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Bottom-up and top-down water-related climate change adaptation strategies in low-income urban areas in Douala, Cameroon

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Key points:

- **Climate change, compounded with more demand for water in urban settings will add new stresses to hydrological systems increasing therefore the risk from water hazards and water insecurity.**
- **The autonomous adaptation strategies by urban poor communities are key to the implementation of the IWRM and DRM frameworks.**

*The figures, tables and ideas expressed in this brief are based on Jessica's PhD research conducted at The University of Manchester from 2010 to 2014. The researcher can be contacted at jroccard@gmail.com

The PhD Thesis is available from https://www.escholar.manchester.ac.uk/uk-ac-man-scw:239599

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Urban growth and lack of proper planning in cities of the global South is forcing low-income communities to settle in hazardous physical environments making them more vulnerable to the impacts of severe weather. Climate change, compounded with more demand for water in urban settings will add new stresses to hydrological systems increasing therefore the risks from water insecurity.

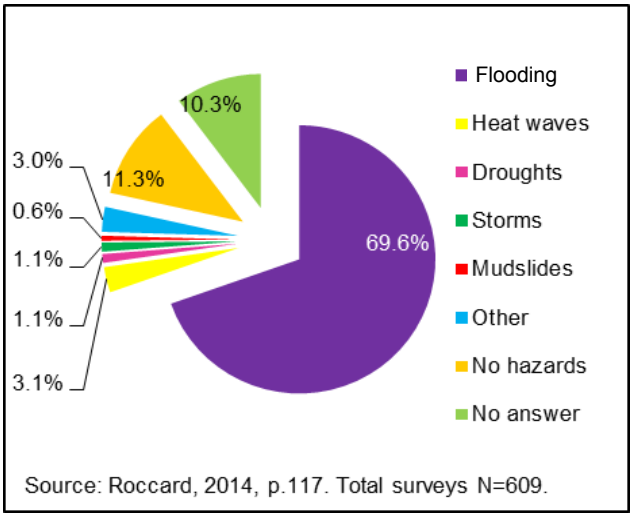
In urban areas, the response to climate change has been dominated by Disaster Risk Management (DRM). This framework aims to reduce vulnerability by supporting the inclusion of risk analysis, sustainable projects and initiatives implementing prevention and mitigation measures to minimise disaster losses; while involving numerous actors and stakeholders (World Bank, 2011). On the other hand, Integrated Water Resources Management (IWRM), has been introduced to support climate change adaptation in water resource planning. This framework, includes a series of technical, economic and environmental aspects in specific social, cultural and institutional contexts (Agnew & Woodhouse, 2010). Both frameworks have been widely criticised: DRM for focusing more on the physical vulnerabilities threatening human settlements and the increase in magnitude and frequency of short-term extreme weather; and IWRM by lacking accuracy and a narrow approach not suitable to the heterogeneity of the world, and leading to ineffective and even counter-productive measures that affect the poor (Merrey *et al.*, 2005; Moser *et al.*, 2010) .

Based on a case study of the city of Douala, Cameroon, this briefing paper examines the challenges of implementing both DRM and IWRM frameworks to adequately reach low-income neighbourhoods, whilst being alert to, and responsive to, the urban poor's autonomous adaptation strategies. It starts by focusing on water-related hazards affecting three urban poor communities located in the central part and at the edge of Doula. It then introduces the operational implementation of the IWRM and DRM frameworks and the urban poor's autonomous adaptation strategies. The brief finally discusses the linkages between both spontaneous and institutional strategies, and the opportunities for bottom-up based adaptation.

Water-related hazards in urban poor communities in Douala

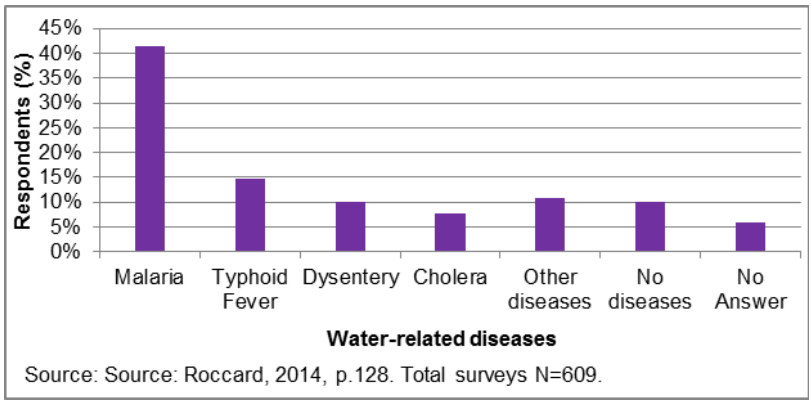
Overall, the majority of low-income communities in the city face three main challenges regarding water: major flooding (see Figure 1), water-related epidemics (see Figure 2), and limited access to drinking water (see Figure 3).

