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INTEGRATED PROJECT PLANNING AND CONTROL FOR CLIMATE-RESILIENT INFRASTRUCTURE: LESSONS FROM CLIMATE DISASTERS IN SOUTH-EAST NIGERIA

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ABSTRACT

This study examines how integrated project planning and control can strengthen climate-resilient infrastructure in South-East Nigeria. The aim of the study is to develop an integrated planning and control framework for improving infrastructure resilience against climate-related disasters in the region. The specific objectives are to identify major climate disaster risks affecting infrastructure, examine weaknesses in current project planning and control practices, assess lessons from past climate disasters, and propose a framework that links climate risk assessment, scheduling, cost control, adaptive design, stakeholder coordination, disaster preparedness, and post-project monitoring. Using a qualitative research design, the study applied content analysis to secondary data from academic studies, policy documents, disaster reports, and project records. The analysis focused on flooding, gully erosion, soil instability, poor drainage, infrastructure vulnerability, disaster management, and project control processes. Findings show that infrastructure failure in the region is linked not only to climate hazards, but also to weak coordination, reactive planning, poor site-risk assessment, limited maintenance, and the narrow use of project control tools. The study argues that resilient infrastructure should be judged not only by time, cost, and scope, but also by its ability to withstand climate stress. It contributes to project management, disaster risk reduction, and climate-resilient infrastructure planning in vulnerable regional construction contexts.

Keywords: Climate resilience, integrated planning, disaster management, project control, climate adaptation, sustainable infrastructure, disaster risk reduction.

1. INTRODUCTION

Global warming has already reached about 1.1°C above pre-industrial levels, and every further rise increases the risk of floods, droughts, heat, erosion, and damage to human settlements (Intergovernmental Panel on Climate Change [IPCC], 2023). This makes climate resilience an urgent global issue, not a distant environmental concern. Across the world, infrastructure is now exposed to stronger climate shocks than many planning systems were designed to handle (OECD, 2024). Roads, bridges, drainage channels, housing, schools, hospitals, markets, and water systems are no longer only construction assets. They are also lifelines that determine how communities survive, recover, and continue after disasters (United

Nations Office for Disaster Risk Reduction [UNDRR], 2015; OECD, 2024). In Nigeria, this concern is more severe because climate hazards meet weak infrastructure, poor maintenance, rapid urban growth, and limited disaster preparedness (Cirella & Iyalomhe, 2018; Ajake et al., 2022; Akinkuolie et al., 2024). South-East Nigeria shows this problem clearly. The region faces recurring flooding, active gully erosion, soil instability, and damage to settlements and transport routes (Amangabara & Otumchere, 2016; Igwe & Egbueri, 2018; Chude et al., 2020; Ekwueme et al., 2021). These hazards do not only destroy the environment. They weaken infrastructure systems, displace people, disrupt livelihoods, and raise the cost of development (Ajake et al., 2022; World Bank, 2023). Yet many infrastructure projects in the region are still planned and controlled as if climate risk is an external problem, not a core project condition. This is the unresolved issue that makes the present study necessary.

The problem has persisted because infrastructure planning, disaster risk reduction, and project control are often treated as separate activities. Project planning tools are used to manage time, cost, scope, and contractor performance, but they do not always give enough attention to future flood exposure, erosion risk, land vulnerability, drainage failure, and post-disaster recovery needs (Mayo-Alvarez et al., 2022; Okoye et al., 2025). This is a serious weakness because climate disasters affect project performance before, during, and after construction. A road may be completed on schedule, but still fail if the planning process ignores runoff patterns, slope movement, soil erodibility, drainage capacity, and community exposure (Amangabara & Otumchere, 2016; Igwe & Egbueri, 2018; Ekwueme et al., 2021). Evidence from South-East Nigeria shows that erosion and flooding are shaped by both natural and human factors, including soil type, rainfall, land use, poor drainage, weak environmental control, and settlement pressure (Amangabara & Otumchere, 2016; Chude et al., 2020; Ekwueme et al., 2021). At the same time, disaster management systems in the region still face gaps in infrastructure, coordination, preparedness, and local response capacity (Ajake et al., 2022). Sustainable design studies in Nigeria also show that housing and infrastructure planning must respond more directly to environmental stress, affordability, and local vulnerability (Ajayi et al., 2023). The Sendai Framework makes this link clear by stressing that disaster risk should be reduced through prevention, preparedness, resilient investment, and better recovery planning (UNDRR, 2015). Recent climate adaptation literature also argues that resilience must connect risk knowledge, planning, governance, and implementation, rather than remain a policy slogan (Majlingová & Kádár, 2025; OECD, 2024). However, in South-East Nigeria, there is still limited synthesis on how project planning and control can be integrated with lessons from climate disasters to guide more resilient infrastructure delivery. This is the specific gap this study steps in to address.

