

# Acquisition of Flood Disaster Risk Reduction Indigenous Knowledge in Kaduna Floodplain, Kaduna Town, Nigeria

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**Annotation:** Generally, the biosphere is undergoing greater weather excesses, variations in rainfall patterns, heat and cold waves, as well as growing droughts and floods. These phenomena have undesirable effects on the surroundings and on people's lives and occupations. Side-lined groups and societies in the poorest counties of the world are predominantly impacted, even as they are least accountable for these variations (United Nations Development Programme (UNDP, 2009).

## Introduction

Generally, the biosphere is undergoing greater weather excesses, variations in rainfall patterns, heat and cold waves, as well as growing droughts and floods. These phenomena have undesirable effects on the surroundings and on people's lives and occupations. Side-lined groups and societies in the poorest counties of the world are predominantly impacted, even as they are least accountable for these variations (United Nations Development Programme (UNDP, 2009).

UNDP (2004) proclaims that flooding is the consequence of natural threat and human susceptibility coming together. Unquestionably, flood catastrophe do not only occur in a physical setting, it also happen in a social and political setting, this suggest that flood disaster not only disclose the fundamental social, economic, political and environmental complications, but regrettably they contribute to deteriorating them, thwarting economic and social advancement.

Considering the devastating impacts of floods, over the years structural measures of flood control and management have been used to manage and control this phenomenon but still the incessant occurring nature of floods remains pronounce globally as well as the local peculiarities of Kaduna floodplain which in turn demands the need for indigenous knowledge strategies (alongside the use of structural measures) which also can play an important role for flood DRR. This, however, prompted the need for this study to explore how indigenous knowledge in flood DRR which has claim credibility in other regions around the world can be acquired in Kaduna floodplain; in which without the acquisition of this form of knowledge it cannot be put into use to the extent of reducing the catastrophic nature of flood disaster in the study area. This is premised on the fact that each region around the world have their own local peculiarities.

## Literature Review

### Concept of Indigenous Knowledge

Blessing (2011) and Sletti (2017) described IK as a tacit knowledge. Basically, it is the knowledge assimilated due years of experience dealing with a specific phenomenon. It provides the basis for problem solving strategies for local communities particularly the poor. In other words, IK is referred to local knowledge existing within and developed regarding a specific condition (s) by people indigenously in a particular area. Thus, it was found in varied literature that communities around the globe are conscious of the prevailing

climatic events such as floods and as a result of that established their distinctive IK for flood DRR relative to the ecological threat (s) they are challenged with.

### **Acquisition of Knowledge Generally**

Pacharapha and Ractham (2012) asserted that acquiring knowledge can be seen at both organizational level and individual level. At organizational level, knowledge acquisition can be well-defined as accommodating knowledge from the external environment and changing it so that it can be used by an organization and at individual level, knowledge acquisition can be accomplished by three activities, which include sourcing from organizational knowledge repositories, learning from others and learning from experiences (Pacharapha and Ractham, 2012).

Knowledge acquisition and knowledge creation are the first steps in the process of developing knowledge (Liao, Wu, Hu and Tsui, 2009). For knowledge to be acquired, willingness, attitude and the ability of a recipient to acquire and use such knowledge are crucial, and there should be willingness to share and acquire this knowledge from both the source and the recipient respectively (Pacharapha and Ractham, 2012; Chigada and Ngulube, 2015). The review of literature suggests that organizational knowledge largely resides within individuals' memory, which means that knowledge acquisition by learning from others plays an important role in Individual Knowledge Acquisition (Ryu, Kim, Chaudhury & Rao, 2005). Furthermore, Ryu et al. (2005) opine that for this type of knowledge acquisition to take place, the two parties who are involved, that is, a knowledge source and a knowledge recipient, mostly know one another and must have interacted over time.

According to Cyr and Choo (2010), knowledge sharing is a form of social exchange that is moderated by the social value orientation of the individual and it can be seen as an exchange of a valuable resource between two parties. While the assumption in the literature is that tacit knowledge would be more effortful and costly to share than explicit knowledge, there is a general lack of empirical work that tests this assumption (Cyr and Choo, 2010). Acquisition and sharing of knowledge during socialisation (where tacit knowledge is shared) are mainly done through observations, shared experiences and imitation, to name but a few. However, it is important to note that for a successful acquisition and sharing of this tacit knowledge to take place, an opportunity for participation as well as access to knowledgeable people is necessary (Koskinen, Pihlanto and Vanharanta, 2003). During externalization, tacit knowledge is externalized, made ready and made easier to share and acquire in any given situation. When the custodians of knowledge make available and share what resides in their minds, their tacit knowledge is turned in to explicit knowledge, which is easier to share and acquire.

