

# A needs-based approach for exploring vulnerability and response to disaster risk in rural communities in low income countries

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## Abstract

*Vulnerability assessment and reduction are now central to developing a holistic and integrated approach to disaster risk reduction, including mitigating the effects of a disaster. Pre-existing frameworks for mapping vulnerability and planning response to disasters do not completely fit the realities of rural communities in low income countries where most people informally organize their own livelihoods, resources, space, security and response to disasters according to their needs and capacities. Livelihood activities are undertaken to satisfy needs. Hence, understanding needs of people and communities in this context can help unravel vulnerability and response capacity to disaster risks. This paper therefore applied a needs-based approach to explore and analyze the vulnerability of two rural communities in northern Ghana to flood risk. A survey was done, using a semi-structured questionnaire, to collect data immediately after the flood in 2007. Based on ranking of needs, the results show that survival and security needs (mainly food, housing, education and reliable income) were dominant before and after*

*the flood. During the flood, however, survival and empathic needs were more important. The results also show the disconnection between institutional frameworks for disaster management and the needs of the communities and, therefore, show a scope for policy and research in disaster management. However, in the context of sustainability, economic needs (dominated by income) were slightly greater than environmental needs (dominated by drainage, water and sanitation and relocation) which, in turn, were higher than social needs (dominated by health and education). Interestingly, most respondents indicated that a reliable source of income was a prerequisite for satisfying social needs in the short term and environmental needs in the long-term. It is concluded that the approach used in this research is simple, intuitive and easy to apply to map vulnerabilities to disaster risk across multiple scales. It is also easy to integrate into policy and management decisions about disaster risk reduction.*

**Keywords:** *vulnerability, flood risk, disaster response, needs-based approach, northern Ghana, low income countries*

The need to build resilient systems and societies in response to disaster risk is now a global priority. The effect of disasters can be reduced by reducing the vulnerability of societies or increasing their response capacities. The capacity of communities to prevent, manage and respond to disasters is contingent on the economic, social and environmental conditions, as well as access to information and technology (IPCC, 2007). The International Strategy for Disaster Reduction (UNISDR, 2004, p.7) defines vulnerability as: "the conditions determined by physical, social, economic and environmental factors or processes, which increase the susceptibility of a community to the impact of hazards". The United Nations Development Program (UNDP, 2004, p.11) defines vulnerability as: "a human condition or process resulting from physical, social, economic and environmental factors, which determine the likelihood and scale of damage from the impact of a given hazard". Hazard refers to: "a dangerous phenomenon, substance, human activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic

disruption, or environmental damage” (UNISDR, 2009, p.17). These definitions suggest that active hazards interact with the vulnerability context or coping capacity of communities to produce disasters. Disaster is the manifestation of a hazard through extensive disruption of the normal functioning of a community or society, with losses or damages to human lives, livelihoods, properties, infrastructure, socio-economic activities and the environment (UNISDR, 2007). According to the former UN Secretary-General Kofi Annan, disasters occur when hazards destroy the lives and livelihoods of people and communities (Annan, 2003). In other words, disasters occur when communities exposed to given hazards have preexisting vulnerabilities or inadequate capacity to reduce or cope with the adverse effects of the hazard (UNISDR, 2007). Hence, the assessment of vulnerability has become central to developing holistic and integrated approaches to disaster risk management and response (Kasperson *et al.*, 2005).

Even though there are several definitions and frameworks for determining vulnerability (see for example: Adger, 2006; Pelling *et al.*, 2005) and planning response to disasters, they do not completely fit the realities of rural communities in low income countries where the bulk of citizens informally organize their own livelihoods, resources, space, security and response to disaster according to their needs and capacities. Often, data required for vulnerability frameworks are unavailable. Because vulnerability is determined by the social, economic and environmental conditions of people or communities (UNISDR, 2004; 2009; Kasperson *et al.*, 2005), an understanding of the socio-economic and environmental needs of people and communities can be used to explore their vulnerability to a target disaster risk. The objective of this paper was to apply Maslow's hierarchy of needs to explore the vulnerability of two rural communities in northern Ghana.

