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Procedia Economics and Finance 18 (2014) 88 – 94

Procedia Economics and Finance

www.elsevier.com/locate/procedia

4th International Conference on Building Resilience, 8-11 September 2014, Salford Quays, United Kingdom

A Study on Community's Perception on Disaster Resilience Concept

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Abstract

In response to the increasing vulnerability of urban community to climate change exacerbated disasters, quite a few Disaster Resilient initiativeshavebeen taken place at different corners of the world aiming at making communities resilient to disasters.In a context where many of such initiatives has followed international frameworks and approaches in framing the concept of 'resilience', this research have attempted toexplore how community perceives'being resilientto disasters'and what factors influences them. The findings have compared and contrasted theexisting literature and the community perception. The study has emphasized the earnest and urgent need of bringing local community perceptions in the initiative to make resilient communities.

Selection and/or peer-reviewed under responsibility of the Centre for Disaster Resilience, School of the Built Environment, University of Salford.

Keywords:Disaster; Resilience; Community; Perception; Attributes.

1. Introduction

Disaster events are pending issues and unresolved problems of development (ADB, 1996) [1]. This creates a necessity in the development process to have a great deal of concern in reducing disaster risk of the community. Hence, being resilient to disaster is acurrent requirement as "it is clear that, in order to reduce the risk and impact of

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Selection and/or peer-reviewed under responsibility of the Centre for Disaster Resilience, School of the Built Environment, University of Salford.
doi:10.1016/S2212-5671(14)00917-4

these threats and to increase the safety and wellbeing of their residents, cities and their communities must be more resilient and prepared to address the threats head-on" (Jabareen, 2012) [2].

Disaster Risk Reduction (DRR) initiatives have been undertaken to build resilient communities and to reduce their vulnerability to disasters following several approaches and frameworks which have explained in literature. Although, the disaster resilience concept has explained in existing literature, "yet these frameworks often fail to capture antecedent social factors that occur at the most local levels or to account for the vulnerability or resilience of the natural environment" (Susan, et al., 2008) [3]. Li-ju Janghas further emphasized the "….Need to understand what helps survivors to function well during and after disasters, and how to incorporate this knowledge into new practice strategies that foster the survivors 'strengths and resilience' " (Jang, 2009)[4]. At the same time, very few studies have been carried out to understand community's mindset before determiningthe intervention and "while it is true that climate change is global in nature, the reality is that addressing climate change highly requires local actions" (Adelaida. *et.al*, 2010) [5]. Many of the national climate change adaptation plans stress the need ofaddressing the rising risk of extreme events and disasters while acknowledge inthe crucialrole of local communities in DRR. Although several initiatives have been implemented to build disaster resilient communities whether these initiativesare shaped with adequate accounts of the expectations of people on disaster resilienceis questionable. Therefore, understanding community's perception and factors which made them being resilient to disasters will open up ventures to improve resilience buildingprocess and to make communityableto cope with disasters and consequent adverse circumstances.

In this light, this research has attemptedto study the community's perception on disaster resilience concept and understand what factors influence community to be disaster resilient. So this study efforts to bring deep insights on local realities in the disaster adaptation process in a context where globally fixed models and frameworks are widely operated.

2. Resilience Concept

The independent Humanitarian Emergency Response Review, commissioned by Secretary of State Andrew Mitchell and led by Lord Ashdown, has highlighted the importance of resilience as a key theme: The more resilient a nation, the less lasting damage disasters caused and the quicker they can recover. Building resilience before a disaster strikes clearly has the potential to save more lives and guard against future crises (DFID, 2011) [6]. "The term resilience is often used in the same manner as the notion of 'bouncing back' that reflects its Latin root *'resiliere'* which means 'to jump back' (Klein *et al.*, 2003; Paton & Johnston, 2006)" (Mayunga, 2007) [7]. It is generally agreed in literature that the concept of resilience originates from the field of ecology, three decades ago. Holling (1973) is frequently cited as probably the first to both use and define the concept of resilience in the field of ecology after publishing his article entitled '*Resilience and Stability of the Ecological Systems'*(Mayunga, 2007) [7]. Two decades later, Holling has redefined the concept of resilience as 'a buffer capacity or the ability of a system to absorb perturbation, or the magnitude of the disturbance that can be absorbed before a system changes its structure by changing the variables' (Holling et al., 1995 cited in Mayunga, 2007). Many academic fields have drawn from this conceptualization of resilience including psychology (Bonanno, 2004;Masten, 2001),sociology (Mileti, 1999), socio -ecological systems (Folke, 2006; Nelson, Adger, and Brown 2007) (Meyer, 2013) [8].

