



The impact of effective management of natural disasters For Africa's development

Emmanuel Innocents Edoun, Roland Azibo Balgah & Charles Mbohwa

To cite this article: Emmanuel Innocents Edoun, Roland Azibo Balgah & Charles Mbohwa (2015) The impact of effective management of natural disasters For Africa's development, *Economic Research-Ekonomska Istraživanja*, 28:1, 924-938, DOI: [10.1080/1331677X.2015.1087325](https://doi.org/10.1080/1331677X.2015.1087325)

To link to this article: <http://dx.doi.org/10.1080/1331677X.2015.1087325>



© 2015 The Author(s). Published by Taylor & Francis



Published online: 27 Oct 2015.



Submit your article to this journal [↗](#)



Article views: 420



View related articles [↗](#)



View Crossmark data [↗](#)

The impact of effective management of natural disasters For Africa's development

Emmanuel Innocents Edoun^a, Roland Azibo Balgah^{b*} and Charles Mbohwa^c

^a*Department of Quality and Operations Management, The University of Johannesburg, Johannesburg, South Africa;* ^b*Department of Science, University of Bamenda, Bamenda, Cameroon;* ^c*Department of Quality and Operations Management, The University of Johannesburg, Johannesburg, South Africa*

(Received 16 February 2015; accepted 24 August 2015)

The escalation of natural disasters in the last two decades or so and their devastating effects on developing countries in general and Africa in particular, has been frequently mentioned in the topical literature. Devastating impacts in African and other developing countries have often been attributed to the failure of formal (state and market) institutions for risk management, frequent in these countries. While the predominance of informal response mechanisms has been acknowledged in these countries, they are presumed to disintegrate in the face of covariate shocks. This article argues that an overly ambitious emphasis on states and markets and a negligence of the role of informal, socially embedded institutions in the effective management of natural disasters is grossly responsible for the negative effects of natural disasters and their perverse implications on Africa's development. A multi-sector framework that can be used for modelling natural disaster management in Africa which has the potential of reducing the negative consequences of disasters is suggested. This is based on the premise that natural shocks must be perceived as social phenomena that are best managed with the participation of those involved. Empirical evidence is included, and the implications of a multi-stakeholder approach to managing disasters to enhance development in Africa are discussed.

Keywords: natural disasters; formal and informal responses; multi-sector framework; African development

JEL classification: G20, O10, M13

1. Introduction

The remarkable global escalation of natural disasters in the last two decades or so has been frequently mentioned in the literature. The period between 1990 and 2005 alone is said to have accounted for more than half of all recorded natural disasters, causing global economic losses more than seven times greater than was observed up to the 1960s (International Strategy for Disaster Reduction [ISDR], 2010; United Nations Development Programme [UNDP], 2008, Van den Berg, Fort, & Burger, 2009). Though the anthropogenic influence and magnitude of climate change and its effects on natural disasters remain largely unknown, trends point towards an escalation. In the twentieth century for example, sea levels are estimated to have risen between 10 and 20 centimetres. By 2100, global temperatures are expected to increase in the range of 1.4 to 5.8°C

*Corresponding author. Email: balgazib@yahoo.com

increasing seasonal and inter-annual variability. These changes will create suitable conditions for increased frequency of extreme events (Mechler, 2004; Nicholls, 2002; Nicholls & Hoozemans, 1999), with expected negative impacts on developing countries in general and Africa in particular. Munich Re (2006) for instance, reports significant effects of natural disasters on developing country economies, leading to losses above 13% of the GDP, compared to less than 3% of GDP in industrialised countries between 1985 and 1999. Africa alone accounted for over 60% of the total victims (those killed and those affected) of natural disasters in 2005 (ISDR 2010).

Billions of dollars have been devoted to post-disaster management on the African continent. The World Bank, for instance invested over USD 7.5 billion for post-disaster construction in Africa between 1980 and 2000 (Gilbert & Kreimer, 1999). Clearly, natural shocks result in income or consumption volatility, with devastating and sometimes irreversible effects, especially on the poor (Günther & Hartgen, 2009). If African development is to be sustained, there is an urgency to pay attention to managing disasters on the continent in a manner that reduces their overall effects on the continent's development. For this to happen, there is a need to develop and utilise frameworks that can accommodate the deficient structural and institutional conditions for disaster management common in Africa. Failing hierarchical and market institutions often defect effective management of natural shocks to evade disasters, and disaster management through public transfers is beyond the fiscal capacity of most governments (Holzmann & Jorgensen, 2000). Most governments are generally deficient in scientific and socioeconomic data for effective risk prevention, reduction, mitigation or coping and the dynamic responses of informal instruments to hazards active in most African countries have not been fully integrated into disaster management (Balgah & Buchenrieder, 2010). Information asymmetry thus contributes to posing natural hazards as a serious threat to development especially in developing countries (Benson & Clay, 2004). This hampers the wide existence and functioning of early warning systems, disaster monitoring and preparedness and the use of community based knowledge of local processes for disaster management in Africa.

The failure of the state in many African countries has been described as negative fall outs of the World Bank and IMF – led structural adjustment programmes on the continent (Macamo, 2005). The state that was initially created to manage issues of common interest or to regulate the functioning of markets was generally reduced to an executive arm of the bourgeoisie (Evans, 1975). The adoption of foreign models in many African countries only led to economic recess, slow pace of development and difficulties in containing unprecedented events such as natural disasters.

This article intends to contribute to the *Africanisation* of disaster management strategies as a means to boost sustainable development on the continent. While this is by no means a panacea for disaster management for all countries on the continent, it is expected to stimulate scientific discussions and empirical testing of a novel framework that could assist in reducing the impacts of sudden, extreme events on the continent.

