Post-Flood Livelihood Switching and sand Mining: An Ethnographic Study of flood-Risk Feedback in Mmiata-Anam, Anambra State Nigeria

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Abstract.

Communities living in the riverine areas of Anambra State suffer annual flooding caused by the Omambala and Anambra rivers. The floods of 2022, which were the most severe in Nigeria since 2012, forced more than 650,000 people to leave their homes in six riverine local government areas, one of which is Anambra West, the area in which Mmiata-Anam is situated. This study examined the links between recurring flooding, disrupted livelihoods and sand mining in Mmiata-Anam. The research is grounded in ethnographic observation and a focus group interview with seven farmer-sand miners between the ages of 18 and 40. The findings revealed that following the floods people change the way they earn a living. Sand mining ceases during the flood period and then restarts when the water levels fall, typically from September or October, with the main mining season lasting from December to either June or July. The participants stated that they switch between farming, fishing and mining according to the season. They also noted that the floods refill the areas where sand has been removed. Moreover, they recognised the advantages of flooding, such as improved soil fertility and an increase in fish, yet they did not see a connection between sand mining and riverbank erosion or greater flooding. Applying political ecology and livelihood diversification frameworks, the study concludes that post-flood sand mining is a form of maladaptation driven by the need to generate income. While it may provide a logical explanation for the loss of sand, it could also reduce the river's capacity to protect against future floods. It should be made clear that this research is not concerned with the extent to which sand mining contributes to flooding; instead it focuses on the seasonal nature of the relationship between the disaster and the resource.

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1. Introduction

Flooding is the most severe recurring natural hazard in Nigeria. In 2022 it impacted 33 of the 36 states, resulted in more than 600 deaths, forced over 1.4 million people to leave their homes and destroyed approximately 110,000 hectares of farmland; this representing the worst situation since 2012 (Ejem et al., 2025). Anambra State also suffered badly, with over 650,000 people affected or made homeless in six riverine local government areas (Davies, 2022). People from Mmiata-Anam were among those who were evacuated to camps for displaced persons in Onitsha (Ujumadu & Akuopha, 2022).

On the floodplain of the Omambala River, flooding is a regular occurrence. It determines when people can farm, fish, move their households and, as this article demonstrates, when sand mining can take place. The damage is structural and the main source of income lost in the southern Nigerian communities during the 2022 floods is small-scale farming (43.9 per cent of the affected households) (Ejem et al., 2025). Severe flooding also leads to a long-term reduction in household consumption (by about 12 per cent) and in agricultural production (by about 17 per cent) (Biscaye & Isah, 2026).

Rural households cope with economic shocks by engaging in farming, fishing, trading, earning wages, and making use of natural resources (Chambers & Conway, 1992; Ellis, 2000; Scoones, 1998). The decisions they make are influenced by factors such as opportunity, season, necessity, and the resources available to them, as well as by the support they receive from markets and institutions (Ellis, 2000; Mohammed & Favretto, 2025). Sand mining is a case in point. Although it offers employment and income, it can also damage the rivers which are important for farming and fishing (Johnbull & Brown, 2017; Aliu et al., 2021; Onwuka et al., 2013). In Anambra State, unregulated sand mining has been associated with river-bank erosion and official bans are difficult to enforce (Ogbo et al., 2024; Nnatuanya, 2021). Although most of the research concentrates on sand mining as a cause of flooding, it seldom examines how flooding can in turn lead to greater sand mining. Fieldwork carried out in Mmiata-Anam showed that sand mining increased following floods and was carried out by the same people whose livelihoods had been affected. This article has three aims: (i) to examine the impact of repeated flooding on farming and fishing in Mmiata-Anam; (ii) to investigate the seasonal connection between flooding and sand mining and the way the local mining economy functions; and (iii) to analyse post-flood sand mining as a form of adaptation by people and what this implies for their perception of flood risk and for environmental management.