Disaster Resilience emphasizes the processes and conditions within communities that enhance or reduce population's ability to resist, adapt to, and recover from a shock or perturbation within the shortest possible time and with little or no outside assistance. Disaster Resilience, in this way, is often synonymous with the notions of 'bouncing back' or 'jumping back' (Klein et al. 2003; Paton and Johnston 2006 cited inBurton, 2012) [9]. Hence several scholars have detailed the definitional aspects of resilience (Meyer, 2013) [8]. Despite more than three decades worth of research on the topic, however, resilience still means very different things to people in different fields (Cutter et al. 2008 cited inBurton, 2012) [9].

Definitions are diverse, reflecting the complexity of society and thinking on society and disasters (Mayunga, 2007) [7].This research has gone throughthe definitionsof over thirty authors and found that a common ground for the term resilience is possible to figure within the field of disaster adaptation though it is complicated to consolidate. As the same time resilience is measured in terms of the time it takes to recover from an event or come back to

normalcy (Klein et al. 2003) all explore the idea of to adopt and recover/ bounce back for the new environment(Burton, 2012) [9].

2.1. Attributes of disaster resilience community

The research has consolidateda set of attributes of community resilience reviewing the following frameworks and models.

- a city-wide resilience matrix named Climate Disaster Resilience Index (CDRI) (Joerin,2012) [10]
- Capital based approach(Mayunga,2007) [7]
- The concepts of ecological, social and socio-ecological resilience (Folke at al. 2003; Zhou et al. 2010)
- The 4R's approach to measuring resilience(Burton, 2012) [9]
- The sustainable livelihood framework(Burton, 2012) [9]
- Community based disaster resilience analysis framework(Burton, 2012) [9]
- DROP model (Cutter et al. (2010) cited in Burton, 2012) [9]

In order to understand the community's perceptionon disaster resilience concept and what supportthem to be resilient, this research has classified the attributes identified through the literature review as follows.

- Physical resilience:
  - oLifelines (electricity, water, telephone)
  - oHousing type
  - oAccess/evacuation potential
  - oHousing age
  - oSheltering facilities
  - oTransportation facilities
  - oCritical infrastructure
- Social resilience
  - oPopulation
  - oEducation / Knowledge
  - oNon- Profit organizations
- Economic resilience
  - ohousehold income
  - oproperty value
  - oemployment
  - oBusiness size
  - oHousing Capital
- Organizational dimension
  - oGovernment organization
  - oMunicipal services
  - oHealth facilities
- Environmental resilience
  - oOwnership of natural resource

This research has been based on thebackground information about the community disaster resilience concept and attributes givenabove.

3. The study area and the method of study

The study has been supported with the empirical evidences obtained from case studies in Batticaloa, Sri Lanka. Batticaloa is an emerging urban area located in the Eastern coast of Sri Lanka and considered as the capital of Batticaloa District. As per the census conducted in 2011, total population of the township exceeds 100,000 who live in aland area of 75km^2. Batticaloa Township is surrounded by water from three sides as Batticaloa lagoon from South and East whilesthe Indian Ocean from West. The townshipis entirely lies within the Global Low Elevation Coastal Zone as located between 1.2m and 4m altitude above mean sea level. The township is highly vulnerable to multiple disasters as cyclones, tsunami, droughts and floods (Abenayake, C. *et.al* 2013) [11]. Among them, flood was taken as the focus of this study considering frequency of occurrence and magnitude. This research has been built on the detailed case studies conducted inthree selected villages in Batticaloa considering the flood frequency. According to the opinions of local experts as obtained through Delphi technique, the community resilience varies depend on the flood frequency. Therefore three villages were selected representing people who had experienced flood: (i) repeatedly every year, (ii) repeatedly but once in five to ten years and (iii) only at once. Manjanthoduwai-North, Thiraimaduand, Puliyanthivu-South were the selected villages respectively whereas 10% of the total affected households were selected as the sample of perception survey toshare their perception on resilience.