Section two will present a succinct review of the literature on the impact of disasters on Africa's development. Section three will introduce the multi-sector (multi-dimensional) framework for disaster management. Section four will present some empirical evidence to support the framework, while section five will conclude the article.

2. Review of literature

2.1. A brief overview of natural disaster statistics¹

The glaring escalation of natural disasters is causing tremendous socioeconomic and psychosocial impacts around the globe. A total of 385 natural disasters killed over 297,000 people worldwide in 2010 (Guha-Sapir et al. 2011). In the same year, over 217 million people were further affected by natural disasters, up from 198.7 million in 2009. These disasters caused USD 123.9 billion of economic damages, up from USD 47.6 billion in 2009 (2011).

The situation in Africa slightly improved over this period. Thanks to improved early warning systems, preparedness and response, the massive mortality from sub-Saharan African droughts for instance in the 1970s has not been repeated over the examined period (Global Assessment Report on Risk Reduction [GAR], 2011). The total number of victims in Africa (9.87 million) decreased in 2010, compared to the 2000–2009 yearly averages of 15.07 million (Guha-Sapir et al. 2011). Although the total number of natural disasters decreased from 69 in 2009 to 64 in 2010, the total number of victims from Africa ranked the continent third, only after Asia (193.98 million) and Oceania (12.1 million) respectively in the same year. Africa accounted for 4.5% of global victims in 2010, while Oceania for instance with more disasters accounted only for 0.3% (2011).

The fact that a lower frequency of disasters leads to a disproportionately higher number of victims suggests that there are deficiencies in the disaster management systems in Africa. In fact the difficulties posed by information asymmetry on the continent have often been reported (Benson & Clay, 2004). According to Guha-Sapir et al. (2011, p. 30), the drop in numbers is mainly due to the absence of extensive droughts and famines in 2010, and to the fact that ‘economic damages from natural disasters in Africa are infrequently and incompletely reported, leading to an underestimation of damage figures’. In other words, the inefficiency of formal (state and market) institutions in properly managing natural disasters in Africa presents a major handicap for the continent’s development (Holzmann & Jorgensen 2000; Macamo 2005). Their reliability and capability for information generation is doubtful. Because natural disasters occur within a political space, it is very likely that political ambitions can supersede concerns about effective disaster management, unless the two goals are compatible or complementary. It is about time to rethink development strategies that are appropriate for Africa – one that goes beyond the politics of patronage and pays attention to long term economic and public interests (Makoba, 2011). An effective model for managing disasters should therefore go beyond state and market institutions to include socially embedded, informal mechanisms that are abundant in the continent.

2.2. Formal an informal response mechanisms and their implications for disaster management in Africa

Risk management arrangements include all formal and informal actions that have historically evolved for the purpose of providing some social protection for households in the event of shocks or their transformation into disasters² (Heitzmann, Canagarajah, & Siegel, 2001; Holzmann & Jorgensen, 2000; Holzmann, Sherburne-Benz, & Telsuic, 2003; Skoufias, 2003). Broadly speaking, they can be split into formal (market and public based) and informal (individual or community based) mechanisms. Both mechanisms can be applied *ex ante* or *ex post*. Merton (1968) defined mechanisms as social processes having designated consequences for designated parts of a social structure. According to

Merton, it is essential for scientists to identifying these mechanisms, establishing under what conditions they come into existence or not. Stinchcombe (1991, p. 367) defined mechanisms as ‘bits of theory about entities at a different level (e.g. individuals) than the main entities being theorised about (e.g. groups), serv[ing] to make higher level theory more supple, accurate and general’. Gross (2009, p. 364) defines a social mechanism as:

a more or less general sequence or set of social events or processes analysed at a lower order of complexity or aggregation by which – in certain circumstances some cause X tends to bring about some effect Y in the realm of human social relations. This sequence or set may or may not be analytically reducible to the actions of individuals who enact it, may underwrite formal or substantive causal processes and may be observed, unobserved or in principle unobservable.

Mechanisms is used here to describe the factors that explain for instance why certain inputs (e.g. shocks from nature) lead to different outcomes (e.g. a disaster or not). This is done on the premise that disasters must be seen as social phenomena that require a deeper reflection on why certain shocks under different conditions lead to different outcomes. To further illustrate this, Hedström and Swedberg (1996) and Gross (2009) assume an observable (non-random) relationship between two variables or events, **I** and **O**. The link between these two events can be expressed by the mechanism, **M**. According to these authors, what characterises the black box is when the link between **I** and **O** is considered either to be void of structure or of no interest, probably because they cannot be observed. Thus a regression coefficient relating **I** to **O** is not enough to describe the causal relationship between **I** and **O**. The black box becomes critical here, as the regression coefficient itself does not say much about the process through which this relationship was established. Mechanisms in the disaster management literature can be formal or informal.

Formal mechanisms on the one hand include, for example, insurance, formal savings, social assistance, relocation and government transfers (Holzmann & Jorgensen, 2000). Informal mechanisms on the other hand comprise community based, socially embedded instruments that have been tested at local levels for preventing, mitigating and coping with shocks (Balgah, Buchenrieder, & Zeller, 2012). They describe the bundle of measures taken at household or community levels to protect against risks or to mitigate or cope with disasters, in the presence or absence of state and market based arrangements. These instruments include for instance strategic marriages, collective action and solidarity, migration, sale of assets, informal savings or borrowing, crop diversification, kinship arrangements and membership in groups and networks (Holzmann & Jorgensen, 2000). Membership in groups and networks are fundamental to social capital, an important component of risk management. The capacity of systems for resilience, adaptation or coping with shocks rests in a proper assessment of the functioning and ability to rely on both formal (state, market) and informal response mechanisms, such as social capital (ISDR, 2012). An over-dependence on state and market institutions does not seem to be appropriate for Africa, where state and market failures are rampant (Holzmann & Jorgensen, 2000; Makoba 2011). It is probably true that when the formal mechanisms are missing or deficient as is the case in many African countries, the informal mechanisms may occupy a much more important place in the proper management of disasters (Balgah & Buchenrieder, 2010). A proper mix of state, market and informal mechanisms seems better for managing disasters on the continent, as the strengths and weaknesses of each mechanism can be adequately taken into

