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RESEARCH ARTICLE

FACTORS INFLUENCING THE PRESERVATION AND DETERIORATION OF NATIONAL MONUMENTS IN BAUCHI AND PLATEAU STATES, NIGERIA

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ABSTRACT

This study examined the factors influencing the preservation and deterioration of national monuments in Bauchi and Plateau States, Nigeria, with emphasis on monument types and spatial distribution, physical condition, climatic and environmental influences, human-induced factors, and sustainable management strategies. A mixed-methods research design was adopted, combining field observation, structured questionnaires, key informant interviews, and documentary review. A total of 400 questionnaires were administered across selected monument sites, including stone causeways, rock art locations, historic palaces, and colonial industrial relics. The results indicate that stone causeways constitute the most dominant monument type (95 percent), with most monuments located in environmentally sensitive areas such as river valleys, floodplains, and hill slopes. Assessment of physical condition revealed that over 60 percent of the monuments are in fair to poor condition, with visible structural weakening, surface erosion, biological growth, and material loss. Climatic and environmental factors, particularly intense rainfall, flooding, temperature fluctuations, and vegetation encroachment, were identified as major contributors to deterioration. Human-induced factors, including agricultural encroachment, vandalism, uncontrolled access, and inadequate maintenance, further exacerbate monument degradation. Respondents strongly supported strategies such as routine maintenance, community participation, public awareness, legal enforcement, and climate-sensitive conservation planning as critical to sustainable preservation. The study concludes that effective monument conservation in Bauchi and Plateau States requires an integrated approach that combines environmental management, community engagement, and strengthened institutional frameworks. It recommends the adoption of preventive conservation practices, community-based heritage management, and improved policy enforcement to safeguard Nigeria's national monuments for future generations.

Keywords: National monuments; Preservation; Climatic impacts; Deterioration; Influencing

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1.0. INTRODUCTION

National monuments constitute an essential component of cultural heritage, serving as tangible expressions of a society's historical trajectory, collective memory, technological achievements, and socio-cultural identity. Across the world, monuments such as archaeological sites, historic buildings, rock art, and ancient infrastructure are increasingly recognized not only as symbols of the past but also as strategic resources for education, tourism development, social cohesion, and sustainable development. International bodies such as UNESCO emphasize that the preservation of cultural heritage contributes significantly to cultural continuity, national identity, and intergenerational knowledge transmission (UNESCO, 2017; ICOMOS, 2019).

Despite their recognized importance, national monuments globally are facing escalating threats arising from both natural and human-induced factors. Climatic variability, including increased rainfall intensity, flooding, temperature fluctuations, and wind erosion, has been identified as a major driver of physical deterioration, particularly for monuments constructed with stone, earth, and other vulnerable traditional materials (Brimblecombe, 2014; Sesana et al., 2021). In parallel, anthropogenic pressures such as unregulated land use, agricultural encroachment, vandalism, neglect, inadequate maintenance, and weak institutional frameworks continue to undermine monument preservation, especially in developing countries (Matero, 2016; Ndoro & Pwiti, 2020).

In Africa, the challenge of preserving national monuments is compounded by limited funding, insufficient technical capacity, weak heritage legislation enforcement, and low public awareness of heritage values. Several studies have observed that many African monuments exist in fragile states due to prolonged neglect and minimal integration of local communities into conservation strategies (Jopela, 2017; Ogundiran, 2020). Furthermore, the impacts of climate change are disproportionately severe in sub-Saharan Africa, intensifying erosion, vegetation overgrowth, flooding, and material decay at heritage sites (Adams et al., 2018).

Nigeria, endowed with a rich array of national monuments ranging from prehistoric rock art and stone structures to colonial-era buildings and traditional palaces, mirrors these broader challenges. Although many monuments have been officially declared and gazetted as national heritage sites, their physical conditions vary widely, reflecting differences in environmental exposure, management practices, community engagement, and institutional support. Existing scholarship indicates that Nigerian monuments often suffer from inadequate conservation planning, limited monitoring, insufficient funding, and competing land-use demands (Aremu, 2015; Okpoko, 2018). These challenges raise concerns about the long-term sustainability of the country's cultural heritage assets.

