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Comparison Of Environmental And Economic Burden Of Sand Dredging On Artisanal Fishing In Ibeshe River, Lagos State, Nigeria

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ABSTRACT

This study assessed and compared the perceived environmental and economic burden of sand dredging on artisanal fishing in Ibeshe River, Lagos State, Nigeria. Three specific objectives guided the study: to assess the perceived environmental burden of sand dredging; to examine the perceived economic burden; and to compare which of the two burdens is more severe. A descriptive survey research design was adopted. Structured questionnaires were administered to 100 artisanal fishermen purposively selected from Ibeshe River community. Data were analysed using descriptive statistics (mean and standard deviation) and inferential statistics (one-sample t-test and paired t-test). Findings showed that sand dredging has a significant perceived environmental burden on artisanal fishing ($M = 4.22$, $t = 29.163$, $p < 0.05$), with fishermen agreeing that dredging increased river disturbance, water turbidity, erosion, debris, and forced fish to migrate from the area. Sand dredging also imposed a significant economic burden ($M = 4.05$, $t = 31.449$, $p < 0.05$), including reduced fish catch, decreased income, increased fishing costs, and threats to livelihood. A paired t-test revealed a significant difference between the two burdens ($t = 2.964$, $p = 0.004$), with the environmental burden perceived as slightly higher. All three null hypotheses were rejected. The study concluded that sand dredging poses serious environmental and economic threats to artisanal fishing in Ibeshe River. Recommendations include strict regulation of dredging activities, mandatory environmental impact assessments, compensation for affected fishermen, and community engagement in dredging management.

Keywords: Sand Dredging, Artisanal Fishing, Economic Burden, Livelihood

INTRODUCTION

Artisanal fishing in Nigeria remains one of the most vital sources of livelihood for rural and periurban dwellers, contributing substantially to domestic food supply and local economies. Artisanal fisheries accounting for over 82% of the total domestic fish output (Tyohemba & Aboki, 2023; Ojo *et al.*, 2025). In Lagos State alone, small-scale fishers supply a significant portion of domestic fish consumption, drawing on a complex network of lagoon, creek, and riverine systems to sustain their catches and incomes (Akintola *et al.*, 2025). Yet, these systems are under intensifying pressure from anthropogenic activities, most notably sand dredging, which has expanded rapidly in response to construction demands for urban infrastructure and real estate development. Despite the importance of artisanal fishing to food security and rural employment, the environmental and economic burdens imposed by sand dredging have been subject to relatively few empirical studies in specific local river contexts, leaving a notable gap in understanding for rivers such as Ibeshe (Sowunmi *et al.*, 2016; Akintola *et al.*, 2025).

Evidence from Lagos State illustrates that sand dredging is far from a benign extractive activity (Ekpu, 2026). In regions where hydraulic and mechanical dredging operations are prevalent, fishers encounter elevated water turbidity and altered habitat conditions that directly diminish environmental efficiency. Research comparing dredging and non-dredging areas demonstrated that artisanal fishermen operating in dredged zones exhibited lower environmental efficiency, partly manifested through lower average fish catch per labour hour and the need to travel greater distances to find productive fishing grounds. These differences are attributed to habitat disruption, changes in sediment composition, and increased water disturbance linked to dredging activities (Sowunmi *et al.*, 2016).

Parallel studies assessing the economic dimension corroborate these findings. Quantitative comparisons in Lagos communities show that fishermen in dredging areas not only experience reduced productivity but also endure higher operational costs. In dredged zones, average daily revenue from fish is consistently lower than in non-dredged areas, while the cost associated with travel, labour, and incidental expenses tends to be higher. These patterns reflect the compounded burden of diminished catch rates coupled with extended effort, undermining both individual household incomes and broader community economic stability.

Perceptions from artisanal fishers further show the lived experience of these burdens. Surveys conducted across multiple fishing communities in Lagos State reveal that a majority of fishers view sand dredging as having detrimental effects on their livelihood activities (Adesina *et al.*, 2017). More than half of respondents in intensive dredging zones reported negative effects on fishing activities, including the need to diversify into off-farm work or reduce reliance on fishing due to declining yields. These subjective accounts align with observable patterns of environmental disturbance documented in the region's waterways and mirror narratives from coastal communities where dredging near traditional fishing grounds has been linked with altered current flows, loss of shallow breeding habitats, and forced shifts in fishing effort (Sundblad *et al.*, 2014; Merem *et al.*, 2019).

Despite this growing body of evidence from lagoon and creek environments, direct empirical research on Ibeshe River remains scarce. This gap is serious given the river's role as a significant local fishing site and its increasing exposure to sand extraction pressures similar to those observed in adjacent water systems. Ibeshe River, like many secondary rivers in Lagos, has seen escalating dredging that local fisher's claim affects their catch availability and livelihood stability; yet, few peer-reviewed studies have systematically quantified or critically examined these effects in situ.

MATERIALS AND METHODS

Study Area

The study was conducted in Ibeshe, a waterfront community located along the Lagos Lagoon in Lagos State, Nigeria. Ibeshe is a well-known artisanal fishing community where residents depend heavily on the river and lagoon for their livelihoods. The community has experienced significant sand dredging activities in recent years, driven by the high demand for sand in the Lagos construction industry (Adekunbi *et al.*,

2018). These dredging operations have raised concerns about their impact on the fishing activities and general well-being of the residents, making the community an ideal study area for this research.

Procedures

Population of the Study

The target population of this study comprised all artisanal fishermen in Ibeshe community who were actively engaged in fishing along the Ibeshe River and were aware of ongoing sand dredging activities. This group includes both full-time and part-time fishermen who have direct experience of the impact of dredging on their fishing activities and livelihoods.

Sample Size and Sampling Technique

A sample size of 100 respondents was used for this study. Purposive sampling was employed to select respondents who were actively involved in artisanal fishing in Ibeshe River and had direct experience with sand dredging activities. This sampling method ensured that only those with relevant knowledge and experience participated in the study, thereby improving the quality and reliability of the data collected.

Instrument for Data Collection

A structured questionnaire was used as the primary instrument for data collection. The questionnaire was titled "Questionnaire for the Comparison of Environmental and Economic Burden of Sand Dredging on Artisanal Fishing in Ibeshe River, Lagos State, Nigeria." It was divided into five sections:

Section A: Socio-Demographic Information – covered sex, age, marital status, educational level, years of fishing experience, fishing type, and average fishing days per week (7 items).