consideration in the management process. States and markets often provide the institutional frameworks under which disaster management operates. Through informal mechanisms, indigenous communities offer alternative knowledge and perspectives for disaster management based on locally developed processes, practices and experiences (Berkes, Colding, & Folke, 2000). The formal and informal therefore seem to present an acceptable blend for a proper management of natural disasters in Africa, in a way that can promote sustainable development on the continent.

Unfortunately, microeconomic theory predicts that informal response mechanisms are capable of supporting the proper management of idiosyncratic (individual) shocks such as the illness of a household member, but often disintegrate in the presence of covariate (widespread) shocks such as a flood or drought. Only formal instruments are resilient under widespread disaster conditions (Alwang, Siegel, & Jorgensen, 2001; Holzmann et al. 2003). In other words, informal instruments are less resilient to covariate natural events as compared to formal ones. Informal instruments constitute the main source of disaster management in Africa – as the states and market institutions often fail (Holzmann et al. 2003; Macamo 2005; Makoba 2011). Very often therefore, from a World Bank-led microeconomic theoretical position, it is conjectured that the predominance of informal response mechanisms on the African continent and the failure of state and market institutions for disaster management are jointly responsible for the catastrophic nature of natural disasters in Africa, that result from improper management (Holzmann & Jorgensen, 2000; Holzmann et al. 2003; Mechler, 2004). While this is true to some extent, it represents only one side of the story. It has been argued elsewhere (for instance Balgah & Buchenrieder, 2010) that the dynamism of informal response mechanisms does not seem to have received the attention it deserves, and has not been fully explored in the economic and social literature on natural disasters. This situation might be responsible for the underestimation of the role of informal instruments in managing large shocks. It is very likely that there is a substitution effect that takes place when state and market institutions fail in managing natural disasters (Skoufias, 2003). This conjecture is based on the premise that households are never passive under disaster conditions. Experiencing a disaster often prepares households better to mitigate or cope with similar disasters in the future. Also, social processes embedded in individuals and communities might be drawn upon in case of a natural disaster. For instance endogenous norms of solidarity and reciprocity can be transformed into willful sharing of relief aid. This action can be strategically important to rapidly mitigate the primary impacts of a natural disaster such as a flood or drought (Balgah & Buchenrieder, 2010). In this line, this article suggests a multi-stakeholder approach to disaster management in Africa – one in which both formal and informal instruments are utilised in the process, based on availability and existence strengths and weaknesses of the different (formal and informal instruments) in the particular disaster context.

3. An operational framework for proper management of natural disaster in Africa

This chapter presents a theoretical framework that has been suggested to be relevant for theoretical and empirical analysis of natural disaster dynamics especially in developing countries. A framework that summarises the contemporary theoretical position will be discussed first before proceeding to the multi-stakeholder framework comprehensively discussed by Balgah et al. (2012). Both frameworks have been developed based on the World Bank's Social Risk Management Framework (Alwang et al. 2001; Heitzmann et al.

2001; Holzmann & Jorgensen, 2000; Holzmann et al. 2003) and the framework for the social dimensions of climate-related shocks (Agrawal, 2008). The Social Risk Management Framework is the most widely used framework for conceptualising and analysing risks and shocks. This justifies its use as the basis for the discourse undertaken in this article. The work of Agrawal (2008) is a unique contribution to the social aspects of shocks. Creating a novel framework guided by these two renowned sources allows the new product to effectively contribute to an innovative and more adapted framework for disaster management in Africa, without digressing too much from the contemporary discourse.

The newly proposed conceptual framework concentrates on the theoretical dynamics of risks and shocks, their transformation into disasters, and the hypothetical situation specific for developing (African) countries.

Figure 1 presents a general theoretical framework for risks and shock dynamics representing the current state of the art. Striking shocks (sudden or slow developing events) can either be idiosyncratic, affecting only a few households (e.g. illness of a household member) or covariate, having an impact on a wider population (e.g. a flood or drought).

Theory predicts on the one hand that in the wake of idiosyncratic shocks, market and informal response mechanisms could support individual households to appropriately manage shocks, accommodating their impacts and reducing negative outcomes and further exposure. The occurrence of covariate shocks on the other hand overwhelms informal and market mechanisms and must be managed through state intervention to evade disastrous, irreversible outcomes such as poverty and vulnerability (Alwang et al. 2001; Holzmann et al. 2003). It should be mentioned here that the success of insurance markets is based on the fact that shocks are usually not correlated.

That insurance markets being more likely to fail in the wake of larger and more frequent shocks is not new for those who are conversant with how the industry functions. Reinsurance schemes have often emerged to buffer such failures (Balgah et al., 2012). This is also true for state mechanisms that are particularly prone to failure especially in developing countries (Macamo 2005; Makoba 2011). It is therefore a proper (or improper) mix of formal and informal management mechanisms that determine whether victims become resilient or further exposed in the event of a natural disaster.

