

## EVALUATING THE ACTION PLAN AND IMPLEMENTATION FRAMEWORK FOR GULLY EROSION MITIGATION IN KABBA, KABBA BUNU LGA, KOGI STATE, 2020 TO 2024

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Cite this article as: Edino, O. F. and Eseyin, S. S. (2026). Evaluating the Action Plan and Implementation Framework for Gully Erosion Mitigation in Kabba, Kabba Bunu LGA, Kogi State, 2020 to 2024. *Journal of Interdisciplinary Postgraduate Research*, pp. 129–134.

### Abstract

Gully erosion ranks among the most worrisome environmental challenges in Nigeria, with devastating consequences for land, infrastructure, agricultural productivity, and rural livelihoods. In recent years the Kabba Bunu Local Government Area of Kogi State has emerged as one of the most severely affected localities, a situation driven largely by human activity such as poor land management, deforestation, and the wider irregularity of the climate. Against this backdrop, the present study evaluates the action plan and the implementation framework for gully erosion mitigation in Kabba between 2020 and 2024. The study adopted a descriptive survey design and generated data from government archives, a structured public survey, and stakeholder interviews in order to assess the degree of implementation, the extent of community involvement, the quality of institutional cooperation, and the sustainability of the methods adopted. The findings reveal that although the action plan combined preventive, corrective, and community driven measures such as tree planting, the construction of drainage and check dams, and sensitisation campaigns, the execution stage was constrained by insufficient funding, weak coordination among the responsible institutions, and a shortage of technical expertise. In spite of these constraints, modest achievements were recorded in erosion control, most visibly in the areas where community involvement was treated as central. The findings underscore the value of integrating local knowledge and community participation, of strengthening institutional structures, and of securing adequate financial allocation for sustainable results. The study concludes that an inclusive and participatory execution framework, supported by continuous monitoring and evaluation, is fundamental to controlling gully erosion and safeguarding livelihoods in Kabba Bunu. It therefore recommends that policy support be strengthened, that community participation be actively encouraged, and that climate resilient land management practices be adopted to secure long term sustainability.

**Keywords:** Gully erosion; Action plan; Implementation framework; Environmental management; Kabba Bunu

## 1. Introduction

Nigeria, a nation highly susceptible to the adverse effects of climate change, faces significant threats to its sustainable development and its socio economic wellbeing (Federal Ministry of Environment, 2021). The available evidence indicates that the climate of the country has been shifting, a change expressed through rising temperatures, increasingly variable rainfall, a measurable rise in sea level, and a greater frequency of extreme weather events such as floods and droughts (National Climate Change Policy, 2021). One of the most devastating consequences of these shifts is soil erosion, and gully erosion in particular, which damages many parts of the country on an annual basis. The intensity of rainfall in several regions, aggravated by the loss of vegetation cover, has heightened the incidence of rainfall induced erosion. Severe flooding and rainstorms have in consequence caused widespread destruction across communities in Kogi and Kebbi states, leaving more than five hundred houses destroyed, displacing many families, and inflicting extensive damage on property and livestock (Tijani, 2025). In Kabba, the headquarters of the Kabba Bunu Local Government Area, the Idde Iya community was among the worst affected.

The disruptive effects of climate change, gully erosion among them, cut across every sector of the socio economic life of Nigeria, with agriculture the most vulnerable. Roughly seventy percent of the population depends on agriculture for its livelihood. Environmental degradation, including soil erosion, is therefore a major concern in Kogi State, where it has reduced agricultural productivity, increased post harvest losses, slowed economic growth, and deepened poverty. Poor road networks and weak basic infrastructure have further compounded these difficulties (Udoinyang, 2025).

Against this backdrop the Nigerian government has initiated a range of measures to curb the impacts of climate change. These include the National Policy on Climate Change, the National Policy on Erosion, Flood Control and Coastal Zone Management of 2005, and the Climate Change Act of 2021. Taken together, these frameworks aim to promote low carbon development, build climate resilience, reduce vulnerability, and improve adaptive capacity across every level of governance (Haider, 2019).