Within this national context, Bauchi and Plateau States occupy a particularly important position due to their concentration of diverse monuments, including rock paintings, stone causeways, mining relics, caves, and historic settlements. These monuments are located within environmentally dynamic landscapes characterized by seasonal rainfall, surface runoff, river systems, and expanding agricultural activities. In Plateau State, especially in areas such as Bokkos Local Government Area, stone causeways such as those found at Butura, Tadding, and Forof are exposed to hydrological processes, vegetation encroachment, and human modification of river channels. Similarly, monuments in Bauchi State face pressures from weathering, erosion, settlement expansion, and changing land-use patterns.

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Empirical evidence also indicates that environmental factors such as rainfall intensity, flooding, surface runoff, temperature variations, and biological growth significantly accelerate the degradation of monuments constructed with stone, earth, and other traditional materials (Brimblecombe, 2014; Sesana et al., 2021). In Bauchi and Plateau States, seasonal climatic conditions, coupled with river dynamics and erosion processes, pose serious risks to monuments such as rock art sites, stone causeways, and historic structures. However, the extent to which these climatic and environmental factors interact with human activities to influence monument preservation remains insufficiently documented.

In addition to environmental pressures, anthropogenic factors continue to exacerbate the deterioration of national monuments in Nigeria. These include agricultural encroachment, uncontrolled grazing, stone removal, vandalism, infrastructural development, and settlement expansion around heritage sites (Jopela, 2017; Ogundiran, 2020). In many cases, local communities depend on the surrounding landscapes for livelihood activities, creating conflicts between heritage conservation and daily survival needs. The absence of clearly defined buffer zones and weak enforcement of heritage protection laws further intensify these challenges.

Previous studies have documented the historical significance and typological characteristics of monuments in Bauchi and Plateau States, there remains a noticeable gap in empirical research that systematically examines the factors influencing their preservation and deterioration. Many existing works focus primarily on descriptive accounts or historical narratives, with limited attention given to the combined effects of environmental conditions, human activities, institutional management, and community practices on monument integrity. This gap constrains evidence-based heritage management and weakens policy interventions aimed at safeguarding these monuments. It is against this background that this study examines the factors influencing the preservation and deterioration of national monuments in Bauchi and Plateau States, Nigeria. To achieve this, the following objectives are the steppingstone:

1. identify the types and spatial distribution of national monuments in Bauchi and Plateau States.
2. assess the current physical condition of selected national monuments in the study area.
3. examine the climatic and environmental factors influencing the preservation and deterioration of the national monuments.
4. analyze human-induced factors, including land-use activities and community interactions, affecting the physical condition of the monuments.
5. propose appropriate strategies for improving the preservation and sustainable management of national monuments in Bauchi and Plateau States.

3.0. METHODS AND MATERIALS

3.1. Study Area

Bauchi and Plateau States are located in the North-East and the North-Central geopolitical zones of Nigeria, respectively. Bauchi State lies between latitudes 9°30′ and 12°30′N and longitudes 8°45′ and 11°00′E, while Plateau State is located between latitudes 8°30′ and 10°30′N and longitudes 8°22′ and 10°38′E (Dung-Gwom et al. 2009). Geographically, Bauchi State is characterized by savannah vegetation, sandstone formations, and seasonal climatic variations that expose monuments to

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geomorphological and climatological processes such as weathering, erosion, rainfall, and temperature fluctuations.