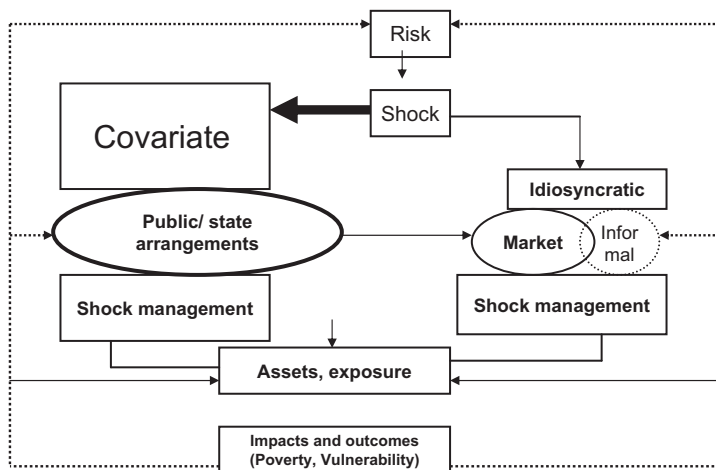


Figure 1. Theoretical representation of natural disaster dynamics. Source: Adapted with permission from Balgah et al. (2012).

A curious question relevant for understanding the effects of natural disasters on Africa’ development is: what happens in practice in many African countries where covariate shocks often occur under conditions characterised by failing states and markets? Conventional wisdom predicts disastrous, irreversible outcomes (Günther & Hartgen, 2009; Heitzmann et al. 2001; Holzmann & Jorgensen, 2000). The position of this article is that an improper understanding of the dynamics of informal response mechanisms can be responsible for its underestimation for preventing, mitigating and coping with natural disasters. In fact a deeper understanding of how informal mechanisms fit within the formal sphere provides a clearer picture of the crucial role that the latter might play in managing risks and shocks for individuals, households and communities in developing countries (Balgah et al., 2012).

Figure 2 presents the conceived hypothetical, multi-stakeholder (multidimensional) framework for disaster management in African countries in particular, and developing countries in general. It is assumed that when covariate shocks occur, even failing states become welfare maximising, usually for political reasons. However, informal responses

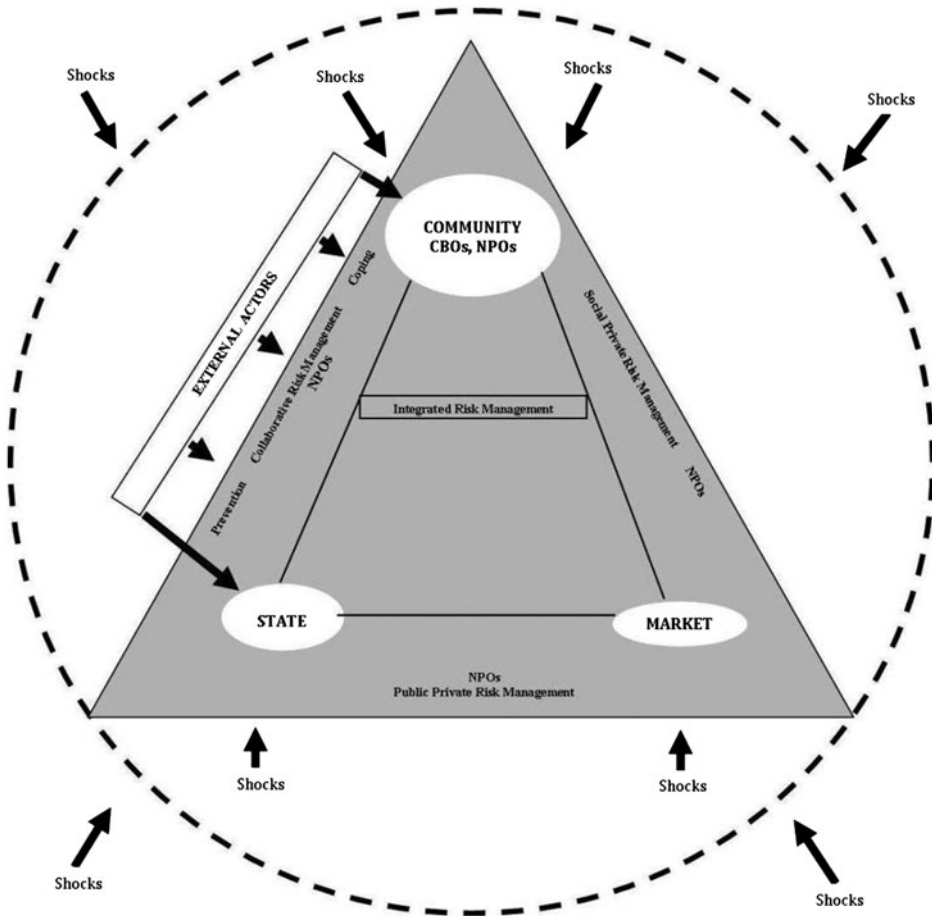


Figure 2. Multidimensional framework for shock dynamics in developing countries. Source: Reproduced with permission from Balgah et al., 2012.

are not passive in the process. Through learning, collective action, experience and ability to organise, informal instruments are subjected to dynamic processes that significantly improve their capacities to cope with aftermath of disasters (Balgah et al., 2012; Campbell, 1999).

A critical issue on this framework is the emergence and consolidation of informal institutions in formalised, persistent nonprofit or community based organisations that proven crucial for short and long term management of natural disasters in many African countries. In addition, the role of external actors in disaster management is clearly demonstrated. External actors often include nonprofit organisations that emerge for altruistic motives especially with failing states and markets (Hansmann, 1980; Steinberg, 2006), and are often consolidated in the long term. The actions of these organisations stimulate changes in the informal structures that remain stable long after the shock and contribute to long term risk reduction, adaptation and resilience. These change processes are more important when states and markets do not function properly. In the presence of active states and markets, nonprofit/community based organisations might act as watch dogs, ensuring that contracts between states, markets and communities are properly implemented (Steinberg 2006). For instance nonprofits can promote collaborative risk management between states and communities, social private risk management between communities and markets, and more rarely moderate public private partnerships for risk management (Balgah et al., 2012).