It is important to note that Kabba, within the Kabba Bunu Local Government Area of Kogi State, is an agrarian community. Local reports indicate that the area has suffered severe environmental damage, with flooding and erosion destroying property worth millions of naira and forcing some families to relocate (Ojo, 2025; Funke, 2025). Given its agricultural importance and its vulnerability to environmental degradation, the implementation of localised climate response strategies, and gully erosion mitigation in particular, is critical. As Odogun (2024) observes, the Kogi State government has awarded contracts worth billions of naira for erosion control works across the state.

It is against this background that the present study evaluates the action plan and the implementation framework for gully erosion mitigation in Kabba, in the Kabba Bunu Local Government Area of Kogi State, for the period running from 2020 to 2024. The primary focus is the assessment of the degree to which the specific action plan was implemented, the level of community involvement, the quality of institutional coordination, the challenges encountered during execution, and the overall effectiveness and sustainability of the mitigation effort during the stated period. The study is therefore not a general discussion of the gully erosion problem, but a targeted evaluation of the 2020 to 2024 action plan and its implementation framework.

## 2. Literature Review

As a country highly prone to the adverse effects of climate change, Nigeria confronts numerous threats to its sustainable development and socio economic wellbeing. This is evident in rising temperatures, variable rainfall, a rising sea level, and a greater incidence of extreme weather events such as floods and droughts. Among the most prevalent and catastrophic of these consequences is soil erosion, including gully erosion, which destroys parts of the country each year. Edino, Eja and Bassey (2022) recognise the role of government in mitigating climate related environmental challenges when they argue that the provision of basic infrastructure by government is itself a form of capacity building for business prosperity. The impacts of climate change, erosion and gully erosion among them, are therefore felt across the socio economic life of the country, and most acutely in the agricultural sector that engages more than seventy percent of the population.

In spite of the extensive national policy frameworks and the growing body of research on the impacts of climate change and the strategies for coping with them, specific assessments of localised implementation frameworks for gully erosion control within particular local government areas such as Kabba Bunu remain under explored. This forms the basis of the present research and identifies the gap it intends to fill. The absence of a first hand assessment of localised erosion control frameworks, coupled with an existing literature that tends to recommend mitigation and adaptation measures rather than to assess empirically the execution and efficacy of localised action plans at the community or local government level, makes this study significant. The literature has tended to focus on wider impacts or general adaptation methods, leaving a gap in the understanding of the practical consequences and challenges of specific and time bound execution frameworks, especially in areas such as Kabba Bunu where agriculture is dominant and exposure to climate hazard is high (Amobi and Onyishi, 2015).

### 2.1 Causes of Gully Erosion

Several studies identify the slope of the land as one of the principal causes of gully erosion. Sloping terrain contributes roughly twenty percent to gully vulnerability (Emeh, Igwe and Ugwoke, 2023), while slope, stream mass, and distance from streams each play a meaningful role in erosion susceptibility (Didams, Firuza and Idakwo, 2020). Topographic factors such as altitude, drainage density, and the topographic moisture index recur consistently as major predictors (Jaafari et al., 2022). Soil characteristics exert a significant influence on gully formation, and the depth of the ground water table has emerged as an unusual but significant predictor (Amare et al., 2021).

Human activity also affects gully formation considerably. Road construction stands out as the dominant anthropogenic factor, with relative significance values reported in the range of twenty seven to thirty four percent (Rahmati et al., 2022). Population density and urbanisation contribute to gully expansion, although with lower relative significance than the ecological factors, and changes in land use and agricultural practice further shape erosion patterns (Han et al., 2022). There are, however, multiple approaches to effective prevention,

including changes in land use, soil and water conservation, the establishment of vegetation, and targeted measures in zones of intense flow (Frankl et al., 2020). Further control strategies include runoff diversion, the filling of headcuts, channel reshaping, and the construction of check dams, alongside community based interventions in which residents use sand filled sacks and used vehicle tyres to slow the rate of gully expansion (Frankl et al., 2020; Abubakar et al., 2025).