In this paper, we argue that integrated project planning and control can improve climate-resilient infrastructure in South-East Nigeria when climate disaster lessons are built into the full project cycle. The study is based on the view that planning should not stop at scheduling activities, estimating cost, and assigning responsibilities. It should also identify climate hazards, assess site vulnerability, plan adaptive design responses, monitor risk indicators, control implementation quality, and support recovery after disaster events (UNDRR, 2015; Mayo-Alvarez et al., 2022; OECD, 2024; Okoye et al., 2025). The paper examines climate disasters in South-East Nigeria as practical evidence for improving future infrastructure decisions. It draws on studies of flooding, erosion, food insecurity, disaster management, sustainable

design, and construction project planning to show where existing systems have failed and where integration is needed (Cirella & Iyalomhe, 2018; Ajake et al., 2022; Ajayi et al., 2023; Akinkuolie et al., 2024). The paper also uses lessons from the Nigeria Erosion and Watershed Management Project to show that infrastructure resilience requires watershed thinking, stakeholder coordination, environmental assessment, and long-term control beyond the construction phase (World Bank, 2023). Methodologically, the study foreshadows an evidence-based review of climate disaster literature, project management studies, and policy reports, with attention to planning tools, monitoring systems, control mechanisms, and resilience outcomes. The expected result is an integrated planning and control framework that links climate risk assessment, project scheduling, cost control, design adaptation, stakeholder coordination, disaster preparedness, and post-project monitoring. In this way, the paper contributes to project management, construction planning, disaster risk reduction, and climate-resilient infrastructure practice in South-East Nigeria.

2. METHOD

This study adopts a qualitative research design based on content analysis of secondary data. The design is suitable because the study seeks to understand how climate-induced disasters, infrastructure failures, and resilience strategies have been discussed across academic, policy, and disaster-management sources. The review focused on South-East Nigeria, with attention to flooding, gully erosion, infrastructure damage, disaster preparedness, and climate adaptation. Secondary data were drawn from peer-reviewed journal articles, government and non-governmental reports, World Bank documents, United Nations disaster risk reduction materials, and published case studies on climate disasters and infrastructure resilience (UNDRR, 2015; Ajake et al., 2022; World Bank, 2023; OECD, 2024).

The sources were selected because they provided evidence on climate risk, project planning, construction control, disaster response, and resilience-building in Nigeria and comparable contexts. Priority was given to sources that addressed South-East Nigeria directly, especially studies on flooding, erosion, soil vulnerability, disaster management infrastructure, and sustainable design (Amangabara & Otumchere, 2016; Igwe & Egbueri, 2018; Chude et al., 2020; Ekwueme et al., 2021; Ajayi et al., 2023). Project management literature was also reviewed to connect climate resilience with planning, scheduling, monitoring, cost control, and project performance (Mayo-Alvarez et al., 2022; Okoye et al., 2025). Data extraction focused on hazard type, affected infrastructure, planning weakness, control failure, adaptation response, stakeholder role, and resilience lesson.

The data were analyzed thematically. Repeated ideas were grouped under disaster risk, infrastructure vulnerability, project scheduling, cost control, design adaptation, stakeholder coordination, disaster preparedness, and post-project monitoring. Comparative analysis was then used to identify common weaknesses and useful practices across the reviewed sources. Based on this synthesis, the study develops an integrated planning and control framework that links climate risk assessment, project scheduling, cost control, design adaptation, stakeholder coordination, disaster preparedness, and post-project monitoring.