In summary, the multi-stakeholder framework for proper disaster management with specific reference to developing countries suggests that the specific and omnipresent conditions of failing or dysfunctional states and markets warrant a serious consideration of the role of informal responses in managing both idiosyncratic and covariate shocks. These informal instruments can be conceptualised and analysed as stand-alone mechanisms, as well as complementary to deficient state and market mechanisms. This framework is for a first instance particularly relevant for developing countries, where state and market failures for risk management are common. An important issue is always to define the boundary of the system (individual, community, village, province, country, [sub]region, etc.) and therefore the unit of analysis. In this sense, anything occurring out of the boundaries will be considered external to the defined system. It is worth mentioning that there may also be internal shocks occurring within the boundaries of clearly defined systems. For simplicity reasons, this has not been indicated in the proposed framework. Nevertheless, whether shocks are internal or external to a system however defined will influence to what extent formal (state and market) and informal response mechanisms will be applied independently or collectively to prevent, mitigate or cope with the short-, medium- and long-term effects (Balgah et al., 2012). If informal mechanisms have been identified to be abundant in African countries (Holzmann & Jorgensen, 2000), then it is just logical to make more use of such resources than do remain illusory about proper functioning states and markets, that are scarcer to find on the continent. This in the opinion of the author is crucial for the effective management of natural disasters in Africa, in a manner that enhances sustainable development on the continent.

4. Empirical evidence on the role of informal mechanisms in managing natural disasters

This section provides some empirical evidence on the role of informal mechanisms in preventing, mitigating and coping with natural disasters. The empirical examples

presented here are restricted to two African countries: Cameroon and Kenya, and an Asian country, Thailand. The choice of the case studies stems from the fact that Cameroon is located along a volcanic line, where disasters are frequent (Bang, 2008). Kenya on the other hand is one of the countries in Africa with the highest frequency of famines and droughts (Guha-Sapir et al. 2011). Natural disasters in this area of Africa have always been very devastating. It seems interesting to examine how informal mechanisms change over time, and how they have supported victims to cope especially with widespread disasters. The Asian case seeks for support for an extension of the framework discussed in this article to other developing countries, especially in Asia, where the occurrence of natural disasters has always had its greatest impacts (Guha-Sapir et al. 2011). The Asian case study is related to the 2004 Tsunamis which devastated many countries on the continent (Segschneider & Worakul, 2007).

4.1. Victim behaviour after the 1986 Lake Nyos disaster in North West Cameroon: what is the role of informal mechanisms?

On 21 August 1986, a natural gas explosion from Lake Nyos in the North West region of Cameroon emitted carbon dioxide and minimal amounts of hydrogen sulphide asphyxiating over 1700 inhabitants and almost all livestock in three villages (Nyos, Cha, Subum) located within a diameter of over 25 kilometres around the Lake (Bang 2008). Later scientific investigations revealed that Lake Nyos contains a huge amount of carbon dioxide (300 million cubic metres) in the deeper layers, with threats of further release in the future. While the scientific community was busy analysing the cause of this natural disaster, a high level conference held in Yaoundé, Cameroon, in March 1987 proposed that surviving victims should be resettled immediately (Sigvaldson, 1989). By the end of 1987, the first government-led resettlement had been effected in Buabua and Kimbi villages. Most households moved in the same year. The rest followed in 1988.

The affected villages were declared disaster areas by the government and moving back was legally prohibited. With the objective to reduce risks and enhance safer rehabilitation, the government and foreign partners embarked on a degassing project in 1995. One full-fledged degassing column was installed and primed at Nyos in 2001, although five columns are needed to completely rule out the possibility of another lemnitic eruption (Halbwachs et al., 2004).

In a socioeconomic survey of surviving households of the disaster carried out in 2009/10, it was observed that many surviving households had self-relocated back into the disaster zone in the last decade in spite of government restriction. Bang (2008) suggests that a major motive for self-relocation is the deficiency of official post-disaster management to jointly address physical, structural and social risk mitigation. This conjecture was difficult to accept, considering that government efforts towards disaster risk reduction was visible during the field work. To answer the question why some households, not all, had illegally returned to the disaster zone, we used experimental econometric approaches, combined with hypothetical questions in the administered questionnaire to illicit differentiated risk behaviour between those who have returned and those who have not (Balgah & Buchenrieder, 2011). As illustrated in Table 1, one of the key underlying factors that explain the differentiated behaviour is the degree of risk aversion which is lower in relocating households (indicated by their willingness to participate by making any payments in lottery games) compared to those who are stationary. This trend was maintained in the experimental games, giving us reason to argue

Table 1. Hypothetical willingness to pay for lottery tickets by household type.

