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The potential use of natural resources in urban informal settlements as substitutes for financial capital during flooding emergencies

Mwazvita T.B. Dalu*, Charlie M. Shackleton

Department of Environmental Science, Rhodes University, Grahamstown, Eastern Cape, South Africa

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ABSTRACT

Rapid and widespread land cover change and the subsequent loss of the buffering capacity provided by healthy ecosystems against natural hazards has resulted in increased vulnerability to natural hazards. There is an insufficient understanding of the natural resources contribution to the resilience of poor urban communities living in informal settlements and the financial implications thereof. Thus, household strategies used to recover from the October 2012 flood shock were investigated within the informal settlements of three small South African towns using questionnaires. Within the vulnerability paradigm and the sustainable livelihood framework, the study also quantified and evaluated the relative contribution of natural resources to recovery strategies and the impacts on household financial capital. We found that natural resources contributed up to 70% to recovery of households from the flood shock, most of this being to reconstruct housing structures after the flood. Factors such as household head education level, household income, kinship level, the extent of property damage and the cost associated with property rehabilitation significantly influenced the uptake of natural resources in recovery from floods, and this was variable among settlements and towns. The main findings showed that natural resources reduced household vulnerability of urban informal settlements by providing an emergency-net function that substitutes financial capital. Their inclusion in disaster management plans and responses has the potential to contribute to the sustainable livelihoods of the urban poor in the Eastern Cape, South Africa.

1. Introduction

Many of the anticipated increased occurrences of natural hazards are not only a consequence of climate change, but rather of rapid and widespread land cover change and the subsequent loss of the buffering capacity provided by healthy ecosystems against natural hazards (Nel et al., 2014). Globally, several studies have linked the influence of landuse change to the exacerbation or reduction of flooding incidence in urban areas (García-Ruiz et al., 2008; Bloschl et al., 2007; Owrangi et al., 2014; Schilling et al., 2014). Coping with climatic shocks, specifically floods, has been studied in various parts of the world (Hoffman and Oliver-Smith, 2002; Khandhlela and May 2006; Benjamin, 2008). Climate change appears to be altering the pattern of flooding in Africa, compounded by anthropogenic alterations of the physical environment. Climatic models suggest that the pattern of unusual flooding is going to change much more than long-term average river flows (Douglas et al., 2008). Many African cities have experienced multiple extreme floods since 1995; a consequence of prolonged heavy rains (Lau et al., 2010). Southern Africa has experienced a significant increase of flooding incidences since 2010 (Decapua, 2011). In South Africa, thirty-three towns across nine municipalities were declared disaster areas in the year 2012. The most affected households were farm worker compounds, informal settlements and rural villages (Department of Science and Technology, 2010).

Dellink and Ruijs (2008), Hoffman and Oliver-Smith (2002) and Robbins (2004) all infer that while socio-economic contexts can more often than not, be a strong determinant of livelihood loss than the actual physical occurrence of a disaster event, socio-ecological dynamics can impact them in ways which people can cope with and adapt to shocks. “Disaster risk management is the application of disaster risk reduction policies and strategies to prevent new disaster risk, reduce existing disaster risk and manage residual risk, contributing to the strengthening of resilience and reduction of disaster losses” (UNISDR, 2009). In light of this understanding of disaster risk management specific to marginalised and disadvantaged segments of society, the services that the natural environment provides are critical in coping responses to shocks, highlighting the need for their inclusion in disaster management. Wunder et al. (2014) highlighted that 18.2% of rural households used natural resources as an initial response mechanism to shock. Jabeen et al. (2010) study on grassroot household and

* Corresponding author.
E-mail address: smazvita@gmail.com (M.T.B. Dalu).

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community coping strategies used by low-income households in Korail, the largest informal settlement in Dhaka, highlighted that among other strategies, natural resources were used in physical strategies. They however did not make a quantification of their contribution relative to the livelihoods of the people nor did they attempt to convert this contribution into monetary values. Shackleton and Shackleton (2004), McSweeney (2004, 2005), Shackleton et al. (2008) and Paumgarten and Shackleton (2011) further highlighted that indeed, the natural environment provides natural and financial capital for safety and emergency nets for the vulnerable during hardships.