Section B: Sand Dredging Activities in Ibeshe River – covered awareness of dredging, frequency of observation, duration of dredging in the area, and the perceived level of dredging (4 items).

Section C: Perceived Environmental Burden of Sand Dredging – contained 7 items (C12– C18) measuring respondents' perception of the environmental effects of dredging, such as water disturbance, turbidity, fish habitat destruction, erosion, and debris.

Section D: Perceived Economic Burden of Sand Dredging – contained 7 items (D19– D25) measuring the economic effects of dredging, including reduced fish catch, income loss, increased fishing costs, and livelihood threats.

Section E: Comparison of Environmental and Economic Burden – contained 4 items (E26–D29) asking respondents to compare and rate both burdens and give their opinion on dredging regulation.

Sections C and D used a five-point Likert scale where: 1 = Strongly Disagree (SD), 2 = Disagree (D), 3 = Undecided (U), 4 = Agree (A), and 5 = Strongly Agree (SA).

Procedure for Data Collection

The researcher obtained the necessary approval before going to the field. Questionnaires were personally distributed to fishermen at the riverbank and fish landing sites in Ibeshe community. The researcher explained the purpose of the study to each respondent to gain their cooperation and ensure honest responses. All 100 questionnaires distributed were completed and retrieved on the spot, giving a 100% response rate

Method of Data Analysis

The data collected were analysed using both descriptive and inferential statistical methods. Descriptive statistics, including frequency counts, percentages, mean scores, and standard deviation, were used to summarise the socio-demographic characteristics of respondents and to answer the research questions.

The Likert scale mean scores were interpreted using the following cut-off points:

Mean of 1.00 – 1.49 = Strongly Disagree

Mean of 1.50 – 2.49 = Disagree

Mean of 2.50 – 3.49 = Undecided

Mean of 3.50 – 4.49 = Agree

Mean of 4.50 – 5.00 = Strongly Agree

For inferential statistics, the one-sample t-test was used to test Hypotheses 1 and 2. It compared the mean scores of each section against the neutral midpoint of 3.0 to determine whether the perceived burden was statistically significant. A paired t-test was used for Hypothesis 3 to compare the environmental and

economic burden scores from the same respondents, determining whether one was significantly higher than the other. All tests were conducted at the 0.05 level of significance. Data analysis was performed using Python v3.11 statistical software.

RESULTS

This chapter presents the results of the data analysis in line with the research objectives, research questions, and hypotheses of the study. The findings are discussed using tables and figures that are supported by explanations and interpretations. The chapter begins with the socio-demographic profile of the respondents, followed by analysis for each of the three research objectives and their corresponding hypotheses.

Section A: Socio-Demographic Profile of Respondents

Before presenting the main findings, it is important to understand the background of the fishermen who participated in the study. Table 4.1 through Table 4.7 present the socio-demographic information of the 100 respondents.

2.1 Sex

Figure 4.1 show the sex distribution of respondents. Out of 100 fishermen, 59 (59%) were male and 41 (41%) were female. This shows that male fishermen dominate artisanal fishing in Ibeshe River, which is consistent with the generally male-dominated nature of fishing communities in Lagos State.

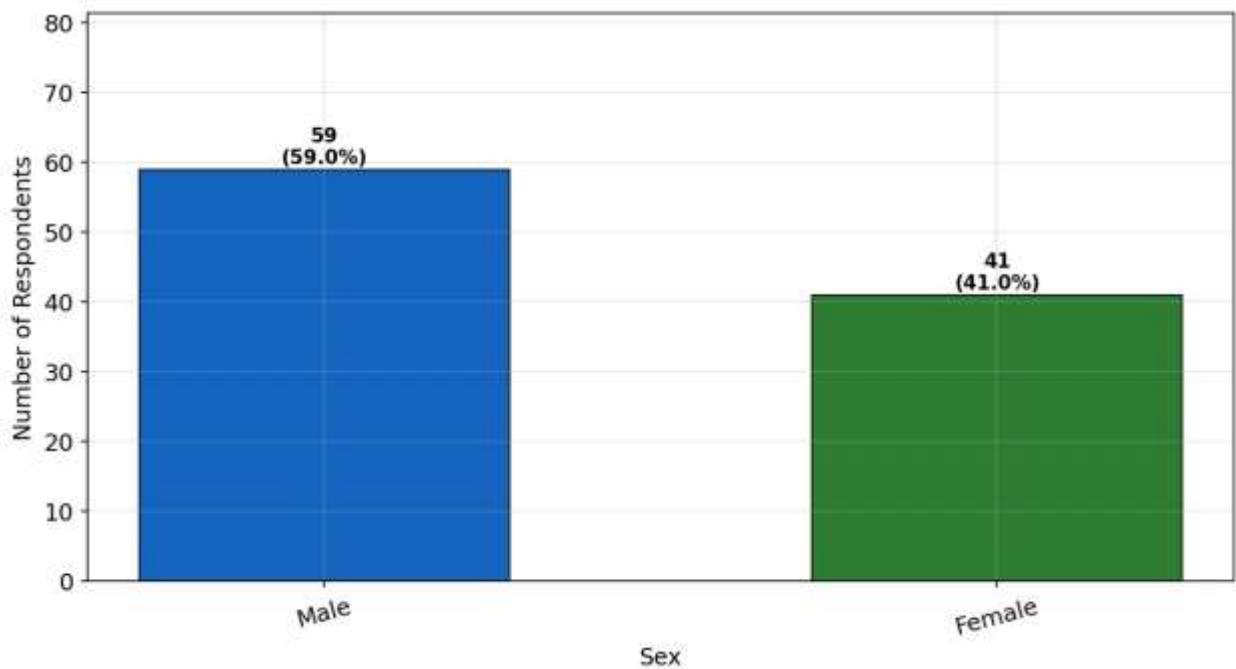


Figure 1: Distribution of Respondents by Sex (n = 100)

2.2 Age Group

Figure 2 show the age distribution of respondents. The 30–39 age group was the largest (31%), followed by the 40–49 group (25%), 20–29 (20%), below 20 (16%), and 50 and above (8%). This shows that most respondents were in their active productive years, meaning they are directly experiencing the current impact of dredging on their fishing livelihoods.

