

INDIGENOUS KNOWLEDGE IN FLOOD DISASTER RISK REDUCTION IN  
KADUNA TOWN NIGERIA

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A thesis submitted in fulfilment of the  
requirements for the award of the degree of  
Doctor of Philosophy

Faculty of Built Environment and Surveying  
Universiti Teknologi Malaysia

MARCH 2019

## DEDICATION

*To God be the glory!*

*To all my family (wife and children) for their prayers and encouragement.  
Also to all my lost ones; may their souls continue to rest in perfect peace!*

## ACKNOWLEDGEMENT

Without reservation, I wish to glorify the name of “Almighty God” for the sound health and the knowledge He bestowed upon me to carry out this thesis successfully. Also, my sincere and immeasurable appreciation goes to my wonderful supervisors in the place of Prof. Dr. Ho Chin Siong and Dr. Gabriel Ling Hoh Teck for their guidance, motivation, inspiration and constructive criticisms in the course of carrying out this research work. They indeed, demonstrated a high level of professionalism in ensuring that this thesis meets the acceptable academic requirement. They are unarguable my role models! I also want to thank all those that contributed in one way or the other to the actualization of this thesis, more especially Kaduna State Emergency Management Agency (SEMA) for their assistance in the course of carrying this thesis. Again, my gratitude goes to all my respondents for their cooperation.

Furthermore, I wish to also tender my appreciation to Tertiary Education Trust Fund (TETFUND) for the sponsorship to pursue this doctoral degree as well as my employer Nuhu Bamalli Polytechnic, Zaria for granting me the study leave in order to acquire this PhD. Additionally, I thank my church members in AGC Abuja Road Kaduna, Nigeria and Power Palace RCCG Skudai Malaysia as well as my friends and colleagues for their prayers and encouragement for the fulfilment of my PhD.

Lastly, my deepest and warm appreciation goes to my wife (Alice Amos Danladi) and my children (Leah, Na’arah and Jedidah) for their earnest prayers, patience, sacrifice, support and encouragement. Also, my gratitude goes to my mother (Amina Danladi Goje) and all my family members as well as my in-laws for their prayers, support and encouragement. May you all remain blessed.

## **ABSTRACT**

In the year 2003, the UN General Assembly adopted resolution 58/124 which specifies that there is a need for enhancing education regarding the use of indigenous knowledge for disaster risk reduction. In relation to flood control, over the years, most attention has been given on the use of structural and non-structural approaches. Thus, this study adopts a qualitative phenomenological approach, using Focus Group Discussions (FGDs) and semi-structured interviews to explore indigenous knowledge for flood disaster risk reduction in Kaduna floodplain. The data generated was analysed using Nvivo 11 software. The analysis of the FGDs revealed that the major flood adaptation strategy in Kaduna is community work. The analysis also revealed that waste dumping in drainages was found to be the major environmental problem. This is related to community work involving local drainage construction, which causes blockages. Additionally, solutions were proposed for the effective use of indigenous flood adaptation strategies, in which public enlightenment was proposed as the means of resolving major waste dumping in local drainages. In addition, it was found in the analysis of the interviews that the major indigenous flood early warning signs identified in Kaduna floodplain are by the weather such as continuous downpour, black thick cloud and position of clouds. These are not based on meteorological stations but on past experiences of living with flood disaster in the floodplain of Kaduna. Also, the analysis indicates various indigenous coping techniques in relation to farming, such as early farming, buildings with raised foundation and relocating animals to safer places. The findings of the study are integrated to form a model that promote civic participation with the use of bottom up approach for flood disaster risk reduction. This study can assist the Kaduna State Emergency Management Agency in policy formulation relating to enhancing civic participation in flood disaster risk reduction alongside structural and non-structural approaches.