### 3. Theoretical Framework

The most appropriate theoretical lens for this study is Systems Theory. Propagated by Ludwig von Bertalanffy, Systems Theory views an organisation, a policy, or a project as a system composed of interconnected parts that work together to achieve a set of objectives. The theory foregrounds the sequence of input, process, output, and feedback in programme assessment, as set out in Figure 1.

Gully erosion control involves many participants, namely government institutions, local communities, environmental specialists, and financing organisations. Systems Theory therefore enables the study to examine how these interconnected actors and processes interrelate in the pursuit of erosion mitigation. The input and output stages allow the action plan for Kabba Bunu between 2020 and 2024 to be evaluated in terms of inputs, which comprise funds, human and material resources, policies, and community involvement, followed by processes, which comprise the modalities of implementation and supervision, and then outputs, which take the form of reduced erosion, improved livelihoods, and more sustainable land use. Feedback, in turn, is the set of responses from the public, as end users, to the quality and quantity of the services rendered by government institutions.

Systems Theory emphasises the importance of feedback in strengthening implementation by exposing gaps and challenges as they arise during execution, so that better strategies can be identified and applied to the erosion control programme. Because environmental interventions demand long term planning, the theory also offers a coherent way of understanding sustainability, connecting policies, implementation processes, and environmental outcomes with the feedback that drives improved service delivery.

Systems Theory Framework Applied to Gully Erosion Mitigation

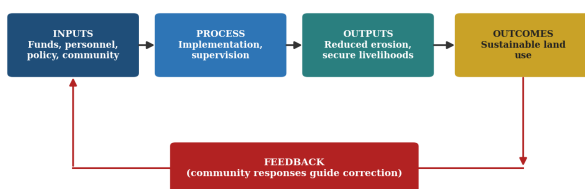


Figure 1: Systems Theory framework applied to gully erosion mitigation, showing the input, process, output, and feedback sequence.

Source: Authors' adaptation of Bertalanffy's Systems Theory.

### 4. Methodology

This study adopts the descriptive survey research design. The design is the most appropriate choice because it enables the researcher to collect, describe, and analyse data systematically on the action plan and the implementation framework for gully erosion mitigation in Kabba between 2020 and 2024. The study

combined quantitative and qualitative approaches. Quantitative information was obtained through a structured questionnaire, while qualitative information was obtained through key informant interviews and the analysis of government archival documents, in order to capture opinions, attitudes, experiences, and evaluations of the interventions.

Using a purposive sampling technique, a total of two hundred respondents were drawn from the population of Kabba residents, estimated at 194,900 as at 2025. Respondents were selected purposively from among the residents most severely affected by the erosion. The sample size requirement was guided by the formula of Cochran (1977), expressed in Equation 1.

$$n = Z^2 pq / e^2 \quad (1)$$

In Equation 1,  $n$  denotes the required sample size,  $Z$  is the standard normal value at the chosen confidence level,  $p$  is the estimated proportion of the attribute present in the population,  $q$  equals one minus  $p$ , and  $e$  is the acceptable margin of error. A total of two hundred copies of the questionnaire were administered to the two hundred respondents, who comprised residents of the most affected communities, among them civil servants, farmers, and other stakeholders. Data presentation and interpretation were based on the two hundred responses received. In addition, informant interviews were conducted with fifteen key community leaders, local government officials, and environmental officers directly involved in and knowledgeable about the mitigation effort.

Interviews and archival documents were analysed through thematic analysis, which involved the transcription of interviews, the careful reading of transcripts and documents, open coding, and the identification of major recurring themes such as implementation challenges, community participation, institutional coordination, and sustainability. Data collection was preceded by the receipt of ethical clearance from the Department of Public Administration, Lokoja. All participants gave informed consent and were assured of the confidentiality of their responses.

