

INDIGENOUS KNOWLEDGE IN FLOOD DISASTER RISK REDUCTION IN
KADUNA TOWN NIGERIA

AMOS DANLADI

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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!*

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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).

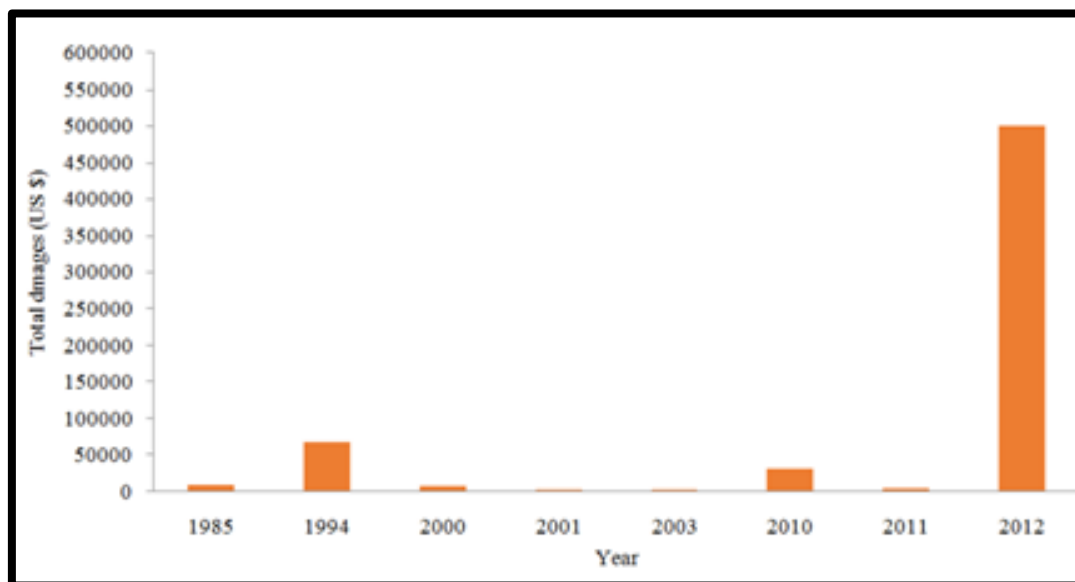


Figure 1.1 Flood Impacts Occurrence in Nigeria.

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 (Katyral *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; Katyral *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.

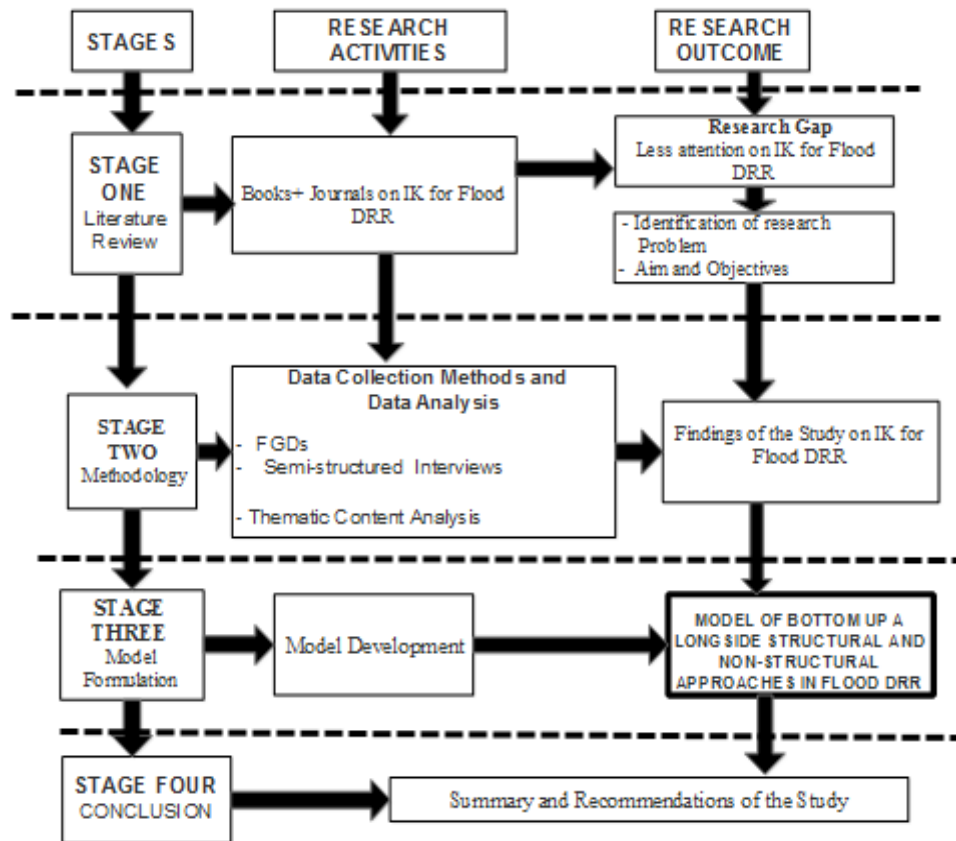


Figure 1.2 Research Framework

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.

