



# Autonomous adaptation to global environmental change in peri-urban settlements: Evidence of a growing culture of innovation and revitalisation in Mathare Valley Slums, Nairobi



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## ARTICLE INFO

### Article history:

Received 4 April 2014

Received in revised form 15 December 2014

Accepted 25 December 2014

Available online

### Keywords:

Urbanisation

Autonomous adaptation

Flooding

Urban slums

Mathare Valley Slums

Climate change

## ABSTRACT

The growth of peri-urban areas is increasingly recognised as a dominant planning and urban design challenge for the 21st century. In burgeoning poor urban settlements growing on city margins, autonomous adaptation strategies are often the only measures to respond to increasing climatic and compounding stressors. Yet, in both research and practice there remains lack of understanding regarding the dynamics of adaptation and risk reduction at the level of the community. In this paper, we argue urban slums are ideal places to consider adaptation because they offer examples of more extreme social-ecological stress than one finds in more established communities – the kind we can anticipate more broadly in the face of climate change. A framework for identifying local adaptation processes is presented and applied to analyse the case of Mathare Valley Slums in Nairobi, Kenya – a densely populated suburb, where residents are regularly exposed to flooding from heavy rainfall. Findings reveal that slums, often viewed as illegitimate, makeshift, and temporary settlements, are places experienced by many residents as permanent communities characterised by rapid environmental change. Processes of adaptation in Mathare have become institutionalised through time, as a new generation of people imagine themselves staying and (re)organise to achieve a higher level of functioning through various strategies to reduce risk. Innovative and revitalising adaptation occurs as residents shift from employing more generic and expected coping strategies, such as evacuating homes or economic diversification, to creating “gated” communities and savings schemes to maintain and improve the settlement, despite uncertain tenure. Both formal and informal institutions, such as youth groups, play an important role in governing such heterogeneous localities, incrementally upgrading the slum and providing critical public services. Long-term residents’ increasing recognition of the permanence of the slum community and its stressful conditions appears to lead to more collective action toward adaptation pathways. However, this is in marked contrast to the dominant non-local perspective of Mathare’s status as both impermanent and illegal, which prevails among government officials. As such, strategies are generally not incorporated into planned interventions. While progressive policies designed to reduce risk exist, they remain nascent in their establishment and fail to benefit slum dwellers. The case illustrates the need to incorporate the wealth of knowledge, techniques, and experience extant at the community level in the development of adaptation planning.

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## 1. Introduction

The confluence of unprecedented rates of urbanisation, economic pressures of globalization, population growth and global environmental change means people are streaming into cities at rates which strain infrastructure and integrative capacities. Regional climate change has the potential to compound existing challenges faced by poor urban dwellers, who are disproportionately affected by impacts (Jabeen et al., 2010). Yet, in the face of a

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lack of support to reduce risk at the local level, often household and community responses are the only adaptations to growing risks. For a number of reasons, local governments in developing countries holding the jurisdiction in marginal urban areas fail to integrate increased risks into policies, plans and actions that serve to benefit slum dwellers (Pelling and Wisner, 2009). Nevertheless, with the augmenting effects of marginality, regular exposure to hydro-meteorological threats, together with the deterioration of overstretched infrastructure and services (UNDP, 2009; UN-Habitat, 2010), a pool of local knowledge and practice has emerged within communities in response. Surprisingly, little attention has been paid within the literature to understand the ongoing processes of autonomous adaptation (Thornton and Manasfi, 2010), particularly of urban slum dwellers. As a consequence, local adaptation strategies are not incorporated into, or supported by, the decision-making processes shaping adaptation and development policies and interventions. This paper addresses this deficiency through an examination of autonomous adaptation strategies employed by people living in a peripheral urban community of Nairobi, Kenya.

Growing urban informality is a highly significant global phenomena, with future implications. Slum growth is both a threat, with the rise of inequality among urban dwellers, distortions in form and functionality of cities and increasing environmental degradation, and an opportunity with improved job prospects and earning power for migrants, and access to goods, services and infrastructure (Wisner, 2009). Across the globe, 3.3 billion people live in urban centres, expected to reach 5 billion by 2030, with 95% of this growth in developing countries (Piorr et al., 2013). In Africa alone, 72% of city dwellers live in slum conditions (UNEP, 2007), and globally make up one seventh of the human population (Mason, 2011). For the purpose of this paper we define an urban slum settlement according to five characteristics: lack of durable housing, sufficient living area, access to improved water, access to sanitation and/or secure land tenure (UN-Habitat, 2009). Given these conditions, it is not surprising that slums have been aptly described as the “dirty secret of the modern mega-city” (Mason, 2011).