This framework provides a structured basis for improving climate-resilient infrastructure delivery in South-East Nigeria.

3. RESULTS

The content analysis produced five result themes. These themes were disaster risk and infrastructure vulnerability, disaster management capacity, resilience and adaptation measures, project planning and control patterns, and lessons for an integrated planning and control framework. The evidence came from studies on flooding, erosion, soil erodibility, disaster management, sustainable design, food security, climate adaptation, infrastructure resilience, and construction project control in Nigeria and related contexts (Ajake et al., 2022; Ajayi et al., 2023; Akinkuolie et al., 2024; Chude et al., 2020; Cirella & Iyalomhe, 2018; Mayo-Alvarez et al., 2022; OECD, 2024; Okoye et al., 2025; World Bank, 2023).

3.1 Evidence Profile and Main Result Themes

The reviewed sources show that climate-resilient infrastructure in South-East Nigeria is shaped by both environmental hazards and project delivery weaknesses. Flooding is repeatedly linked with poor drainage, weak land-use control, and limited long-term adaptation planning (Cirella & Iyalomhe, 2018; Ajake et al., 2022; Akinkuolie et al., 2024). Gully erosion is also a major result theme, especially in Imo, Anambra, and Enugu, where soil type, geology, runoff, slope conditions, and human activity increase land failure and infrastructure exposure (Amangabara & Otumchere, 2016; Igwe & Egbueri, 2018; Chude et al., 2020; Ekwueme et al., 2021). Project control literature adds a second layer to the results by showing that scheduling, earned value, cost monitoring, and planning techniques are useful but often remain focused on time and cost rather than climate risk and resilience performance (Mayo-Alvarez et al., 2022; Okoye et al., 2025).

Table 1: Summary of content-analysis result themes

Result theme	Main result from the sources	Key sources
Disaster risk and infrastructure vulnerability	Flooding, gully erosion, soil instability, and weak drainage expose roads, housing, settlements, and public infrastructure.	Amangabara & Otumchere (2016); Igwe & Egbueri (2018); Chude et al. (2020); Ekwueme et al. (2021); Ajake et al. (2022)
Disaster management capacity	Disaster response is affected by weak coordination, limited infrastructure, poor preparedness, and uneven institutional capacity.	UNDRR (2015); Ajake et al. (2022); IPCC (2023)
Resilience and adaptation measures	Adaptation actions exist, but many remain localized, reactive, or weakly scaled across infrastructure systems.	Cirella & Iyalomhe (2018); Akinkuolie et al. (2024); World Bank (2023); OECD (2024)

Planning and control techniques	Scheduling and cost control tools support delivery but need stronger links with climate risk, design adaptation, and post-project monitoring.	Mayo-Alvarez et al. (2022); Okoye et al. (2025); OECD (2024)
Integrated framework output	The findings support a framework that links risk assessment, scheduling, cost control, design adaptation, stakeholder coordination, preparedness, and monitoring.	UNDRR (2015); World Bank (2023); OECD (2024); Majlingová & Kádár (2025)

Source: Authors' synthesis, 2026

3.2 Disaster Risk and Infrastructure Vulnerability

Flooding appears as a repeated risk because it damages housing, roads, public facilities, drainage systems, farms, and community access routes (Cirella & Iyalomhe, 2018; Ajake et al., 2022; Akinkuolie et al., 2024). Erosion is also a central risk in the South-East because gullies develop through a combination of rainfall, erodible soils, slope conditions, runoff concentration, poor drainage, and land-use pressure (Amangabara & Otumchere, 2016; Igwe & Egbueri, 2018; Chude et al., 2020; Ekwueme et al., 2021). These sources show that infrastructure failure is not caused by climate events alone. It is also linked with weak site planning, poor drainage control, vulnerable soils, and limited preventive maintenance (Amangabara & Otumchere, 2016; Cirella & Iyalomhe, 2018; Ekwueme et al., 2021; World Bank, 2023).