Direct observations, questionnaire surveys and in-depth interviews were employed to study community perceptions. Local community shared their experience onthe nature of disaster they face, what they do as a response and what/whosupported to them inrecovery process. The findings were compared and contrasted with a set of factors identified through a comprehensive literature review on disaster resilient communities.

4. Results and Discussion

4.1. Attributes contributing to disaster resilientcommunity

The study has revealed a wide range of attributes that communityperceives as the factors contributing to their resilience. Figure 4.1 indicates the attributes mentioned by participants. Accordingly, the most influential attributes were experiential knowledge (18%),level of income (18%),communication facilities (14%), geographic location (11%) and Social Networks (9%).

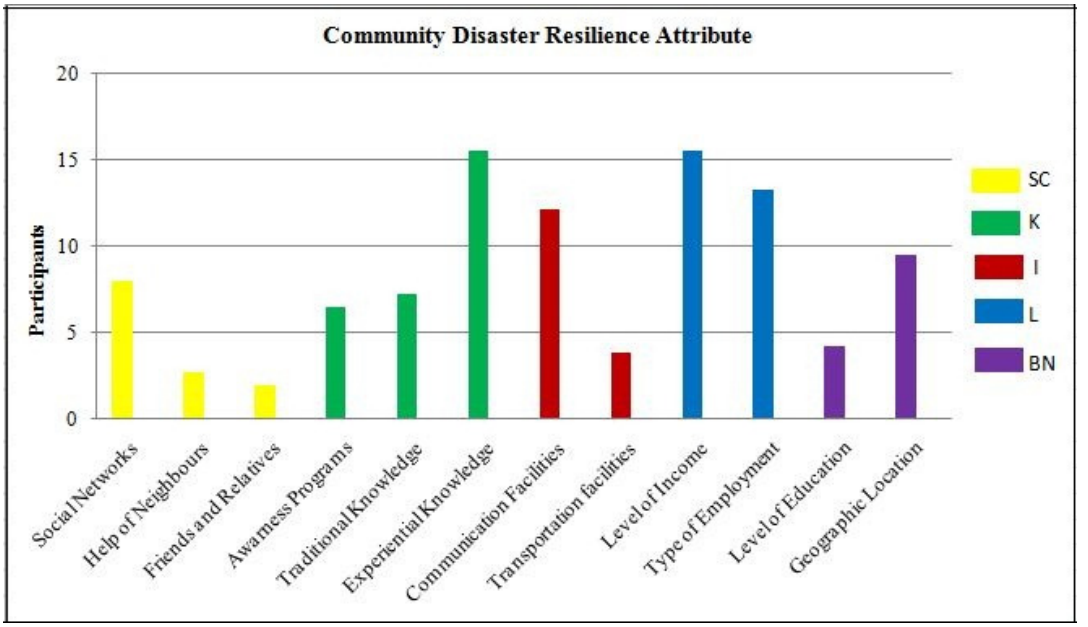


Figure 4.1: Attributes of community resilience to floods, Batticaloa

As indicated in table 4.1, the attributes were classified into five themes for further analysis as social capital, infrastructure, knowledge, livelihoods and basic needs.

Table 4.1: Attributes gathered from communities

Attributes	Themes
Social Networks Help of Neighbors Friends and Relatives	Social Capital (SC)
Communication Facilities Transportation facilities	Infrastructure (I)
Awareness Programs Traditional knowledge Experiential Knowledge	Knowledge (K)
Level of Income Type of Employment	Livelihoods (L)
Geographic Location Level of Education	Basic Needs (BN)

(Source: Prepared by author based on questionnaire survey)

Accordingly, knowledge and livelihoodcan be considered as the most crucial attributes whereas social capital and access to infrastructure is the second most important. When compare this with the attributes identified through the comprehensive literature review mentioned above, a significant gap could be observed. Many of the attributes stated

in literature was mentioned by local community during the study. Yet some of those attributes were given a minor importance by the community. This kind of situation is supported by a statement of Maarten van Aalst, who is the head of the Red Cross/Red Crescent Climate Centre, "Identification of minimum standards for [Disaster Resilience Community does not aim for impossibly idealized solutions but for practical approaches that are achievable by communities with relatively limited support". Table 4.2 indicates the comparable listsof attributes which consolidated throughthe literature review and what was found through the community perception survey.