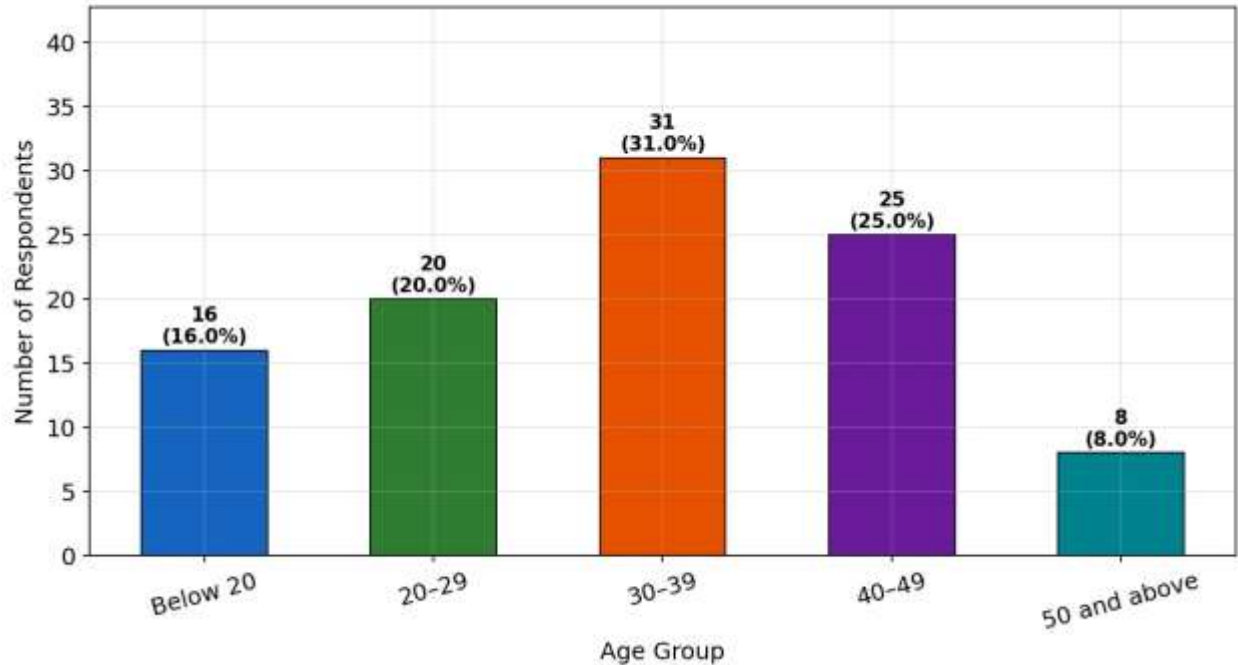


Figure2: Distribution of Respondents by Age Group (n = 100)

2.3 Marital Status

Table 3 and Figure 3 reveal that 72% of respondents were married, 20% were single, and 8% were widowed. The high proportion of married fishermen suggests that many fishing households and their dependants are directly affected by any economic or environmental disruption caused by dredging.

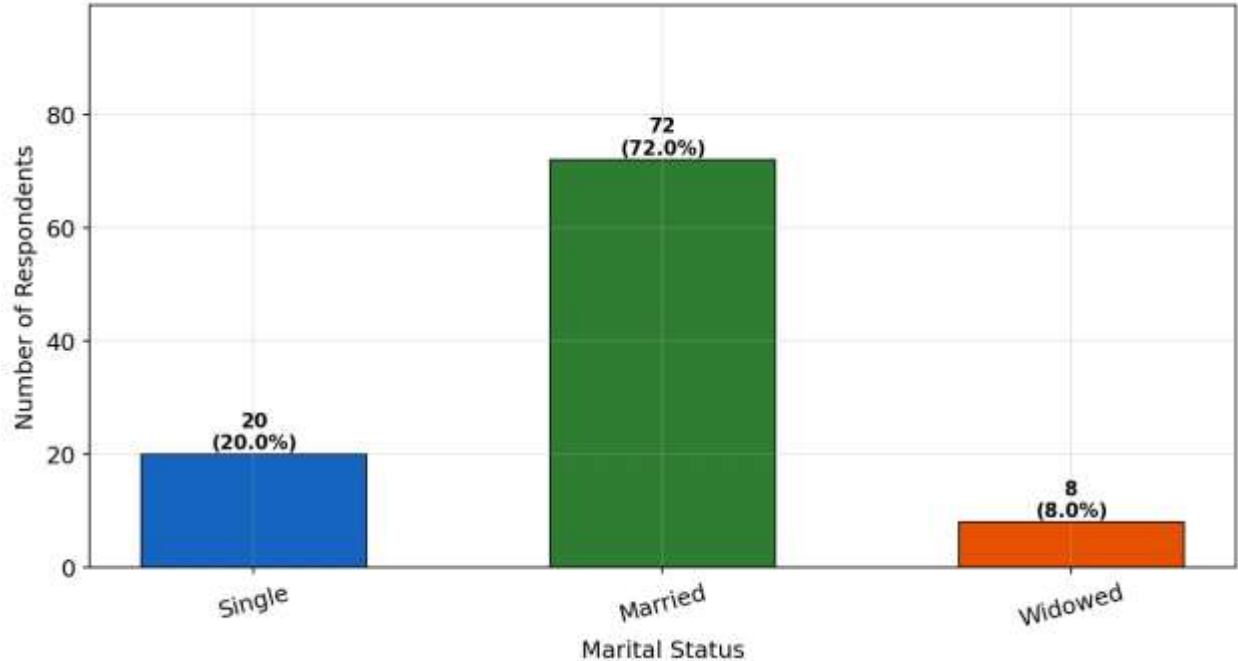


Figure3: Distribution of Respondents by Marital Status (n = 100)

2.4 Educational Level

Figure 4.4 show the educational background of respondents. The majority had secondary education (44%), followed by primary (31%) and no formal education (25%). No respondent had tertiary education. This indicates a generally low formal education level among artisanal fishermen in Ibeshe, which may limit their awareness of and response to environmental regulations. .