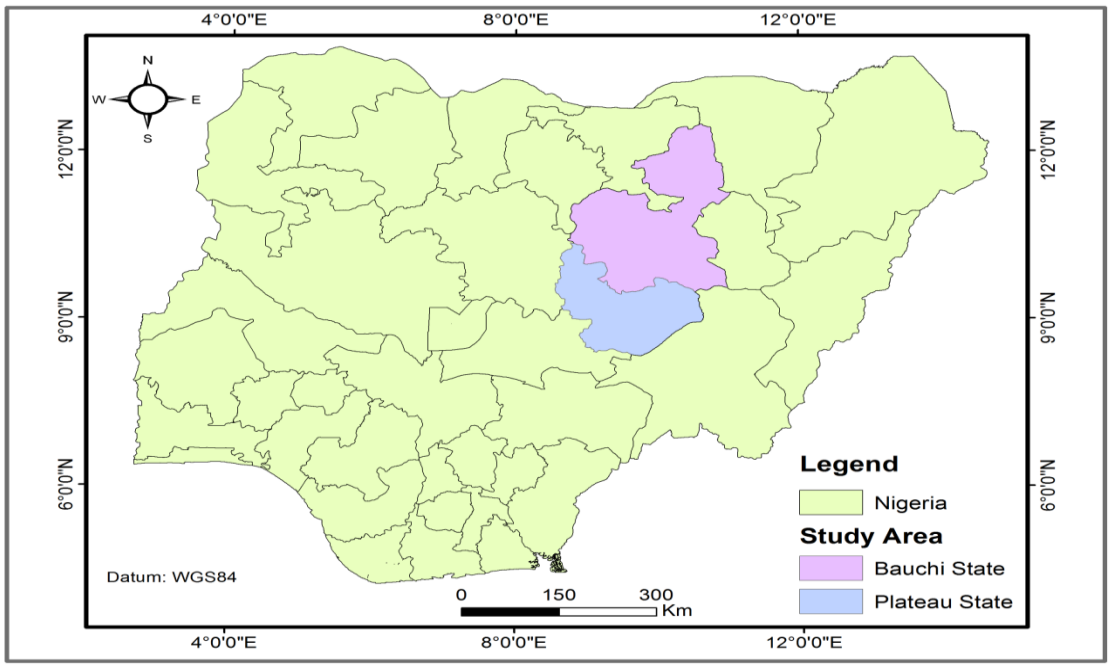

Figure 1: Nigeria showing Bauchi and Plateau States
Source: GIS Lab, Department of Geography and Planning, University of Jos (2024).

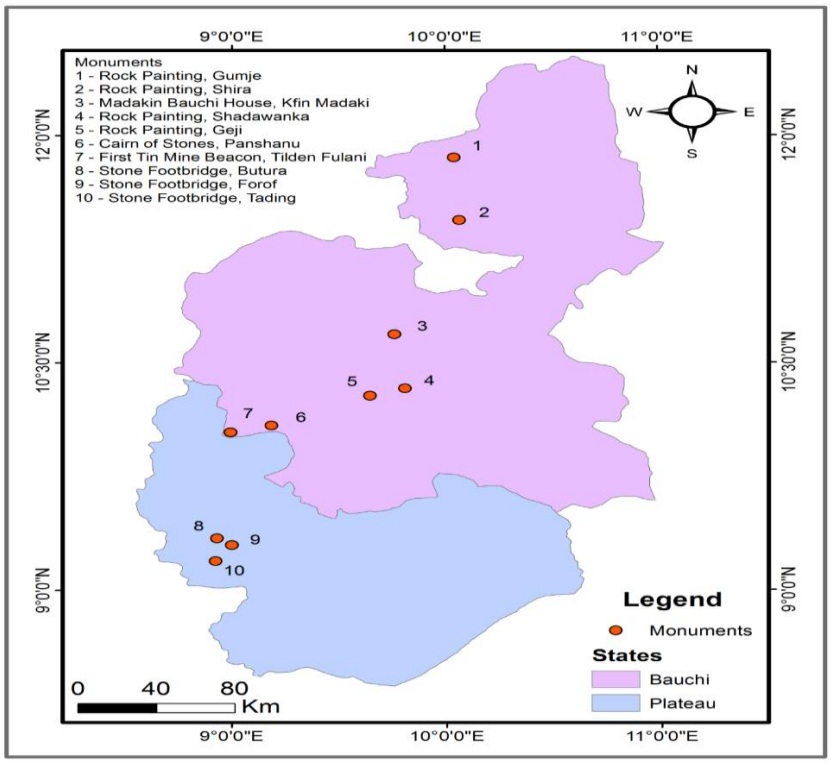

Figure 2: National Monuments in Bauchi and Plateau States
Source: GIS Lab, Department of Geography and Planning, University of Jos (2024)

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3.2. Research Design

The study adopted a descriptive cross-sectional research design using a mixed-methods approach**.** This design was considered appropriate because it allows for systematic assessment of the physical condition of monuments at a specific point in time while capturing perceptions, attitudes, and experiences of host communities regarding monument preservation and deterioration. The combination of quantitative and qualitative methods enabled triangulation of findings, thereby enhancing the reliability and validity of the results.