This knowledge can be externalised in the form of books, manuals, databases, emails, letters and discussions. The acquisition of knowledge between individuals (mentor and mentee) is mostly through dialog, which can happen directly between individuals.

### **Significance of Indigenous Knowledge Acquisition for Flood DRR**

Flood risk has the likelihood of increasing immensely in different parts of the world, due to factors such as: urbanization taking place on most floodplains areas and also due to climate change Loucks (2017) as well as economic growth among other factors (Bauer, 2013). Generally, communities in varied parts of the world are faced with different hazards, flood risk inclusive. Considering this, as part of management measures, inhabitants of various communities' employ IK techniques that they acquired for years based on the experience of living with a peculiar environmental condition (Nyong *et al.*, 2007). Some of the strategies employed in various regions around the globe in mitigating the impacts of flood disaster as a result of IK acquisition are multi-dimensional such as building on raised platforms, use of sandbags, floating gardens, planting of trees, cultivation of flood resistant crops etc. All these plays immeasurable roles in reducing the menace associated floods. Inductively, without the acquisition of IK for flood DRR all these aforementioned strategies wouldn't have been possible to empirically apply them in reducing flood destructive tendencies.

### **The Study Area**

Nigeria is located within the African continent and Kaduna lies between latitude 10° 39' 0"N, 10° 24' 0"N and 7°33' 0"E, 7°21' 0"E on the high plains of Northern Nigeria with a rising and falling terrain.

Kaduna State (Figure 1) generally consists of 23 local Govern Areas but Kaduna Town mainly comprises of four urban Local Government Areas (Kaduna North, Kaduna South, Igabi and Chukun). The main rainy season occurs between March and October. Kaduna city enjoys an average annual rainfall of 1,200 mm. The rainfall pattern has been traditionally characterized as monomodal with peak precipitation in July and August. River Kaduna where the floodplain lies is the dominant water body in the study area, as well as, the offshoot of River Niger found in central Nigeria. It begins from Jos Plateau 18 miles (29 km) South-Western part of Jos Town near Vom and it runs in North-Western direction at 22 miles (35 kilometres) North-East of Kaduna Town

Also, the study area comprised of residuals mostly of crust derivation, worn bed rocks mass capped by hardened iron stone and tropical ferruginous soil (Max lock and Partners, 2010). Urban growth over the years have reformed the relief, soil cover and vegetation of Kaduna Town, this is due to excavation, land cover change, physical urban construction and expansion. The rising and falling relief of the study area ranged amid 457m and 645m beyond sea level.