2. Review of Related Literature

The vulnerability to flood disasters results from the way in which environmental exposure interacts with the socio-economic conditions that influence the ability to predict, endure, and recover from hazards. As Egbinola et al. (2015) point out, in Nigeria there have been severe losses among farm households, who have had to rely on borrowing, selling assets, carrying out short-term migration, and diversifying their livelihoods. These actions take into account the wide-ranging economic, social, cultural and even religious effects experienced in the Omambala area and other riverine regions of Anambra State (Efobi et al., 2015). While flooding changes the way households allocate their labour, diversification is not something that happens automatically since assets, gender, finance and institutions all place constraints on the ability to diversify (Mohammed & Favretto, 2025; Biscaye &

Isah, 2026). Likewise, Umechukwu et al. (2026) highlight the significant agricultural and food-security implications and stress that income diversification and flood mitigation should be seen as complementary responses.

Sand is a resource of strategic importance for construction, and the act of extracting it from rivers has now become a matter of concern for global governance (UNEP, 2019, 2022). Reviews have connected river-sand mining with riverbed lowering, bank instability, loss of biodiversity, and damage to the livelihoods of people who depend on rivers (Kondolf, 1997; Koehnken & Rintoul, 2018; Rentier & Cammeraat, 2022; Park et al., 2026). The situation in Nigeria is also mixed in that extraction leads to the creation of jobs and brings in revenue, but at the same time changes the course of rivers and weakens farming and fishing (Johnbull & Brown, 2017; Aliu et al., 2021); along the Odene-Aguleri River, unresolved disputes over the sharing of royalties between villages have weakened regulation and encouraged political protection of illegal extraction (Ogbo et al., 2024). There are three gaps: Nigerian flood studies seldom look at the extraction of resources as a response to livelihood needs after a flood; sand-mining studies rarely consider flooding as a factor that influences when extraction takes place; and research into livelihoods has not looked at sand mining as an activity that occurs after a flood in the Omambala region. This study brings the three processes together.

2.1 Theoretical Framework

The study was anchored on two primary approaches. Political ecology examines environmental change in terms of social, political and economic relationships and investigates who controls the resources, who benefits, who bears the costs and how the rules are enforced (Blaikie & Brookfield, 1987; Nnatuanya, 2021). This involves property arrangements such as leases and subleases, as well as labour and markets. The sustainable livelihoods approach explains the way in which households make their decisions; it states that rural families engage in a variety of activities and that their choices depend on the season, the level of risk and their access to resources (Chambers & Conway, 1992; Scoones, 1998; Ellis, 2000). Together, these two perspectives enable an understanding of the connection between floods, livelihoods and sand mining. The feedback loop consists of four elements. Firstly, each year's floods result in the loss of crops, damage to houses, the need for people to relocate and the accumulation of debt. At the same time, the floods bring new sand which fills in the areas where sand has previously been removed. After the flood, this newly deposited sand becomes available for mining. This is due to the continuous demand for sand in the cities and the fact that household labour is free from both farming and fishing during this time, causing mining to increase. Moreover, the people involved noted that mining offers a better return than farming following a flood, so more individuals move into mining. However, continuous sand mining can lead to a deeper riverbed, cause the river banks to collapse and make the water more turbulent ("hungry water": Kondolf, 1997), thereby reducing the river's capacity to cope with future floods and damaging the land which protects the community.

The repeated flooding, disrupted livelihoods, and sand mining can be summarized as a chain of relationships:

· Because of repeated flooding, people experience greater exposure to losses of crops, damage to housing, and disruption of their livelihoods.

Households resort to a range of alternative strategies, such as fishing when the water is high, making temporary moves, borrowing money, and engaging in a variety of types of work.

· The return of the floodwaters enables physical access to the river sand deposits while the process of flood deposition replenishes the resource.

At the present time, sand mining offers a source of cash income and creates jobs as part of the local extraction chain when household liquidity is at its lowest.

Further extraction could change the conditions of the river and floodplain, with a consequent impact on future vulnerability to livelihood losses and flooding.

Governance introduces yet another stage to this cycle. The community holds ownership of the land and leases it and subleases it in an informal manner, whereas state regulation is both weak and not enforced (Ogbo et al., 2024). Because of this, the cycle goes on without being broken. This is a clear case of maladaptation: a measure that offers a short-term solution but may increase long-term risks. It also constitutes a policy problem, since the time following floods, when households are at their poorest and in the greatest debt, is precisely the period when bans on mining are least effective. The possible connection between sand extraction and future flood risk is proposed here as a subject for further research and not as a proven outcome of this study.