REFERENCES

- Abbas, I.I. (2008). Use of satellite remote sensing and geographic system to monitor land degradation along Ondo Coastal Zone (Nigeria). *Balwois, Orid Macedonia*, 27, 1-13.
- Abaje, I. B., Ogoh, A. O., Amos, B. B., & Abashiya, M. (2016). Climate change, flood disaster assessment and human security in Katsina State, Nigeria. *American Journal of Human Ecology*, 4 (4), 47-56.
- Acharya, A.; & P. (2016). *The River Itself Warns Us: Local Knowledge of Flood Forecasting in the Gandaki River Basin*, West Champaran and India.
- Adebayo, J.A. & Rabee, R. (2011). Lagos (Nigeria) Flooding and influence of urban planning. *Journal of Urban Design and Planning (ICE)* 164 (3):175-187.
- Adelekan, O.(2010). Vulnerability of poor urban coastal communities to flooding in Lagos, Nigeria. *Environment and Urbanization* 22 (2): 433-450.
- Afoakwah, G. (2016). Exploring the Lived Experiences of First-time Breastfeeding Women: A Phenomenological Study in Ghana (Doctoral dissertation, University of Manchester, United Kingdom). Retrieved on 6th July, 2017 from https://scholar.google.com/scholar?hl=en&as_sdt=0%.
- Agrawal, A. (2014). Indigenous and Scientific Knowledge: Some Critical Comments. *Anthropology Indonesia*.
- Alexander, D. E. (2000). *Confronting Catastrophe: New Perspectives on Natural Disasters*. Terra and Oxford University Press.
- Alexander, A. E. (2001). Sacred ecology: Traditional ecological knowledge and resource management. *Organization & Environment*, 14 (3), 377.
- Aljazeera. (2006). Africa Nigerian Flood Displaces Millions. Retrieved on 7th March, 2016 from <http://English.aljazeera/news/Africa/2016/04/201095423901.Html>.
- Anderson, M., & Woodrow, P.J. (1998). *Rising from the Ashes: Development Strategies in Times of Disaster*. Boulder, Co: Lynne Reinner.
- Anik, S. I., & Khan, M. A. S. A. (2012). Climate change adaptation through local knowledge in the north eastern region of Bangladesh. *Mitigation and Adaptation Strategies for Global Change*, 17 (8), 879-896.

- Archer, E. R. (2010). *Climate change—A critical emerging issue*. DEA.
- Arunotai, N., Wongbusarakum, S & Elias D. (2008). *Bridging the Gap between the Right and Needs of Indigenous Communities and the Management of Protected Areas: Case Studies from Thailand*. Bangkok: UNESCO Bangkok Times of Disaster. Boulder: Wester View Press.
- Asian Disaster Preparedness Centre (ADPC). (2005). *A Prima: Integrated Flood Risk Management in Asia*. Bangkok: Thailand.
- Ayado, S. (2011, October 7). Nigeria: 300 Houses, Markets Flooded in Makurdi Downpour, Leadership Newspaper. Pp 1.
- Backstone, A. (2012). *Principles of Sociological Inquiry-Qualitative and Quantitative Methods*. The Saylor Foundation.
- Badola, R., & Hussain, S. A. (2005). Valuing ecosystem functions: An empirical study on the storm protection function of Bhitarkanika mangrove ecosystem, India. *Environmental Conservation*, 32 (1), 85-92.
- Bandara, W. (2006). Using Nvivo as a Research Management Tool: A Case Narrative. In *Quality and Impact of Qualitative Research: Proceedings of the 3rd International Conference on Qualitative Research in IT & IT in Qualitative Research*.
- Basher, R. (2006). Global Early Warning Systems for Natural Hazards: Systematic and People-Centred. *Philosophical Transactions of the Royal Society a: Mathematical, Physical and Engineering Sciences*, 364 (1845), 2167-2182.
- Bariweni, P.A., Tawari C.C. & Abowei, J.F.N. (2012). Some environmental effects of flooding in the Niger Delta Region of Nigeria, *International Journal of Fisheries and Aquatic Sciences*. 1(1): 35-46.
- Battiste, M., & Youngblood, J. (2000). *Protecting Indigenous Knowledge and Heritage: A Global Challenge*. UBC Press.
- Baumwoll, J. (2008). *The Value of Indigenous Knowledge for Disaster Risk Reduction: A Unique Assessment Tool for Reducing Community Vulnerability to Natural Disasters*. Webster University.
- Bauer, K. (2013). Are preventive and coping measures enough to avoid loss and damage from flooding in Udayapur District, Nepal? *International Journal of Global Warming*, 5 (4), 433-451.
- Becker, J., Johnston, D., Lazrus, H., Crawford, G., & Nelson, D. (2008). Use of traditional knowledge in emergency management for tsunami hazard: a case