### Theoretical Context and Conceptual Framework

Maslow's theory of human motivation (Maslow, 1943; 1970) describes human endeavours as an attempt to fulfill a hierarchy of needs, in order of prepotency:

1. *Survival Needs*: are fundamental to survival and existence. They intertwine with survival instincts to drive motivated behavior, such as livelihood activities or human-environment interactions (Yawson *et al.*, 2009). Examples include need for food, water, health, clothing, and shelter. Individuals who have not satisfied their survival needs will
2. *Safety or Security Needs*: relate to need for protection from harm. Safety needs are the next most obsessive needs of individuals when their physiological needs are partly or wholly satisfied. Safety needs emerge and become stronger because they are psychologically (not physiologically) perceived to threaten life, survival, livelihood or wellbeing. Thus, these needs relate to safety from existential stresses or the capacity to cope with such stresses should they occur. They also include secure access to resources, opportunities, privileges and tools required for maintaining life and livelihood. Perceptions of safety or livelihood security in relation to extreme events have been shown to be a major determinant of coping or adaptation measures adopted by farming households (Mubaya *et al.*, 2012).
3. *Empathic Needs*: relate to need for affection and emotional support. Apart from kinship ties, individuals tap opportunities to build social resilience against some stresses (e.g. in times of disaster) by building social networks or joining groups that can be religious, political, social or economic for the purpose of receiving affection, sympathy and a range of support when there is a crisis. Social networks, thus, become instrumental for self-protection of both the individual and the social collective and satisfying the emotional and psychological need for belonging.
4. *Esteem Needs*: consist of need for self-respect (characterized by desire for confidence, self-worth, competence, achievement, mastery, and independence) and need for respect from others (characterized by the desire for social recognition of one's achievement, prestige, status, fame or power).
5. *Self-actualization*: this is the capstone of the hierarchy. It is a peak experience referred to as transcendence by Maslow. Self-actualization here is the ability to maintain or recover well-being after a crisis or disaster. It is at this point where the individual can be truly independent and functional in interdependent relationship. This level of needs is referred to as *being needs* by Maslow while those at the bottom of the hierarchy are *deficit needs*.

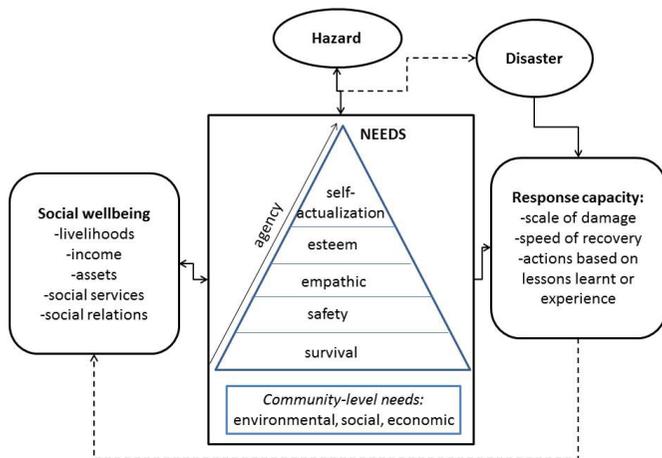


Figure 1: Conceptual framework for needs-based analysis of vulnerability to disaster.

Figure 1 shows the conceptual framework for the needs-based approach for analyzing vulnerability to disaster. In this framework, the state of social wellbeing produces needs (vulnerability context), and a hazard interacts with these needs to produce a disaster. The hierarchical level of needs determines people’s capacity to reduce disaster risk or cope with disasters. In the event of a disaster, a response capacity is evoked and tested. The outcomes of disaster, indicated by the scale of damage, speed of recovery and actions taken based on lessons learnt, will feedback into social wellbeing. The *damage* in this context encompasses both physical and non-physical (e.g. psychological) damages.

## Method

### Study location

This study was conducted in two rural communities, Daboya and Boinya, in the West Gonja Municipality in the northern region of Ghana (Figure 2). The study area is part of the Guinea Savanna agro-ecological zone, the driest agro-ecological zone in Ghana. The climate is characterized by a unimodal rainy season from May to September, with the peak in August-September, alternating with a dry period from October-November to March-April. Annual rainfall is about 1100 mm with high spatial and temporal variability (Rademacher-Schulz *et al.*, 2014). Communities participating in the current research have a gentle topography, with mean slopes of 7%. The study area is drained by the White Volta River, which extends beyond Ouagadougou in Burkina Faso. It is dominated by grasslands interspersed with drought-tolerant tree species such as acacias, baobab, and

dawadawa. The three northern regions are described as the poorest in Ghana, accounting for about 50% and 80% respectively of the poor and extremely poor people in Ghana (Rademacher-Schulz *et al.*, 2014). Subsistence farming, animal rearing and fishing are the most dominant livelihood activities and about 80% of the population in Northern Region engages in small-scale farming, with low external inputs.