The questionnaire data were analysed using the Statistical Package for the Social Sciences, version 26, in order to generate tables, percentages, and frequencies. The survey instrument was tested for reliability through the Cronbach alpha coefficient, computed as shown in Equation 2.

$$\alpha = [k / (k - 1)] \times [1 - (\sum s_i^2 / s_t^2)] \quad (2)$$

In Equation 2,  $k$  is the number of items on the scale,  $s_i^2$  is the variance of each individual item, and  $s_t^2$  is the variance of the total scale. The procedure returned a value of 0.82, which indicates that the questionnaire items were reliable. Because the research seeks to evaluate an existing programme rather than to establish cause and effect, the descriptive survey is the most suitable design. It provides a comprehensive and factual account of the situation and enables the researcher to make evidence based recommendations for improved policy formulation and implementation.

### 5. Empirical Data and Results

This section presents the demographic profile of the respondents and their responses to the key evaluation items, each measured on a five point Likert scale where one denotes strong disagreement and five denotes strong agreement. The demographic profile is summarised in Figure 2.

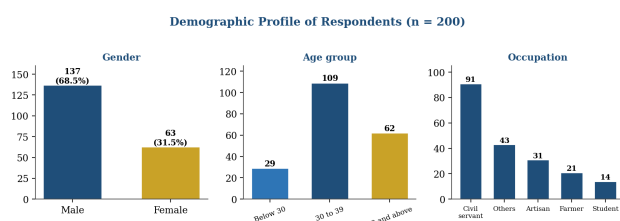


Figure 2: Demographic profile of respondents by gender, age group, and occupation (n = 200).

Source: Field survey, 2025.

### 5.1 Demographic Profile of Respondents

Table 1 reports the distribution of respondents by gender, age, and occupation. Of the two hundred respondents, one hundred and thirty seven, representing 68.5 percent, were male, while sixty three, representing 31.5 percent, were female. The age distribution shows that the largest group, one hundred and nine respondents or 54.5 percent, fell within the thirty to thirty nine year band, a cohort likely to be active in decision making. A further sixty two respondents, representing 31.0 percent, were aged fifty and above and bring considerable experience, while twenty nine respondents, or 14.5 percent, were below thirty. In terms of occupation, civil servants formed the largest group at ninety one respondents or 45.5 percent, followed by the residual category of others at forty three respondents or 21.5 percent, artisans at thirty one or 15.5 percent, farmers at twenty one or 10.5 percent, and students at fourteen or 7.0 percent.

Table 1. Demographic Profile of Respondents (n = 200)

| Variable   | Category      | Frequency | Percent |
|------------|---------------|-----------|---------|
| Gender     | Male          | 137       | 68.5    |
|            | Female        | 63        | 31.5    |
| Age group  | Below 30      | 29        | 14.5    |
|            | 30 to 39      | 109       | 54.5    |
|            | 50 and above  | 62        | 31.0    |
| Occupation | Civil servant | 91        | 45.5    |
|            | Others        | 43        | 21.5    |
|            | Artisan       | 31        | 15.5    |
|            | Farmer        | 21        | 10.5    |
|            | Student       | 14        | 7.0     |

Source: Field survey, 2025.

### 5.2 Perceptions of the Action Plan

Table 2 consolidates the responses to the five core evaluation items, and Figure 3 displays the same responses as a diverging distribution that makes the balance of agreement and reservation immediately visible. On the question of whether the government introduced specific gully erosion mitigation projects between 2020 and 2024, one hundred and twenty respondents, representing 60.0 percent, agreed and a further forty nine, representing 24.5 percent, strongly agreed, so that 84.5 percent expressed agreement. Only eight respondents, representing 4.0 percent, strongly disagreed, nine, representing 4.5 percent, disagreed, and fourteen, representing 7.0 percent, were neutral.

On whether drainage construction and channelisation formed part of the erosion mitigation measures in the respondents' communities, one hundred and twenty seven respondents, representing 63.5 percent, agreed and forty eight, representing 24.0 percent, strongly agreed, so that 87.5 percent expressed agreement. On whether the mitigation actions addressed the most affected gully sites, ninety three respondents, representing 46.5 percent, agreed and fifty nine, representing 29.5 percent, strongly agreed, so that 76.0 percent expressed agreement, while twenty four percent either dissented or remained neutral. On whether the relevant government agencies coordinated the projects effectively, one hundred and twenty one respondents, representing 60.5 percent, agreed and thirty eight, representing 19.0 percent, strongly agreed, so that 79.5 percent expressed agreement.