Dependence on and use of natural resources has been categorised by Shackleton and Shackleton (2004) as daily nets (serving a regulatory purpose) and safety or emergency nets (as a fall-back in times of need). Such natural resources include any biological resource collected from the wild by rural and urban households for direct consumption or income generation on a small scale (Hoffman and Oliver-Smith, 2002; García-Ruiz et al., 2008; Owrangi et al., 2014; Schilling et al., 2014; Kaoma and Shackleton, 2015). Natural resources in their role as safety/emergency nets can indeed assist households with coping in times of difficulties that manifest as sudden changes in the economic, social or bio-physical environments within which households exist and function (Fisher et al., 2010; Mercer, 2010; Gentle and Maraseni, 2012; Suckall et al., 2014). The daily net function of natural resources represents a cost saving to households (Shackleton and Shackleton, 2004; Bloschl et al., 2007; García-Ruiz et al., 2008; Kaoma and Shackleton, 2015). While natural resources meet daily household needs, this allows households to use their limited cash resources to secure other needs, including contributing to resilience. They endeavour to accumulate a much needed asset base for a more secure livelihood, such as educating children, or accumulating agricultural capital (García-Ruiz et al., 2008). This cost saving benefit to a household does also indeed spill over to national level through the provision of food, shelter, energy and medicine, in the absence of which the state would ultimately have to provide (Shackleton et al., 2007; García-Ruiz et al., 2008; Owrangi et al., 2014; Schilling et al., 2014). It is for this very reason that the role that natural resources play in easing poverty and providing additional options for income generation cannot be ignored or trivialised. Furthermore, as disasters are often measured in terms of financial losses, damage to informal housing or low cost housing often does not meet the criteria of disaster, meaning those affected do not receive much immediate help to cope and recover. Thus, including natural resources in disaster relief could provide an immediate relief to vulnerable households at minimal cost to the State, by providing materials that can be used to reinforce housing structures, and also provide food supplements and income (Schilling et al., 2014; Sachikonye et al., 2016).

There is a clear relation between vulnerability and livelihoods (Benjamin, 2008). A livelihood is understood as the capabilities, assets and activities that are required for a means of living (Chambers and Conway, 1992), such as access to information, which has implications for the awareness levels of the people living in risky spaces, what they can do in response to risk and knowing how to access help in the event of a disaster. Factors such as illiteracy, age and state of mind and inability to understand the local language can increase vulnerability (Kaźmierczak and Cavan, 2011). The limited ability to prepare is especially a problem in poor households as many cannot invest in flood insurance or house reinforcements to protect against floods. Female-headed households are more vulnerable as they are physically less able to prepare (Wisner et al., 2004). The size of a household, particularly the number of dependents, can compromise the ability of households to respond to flooding, as they find it difficult to move away from danger as resources are often spread thinly (Adger, 2006).

Although vulnerability is created at national and global levels, it is often felt and experienced at the local level, within households (Douglas et al., 2008). The ability of households to recover is affected when marginalised groups in society are overlooked in the development cycle (Green, 2008). Disaster management in South Africa is increasingly a priority for the national, provincial and local governments. Unplanned and unmanaged developments in informal settlements however limit government's ability to mitigate and manage flooding as these areas typically lack in proper service provision and infrastructure (Douglas et al., 2008). This state of lack, under-development and other factors point to natural resources as being a potentially viable and sustainable means for developing countries to cope with and to mitigate flood disasters (The Conservation Fund, 2013). Holloway et al. (2010) highlighted that communities along the Swartvlei catchment, Western Cape (South Africa), tended to use natural resources to reinforce a bridge and estuary mouth following flooding. This study is therefore necessary to highlight the importance of including natural resources in disaster management plans and to advocate for their effective use in coping with flooding hazards through training and other strategies, as well as to promote their sustainable use.

Given the above context of socio-economic vulnerability to flooding shocks, and the evidence of the possible role that natural resources may provide in reducing this vulnerability by providing emergency and safety nets to the socially vulnerable, this study aimed to improve our understanding of this phenomenon. The main aim was therefore to feed into this strategy by providing the necessary knowledge of response activities and recovery strategies. This study therefore investigated the aspects of livelihoods that were most affected in the Eastern Cape floods of 2012–2013. We investigated the various ways in which households responded by coping or adapting to the identified effects of the flood, with a specific focus on the use of natural resources. Furthermore, we investigated which types of natural resources were used, how they were used in relation to the identified flood effects on livelihoods and the extent to which they were used. Lastly, the study investigated socio-economic factors that affected the use of natural resources as identified in a study by Kaźmierczak and Cavan (2011).

2. Materials and methods

2.1. Study area

The study was conducted in three randomly selected towns in the Eastern Cape province namely Grahamstown, Port Alfred and Port St Johns (Fig. 1), which had been affected by the 2012 flooding event. The population that was affected by the flooding was determined by reviewing press releases related to flooding. The populations were then divided into homogeneous subgroups by grouping them into clusters of households by settlement. Using press releases, four informal settlements were identified in Grahamstown, three in Port Alfred and four in Port St Johns. These informal settlements formed the stratum as they were mutually exclusive and homogeneous (Fig. 1). The three study towns were declared as disaster zones by the local and/or national government in the local press releases that referred to the flooding incident that occurred in the towns between late 2012 and early 2013. The key demographic data for the study towns are presented in Table S1.

Households located in the three study towns were selected for the purposes of this study using purposive, snowball and random sampling techniques. As census data for informal settlements was unavailable, Google Earth imagery was used to show the number of households in the settlements. Microsoft Excel was then used to randomly select a total of 236 households. In Grahamstown, 83 households were selected (18 in Sun City, 11 – Polar Park, 26 – Phaphamani, 28 – Zolani), 83 from Port St Johns (24 – Gapiri, 23 – Green Farm, 21 – Tiger Flats, 15 – Sikikili) and 70 from Port Alfred (38 – Biso, 23 – Cricket Park, 9 – New Rest).

2.2. Data collection

The initial part of the questionnaire collected data on the household demographic status, with questions that gathered information on