## ABSTRAK

Pada tahun 2003, Perhimpunan Agung PBB menerima pakai resolusi 58/124 yang menyatakan bahawa terdapat keperluan untuk meningkatkan pendidikan berkenaan penggunaan pengetahuan masyarakat peribumi dalam mengurangkan risiko bencana. Berhubung dengan kawalan banjir, selama bertahun-tahun, banyak perhatian diberikan kepada penggunaan pendekatan struktur dan bukan struktur. Oleh itu, kajian ini menggunakan pendekatan fenomenologi kualitatif dengan menggunakan Perbincangan Kumpulan Fokus (FGD) dan temu bual separa berstruktur untuk meneroka pengetahuan masyarakat peribumi dalam mengurangkan risiko bencana banjir di banjaran Kaduna. Data yang dihasilkan dianalisis dengan menggunakan perisian Nvivo 11. Analisis juga menjelaskan bahawa pembuangan sisa dalam saluran didapati sebagai masalah utama alam sekitar. Ini berkaitan dengan kerja masyarakat yang melibatkan pembinaan saluran perparitan tempatan, yang menyebabkan penyumbatan. Di samping itu, penyelesaian telah dicadangkan untuk penggunaan strategi penyesuaian banjir yang berkesan, di mana pencerahan dalam kalangan masyarakat awam dicadangkan sebagai cara menyelesaikan larangan pembuangan sisa utama dalam saluran perparitan tempatan. Di samping itu, turut ditemui dalam hasil analisis temubual bahawa petanda amaran awal banjir yang dikenal pasti di banjaran Kaduna adalah cuaca seperti hujan yang berterusan, awan hitam yang tebal serta kedudukan awan. Ini bukan berdasarkan stesen meteorologi tetapi berdasarkan kepada pengalaman masa lalu dalam menghadapi bencana banjir masa lalu di kawasan banjir di Kaduna. Selain itu, analisis menunjukkan pelbagai langkah penyelesaian masyarakat peribumi yang berkaitan dengan pertanian seperti pertanian awal, pembinaan bangunan dengan asas yang tinggi dan penempatan semula haiwan ke tempat yang lebih selamat. Penemuan kajian ini diintegrasikan untuk membentuk satu model yang menggalakkan penyertaan sivik dengan penggunaan pendekatan *bottom-up* untuk mengurangkan risiko bencana banjir. Kajian ini boleh membantu Agensi Pengurusan Kecemasan Negeri Kaduna dalam merangka polisi yang berkaitan dengan menambah baik penyertaan sivik dalam pengurangan risiko bencana banjir bersama-sama dengan pendekatan struktur dan bukan struktur.

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## **LIST OF ABBREVIATIONS**

BCCAP	-	Bangladesh Climate Strategy and Action Plan
CB	-	Community Based
CBA	-	Community Based Association
DRR	-	Disaster Risk Reduction
Das	-	Departmental Agencies
DMUs	-	Disaster Management Units
EM-DAT	-	Emergency Data
EMVs	-	Emergency Management Volunteers
FGD	-	Focus Group Discussions
IK	-	Indigenous Knowledge
LEMA	-	Local Emergency Management Agency
NEMA	-	National Environmental Management Agency
NGO	-	Non Governmental Organization
NAPA	-	National Adaptation Program
NDMF	-	National Disaster Management Framework
NPC	-	National Population Commission
SEMA	-	State Emergency Management Agency
TFK	-	Traditional Flood Knowledge
UN	-	United Nations
UNISR	-	United Nations Strategy for Disaster Reduction
UK	-	United Kingdom
US	-	United State
UNESCO	-	United Education, Scientific and Cultural Organization
UNDP	-	United Nation Development Program
UNEP	-	United Nations Environmental Program

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## CHAPTER 1

### INTRODUCTIONN

#### 1.1 Introduction

Indigenous Knowledge (IK) is considered to be an important tool for humans for quite some time (Wisner, 2004; Bounwoll, 2008; Mapara, 2009; Mercer *et al.*, 2012). In this contemporary time of rapid technological and social advancement, a lot of IK has been substituted with modernist global values and is about been lost or forgotten (Mapara, 2009; Mawere, 2012). Nevertheless, IK is fast been appreciated globally as an imperative means for solving existing challenges (Bounwoll, 2008; Wisner, 2014).

The reintroduced value for the practical and social environmental talents is developed from postmodernism, which values diversity as an advantage or strength, as well as, from the contemporary global paradigm of enhancing democracy, which considers self-determination of communities as important together with the technocratic process (UNEP, 2009; Gandure, 2011). Long ago, dissemination of Disaster Risk Reduction (DRR) information and knowledge have been employing the Top-down centralize process without paying attention to the bottom-up process which specifically involves the affected communities (Pelling and Uitto, 2001; Archer, 2010). As a matter of fact, one of the disadvantages of the top-down approach has always been its lack of maximization of civic participation and collaboration with the affected communities, this, in turn, spawned Community-Based DRR as a participatory strategy for DRR (Bounwoll, 2008; Arunutai *et al.*, 2008). Undeniably, the incorporation of IK in policy is always belittled (Donovan, 2010 and Wisner, 2014), despite the enormous advantages it has in DRR.

