Capacity Building for Disaster Mitigation in The Flood Plains Areas of Kogi State, Nigeria

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ABSTRACT: *Capacity buildings in the built environment shut the laxity of urban control and regulatory compliance in developing areas. In Kogi State, Nigeria, they had been an urban chaos of natural disasters such as floods leading to deaths, destruction of houses, and properties in communities. This paper identifies and examines the potential hazards and risks precaution, focusing on the development of local stakeholders for threat identification, preparedness, strengths and weakness towards disaster mitigation in Nigeria. Quantitative data were collected using a structured questionnaire survey of building owners, residents, architects, engineers, surveyors, building supervisors, and building control officers with a valid percentage of 82% responses, and semi-structured face-to-face interviews and case study methods with aforementioned built environment relevant stakeholders in obtaining information on the necessity of capacity building to prevent or reduce the impact of disaster. Using SPSS for descriptive and inferential statistics analysis and the content analysis for qualitative data, the findings indicates that professionals in the built environment support the development of local communities and other stakeholders in identifying hazards, knowing who is at risk to be harmed, the precaution to be taken, record keeping, and periodic updating of the data. There was a capacity building gap for self-help disaster prevention and strengthening among the local communities as it relates to the built environment standards and regulations which will reduce the impacts of the hazard from the case studies. And the qualitative analysis revealed that there was sketchy information on previous data of disaster occurrences, awareness on preparedness, local infrastructures development and maintenance for standards and regulation compliance and control strategies are in dire needs of the local capacity building in Nigeria. Thus, the findings finally lead to the proposed recommendations uch as compulsory training to improve skills and knowledge of stakeholders, insurance policy education to create awareness, suspension of building approval within the areas, and training of vulnerable women and children for the local capacity building as a means of reducing the impacts of disasters in Nigeria.*

KEY WORDS: capacity building, disaster, mitigation, control, compliance

INTRODUCTION

The built environment in Nigeria has continued to suffer severe losses of both human and materials resources as a result of natural and man-made disaster, and persistent flooding. This study focuses on the natural disaster of re-occurring flooding since July and October 2012 resulting in deaths, collapse of infrastructures, such as roads, buildings, bridges, farms, and livestock across the country especially in Kogi, Anambra, Delta, Imo, Niger, Benue, Taraba, Cross River, and Plateau worth billions of Naira. In which, 363 people were killed and over 2.1 million people were displaced National Emergency Management Agency (2012). Similarly, in September and October 2018 and within the same period in, 2019 and 2020, flood again left an undeletable marks in the heart of many Nigerians in Kogi, Niger, Anambra, and Delta where over 141 people were killed and over 19,360 people were displaced as shown in Figure1 and 5735 homes and farms were destroyed (17th September NEMA Report, 2018, Author personal experience, 2019 & 2020).

Figure 1: An example of the devastating effect of flood disaster in Lokoja, Nigeria
Source: Author field Survey (2019)

Aim and Objectives

Aim
The principal aim of this paper is to examine potential hazards and reduction in the flood disaster impact through capacity building (CB) of local stakeholders for threat identification, preparedness, strengths and weakness. The following objectives guide the development of this paper.

Objectives
1.   To create awareness of coping mechanism and strategies to reduce the impact of flood disaster.
2.   To advocate the building of local capacities in human skills, technology, data, models and methods to prevent or reduce the impacts of future occurrence of flood disasters in the built environment.
3.   To identify priority of community in the flood disaster training for mitigation through questionnaire and interview
4.   To investigate appropriate ways to receive information on flood disaster preparedness.
5.   This paper will provide an opportunity to study the strengths, weakness, threat and opportunity towards flood disaster mitigation and prevention.
6.   To advise on the policy direction by industry policy makers on standards and regulations that can reduce the impacts from the result findings.

