

insights in DRM

A Practitioner's Perspective on Disaster Risk Management in Latin America & the Caribbean

Integrated Metropolitan Planning: A Case for DRM in the State of Rio de Janeiro

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“The partnership with the World Bank in the context of DRM is paramount to developing our capacity in the face of increasing numbers of disasters in Brazil. Specifically for the Ministry of Cities, the focus has been on improving urban planning to avoid creating new risks, and learning how to better manage existing risk.”

—Yuri Rafael Della Giustina - Sr. Infrastructure Specialist, Ministry of Cities

Challenge

In January 2011, extreme flooding and devastating landslides caused by heavy rains left a wake of more than 1,000 deaths in the state of Rio de Janeiro, with the most devastating impacts on the most vulnerable populations living in the state's mountainous region (*Região Serrana*). The total cost to the state of Rio de Janeiro was over US\$2 billion, more than one percent of the state's GDP. Direct impacts to the infrastructure and social sectors accounted for over 50 percent of losses, severely disrupting public services including transportation, telecommunications, water and sanitation, health care and education throughout the affected areas.

The state of Rio de Janeiro has a history of leadership in disaster response in the country dating back to the 60s. Following a massive flooding and landslide event in 1966, the state established the country's first civil defense authority and institutionalized a disaster-response mechanism for its citizens. During the same period, Brazil's capital city moved from Rio de Janeiro to Brasilia, which caused the region's economy to suffer due to diminished institutional capacity and financial capital to compete in the surge of industrialization throughout the country. However, since 2000, the state's economy recovered significantly due to discoveries of offshore fossil fuels and growing investments in tourism, leading to a population surge and economic boom across the state. This economic resurgence caused some detrimental effects on the urban landscape of the state, particularly in the capital city, as the urban poor often settle into largely unregulated and unplanned *favelas*¹ in high-risk areas, including flood zones and steep mountainsides prone to landslides.

With the spotlight on Rio de Janeiro as one of the host cities of the World Cup in 2014 and Summer Olympics in 2016, national, state and municipal authorities are on the front line to protect residents and tourists from disasters and are striving to build resilience by improving land-use planning and implementing best practices in DRM to better prepare for climatological hazards.

Intervention

In the wake of the Rio flooding and landslide disaster in 2011, government authorities sought to understand the economic impacts and human losses triggered by extreme hazard events, and the underlying causes of disaster risk in the country. In partnership with the municipal, state, and national-level governments, the World Bank's Latin America and the Caribbean

Region Disaster Risk Management and Urban Development (LCSUDU) team developed a number of DRM interventions, including analytical studies, technical assistance, and capacity building activities to strengthen national and sub-national institutions and tackle the complex nature of disaster events in Brazil. These interventions include four main areas: risk identification, disaster preparedness and response, policymaking, and economic analysis.

Risk Identification

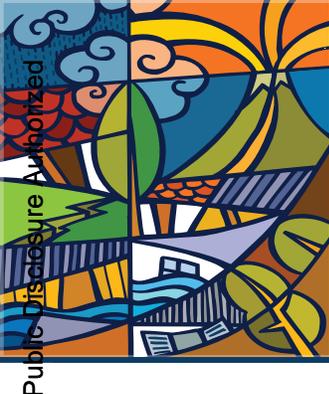
- ◆ **Landslide and Flood-Risk Maps:** The LCSUDU team collaborated with the Department of Mineral Resources (Departamento de Recursos Minerais) and the State Environmental Institute to develop landslide and flood-risk maps to assist in identifying hazard prone areas, people and infrastructure susceptibility and to produce risk information for decision-making.
- ◆ **Pilot Urban Growth Monitoring System:** The Ministry of Cities and the LCSUDU team collaborated to develop the Pilot Urban Growth Monitoring System. This program supports the Ministry of Cities' mission to increase the capacity of municipalities so they can incorporate DRM considerations into their urban expansion plans. Utilizing [OpenDRI](#)² principles, this pilot drew upon [a series of temporal satellite images](#)³, hazard maps and Geographic Information System (GIS) data layers to better integrate existing knowledge and research on urban expansion and areas of geological and environmental fragility (see map below).



Prototype map showing urbanization in Rio de Janeiro municipality from 1994 (pink) to 2011 (red).

Disaster Preparedness and Response

- ◆ **Improved Early Warning System (EWS):** The Civil Defense, State Environmental Institute and the Department of Mineral Resources collaborated to implement a more effective EWS and disaster contingency plans. The EWS includes low, medium and high-risk



alerts and is directly linked to the Civil Defense system that sends out alerts every 15 minutes. The [state early warning system](#)⁴ benefits five million people in 21 municipalities, and covers the most risk-prone and populated areas.