3.3. Sources of Data

Data for the study were obtained from both primary and secondary sources**.** Primary data were collected through structured questionnaires administered to residents of host communities; direct field observations of the physical condition of monuments; key informant interviews with traditional leaders, community elders, and officials of the National Commission for Museums and Monuments (NCMM). Secondary data were sourced from published and unpublished materials, including academic journals, textbooks, government reports, NCMM archival records, policy documents, conference proceedings, and relevant online databases. These materials provided historical background, theoretical perspectives, and contextual information on monument conservation and heritage management.

3.4. Population of the Study and Sample Size

The population of the study comprised residents of communities hosting accessible national monuments in Bauchi and Plateau States. Although ten national monuments exist within the two states, security concerns rendered two monuments inaccessible, resulting in **eight monuments** being included in the study. Consequently, the population consisted of residents living in proximity to these monuments, as they are the primary stakeholders interacting with the heritage sites. Given that the exact population size of these communities was unknown, the sample size was determined using the formula for unknown populations as recommended by Israel (1992):

$$x = \frac{Z^2 pg}{e^2}$$

Where S is the sample size, Z is the z-score at 95% confidence level (1.96), p is the estimated population proportion (0.5), q is $1 - p$, and e is the margin of error (0.05). Based on this computation, an approximated sample size of 400 respondents was obtained and used for questionnaire administration.

Sampling Technique

A multistage sampling technique was employed. First, purposive sampling was used to select accessible monuments based on safety and relevance. Second, stratified sampling was adopted to divide host communities into wards or settlement units. Finally, simple random sampling was applied to select households within each stratum, targeting adult residents with adequate knowledge of the monuments. Key informants were selected purposively based on their historical knowledge and custodial roles within the communities.

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3.5. Data Analysis

Quantitative data obtained from questionnaires were coded and analyzed using descriptive statistical techniques, including frequencies, percentages, means, and charts, with the aid of statistical software. These analyses facilitated the interpretation of patterns related to monument condition and perceived factors of deterioration. Qualitative data from interviews and field observations were analyzed using thematic content analysis, allowing for identification of recurring themes related to environmental impacts, human activities, institutional challenges, and community participation in conservation. The integration of quantitative and qualitative findings provided a comprehensive understanding of the factors influencing the preservation and deterioration of national monuments in the study area.

4.0. DISCUSSIONS AND RESULTS

4.1. Assessment of Types and Spatial Distribution of National Monuments

The types and spatial characteristics of national monuments identified in Bauchi and Plateau States are presented in Table 1. The results reveal distinct patterns in the typology and spatial characteristics of national monuments across the study area, highlighting the relationship between monument type, dominant functional classification, and locational context. Stone causeways, represented by the Butura, Forof, and Tadding monuments, account for the highest frequency at 95 percent**,** making them the most dominant monument type identified. This finding aligns with Ogundiran (2020), who argues that many precolonial African monuments were constructed as functional adaptations to landscape challenges rather than as symbolic edifices.

The rock art and rock painting sites such as the Shira Rock Paintings and Shadawanka Cave, recorded 75 percent in the sequence. Historic buildings and palaces, exemplified by Gidan Madaki, show an exceptionally high frequency of 97 percent and are primarily located within settlement cores and traditional political centres. Ndoro and Pwiti (2020) argue that monuments embedded within living cultural landscapes often benefit from sustained community engagement, which enhances their symbolic value and prospects for preservation. Industrial and colonial monuments, represented by the Tin Mining Beacon, recorded a frequency of 82 percent and are predominantly located in isolated sites or former mining zones. From an inferential standpoint, the results demonstrate that monument type, dominant classification, and spatial location are interdependent factors shaping both heritage significance and vulnerability**.**