LITERATURE REVIEW

From the research of Pandey and Okazaki (2005) appropriate identification and training of stakeholders to effectively manage disaster will benefit the community and society in general. Of which, the disaster management training assistance to various stakeholders will mitigate the effect of flood disaster and as well serve as a tool for national development. For individuals, capacity may relate to leadership, advocacy skills, training/speaking abilities, technical skills, organising skills, and other areas of personal and professional effectiveness" (Whittle S., Colgan A. and Rafferty M., 2012: p8). This research focuses on stakeholder's capacity development for threat identification, preparedness, weakness, and strengths in the mitigation of disaster, especially flood.Scott et al opined that Capacity centres on abilities and competencies to achieve a given objective (s), capacity also operates at individual, organisational, institutional and societal level. It is a broad concept which touches not just on technical abilities but resources, context and relationships.

Disaster vulnerability can be reducn the built environment through the management of the built environment characteristics, improving the capabilities of the stakeholders; the communities, government, private & public institutions, and non-governmental organization (Amaratunga, n.d). Amaratunga (n.d) further declares the dominance of capacity building in disaster management, policy and practice with increasing impacts of climate change from United Nations Office for Disaster Risk Reduction (UNISDR).

All over the world, different strategies of capacity building (CB) exist in the form of knowledge, skills, technology, and resources. The capacities necessary for effective disaster mitigation is suggested in general through well-developed disaster plans & preparedness, coping mechanism, adaptive strategies, memory of past disasters, good governance, ethical standards, local leadership, physical capital, resilient buildings and infrastructure that cope with and resist extreme hazard force in Amaratunga, n.d). Capacity building of communities requires a structural process of time investment, mediation, gradual changes in the introduction of different approach and ideas and not about the challenge of lacking skills and knowledge assumed by many scholars (Craig, 2007).This research in an attempt to examine potential hazards and reduction in the flood disaster impact focuses on the capacity building of local stakeholders for threat identification, communication process, preparedness, weakness, and strengths towards disaster mitigation in Nigeria using various methods to capture and analyse the data.

Capacity building subject has been shifted to "Capacity development" by aid assistance and donor agencies (Horton, 1999: pp153).Which is classified and thought as change management with five (5) explicit properties of organizational change intervention as competency (qualified and experienced) people, Relevant programmes for change adaptation, Efficient organisational structures for a direction change and values to be used in assessing the success of the change , Adequate resources, and an effective capacity building is used to strengthening cooperation and partnerships to achieve sustainable development impact By International developing agencies (Horton, 1999). The drivers for an assessment of capacity changes are found in the four core

organisational capacity issues. Which are; institutional arrangements, leadership, knowledge, and accountability (UNDP 2008). This strengthened the ability of individuals, institutions and societies to perform functions, solve problems, and set and achieve objectives that are sustainable in helping the community and society at large (UNDP, 2008). Capacity building subject has been shifted to "Capacity development" by aid assistance and donor agencies (Horton, 1999: pp153).Which is classified and thought as change management with five (5) explicit properties of organizational change intervention as competency (qualified and experienced) people, Relevant programmes for change adaptation, Efficient organisational structures for a direction change and values to be used in assessing the success of the change , adequate resources, and an effective way of working (Amaratunga D, Haigh R and Hettige S., 2016).

RESEARCH METHODOLOGY

This paper adopted a mixed technique to collect and analysed the data. These methods enable this paper to learn how to examine potential hazards and reduction in the flood disaster impact, and to collect the facts of data from the affected areas relevant to the problem. Yin (2003) advocates the use of such research methods in answering the questions of what, why and how.

Design
Questionnaire sample: The structured questionnaire survey used for data collection consists of respondent's demographic data, including their age, sex, educational qualifications, professional discipline, and the number of years they stayed within the flood prone areas. It consists of building owners and residents in the communities, of which 213 valid responses representing 82% of the total number of 260 questionnaires administered which was measured on Likert scale 1-2, 1-4, and 1-5 in diferent cases respectively.

Interview Sample: Qualitative data used semi-structured face-to-face interviews methods with built environment professionals, communities, NEMA officials, developers, enforcement officers, and other relevant stakeholders in obtaining information on the necessity of capacity building to prevent or reduce the impact of disaster. Six (6) experts representing the four communities with wider experience and knowledge of flood disaster in those communities were selected from the management rank and between 6 and 22 years of experience.