- study from Washington State, USA. *Disaster Prevention and Management: An International Journal*, 17 (4), 488-502.
- Beekhuizen, J., Nielsen, S., & Von Hellens, L. (2010, November). The Nvivo Looking Glass: Seeing the Data through the Analysis. In *5th Conference on Qualitative Research in IT*, Brisbane, Australia.
- Bennett, N. D., Croke, B. F., Jakeman, A. J., Newham, L. T., & Norton, J. P. (2010). *Performance Evaluation of Environmental Models*. Retrieved on 8th January, 2017 from <https://scholarsarchive.byu.edu/iemssconference>.
- Bernard, H. R. (2002). *Research Methods in Anthropology: Qualitative and Quantitative Approaches* (3rd ed.) Walnut Creek, CA: Alta Mira Press.
- Blessing O.N. (2011). Africa Indigenous Knowledge Systems (AIKS). *Simbiosis Electronica De Ciencias De La Informacion*, 7 (2).
- Boardman, J., & Vandaele, K. (2016). Effect of the spatial organization of land use on muddy flooding from cultivated catchments and recommendations for the adoption of control measures. *Earth Surface Processes and Landforms*, 41 (3), 336-343.
- Chang, L.B., Yanda, P.Z. & Ngama, K. (2010). Indigenous knowledge in seasonal rainfall prediction in Tanzania: A case of the South-Western Highland of Tanzania. *Journal of Geography and Regional Planning*, 3 (4): 66-74.
- Cruikshank, J. (2014). *Do Glaciers Listen? Local Knowledge, Colonial Encounters, and social imagination*. Ubc press.
- Creswell, J.W. (2007) *Quantitative Inquiry and Research Design: Choosing among Five Approaches*, 2nd Edition, Sage Publications Ltd.
- Creswell, J.W. (2012). *Educational Research; Planning, Conducting and Evaluation of Quantitative and Qualitative research* – 4th ed. Pearson.
- Corbin, J. M., & Strauss, A. (1990). Grounded theory research: Procedures, canons, and evaluative criteria. *Qualitative Sociology*, 13 (1), 3-21.
- Dekens, J. (2007). *The Snake and the River Don't Run Straight: Local Knowledge on Disaster Preparedness in the Eastern Terai of Nepal*. International Centre for Integrated Mountain Development (ICIMOD).
- Delica-Willison, Z., & Willison, R. (2004). *Vulnerability Reduction: A Task for the Vulnerable People themselves. Mapping Vulnerability: Disasters, Development and People*. Earthscan, London, 145-158.

- Delica-Willison, Z., & Gaillard, J. C. (2012). Community Action and Disaster. *Handbook of hazards and disaster risk reduction*, 711-722.
- De-Guchteneire, P., Krukkert, I. & Von Liebestein, G. (2004). *The Best Practice Indigenous Knowledge*. Retrieved on 8th February, 2017 from <http://www.uneco.org/mostbpikpub.html>.
- Devkota, R. P., Cockfield, G., & Maraseni, T. N. (2014). Perceived community-based flood adaptation strategies under climate change in Nepal. *International Journal of Global Warming*, 6 (1), 113-124.
- Dewan, A. M., Islam, M. M., Kumamoto, T., & Nishigaki, M. (2007). Evaluating Flood Hazard for Land-use Planning in Greater Dhaka of Bangladesh using Remote Sensing and GIS Techniques. *Water Resources Management*, 21 (9), 1601-1612.
- Douglas, I., & Alam, K. (2006). *Climate Change, Urban Flooding and the Rights of the Urban Poor in Africa: Key findings from six African cities*. Action Aid, London, 6.
- Donovan, K.(2010). Cultural Responses to Geophysical Hazards on Mt Merapi, Indonesia. (Doctoral thesis, University of Plymouth, Plymouth).
- Du, W., FitzGerald, G. J., Clark, M., & Hou, X. Y. (2010). Health impacts of floods. *Prehospital and Disaster Med*, 25 (3), 265-272.
- Eisenhardt, K.M., & Santos F.M. (2002). Knowledge Based Views: A New Theory of Strategy. *Handbook of Strategy and Management 1*, 139-164.
- Ekikan, I., Musa, S.A., & Alkassim, R.S. (2016) . Comparison of convenience sampling and purposive sampling. *American Journal of Theoretical and Applied Statistics* , 5 (1), 1-4.
- Eliki, M.R.(2005). Case Study of Disaster Risk Mitigation. CRED.Pilot Course :Fiji: SOPAC.
- Elo, S., & Kyngas, H.(2008). The qualitative content analysis process. *Journal of Advance Nursing*. 62 (1), 107-115.
- EM-DAT .(The International Disaster Database). CRED. (2014). Flooding Data for Nigeria. Retrieved on 3rd April, 2018 from http://www.emdat.be/https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=EM-DAT.
- Emerton, R. E., Stephens, E. M., Pappenberger, F., Pagano, T. C., Weerts, A. H., Wood, A. W., ... & Baugh, C. A. (2016). Continental and global scale flood forecasting systems. *Wiley Interdisciplinary Reviews: Water*, 3 (3), 391-418.

