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Comparative Assessment of Ecotourism Potential and Sustainability at Erin-Ijesa and Ayikunugba Waterfalls, Nigeria

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Abstract

This study examines the ecotourism potentials, ecological perspectives, and sustainable development practices at Erin Ijesa and Ayikunugba Waterfalls in Osun State, Nigeria. A quantitative research design was adopted using a structured questionnaire. A total of 160 respondents (80 respondents in each community) were sampled through a random sampling method in both communities (Erin Ijesa and Oke Ila respectively). Findings show both sites have notable cultural value, as 62.5% of respondents in Erin Ijesa and 66.3% of respondents in Ayikunugba were affirmative. Results also revealed that Erin Ijesa and Ayikunugba Waterfalls serve educational purposes, with seminar hosting having the highest percentage (74.0% and 72.2%, respectively). Ecological qualities, particularly natural beauty and scenery, scored high at both sites with 92.5% and 95.0% in Erin Ijesa and Ayikunugba, respectively. Diverse plant covers were notable in both sites. However, research potential was rated lower at 51.6% in Erin Ijesa and 48.0% in Ayikunugba Waterfalls. To address this, policy must shift the management emphasis from mass tourism toward edu-tourism by formalising university collaborations and diversifying site infrastructural facilities to support scientific field study. The study concludes that while both waterfalls offer considerable ecotourism and developmental prospects, sustainable tourism development depends on improved planning, stronger community involvement, and targeted investments in environmental management and education.

Keywords: Sustainable tourism**,** waterfalls**,** cultural heritage, ecology, ecotourism potential.

Introduction

Tourism is the biggest and fastest-growing sector globally that is continuously being marketed as one of the strategies of enhancing the economic activity of the region in both developed and developing economies (United Nations World Tourism Organisation, 2023). Furthermore, the growth in the tourism industry has enhanced the site's image, enabling the host town to enjoy several benefits, for instance, job opportunities, better livelihood and community development (Ojebode, 2023). Nigeria is greatly endowed with a wide range of natural assets, among which are its diverse waterfalls that stand out as particularly captivating tourist attractions (Bashiru et al., 2024; Martins et al., 2024). Some of the top tourist attractions in this area include waterfalls where people conduct parties, picnics, picture shoots, film shoots, academic studies (seminars and conferences), business meetings and adventures, among others. Even though it is a hindrance to species movement, it still has a considerably important ecological benefit as it offers unique habitats that are crucial in the conservation processes (Ajayi, 2020). These natural marvels have been hailed as being mystical, rich in culture, full of legends and magical in beauty and hence, together, they have come to be the most patronised tourist attractions in the country. They attract local and international tourists who want to recreate, have adventure, find spiritual comfort, and experience the local culture (Bashiru et al., 2024). Back to the continent of Africa, tourism has not attained economic maturity, although it is a significant part of the economy of the countries.

The general travel and tourism sector of Nigeria is going to grow tremendously. Projections suggest that it is going to make a big impact on the national economy, with forecasts that show that it will create nearly 2.6 million new employment opportunities and an economic contribution of approximately N12.3 trillion (equivalent to $8.2 billion) by 2032 (Mathew et al., 2021). This illustrates the huge economic potential that nature-based tourism could present as an important driver of national development. In the management with a sense of sustainability, nature-based tourism is a potent force towards the realisation of national development goals, improvement of biodiversity protection, and rural economy diversification. This is achieved through the creation of both direct and indirect job opportunities and income streams that are beneficial to a large range of households. The examples of other countries also show that the strategic investments in natural protected areas can provide significant economic benefits, usually with a skewed advantage to lower-income households and higher employment rates among women (Adewale et al., 2020).