Table 4.2: Comparison of the attributes consolidated through literature review and the empirical study

Batticaloa communities' perception	**Attributes indicates in the Literature**
Social Networks	Lifelines (electricity, water, telephone)
Help of Neighbors	Housing type/Housing capital
Help of Friends and Relatives	Access/evacuation potential
Access to Communication Facilities	Housing age
Access to Transportation facilities	Sheltering facilities
Awareness Programs	Transportation facilities
Traditional knowledge	Critical infrastructure
Experiential Knowledge	Population/ Demographic factors
Level of Income	Education / Knowledge
Type of Employment	Non- Profit organizations
Geographic Location	Government organization
Level of Education	Municipal services
Access to Health facilities	Access to health facilities
Property values	Ownership of natural resources
Availability of Natural resources	Household Income
Size of Business	Property value
Value of House	Employment
	Size of natural resources

Some of the studies have statedsocial networks and community bounds as less measured community disaster resilience attribute (Meyer,2013) [8], yet social network and community bounds were repeatedly mentioned by participant asan important factor inbuildingtheresilience of local community. This was further elaborated through thedetailed attributessuch as physical supports and the knowledge/information shared with neighbors, friends andrelatives.

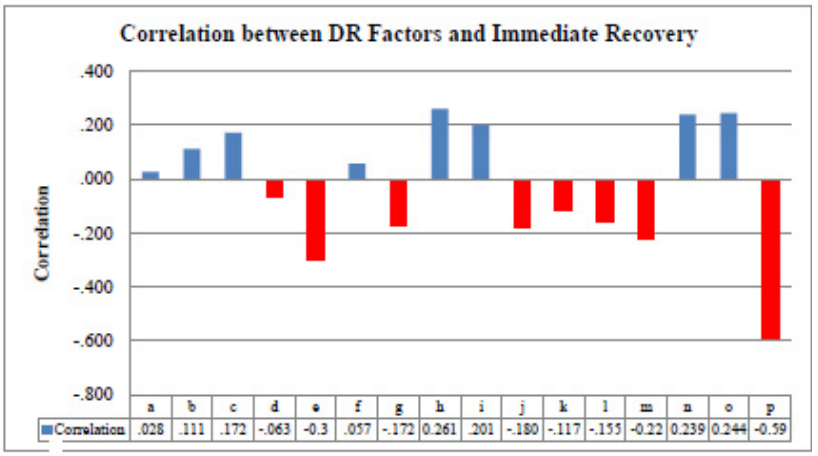
Atthe same time,access to electricity, access to water, age of housing andavailability of governmental organizations were notmentioned by the community although those have been indicated as important attributes in the literature.

Theresults of this analysis suggest a strong possibility of locally specific circumstances where the attributes of making people resilient to disasters.

4.2. Relationship between Attributes and Community Disaster Resilience

A set of nominal values were assigned to the identified factors and correlated them with the time taken for immediate recovery form disasters. Assigning values were based on a qualitative assessment of participants as per

individual opinions. Aggregated value of individual opinions was taken for correlation computation. The level of significance and positive/negative factor of community opinions were compared with the relationships that explained in the reviewed literature Findings of the correlation analysis have been stipulated in Figure 4.2.



	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p
Correlation	.028	.111	.172	-.063	-0.3	.057	-.172	0.261	.201	-.180	-.117	-.155	-0.22	0.239	0.244	-0.59

Figure 4.2: Correlation between attributes of disaster resilience and Immediate Recovery

Key of the table : a- age, b-sex, c- family size, d- level of education l, e- type of employment, f-monthly average expenditure, g-monthly Average income., h-government financial support, i- ownership of a bicycle, j- ownership of a motor bike, k- ownership of a car, l- ownership of a Three wheeler, m-access to communication facility, n- age of house, o- access to safe drinking water, p- access to water for sanitation

No correlation value was significant but the findings could be supported from the reviewed literature. Frequency of floods, level of education, type of employment, monthly average income and access to communication facilities revealed a negative correlation with the time taken for immediate recovery. This indicates when the above mentioned factors increase then the time taken for the immediate recovery from Flood decrease (r-0.58).