Thus, the incremental rate of vulnerability to disaster risk linked with natural disasters, flooding inclusive goes simultaneously with human advancement (Badola

and Husain, 2005). In short, economic inequalities forced people to occupy Kaduna floodplain which is a flood marginal area. Hence, the undesirable impacts exerted by flood disaster in Kaduna floodplain and considering the more attention given to structural and non-structural approaches to flood disaster control, which have proven not to be enough over the years due to the incessant flood disasters occurrences and its enormous associated impacts, prompted the need to enhance the use of bottom-up for flood DRR in Kaduna Town which can promote civic participation in flood mitigation activities. In line with this, this research deemed it right to formulate a model that will enhance IK as a powerful resource for flood DRR.

The section below states the background of the study, problem statement, research questions, research aim and objectives, scope and the significance of the study. The main purpose is to enhance civic participation in the use of bottom up approach in flood DRR in Kaduna Town.

However, the thesis also includes a review of the relevant literature which serves as theoretical grounding for the study. In addition, the study area, methodology, a synthesis of findings and discussions as well as the conclusion and recommendations of the study were covered as separate chapters.

## **1.2 Background of the Study**

In the year 2003, a resolution 58/124 was adopted by the UN General Assembly. Consequently, this led to convening a second world conference on DRR (United Nations, 2003; Malferethane, 2013). Thus, the general aim of organizing the second world conference on DRR was in order to encourage the obligation in relation to the application of DRR strategies ranging from the national, state and local levels, and specifically its incorporation into development planning practices. However, during the conference the advancement made was acknowledged, but nonetheless it was proclaimed that more needs be done. Hence, in view of this, various governments and their agencies settled for the Hyogo Framework for Action (2005-2015): Encouraging as well as Building the Resilience of Communities to Natural Disasters.

Thus, the UNISDR (2005) stressed that it was highlighted in the second world conference the need for education, exchange of experiences as well as capacity building as the basic components to generate and back various communities in mitigating disaster risks. In addition, the conference specified that there is also need for enhancing education regarding the usage of IK for DRR. Thus, this evidently confirms that the conference acknowledges the worth of IK system for DRR including flooding among other forms of natural disasters bedevilling human race.

In recent time, disasters more especially flooding, has increased as a result of climate change (leading to recurrent and severe downpours), sea level rise, population explosion and rapid urbanization etc. (Peduzzi *et al.*, 2009; Gill *et al.*, 2004; Action aid 2006; Raaijmakers *et al.*, 2008). Furthermore, the effects of flood disaster over the last two decades was reported to be enormous, resulting to the loss of billions of US dollars (Guha-Sapir *et al.*, 2013). More than 3700 flood outbreaks were documented in the EM-DAT database, spanning a time frame between 1985 to 2014 (EM-DAT, 2014).

Henceforth, in Kaduna and Nigeria as a whole, flood disaster and ways of controlling its effects are crucial matters (Obeta, 2014). Thus, with a past history of overwhelming floods that impacted on millions of the populists as well as resulted to incurring huge financial losses running to billions of US dollars; the significance of discovering a participatory flood mitigation method is utmost (UCHA, 2012). Considering the fact that, stakeholders' efforts concerning confronting flood risks over the years did not produce reasonable outcomes, in which they are been condemned as been ad-hoc, not well coordinated and non-participatory (Obeta, 2014).

Thus, considering flood risk mitigation as well as what has been learnt from other places experiences in relation to flood disaster, it can be debated that government stakeholders' attempts in controlling floods is inadequate due to the over-dependence on structural and non-structural approaches which stand the chances of failing. The increasing figure of impacted flood victims as well as the hindrance to sustainable development due to flood outbreaks within Kaduna and Nigeria in general shows that a lot concerning flood disaster is yet to be undertaking in the country in relation to its

remedies. Thus, more disturbing is the fact that Nigeria is considered as one of the most overpopulated countries in Africa with an estimated population of over 170 million persons (World Bank, 2013). Henceforth, regarding the theory that population explosion is capable of increasing flood risk in the future, the present population estimates in the study area spurs the need towards encouraging the capabilities of the populists to adapt/cope with floods.