The substantial economic forecasts for Nigeria's tourism sector underscore the profound importance of developing natural

attractions like waterfalls. This makes them more important than only benefiting their localities, but they become central to the economic diversification and poverty reduction efforts of the nation. The estimated ₦12.3 trillion contribution to the economy is a macro-level indicator of the national economic potential. To achieve this growth, it requires proper micro-level development of certain sites and attractions. The strategic improvement of waterfalls like Erin Ijesa in Oriade Local Government Area and Ayikunugba in Oke Ila- Orangun in Ifedayo Local Government Area of the Osun State, Nigeria, is therefore not just a local issue but a part of the overall economic policy of Nigeria. It means that, when invested in specifically, the economic impact of these locations can be large, and both governmental agencies and the private sector should devote significant resources towards them, turning them into a strategic economic necessity rather than a leisure facility (Nwankwo, 2020).

The major problem facing the current tourism landscape in Nigeria is a concurrent issue; that is, over-exploitation and under-utilisation. This resulted in a critical imbalance that threatens the ecological and sociological integrity of popularised destinations such as Erin-Ijesa Waterfalls while leaving high-potential sites such as Ayikunugba in critical economic quiescence. This study addresses a significant research gap by shifting from localised to holistic analysis of the sites. This will provide a comparative framework indispensable for regional load-balancing and spatial planning. By positioning Erin-Ijesa as a benchmark for long-term sustainable impacts, the research highlights the threshold where popularity begins to erode sustainability, providing a blueprint for a complementary destination framework that decentralises foot traffic to prevent environmental degradation at overcrowded hubs. Ultimately, this comparative approach allows for the development of a standardised Ecotourism Potential Index, which provides regional planners with the empirical data needed to activate the correct socio-economic drivers, essential for balanced development. For instance, infrastructure, marketing, and community involvement can help to transform underexplored sites into sustainable economic assets while preserving the integrity of established landmarks.

This paper will present a detailed comparative evaluation of two of the most popular natural attractions in Osun State, Nigeria: the Erin Ijesa Waterfall, Oriade Local Government Area and Ayikunugba Waterfall, Ifedayo Local Government Area, all in Osun State. The overall objective is to critically examine their respective tourism potentials, the attitude of the respective local communities towards the development of tourism, the ecological views and critically assess the current situation and prospects of sustainable development practices at both sites.

The ability to compare two sites in the same state enables this research to establish the systemic challenges and recognise practical practices, which can be extended to the broader area. This allows the shift towards location-specific observations to larger, more effective policy suggestions, which will deal with the underlying problems that impact more than one destination (Adesina, 2025).

Objectives of the Study

The specific objectives of this study are to:

- Analyse the tourism potential of the selected waterfall destinations.
- Examine community perceptions toward tourism development at the study sites.
- Investigate the ecological and sociological perspectives associated with tourism activities at each waterfall location.
- Assess the current status and future potential of sustainable ecotourism development practices at the selected waterfall destinations.

Literature Review

Tourism in Nigeria has been poorly developed in relation to its potential, considering the fact that tourism in this country has a wide range of natural and cultural resources. Researchers observe that the nation has resources of global ecological and touristic value that might be used to enhance the diversification of the economy (Obafiah et al., 2022). Tourism has been considered one of the greatest labour employers in the world, and in Nigeria, it has been known to provide opportunities to millions of people, but its huge benefits are still untapped.

It has been found that ecotourism, which is a fast-growing international market, is one of the strategic directions towards which Nigeria can turn. Kenya, Madagascar, Nepal, Thailand, and Malaysia are just some examples of countries that have been able to use ecotourism as a major contributor to their GDP (Olubunmi-Ojo et al., 2022). In the case of Nigeria, waterfalls are valuable ecotourism assets that can create employment opportunities, help develop infrastructures, and community-based businesses (Adejumo et al., 2014).