Case measurement sample: The case study of the riverside areas of Gadumo, Ganaja, Adankolo, and Ibaji was to identify disaster capacity gaps, self-help disaster mitigation availability, capacity development & strengthening of local communities within the areas for threats identification and preparedness to mitigate the disaster. Four communities selected were maintained with the total number of 213 buildings were identified consisting of 66 at Gadumo, 55 at Ganaja, 50 at Adankolo, and 42 at Ibaji area respectively.

Data Collection
Questionnaire data collection: Stratified random sampling was employed to distribute a questionnaire to individuals who differed in terms of their gender, years of experience within the

area, and academic qualifications. The dataset of respondents includes Gadumo (76), Ganaja (65), Adankolo (60), and Ibaji(59). Of the 260 questionnaires administered, 213 were returned, representing an82% valid response rate with Gadumo (66), Ganaja (55), Adankolo (50), and Ibaji (42) respectively.

Case measurement data collection: The total of 213 buildings distances from the river bank were measured against the proposed standard of Lagos and Oyo state building setback for riverside areas according to the river sizes. In which 15m and 50m were proposed as minimum and maximum setback for development in the state due to lack of water control for the flood plain areas.

Interview Data collection: Six (6) experts were interviewed bothering on the necessity of capacity building, information communication preference on flood disaster, frequency of the flood occurrences, insurance of lives and properties, and regulatory enforcement and compliance.

Data Analysis
The analysis was conducted using SPSS for descriptive and inferential statistics and for Weighted Mean Rating of variables to establish the capacity building gap for training. In which the data were processed into numerical codes and entered into a pre-designed data entry spreadsheet. Which generated descriptive statistics, such as frequencies for categorical variables to determine how many people provided each response, the mean, and the percentage the content analysis for qualitative data were employed to interpret the interviews data and case measurement were interpreted based on the standard distance criteria.

 RESULTS

This section presents the results of this research. Table 1 is the summary view of the Sex characteristics of respondents from the communities.

Table 1: Sex characteristics of respondents

Gender	Frequency	Percentage %
Male	154	72
Female	59	28
Total	**213**	**100**

Source: (Authors Questionnaire survey, 2020)

From table 1 above 72% respondents of this study are male and 28% are female respectively. This indicates the dominance of male counterpart in building ownership in Nigeria.
The respondent's ages are from 18 years and above as shown in table 2 below.

Table2: Age Distribution of respondents

Age	Gadumo		Ganaja		Adankolo		Ibaji		
	Freq.	**(%)**	**Freq.**	**%**	**Freq.**	**%**	**Freq.**	**%**	**Total freq.**
18-25	3	5 %	5	9	0	-	7	16	**15**
26-32	6	10	4	7	1	2	7	16	**18**
33-39	10	14	11	20	3	6	8	19	**32**
40-47	20	30	15	28	13	26	9	22	**57**
48 & above	27	41%	20	36	33	66	11	27	**91**
		100		100		100		100	
Total freq.	**66**		**55**		**50**		**42**		**213**

Source: (Authors Questionnaire survey, 2020)

Table 2 shows the age distribution of respondents. The highest response age group is 48 & above at 41% in Gadumo, 36% in Ganaja, 66% in Adankolo, and 27% in Ibaji respectively. A frequency and percentage response has shown lower responses of age distribution of 18 to 32 years.

Table 3 shows the education qualification of respondents. In which, this research indicate no formal education to formal tertiary education for respondents.

Table 3: Educational Qualification

Educational Qualification

	Frequency	Percentage (%)
No formal education	30	14
Primary education	40	19
Secondary education	50	23
Tertiary education	72	34
Post graduate	21	10
Total	213	100

(Authors Questionnaire survey, 2020)

From table 3 above Tertiary education has the highest percentage response of 34%, followed by secondary education at 23%, 19% for primary education, No formal education has 14%, and postgraduate respondents has 10%. This shows that educational level does not really stopped people from putting themselves at risk of flood disaster or living in flood prone areas in Kogi State.