Table 1: Types and Spatial Distribution of National Monuments in Bauchi and Plateau States

Monument Type	Examples Identified	Dominant location/ characteristics	Dominant Type	Freq (%)
Stone causeways	Butura, Forof, Tadding	River valleys, floodplains, rural peripheries	Archeological	95
Rock art/rock paintings	Shira rock paintings, Shadawanka Cave	Hill slopes, caves, rock outcrops	Historical	75
Historic Buildings/palaces	Gidan Madaki	Settlement cores, traditional political centres	Cultural	97
Industrial/colonial monuments	Tin Mining Beacon	Isolated sites/ former mining zone	Historical	82

Source: Authors' Analysis (2026).

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4.2. Evaluation of Physical Condition of Selected National Monuments

The results presented in Table 2 reveal clear differences in the physical condition of national monuments based on monument type, environmental context, and level of human interaction. Stone causeways the most physically degraded monuments **(**88 percent) as being in poor to very poor condition; Rock art and rock painting sites were predominantly rated as fair to poor (72 percent), reflecting moderate to advanced deterioration. Similarly, Historic buildings, particularly Gidan Madaki, displayed comparatively better physical conditions (65 percent), largely due to continuous use and periodic maintenance by local custodians.

Industrial and colonial monuments, such as the Tin Mining Beacon, were rated fair (58 percent), indicating early-stage deterioration associated with neglect and environmental exposure rather than structural failure. The severe deterioration observed in stone causeways aligns strongly with existing scholarship of Brimblecombe (2014) on heritage vulnerability in fluvial environments, who emphasizes that stone-based heritage structures located within river valleys are highly susceptible to mechanical erosion, chemical weathering, and sediment abrasion. The findings from Butura, Forof, and Tadding therefore corroborate these assertions, demonstrating that environmental exposure remains a dominant determinant of physical decline. In contrast, the relatively better condition of historic buildings, particularly Gidan Madaki, supports arguments advanced by Ndoro and Pwiti (2020), who contend that monuments integrated into active social and cultural life benefit from informal conservation mechanisms.

Table 2: Physical Condition Assessment of Selected National Monuments

Type	Example	Environmental Setting	Observed Condition	Deterioration Indicators	Condition Rating
Stone causeways	Butura, Forof, Tadding	River valleys, floodplains	Severe surface erosion, stone displacement	Flood erosion, sediment deposition	Poor-very poor (88%)
Rock art/paintings	Shira Rock, Shadawanka Cave	Hill slopes, caves, rock outcrops	Pigment fading, surface exfoliation, biological growth	Weathering, moisture seepage, human contact	Fair-poor (72%)
Historical building/ palace	Gidan Madaki	Settlement/ traditional centres	Structural stability with localized material decay	Cracks, roof degradation, aging materials	Good-fair (65%)
Industrial	Tin Mining Beacon	Isolated former mining zones	Surface weathering, neglect, vegetation encroachment	Corrosion, exposure, lack of maintenance	Fair (58%)

Source: Authors' Analysis (2026).

4.3. Climatic and Environmental Factors Influencing Monument Preservation

The results in Table 3 demonstrate that climatic and environmental factors exert significant and cumulative pressure on national monuments in the study area. Rainfall intensity and surface runoff most severe environmental threats, with 91 percent of respondents and field observations identifying flooding and sediment deposition as major contributors to deterioration, particularly for stone

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causeways located in river valleys. High relative humidity and persistent moisture were also identified as critical factors (83 percent), especially for rock paintings and historic buildings.

Collectively, these findings reveal that environmental factors operate synergistically, accelerating degradation when left unmanaged. The dominance of rainfall and runoff as deterioration agents strongly corroborates findings by Brimblecombe (2014), who identified moisture as the primary catalyst for physical and chemical decay in outdoor heritage structures. Matero (2016) further explains that moisture infiltration accelerates pigment loss, salt crystallization, and biological colonization, all of which were evident at the Shira and Shadawanka sites.