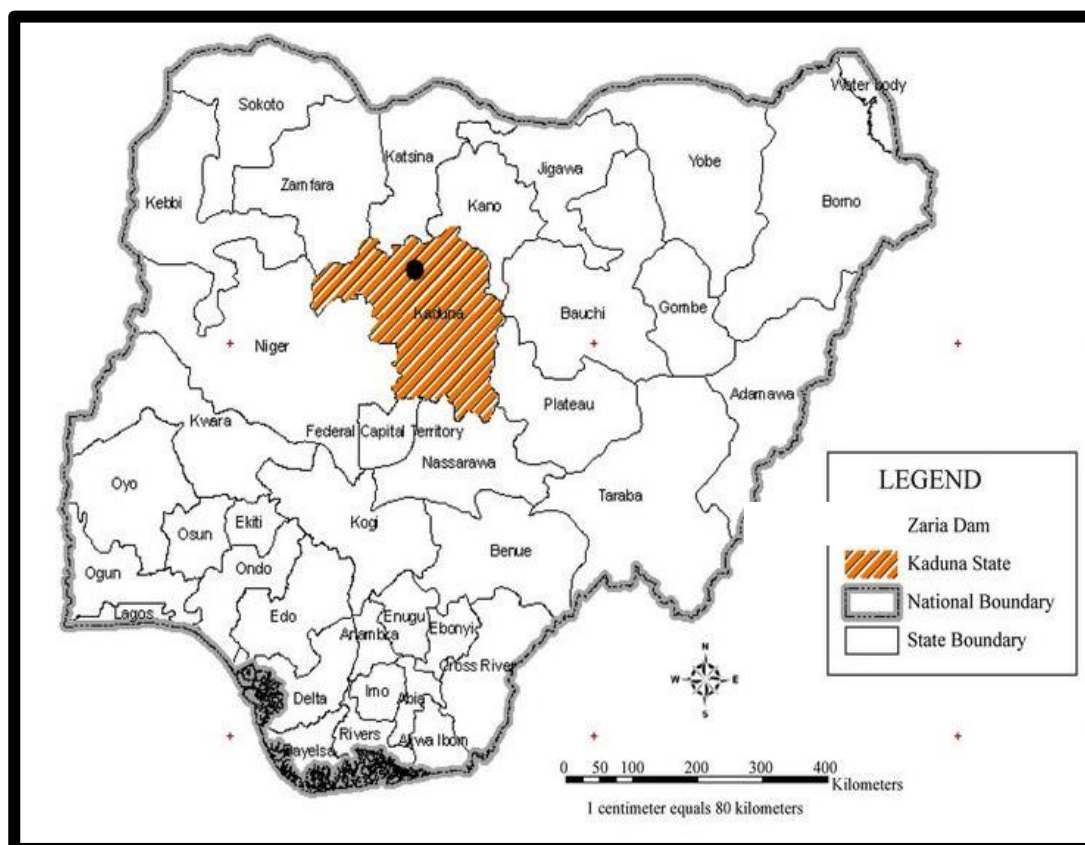


Figure 1 Map of Nigeria Showing Kaduna State

### Methods

The study employs a purposive sampling technique; this is because it is a non-random technique that requires no fundamental theories or a set number of respondents or participants; rather it is the researcher who determines what needs to be studied and hence, look for people who are willing as well as ready to give the information by virtue of their knowledge or experience (Bernard, 2002; Etikan, 2016). In this research, FGDs were carried-out on how IK for flood DRR is acquired. Hence, a homogenous purposive sampling technique was employed for the selection of settlements that makes-up Kaduna floodplain, that is, that falls within the four Local Government councils constituting Kaduna Town via; Kaduna South, Igabi, Chikun and Kaduna North. In each of the Local Government Councils, there are settlements that are found within the floodplain. The criteria used for the selection of settlements for the FGDs in the four Local Government Councils were pieces of papers in which written names of settlements found in each local Government Council in Kaduna

Town were written and then the pieces of papers were folded and was mixed, after that it was kept on a table and third parties were asked to pick one folded piece of paper in each Local Government Council and two from the larger Local Government Area Councils making a total of six settlements out of the four Local Government Councils. See table below

Table 1 Focus Group Discussion Communities

S/ N	Names of Settlement	Participants Gender	n
1	Angwan Muazu	Men	6
2	Nasarawa	Men	6
3	Kudenda	Men	6
4	Nariya	Men	6
5	Kabala Doki	Men	6
6	Barnawa	Men	8
Total			38

After the selection of the target participants for the FGDs in the various settlements along the floodplain of Kaduna Town. The researcher visited the settlements for follow-ups. The researcher met with the community heads in order to help in the mobilization of the selected participants. At the same day, convenient dates, time as well as venues in each of the selected settlements were fixed. The first FGD took place on the agreed date and the size of each group ranges from 6-12 participants'. The reason for this group size is in order to have control of the FGD sessions as a larger group tends to pose more problems in terms of management (Qates and Alevizou, 2017). As a whole six (6) FGDs were conducted in the study area in which five of the six settlements chosen for the FGD have a minimum number of six (6) participants except one of the settlement that has eight (8) number of participants (See Table 1) and this was attributed to the people that avail themselves for the FGD session. Most importantly, the researcher ensures that the minimum number of participants for each FGD session was not compromised (See Plate 1), in all a total of (n-38) participants were used for the FGD sessions.