The pattern shifts on the question of timeliness. On whether projects were completed within the planned timeframe, sixty respondents, representing 30.0 percent, agreed and twenty nine, representing 14.5 percent, strongly agreed, so that only 44.5 percent expressed agreement. By contrast, thirty eight respondents, representing 19.0 percent, strongly disagreed and forty three, representing 21.5 percent, disagreed, so that 40.5 percent expressed disagreement, while thirty respondents, representing 15.0 percent, were neutral. This item is the clear outlier in an otherwise positive assessment, and it points to persistent difficulty with project delay.

Table 2. Respondent Perceptions Across the Five Evaluation Items (percent, n = 200)

| Evaluation item                  | SD   | D    | N    | A    | SA   |
|----------------------------------|------|------|------|------|------|
| Government introduced projects   | 4.0  | 4.5  | 7.0  | 60.0 | 24.5 |
| Drainage and channelisation used | 2.5  | 4.5  | 5.5  | 63.5 | 24.0 |
| Most affected sites addressed    | 5.5  | 8.0  | 10.5 | 46.5 | 29.5 |
| Agencies coordinated effectively | 4.0  | 5.5  | 11.0 | 60.5 | 19.0 |
| Projects completed on schedule   | 19.0 | 21.5 | 15.0 | 30.0 | 14.5 |

Note: SD strongly disagree, D disagree, N neutral, A agree, SA strongly agree. Source: Field survey, 2025.

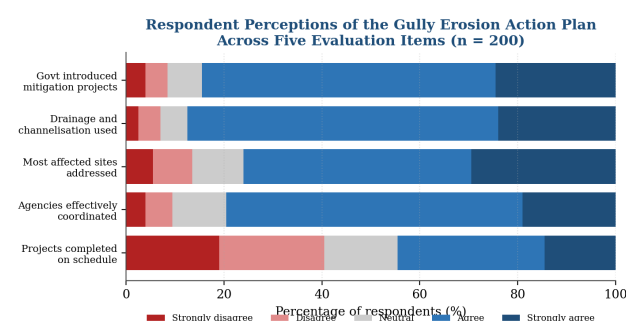


Figure 3: Diverging distribution of respondent perceptions across the five evaluation items.

Source: Field survey, 2025.

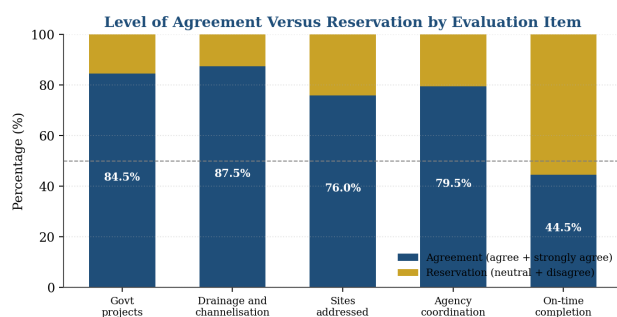


Figure 4: Level of agreement versus reservation by evaluation item.

Source: Field survey, 2025.

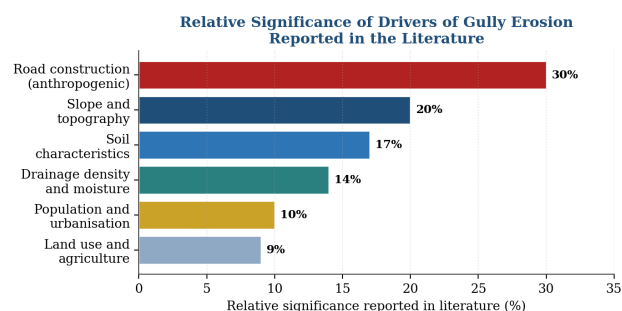


Figure 5: Relative significance of the drivers of gully erosion reported in the literature.

Source: Authors' synthesis of the cited literature.