Therefore, this research intends to explore IK for flood DRR in the floodplain of Kaduna Town in Nigeria, so that a model will be formulated to enhance civic participation in the use of bottom up approach for flood DRR. This is attributed to the fact that diverse provinces around the globe may have varied or in some cases same IK in terms of flood adaptation strategies, flood early warning signs, response as well as coping techniques and again considering the fact that the structural as well as the non-structural methodologies employed over the years to mitigate the risk related to floods have proven not to be sufficient to wholly curtail the threat linked to flood disasters. Thus, the inefficiencies of these approaches (dams, dikes, levees, embankments etc.) are obvious by the continuous flood disaster incidences all over the world, which consequently amounted to impacting adversely predominantly on inhabitants of the floodplain. Considering this, what is learned and recognized indigenously can be comprehended and accepted by undertaking an intense study on how IK and practices can be encouraged or enhanced in flood DRR.

### **1.3 Statement of the Problem**

Flood disaster has been accounted for the devastation of valuables amounting to billions of US dollars in different nations around the world (Aljazeera, 2010). Thus, its probable destructive consequences are colossal, predominantly on persons who are living in the less developed nations of the world, more especially in Africa, Asia, and Latin America (Odufuwa *et al.*, 2012). Generally, flooding has truly turned to environmental hazard in many nations as well as in numerous coastal regions beside the Atlantic sea, such that, surrounding urban areas as well as river valleys are often impacted by flood disaster virtually on a yearly basis (Jeb and Aggarwal, 2008).

Furthermore, Yahaya and Abdalla (2010) and Adebayo (2011) asserts that flood disasters take place in three distinguishing ways - coastal flooding, urban flooding and river flooding. However, there have been also varied causes of flood disaster over the years, but in this contemporary time, climate change is known to champion all (Bariweni *et al.*, 2012).

Thus, globally, flood disaster is known to be associated with varied impacts. Hence, Robert (2007) asserts that annually, about 250 million persons are vulnerable to flood risk. Therefore, the impacts of flooding that ravages properties worth billions of dollars and in extreme cases even claim lives around the world takes the form of human, agricultural, infrastructural, economic, health, environmental and social impacts. However, in Nigeria, flood disaster and the methods of tackling its problems are things of concern (Obeta, 2014). Obviously, the country has witness destructive flood events which result in impacting on millions of individuals as well as resulted to huge financial losses (NEMA, 2013). In 2012, Nigeria witnessed one of the most dreadful flood disaster outbreaks in more than 40 years (see Figure 1.1).

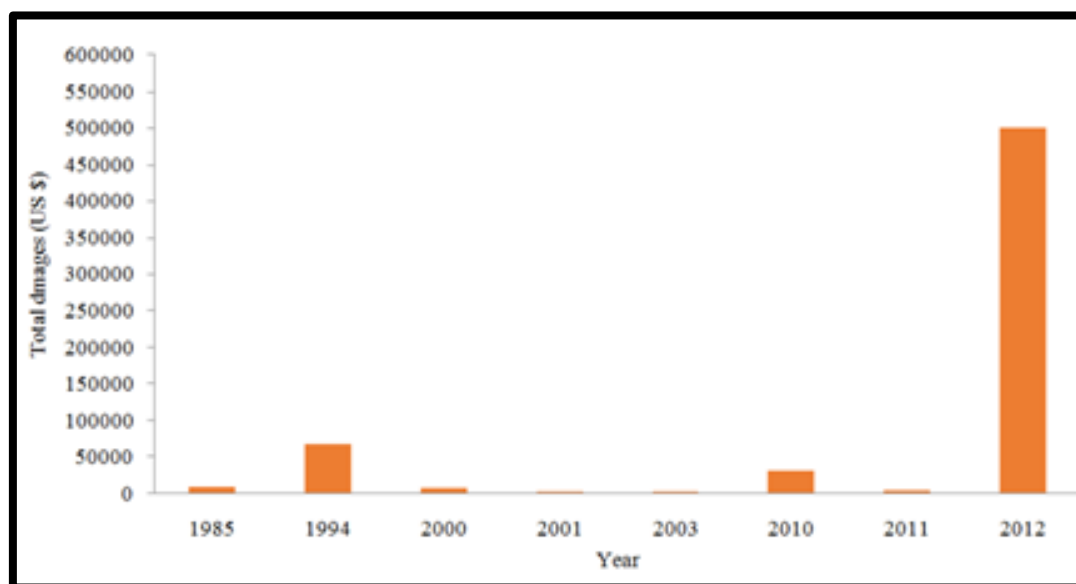


Figure 1.1 Flood Impacts Occurrence in Nigeria.