Empirical studies of Nigerian waterfalls show both their potential and current limitations. As noted by Tunde (2012), Kwara State had not been able to get much socio-economic advantage from the development of Owu Falls to the host community, which is why it should be developed and promoted. Babafemi et al. (2021) similarly identified anthropogenic pressures like logging, farming, burning, and grazing, all of which compromise the ecological integrity of Owu Falls. Obadiah et al. (2022) in Nasarawa State emphasised Farin Ruwa Waterfalls because the resource has the potential to trigger employment, foreign exchange earnings, infrastructure development, and cultural preservation, but the potential is yet to be realised. In a comparative analysis of Erin-Ijesha and Arinta Waterfalls, (2017) found that both sites, despite the presence of basic hospitality facilities, are plagued by low infrastructural development. This curtails the financial returns. In general, although Nigeria has rich water resources, the nation has not developed its ecotourism resources.

Community Perceptions and Participation in Tourism Development

Community perception and involvement are crucial in the attainment of a sustainable tourism development since host populations are the ones in direct contact with the tourism resources and feel the social, cultural, economic and environmental effects of tourism. When communities have a significant role in planning, implementation and management of tourism, they have a sense of ownership that fosters cooperation, resource conservation and

sustainability. Research on the Osun-Osogbo Sacred Grove and the Osun-Osogbo Festival indicates that the involvement of communities enhances cultural preservation as well as creates economic opportunities like job creation, local entrepreneurship, and increased commercial practices (Asifat et al., 2025; Asifat, Samotu and Awe, 2025). Favourable community attitude leads to increased local backing of tourism projects and protection of cultural heritage sites.

The significance of participation is once again supported by research carried out in natural tourism destinations. In Owu Waterfall and Oke-Idanre Hills, studies indicate that community engagement can lead to environmental protection, effective resource use, and a higher satisfaction among tourists, whereas the absence of community engagement can cause an ecological decline and unequal distribution of benefits (Babafemi et al., 2021; Oladeji, Awolala & Alabi, 2022). Similarly, research about Olumirin (Erin-Ijesha) Waterfall suggests that communities tend to endorse tourism in which infrastructural development and socio-economic gains are evident, albeit a lack of participation in the decision-making process poses a developmental challenge (Olubunmi-Ojo et al., 2022).

Poverty alleviation and improvement of rural livelihood have also been associated with tourism development. Community participation allows the residents to enjoy the benefits of employment opportunities, small businesses, and diversification of income related to tourism activities (Oluyemi & Shitu, 2024). Geotourism and waterfall research also highlight that community stewardship is beneficial to conservation practices and the long-term sustainability of tourism attractions (Ogezi, Aga & Okafor, 2010; Owolabi, 2019). In general, the literature reviewed clearly shows that sustainable tourism development is highly reliant on positive perception, inclusive participation, sharing of benefits in an equitable manner, and interdependence between communities, government agencies and tourism stakeholders. Active communities will be able to promote the growth of tourism as well as safeguard environmental and cultural resources to be used by the next generation.

Sustainable Development Practices and Challenges in Waterfall Tourism

Sustainable tourism globally involves the balancing of economic viability, environmental stewardship and social equity. Yet, waterfall tourism in Nigeria has various constraints which cannot support sustainable development which include;

- One of the greatest obstacles is infrastructure deficiencies. Olumirin and Arinta Waterfalls have been reported to have poor road access, a lack of visitor facilities, and unfinished structures (Ajulo et al., 2017; Arowosafe et al., 2021). These deficiencies reduce accessibility and deter potential visitors, limiting revenue generation and growth of the site (Oladele & Digun-Aweto, 2018).
- Environmental and cultural impacts further complicate development. In a study conducted by Ijeomah et al. (2009) at Urashi Waterfalls, the authors reported the destruction of sacred shrines, the shooting down of culturally important trees and the parting of members of the community on religious grounds, which increased their susceptibility to erosion as well as cultural dissatisfaction. Equally, waste issues pose

a hazard to the ecological integrity. Although Wani et al. (2022) noted this issue in India, it can be compared to Nigeria, where uncontrolled waste affects the quality of water and scares away visitors.