- Fingesi, E.T. (2001). The Effect of Sectarial Riot on Housing Supply in Barnawa, (Unpublished Msc Thesis, Department of Geography , FASS, Nigeria Defense Academy, Kaduna). Retrieved on 8th March, 2016 from https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=Fingesi.+%28200
- Flick,U.(ED). *Managing Quality in Qualitative Research.Los Angeles.London, New Delhi.Sage.*
- Gaillard, J. C. (2007). Resilience of traditional societies in facing natural hazards. *Disaster prevention and management: An International Journal*, 16 (4), 522-544.
- Glantz, M.H. (2009). *Head ups Early Warming Systems for Climate, Water and Weather Related Hazards.* United Nations University Press,Shibuya Tokyo, 15-8925, Japan.
- Gaillard, J. C. (2010). Vulnerability, capacity and resilience: perspectives for climate and development policy. *Journal of International Development: The Journal of the Development Studies Association*, 22 (2), 218-232.
- Gaillard, J. C., & Mercer, J. (2013). From knowledge to action: Bridging gaps in disaster risk reduction. *Progress in human geography*, 37 (1), 93-114.
- Gandure, S. (2011). *Reducing Climate Change Rsks by 'Living with Drought': Investigating Local Institutional Design in Zimbabwe.* Africa in Focus, 163.
- Gill, S., Pauleit, S., Ennos, A.R., Lindley, S.J., Handley, J.F., G. William, J. & Ueberjahn T.A. (2004). *Literature Review: Impacts of Climate Change on Urban environments.* Centre for Urban and Regional Ecology (CURE) University of Manchester. Retrieved on 5th March, 2016 from http://www.seed.manchester.ac.uk/cure/medialibrary/asscue/downloads/asscue_litreview.pdf.
- Global Change System of Analysis, Research and Training. (2011). *Start Grant for Global Change Research in Africa Final Project Report.*
- Global Network of Civil Society Organization for Disaster Risk Reduction(GNDR). (2009). "Cloud Built Little Rain-Views from front Line: Local Perspective of Progress Toward the Implementation of Hygo Framework of Action. Retrieved on 12th June, 2017 from <http://www.globalnetwork-Dr.org/reports/vuflfillreport0609.pdf>.
- Grigg, N. S. (2016). *Integrated Water Resource Management: An Interdisciplinary Approach.* Springer.

- Guha-Gapir, D., Hoyois P.H & Below, R. (2013). *Annual Disaster Statistical Review 2012: The Numbers and Trends*. Brussels: CRED; 57.
- Gupta, K. (2007). Urban flood resilience planning and management and lessons for the future: case study of Mumbai, India. *Urban water journal*, 4 (3), 183-194.
- Hall, P. (2007). Early warning system: Reframing the discussion. *The Australian Journal of Emergency Management*, 2 (22), 1324-1540.
- Haque, M. A., Rahman, D., & Rahman, m. H. (2016). The Importance of Community Based Approach to Reduce Sea Level Rise Vulnerability and Enhance Resilience Capacity in the Coastal areas of Bangladesh: A Review. Retrieved on 19th February, 2017 from https://scholar.google.com/scholar?hl=en&as_s.
- Hamilton-Ekeke, J. T., & Dorgu, E. T. (2015). Curriculum and indigenous education for technological advancement. *British Journal of Education*, 3 (11), 32-39.
- Hazarika, N., Tayeng, T., & Das, A. K. (2016). Living in troubled waters: Stakeholders' perception, susceptibility and adaptations to flooding in the Upper Brahmaputra Plain. *Natural Hazards*, 83 (2), 1157-1176.
- Hernandez-Guerrero J., Vieyra-Medrano AM.E., & Mendoza M.E. (2012). Adaptation strategies in communities under precarious housing: Flooding risks in the peri-urban sector of the city of Morelia, Michoacan, Mexico. *Applied geography*, 34, 669-679.
- Ho, M., Lall, U., Allaire, M., Devineni, N., Kwon, H. H., Pal, I., & Wegner, D. (2017). The future role of dams in the United States of America. *Water Resources Research*, 53 (2), 982-998.
- Hooli, L. J. (2016). Resilience of the poorest: Coping strategies and indigenous knowledge of living with the floods in Northern Namibia. *Regional Environmental Change*, 16 (3), 695-707.
- Howell, P. (2003). *Indigenous early warning indicators of cyclones: potential application in coastal Bangladesh*. London: Benfield Greig Hazard Research Centre.
- Hiwasaki, L., Luna, E., & Shaw, R. (2014). Process for integrating local and indigenous knowledge with science for hydro-meteorological disaster risk reduction and climate change adaptation in coastal and small island communities. *International Journal of Disaster Risk Reduction*, 10, 15-27.
- Islam, M. S., Hasan, T., Chowdhury, M. S. I. R., Rahaman, M. H., & Tusher, T. R. (2012). Coping techniques of local people to flood and river erosion in char