Source: EM-DAT database between 1985 and 2012

Nonetheless, the impacts of flood disaster in Kaduna are not different from what is obtainable in Nigeria as a whole and the world in general. Thus, ineffective



flood risk mitigation or reduction measures by Kaduna State Emergency Management Agency (SEMA) to tackle the recurrent flooding within the floodplain made it almost a yearly phenomenon. Generally, flood disaster in Kaduna, although not the foremost cause of death impacts as well as dislodges large number of persons more than any form of natural catastrophe. Hence, it's one of the bases for enormous destruction to assets, in which at most 20% of the populists are often subjected to the risk of one type of flood disaster prevalence or the other (*Daily Trust Newspaper, 2007*). Hence, Ayado (2011) asserted that 500 houses in Kaduna Metropolis were impacted due to heavy rainfall which result in devastating a lot of properties and caused many persons to be displaced (See Table: 1.1)

Table 1.1 Recorded Floods Impacts in Kaduna Town

S/N	Date of Occurrence	LGA	Location	Nature of Disaster	Causes of Disaster	No. of People Affected	No. of Properties Affected
1	23rd, August, 2003	Kaduna North/South, Chikun, Jaba, Jamaa	Malali, Barnawa,,A/Rimi, Kuja ma	Flood	River Kaduna Overflow its banks and heavy downpour	50	30,000 houses
2	12th September, 2012	Kaduna North	Rafin Guza	Flood	River Kaduna Overflow its banks and heavy downpour	40	40 houses
3	12th September, 2012	Kaduna North	Haliru Dantoro Close	Flood	River Kaduna Overflow its banks and heavy downpour	12	12 houses
4	12th September, 2012	Kaduna South	Bashama Road	Flood	River Kaduna Overflow its banks and heavy downpour	22	22 houses
5	12th September, 2012	Kaduna South	Barnawa Road, Kaduna Garden	Flood	River Kaduna Overflow its banks and heavy downpour	72	72 houses
6	17th September 2012	Chikun	Barnawa	Flood	Heavy downpour	107	107 houses
7	12th september, 2012	Chikun	Nasarawa	Flood	Heavy downpour	147	81 houses, 66 farmland

**Source:** Kaduna State Emergency Management Agency, 2012 & National Emergency Management Agency (2016)

Unarguably, flood devastation of lives as well as assets may perhaps be increased and the monetary adversities could be enormous, if not sufficiently handled well (Sebastian, 2012). Hence, the necessity to support a participatory bottom up as well as all-encompassing flood reduction measure can assist in lessening the undesirable effects of flood disaster, amidst the residents of the floodplain for sustainable development (Sebastian, 2012). Thus, considering the fact that floods cannot be wiped-out; that is, individuals cannot hinder nature from manifesting its course; nonetheless, flood must be masterminded and their impacts on the environment and the populist be enormously mitigated (Leonard *et al.*, 2013).

Hence, throughout the year's two dominants approaches (structural and non-structural) have been used as part of flood disaster control in developed (USA, UK) and developing continents (Africa, Asia, and Latin America) of the world (Katyal *et al.*, 2011; POSTNOTE, 2011; Global Change Research in Africa, 2012; Senol, 2016; Matczak *et al.*, 2017). The structural approach include; dams, artificial levees, wind dykes, channel straighttning, floodwall and flood profing. While the non-engineering or non-structural approaches to flood control includes; the floodplain zoning, washland, flood forecasting and warning system as well as flood insurance. All these proved not be adequate because of the persistant flood disaster impacts around the world as well as these approaches have their shortcomings ranging from structural failure, encroachments of development into flood-prone zoned areas, instruments failure for flood forecasting and early warning system etc.