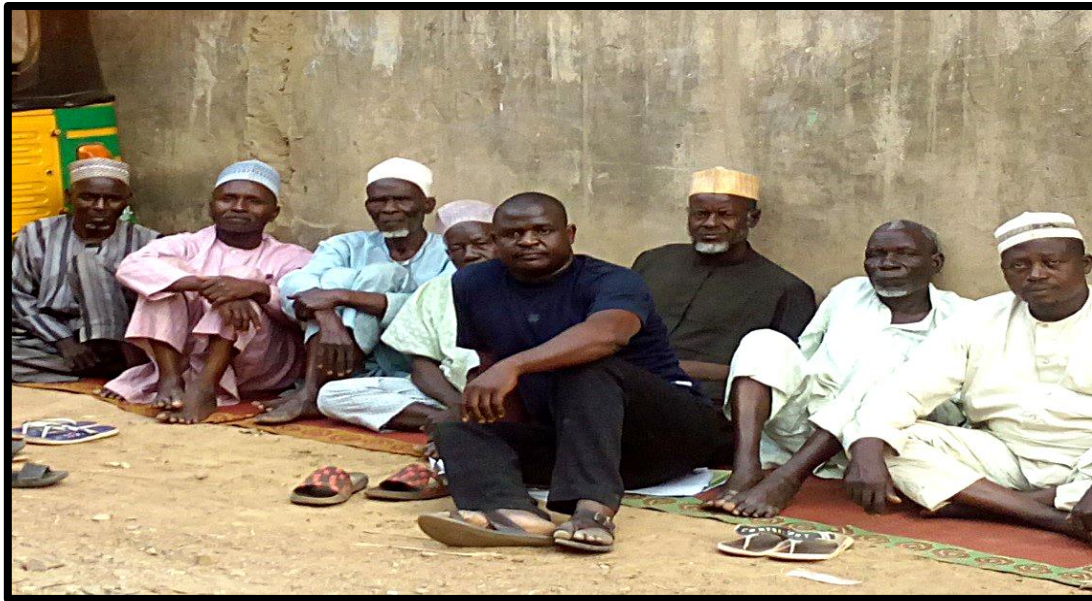


Plate 1 FGD Participants in Kabala Doki of Kaduna Floodplain

Furthermore, before the FGD sessions began after greetings, the introduction of the subject of discussion was made by the facilitator to the group members as well as some rules were evolved such as no interruption of a speaker, response should be one at a time, respect for others people's opinion and no discussion within the discussion. After that, the facilitator regulated and guides the discussions by asking questions.

Also, when the discussion began a research assistant was in the scene helping in the recording of the responses of participants as they share their experiences. From time to time the facilitator reminds the participants of the main purpose of the FGD so as to keep them on track and also to encourage them to give honest and sincere answers. Again, the facilitator tries as much as possible not to deviate from the questions in the questions guide that targets the exploration of how IK of flood DRR is acquired in the floodplain of Kaduna Town. Thus, after, the conducts of the first (1) FGD the remaining five (5) FGDs took the same pattern and were fixed on consensus dates. All the FGDs were facilitated by the facilitator in a local dialect (Hausa) and also there was one research assistant who helped in note taking apart from the person recording conversations in all the sessions.

This research employs Computer-Assisted Qualitative Data Analysis Software (CAQDA) package. Categorically Nvivo 11 was utilized in coding and analysing the data on how IK for flood DRR is acquired. Nvivo 11 is well suited for the analysis of the FGDs in this research because it provides the functionalities required for this study. Additionally, prior researches recommended the use of Nvivo software in case study researches (Beekhyuzen *et al.*, 2010). After successfully coding and analysis the data of this study, a chart was employed in presenting the findings of this study on flood DRR IK acquisition in Kaduna Floodplain in Nigeria

### **Findings of the Study**

#### **Flood DRR IK Acquisition in Kaduna Floodplain**

Based on the findings of the FGDs conducted with the residents of Kaduna floodplain, it was found that flood DRR IK is acquired in two main ways; through testimony such as from older/ parents and by community leader's as well as it is also acquired through experience by participation as well as self-discovery/wisdom . Figure 2 shows the summary of findings.