- areas of Bangladesh. *Journal of Environmental Science and Natural Resources*, 5 (2), 251-261.
- Jackson, A. (2014). "Flood Management". Geography A. S Notes. Retrieved on the 5th April, 2016 from http://scholar.google.com/scholar?hl=en&as_sdt=0%2C5.
- Jeb, D.N. & Aggarwal, S.P. (2008). Flood inundation hazard modelling of the river Kaduna using remote sensing and geographic information system. *Journal of Applied Sciences Research*, 4 (12): 1822-1833.
- Kaduna State Emergency Management Agency. *Submission of report on SEMA's Level of Preparedness Against Nimet's Predicted 2013 Flood Disaster in Kaduna State*, dated 19th august 2013.
- Kaguny, A., Wandibba, S., & Wanjohi, J. G. (2016). The use of indigenous climate forecasting methods by the pastoralists of Northern Kenya. *Pastoralism*, 6 (1), 7.
- Kaijazi, A.L., Chang, L.B., Liwega, E.T.A, Kanemba, A., & Nindi, S.J. (2013). The Use of Indigenous Knowledge in Weather and Climate Prediction in Mahenge and Ismani Wards, Tanzania, 6(7), 274-279. Retrieved on 25th March, 2016 from <http://doi.org/10.5897/JGP2013.38>.
- Katyal, A. K., & Petrisor, I. G. (2011). Flood management strategies for a holistic sustainable development. *Environmental Forensics*, 12 (3), 206-218.
- Knight, L. (2011). World Disaster Report 2011: Focus on hunger and malnutrition. In *World Disaster Report 2011: Focus on hunger and malnutrition*. International Federation of Red Cross and Red Crescent Societies (IFRC).
- Kumar, K.A. (2018). Unit-1 Indigenous Environmental Knowledge Systems and Development. IGNOU. Retrieved on 5th April, 2016 from <https://scholar.google.com/scholar?hl=et=0%2C5&q=Kumar%2>.
- Kropp, S. (2012). The influence of flooding on the value of real estate. *Journal of Building Survey, Appraisal & Valuation*, 1 (4), 318-324.
- Krippendorff, K. (2018). *Content Analysis: An Introduction to its Methodology*. Sage Publications.
- Kvale, S., & Brinkmann, S. (2009). *Interviews: Learning the Craft of Qualitative Research Interviews* (2nd ed). Thousand Oaks, CA, US: Sage Publication, Inc
- Leonard, I.U & Dorothy, I. U. (2013). Gender floods, and mental health: The way forward. *An International Journal of Asian Social Science*, 3 (4), 1030-1042.

- Loucks, D.P., & Van Beek, E. (2017). *Water Resource Systems Planning and Management: An Introduction to Methods, Models, and Applications*. Springer. Retrieved on 17th January, 2018 from <http://ecommon.cornel.edu/xmlni/bitstream/handle/1813/481959/2F978-319-44231-/6pdf?sequence>.
- Lunga, W. (2014). The Inclusion of Indigenous System into Disaster Risk Reduction. The Case Study of Zimbabwe (Doctoral dissertation, North Western University, Potchefstroom).
- Macherera, M., & Chimbari, M. J. (2016). A review of studies on community based early warning systems. *Jàmbá: Journal of Disaster Risk Studies*, 8 (1), 4-7.
- Matczak, P., Lewandowski, J.M, Chorynski, A., A., Szwed, M., & Kundzewicz, Z. W. (2017). Doing more while remainnig the same? Flood risk governace in Poland. *Journal of Flood Risk Management*, 11 (3), 239-249.
- Madu, C. N., & Kuei, C. H. (2017). *Handbook of Disaster Risk Reduction & Management*. World Scientific Publishing Company.
- Maferethane, O. I. (2013). The Role of Indigenous Knowledge in Disaster Risk Reduction: A Critical analysis (Doctoral Dissertation, North-West University).
- Mapara, J. (2009). Indigenous knowledge systems in Zimbabwe: Juxtaposing postcolonial theory. *The Journal of Pan African Studies*, 3, 139-155.
- Marfai, M. A., Sekaranom, A. B., & Ward, P. (2015). Community responses and adaptation strategies toward flood hazard in Jakarta, Indonesia. *Natural hazards*, 75 (2), 1127-1144.
- Massey, O. T. (2011). A proposed model for the analysis and interpretation of focus groups in evaluation research. *Evaluation and program planning*, 34 (1), 21-28.
- Maurial, M. (1999). *Indigenous Knowledge and Schooling: A Continuum between Conflict and Dialogue*. What is indigenous knowledge, 59-77. New York, NY: Flmer Press.
- Mawere, M. (2012) . *The Struggle of An Indigeious Knowledge System in An Age of Globalization – A Case for Children’s Traditional Games in South-Eastern Zimbabwe*. Langaa Publishing House: Bemanda, Cameroon.
- Mawere, M. (2013). Traditional environment conservation strategies in pre-colonial Africa: Lessons for Zimbabwe to forget or to carry forward into the future. *Afro-Asian Journal of Social Sciences*, 4 (4), 1-23.