### **1.3.1 Gap in Knowledge**

As noted earlier, more attention is being given to the top down approaches (structural and non-structural approaches) to flood disaster control and management in the developed and the developing countries of the world (Zbigniew, 2002; Katyal *et al.*, 2011; POSTNOTE, 2011; Global Change Research in Africa, 2012; Senol, 2016; Matczak *et al.*, 2017). But the persistent flood manifestation around the world have demonstrated that they are still not enough to thoroughly tame the outpouring floods

prevalence in both the richer and poorer communities around the world (Global Change Research in Africa, 2012).

So far, there has been little discussion about IK which is participatory in reducing the catastrophe connected with flood disaster (Acharya and Poddar, 2016; Phu and De, 2016; Moon *et al.*, 2017). As a matter of fact, the acquisition and transfer of IK is paramount, this is considering the fact that it is being subjected to the threat of diminishing because of the more attention given to structural and non-structural approaches, hence its acquisition and transfer from one generation to another ensures its sustainability and at the same time, serves as a basis of its applicability in the areas of flood DRR adaptation strategies, flood early warning signs, response and coping techniques peculiar to any particular given region.

Furthermore, although research and development institutions, for instance, the federal, states and local environmental management agencies in Nigeria and the world over are aware of the significance of IK practices in flood DRR, in practice there is little or no documentation of its uses in official channels. At this point, it is worthy to note that the increasing interest on IK for flood disaster DRR should be seen within the premise of governance and a drift to enhancing participatory approaches in flood DRR. In view of this, IK for flood DRR can be an entry point for promoting floodplain residents' civic participation in flood DRR for a comparative advantage. In essence, exploring IK for flood DRR is very important because it can fill the gap in case the structural and non-structural methodologies totally failed or fizzled as well as when confronted with any flood induced challenge that requires immediate reaction. For instance, literature indicates that IK aided the residents of Surin Islands in Thailand to cope with the gigantic Indian Sea Tidal wave of the year 2004. Also, the populists of Moken society who often talk about the 'God of waves'(Laboon), transmitted to younger generation saved the inhabitants of the community as well as the tourists that visited the region (Stevens, 2009). Furthermore, instances of IK of climate change and catastrophe early warning signs, have offered residents of marginal areas some assistance with coping with floods situations in Rajasthan. Hence, this kind of knowledge includes the understanding of cloud types, the conduct of reptiles, wind movement, feathered creatures and insects stands as a classic illustration employed to

detect flood early warning signs. Consequently, in view of the comprehension of the danger associated to floods, the residents have built houses that are resilient to floods as coping and response measures (Pareek and Trivedi, 2011).

Hence, indisputably if IK is encouraged in flood DRR, the community will get reinforced and it employs them to play a significant role in flood risk reduction or lessening exercises. In view of all these advantages, although different regions around the world have their peculiar IK for flood DRR, however, there is no empirical research conducted in Kaduna Town in relation to IK for flood DRR that is why this research seeks to ask the following research questions:

### **1.3.2 Research Questions**

- What and how the IK for flood DRR acquired, transferred and the various adaptation strategies in Kaduna floodplain?
- What are the IK flood early warning signs and the residents (response/coping) techniques to flood disaster in Kaduna floodplain?
- How can civic participation be enhanced by the use of bottom-up for flood DRR in Kaduna Town?

### **1.4 Research Aim and Objectives**

The aim of this research is to explore IK for flood DRR in Kaduna floodplain in order to formulate a model that will enhance civic participation in the use of bottom-up for flood DRR. Therefore, the specific objectives of the research are outlined below:

1. To explore the IK for flood DRR acquisition, transfer and the various adaptation strategies in Kaduna floodplain.
2. To identify the IK flood early warning signs and the residents (response/coping) techniques to flood disaster in Kaduna floodplain.

- 3 To formulate a model that will enhance civic participation in the use of bottom-up for flood DRR in Kaduna Town.

## **1.5 Research Scope**

This research will study how IK is acquired and transferred in Kaduna floodplain. Also, the study will cover issues such as IK flood adaptation strategies, flood early warning signs, response and coping techniques in Kaduna floodplain. Furthermore, a model that will enhance civic participation in the use of bottom-up for flood DRR will finally be formulated.

However, though the literature review cross-examined diverse topics linked to the subject of discussion in this study, the research will only consider Kaduna Town which mainly comprises of four different local government areas that falls within the floodplain area namely Kaduna South, Igabi, Jukun and Kaduna North Local Government Areas.