Number of year's people stayed in the floodplain Area
This research investigates the number of years (experience) the respondents stayed or gathered within the floodplain area and the results in table 4 shows the summary.

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Table 4: No of years stayed in the flood plain location

No of years stayed in the floodplain location

Yrs	Gadumo		Ganaja		Adankolo		Ibaji		
	Freq.	(%)	Freq.	%	Freq.	%	Freq.	%	Total freq.
1-5	7	11%	3	5	3	6	1	2	14
6-10	31	47	20	37	12	24	6	15	69
11-15	13	20	8	14	18	36	3	7	42
16-20	10	15	15	28	10	20	11	26	46
25 & above	5	7%	9	16	7	14	21	50	42
		100		100		100		100	
Total freq.	66		55		50		42		213

Source: (Authors Questionnaire survey, 2020)

Communities Concerned about the flood disaster

The responses of communities about their concern for the flood disaster were gathered and the summary is presented in table 5.

Table 5: Concerned about the flood disaster in the community

Var.	Gadumo		Ganaja		Adankolo		Ibaji	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Concerned	50	76%	37	67	40	80	38	90
Not concerned	16	24	18	33	10	20	4	10
Total	66	100	55	100	50	100	42	100

Source: (Authors Questionnaire survey, 2020)

Effective way to receive information on flood disaster

Table 6 show the effective way in which the communities wish to receive information about the flood disaster.

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Table 6: Effective way to receive information on flood disasters
This information is to enable this paper achieve the preferred communication channel to receive information on flood in their locality.

Way	Frequency	Percentage
Television	50	23
Newspaper	10	5
Internet	5	2
Radio	98	46
Tall hall meetings	33	15
Mail	16	8
Billboard	1	1
Others	0	
Total	213	100

Source: (Authors Questionnaire survey, 2020)

Support for training development on disaster preparedness
This study investigated the willingness of communities to disaster training support for stakeholders and the summary is shown in table 7.

Table7: Support for training development on disaster or emergency preparedness for stakeholders

	Frequency	Percentage %
Yes	190	89
No	23	11
Total	213	100

Source: (Authors Questionnaire survey, 2020)

Flood Insurance
Table 8 is an investigation into the flood insurance cover to the communities.

Table 8: flood insurance

	Frequency	Percentage %
Yes	0	
No	207	97
Don't know	6	3
Total	213	100

Source: (Authors Questionnaire survey, 2020)

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Enforcement of Standard/Regulations on flood disaster

The investigation into the standards and regulations on flood to vulnerable areas show the following results in table 9.

Table 9: Enforcement of Standard/Regulations on flood disaster vulnerable areas

	Frequency	Percentage (%)
High	80	38
Low	133	62
Total	213	100

Source: (Authors Questionnaire survey, 2020)

Community Priority ranking or disaster mitigation planning

A total of 213 buildings were selected from the four communities (GADUMO 66, GANAJA 55, ADANKOLO 50, and IBAJI 42) using the same questionnaire strategies and data collected were ranked using means score index, severity index or relative importance index. Similar scale of 1-5 (High priority as 5, priority as 4, medium priority as 3, low priority as 2, and least priority as 1) was used for the analysis. Table 6 is a summary of the Mean Average Weighted Rating (**RII = ∑fx/∑f.1/A or** $\overline{X}$**/A**)

Table 10: Rating of community priorities indication for disaster mitigation planning (Mean Average Weighted Rating for Ranking)

S/no	Variables	∑f	$\overline{X}$	RII	Ranking
1	Protecting private property	213	3.760	0.58	9th
2	Protecting critical facilities (hospitals, transportation networks, fire stations)	213	3.745	0.54	10th
3	Preventing development in floodplain areas	213	3.722	0.53	11th
4	Protecting natural environment	213	3.687	0.49	12th
5	Training Information on natural disasters or emergency preparedness	213	4.145	0.85	3rd
6	Financial aids/food supply	213	3.845	0.67	5th
7	Capacity development of household members	213	4.490	0.89	1st
8	Protecting historical / cultural landmarks	213	3.790	0.60	8th
9	Compensation/relocation/evacuation from vulnerable areas	213	3.905	0.704	4th
10	Protecting building occupants	213	4.474	0.88	2nd