3. Methodology

An ethnographic and qualitative case-study method was used. The research problem was first identified by observation and then looked at in a focus group discussion (FGD). This method is appropriate for shared, community-level knowledge such as the flood and mining calendars and the collective coping strategies (Krueger & Casey, 2015).

The study was carried out in Mmiata-Anam, a community located in the Anambra West Local Government Area of Anambra State, on the flat floodplain of the Omambala River, a tributary of the lower Niger, and is almost entirely situated in the region subject to annual flooding. The local economy is based on three primary activities: farming of crops after the floods and on the upland areas (including yam, cassava, pepper and potatoes), artisanal fishing, and artisanal sand mining.

The focus group discussion took place in March 2026 at the mining site in Umuonuora village and included seven men aged between 18 and 40. They were all farmers and sand miners, having lived in the community for at least fifteen years and being fluent enough to talk about their experiences in Igbo. The discussion went on for about 90 minutes and was carried out entirely in Igbo. Prior to the session, the researcher made it clear to the participants what the study was about, its scope, and the fact that it was voluntary, and each of the participants provided informed consent. Two research assistants helped with the logistical aspects and observed the participants' non-verbal behaviour. The session was recorded on audio, and the researcher also made handwritten notes in order to carry out a verbatim transcription and analysis.

The guide was semi-structured and dealt with issues such as community livelihoods and culture, the experience and consequences of flooding, displacement and recovery, mining methods and economics, the perceived advantages of flooding, and cultural adjustments. The discussion was analysed thematically (Braun & Clarke, 2006), with codes being developed inductively from both the emic categories and the analytic themes. The researcher then interpreted these in view of the local situation and the anthropological literature concerning adaptation and risk (Oliver-Smith, 1996; Douglas & Wildavsky, 1982). The accounts given by the participants are regarded as qualitative evidence of perception and practice, not as statistical data.

The researcher was careful to acknowledge their status as an outsider in Mmiata-Anam and was open about the aims of the research; they made use of local facilitators and remained conscious of power relations and ethical considerations (Clifford & Marcus, 1986). However, the study does have limitations since it involved only one focus group consisting of men, the income figures were self-reported, the dates were recalled and no geomorphic measurements were taken. As a result, it is not possible to make any claims regarding prevalence, comparisons of net earnings, or causation.

4. Findings

4.1 Effects of recurrent flooding on farming and fishing livelihoods (Objective i): Ethnographic Perspectives

The participants stated that farming is their main means of earning a living: “You can't just give up farming in the face of such a disaster since farming is our primary source of livelihood and if you don't farm then what will you eat?” (P1); “Each one of us here is also a farmer and owns farmland” (P3). Yet the floods occur every year from July and last for one to three months, frequently destroying their farms. These experiences illustrate how communities adjust to unpredictable environments (see Oliver-Smith, 1996). When the floods begin, the farmers rush to their farms in order to save as much of their crops as possible (“When it starts, we rush to our farms to salvage whatever we could”, P1), but since everyone harvests at the same time, the prices fall: “Because everyone harvests at the same time there is usually a large supply and very little demand” (P1). The floods also damage the houses, interrupt the roads, and cause families to relocate to places such as Otuocha, Umueri, Awka, Asaba, or Abuja. Some people remain, living on higher ground and using canoes to get about. The first term of school is missed and cultural events, such as burials, weddings, festivals, and even the movement of community deities, are put off because of the floods. These accounts demonstrate that flooding has an impact not only on the economy but also on local culture and social life. Recovery usually begins with borrowing money: “We sometimes have to borrow a lot in order to recover and the situation gets worse when the farm which you cultivated with a loan is also destroyed the following year” (P1). Nevertheless, floods are not only damaging. Fishing improves during the high-water period (“It is two seasons. We fish when the water level is low and when it is high”, P3), and the floods make the soil more fertile: “There are places in this community that have never used fertilizers… the more a spot is flooded, the more manured it becomes” (P2, P5). This increased fertility helps to explain why families maintain large farms, even though their crops are almost entirely destroyed every year. These responses show the

resilience and adaptability present in local knowledge and practices, which are important in anthropology and other disciplines that study risk and adaptation.