Figure 1 Main weather-related hazard events identified by members of three urban poor communities in Douala (in percentage)



Source: Roccard, 2014, p.117. Total surveys N=609.

Figure 2 Households affected by water-related diseases in three urban poor communities in Douala (in percentage)



Source: Source: Roccard, 2014, p.128. Total surveys N=609.

DRM and IWRM frameworks in urban poor communities

In the Republic of Cameroon, responses to climate change impacts have been dominated by the DRM framework which puts more emphasis on emergency actions to face flooding. The role of local government is not well defined despite its substantial knowledge of the challenges facing low income settlements, including groundwater contamination and the lack of drainage and sanitation infrastructure as well as clean water access. Douala's struggle to implement the DRM framework in a sustainable manner is made worse by the absence of a locally based specific team other than the fire brigade concerned with flooding and water scarcity. In addition, the lack of urban planning, improvement of drainage infrastructure and road access in the settlements hampers the possibility of emergency intervention measures. Consequently, support when disasters happen rarely reaches urban poor communities.

Regarding the IWRM, the framework is applied in a context where the Cameroonian Government has recently reformed the water utility company to create a public-private partnership. Nevertheless, the IWRM framework is still at an early stage of its implementation.

At present, the IWRM and DRM frameworks are not effectively reaching the poor in Douala. Nevertheless, projects to face water-related issues in low-income communities are being undertaken outside the DRM and IWRM frameworks by institutions such as Douala II City Hall, Douala Urban Council, the Ministry of Territorial Administration and Decentralisation through the community leader, and the Ministry of Public Health (Table 1).

In spite of the water-related measures and projects carried out by the authorities in low-income communities, the delivery of basic services and protection for the communities to face water-related hazards is still not fully effective. However, the impacts of water-related hazards appear limited when considering their frequency and intensity. Similarly, lack of tap water access does not seem to be a major issue in the communities (Roccard, 2014).

Water-related autonomous adaptation strategies in urban poor communities in Douala

The limited impacts of water-related hazards mentioned above have been achieved in part due to the strategies implemented by the urban poor. Indeed, the lack of effective outcomes from the institutional measures and projects has led to a strong process of autonomous adaptation by inhabitants of poor communities (Box 1). These reactions to water-related issues take many forms both at community and household levels, showing the extent of the adaptation capacities of the urban poor (Table 2). For instance, while water scarcity is minimised by alternative water sources (Figure 3), flooding impacts are reduced by the construction of low walls around households (Image 1).

Table 1. Institutional water-related projects implemented in three urban poor communities in Douala

Water-related hazard	Water-related epidemics	Limited access to drinking water	Lack of drainage and sanitation systems
Institutional project	- Distribution of long-lasting impregnated mosquito nets - Vaccines campaigns - Hygiene awareness campaigns - House disinfection - Free cholera treatment	- Water awareness campaign - Well digging - Well disinfection - Water disinfection	- Drainage digging - Latrines disinfection - Sanitation awareness campaign - Collection of solid waste

Source: adapted from Roccard, 2014, p.156

Box 1

Autonomous adaptation is understood in this brief as the processes and actions people implement by themselves to reduce their vulnerability to the impacts of climatic events on their well-being, and which increase their adaptive capacities.

These strategies appear to replace and/or compliment formal institutional programmes, measures and projects (Table 3).

The main autonomous strategies for accessing water focus on the exploitation of groundwater by the low-income communities. However, water wells and private boreholes are often heavily contaminated and flooding water is not well discharged. The impact is expressed by the recurrence

Table 2 Main water-related autonomous adaptation strategies to water-related issues in three urban poor communities in Douala

Strategies	Issue Addressed
Low wall construction	Floods
Raising the house's height	Floods
Drainage construction	Floods, water-related epidemics
Drainage maintenance	Floods, water-related epidemics
Lifting up household goods with ropes	Floods
Filtering of public water supply	Floods, water scarcity
Creation of small water companies	Water scarcity
Well construction	Water scarcity
Borehole construction	Water scarcity
Well disinfection	Floods, water-related epidemics, water scarcity
Changing water supplier	Water scarcity
Filling stagnant water puddles	Water-related epidemics, water scarcity

Source: Adapted from Roccard, 2014, p.184

Actions concerned with flooding are implemented by the urban poor to protect their own housing unit. However, these strategies are not sustainable. Community members lack financial resources and long term coordination mechanisms which prevents them from adopting more effective solutions, including investing in more resilient building materials.

Opportunities for autonomous-based adaptation

Governments urgently need to find and implement alternative and adaptive forms of urban planning to face the water-related hazards and their related impacts. To implement such policies, a legal and institutional framework needs to be in place that will allow all stakeholders, especially the poor, to become part of the process and manage the resources according to agreed rights, powers and obligations.