3.3 Disaster Management and Resilience Capacity

The reviewed evidence shows gaps in coordination, preparedness, response infrastructure, and local implementation in South-East Nigeria (Ajake et al., 2022). These gaps matter because the Sendai Framework treats disaster risk reduction as a process that requires risk knowledge, resilient investment, preparedness, recovery planning, and institutional coordination (UNDRR, 2015). The IPCC also shows that climate risks increase when exposure, vulnerability, and weak adaptation systems meet more intense climate hazards (IPCC, 2023). The findings therefore show that disaster management in the region is not only an emergency-response problem. It is also a planning and control problem because infrastructure projects need risk information before design, control checks during delivery, and monitoring after use (UNDRR, 2015; Ajake et al., 2022; OECD, 2024).

3.4 Resilience and Adaptation Measures

Some sources report adaptation actions such as drainage works, erosion control, watershed management, vegetation cover, flood-risk awareness, and climate-sensitive design (Igwe & Egbueri, 2018; Cirella & Iyalomhe, 2018; World Bank, 2023; Akinkuolie et al., 2024). However, the evidence also shows that many actions are reactive, localized, or project-bound rather than embedded across the full infrastructure

cycle (Ajayi et al., 2023; World Bank, 2023; OECD, 2024). The Nigeria Erosion and Watershed Management Project provides important evidence that erosion and flood control require watershed thinking, environmental assessment, community participation, engineering works, and long-term operation and maintenance (World Bank, 2023). Sustainable design literature also shows that housing and infrastructure resilience require attention to affordability, climate exposure, material choices, local needs, and environmental performance (Ajayi et al., 2023).

3.5 Project Planning and Control Patterns

Studies on construction project management in Nigeria show that planning and scheduling techniques are important for project delivery, but their effectiveness depends on proper use, monitoring, resource planning, and control discipline (Okoye et al., 2025). Earned value management and related control methods support schedule and cost tracking, but the reviewed project-control literature shows that these tools are usually strongest when performance measures are clearly defined and regularly monitored (Mayo-Alvarez et al., 2022). In the climate-resilience evidence, the control problem is wider than time and cost. Projects also need to track climate risk exposure, drainage adequacy, slope stability, design adaptation, stakeholder readiness, maintenance plans, and post-project performance (UNDRR, 2015; World Bank, 2023; OECD, 2024; Majlingová & Kádár, 2025).

3.6 Lessons from Climate Disasters

The evidence shows that early risk assessment is needed before infrastructure sites are selected and designs are approved (Amangabara & Otumchere, 2016; Igwe & Egbueri, 2018; Ekwueme et al., 2021). It also shows that project schedules and budgets need climate-risk allowances because floods, erosion, drainage works, resettlement issues, and emergency repairs can affect delivery time and cost (Mayo-Alvarez et al., 2022; World Bank, 2023; Okoye et al., 2025). Stakeholder coordination also appears as a repeated lesson because disaster risk reduction depends on government agencies, contractors, communities, technical experts, and local institutions working with shared risk information (UNDRR, 2015; Ajake et al., 2022; World Bank, 2023; Majlingová & Kádár, 2025).

Table 2: Framework components derived from the results

Framework component	Result evidence	Control focus
Climate risk assessment	Flooding, erosion, soil erodibility, slope conditions, runoff, and land-use pressure expose infrastructure to failure.	Screen sites, map hazards, assess drainage, soil, slope, and exposure before design.
Project scheduling	Climate events and site risks can delay works and recovery activities.	Add risk allowances, weather windows, emergency tasks, and review points.