11	Promoting cooperation among public agencies, citizens, non-profit organizations and businesses	213	3.832	0.65	6th
12	Protecting and reducing damage to utilities	213	3.820	0.62	7th
13	Strengthening emergency services (police, fire, ambulance)	213	3.643	0.45	13th

Source: (Authors Questionnaire survey, 2020)

CASE MEASUREMENT ANALYSIS OF BUILDING DISTANCE FROM THE RIVER BANK

Another method of data gathering adopted by this study is a case study to ascertain the actual distance of some buildings to the river bank. And this was conducted in the same communities under investigation.

Table11: **Building Distance from the river bank**

Distance (M)	Gadumo		Ganaja		Adankolo		Ibaji		
	Freq.	**(%)**	**Freq.**	**%**	**Freq.**	**%**	**Freq.**	**%**	**Total freq.**
0-5m	35	53%	37	67	27	54	20	47	119
6-10m	21	32	10	18	12	24	10	24	53
11-15m	8	12	5	10	9	18	7	17	29
16 & above	2	3	3	5	2	4	5	12	12
		100		100		100		100	
Total freq.	66		55		50		42		213

Source: (Authors field measurement, 2020)

This study also investigated some steps these communities took or taken to mitigate flood disaster in their area and table 12 is the summary of the results.

Table 12: Actions Community or individual taken to mitigate flood disaster

Community	Action
Gadumo	elevate house entrance, monitoring water rise, relocation
Ganaja	Relocate children, elevate building entrance, monitor water rise
Adankolo	Stop building, elevate existing building, monitor water rising
Ibaji	Building of mid-rise houses of two (2) floors, elevate building,

Source: (Authors field survey and observation, 2020)

Experts Interview

The purpose of conducting expert semi-structured interviews was to investigate the training records of the communities and household members for disaster, to identify the frequency of flood disaster occurrences, available insurance cover, evacuation and houses occupant protection method, records of previous disaster for preventive measures, and the availability of information through awareness creation. Six (6) experts, one each from different representatives were selected for the face- to- face semi structured interview which was purposeful, based on their experience and wider knowledge of the flood disaster within the communities as detailed out in table 13

Table 13: Selected people for the Interview

s/no	Interviewee	Rank	Years of experience
1	National Emergency Management Agency (NEMA)	Zonal Manager	15
2	Residents	Caretaker	6
3	Developers	Chairman	8
4	Built Environment professional	State Coordinator Engineering	22
5	Building Control Officer	Zonal Manager	11

Source: (Authors Questionnaire survey, 2020)

All those interviewed had a sound knowledge of capacity building for disaster mitigation. Their experiences and knowledge span between 6 and 22 years in a position as managers, coordinator, chairman and caretaker working closely with the affected communities.

Challenges to Capacity Building from expert interviews

Ancestral home and the grandparent's grave of people affected by flood disaster were identify as big challenge to relocation option. Similarly, lack of understanding of the benefits of capacity building to the individual and community will affects participation, and it is supported by a literature (Claussen, C 2011). In addition, women and children who are majorly victims of flood disaster are not allowed much association and interaction due to cultural and religious barriers. Hence, that could affect the smooth operation of developing capacity in the communities. Literature review also explains how culture and religion affects development (Scott *et al*, 2014). Ginige *et al* (2016) explain gender biases against women as the main factors which determine the capacity building and vulnerability to disasters. The study stress that managing higher disaster vulnerabilities of women is an important issue to be addressed even in capacity building (CB).