Adapting to climate change impacts and integrating climate issues into policies does not involve entirely new processes or techniques (Kristensen *et al.*, 2009). Indeed, policies such as the water law in Cameroon allow the implementation of community-based projects. Based on the principles of IWRM, the policies should integrate the autonomous adaptation strategies of all expected impacts of climate change and population growth that are already transforming land-use and livelihoods.

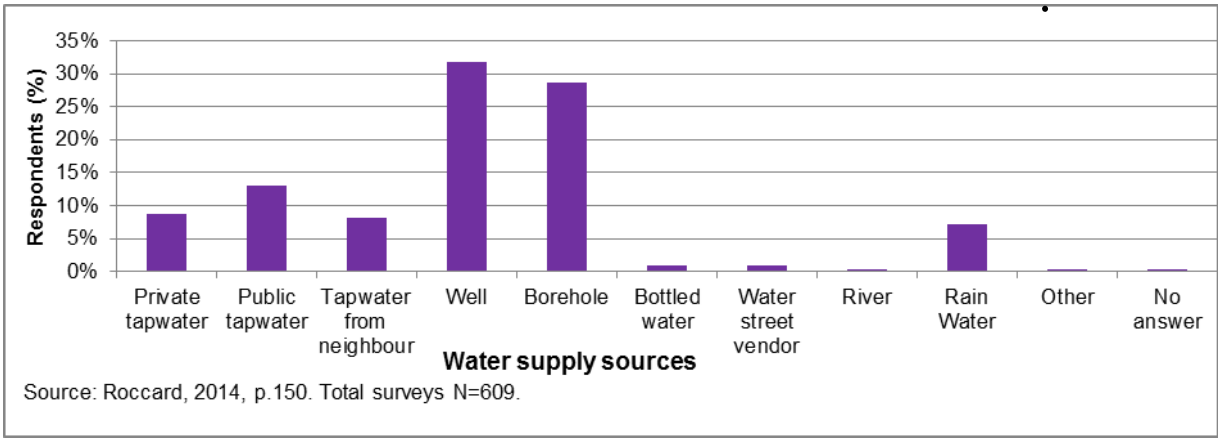
By taking into account communities' autonomous actions and current strategies to mitigate water -related risk, city, regional and national initiatives can be more effective. Indeed, these measures would be adapted to the needs and socio-cultural habits of the low-income communities and increase in effectiveness. However, these actions need to be introduced at different spatial and time scales depending on the socioeconomic and environmental contexts.

Although the development of joint planned and autonomous strategies may improve their implementation, the lack of basic data regarding the needs and actions already taking place impedes their effectiveness. Indeed, this gap prevents the water-related frameworks and autonomous strategies from being fully effective.

Picture 1 Low wall to reduce flooding impacts on household in Newtown Airport 5 in Douala

Photo: Roccard (2012)

Figure 3 Water supply sources in three urban poor communities in Douala (in percentage)



Source: Roccard, 2014, p.150. Total surveys N=609.

Table 3 Linkage between institutional and autonomous strategies

Autonomous adaptation strategies	Linkages to and impacts on the institutional
Disinfection of wells	Reproduction of institutional emergency response to epidemic
Disinfection of household water supply	
Changing water source	Refusal of formal water supply systems from the communities' members
Water storage	
Drainage construction	Reproduction of institutional flooding response
Drainage maintenance	
Well construction	Refusal of the communities' members to connect to formal water supply systems
Borehole construction	
Development of small water companies	

Source: Adapted from Roccard, 2014, p.189

Similarly, the lack of topographical and infrastructure maps impacts on water discharge and sanitation actions. Hence, the importance of making elemental data available is stressed and would improve planning capabilities.

At a community level, the possibilities of intervention for IWRM and DRM are: water allocation, strengthening of pollution control, close monitoring, basin planning, economic and financial management per river basin, strengthening of information and communication management, the organisation of stakeholder participation, and a strengthening of flood management (Cap-Net, 2009). These projects and measures, already carried out at a national level, might greatly benefit from implementation at community level.

Conclusion

Low-income individuals, households and communities in Douala autonomously implement multiple and diverse strategies to minimise the impacts of water-related risks as well as water scarcity. In Douala, their adaptive capacity to access water is mainly based on the abundance and proximity of groundwater resources. In parallel, urban poor minimise hazards' impacts by modifying the build environment when possible. As a result, autonomous actions reduce the vulnerability of the urban poor. The effectiveness of these strategies to address flooding, water-related diseases and access to water supply is, however, limited by many factors, including the financial, environmental and infrastructural.

The autonomous adaptation strategies are key to the implementation of the IWRM and DRM frameworks. Initiating and supporting the strategies implemented and by the communities' members would facilitate the sustainable development of spontaneous settlements. The analysis of the autonomous adaptation process taking place in the communities shows it should be investigated with adaptation policies, as they are shown to have a strong influence on each other. More effort is needed to identify and communicate best practice in flood risk measurement, water access, and health risk response, and a deeper global commitment to implement these best practices is required.

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