In August and September 2007, heavy rainfall combined with the discharge of excess water from the Bagre Dam in Burkina Faso to cause widespread, devastating flooding in Northern Ghana. The flood caused considerable damage to life, properties, infrastructure and facilities and disrupted essential social services (Armah *et al.*, 2010). Farms, animals and food storage and processing facilities were damaged and 20 human lives were lost. What made this flood unique was that it was preceded by a prolonged dry spell. An initial estimate by the Ministry of Food and Agriculture indicated that about 70,500 hectare of farmlands were affected, with a production loss of 144,000 tons of food crops and 50,000 people at risk of prolonged food insecurity (UNOCHA, 2007). Daboya and Boinya were among the worst-affected communities.

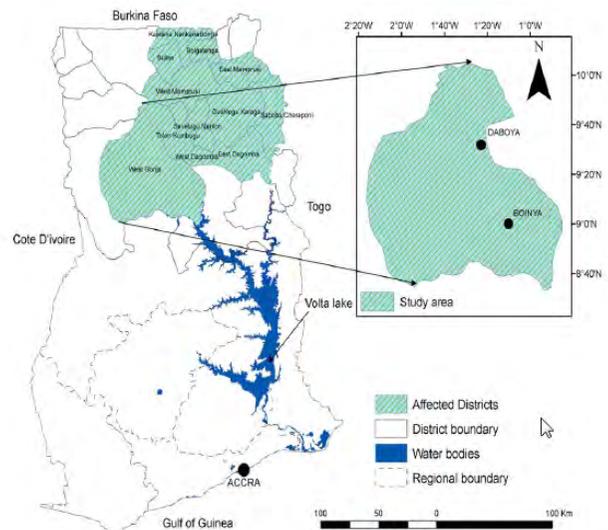


Figure 2: Map showing the locations of the communities where the study was conducted.

### Data collection

A survey was conducted between November 2007 and November 2008 in the study communities. A total of 220 people (110 from each community) were randomly selected and interviewed using a semi-structured questionnaire. The interviews were conducted by the authors with the aid of an interpreter where necessary.

Of the respondents, 75% were males. While women play crucial roles in agricultural production or provision of labour in rural Ghana, women in northern Ghana usually prefer that men respond to interviews - except for female-headed households. Most of the respondents (97%) had lived in the communities for more than five years.

### **Application of a needs-based approach**

The questionnaire elicited demographic information, and a range of needs at the individual, household and community levels, before, during and after the flood. The respondents were asked to state no more than 10 needs at the levels of individual or household and community. Respondents were asked to state whether these needs were crucial in the way community members were affected or in the way they responded to the flood event. The respondents were asked to state their personal or household needs before, during and immediately after the flood. Next, they were asked to consider the needs of their community in the same manner as the individual/household needs. The respondents were then asked to rank the enumerated needs in order of importance or priority using values ranging from 1 (low importance) to 10 (extremely important). They were not allowed to assign a value more than twice to the needs. However, they were allowed to repeat a particular need before, during or after the flood.

The data was tabulated and analyzed in Microsoft Excel. The frequencies of needs were compiled. The averages of the ranking values of each need were calculated as the sum of the ranking values divided by the frequency after the flood. Based on these average rank values, the stated needs were assigned to the appropriate hierarchy on the Maslow's hierarchy of needs and ranking was done for each hierarchy. However, the community level needs were grouped into social, environmental and economic. Needs with average rank values above 5 are reported in this paper.

## **Results**

### **Demographic information**

The demographic characteristics of respondents have been published in Armah *et al.* (2010). Most of the respondents, about 67%, had no formal education. Of those who had had formal education, 24% had only basic education, 8% had either a secondary or vocational education, while 1% had a tertiary level education.