DISCUSSION OF FINDINGS

It has been revealed from this research that local communities ravaged by flood disaster over the years lack necessary capacity training to prevent or reduce the impact. This has led to the devastating effect of more deaths and property loss over time. Despite this threat, people have

stayed in the floodplain for many years between 6 and 25years as revealed. This is not unconnected with the expert's interview revelation about ancestral home and building connection in which some persons will never leave their inherited home and their grandfather's grave for whatever reason. It was revealed that the whole communities were worried over the flood disaster at 76%, 67%, 80%, and 90% respectively. This revelation can be built upon to identify communities' key stakeholders early for capacity building benefits advocacy, hazard identification and disaster preparedness; similar contribution were made by Scott *et al* (2014).

This study finding also revealed how each community preferred flood disaster information through radio at 46%, followed by television at 23%, and town hall meetings at 15%. This revelation is in-depth in our modern day society. It has shown the connection of our radio programmes in different local languages as a means of communication than the network news of the television which most communities never enjoyed because of electricity failure. Internet, newspapers, and mail were rejected as the means of communication to them. This can be connected with the resident expert interview on poverty level since each of those methods requires additional payment to obtain the information. On the capacity building support 89% responses support local training and development of stakeholders. This indicates the stakeholder's readiness to be trained on hazard identification, preparedness, and disaster impact reduction. From literature review, Panda & Amaratunga (2016) listed preparedness as an effective disaster approach to building resilience cities or communities and Amaratnuga and Haigh, (2011) agreed that the success of any post disaster project are the determinant of it stakeholders who are specialised in specific roles and functions to carry out their duties effectively . This was also revealed in the communities' priority ranking for disaster mitigation which ranked capacity building of household as 1st, building occupant's protection as 2nd and training on disaster preparedness as 3rd ranked. It was revealed that 97% of the people and their building do not have insurance cover. This is a clear indication about low level of insurance policy awareness and operations in Nigeria. It was revealed that regulatory enforcement for flood disaster is very low at 62% responses. This is in tandem with Agapiou and Yakubu (2019) submission that lack of training and development causes non-compliance with standards and regulations in Nigeria construction industry. This is manifested in the case measurement for the distance of buildings from the river bank. In which, 53% of buildings were close to the river at 0.5m distance in Gadumo, 67 % closeness at 0.5m in Ganaja, 54% in Adankolo and 47% in Ibaji area respectively. There was no regulatory enforcement Vis-a-Vis compliance in observing the minimum distance of 15m. Expert interview and literatures revealed the following benefits of CB of community stakeholders to identify potential hazard or harm and possible ways of mitigating them to reduce the death and property loss in the event of flood disaster, it will reduce dependency on others for help and encourages local participation and trust among themselves for solution (Scott et al 2014), it will improve the quality of the knowledge and skills of the individuals and that of the community and making them responsible for their future (Scott et al, 2014), and will build up transferable skills and knowledge that will help several generations in the control of disaster.

CONCLUSIONS

This research aimed at capacity building of local stakeholders to identify threat, preparedness, weakness, and strengths towards disaster mitigation in the communities in reducing the impacts of disasters in Kogi State Nigeria. Capacity building should be encouraged as a matter of urgency. This should start with information dissemination via the radio programme, those staying very close to flood plain areas without adherence to regulations should be protected by policy with a temporary measure of relocation to safe environment by the government and all the buildings and people should be insured on a short term. Findings from the check reveal that developing local capacity will benefit individuals, the community and the society at large by improving the quality of skills and knowledge and playing down the challenges.

Recommendation from the research findings
Short term Recommendation
- There should be a policy directive on compulsory flood and disaster migitation training for all residents and owners of buildings in floodplain areas.
- There should be an introduction of insurance policy education to those at risk to reduce the aftermath loses of life and properties.
- Building permits for development within the floodplain areas should be suspended.

Long term Recommendation
- Relevant stakeholders should be identified in the communities and trained to improve local skills and knowledge of flood disaster impact reduction.
- Women who are vulnerable, having lesser access to information's, lower level participation in decision making, and financially handicapped as recognized by Ginige et al (2011) should be given full consideration in the capacity training of stakeholders for disaster prevention and reduction.

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