“Higher experience of disasters, mainly floods, enhances the preparedness of people based on a learning effect that would take place among people after they experience such events”(Mishra et .al, 2007 cited in Joerinet.al, 2012) [10]. Increasing frequency of floods has developed the experiential knowledge of the community and made them more resilient. Meyer too claims that “Previous experience with disasters can buffer these effects and increase resilience because individuals with previous experience with disasters are able to understand the disaster process and potential effects and be psychologically prepared for the next event” (Knight et al. 2000; Norris and Murrell 1988 cited in Meyer, 2013) [8] .All these evidence prove the strong relationship between frequency of floods and immediate recovery.

Literature review implied a positive correlation between income indicating that higher the income, faster the ability to recover from disaster. “The more stable and growing economy will generally enhance resilience, while an unhealthy or declining economy is an indicator of increasing vulnerability (Buckle, 2001 cited in Mayunga, 2007)”. This can be further supplemented by the results on type of employment. Where people have permanent sources of income, there they had been more resilient to disaster in comparison to the once have temporary sources.

Level of education, access to transportationalso has a positive relationship with disaster resilience, “Physical infrastructure such as roads, bridge, dams and levees as well as communication and transportation systems are essential for proper functioning of community, especially during evacuation time” (Mayunga, 2007) [7].

As explained in literature, “Physical capital is one of the most important resources in building capacity of the community to cope with disasters…[This can be measured by] the number, quality, and location of housing units, business/industry, shelters, lifelines, and critical infrastructures” (Mayunga, 2007) [7]. In support, participants of the survey mentioned has housing age has a negative relationship with the recovery time. Because when house is gettingolder it is highly sensitive and therefore more vulnerable. As the damages to old houses are high it takes a lot of time to recover.

Cutter, Burton, and Emrich's (2010) has modeled demographic attributes such as educational inequality, elderly population, disabled population, and non-native English speaking population, which all negatively affect resilience (Meyer, 2013) [8]. According to the findings, it indicated that age of respondent shows negative correlation with the time taken for recovery. When remove the entries of the respondents below age 30, the correlations between age and time taken for recovery revealed a strong correlation of r=7.

5. Conclusion

Climate change exacerbated disaster events are one of the most discussed issues in the world in recent years: Sri Lanka being an island nation, is highly vulnerable to the negative consequences of hydro-meteorological disasters. In response, there is a strong need of urban communities to be coped-up, adopted and bounced back after a disaster. In a milieu where many of the resilience building initiatives operate through the interpretations of generalized global perceptions, this study attempted to explore the attributes of disaster resilient community and factors which influenced on making them resilient, and the level of significance of each factor, through a local community perception referring to a case of Batticaloa.

According to this research Batticaloa community's social network including the supports of neighbors, friends and relatives; access to communication facilitiesand transportation facilities;awareness programs, traditional knowledge, experiential knowledge, level of income, type of employment, geographic location, level of education has identified as the attributes which make people resilient to disasters. When comparing this with the attributes discussed in a set of reviewed literature, it was notable a clear gap in priorities of local community perception and many of the literature. This emphasizes the need of giving high priority to understand the mindset of the local community infuture interventions.

The findings of empirical studies have indicateda variationof perception among individuals on different grounds. Therefore, the study has considered the aggregated values as collective perceptions. However, authors perceive the importance of addressing the differences among community groups in decision making. Findings of case studies have compared with a set of reviewed literature for the purpose of analysis. The literature review was limited to a set of identified publications which authors perceived as the most relevant and accessible. Having said the above limitations, the findings of the studies are versatile enough to emphasize the importance of recognizing local perception in resilience building process rather than merely following globally fixed models and frameworks. The study has brought deep insights on local realities of unique community personalities, culture that makes differences in the levels of individual's resilience. Understanding the community mindset and enhancing their capacity will essentially shape the adaptation process. Planned adaptation interventions need to acknowledge the people's ability to plan, their right to choose, and the right to be able to make an informed choice. This approach will help to bridge the gap between spatial planning and disaster resilience buildings, especially in DRR initiatives in for the future world.

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