Table 3: Climatic and Environmental Factors Affecting National Monuments

Climatic/Environmental Factor	Manifestation at Monument Sites	Most Affected Monument Types	Severity Level (%)	Dominant Impact on Physical Condition
Rainfall intensity and runoff	Flooding, sediment deposition, stone displacement	Stone-causeways (Butura, Forof, Tadding)	91	Structural weakening and partial collapse
Temperature variation	Thermal expansion and contraction, surface cracking	Rock art, historic buildings	76	Surface exfoliation and pigment fading
Relative humidity and moisture	Dampness, biological growth (algae, lichens)	Rock paintings, historic buildings	83	Chemical alteration and material decay
Wind action	Abrasion, dust deposition	Rock outcrops, exposed monuments	68	Surface erosion and loss of inscriptions
Vegetation growth	Root penetration, stone displacement	Stone causeways, industrial monuments	79	Structural instability
Soil erosion	Undermining of foundations	Stone causeways, historic structures	74	Tilting and collapse risk

Source: Authors' Analysis (2026).

4.4. Human-Induced Factors Affecting the Physical Condition of Monuments

The results indicate that human-induced factors play a dominant role in shaping the current physical condition of national monuments in Bauchi and Plateau States. Neglect and lack of maintenance recorded the highest response level (93 percent), reflecting systemic weaknesses in heritage management practices. This neglect allows minor environmental damage to escalate into severe structural deterioration. Vandalism and defacement (81 percent) were especially pronounced at rock art and stone causeway sites, where accessibility exposes monuments to unauthorized human interaction.

Agricultural activities (76 percent) were observed primarily in rural landscapes, where monuments are embedded within productive land systems, leading to soil disturbance and foundation instability. Settlement encroachment (69 percent) reflects increasing population pressure and urban expansion, particularly around historic buildings located in settlement cores. Looting and material theft (74 percent) further compromise monument stability by removing original fabric, while weak

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institutional protection (88 percent) intensifies all other human-induced threats by leaving sites unguarded and unmanaged.

The prominence of neglect and inadequate maintenance corroborates the findings of Okpoko (2018) and Aremu (2015), who argue that institutional shortcomings, limited funding, and weak policy enforcement are central to heritage deterioration in Nigeria. The widespread occurrence of vandalism aligns with Jopela (2017), who attributes such behavior to limited public awareness and exclusion of local communities from heritage governance. Agricultural activities and settlement encroachment support Ogundiran's (2020) observation that heritage sites in Africa frequently compete with livelihood activities for land use.

Table 4: Human-Induced Factors Influencing the Physical Condition of National Monuments in Bauchi and Plateau States

Human-Induced Factor	Field Evidence Observed	Monument Types Most Affected	Response Level (%)	Impact on Physical Condition
Neglect and lack of maintenance	Cracks, collapsed sections, vegetation growth	All monument categories	93	Accelerated deterioration
Vandalism and defacement	Graffiti, surface scratching, removal of stones	Rock art, stone causeways	81	Loss of integrity and authenticity
Agricultural activities	Farming, grazing, irrigation channels	Stone causeways, historic buildings	76	Foundation instability
Settlement encroachment	Buildings close to sites, land conversion	Historic buildings, rock art	69	Structural stress and landscape alteration
Looting and material theft	Removal of stones and artefacts	Archaeological monuments	74	Structural weakening
Weak institutional protection	Absence of fencing, signage, monitoring	All monument types	88	Increased exposure to damage

Source: Authors' Analysis (2026).

4.5. Strategies for Improving Preservation and Sustainable Management

According to the data presented in table 5, there is a strong consensus among respondents to improve the preservation and sustainable management of national monuments. Regular maintenance and monitoring received the highest level of support (96%), Public awareness and heritage education (91 percent) and community participation in site management (89%) also recorded high support levels, suggesting a growing understanding of the role of local stakeholders in safeguarding heritage resources. Physical protection measures such as fencing and signage (87 percent) were considered essential in reducing human-induced threats previously identified in the study. Legal enforcement and policy strengthening (84 percent) reflect concerns about weak implementation of heritage laws, while integration of monuments into land-use planning (79 percent) underscores the need to address spatial conflicts between heritage sites and development activities. Sustainable tourism development (75%) received comparatively lower support, possibly due to concerns over infrastructure deficits and risk of over-use. The prominence of regular maintenance aligns with Matero (2016), who emphasizes preventive conservation as the cornerstone of sustainable heritage management. High support for