## **1.6 Significance of the Study**

This research will be significant in the following ways:

1. The findings of this study will be utilized in the formulation of a policy relative to flood DRR by the Kaduna State Emergency Management Agency (SEMA) and also at the same time it will assist to a great extent in promoting civic participation of the affected floodplain residents in flood DRR in Kaduna which over the years has been overlooked.
2. Also, the outcome of this study will provide a platform for IK management as well as assist in awareness creation of the role IK plays in flood DRR and at the same time help in making adequate preparation even before flood disaster outbreak.

3. The study will provide a comprehensive IK guide for flood risk reduction which can be referred to by other places around the world having the same environmental context with the study area as well as experiencing flood disaster outbreaks.

## **1.7 Operational Research Framework**

In order to ensure that all the research undertakings are carried out in a more composed, organized, articulated and finished at the desired time, a scheduled research framework is required. Specifically, this research framework is prepared in order to serve as a guide as the study is been carried out. Also, it will assist in giving direction by clarifying the connections and interrelations that exists at various levels of the activities to be undertaken as the research progresses.

In line with the research framework, at the beginning of the study the problem statement was defined as well as the research questions, the objectives of the study and the scope of the research were stated. Considering the aim and objectives of the study, the research activities were grouped into three stages as shown in Figure 1.2, Stage one comprises of literature review which produces chapter 1 and 2 that were discussed fully in the main research work. Stage two has to do with the data collection and analysis employed in the study in order to answer the research questions. Stage three present the model for enhancing civic participation in the use of bottom-up for flood DRR in Kaduna Town. Stage four, serves as the conclusion of the research comprising of the summary and recommendations of the study.

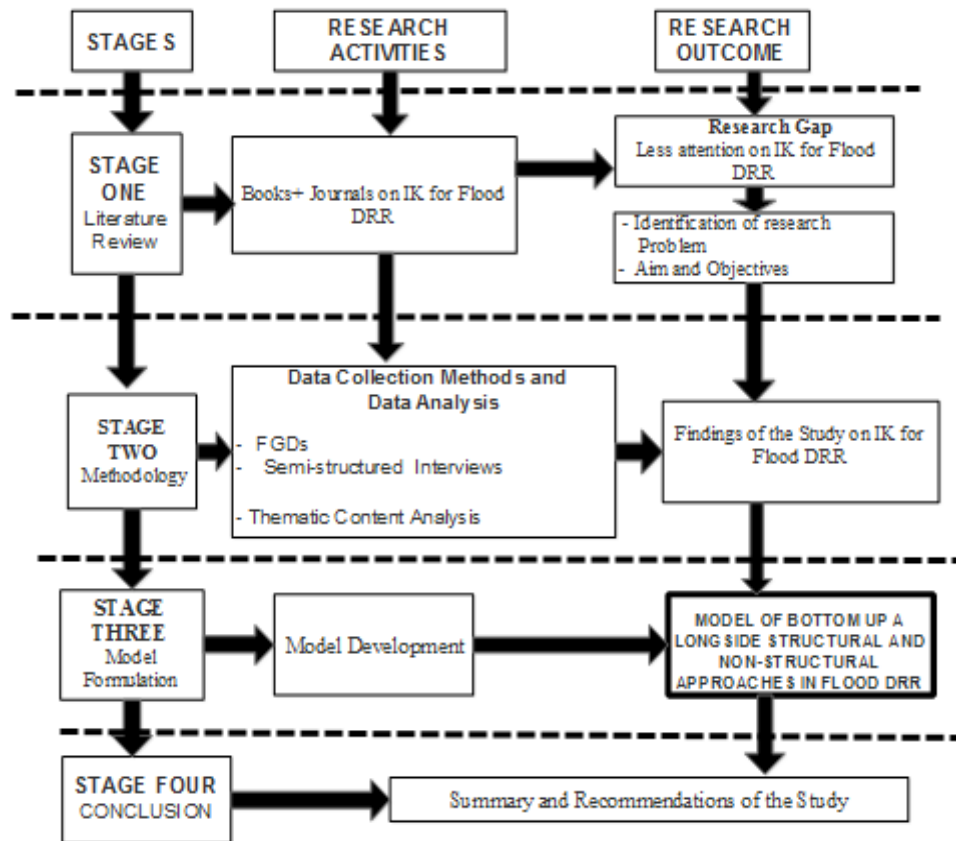


Figure 1.2 Research Framework

### 1.7.1 Structure of the Thesis

The thesis is structured into six chapters which are outlined as follows:

**Chapter 1:** This chapter gives a general overview of the research, starting from the introduction, background of the study, problem statement, research questions, aim and objectives, and significance of the study as well as the scope of the research.