- Maxwell, S. E., & Delaney, H. D. (2003). *Designing Experiments and Analysing Data: A Model Comparison Perspective*. Routledge.
- Max Lock and Partners. (2010). *Draft Kaduna Master plan: A survey and Plan of Kaduna for the government of Kaduna state*. London.
- Mavhura, E., Bernard, S., Collins, A.E., & Manasa, D. (2013). Indigenous knowledge coping strategies and resilience to flood in Muzarabani, Zimbabwe, *International of Journal of Disaster*, 5, 38-48.
- McCarty, J. J., Canziani, O. F., Leary, N. A., Dokken, D. J., & White, K. S. (2001). *Climate Change 2001: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Third Assessment Report of the Intergovernmental Panel on Climate Change* (No. 574.5222 C639co 2001). Cambridge University Press.
- Mercer, J., Dominey-Howes, D., Kelman, I., & Lloyd, K. (2007). The potential for combining indigenous and western knowledge in reducing vulnerability to environmental hazards in small island developing states. *Environmental Hazards*, 7 (4), 245-256.
- Mercer, J., & Kelman I. (2008). Living with flood in Singas, Papua New Guinea, Good Practices and Lesson Learned from Experience in Asia-Pacific Region, 46-51. Retrieved on 10th May, 2015 from <http://www.unisdr.org/eng/about-isdr//isdr-publication/19-indigenous Knowledge. DRR/indigenous. DRR. pdf>.
- Mercer, J., Gillard, J.C., Crowley, K., Alexandra, B., Berker, J., & Shannon, R. (2012). Culture and disaster risk reduction: Lesson and opportunities. *Environmental Hazards*, 11 (2), 74-95.
- Mitchell, J. Pearce, R., Stephens, M., Taylor, J., & Warchivker, I. (2005). *Indigeious Population and Resources Flows in Central Australia: A Social and Economic Baseline Profile*, Centre for Remote Health.
- Moon, J., Flannery, W., & Revez, A. (2017). Discourse and practice of participatory flood risk management in Belfast, UK. *Land Use Policy*, 63, 408-417.
- Molina, J. G. J. (2016). People's knowledge, people's defense: Utilizing local practices for disaster safety and adaptation in Rapu-Rapu, Albay, Philippines. *Jurnal Kajian Wilayah*, 3(2), 225-237.
- Motaleb, A. M., & Irfanullah, M. H. (2011). Reading nature's mind: Disaster management by indigenous people of Bangladesh. *Indian Journal of Traditional Knowledge*, 10 (1), 80-90.

- Morrison, A., Noble, B. F., & Westbrook, C. J. (2018). Flood risk management in the Canadian Prairie Provinces: Defaulting towards flood resistance and recovery versus resilience. *Canadian Water Resources Journal/Revue Canadienne Des Ressources Hydriques*, 43(1), 33-46.
- Mutikiti, R. & Gunda, M. R. (2007). Environmental management: Karanga ecotheology in Charumbira Communal Lands. *Swedish Missiological Themes*, 95 (3), 4-6.
- NEMA. (2013). *Report on Flood Disaster in Nigeria: Government press. NEMA. Published by Cork University Press First Floor, East Wing, Main Quadrangle, Western Road Cork.*
- Nyong, A., Adesina, F., & Elasha, B. O. (2007). The value of indigenous knowledge in climate change mitigation and adaptation strategies in the African Sahel. *Mitigation and Adaptation Strategies for Global Change*, 12 (5), 787-797.
- Obeta, M. C. (2014). Institutional approach to flood disaster management in Nigeria: need for a preparedness plan. *British Journal of Applied Science & Technology*, 4 (33), 4575.
- Odofuwa, O., Adedeji H., Oladesu, J. O & Bongwa A. (2012). Floods of fury in Nigerian Cities. *Journal of Sustainable Development*, 5 (7), 69- 79.
- OCHA (UN Office for the Coordination of Humanitarian Affairs). (2012). *Nigeria: Floods, Emergency Situation Report No. 2*. Retrieved on 23rd July, 2016 from <http://www.ochaonline.un.org/rowca>.
- Okonya, J. S., & Kroschel, J. (2013). Indigenous knowledge of seasonal weather forecasting: A case study in six regions of Uganda. *Agricultural Sciences*, 4 (12), 641.
- Ostovarzijerdi, A., Ghanbari, A., & Karkon, M. (2019). Investigating the behaviour of the plastic concrete made with different types of fibres with an approach to the mixing plans of plastic concrete. *Civil Engineering Journal*, 5 (1), 227-245.
- Peduzzi P., Dao, H., Herold, C., & Mouton, F. (2009). Assessing Global Exposure and Vulnerability Towards Natural Hazards: The Disaster Risk index. *Natural and Earth System Sciences*, 9 (4), 1149-1159.
- Philip, B.D. (2009). "Disaster Recovery System. *Science*, 9, 1149 "Disaster Recovery, CRC Press Boca Raton FL, 21-167.