Cost control	Erosion control, drainage, adaptation works, and maintenance require planned resources.	Track resilience costs, contingencies, variation risks, and lifecycle costs.
Design adaptation	Conventional designs may fail where drainage, soil, and climate risk are ignored.	Align design with watershed conditions, drainage capacity, materials, and local vulnerability.
Stakeholder coordination	Fragmented agency action and weak community engagement reduce response quality.	Coordinate government, contractors, experts, communities, and emergency actors.
Disaster preparedness	Preparedness gaps increase loss during floods and erosion events.	Include early warning, evacuation support, emergency access, and response roles.
Post-project monitoring	Infrastructure remains exposed after completion if maintenance and risk checks are weak.	Monitor drainage, erosion movement, asset condition, community feedback, and adaptation performance.

Source: Authors' synthesis, 2026

3.7 Framework Output

The final result is an integrated planning and control framework for climate-resilient infrastructure in South-East Nigeria. The framework links climate risk assessment, project scheduling, cost control, design adaptation, stakeholder coordination, disaster preparedness, and post-project monitoring. Each part of the framework was derived from recurring findings across the disaster-risk, adaptation, infrastructure, and project-control sources (UNDRR, 2015; Mayo-Alvarez et al., 2022; World Bank, 2023; OECD, 2024; Majlingová & Kádár, 2025; Okoye et al., 2025).

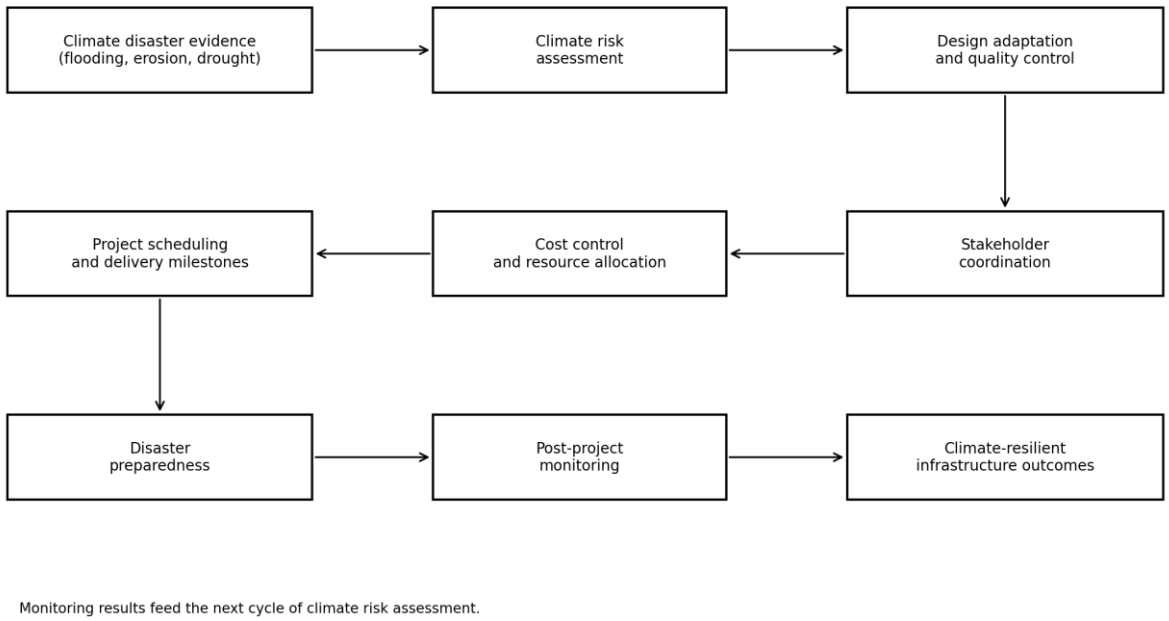


Figure 1: Integrated project planning and control framework for climate-resilient infrastructure
Source: Authors' synthesis, 2026

4. DISCUSSION

4.1 Integrated Planning and Control for Climate Resilience

The findings show that climate-resilient infrastructure in South-East Nigeria needs more than normal project planning. The region faces repeated flooding, gully erosion, unstable soils, poor drainage, and damage to roads, houses, farmlands, and settlements (Amangabara & Otumchere, 2016; Igwe & Egbueri, 2018; Chude et al., 2020; Ekwueme et al., 2021). These risks are becoming more serious because climate change is increasing the pressure on infrastructure and vulnerable communities (Intergovernmental Panel on Climate Change [IPCC], 2023; OECD, 2024). For this reason, infrastructure projects should not be planned only around time, cost, and scope. They should also include climate risk assessment, site vulnerability, design adaptation, disaster preparedness, stakeholder coordination, and post-project monitoring (United Nations Office for Disaster Risk Reduction [UNDRR], 2015; OECD, 2024; Majlingová & Kádár, 2025).