**Chapter 2:** The chapter provided a review of relevant literature in relation to IK for flood DRR, covering topics such as the concepts of IK, characteristics of IK. Also, the chapter discusses the place of IK in the field of DRR as well as a generic model of knowledge, actions and stakeholders for DRR was also discussed. Additionally, significance of IK in the reduction of flood risk through flood forecasting, flood early warning signs, adaptation and coping strategies were

discussed. Furthermore, some examples of IK for flood DRR in some regions around the world were discussed. The chapter ended with a conceptual framework of the study followed by a summary of the chapter.

**Chapter 3:** This chapter discussed the research methodology of this study, which involves procedures followed to achieve the research aim and objectives of the study. The chapter begins by giving a general overview of the study area, in which the location and the physical characteristics as well as the brief historical background of Kaduna were discussed. Furthermore, the institutional capacity for DRR under the National Disaster Management framework in Nigeria as well as the mandate of Kaduna State Management Emergency Agency (SEMA) were also discussed. These was dicussed in order to demonstrate the non valuing of IK by SEMA in relation to DRR in Kaduna and Nigeria as a whole. .

Subsequently, this chapter gives a detailed explanation of the research methodology employed in conducting this research, such that the following parts were discussed via purpose of the research, research philosophy, reasoning levels employed in the study such as inductive and deductive, research approach (Qualitative Phenomenological Approach), the sampling technique (Purposive Sampling) as well as the participants' selection criteria for this study were also discussed. Again, the data collection techniques such as Focus Group Discussions (FGD), FGDs Data Collection procedure, Semi-Structured interviews and Semi-Structured data collection procedure were also discussed. Also, secondary sources as technique for data collection was also employed in this study. The chapter finally discussed the data analysis methods and it ended with a summary.

**Chapter 4:** The chapter presents the results and discussions of the FGDs conducted in Kaduna floodplain in order to answer objective one of the study. The chapter begins by discussing IK for flood DRR acquisition, transfer and the various IK flood disaster adaptation strategies employed in the study area such community work e.g. Local Drainage Maintenance, Local Drainage Construction. Planting of trees etc.as well as outmigration as also an IK flood DRR adaptation strategy were discussed. In addition, the problems associated with the IK flood DRR adaptation



strategies were discussed e.g. indiscriminate dumping of refuse in local drainages, cutting down of trees etc. Also, solutions associated with the problems of the various IK flood DRR adaptation strategies in Kaduna floodplain were discussed. Finally, the chapter ended with a summary.

**Chapter 5:** The chapter begins by covering the results and discussions of the semi structured interviews carried out in the study area, in which IK flood early warning signs observed in Kaduna floodplain based on nature, water observation, and weather were discussed. Also, the chapter discussed the residents' response techniques such as the means of passing information if flood disaster is perceived to take place, indigenous ways of evacuation from flood stricken areas and external support if flood disaster prevails. Again, this chapter discussed the IK flood coping techniques in Kaduna floodplain such as indigenous farming flood coping technique, animals flood coping techniques and buildings flood coping techniques. Furthermore, the chapter discusses the interrelations between themes of the study. In addition, discussion in relation to previous studies on IK flood early warning signs, the residents' response and coping techniques in Kaduna floodplain was held.

**Chapter 6:** This chapter discussed the formulation of the model for enhancing civic participation in the use of bottom up for flood DRR. Again, the chapter discussed the integrations of the findings of this study. Furthermore, the stages in the formulation of the model of this study were also discussed. Additionally, the chapter discussed the validation results of the formulated three-stage activity model for enhancing civic participation in the use of bottom up for flood DRR. Also, a summary of the formulated model was discussed as well as the chapter ended with a summary.

**Chapter 7:** This is the concluding chapter of this study. The chapter begins by discussing the summary of the research such that the summary of the realization of each objective of the research. It then continues by discussing the contributions of the research such as theoretical and policy contributions. In addition, the chapter discussed the limitations of the study as well as recommendations for further studies. The chapter ended with a closing remark.

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