy: Resilience actions identified, actions prioritized based on resilience indicators and feasibility criteria, resilience strategy drafted.

Phase 5. Implementation: Identifying funding options, feasibility and project planning, monitoring framework and implementation.

Phase 6. Monitoring and Review: Performance indicators and reporting system, ongoing monitoring, review and reporting.

Analyzing current pressures and disaster risks, and how they will be exacerbated or altered under future climate change scenarios, allows Bogor to invest in Disaster Risk Reduction (DRR) programs and infrastructure that will appropriately serve the needs of its citizens today, as well as in future years, and to consider community-based initiatives that help the community increase their disaster resilience in the face of a changed climate.

Bogor: City of Rain

Located approximately 60 km south of Jakarta, the City of Bogor is like a pseudo capital for the extensive archipelago; it is the home of the current Indonesian President, who often works from this centre. It is a city where many people choose to live and then commute to work in Jakarta. Equally, many wealthy Javanese also have their holiday homes in or near the city. Bogor's population of over 1 million people live in an area of approximately 120 km², and it's a population that is rapidly growing, at a rate of approximately 1.5% per year. (Bogor City Government, 2016)

Home to the Bogor Botanical Gardens, the city sits in a basin between two volcanoes, Salak to the South of the city and Gunung Gede ("Big Mountain") to the South-East. Parts of the city have quite steep slopes so are sensitive to erosion. Named the "City of Rain", Bogor experiences high levels of precipitation, however, residents have noted that the predictability of the wet and dry seasons is diminishing. Not surprisingly, several rivers traverse the city and there are also several small lakes within the city boundaries. Located at a higher elevation than Jakarta, Bogor is generally cooler than the capital, but recent measurements suggest the urban area temperatures are becoming noticeably hotter.

Like many cities in Indonesia, the City of Bogor experiences localized flooding during heavy rain events, has areas of informal settlements that are built on highly vulnerable land, with issues of poor sanitation, decrease in availability of clean water and associated health impacts. Climate change is anticipated to exacerbate these issues, and city officers wish to work with their communities to adapt together.

The Initiative: Climate Adapted Disaster Risk Reduction

Aims of the project

The ICLEI-ACCRN project aimed to carry out a rapid assessment of the current and potential climate change risks for the urban area of Bogor, to identify possible actions to reduce the risk, and to build the capacity of Bogor City staff to confidently engage their community in climate change adaptation initiatives. Additionally, the project hoped to foster an understanding of integrated planning based on the principles of climate resilience, as a mechanism for sustainable development.

Action on climate change is not new to the City of Bogor

The City of Bogor has a long history of engaging with climate change issues – being one of the first in Indonesia to join ICLEI's Cities for Climate Protection (CCP) program in the year 2000 and commit to reducing the city's greenhouse gas emissions, and more recently engaging in the Urban LEDS project (2012 – 2015). These initiatives primarily focused on reducing greenhouse gas emissions, both from city operations and from the community. Current Mayor Bima and former Mayor Diani have been very supportive of action on climate change, issuing Mayoral decrees to support projects that work on climate change. This prior work on ICLEI climate change programs provided a good foundation for the organization to extend their capacity.

The ICLEI-ACCCRN project was the first project to expand the city's focus to preparing to adapt to the future risks of climate change, in a structured, holistic way.

Through the ICLEI-ACCCRN project, which was managed by the Environmental Agency of Bogor, a Working Group on Climate Change was established, with members from Bappeda, the Health Agency, Public Works Services, the Disaster Agency and members of the community. This group, working through the structured ICLEI-ACCCRN process (Refer Box 1 and Figure 1) , undertook several activities to build the capacity of city staff. These included collaboratively developing climate vulnerability and risk maps, identifying "hotspot" areas that are particularly vulnerable to multiple hazards, and systematically identifying and prioritizing actions.

Of utmost importance in the ICLEI-ACCCRN process is the concept of shared learning dialogues, where stakeholders from across the organization, external organizations and community members can come together to share experiences of current day impacts and risks, as well as learn about the science of future potential risks. This engenders mutual learning and understanding, and helps build trust within the organization, between organizations and the community.