4.2 Weak Disaster Coordination

A major issue from the results is weak coordination among disaster management actors. Disaster response in South-East Nigeria often involves federal, state, local, and community institutions, but these actors do

not always work through one clear system (Ajake et al., 2022). This weak coordination can delay response, slow recovery, and reduce the value of disaster interventions (Ajake et al., 2022; World Bank, 2023). The Sendai Framework stresses that disaster risk reduction should be based on shared responsibility, strong governance, preparedness, and resilient investment (UNDRR, 2015). The findings suggest that these principles are still not fully built into infrastructure planning and control in South-East Nigeria.

4.3 Climate Risk Should Start the Project Cycle

The findings also show that climate risk is often addressed too late. Many responses come after flood damage, erosion expansion, or infrastructure failure has already occurred (Ajake et al., 2022; World Bank, 2023). This is a weak approach because flooding and erosion in South-East Nigeria are linked to known factors such as rainfall, runoff, soil erodibility, slope conditions, poor drainage, and land-use pressure (Amangabara & Otumchere, 2016; Igwe & Egbueri, 2018; Chude et al., 2020; Ekwueme et al., 2021). These risks can be studied before construction begins. Therefore, climate risk assessment should guide site selection, feasibility studies, design review, cost estimation, scheduling, procurement, supervision, and maintenance planning (UNDRR, 2015; OECD, 2024; Okoye et al., 2025).

4.4 Project Control Tools Need Resilience Indicators

Project scheduling, cost control, and earned value management are useful for monitoring time, cost, and progress (Mayo-Alvarez et al., 2022; Okoye et al., 2025). However, the results show that these tools are not enough when used alone. A project may be delivered on time and within budget, but it may still fail if it ignores erosion risk, flood exposure, drainage weakness, or long-term maintenance needs (Mayo-Alvarez et al., 2022; OECD, 2024). This means that project control should include resilience indicators. These may include drainage adequacy, slope protection, soil stability, climate-risk screening, emergency access, maintenance plans, stakeholder readiness, and post-project performance checks (UNDRR, 2015; World Bank, 2023; OECD, 2024).

4.5 Design Adaptation and Local Conditions

The findings also support the need for climate-sensitive design. Infrastructure in South-East Nigeria should respond to local soil, rainfall, drainage, settlement, and erosion conditions (Amangabara & Otumchere, 2016; Cirella & Iyalomhe, 2018; Ekwueme et al., 2021). Sustainable design studies in Nigeria also show that housing and infrastructure should respond to environmental stress, local needs, and affordability (Ajayi et al., 2023). In flood-prone and erosion-prone areas, this may require stronger drainage, slope stabilization, erosion-control works, flood-resistant housing, safer road alignments, and better maintenance systems (Chude et al., 2020; Ajayi et al., 2023; OECD, 2024). These measures should

be included from the beginning of the project, not added after failure has occurred (UNDRR, 2015; OECD, 2024).

4.6 Lessons from NEWMAP

The Nigeria Erosion and Watershed Management Project gives an important lesson for this study. NEWMAP showed that erosion control requires more than isolated engineering works. It requires watershed planning, environmental assessment, community involvement, institutional coordination, and long-term monitoring (World Bank, 2023). This lesson is important because erosion often crosses community and local government boundaries in South-East Nigeria (Amangabara & Otumchere, 2016; Chude et al., 2020; Ekwueme et al., 2021). Infrastructure projects should therefore not be controlled as single-site activities only. Roads, drains, housing, and erosion-control works should be planned as parts of wider environmental systems (World Bank, 2023; OECD, 2024).