4.2 The seasonal flood–mining calendar and the organization of the mining economy (Objective ii)

Mining ceases when there is flooding and resumes as soon as the water has receded: "As soon as the flood comes, this activity is suspended. The entire area will be flooded and you won't see anyone here. That is why during the dry season we carry out sand mining" (P4). Mining generally restarts in September, or in October if the floods are more severe, with the main mining period extending from December to June or July. One person stated that he began mining in 2012 following a major national flood, which is consistent with the idea that people turn to mining after experiencing disasters, although this is only one example. When mining is not taking place, people return to farming and fishing ("we go back to farming and fishing. It usually happens at the same time as our harvest", P3), so the mining timetable corresponds to the flood cycle (see Table 1). Sand is obtained using a dredging machine which pumps the sand from the riverbed, and in the shallow areas divers scoop the sand into canoes. Sand mining is divided into three categories. The first group consists of the dredgers who operate the machines. The second category includes the loaders who fill the trucks. The third group comprises the suppliers, truck owners and drivers, who deliver the sand to the buyers (P4). The loading crews charge ₦8,000 per truck, dividing this amount among four loaders at ₦2,000 each, and they load about ten trucks each day, so each loader can earn approximately ₦20,000 per day when there is work available. Suppliers pay about ₦20,000 per truck. This is the price of sand in the construction market and can be found in Onitsha and the surrounding towns. These figures are provided by the participants and have not been audited. Access to the mining site is arranged by the community: "This land belongs to the obodo (community). It is on lease to Uche (not his real name) who in turn sublets it in three parts to other people" (P5). No one mentioned having obtained any state permits, environmental inspections, or paying royalties; the process is managed informally and lies outside government supervision.

Activity	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**
Flood (inundation; displacement)						●	●	●	●			
Mining suspended						●	●	●	●			
Mining season (efficient)	●	●	●	●	●	●	●					●
Mining resumes as waters recede								●	●	●	●	

Dry-season fishing (low water)		●	●	●	●	●						
Flood-season fishing (more fish)							●	●	●	●		
Premature harvest / rebuild / borrowing							●	●	●	●	●	
Schools (first term lost)									●	●	●	
Burials, weddings, festivals												●

Table 1. A reconstructed annual livelihood calendar for Mmiata-Anam based on the findings from the focus group discussions. ● denotes the period when activity took place (as reported by the participants; the start and end of this period vary according to the severity of the floods).

4.3 Post-flood sand mining as livelihood adaptation and the risk-perception gap (Objective iii)

Every one of the seven people involved in this study took on the roles of both farmer and miner, the particular occupation they held varying from season to season and with neither job being entirely given up. Farming does not replace sand mining; all three activities, farming, sand mining and fishing, take place seasonally and reinforce one another. The decision to engage in one activity or the other is based on economic and socio-cultural considerations rather than simply on monetary income. Sand mining provides a quick means of earning money since it does not require any initial investment in planting, a feature which is particularly useful when families are in the process of rebuilding following disasters. Fishing and farming supply the population with food, thanks to the fertile soil left behind by the floods. The way in which human activity is linked to the environment is in accordance with anthropological theories concerning adaptation and the use of human knowledge of the surrounding world (Douglas & Wildavsky, 1982). The participants described how the cycle is renewed: "as it extracts sand, the space on the river bed becomes deeper. But when the flood comes, it refills that spot with sand from elsewhere" (P2). In this way the participants saw flooding as one of the beneficial effects of sand mining. Yet, none of the participants mentioned any of the risks connected with this practice during the course of the research, and none of them regarded sand mining as a cause of bank erosion, channel instability, or more severe flooding. All the problems referred to were only those relating to flooding. This is one of the key findings of the study and shows that the participants do not properly appreciate the risks involved in sand mining.

5. Discussion

5.1 Implications for theory

These findings are significant for developing theories of livelihood diversification because farming, fishing, and sand mining are organized according to the environmental calendar. For instance, when flooding occurs, some activities cease, and others begin. When a shock eliminates all the alternative activities, complementarity gives way to substitution, with one activity replacing another at the point of maximum profitability. In the typical situation of complementarity, when the two activities take place outside of the flooding period, there is no complementarity between artisanal mining and farming. In the case of Bamako in Mali, for example, almost half of the farmers were involved in mining sand during times of low labour demand on the farms and used the money earned to buy agricultural inputs (Bamako study, 2024). In this case, all seven of the respondents carried out both farming and sand mining at the same time, without changing their occupations from season to season. Mining provides quick money without the need for the initial capital required for planting, which is helpful for carrying out reconstruction and settling old debts. Farming produces food and makes use of the soil fertility after the floods, while fishing is essential during the high-water period. These activities align with anthropological theories on the use of environmental knowledge (Douglas & Wildavsky, 1982).