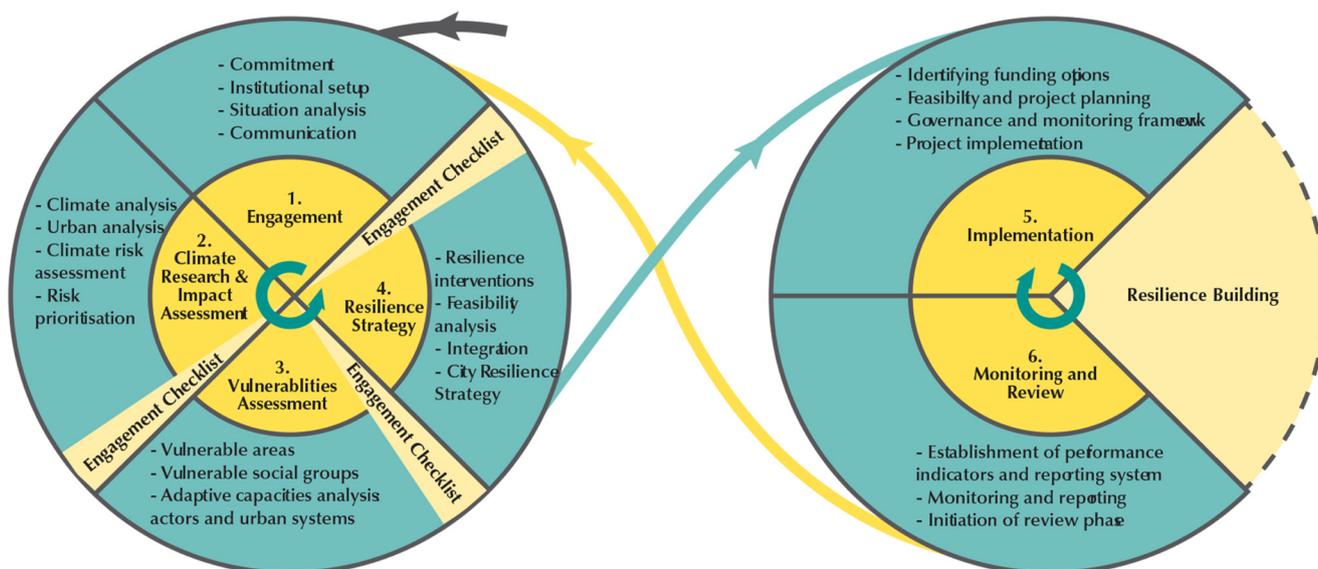


Figure 1: The six-phase ICLEI-ACCCRN Process

Strengthening the DRR analysis and strategy

At the time the ICLEI-ACCCRN project commenced in Bogor, the city was mandated to establish a Disaster Risk Reduction (DRR) agency and prepare a DRR strategy. This initiative was driven by Bappeda – the Development Planning Agency for Bogor. An extensive ad hoc team met to drive this process, which included members of the ICLEI-ACCCRN Working Group on Climate Change. It was therefore inevitable that these two projects, delivered by two different departments in Bogor, would discover opportunities to overlap and interlink.

In establishing the DRR Strategy, the team were mainly using historical trend weather and impact data, and extrapolating this to forecast future risk. However, by collaborating with the ICLEI-ACCCRN project, the DRR team were able to access future climate projections and risk assessments, and incorporate these into their analysis. This allowed the DRR analysis, strategy and its prescribed actions to be strengthened.

Approaching analysis through the lens of urban systems

The collaboration of the ICLEI-ACCCRN process with the development of the DRR strategy also introduced the concept of working through the lens of urban systems to establish vulnerabilities and risks, and identify priorities. By investigating key urban systems such as sanitation, transport, communications etc, overlaid with future climate risk information, the DRR process could better target priority activities to sectoral areas where multiple risks magnified the potential impact.

Using the urban systems approach also assisted in integrating priorities into different sectoral planning documents for the city. Although thinking of integrated “urban systems” was a new way of working for the city staff, the management and operational structure of departments is sectorally-based, so it made logical sense to them.

Results

Future climate considerations integrated into City Disaster Risk Reduction Management Master Plan

Through using the climate projection data obtained as part of the ICLEI-ACCCRN project, and collaboration with the Working Group on Climate Change, the Bogor DRR Strategy incorporated future climate projections into its risk framework, rather than relying on historic trend data only. This improved the analysis behind the DRR strategy, and strengthened the final strategy as well.