- There is under development in economic sustainability. Although waterfalls have the potential to earn individuals' income and jobs, corruption, lack of investment, and over-reliance on oil revenues have limited the tourism sector in Nigeria (Jemirade, 2021). According to Ogezi et al. (2010), waterfalls like Kurra and Assop that are found in geotourism-rich Plateau State have not been fully exploited. Similarly, Akinola et al. (2013) and Oluyemi and Shittu (2024) highlighted that places like Owu, Erin-Ijesha and Arinta could serve as good sources of income to the local economies, provided that they are well developed, managed and marketed.

Moreover, a lack of community engagement compromises sustainability. An example is the case of Arinta Waterfalls, where people expressed poor attachment to the location due to poor development and poor knowledge by the government (Ijasan & Izobo-Martins, 2012). The same was found at Erin-Ijesha waterfall, where lack of governmental commitment and partnership with the stakeholders (Akinola et al., 2013). Without inclusive governance and equitable participation, communities are not likely to support conservation or development initiatives. Furthermore, research on Nigerian waterfalls has been predominantly concentrated around Erin Ijesa because it is a popular site, and there has been very little comparative research involving the less developed sites, such as Ayikunugba. Comparative studies on various waterfalls are few to establish best practices. Thus, the incorporation of community perceptions, environmental issues, cultural dimensions and sustainable practices in empirical analysis is limited. This paper fills these gaps with the help of a comparative, community-based study, which is based on both qualitative and quantitative evidence.

Theoretical Framework

The theoretical frameworks that anchor this study are;

Sustainable Development Theory

The Sustainable Development Theory came out of the historic document of the World Commission on Environment and Development, also referred to as the Brundtland Report (1987). The theory focuses on development that fulfils the demands of the current generation without interfering with the capacity of future generations to satisfy their needs. It promotes that the three dimensions of development, which are interrelated, should be integrated as environmental protection, economic viability and social equity.

In the framework of ecotourism, the Sustainable Development Theory is a framework through which the interaction between tourism activities and the promotion of economic growth, ecological conservation and community wellbeing can be determined. Waterfalls in tropical areas have a great ecotourism potential because of the richness of their biodiversity, scenic scenery and cultural relevance. Nevertheless, the unregulated development of tourism can lead to environmental degradation, loss of biodiversity, and displacement.

By using the Sustainable Development Theory in this research, it is possible to determine whether tourism activities in Ayikunugba and Erin Ijesa waterfalls would help in enhancing the sustainability of the environment in the long-term and at the same time, enhancing the livelihood of the people. The theory informs the research on how the tourism revenue generation, employment opportunities, as well as infrastructural development can be achieved without interference with ecosystems, waste management practices and responsible visitor behaviour.

Moreover, the theory focuses on intergenerational responsibility, which implies that development in tourism should be conservation-based in terms of visitor numbers, environmental education, community-based management and sustainable use of resources. Sustainable Development Theory, therefore, offers an approach to assessing the ecotourism development in study sites in relation to the global sustainability objectives and ecotourism development in line with sustainable rural development.

Ecological Systems Theory

The Ecological Systems Theory is a theory of human beings that was propounded by Urie Bronfenbrenner in 1979 to explain the dynamic interactions between human beings and the environmental systems around them. The theory was initially formulated in the field of developmental psychology, but has been widely used in environmental sociology and ecotourism research since it reveals the mutual effects of environmental conditions and social structure.

The theory also aids the ecotourism research in explaining how the ecotourism activities affect the ecosystems and ecological conditions, which in turn affect human attitudes, behaviours and perceptions towards conservation. The framework is especially applicable to the waterfall tourism settings that entail ecological integrity and social participation, in which the two are closely related.