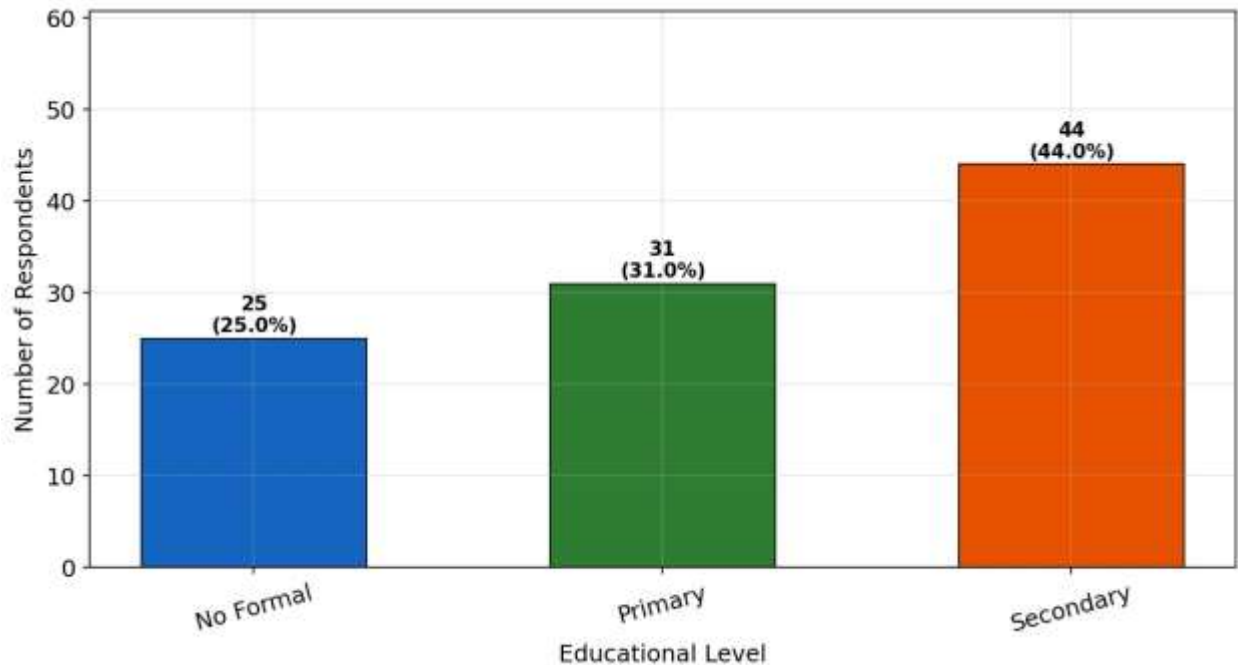


Figure 4: Distribution of Respondents by Educational Level (n = 100)

2.5 Years of Fishing Experience

Figure 4.5 show that the majority of respondents (57%) had more than 15 years of fishing experience, followed by 11–15 years (19%), and 1–5 and 6–10 years (12% each). This indicates that most respondents are experienced fishermen who have witnessed long-term changes to Ibeshe River, making their perceptions of dredging impacts particularly valuable and reliable.

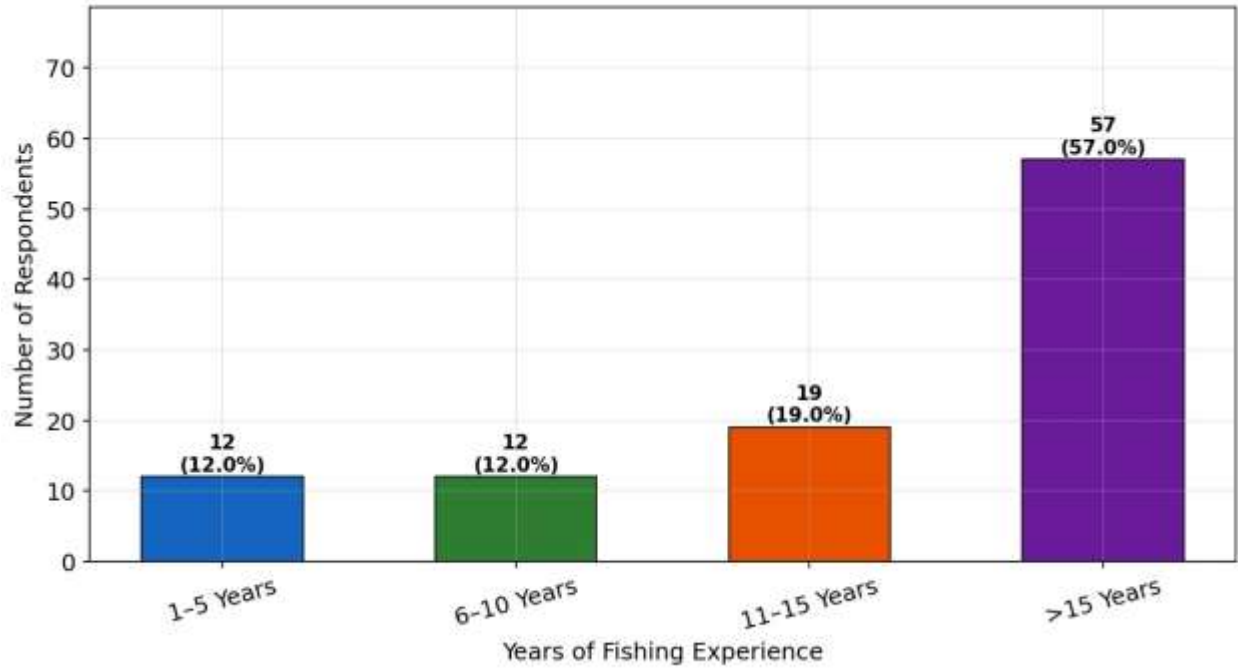


Figure 5: Distribution of Respondents by Years of Fishing Experience (n = 100)

2.6 Fishing Type

Figure 4.6 show that 51% of respondents were part-time fishermen and 49% were full-time. The near-equal split suggests that some fishermen have already diversified their income sources, possibly in response to declining fish catches caused by dredging activities.