## 6. Results and Discussion

The results are discussed according to the key criteria by which the action plan and its implementation framework were evaluated, namely government intervention, the use of structural measures, the targeting of affected areas, institutional coordination, and project timeliness.

### 6.1 Government Intervention and Implementation

The study finds that government engagement in gully erosion control in Kabba Bunu between 2020 and 2024 was widely acknowledged by respondents. A strong majority agreed that the government introduced definite mitigation projects during the period, which indicates that the intervention was both visible and recognised at community level and that the government was responsive to the erosion problem in the affected areas. This reading is consistent with the wider observation that targeted public investment functions as a form of capacity building for community resilience (Edino, Eja and Bassey, 2022).

### 6.2 Structural Measures and Targeting

The study also finds that structural control measures, and drainage construction and channelisation in particular, were central to the mitigation effort, with an overwhelming majority confirming that such works were carried out in their communities. The mitigation actions were largely directed at the most severely affected sites, as the majority of respondents attested. A notable minority nevertheless expressed disagreement or neutrality, which suggests that, despite broad coverage, some affected areas may not have received adequate attention. This finding echoes evidence from comparable Nigerian settings that the spatial targeting of erosion works is rarely complete and benefits from continuous reassessment (Igwe, Ajadike and Ogbu, 2023).

### 6.3 Institutional Coordination and Timeliness

The study further finds that the relevant government agencies were widely perceived to have coordinated the projects effectively, since most respondents agreed that inter agency collaboration was sound. The presence of neutral and negative responses nevertheless indicates that coordination difficulties may persist, most plausibly in communication, in the extent of community participation, or in the consistency of implementation. The findings on timeliness are the most mixed of the set. While a plurality affirmed timely completion, the substantial body of disagreement signals recurring delay, which is a common feature of publicly financed erosion works where funding release and contractor mobilisation are irregular (Odogun, 2024).

### 6.4 Overall Assessment

In sum, the findings reveal that the erosion control effort in Kabba Bunu was mostly effective and reasonably well coordinated, yet there remains clear room for improvement in community participation, in the completeness of coverage, and in the sustained collaboration of the responsible agencies. The Systems Theory lens helps to locate these shortcomings, since each of them is, in effect, a weakness in the feedback loop that should connect community experience back to the planning and supervision of the works.

## 7. Conclusion and Recommendations

The study concludes that government involvement in gully erosion control in Kabba Bunu between 2020 and 2024 was broadly effective and visible to the public. Measures such as the construction of drainage and erosion control channels were extensively completed and were widely regarded as addressing the most affected sites. The responsible agencies were largely seen to have managed the projects competently, which contributed to the successful implementation of the control initiatives. At the same time, a minority of respondents highlighted gaps in coverage and coordination, which indicates that a number of areas still require attention if erosion management is to become comprehensive and lasting. Drawing on these findings, the study advances the following recommendations.

First, the coverage of erosion control projects should be expanded so that every critical and vulnerable gully site, including those that have so far received inadequate attention, is identified and incorporated into future interventions. Second, collaboration among the responsible agencies should be improved through effective communication and the frequent inspection of works, in order to secure the durability and efficacy of the projects. Third, community members should be drawn into the planning, monitoring, and maintenance of erosion control infrastructure so as to strengthen ownership, sustainability, and responsiveness to local need. Fourth, innovative and environmentally friendly control measures, such as keeping drainage channels clear of waste, should be encouraged to raise the resilience and impact of the works. Fifth, an orderly monitoring and evaluation structure should be established to assess the efficacy of ongoing projects, to identify challenges early, and to permit proactive adjustment for better results.

### Limitations of the Study

The study was confined to the Kabba Bunu Local Government Area and relied largely on self reported data from respondents. Some response bias may therefore be present. Future studies would do well to adopt a comparative approach across several local government areas, or to employ objective measures such as satellite imagery for the assessment of erosion reduction.

### Declarations

The authors affirm that this research is free of any conflict of interest. The research received no external funding. The Department of Public Administration, Lokoja, granted ethical clearance, and all research was conducted in compliance with established ethical research standards and principles.

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