The Ecological Systems Theory is based on 5 layers of the environment that are interrelated:

- **Microsystem:** Microsystems are the immediate environments where direct interactions take place. This research, it covers the local families, tour guides, traders, artisans, transport operators, and vendors in the vicinity of the waterfalls. These actors have the immediate economic and environmental effects of tourism. They have a strong impact on ecological sustainability in the destination due to their attitudes towards conservation practices, waste disposal and visitor management.
- **Mesosystem:** The mesosystem explains interactions between various institutions and stakeholders locally. This involves partnerships between the community associations, traditional institutions, schools, tourism management committees, and local tourism boards at Ayikunugba and Erin Ijesa waterfalls. Good communication between these groups facilitates coordinated conservation, cultural preservation and sustainable tourism governance.
- **Ecosystem:** The ecosystem is the external frameworks that have an indirect impact on the local tourism environments. The policy implementation, infrastructure

development, funding opportunities, and conservation programs are influenced by the regional tourism authorities, environmental agencies, private investors, and non-governmental organisations. Though these institutions cannot be directly controlled by the community members, their decisions largely influence the development of tourism and the ecological performance.

- **Macrosystem:** The macrosystem involves larger societal and cultural frameworks like national tourism regulations, environmental laws, cultural beliefs and economic interests. Ecotourism is being promoted and controlled in Nigeria in such a manner that its promotion and control depend on cultural reverence towards natural landscapes, the government policies regarding tourism and sustainability. These are wider forces that contribute to how people perceive conservation, and it sets priorities regarding investment in the development of waterfall tourism.
- **Chronosystem:** The chronosystem records past alterations and temporal evolutions to tourism destinations. This incorporates the changing policies in the tourism sector, expansion of infrastructure, modernisation issues, climate change and recent development projects that have impacted Ayikunugba and Erin Ijesa waterfalls. Having a sense of these temporal dynamics enables the study to determine the relevance of past decisions and current interventions to current sustainability outcomes.

Social Exchange Theory

Social Exchange Theory is a theory of social relationships due to George Homans (and then Peter Blau), where social interactions are viewed as systems where participants evaluate their social engagements based on the perceived advantages and the likely costs. This theory presupposes that the rational assessment of gains, rewards, and potential drawbacks of a specific relationship or activity is one of the main factors that shape human behaviour in a social context. Social Exchange Theory has emerged as a popular theoretical approach to host community relationships with tourism development and sustainability programs within tourism studies.

The core assumption of the theory is that members of the community would tend to favour tourism development when they believe that tourism has tangible and intangible benefits that outweigh its social, economic, cultural or environmental costs. The community perceptions develop positively when tourism leads to better livelihoods, increased infrastructure, promotion of cultures, and environmental conservation. On the other hand, opposition to tourism can arise whereby the local residents have suffered negative impacts like environmental degradation, cultural disturbance, overcrowding or unequal tourism gains.

Waterfall destinations have the local residents who, in the context of developing ecotourism, consider the effects of tourism based on their daily experiences and perceivable results. Such can be employment opportunities, generating income and local businesses, improvement of infrastructures, enhanced cultural awareness, and community identity. Meanwhile, locals are still aware of the possible negative outcomes, e.g. waste build-up, burdening natural resources,

fronting up of tourists, and breaking of traditional ways of life. Their approval or disapproval of tourism projects is thus based on their perceptions of the balance between these perceived benefits and costs.

The sociological approach of the current research is especially applicable to the Social Exchange Theory since it is considered that the perception of the community is a direct factor contributing to the participation, cooperation, and sustainability of the ecotourism projects. Local communities will also tend to be more involved in conservation activities and take up custodian roles in the management of ecological resources when they feel that they have been treated fairly in the sharing of benefits, transparency in decision making and inclusion in tourism management processes. The theory is therefore significant in the explanatory context of the community attitudes, degree of participation, and social acceptability of ecotourism development at Ayikunugba and Erin Ijesa waterfalls.