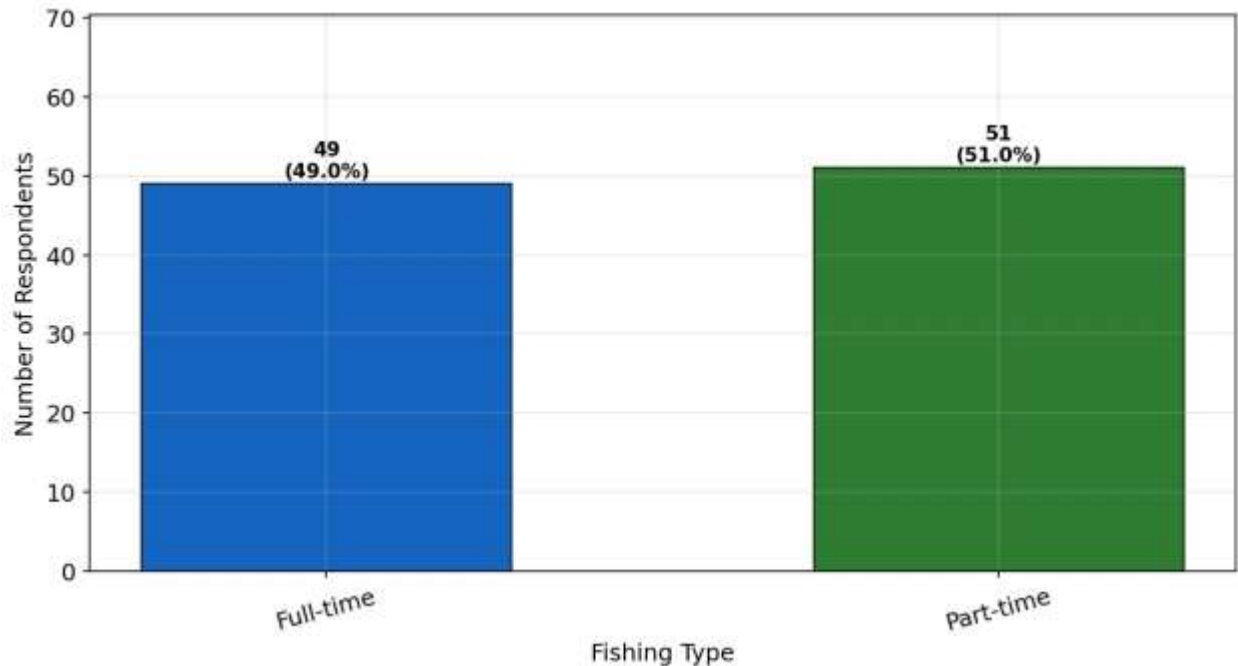


Figure 6: Distribution of Respondents by Fishing Type (n = 100)

2.7 Average Fishing Days per Week

Figure 7 show that 45% of respondents' fish 5–6 days per week, 35% fish 3–4 days, 12% fish every day, and 8% fish only 1–2 days per week. The high proportion of respondents fishing 5–6 days shows strong dependence on fishing as a livelihood, reinforcing the significance of any disruption caused by dredging activities.

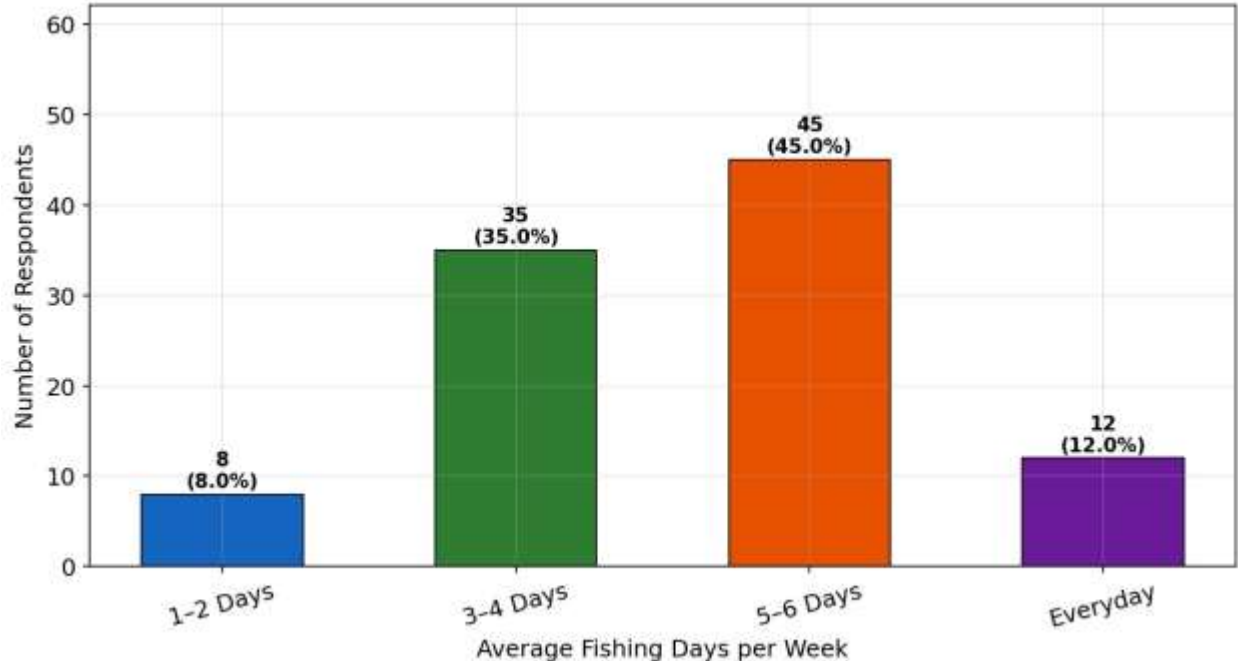


Figure 7: Distribution of Respondents by Average Fishing Days per Week (n = 100)

3 Section B: Sand Dredging Activities in Ibeshe River

Before analysing the environmental and economic burdens, it is important to understand the context of dredging in Ibeshe River as perceived by fishermen. Tables 4.8 to 4.11 present this background information.

3.1 Awareness of Dredging

Findings show that all 100 respondents (100%) were aware of sand dredging activities in Ibeshe River. This complete awareness confirms that dredging is a visible and significant activity in the community, and that respondents are well-positioned to assess its impact on their fishing activities.

3.2 Frequency of Dredging Observation

Respondents reveal that the majority of respondents observed dredging activities weekly (48%), followed by occasionally (32%), rarely (16%), and daily (4%). This shows that dredging is a recurring event in Ibeshe River, regularly witnessed by fishermen, and therefore likely to have a consistent impact on their fishing environment.