4.7 Community Participation

The findings show that community involvement is central to resilience. Local people often understand where floods begin, where water gathers, where erosion expands, and where infrastructure fails during heavy rainfall (Ajake et al., 2022; Akinkuolie et al., 2024). This knowledge can support early warning, evacuation planning, drainage maintenance, vegetation control, and better site decisions (Ajake et al., 2022; Akinkuolie et al., 2024). However, community action alone is not enough. Local efforts need technical support, funding, engineering input, government backing, and long-term monitoring (UNDRR, 2015; World Bank, 2023; OECD, 2024). This supports the study's framework, which places stakeholder coordination at the centre of climate-resilient infrastructure planning.

4.8 Policy and Practice Implications

The study suggests four key policy and practice actions. First, climate risk assessment should be required before major infrastructure projects are approved in flood-prone and erosion-prone areas (UNDRR, 2015; OECD, 2024). Second, project planning documents should include resilience indicators, not only time, cost, and scope indicators (Mayo-Alvarez et al., 2022; Okoye et al., 2025). Third, infrastructure budgets should include adaptation, maintenance, and monitoring costs because resilience depends on long-term control (World Bank, 2023; OECD, 2024). Fourth, disaster agencies, engineers, planners, contractors, local governments, and communities should work with shared climate and site-risk information (Ajake et al., 2022; UNDRR, 2015; Majlingová & Kádár, 2025).

4.9 Limitations of the Study

This study has some limitations. First, it used secondary data from published studies, policy documents, reports, and project records. This helped to identify broad patterns, but it did not include field visits,

interviews, or direct observation. Second, the available literature does not cover all parts of South-East Nigeria equally. Some evidence focuses on erosion in Imo, Anambra, and Enugu, while other states and infrastructure types are less represented (Amangabara & Otumchere, 2016; Igwe & Egbueri, 2018; Ekwueme et al., 2021). Third, the proposed integrated planning and control framework has not yet been tested on live infrastructure projects. Future studies should apply it to road, drainage, housing, erosion-control, and recovery projects in South-East Nigeria (Mayo-Alvarez et al., 2022; Okoye et al., 2025; OECD, 2024). Fourth, this study focused mainly on planning and control. It did not deeply examine financing, procurement politics, contractor behaviour, land ownership, or community conflict, although these factors can affect infrastructure resilience (Ajake et al., 2022; World Bank, 2023).

5. CONCLUSION AND FUTURE DIRECTION

This study examined how integrated project planning and control can support climate-resilient infrastructure in South-East Nigeria. The findings show that flooding, gully erosion, unstable soils, poor drainage, weak coordination, and reactive disaster response continue to expose communities and infrastructure to climate risk. The study also shows that normal project planning is not enough when climate threats are already known before construction begins. Infrastructure projects in the region should not be judged only by time, cost, and scope. They should also be judged by how well they assess climate risk, respond to site conditions, adapt design, involve stakeholders, prepare for disasters, and remain functional after completion. The study therefore proposes an integrated planning and control framework that links climate risk assessment, project scheduling, cost control, design adaptation, stakeholder coordination, disaster preparedness, and post-project monitoring. This framework offers a practical way to move infrastructure delivery from emergency repair toward prevention, adaptation, and long-term resilience.

Future work should test this framework in real infrastructure projects across South-East Nigeria, especially road, drainage, housing, erosion-control, and post-disaster recovery projects. Field studies should include engineers, planners, contractors, disaster agencies, local governments, and affected communities so that both technical and local knowledge can inform project decisions. Future research should also examine how resilience indicators can be added to project schedules, budgets, procurement documents, monitoring tools, and maintenance plans. More state-by-state studies are needed because flood and erosion risks differ across Anambra, Imo, Enugu, Abia, and Ebonyi. Further studies should also explore financing, procurement delays, contractor capacity, land-use conflict, and public-private partnerships, since these factors affect whether climate-resilient infrastructure can be delivered in practice. Overall, South-East Nigeria needs infrastructure planning that is proactive, coordinated, locally informed, and climate-aware.

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