- Phu, P. X., & De N. N. (2016). The situation and solutions for using indigenous knowledge of local people in adaptation to floods in Giang Province, Vietnam. *Asia-Pacific Journal of Rural Development* 26(2).
- Pelling, M., & Uitto, J. I. (2001). Small island developing states: natural disaster vulnerability and global change. *Global Environmental Change Part B: Environmental Hazards*, 3 (2), 49-62.
- Parah, K. (2016). Environmental and Land Use Consultancy Firm. Zaria, Nigeria.
- Pareek, A., & Trivedi, P. C. (2011). Cultural values and indigenous knowledge of climate change and disaster prediction in Rajasthan, India. *Journal of Traditional Knowledge*, 10 (1), 183-189.
- POSTNOTE. (2001). National Flood Management, Houses of Parliamentary Office of Science and Technology U.K.
- Raaijmakers, R., Krykow, J., & Van Der Veen, A. (2008). Flood risk perceptions and spatial mul-ticriteria analysis: An exploratory research for hazard mitigation. *Natural Hazards*, 46 (3), 307-322.
- Ringo, J., Luvinga, K., Morsardi, L., Omary, I., Mayengo, G., & Kawonga, S. (2016). Indigenous knowledge in flood management and control in Kilosa District, Tanzania. *Int. J. Mar. Atmos. & Earth Sci*, 4 (1), 1-15.
- Robert, S. (2007). *The human cost of the June Floods Britain*, Published by the International committee of the Fourth International ICFI, World Social web.
- Rodriguez, J. K., Holvino, E., Fletcher, J. K., & Nkomo, S. M. (2016). The Theory and Praxis of Intersectionality in Work and Organisations: Where do we go from here. *Gender, Work & Organization*, 23 (3), 201-222.
- Rouillard, J. J., Ball, T., Heal, K. V., & Reeves, A. D. (2015). Policy implementation of catchment-scale flood risk management: Learning from Scotland and England. *Environmental Science & Policy*, 50, 155-165.
- Santha, S. D., Gahana, P., & Aswin, V. S. (2014). Local knowledge, early warning and coastal hazards: Participatory inquiry among fish workers in Kerala, India. *Action Research*, 12 (3), 273-292.
- Sawa, B.A. (2002). Persistence of Wet and Dry Spells North of lat. 100 Nigeria. (Unpublished M.Sc. Thesis, Geography Department ABU, Zaria).
- Schwartz, B.S., S. Brain, J.B. Harris A. I. I Khan, R. C. Larcque, D.A. Sack, M.A. M. (2016). Diarrheal epidemics in Dhaka, Bangladesh, during three

- consecutive Floods: 1988 and 2004. *The American Journal of Tropical Medicine and Hygiene* 74 (6), 1067-1063.
- Sarki, S.A. (2015). Analysis of Flood Encroachment Pattern and Management in Kaduna Metropolis (M.Sc. thesis, URP department A.B.U, Zaria).
- Senol B. M. (2016). An assessment of flood risk factors in riverine cities of Turkey: Lessons for resilience and urban planning. *METU Journal of the Faculty of Architecture*, 33(2). 5-7.
- Semmens, S. (2016). *An Examination of the Impact of the Natural Environment on Levee Sustainability*. Colorado School of Mines.
- Sharp, R. (2017). *Knowledge, Ideology and the Politics of Schooling: Towards a Marxist Analysis of Education*. Routledge.
- Shaw, R., & Takeuchi, Y. (2007). Indigenous Skills in Disaster Reduction Application to Flood Mitigation in Japan. Tech monitor. Retrieved on 15 march 2017 from http://www.techmonitor.net/tmimage/4/43/07nov_dec_sf2.pdf.
- Shaw, R., Uy, N., & Baumwoll, J. (2008). Indigenous Knowledge for Disaster Risk Reduction: Good practices and lessons learnt from the Asia-Pacific region. *UNISDR Asia and the Pacific, Bangkok*.
- Silverman, D. (2015). *Interpreting qualitative data*. Sage.
- Siyanee, H., Piyapong, J., Toyoda, Y., Mizuta, T., & Kanegae, H. (2009). An Influence of Social Network on Knowledge Transferring in Flood Mitigation and Preparedness: A Case Study of Waju Area, Ogaki City, *Disaster Mitigation of Cultural Heritage and Historic Cities* 3. 275- 82.
- Slater, L. J. (2016). To what extent have changes in channel capacity contributed to flood hazard trends in England and Wales? *Earth Surface Processes and Landforms*, 41 (8), 1115-1128.
- Sletti, V.K., & Singhal, A. (2017). Identification and amplification of tacit knowledge: The positive deviance approach as knowledge management praxis. *Electronic Journal of Knowledge Management* 15 (1), 2-4.
- Snieder, R., & Larner, K. (2009). *The Art of being a Scientist: A Guide for Graduate Students and their Mentors*. Cambridge University Press.
- Steven, A. (2009). How is Indigenous Knowledge Changing Natural Hazards Mitigation? Retrieved on 3rd December, 2015 from http://www.emergencycymgt.com/templates/gov_print_article?Id=5638051.