3.3 Duration of Dredging in the Area

Findings show that the majority (80%) reported that dredging has been going on in their area for more than 6 years, while 20% reported 4–6 years. This is a significant finding, as it indicates that the community has been exposed to dredging for a long time, meaning the environmental and economic impacts observed are likely to be cumulative and deeply felt.

3.4 Perceived Level of Dredging

This show that 60% of respondents rated the level of dredging as High, 36% as Moderate, and only 4% as Low. The fact that 60% consider dredging to be at a high intensity level indicates that fishermen

perceive dredging as an overwhelming activity in their river environment, setting the context for understanding the severity of its environmental and economic impacts.

Objective 1: Perceived Environmental Burden of Sand Dredging

Research Question 1: *What are the perceived environmental effects of sand dredging on artisanal fishing in Ibeshe River?*

To answer this research question, respondents were asked to rate their level of agreement with seven statements in Section C (Items C12–C18) about the environmental effects of sand dredging.

The results are presented below.

4.1 Descriptive Statistics – Environmental Burden (Section C)

Table 12 presents the mean scores and standard deviations for all seven environmental burden items, while Figure 12 shows the mean scores in a bar chart. The Likert scale used for this section is: 1 = Strongly Disagree, 2 = Disagree, 3 = Undecided, 4 = Agree, 5 = Strongly Agree.

This shows that respondents agreed with all seven environmental impact statements. The highest mean was recorded for C17 – Sand dredging has forced fish to move away from the area (M = 4.55, Strongly Agree), meaning fishermen strongly agree that fish migration due to dredging is a major environmental problem. Other highly rated items include C12 – increased river disturbance (M = 4.39, Agree), C15 – destruction of fish breeding areas (M = 4.39, Agree), and C18 – increased debris (M = 4.39, Agree). The lowest mean was C13 – increased turbidity (M =

3.67), though still rated as Agree. The overall section mean of 4.22 (Agree) indicates that fishermen in Ibeshe River broadly agree that sand dredging has caused significant environmental harm.

4.2 Frequency Distribution – Environmental Burden (Section C)

shows strong agreement across all environmental items. For C17 (fish forced to migrate), 100% of respondents agreed or strongly agreed — not a single fisherman disagreed. For C18 (debris in river), 100% agreed or strongly agreed. For C15 (destruction of breeding areas), 96% either agreed or strongly agreed. This pattern of responses reflects near-unanimous perception among Ibeshe fishermen that sand dredging is causing serious environmental harm to the river.

4.3 Hypothesis Testing – H01

H01: *Sand dredging has no significant perceived environmental burden on artisanal fishing in Ibeshe River.*

A one-sample t-test was conducted to test this hypothesis, comparing each item mean and the overall section mean against the neutral midpoint of 3.0. A result is significant if $p < 0.05$. Table

shows that all seven items were statistically significant at $p < 0.001$. The overall composite mean for Section C was 4.22, and the t-test gave $t = 29.163$, $p = 0.000$. Since $p < 0.05$, H01 is rejected. This means sand dredging has a significant perceived environmental burden on artisanal fishing in Ibeshe River. The environmental effects are not random or minor — they are strongly and consistently felt by fishermen.

5 Objective 2: Perceived Economic Burden of Sand Dredging

Research Question 2: *What are the perceived economic effects of sand dredging on artisanal fishing in Ibeshe River?*

To answer this question, respondents rated seven statements in Section D (Items D19–D25) about the economic effects of sand dredging on their fishing activities.

5.1 Descriptive Statistics – Economic Burden

. The highest mean was D22 – increased cost of fishing (M = 4.69, Strongly Agree), showing that fishermen strongly feel that dredging has made fishing more expensive. D23 – fishing has become more difficult and stressful (M = 4.51, Strongly Agree) was also strongly rated. D19 – reduced fish catch (M = 4.40) and D25 – threatens livelihood (M = 4.24) were also agreed with. D21 – spending more time fishing (M = 3.48) and D24 – reduced customers (M = 3.23) fell in the Undecided range, suggesting these effects are less uniformly experienced. The overall section mean of 4.05 (Agree) shows that the economic burden of dredging on artisanal fishing is significant and widely felt.

5.2 Frequency Distribution – Economic Burden

shows that for D19 (reduced fish catch), 100% of respondents agreed or strongly agreed which mean that every single fisherman surveyed believes dredging has reduced their daily catch. For D22 (increased cost), 100% agreed or strongly agreed. For D23 (more difficult fishing), again 100% agreed or strongly agreed. For D25 (threatens livelihood), 100% agreed or strongly agreed. These results show an overwhelming consensus that sand dredging is causing severe economic harm to artisanal fishermen in Ibeshe River.

3 Hypothesis Testing – H02

H02: Sand dredging has no significant perceived economic burden on artisanal fishing in Ibeshe River.

A one-sample t-test was conducted to test H02. Results are in Table 17 and Figure 17. shows that six out of seven items were statistically significant at $p < 0.001$. Only D24 (reduced number of customers) was not significant ($p = 0.087$), suggesting that this specific economic effect is not uniformly experienced by all fishermen. The overall composite mean was 4.05, with $t = 31.449$, $p = 0.000$. Since $p < 0.05$, H02 is rejected. Sand dredging has a significant perceived economic burden on artisanal fishing in Ibeshe River.

6 Objective 3: Comparison of Environmental and Economic Burdens

Research Question 3: Which burden is perceived to be more severe on artisanal fishing in Ibeshe River, environmental or economic?

To answer this question, Section E of the questionnaire was analysed descriptively, and a paired ttest was used to formally compare the two burden scores from the same respondents.

6.1 Section E: Respondents' Views on Comparative Burden

6.1.1 Which Burden is More Harmful?

Table 4.18 show that 45% of respondents considered the economic burden to be more harmful to artisanal fishing, 44% said both are equally harmful, and only 11% identified the environmental burden as more harmful. This tells us that most fishermen feel the money and income problems caused by dredging affect them most directly in their daily lives.

Source: Field Survey, 2026.

6.1.2 Rating of Environmental Burden

6.1.3 Rating of Economic Burden

This show that 79% of respondents rated the economic burden as High and 21% as Moderate. No respondent rated it as Low. This is a very strong finding, it shows that nearly four out of five fishermen believe the economic damage from dredging is at a high level.