Eighty percent of the respondents had dependents, ranging from 1 to 20 dependents. The average number of dependents was five. Farming was the predominant occupation among respondents (66%), followed by fishing (17%). There were other livelihood activities such as trading, teaching, and artisans. Some of the respondents earned income from both farming and off-farm sources.

Most of the respondents (70%) had been farming for 10 years or more. The main farming activities of respondents were animal husbandry (71%), crop production (41%) and mixed farming (52%). Forty five percent of respondents had farm sizes ranging from 2.4 to 4 ha and about 2% of respondents had farm sizes ranging from 6.4 to 8 ha. A substantial number of respondents farmed for commercial and subsistence purposes while 16% engaged in only subsistence farming. The maximum annual income from farming was 850 Cedis, where 1 Cedi was equivalent to 0.9 USD at the time of data collection. However, average annual income for all respondents was 795 Cedis. Sixty-six percent of the respondents earned off-farm income, of which 72% earned that income from their communities.

The total annual income for respondent households ranged from 60 to 2,500 Cedis. The majority of respondents lived in mud- and thatch-houses situated in a bare, dusty surroundings. Only 9% lived in houses made of cement blocks. Forty five percent of respondents lived in their own houses and 53% lived in houses owned by a relative.

### **Individual and household needs**

Respondents listed a wide range of needs at the individual and household levels. Needs with average rank values greater than 5 are reported in Table 1. Survival and safety needs were dominant. Food was ranked as the number one need, with average ranking value of 9.6, followed by shelter, healthcare and water. The general trend in this category of needs is that the frequencies increased from before, during and after the flood. For example, the number of respondents who indicated food as a need increased from 194 before the flood, to 211 and 202 during and after the flood respectively. Hence, the importance of these needs is indicated not only by their relative rankings, but also by their increasing frequencies from before, during and after the flood. With safety or security needs, education and skills training ranked 1<sup>st</sup>, followed by employment and

Table 1:  
*Components, frequencies and rankings of individual/household-level needs.*

Need Category	Components	Frequency			Avg. rank value	Ranking by need category
		Before	During	After		
Survival	Food	194	211	202	9.6	1
	Water	78	203	137	8.1	4
	Shelter	156	187	202	9.2	2
	Sanitation	179	201	214	6.8	7
	Healthcare	109	216	193	8.2	3
	Land	53	-	81	7.7	5
	Tools, implements, machines	91	-	131	6.7	8
	Farm inputs	115	-	126	7.4	6
	Labour	71	-	113	6.2	9
	Clothes & shoes	31	101	94	5.3	10
Safety/Security	Employment or good, reliable income	131	149	168	9.3	2
	Education & Skills training	193	-	206	9.4	1
	Market for produce	81	-	94	7.5	5
	Land tenure security	96	-	127	7.8	4
	Support and protection against flood	192	218	194	8.3	3
Empathic	support from government	43	182	58	5.6	2
	support from other networks	32	204	193	7.1	1
Esteem	Respect, dignity and confidence	14	86	194	6.2	1

reliable income, support and protection against flood and land tenure security. Again, the frequencies increased from before the flood to after the flood. A total of 206 respondents indicated that education and skills training were paramount after the flood.

For empathic needs, 204 and 193 respondents stated that support from other networks were more important than state support for citizens during and after the flood respectively. Non-state support networks included relatives, friends, social groups (e.g. religious groups) and non-governmental organizations. Even though support from government had a relatively low average ranking value, the respondents felt strongly about it. For example, one respondent, stated that “we too are Ghanaians so the government must do for us what it does for those in the cities when they are in crises”. Another respondent stated that “the government must do for us what other governments do for their citizens during flood”. For esteem related needs, few (14) respondents indicated a need for self-esteem (indicated by respect, confidence and dignity) before the flood. However, 194 respondents stated the need for self-esteem after the flood. This marks an increased need for self-esteem following the flood event.