- Sule, Z. O., Sani, S. O., & Anoze, D. S. (2016). The flood hazard assessment of Kaduna Metropolis, Nigeria. *Journal of multidisciplinary engineering sciences and technology*, 3 (3), 4243-4251.
- Tapsell, S and Ohl, C.A. (2000). Flooding and human health: The dangers posed are not always obvious. *BMJ: The British Medical journal* 321 (7270),1167.
- Tibby, J, Lane, M.B, & Gell, P.A (2008). Local knowledge and environment management: A cautionary tale from Lake Ainswoth, New South Wales, *Australia Environmental conservation*. 34-341.
- Twigg, J. (2004). *Disaster Risk Reduction: Mitigation and Preparedness in Development and Emergency Programming*. Overseas Development Institute (ODI).
- Turpie, J. (1999). *Economic value of the Zambezi Basin wetlands*. Harare, ZW: IOUCN ROSA.
- UNESCO. (2009). The Barotse Cultural Landscape. *Zambian national heritage conservation commission: Zambia*. Retrieved on 14th January 2017 from https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=+Zambian+national+heritage+conservation+commission%3A+Zambia&btn.
- UN (2003). General Assembly Resolution 58/214 World Conference on Disaster Risk Reduction. Retrieved on 6th May, 2016 from <https://www.coe.int/t/APCAT-2005-26-e-rapport-kobe.pdf>.
- United Nations Environment Programme (UNEP) (2009b). *The Role of Ecosystems Management in Climate Change Adaptation and Disaster Risk Reduction Copenhagen Discussion Series*. Retrieved on 6th May 2016 from https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=+Management+in+Climate+Change.
- Van, M.M. (2016). *Researching lived experience: human science for an action sensitive pedagogy*. Routledge New York.
- Van Berchum, E. C., Mobley, W., Jonkman, S. N., Timmermans, J. S., Kwakkel, J. H., & Brody, S. D. (2018). Evaluation of flood risk reduction strategies through combinations of interventions. *Journal of Flood Risk Management*, e12506.
- Van-Der, V.R. G. (2017). A literature review on the relationship between risk governance and public engagement in relations to complex environment issues. *Journal of Risk Research*, 1-18.

- Vaismoradi, M., Turunen, H., & Bondas, T. (2013). Content analysis and thematic analysis: Implications for conducting a qualitative descriptive study. *Nursing & health sciences*, 15 (3), 398-405.
- Raaijmakers, R., Krywkow, J., & Van da veen, A. (2008). Flood risk perceptions and spatial multicriteria analysis. An exploratory research for hazard Mitigation. *Natural Hazards*, 46 (3) 307-322.
- Ringo, J., Luvinga, K., Morsardi, L., Omary, I., Mayengo, G., & Kawonga, S. (2016). Indigenous knowledge in flood management and control in Kilosa District, Tanzania. *International Journal of Atmospheric and Earth Science*, 4 (1),1-15.
- Warren, D. M., & Mundial, B. (1991). *Using indigenous knowledge in agricultural development* (No. 13167). Washington, DC: World Bank.
- Warren, D. M., Slikkerveer, L. J., & Brokensha, D. (1995). *The cultural Dimension of Development: Indigenous Knowledge Systems*. Intermediate Technology Publications Ltd (ITP).
- White, G.F., Kates, R.W., Burton, I. (2001). Knowing better and losing even more: The use of knowledge in hazards management. Global environmental change part B. *Environmental Hazards* 3 (3),81-92.
- Wisner, B.P.M., Blaikie, T., Cannon, I. (2004). *At Risk: Natural Hazards, people's vulnerability and Disaster*. Routledge, London.
- Wisner, B., Oxley, M., Budihardjo, P. H., Copen, K., Castillo, G., Cannon, T.& Bonduelle, S. (2014). Down home, it's all the same. In *Community-based adaptation to climate change* 172 (191), 172-191). Routledge in association with GSE research.
- Wisner, B., Blaikie, P., Canoon T., & Davis I. (2004). *At Risk Natural Hazards People's Vulnerability and Disaster* (2nd edition). Routledge: London.
- World bank. (2013). The Work Bank: Working for a World Free of Poverty Population (total) Washington D.C: World Bank Group. Retrieved on 7th July, 2016 from https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=World+bank.+%282013%29.
- Yahaya, S., Ahmad, N., & Abdalla, R. F. (2010). Multicriteria analysis for flood vulnerable areas in Hadejia-Jama'are River basin, Nigeria. *European Journal of Scientific Research*, 42 (1), 71-83.
- Zbigniew, W. Kundzewicz. (2002). Non-structural flood protection and sustainability. *Water International*, 27 (1):1, 3-13.

Wenger, C. (2015). Better use and management of levees: Reducing flood risk in a changing climate. *Environmental Reviews*, 23 (2), 240-255.