6.1.4 Opinion on Dredging Regulation

Finding shows that 55% of respondents believe dredging should be controlled and monitored, 41% believe it should be stopped completely, and only 4% think it should be allowed without restriction. This shows that fishermen do not want an outright ban but demand proper regulation and management of dredging to protect their livelihoods.

Field works shows that the overall environmental burden mean (4.22) is slightly higher than the economic burden mean (4.05), with a difference of 0.17. While both burdens are perceived at a high level (both above 4.0), the environmental burden was rated marginally higher overall. At the item level, some economic items like D22 (cost of fishing, $M = 4.69$) and D23 (difficulty of fishing, $M = 4.51$) scored higher than some environmental items, showing that specific economic pressures are very deeply felt.

6.3 Hypothesis Testing – H03

H03: There is no significant difference between the perceived environmental and economic burdens of sand dredging on artisanal fishing in Ibeshe River.

A paired t-test was used to test this hypothesis. This test compares the environmental and economic burden scores of the same respondents to determine if there is a statistically significant difference.

Results are shown in Table 4.23

Table 1: Paired t-Test Results – Environmental vs Economic Burden (H03)

Variable	N	Mean	t-value	p-value	Sig.	Decision
Environmental Burden (Section C)	100	4.22				
Economic Burden (Section D)	100	4.05	2.964	0.004	**	Significant

Source: Field Survey, 2026. ** $p < 0.01$. Paired comparison per respondent.

Table 1 shows that the paired t-test produced $t = 2.964$, $p = 0.004$, which is less than the 0.05 significance level. Therefore, H03 is rejected. There is a significant difference between the perceived environmental and economic burdens of sand dredging. The environmental burden ($M = 4.22$) was significantly higher than the economic burden ($M = 4.05$), meaning respondents, on average, perceive the environmental damage to be slightly more severe than the economic damage. However, both are rated at a high level, and the difference is small, which is why 44% of respondents rated both as equally harmful.

7 Summary of Hypothesis Testing

Table 2 below summarises the decisions for all three hypotheses.

Table 2: Summary of Hypotheses Testing Results

Hypothesis	Statement	Test Used	Result	Decision
H01	Sand dredging has no significant perceived environmental burden	One-sample ttest	$t=29.163$, $p=0.000^{***}$	REJECTED
H02	Sand dredging has no significant perceived economic burden	One-sample ttest	$t=31.449$, $p=0.000^{***}$	REJECTED
H03	No significant difference between environmental and economic burdens	Paired t-test	$t=2.964$, $p=0.004^{**}$	REJECTED

Source: Field Survey, 2026. *** $p < 0.001$, ** $p < 0.01$. All tests at $\alpha = 0.05$.

8 DISCUSSION OF FINDINGS

This section discusses the findings of the study in relation to existing literature, examining what other researchers have found about the environmental and economic impact of sand dredging on artisanal fishing.

8.1 Perceived Environmental Burden of Sand Dredging

The findings from Objective 1 showed that artisanal fishermen in Ibeshe River strongly agreed that sand dredging has caused significant environmental damage. The overall mean for Section C was 4.22 (Agree), and the one-sample t-test confirmed this was statistically significant ($t = 29.163$, $p < 0.001$), leading to the rejection of H01. The most strongly agreed environmental effect was that dredging forces fish to move away from the area (C17, $M = 4.55$, Strongly Agree), followed by increased river disturbance, destruction of fish breeding areas, and increased debris in the water.

These findings are well supported by existing literature. Etah et al. (2025) noted that sand and gravel extraction disrupts benthic ecosystems, reduces biodiversity, and compromises ecosystem services. The fact that 100% of respondents agreed that fish have been forced to migrate from the area aligns with

Duque et al. (2025), who found in Buenaventura Bay, Colombia, that dredging caused significant shifts in fish assemblages, with sensitive species declining and others relocating to less disturbed zones. Similarly, Sowunmi et al. (2016) documented that water turbidity caused by dredging in Lagos State significantly disrupted fish feeding behavior and spatial distribution, forcing fishermen to travel farther to find productive fishing grounds. The finding that 96% of respondents agreed that dredging has destroyed fish breeding areas (C15) is particularly concerning. Dredging operations, involving the removal of sediment from riverbeds, directly disrupt natural habitats, often resulting in biodiversity loss and alterations to hydrological processes (John, 2021). Adekunbi et al. (2018), who conducted an earlier study specifically in Ibeshe, Lagos Lagoon, also found that dredging significantly altered water quality and sediment properties, negatively affecting fisheries. This earlier finding is now further confirmed by the current study's strong statistical evidence.

The high agreement with C16 – erosion and riverbank damage ($M = 4.20$) is also consistent with literature. Angnuureng et al. (2023) noted that sand dredging removes sediment that naturally replenishes shorelines, thereby accelerating erosional processes and undermining natural defenses against flooding. This is especially worrying for a waterfront community like Ibeshe, where residents live close to the riverbank.

8.2 Perceived Economic Burden of Sand Dredging

The findings from Objective 2 revealed that sand dredging has also imposed a significant economic burden on artisanal fishing in Ibeshe River. The overall Section D mean was 4.05 (Agree), and the paired t-test confirmed significance ($t = 31.449$, $p < 0.001$), leading to the rejection of H02. The most strongly felt economic burden was D22 – increased cost of fishing ($M = 4.69$, Strongly Agree), followed by D23 – fishing has become more difficult and stressful ($M = 4.51$, Strongly Agree). Critically, 100% of respondents agreed or strongly agreed that dredging has reduced their daily fish catch (D19) and increased fishing costs (D22), and threatened their livelihood (D25). These findings are strongly supported by Sowunmi et al. (2016), who compared fishermen in dredged and non-dredged areas of Lagos State and found that those in dredged zones had significantly lower fish catches per labour-hour and reduced gross profit. The study showed that dredging-induced environmental changes translate directly into economic losses for artisanal fishermen. Similarly, Unaeze and Jumbo (2023) in Rivers State found that dredging increased operational costs and compelled fishers to travel longer distances, raising fuel expenses and exposure to risk. The finding that D22 – increased cost of fishing – was the most strongly agreed item among all economic items ($M = 4.69$) reflects the practical reality described by Ekpu (2026), who reported that dredging in Lagos reshapes channels and currents, forcing artisanal fishers to travel farther offshore, directly increasing fuel costs and equipment wear. Atewogboye and Ndimele (2023) also documented that small-scale fishers in coastal Lagos face declining catches and rising operational costs, with some compelled to abandon fishing entirely. The finding that D25 – dredging threatens livelihood ($M = 4.24$) was agreed by all 100 respondents reinforces this threat to the long-term sustainability of artisanal fishing in Ibeshe. The only item that was not statistically significant was D24 – reduced number of customers ($p = 0.087$). This may be because fish buyers and customers may not be aware of the source of fish, or respondents may sell to middlemen who absorb the market-side effects. This finding is nuanced and suggests that while production-side losses are severe, market-side disruptions are less consistently experienced.