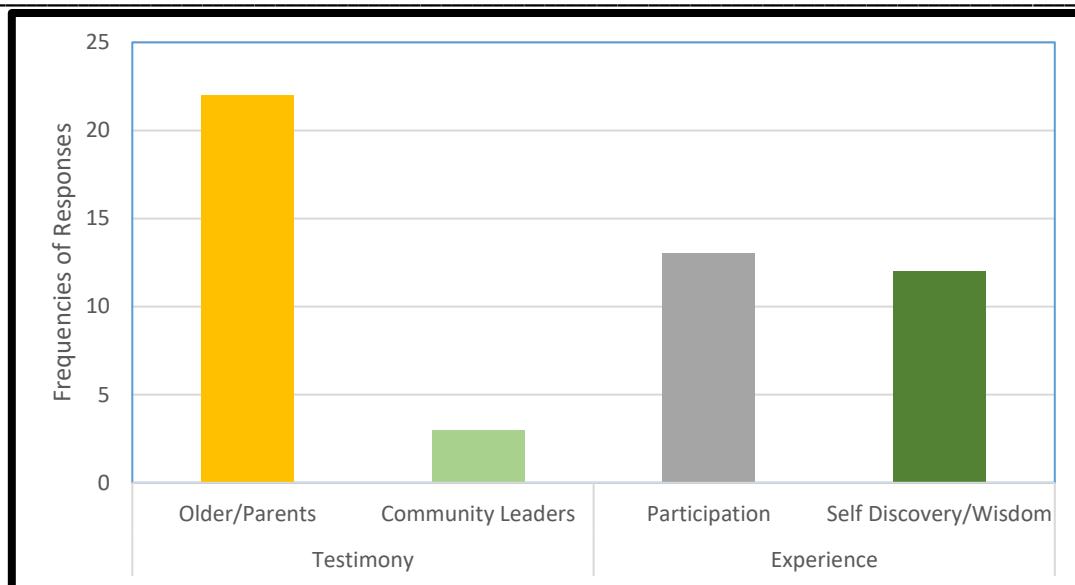


Figure 2 Acquisition of Flood DRR IK in Kaduna Floodplain

### Acquisition of flood DRR IK by Testimony

Majority of the responses in the FGDs revealed that flood DRR IK is acquired in the floodplain of Kaduna majorly by testimonies made by older folks and parents (Figure 2). This is an indication that they possess enormous IK for flood DRR as a result of their long period of habitation in the study area witnessing flood disaster outbreaks. In view of this, more often the older folks do testify to the younger generation various IK flood DRR undertakings, which was applied in the time past and it worked for them, which they always deemed it right to share with the younger generation in the floodplain so that it can be utilized by them in flood disaster lessening activities. Hence, by so doing, this makes the younger generation to acquire this form of knowledge (IK). Some of the respondents opined as follows:

*“This knowledge is gotten long ago from our old parents and great grandfathers that told us what is been done, I hope you understand?”*

(FGD2, RQ1, RPT2)

Again, another participant supported the above assertion. He uttered that:

*“Our parents and grandparents use to tell us about how to reduce the impact of flooding.”*

(FGD2, RQ1, RPT3)

Furthermore, some other few responses reported that flood DRR IK was also acquired through the testimonies of community leaders. Thus, the low response is an indication that community leaders rarely demonstrate flood DRR IK except during flood disaster prevalence when they do take the lead in flood reduction activities in the study area. Not-with-standing, they possess the IK for flood DRR for unmemorable period of time, considering the fact that, at each time flood disaster strikes they do play a critical role in ensuring that all the necessary measures are worked out in order to mitigate the impacts it does come along with, thus making them to have IK for flood DRR, which they do testify and has always been applied in flood disaster lessening activities in Kaduna floodplain. This was supported by the assertions below:

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*“It is gotten from community heads (kings)... by telling us what to do in relation to flood disaster reduction.”*

**(FGD1, RQ1, RPT1)**

Additionally, it was further emphasized by another respondent as follows:

*“Just like the first speaker said, it is gotten from community heads”.*

**(FGD1, RQ1, RPT2)**

### **Acquisition of Flood DRR IK by Experience**

Also, significant responses revealed that flood DRR IK is also acquired by experience in the floodplain of Kaduna (Figure 2). It was found that for flood DRR IK to be acquired by experience it specifically involves participating in various flood disaster reduction activities for quite some time in the study area, thereby making the residents to acquire this form of knowledge (IK). It was found that the acquisition of flood DRR IK through participation was mostly initiated when most of the residents of the floodplain were much younger and coupled with the fact that, flood disasters keeps manifesting in the study area, such that flood reduction measures were undertaken at the community level, in which no one in the floodplain was left out, not even the younger children, do participate in flood reduction activities. This, in turn, resulted in making the residents to acquire a great deal of experience in relation to flood DRR. This was further confirmed by a participant below:

*“Since we were young we have been involved in flood disaster risk reduction activities.”*