### Community-level needs

Community-level needs were classified into economic, environmental and social needs. As shown in table 2, income and job opportunities ranked 1<sup>st</sup> and 2<sup>nd</sup> respectively, under economic needs. A number of respondents stated that this need increased from before the flood to after the flood. Even though 187, 201 and 196 respondents stated that transport system was a community need before, during and after the flood, this need ranked lower than income and job opportunities. Interestingly, agricultural extension services had the lowest ranking within the economic needs. Environmental needs, drainage and water and sanitation ranked highest and had higher frequencies, followed by relocation and flood protection. During the flood, the majority of respondents indicated that drainage, water and sanitation and safe zones were an important need. After the flood, a substantial number of the respondents felt that flood protection and relocation were important. With socio-cultural needs, education and skills training ranked highest, followed by healthcare. Community level disaster awareness and response plan ranked 3<sup>rd</sup>, while evacuation, rescue and relief service at community level ranked 4<sup>th</sup>. Apart from credible source of information and communal support, which had higher frequencies during

Table 2  
*Components, frequencies and rankings of community-level needs.*

Need Category	Components	Frequency			Avg. rank value	Ranking by need category
		Before	During	After		
Economic	Good income	132	143	179	8.7	1
	Job opportunities	151	-	187	8.2	2
	Transport system	187	201	196	7.1	3
	Agricultural extension services	61	-	32	6.6	4
	Safe zones	31	187	98	7.1	5
Environmental	Drainage	121	203	197	8.4	1
	Water and sanitation	81	198	151	8.1	2
	Relocation	31	-	122	7.9	3
	Flood protection	137	-	193	7.7	4
	Organization & leadership	17	41	54	5.2	7
Socio-cultural	Evacuation, rescue & relief services	19	198	203	7.3	4
	Education & skills training	190	-	207	7.9	1
	Healthcare	110	210	189	7.7	2
	Non-formal learning opportunities	12	-	17	5.4	6
	Credible source of information	161	204	152	6.9	5
	Communal support	23	121	68	6.4	6
	Disaster awareness and response plan	186	-	202	7.5	3

the flood, all socio-cultural needs appeared to increase from before the flood to after the flood.

## Discussion

Maslow's theory of human motivation, the hierarchy of needs, can form a framework for understanding actions and resource mobilization in response to existential stimuli. It may better suit this purpose, rather than forming a rigid explanation of all human activities (Tanner, 1995; Yawson *et al.*, 2009). Needs assessment based on this hierarchy can be used to explore the vulnerabilities or response capacities of households and communities to disaster, shown in figure 1. The prevalence and the ranking of needs can give an idea about the conditions or risk factors that render the communities vulnerable to flood risk. The needs stated in this study suggest that if these needs had been considerably addressed, respondents may have coped better with the flood.

### Individual/household-level need

At the individual or household level, survival and safety needs were dominant, as shown in table 1. Food was the most important survival need. It was also the most important need across all needs at individual or household levels. This suggests that, although the communities are predominantly agricultural, access to food remains problematic. Problems with food, water,

healthcare and shelter threaten life or survival itself and, as expected, those affected will devote their efforts and resources in addressing these problems to the detriment of higher level needs. The importance of these needs, at a higher level of the hierarchy, is also shown by their respective rankings and increasing frequencies before, during and after the flood. For example, as most of the residents lived in mud and thatch houses, the flood washed away a substantial number of houses (UNOCHA, 2007; Armah *et al.*, 2010). This suggests that the flood worsened the pre-existing survival needs of residents in the communities. Individuals, households or communities grappling with survival needs are invariably coping with multiple socio-economic and environmental stresses that render them vulnerable to disaster event. Difficulties with access to food, water and shelter only become magnified during a disaster. People and communities at this level of need require coping information (Norwood, 1999) amongst a range of other potential supports.

Education and skills training ranked highest among safety or security needs, followed by employment and reliable income. A number of respondents indicated the importance of these needs increased substantially after the flood. This suggests an increasing awareness of such safety or security needs over time, especially after the flood. Education, skills and income appear to be critical

for minimizing vulnerability and increasing the capacity to respond to disaster, by increasing individual and communal agency. It is plausible that the respondents considered education and skills training as an avenue for livelihood or income diversification and, for that matter, a better life. Similarly, most of the respondents believed that employment and good, reliable income can make them resilient to flooding. Support and protection from flood also ranked high and had high frequencies, showing how a substantial number of the respondents considered that this safety need was very important. It is also important to note that there were no flood defenses in the communities studied.