8.3 Comparison of Environmental and Economic Burdens

The findings from Objective 3 showed that both the environmental and economic burdens of sand dredging are high, but the environmental burden ($M = 4.22$) was significantly higher than the economic burden ($M = 4.05$), as confirmed by the paired t-test ($t = 2.964$, $p = 0.004$), leading to the rejection of H03. While the difference between the two means is small (0.17), it is statistically meaningful. Interestingly, when asked directly, 45% of respondents identified the economic burden as more harmful in their daily lives, and 44% said both were equally harmful. Only 11% identified the environmental burden as more harmful. This issues where the statistical test shows environmental burden is slightly higher, but respondents subjectively feel the economic burden more, is an important finding. It suggests that while

the ecological damage is objectively greater, fishermen experience the economic consequences more personally and immediately, because it is their income and food security that is directly at risk every day. This is consistent with Charles and Koshuma (2025), who noted that communities dependent on fishing are particularly affected by the economic consequences of environmental degradation caused by dredging. The finding that 79% of respondents rated the economic burden as High compared to 60% for the environmental burden supports this interpretation. Eduok et al. (2021) similarly found in Akwa Ibom State that even when ecological disruption is high, it is the downstream economic effects, reduced catches, higher costs, and forced livelihood changes, that are felt most acutely by fishing households. Hemmler et al. (2025) noted from a West African context that the socio-economic ramifications of dredging on fishing communities are equally as significant as the ecological ones, particularly in urbanised zones where the scale of dredging is large. The fact that 55% of respondents want dredging to be controlled and monitored (rather than stopped) shows that fishermen understand the economic role of dredging in Lagos but are demanding that it be managed responsibly. This is in line with Sowunmi et al. (2016) and Adekunbi et al. (2018), who both emphasized that regulation, community engagement, and sustainable management practices are necessary to protect artisanal fisheries without completely halting an economically important activity.

CONCLUSION

This study assessed and compared the perceived environmental and economic burden of sand dredging on artisanal fishing in Ibeshe River, Lagos State. First, sand dredging in Ibeshe River has a significant perceived environmental burden on artisanal fishing. Fishermen consistently agreed that dredging has increased river disturbance, caused water turbidity, destroyed fish breeding areas, led to erosion, increased debris in the water, and most critically, forced fish to migrate away from the area. These environmental impacts are widely and strongly felt across the fishing community. Second, sand dredging has a significant economic burden on artisanal fishing in Ibeshe River. The most severe economic effects include increased fishing costs, greater difficulty in fishing, reduced daily fish catch, and a direct threat to the livelihood of fishermen. Every respondent agreed that dredging has reduced their daily catch and increased the costs of fishing, a unanimous finding that speaks to the severity of the problem. Third, there is a statistically significant difference between the environmental and economic burdens of sand dredging, with the environmental burden being slightly higher based on statistical comparison. However, respondents personally perceive the economic burden as more harmful in their daily lives, as income and food security are the most immediate concerns for fishing households. In conclusion, sand dredging poses serious and compounding threats to artisanal fishing in Ibeshe River, environmentally and economically. Without proper regulation and community-centred management, the livelihoods of fishermen and the ecological health of the river will continue to deteriorate.

RECOMMENDATIONS

Based on the findings and conclusions of this study, the following recommendations are made:

2.1 Recommendations to Government and Regulatory Bodies

1. The Lagos State Ministry of the Environment and NESREA should immediately enforce stricter regulation of sand dredging in Ibeshe River. Dredging permits should only be issued after a thorough Environmental Impact Assessment (EIA) that specifically considers the impact on artisanal fishing communities.
2. A continuous environmental monitoring programme should be set up to regularly test water quality, turbidity, sediment levels, and fish population changes in Ibeshe River. The results should be made available to the public, including the fishing community.
3. The government should set up a compensation and livelihood support fund for artisanal fishermen who have already suffered income losses due to sand dredging. This fund should be financed through levies on dredging operators.

2.2 Recommendations to Dredging Companies

1. Dredging companies operating in Ibeshe River should adopt precision dredging technologies and sediment containment structures such as silt curtains to reduce water turbidity and minimise the disturbance to fish habitats.
2. Companies should schedule dredging operations to avoid peak fish breeding and spawning seasons, which can be identified in collaboration with the fishing community and fisheries experts.
3. Dredging companies should set up a formal community engagement mechanism, including regular meetings with fishermen, a complaints channel, and a transparent process for addressing environmental concerns raised by the community.
4. Companies should contribute to livelihood diversification programmes for fishermen affected by dredging, such as funding aquaculture training, fish processing skills, and support for cooperatives.

2.3 Recommendations to the Ibeshe Fishing Community

1. Fishermen should form or strengthen their fishing cooperatives to collectively advocate for their rights, share information about dredging impacts, and engage regulatory authorities as a united voice. A disorganised community is easier to ignore.
2. Fishermen who can afford to should consider diversifying into aquaculture or fish farming as a supplement to river fishing, reducing dependence on an increasingly disturbed natural environment.
3. The community should work with NGOs and environmental lawyers to understand their legal rights and engage in formal policy processes, such as public hearings for new dredging permits, to ensure their voices are heard.

2.4 Recommendations for Future Research

1. Future studies should conduct laboratory-based water quality and sediment analysis in Ibeshe River to provide objective scientific data alongside community perceptions, giving a fuller picture of the actual environmental damage caused by dredging.
2. A cost-benefit analysis of sand dredging in Ibeshe River should be conducted to weigh the economic benefits of sand extraction against the economic and environmental losses suffered by the fishing community, providing evidence for policy decisions.

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