**(FGD6, RQ1, RPT3)**

Furthermore, another participant affirm the above assertion. He explained that:

*“All of us including our children do create waterways.”*

**(FGD2, RQ1, RPT4)**

Additionally, many responses pointed that flood DRR IK acquired through experience by some residents of Kaduna floodplain was found to be derived by self-discovery or wisdom (Figure 2). This involves trying a particular technique of cushioning the impacts of flood disaster through trial and error, which do turn-out to work. It was unveiled by some of the FGDs participants that sometimes whenever flood disaster prevails, the affected floodplain residents employ various measures in ensuring that the impacts of flood disaster on them and their properties are mitigated to the barest minimum. Thus in the process of such trials, some of these measures assist in cushioning the impact of floods. This is exemplified as follows:

*“We use our own natural wisdom to also deal with some of the impacts of flood disaster.”*

**(FGD2, RQ1, RPT3)**

Furthermore, another participant supported the above submissions. He explained that:

*“IK for flood DRR was acquired through wisdom based on the experience of living with the peculiarity (flood disaster) we found themselves.”*

**(FGD6, RQ1, RPT3)**

Hence, the implication of both acquisition of flood DRR IK either by testimonies or by experience plays an important role in its application in flood disaster mitigation measures in Kaduna floodplain without which it would not have been realizable.

### **Discussion**

The study explored the acquisition of Indigenous Knowledge for flood DRR in Kaduna floodplain in Nigeria (Figure 2). Based on the findings of the study it was discovered that the acquisition of IK for flood DRR in Kaduna floodplain is majorly by the testimony made by individuals that have been mitigating the disastrous impacts of floods over the years. Thus, following the review of literature undertaken in line with this study, this finding is supported by the assertion made by Parapha and Racthan (2012) who opined that acquiring knowledge can be through individual level or organizational level. Undoubtedly, acquiring IK through testimony made by individuals (s) living in the floodplain of Kaduna that have the prior knowledge of flood DRR play an important role in learning from them. Ryu et al (2005) further elaborated by asserting that for this kind of knowledge acquisition to take place, the people involved, that is, the knowledge source and knowledge recipient must have interacted.

Additionally, the findings of this study also reveals that the acquisition of IK for flood DRR can also be through experience which is by either through participation or through self-discovery/wisdom. Thus, this finding is also been supported by Koikinen, Pihlanto and Vanharanta (2003) who opined that the acquisition and sharing of IK is mainly achieved through observation and shared experience to mention but a few. Hence it is worthy to note that for efficient acquisition of IK for flood DRR to take place, an opportunity for participation as well as access to people that have such knowledge cannot be ignored.

### **Conclusion and Recommendation**

This paper undertakes the exploration of flood DRR IK acquisition in Kaduna floodplain in Nigeria. The findings of this study shows that, this form of knowledge is indigenously acquired significantly through testimonies made by individuals who possesses the prior knowledge of flood DRR and this is gotten through older people/parents in the study area who often testifies to younger generation the efficacy of some of the IK flood lessening measures they employed in the time past whenever floods strikes. Furthermore, this study unveiled that still through testimony, community leaders who are often involved in flood reduction activities in the study also possesses IK for flood DRR.

Again, the study also shows that apart from IK acquisition for flood DRR by testimony, experience also plays an important role in the acquisition of this form of knowledge in the study area. Hence, the acquisition of IK for flood DRR by experience, specifically involves participation in flood disaster reduction activities which over time one gets acquainted with it. Additionally, through experience one can also acquire IK for flood DRR through self-discovery/wisdom as a result of try and error. As a matter of fact, the acquisition of IK for flood DRR cannot be taken for granted considering the role it plays when applied for flood disaster mitigation, because over the years, only structural methodologies were encouraged in flood control and management which did not yield momentous output in flood control and management, but if IK for flood disaster is acquired and put into practice unrelentingly, flood DRR in Kaduna floodplain will be a holistic venture and in turn will assist in mitigating the menace associated with flood disaster destruction of lives and properties in the study area.

Thus, this study recommends that the findings inferred from this study should be utilized by Kaduna State Emergency Management Authority (SEMA) in evolving policy statements in abating the disastrous tendencies of flood disaster in Kaduna floodplain. Also, this study recommend that further studies should be conducted to find-out whether IK acquisition for flood DRR will stand the taste of time if utilized amid other competing approaches in flood control and management.



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