With reference to empathic needs, support from non-state networks ranked higher and had higher frequencies than state support. This might be partly due to the poor response and support the communities received from the state compared to non-state actors. Most of the respondents felt the government had neglected or let them down and this may have strengthened preferences for non-state support networks such as family and friends, religious bodies and non-governmental organizations (NGOs). One respondent commented that, "it is an NGO that is helping us to rebuild our houses and re-organize ourselves and not the government". Most of the respondents received material and non-material support from relatives, friends, NGOs and some religious organizations. In times of existential distresses, empathic needs appear to have surfaced. Social networks became instrumental in enabling the individuals to satisfy survival needs at the very least. Community development groups, farmers associations, religious associations, political connections, and professional networks became instrumental in providing insurance against external stresses. This result suggests that the government needs to rebuild the confidence and trust of the communities in state support mechanisms in times of disaster.

### **Community-level needs**

Income and job opportunities dominated economic needs, whose rankings were slightly higher than environmental needs. This is not surprising, given the low income levels and the predominance of farm-based livelihoods in the communities studied. There appears to be a widespread desire for income and livelihood diversification in these communities. Possibly, the respondents believe that improvement in their economic conditions can make them resilient to flooding. While the communities are predominantly farming based, it

is surprising to see that needs for extension services had low frequencies and rankings. This might suggest an erosion of interest in farming and erosion of confidence in these services after the flood. Interestingly, all environmental needs reported in this study are related to flooding, underscoring how the communities believe that the perennial problem of flooding can be addressed. Sociocultural needs have been largely reflected at the individual or household levels, including the predominance of education and skills training and healthcare. However, the ranking and frequencies of disaster awareness and response planning, especially after the flood, suggests that the communities desire self-organization. In the least, they appear to appreciate their role as first line responders to disaster, including evacuation, rescue and relief services.

### **Needs in the context of vulnerability to disaster risks**

The Hyogo Framework for Action 2005-2015 emphasized the need for methods for the assessment of social, economic and environmental vulnerabilities at varying scales to enable the reduction of disaster risk and promotion of disaster-resilient societies (UNISDR, 2005). The vulnerability-based disaster risk reduction approach integrates the susceptibility of social units and their economic, socio-cultural and environmental capacity to deal with potential damage (Cardona, 2004; Hilhorst and Bankoff, 2004). Multi-level interactions among system components (livelihoods, socio-economic and environmental conditions, institutions and policies) produce vulnerability. Thus, the social, economic and environmental needs of individuals, households and communities can reveal both their susceptibility and coping or response capacity for a particular disaster risk in a manner consistent with the definitions of vulnerability from the UNISDR (2004; 2009) and UNDP (2004).

Although the current research grouped needs according to a hierarchical order and rankings within each hierarchy, survey results collectively point to the social, economic and environmental susceptibility and coping ability related to floods. In the context of social vulnerability, as defined by Cannon *et al.* (2003) and Cutter *et al.* (2003), and in the context of figure 1, high rankings and frequencies for food, shelter and water suggest that the wellbeing of the respondents was poor before the flood and even worse afterwards. The importance of safety or security needs suggests that the livelihoods of the respondents are largely precarious and there is low opportunity for self-protection and income or

livelihood diversification due to low level of education, skills and income. It also suggests some of the assets they have and their ability to use these assets to cope with disaster. The relevance of empathic needs suggests weak social protection and institutional arrangements for responding to flood disaster in the communities. This is highlighted by the higher ranking of non-state support or social networks over state support. The relevance of esteem needs suggest the importance of rebuilding the self-confidence, respect and dignity of the respondents especially after the flood. This indicates a weakening of mental wellbeing and self-confidence and the need for less tangible, non-material support during and after the flood. Thus, the current results suggest that poor and slow response and recovery might weaken the will and capacity of the communities to effectively respond to subsequent disaster events, creating secondary or reinforced vulnerabilities. Identifiable community-level needs underscore a need for the investment of effort in physical and land use planning and the provision of infrastructure such as water and sanitation, drainage and flood defenses.