Living under stressful and changing urban circumstances requires continuous adaptation. However, while governments in developing countries and Least Developing Countries (LDCs) are tasked to develop National Adaptation Programmes of Action (NAPAs) and National Adaptation Plans (NAPs), there is limited scholarship backed by empirical cases on local adaptation processes to support this policy development, especially in urban environments. Literature on climate adaptation has tended to focus on particular geographic levels, such as national (Jones et al., 2010) and rural community boundaries (Agrawal, 2008, Dabi et al., 2009), particular coping strategies (Bryan et al., 2013) or particular types of risks (Osman-Elasha et al., 2009). The same bias is mirrored in the practices of international organisations and national disaster risk reduction (DRR) departments (Wahlström, 2011). As a result, particular views of risk are reinforced in various levels of decision-making, propelling resources into international top-down approaches to aid relief in rural environments. This is despite the existence of robust evidence suggesting the approach has not worked (Patal, 2007; Douglas et al., 2009). There is an urgent need for practical support that reduces residents' vulnerability, and in-depth analyses of how global processes of urbanisation and global environmental change manifest in localities may contribute to this end (Chatterjee, 2010; Adeniji and Ogundiji, 2009; Nchito, 2007; Douglas et al., 2009).

Using the case of Mathare Valley Slums in central Nairobi, Kenya, the aims of this paper are threefold. First, we consider perceptions of impacts of environmental change and key drivers of

vulnerability to situate the impacts of climatic change and variability in broader processes of socio-ecological change. We then describe strategies to respond to, prepare for or reduce flood risk at local levels of social organisation and decision-making, i.e. intra-household, household and community levels (Cash et al., 2006), which over time result in incremental, collective action and transformative change. The paper concludes by drawing lessons from Mathare to inform the development of appropriate adaptation interventions, policies or programmes. We show how local strategies evolved over short- and medium-term time horizons could be supported to enhance long-term adaptation. A combination of ethnographic methods allows for a critical assessment of how policies and strategies to reduce risk actually play out on the ground.

Our findings show that slums, often viewed as illegitimate, makeshift, and temporary settlements, are places experienced by many residents as permanent communities characterised by rapid environmental change. Moreover, incremental, collective action and empowerment associated with it indicate residents are acutely aware of the measures needed to reduce environmental risk. Autonomous adaptation strategies of slum dwellers offer examples of more extreme social-ecological stress than one finds in formalised settlements – where both early warning and response systems are more readily resourced and coordinated. Given rates of unprecedented unplanned urbanisation, particularly in African cities where levels of informality are amongst the highest in the world (UN-Habitat, 2011a), capturing this information has important implications for targeting policies, funding and planning, not only in peripheral urban communities, but for any community responding to rapid social-ecological change. The methodology used can also be applied to identify and incorporate local adaptation processes into policy and planning in multiple contexts.

## 2. Conceptualising adaptation processes

Adaptation strategies are actions that people employ not only to reduce adverse effects of specific environmental changes, but also to enhance opportunities for well-being. Actors do not have to consciously choose to adapt, but rather may do so autonomously, either voluntarily or involuntarily. Planned adaptation, in contrast, is a deliberate action with the aim to return to, maintain or achieve a desired state (Thornton and Manasfi, 2010). It is based on an awareness that conditions have changed or will change. Adaptation can vary in form and function (e.g. technological, behavioural, institutional), temporality (e.g. anticipatory, concurrently, and reactively), or in spatial scope (Waggoner, 1992; Burton et al., 1993). Adaptation may be a response to a range of stimuli in addition to climatic change, such as ecological or market/welfare changes (Wongtschowski et al., 2009). Local adaptations of an individual, household or community can be supported, constrained or undermined by extra-local interventions. Moreover, in some circumstances, strategies may result in unintended deleterious consequences, trade-offs, or increased vulnerability to hazards, i.e. maladaptation (Davies, 2009). Here, we are most concerned with what form autonomous adaptation takes in the absence of external support (Carter et al., 1994).

As part of a behavioural process, adaptation actions might become contingent on each other. When actors' strategies and processes combine one begins to see entailments and pathways develop – implying a chain of actions towards a future alternative state. For example, by digging drainage channels or constructing storage areas in roofs, residents intensify investment in and around the home. This may lead to a rise in property rates, or heightened security to protect property. Adaptation pathways

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