Policymaking

◆ **2012-2015 Multi-Year Development Plan:** The World Bank provided technical assistance in outlining the vision for the metropolitan area. The Plan takes into account the Integrated Program for Rio de Janeiro's Metropolitan Region, as well as multi-sector plans covering DRM, urban, environment, transport and housing areas, among others.

◆ **Morar Seguro Program:** In April 2010, authorities launched the *Morar Seguro* (Live Safely) program, a state-integrated metropolitan program that integrates DRM into economic and urban development planning. This includes i) a housing program that gives priority to people living in risk areas; ii) a social rental program for families affected by disaster, and iii) technical assistance and financial incentives for municipalities to establish the boundaries of risk areas.

Economic Analysis

◆ **Damage and Loss Assessment (DaLA):** In 2012, a DaLA of Brazil's most major climate-related disaster events since 2008 was conducted using the [ECLAC methodology](#)⁵, which helped to expand the national dialogue on DRM (see table below). The DaLA aggregated four events and analyzed the major sectors, concluding that the most affected by far was the housing sector accounting for approximately 48% of total costs (R\$7.3 billion, US\$3.1 billion), followed by the transport sector (18%: R\$ 2.8 billion, US\$1.2 billion). These costs include direct physical damages to economic assets (mainly building and transport infrastructure), and indirect economic impacts resulting from loss of connectivity and disruption of public services and transportation that affect local and national economic activities and value streams.

Year	Event	Number of Victims	Total Cost (R\$ billion)	Total Cost (US\$ billion)	GDP % Loss (by state)
2008	Floods and landslides in Santa Catarina	110	5.32	2.27	2.67%
2010	Floods in Pernambuco	20	3.37	1.45	4.30%
2010	Floods in Alagoas	36	1.85	.79	8.72%
2011	Floods and Landslides in Rio de Janeiro	1,000 (approx.)	4.71	2.03	1.35%
Total		1,166	15.25	6.54	-

Disasters and economic losses of the four major disasters in Brazil (2008-2011).

Outcome

A culture of disaster risk awareness is growing in Brazil as urban planners are developing integrated and proactive approaches to urban development by institutionalizing DRM policies and building technical capacities to mitigate disasters through comprehensive disaster risk management programs. The state of Rio de Janeiro has catalyzed a shift

in the country from a reactive approach disaster response to improved risk management strategies that aim to produce risk information to support informed decision-making. Investments now focus on building technical capacity at the national, state and municipal levels to support the DRM engagements initiated in recent years.

“As a society we have the means to create tools and procedures to reduce the risk of disasters and ensure greater resilience for both communities and infrastructure.”

—President Dilma Rousseff, in 2012 launch of National Plan for Risk Management and Natural Disaster Response

The Rio de Janeiro Metropolitan Region is not only distinguished as one of the top tourist destinations in the world and the second largest hub of economic activity in the country, but its approach to disaster risk management is now seen as a model for other areas of Brazil. These interventions facilitate the understanding of disaster risk in Brazil, and government authorities are actively engaging in robust and strategic activities to strengthen the institutional framework in order to improve disaster preparedness and response actions, create awareness, and build technical capacity to address the root causes of disasters.

However, even with recent progress, much remains to be done to improve the performance and technical capacity of government authorities to employ DRM principles into decision-making processes. To address the increasingly frequent and intense natural hazards in Brazil, future studies will help to identify the best technologies for collecting and using data, and develop strategies and urban policies for land-use planning to avoid settlements in high-risk areas and incorporate mitigation measures for existing hazards.

Recognizing the high stakes in protecting its citizens, economy and hundreds of millions of visitors that are expected to arrive in the coming months and years, national, state and municipal authorities in Rio de Janeiro are collaborating to urgently integrate key policies, investments and metropolitan planning practices that build disaster resilience.

Endnotes

- ¹ *Favela* is the term for a slum in Brazil, most often within urban areas, as seen here: www.photosnack.com/FE7975B8B7A/pdc9acuu
- ² Open Data for Resilience Initiative (OpenDRI) was launched by GFDRR in 2010 to increase the use of data in DRM. <https://www.gfdrr.org/opendri>
- ³ <http://www.photosnack.com/FE7975B8B7A/ptmyv855>
- ⁴ <http://inea.infooper.net/inea/>
- ⁵ The DaLA Methodology was initially developed by the UN Economic Commission for Latin America and the Caribbean (ECLAC) in 1972, in order to capture the closest approximation of damage and losses due to disaster events. It is a flexible tool that can be adapted to specific disaster types and government ownership requirements, and uses national accounts and statistics as baseline data to assess damage and losses. <https://www.gfdrr.org/fr/node/69>

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