Possible win	Payment categories	Resettled (%)	Relocated	P	Likelihood ratio
Up to 100 USD(50,000 FCFA)	0 FCFA	83.8	41.7	.002	.001
	> 0 FCFA	16.2	58.3		
Up to 2000 USD(1,000,000 FCFA)	0 FCFA	83.8	41.7	.001	.000
	> 0 FCFA	16.2	58.3		
Up to 4,000 USD(2,000,000 FCFA)	0 FCFA	83.8	41.7	.003	.002
	> 0 FCFA	16.2	58.3		

Source: Balgah and Buchenrieder (2011). © 2011 DLG-Verlag. Reproduced by permission of DLG-Verlag. Permission to reuse must be obtained from the rightsholder.

that the decision to self-relocate or not is fundamentally explained by unobservable endogenously embedded risk taking abilities, the observable component of which is manifested in the action of relocating or not. Interestingly, the household size of non-mobile households (9) was significantly higher than for self-relocating households. This seems logical as self relocation decisions are technically more difficult to arrive at in larger than smaller households. As suggested by Hedström and Swedberg (1996), a closer look at these underlying mechanisms provided deeper, fine grained explanations for the observed phenomenon of self relocation. In our sample of 470 households, no single household was found with any form of comprehensive insurance policy. We conclude that households returning to the disaster zone have endogenous risk taking capacities that have little or nothing to do with state and market institutions. The mere fact that they are relocating illegally suggests that when state and market institutions cannot provide security to victims, they may develop endogenous approaches that help them to manage the risks they are exposed to.

4.2. Social mechanisms and responses to drought in Southern Kenya

Drought-related food security has been a common and almost regular phenomenon in the Horn of Africa, and in Kenya in particular. Drought frequency is predicted to increase with changing climate (Mworia & Kinyamario, 2008). Responding to droughts in Kenya has never been the sole business of the state and insurance markets. Community institutions and nonprofit organisations have often played an important role (Campbell, 1999). In an attempt to study the evolution of community based, socially embedded informal response to drought in Southern Kenya, Campbell (1999) examined a panel data-set spanning a 20 year period, that is 1972–76 and 1994–95: two strategic periods over which southern Kenya was struck by two separate droughts. He concluded that there was a dynamic response on the rural communities prone to drought-related food security over the examined period. In fact the ‘driving forces of change emanating from national and international scales creat[ed] the broad context for change [and] local processes embedded in a community’s interaction with the natural resource mediated these forces (Campbell, 1999, p. 379). In the 1970s, the predominantly Massai communities in southern Kenya were nomadic livestock farmers and hunters, while the minority Kikuyu and Kamba tribes were crop farmers. Marriages were predominantly intra-tribal. In the late 1990s, intermarriage was more common than ever before. This informal risk management strategy has been adopted by many households based on their drought-related experiences over the years, since droughts often affected crops and livestock differently. In addition, in the 1990s, some Massai were found to include crop

cultivation in their production systems and many were traders. Ecotourism had significantly replaced hunting amongst the Massai and this once much closed society was now significantly exposed to the international community. Horticulture had emerged as an important activity in the region that strategically benefited from the intermarriage systems between Massai and other tribes.

Strategic response to natural disasters was different in the 1970s as in the 1990s. While there was a total dependence on (state) institutional support to cope with the disaster of the 1970s, an increased proportion of farmers 'sought assistance from family and friends [during] the 1994–95 hardship' (Campbell, 1999, p. 402). There was also an increase in savings of food and cash as means to reduce vulnerability to food shortages over the examined period in the research area. This case does show clearly that informal mechanisms are dynamic and can fit well in a proper mix of instruments destined for the proper management of natural disasters in Africa. Such an approach has potentials for promoting Africa's development.

4.3. Informal responses and recovery after the 2004 Tsunamis in Asia: the case of Thailand

The tsunamis of December 2004 impacted devastating effects on many Asian countries. In northern Thailand for example, it rendered most inhabitants poor, creating losses that affected the whole Thai economy. Six provinces along the Andaman Coast were heavily destroyed, leaving 8000 people dead. Coral reefs and coastal habitats were interfered with and the intrusion of sea water affected agricultural productivity. The estimated financial loss was US\$2 billion, and the overall GDP growth of Thailand reduced by 0.4% (Segschneider & Worakul, 2007).

The Lamphoon community in Takua Pa District was seriously affected by the tsunami. Only 30 of 52 original families could be identified in the community after the disaster. Although a huge wave of aid swept into the affected communities after the retreat of the tsunami, 'many people in Lamphoon had little opportunity to obtain any of this aid. The land [had been] cordoned off and many people were unable to enter and find the remains of their dead ones' (Santhanboa, 2008, p. 9). The Lamphoon community is not a fishing community, although it is located along the Andaman Coast. Its inhabitants are primarily former mining workers who migrated into the region in the 1970s but remained after the mining concessions had expired. In spite of land reforms in Thailand in the later part of the twentieth century, these villagers could not acquire land titles because the major mining companies rebuked such attempts at claiming ownership over the land. In addition, land title issuing officers required bribes which community members were too poor to afford. Thus surviving households in the Lamphoon community were not only faced with the difficulty of accessing relief aid and identifying their property, but also with the problem of returning to their property after the disaster, even if it could be identified. Tourism, the major source of income, had been destroyed by the natural disaster and they were threatened and prohibited by the mining companies from rebuilding their houses. Only community mobilisation and collective action brought progress.

After a series of community meetings, four regional slum networks were formed. Villagers returned to the area on 4 February 2005 with the intention of reconstructing their houses. Fast, cooperative and quality work was needed, in addition to funding. Through community dialogue, each household agreed and contributed a lump sum of 1,000 Baht for daily expenditures and a collective loan of 500,000 Baht for high cost

activities and management (Santhanboa, 2008). At the time 1 US Dollar was equivalent to 34.1 Thailand Baht (THB). The community decided on the construction of 30 houses (i.e. one house per surviving family). Some additional financial resources were obtained from non-governmental organisations such as The Thai Red Cross Society, Oxfam, World Vision and Plan International. Based on a budget drawn up and transparently managed by the stakeholders themselves, and with the employment of community labour, 30 houses were constructed in six months. A close examination of this case study by Santhanboa (2008) and Balgah and Buchenrieder (2010) suggests that socially embedded mechanisms such as the ability to organise and act collectively as well as endogenous cognitive social capital (such as solidarity and reciprocity) can help explain why these victimised households were able to return to their formal land and completely construct houses, in spite of evident resistance from the mining companies claiming ownership of the land. This conjecture is supported by a statement of one of the victims:

During those days, none of us had a good night's sleep. After we started, more and more people began to join in. The rebuilding of houses was intended to become a community activity in order to strengthen the process [of reconstruction]. (Pi Yupin as quoted by Santhanboa 2008, p. 13)

Again, this case study demonstrates the power of informal responses in the management of natural disasters.