Needs and rankings highlighted in this study encompass several dimensions of social vulnerability because they indicate the socio-economic and environmental conditions that render the respondents and their communities vulnerable to flood (Cutter *et al.*, 2003). They also represent susceptibilities to physical environmental and socio-economic influences on coping capacity, which respectively lead to first and second order impacts (Carreno *et al.*, 2005; Cardona and Hurtado, 2000; also shown in figure 1). Needs outlined in the current study also indicate *revealed* vulnerabilities which can be used to geographically map potential vulnerabilities to future flood events. Revealed vulnerabilities also help to show the asset base and the deployment of assets in response to disaster event (mainly flood and drought), which is applicable to several frameworks for mapping vulnerability (for example, by: DFID, 1999; Chambers & Conway, 1992). The needs of individuals, households and communities can therefore be mapped to understand actions necessary for reducing vulnerability to a target disaster risk. By addressing these identified needs, policy makers and disaster reduction planning by the National Disaster Management Organization (NADMO) can reduce vulnerability of the communities to future floods.

The current research illustrates how a multi-level approach is required to address different levels of

vulnerability at the household and community levels. Incidentally, as the needs of people and communities are addressed hierarchically, communities, families and individuals can be shifted towards greater agency, for responding to disaster and building resilience. For example, the satisfaction of survival needs will allow people to think about, and direct efforts to satisfy, their safety needs. Addressing these safety needs will require important actions to improve social services, livelihoods, infrastructure and environmental management. The satisfaction of safety needs will also allow disaster affected populations to perform empathic roles, individually and collectively, during a crisis. To this end, community-based organizations and other social networks become strengthened. Once individuals reach this stage, they are more likely to strive to consolidate self-esteem, by seeking to be independent and building a stronger or resilient community.

#### **Implications for integrated research and policy on disaster risk**

Integrated disaster risk research must focus on simultaneously reducing vulnerabilities and disaster risks. To this end, the socio-ecological context becomes critical. Human needs drive livelihood activities and interactions with the environment. Thus, by understanding human needs at varying scales, it is possible to understand the processes and factors that predispose people and communities to disaster risk. Needs-based assessment of vulnerability has, to date, not been given sufficient attention in literature on disasters. However, progress in understanding the impact of vulnerability factors on proximal disaster outcomes (e.g. loss of property and life) and distal disaster outcomes depends on gaining a better understanding of the vulnerability factors themselves. This is especially true in terms of the needs of affected groups. Several questions become pertinent for research and policy. For example:

1. What do the individuals who are part of the community affected by floods identify as their key needs?
2. What needs are not being met by policy makers and disaster relief agencies before, during or after the disaster?
3. How can these needs be addressed effectively and progressively to reduce vulnerability to future floods?

Thus, research efforts should be directed towards understanding, characterizing and prioritizing the needs that motivate or constrain livelihood activities, human-environment interaction and wellbeing, in relation to an identified disaster risk. This is particularly relevant for communities where people use largely informal means to organize their lives and livelihoods. Resulting understandings can substantially contribute to effective policy and disaster management decisions. Thus, in low income countries where there is scant data on components of some indicators of vulnerability, the social, economic and environmental needs of people and communities ought to be coupled with disaster management, which includes research, preparedness and response at the local level. To this end, the approach proposed in this paper becomes crucial. This needs-based approach will highlight macro- and micro-scale issues that need to be integrated in research on disaster risks, to inform policy and management decisions.

## Conclusion

The effects of disasters such as floods are mediated by the material and non-material conditions of the people affected. Understanding the needs of individuals, households and communities is therefore crucial for integrated research and policy on disaster management. A needs-based approach was applied to explore the vulnerability of individuals/households and rural communities to flood events. The study results showed how survival and safety needs largely predisposed the communities to a 2007 flood event and how these needs intensified after the flood. At the community-level, there is a need for infrastructure and economic opportunities to increase incomes.

The results of this study remain limited in terms of spatial-temporal coverage and number of respondents. An extended study will be required to validate or consolidate the findings into theory and practice and to make it applicable in other jurisdictions. The needs-based approach applied in this study nonetheless includes the strength of incorporating established concepts and frameworks for mapping social vulnerability, especially for rural communities in low income countries.

We conclude that the approach illustrated in the current research is both intuitive and simple. Using this approach makes it easier to map both revealed and potential vulnerabilities to a target disaster risk across multiple scales. It also becomes easier to integrate these maps

into disaster-related research, policy and management decisions. Disaster management organizations and policy makers can thereby direct effort to reducing vulnerability or increasing community-level response to disaster by progressively addressing the identified needs of target communities.

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