The participants described the restorative aspect of the life cycle: "as it extracts sand, the space on the river bed becomes deeper. But when the flood comes, it refills that spot with sand from elsewhere" (P2). This was seen as a positive effect of flooding. Yet none of the respondents mentioned any risks connected with sand mining: no one linked sand mining to problems such as bank erosion, channel instability, or an increase in flooding. All the problems were attributed to flooding. The contradiction, having full awareness of the renewal process and at the same time failing to perceive any risks, is one of the key findings of the research. The fact that the community members do not perceive any risks is important when looking at their views on risk and at the possible differences between local and external perspectives on environmental issues.

Finally, the documented gap in risk perception shows that even though local ecological knowledge may be extensive, it does not automatically include the causal models that are externally generated, a result that is relevant to the topic of risk perception. The period after the floods, from September to December, is when families are at their poorest, have the most debt, and are most likely to increase sand mining. Recovery programmes are also weakest at this time. Support during this period should include rebuilding grants, loans to restock supplies, and better storage or processing options (such as cassava processing) in order to help avoid the price drop that makes mining more attractive. Programme initiatives aimed at the regular agricultural off-seasons, such as dry-season job schemes, do not deal with the real issue, which is income loss due to floods, not just a lack of work. Local knowledge about the timing of the floods, sediment movement, and fishing seasons should be incorporated into environmental assessments, together with scientific monitoring.

5.3 Implications for policy

In Mmiata-Anam sand extraction is carried out through an informal system of land ownership based on leasing and subleasing, a process which involves a three-tiered labour structure. Rather than being ignored, these practices could be incorporated into a formal

regulatory framework. In Anambra State, the ban has not worked because although it targets the supply side it does not take into account the problem of people losing their means of livelihood as a result of floods (Ogbo et al., 2024). The ban is seen as an external restriction on a way of life that is essential, given the role floods play in the issue. Instead, the ban should be replaced by a system of regulation which involves formalising the community's leasing process, specifying the areas and depths from which sand can be extracted, making sure that the royalties received are transparent to the community members, and carrying out enforcement and monitoring during the period when the activity is at its peak, that is between September and December. There should be cooperation between the flood management and environmental agencies since the same families experience flooding and rely on the river for their livelihood activities, including regulated sand mining.

6. Conclusion

The study in question has used the ideas of sustainable livelihoods and political ecology to examine the interdependence between recurring flooding and sand mining in Mmiata-Anam. Ethnographic research showed how farmers cope with environmental hazards and adjust their practices in response. Focus group interviews proved that sand mining takes place as a reaction to flooding and the displacement of farmers, since people only begin to mine sand after the floods have occurred, and they switch between fishing, sand mining and farming depending on the season. The present research has therefore demonstrated that both the seasonal patterns and the use of resources are shaped by local culture and by the people's perceptions and knowledge of environmental risks, thus adding to the existing body of knowledge on human-environment relationships. The participants saw floods as an event which replenished the sand and made the soil more fertile, but they did not perceive any dangers associated with sand mining. Consequently, the practice of mining sand after flooding is in fact a form of maladaptation within the flood-livelihood-sand-mining cycle. Even though the research has not established any causal link between sand mining and an increase in flooding at this site, it has shown that flooding and sand mining are connected because of livelihood strategies and seasonal patterns. This research offers new insights for anthropology and other related fields concerning maladaptation and the way in which risk is managed and choices are made by river communities in West Africa. The annual profit obtained from the sand mined following the floods can be seen as taking a loan against the future capacity of the river to protect the family, and it would be better if the community became aware of this risk, took account of it in terms of price and managed it rather than ignoring it. Further research should include women, leaseholders and suppliers, as well as carry out seasonal surveys of livelihoods and river monitoring in the Anam towns.

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