5. Conclusion

Development on the African continent has generally lagged behind other continents, despite significant economic progress being reported in recent years. The increasing occurrence of natural disasters further threatens peace, security and sustainable development in many African countries. The impacts of disasters are often catastrophic. Microeconomic theory has attributed this to failing state and market institutions. This situation cannot be blamed on internal processes alone. While political leverage has been seen as a key factor in state and market failure in many African countries, the World Bank and IMF-imposed structural adjustment programmes have been described as crucial in disciplining the African states. Predicted economic growth through market liberalisation did not take place as expected. At the same time the regulatory functions of the state on the market was equally reduced.

In spite of this prevailing situation, the continent has had to deal with increasing natural disasters in the last two decades or so. Formal (state and market) institutions that are theorised to accommodate large disasters were not fully effective. At the same time, the place of informal mechanisms that are abundant in the social fabric of many African societies has not be fully considered.

This article has argued that for natural disasters to be properly managed in order to enhance Africa's development, there is a need to adopt a multi-stakeholder approach that goes beyond the state-market paradigm, and pays more attention to the role that informal responses can play independently or together with the formal ones. This framework has been presented and discussed, and published empirical case studies provided to substantiate the theoretical argument. The discourse undertaken here has some implications for research and disaster management in African and other countries.

Firstly, the role of informal mechanisms do not seem to be restricted to idiosyncratic (individual) shocks as currently conceived in the topical literature. The empirical case

studies demonstrate that even under conditions of large disasters, informal mechanisms can be very useful. There is a need for further research on this issue, in order to develop a new line of theory.

Secondly, it seems as if formal responses become much more important when the role of states becomes more explicit. This is demonstrated in the Cameroonian case study where disaster victims – after waiting a quarter of a century – decide to return illegally to the disaster zone. State intervention has been restricted to yearly ceremonious events, and households are not hooked up to the insurance markets. Because people are never passive in the face of natural disasters, it is just logical that these victims resort to informal responses under these conditions.

Research should therefore concentrate on understanding under what conditions disaster victims will adopt formal or informal mechanisms, or whether both are appropriate for managing natural disasters. Irrespective of the determinants, the position of this article is that a proper mix of formal and informal mechanisms is necessary for a proper management of natural disasters in Africa, in a manner that enhances long-term development.

Disclosure statement

No potential conflict of interest was reported by the authors.

Notes

1. This section is mainly based on Guha-Sapir, Vos, Below, and Ponserre (2011), Annual Disaster Statistical Review The Numbers and Trends, Brussels: Centre for Research on the Epidemiology of Disasters (CRED) For the sake of the article, most of the focus will be on Africa.
2. A natural disaster is the result of a complex interaction between a potentially damaging physical event (e.g. a flood or drought) and the vulnerability of a society, its infrastructure, economy and environment as determined by human behaviour (Birkmann, 2006). The losses from a disaster are contingent on the nature of the hazard and the vulnerability of the system elements. Failing states and markets increase the vulnerability of countries to natural disasters. A natural disaster therefore exists when a (natural) event overwhelms preventive, mitigating or coping capacities, necessitating nationwide or international assistance (ISDR 2010).

References

- Agrawal, A. (2008). *The role of local institutions in adaptation to climate change*. Paper prepared for the Social Dimension of Climate Change, Social Development department, The World Bank, Washington, DC, March 5–6.
- Alwang, J., Siegel, P. B., & Jorgensen, S. L. (2001). *Vulnerability: A view from different disciplines* (Social Protection Discussion paper No. 0115). Washington, DC: World Bank.
- Balgah, R. A., & Buchenrieder, G. (2010). The dynamics of informal responses to covariate shocks. *Journal of Natural Resources Policy Research*, 2, 357–370.
- Balgah, R. A., & Buchenrieder, G. (2011). Natural shocks and risk behavior. Experimental evidence from Cameroon. *Quarterly Journal of International Agriculture*, 50, 155–173.
- Balgah, R. A., Buchenrieder, G., & Zeller, M. (2012). *Dynamics of formal and informal responses to shocks: With empirical evidence from Cameroon*. Saarbrücken: Lambert Academic Publishing.
- Bang, H. N. (2008). *Social vulnerability and risk perception to natural hazards in Cameroon two decades after the lake Nyos Disaster: What future prospect for the displaced disaster victims?* Paper presented at the 2008 Summer Academy for Social Vulnerability at the United Nations University-Institute for Environmental and Human Security (UNU-EHS) in Germany, October 9–11.