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community participation reinforces Ndoro and Pwiti's (2020) assertion that inclusive heritage governance enhances protection by fostering a sense of ownership. The emphasis on public awareness and education corroborates Aremu (2015) and Okpoko (2018), who identify heritage education as critical for changing attitudes toward monument preservation in Nigeria. The relatively moderate support for sustainable tourism reflects Brimblecombe's (2014) caution that unmanaged tourism can exacerbate deterioration if conservation frameworks are not firmly established.

Table 5: Preferred Strategies for Improving the Preservation and Sustainable Management of National Monuments

Proposed Strategy	Description/ Field Evidence	Stakeholders Involved	Level of Support (%)	Expected Conservation Outcome
Regular maintenance and monitoring	Periodic inspection, cleaning, minor repairs	NCMM, State governments	96	Reduced deterioration rate
Community participation in site management	Engagement of local custodians and youth groups	Host communities, traditional institutions	89	Enhanced site protection
Legal enforcement and policy strengthening	Application of heritage laws and penalties	Federal and State authorities	84	Deterrence of vandalism
Public awareness and heritage education	Sensitization campaigns, school programs	NGOs, schools, media	91	Improved public stewardship
Physical protection measures	Fencing, signage, controlled access	NCMM, local councils	87	Reduced unauthorized access
Integration into land-use planning	Inclusion of monuments in development plans	Planning Authorities	79	Minimized encroachment
Sustainable tourism development	Guided visits, local revenue generation	Financial sustainability	75	Tourism boards, communities

5.0. CONCLUSION AND RECOMMENDATIONS

5.1. Conclusion

This study assessed the factors influencing the preservation and deterioration of national monuments in Bauchi and Plateau States, Nigeria, with emphasis on monument types, physical condition, climatic and environmental influences, human-induced pressures, and sustainable management strategies. The findings demonstrate that the monuments, which include stone causeways, rock art, historic buildings, and colonial-era industrial relics, are unevenly distributed across diverse ecological and cultural landscapes, making them differentially vulnerable to deterioration. The results reveal that a significant proportion of the monuments are in fair to poor physical condition, largely due to prolonged exposure to climatic stressors such as rainfall intensity, flooding, temperature fluctuations, and biological growth.

The outlined environmental pressures are compounded by human-induced factors, including land-use encroachment, agricultural activities, vandalism, uncontrolled access, and inadequate institutional oversight. Finally, the study contributes empirical evidence to heritage conservation discourse in Nigeria by demonstrating that preservation outcomes are shaped by the interaction of environmental

conditions, human behavior, and management capacity. Without deliberate intervention, many of these monuments face accelerated deterioration, loss of cultural value, and eventual disappearance.

5.2. Recommendations

Based on the objectives and findings of the study, the following recommendations are proposed to enhance the preservation and sustainable management of national monuments in Bauchi and Plateau States:

1. Institutionalization of Preventive Conservation Programs particularly the National Commission for Museums and Monuments (NCMM), should prioritize routine inspection, documentation, and low-impact maintenance of monuments to reduce long-term deterioration, in line with preventive conservation principles.

2. Strengthening Community-Based Heritage Management should be formally integrated into monument management frameworks through participatory governance structures, capacity building, and incentive-based stewardship programs, recognizing their role as primary custodians.

3. Improved Legal Enforcement and Land-Use Regulation should be rigorously enforced, while heritage impact assessments should be made mandatory for development projects near monument sites to minimize encroachment and land-use conflicts.

4. Public Awareness and Heritage Education Initiatives should be mainstreamed into school curricula and community sensitization programs to foster positive attitudes.

5. Climate-Sensitive and Sustainable Tourism Development should be promoted as a means of generating revenue for conservation, provided it is guided by climate-responsive planning and community benefit-sharing mechanisms.

Conflict of Interest

The authors declare that no conflict of interest exist in this manuscript.

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