Comprehensive Action Plan for Adaptation to Climate Change developed

A comprehensive Action Plan for Adaptation to Climate Change was developed as a result of City of Bogor undertaking the ICLEI-ACCCRN process. The plan documents specific climate risks that the city faces and areas of vulnerability, but importantly, identifies strategies for action the City can take to reduce the impact of climate change. This encompasses the priority sectoral areas, and incorporates low carbon development, disaster risk reduction and climate change adaptation.

Cross-organisational cooperation for climate mitigation and adaptation

The Working Group on Climate Change draws together members from different departments within the City of Bogor, as well as connecting to other government agencies. These connections helped facilitate the development of actions that will meet both mitigation and adaptation aims, including planting more trees in the city centre, to help reduce the impact of the “urban heat island”, and to capture carbon dioxide. There is now a combined package of mitigation and adaptation initiatives in the mid-term development program.

Innovative community-driven initiative to reduce flood risk – both now and in the future - implemented

As a consequence of the ICLEI-ACCCRN project (with funding through the ACCCRN Small Grants program), a flood mitigation “eco-drain” was installed in Ward 09, sub-district Sindang Rasa, in East Bogor (Figure 2). The project was conceived and driven at the community level by the Bogor Healthy Citizen Forum (an NGO established by the Mayor), and facilitated by the City.

Sindang Rasa was an area frequently exposed to flooding, which regularly closed the local elementary school and community health centre. Additionally, the standing water left after a heavy rain event provided a breeding ground for mosquito-borne diseases such as dengue fever. The project involved the construction of a paved road that allows storm water to filter through into a water reservoir. A retention wall is part of the project design, and will serve as a rainwater harvesting facility, providing an additional source of water for the citizens of Sindang Rasa.

Lessons Learned

Take advantage of organizational opportunities

The ICLEI-ACCCRN project was originally not working directly with the Disaster Risk Agency. However, being attuned to the broader use of the work that was being done, Bogor City staff were able to tap into the ICLEI technical expertise to enhance their DRR Strategy, also introducing new techniques and information to a broader audience of city personnel.

Continue to build on knowledge foundations

In Indonesia, city personnel often move from one department to another, not staying for more than 6 – 12 months in one role. This can severely impact capacity building efforts. However, ongoing engagement with the city over several years and several programs helps to reinforce learnings, as well as engage a cross-section of staff over time. This enabled the ICLEI-ACCCRN project to build on a base foundation and understanding of climate change.



Figure 2: Construction of the “Eco-drain”

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Replication

This case demonstrates the flexibility of the ICLEI-ACCCRN process, and how its components can be used across different sectors within local government, to enable climate change adaptation to be embedded. The integration of climate considerations into the city's disaster risk reduction planning process and final strategy was enabled by the thoroughness of the ICLEI-ACCCRN process.

- **Staff/Capacity:** City of Bogor staff had engaged with climate change issues for many years. This base of climate change understanding facilitated the process of integrating climate considerations into their DRR planning.
- **City Characteristics:** Successive Mayors of Bogor have been keen to progress climate change initiatives and have supported action by the city personnel. This support enables not only the plans to be developed, but also to be ratified, allocated budget and implemented.
- **Stakeholder Engagement:** Engagement across organizational departments was crucial to the climate change adaptation planning process, and the integration of climate considerations in the DRR strategy. Establishing the Working Group on Climate Change was a central mechanism for this engagement.

Costs and Funding

Funding for Bogor's participation in the ICLEI-ACCCRN project was provided by the Rockefeller Foundation. Although the allocation to Bogor represented approximately \$25,000 USD, the ICLEI Indonesia office was also working with Bogor on two other initiatives that reinforced and leveraged the ICLEI-ACCCRN project work. These were Urban LEDS and the Earth Hour Challenge.

References and Further Reading

ICLEI-ACCCRN Process toolkit, available at: <https://www.acccrn.net/node/620>

Bogor Road Paving Project adapted to Climate Change, ICLEI-ACCCRN Small Grant Snapshots, available at: <http://oceania.iclei.org/>

Bogor City Government (2016) Rencana Aksi Adaptasi Perubahan Iklim Pemerintah Kota Bogor (Action Plan for Adaptation to Climate Change Bogor City Government)



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