- Benson, C., & Clay, E. J. (2004). *Understanding the economic and financial impacts of natural disasters*. Washington, DC: World Bank.
- Berkes, F., Colding, J., & Folke, C. (2000). Rediscovery of traditional ecological knowledge as adaptive management. *Ecological Applications*, 10, 1251–1262.
- Birkmann, J. (2006). *Measuring vulnerability to promote disaster resilience societies: Conceptual frameworks and definitions*. Bonn: United Nations University.
- Campbell, D. J. (1999). Response to drought among farmers and herders in Southern Kajiado District, Kenya: A comparison of 1972–1976 and 1994–1995. *Human Ecology*, 27, 377–416.
- Evans, M. (1975). *Karl Max*. London: Indiana University Press.
- GAR (Global Assessment Report on Risk Reduction). (2011). *Revealing risk. Redefining development*. New York: United Nations International Strategy for Disaster Risk reduction (UNISDR).
- Gilbert, R., & Kreimer, A. (1999). *Learning from the World Bank's experience of natural disaster related assistance*. Washington, DC: World Bank.
- Gross, N. (2009). A pragmatist theory of social mechanisms. *American Sociological Review*, 74, 358–379.
- Guha-Sapir, D., Vos, F., Below, R., & Ponserre, S. (2011). *Annual disaster statistical review*. Brussels: Center for Research on the Epidemiology of Disasters (CRED).
- Günther, I., & Harttgen, K. (2009). Estimating household vulnerability to idiosyncratic and covariate shocks. A novel method applied in Madagascar. *World Development*, 37, 1222–1234.
- Halbwachs, M., Sabroux, J.-C., Grangeon, J., Kayser, G., Tochon-Danguy, J.-C., Felix, A., ... Hell, J. (2004). Degassing the “killer lakes” Nyos and Monoun, Cameroon. *Earth Observation System*, 85, 281–288.
- Hansmann, H. (1980). The role of nonprofit enterprise. *Yale Law Journal*, 89, 835–901.
- Hedström, P., & Swedberg, R. (1996). Social mechanisms. *Acta Sociologica*, 39, 281–308.
- Heitzmann, K., Canagarajah, R. S., & Siegel, P. B. (2001). *The Sources of vulnerability: A rationale and guideline for the assessment of risks and risk responses*. Paper prepared for the Social Protection Discussion Paper series, Human Development Network, World Bank, Washington, DC.
- Holzmann, R., & Jorgensen, S. (2000). *Social risk management: A new conceptual framework for social protection and beyond*. (Social Protection Discussion Paper No. 0006). Washington, DC: World Bank.
- Holzmann, R., Sherburne-Benz, L., & Telsuic, E. (2003). *Social risk Management. The World Bank's approach to social protection in a globalized world*. Washington, DC: Social Protection Department of the World Bank.
- International Strategy for Disaster Reduction (2010). Disaster statistics 1991–2005. Retrieved December 12, 2012, from <http://www.unisdr.org/disaster-statistics/occurrence-trends-century.htm>
- International Strategy for Disaster Reduction (2012). *Terminology: Basic terms of disaster risk reduction*. ISDR Secretariat. Retrieved August 5, 2013, from www.unisdr.org/eng/library/lib-terminology-eng-p.htm
- Macamo, E. S. (2005). *How development aid changes societies. Disciplining Mozambique through structural adjustment*, paper presented at the CODESRIA conference held in Maputo-Mozambique, December 6–10.
- Makoba, J. W. (2011). *Rethinking Development Strategies in Africa. The Triple Partnership as an Alternative Approach – The case of Uganda*, Bern: Peter Lang AG, International Academic Publishers.
- Mechler, R. (2004). *Natural disaster risk management and financing disaster losses in developing countries*. Karlsruhe, Germany: Verlag Versicherungswirtschaft GmbH.
- Merton, R. (1968). The self-fulfilling prophecy. In *Social Theory and Social Structure* (pp. 475–490). New York, NY: The Free press.
- Munich, Re. (2006). *Environmental report 2005 – Perspectives – Today's ideas for tomorrow's world*. Munich: Münchener Rückversicherungs-Gesellschaft.
- Mworia, J. K., & Kinyamario, J. I. (2008). Traditional strategies used by pastoralists to cope with la nina induced drought in Kajiado, Kenya. *African Journal of Environmental Sciences and Technology*, 2, 10–14.
- Nicholls, R. J. (2002). Analysis of global impacts of sea-level rise: A case study of flooding. *Physics and Chemistry of the Earth*, 27, 1455–1466.

- Nicholls, R. J., & Hoozemans, F. M. J. (1999). Increasing flood risk and wetland losses due to due to global sea-level rise: Regional and global analysis. *Global Environmental Change*, 9, S69–S87.
- Santhanboa, C. (2008). Building houses in lampoon community after the Tsunami. In Tsunami Aid Watch (Ed.), *Building for the future. A communal approach to rehabilitation after the Tsunami* (pp. 8–18). Tsunami Aid Watch, Southeast Asia Regional Office.
- Segschneider, K., & Worakul, W. (2007). *78 weeks later: A descriptive, quantitative and qualitative summary after the Tsunami in Thailand*. Tsunami Aid Watch, Southeast Asia Regional Office.
- Sigvaldson, G. E. (1989). International conference on Lake Nyos disaster, Yaoundé, Cameroon 16–20 March 1987, Conclusions and recommendations. *Journal of Volcanology and Geothermal Research*, 39, 97–107.
- Skoufias, E. (2003). Economic crises and natural disasters: Coping strategies and policy implications. *World Development*, 31, 1087–1102.
- Steinberg, R. (2006). Economic theories of nonprofit organizations. In Powell, W. W. & Steinberg, R. (Eds.), *The Nonprofit Sector: A Research Handbook*, 2nd ed. (pp. 117–139). Yale University.
- Stinchcombe, A. L. (1991). The conditions of fruitfulness of theorizing about mechanism in social sciences. *Philosophy of the Social Sciences*, 21, 367–388.
- United Nations Development Programme (2008). *Reducing Disaster Risk. A Challenge for Development*. New York, NY: United Nations Development Program (UNDP).
- Van den Berg, M., Fort, R., & Burger, K. (2009). *Natural hazards and risk aversion: Experimental evidence from Latin America*. Paper presented at the International Association of Agricultural Economists (EAAE) Conference, Beijing, China, August 16–22.