Relevance of the Integrated Theoretical Framework

A combination of Sustainable Development Theory, Ecological Systems Theory and Social Exchange Theory gives a comprehensive approach to the study of ecotourism development in waterfall destinations. The Sustainable Development Theory evaluates how tourism affects a balance between economic gain, environmental conservation, and social welfare. Ecological Systems Theory describes how individual-environmental systems and institutional systems interact to influence the outcomes of tourism at various levels. Social Exchange Theory explains the attitudes of communities on the perceived costs and benefits of tourism, which affect their involvement and support.

The three theories combined allow conducting a comprehensive analysis of ecotourism possibilities both ecologically and sociologically, and assessing the sustainability results. The framework focuses on the essential components, which include community involvement, protection of biodiversity, responsible tourism, equitable distribution of benefits and the sustainability of the environment in the long run. In general, it offers a good theoretical foundation for evaluating ecotourism, ecological processes, sociological issues and sustainable development in tropical waterfall sites.

Conceptual Framework

The conceptual framework describes how the development of ecotourism at a famous tropical waterfall develops out of the potentials of natural resources into the results of sustainable development via the interconnection between ecological, sociological and institutional processes. The framework starts by listing the ecotourism potentials, which consist of the scenic beauty of the waterfall, richness of biodiversity, cultural heritage and what recreational opportunities the site has to offer. These characteristics are the basis that attracts tourists and triggers the development of tourism. These potentials contribute to the growth of tourism activities, including visitor recreation, local economic involvement, job generation and the cultural exchange between the host communities and tourists. Although tourism engagements

bring about economic opportunities, they also present environmental pressures and social changes that need to be managed.

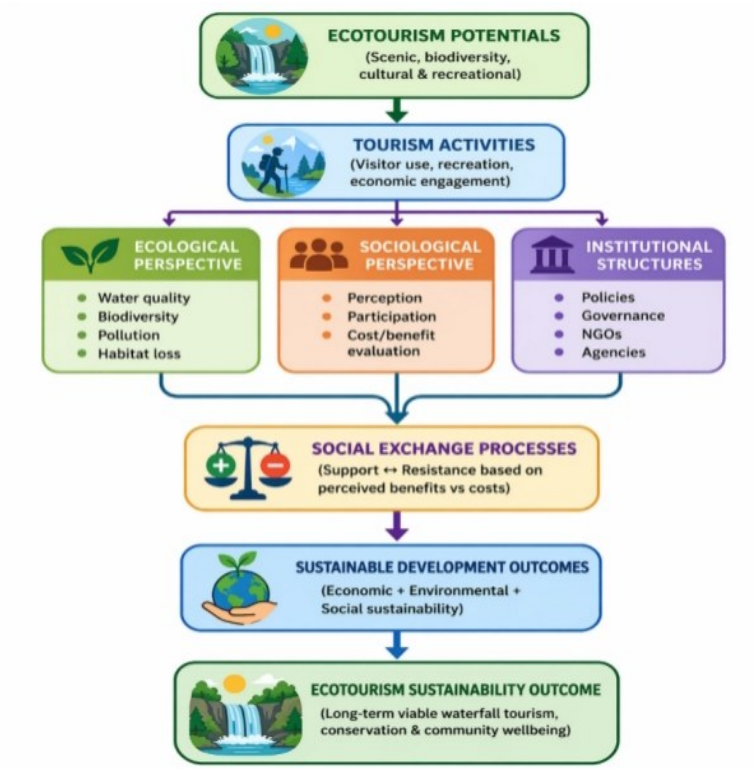


Figure 1: Conceptual Framework relating the three (3) theories utilised in the study

The framework combines three key perspectives to comprehend these impacts. The ecological approach analyses the environmental factors, such as the quality of water, the preservation of biodiversity, the management of pollution, and the preservation of habitats. The sociological approach is based on the community perceptions, participation, cultural values, and assessment of the benefits and costs of tourism by the residents. The institutional view emphasises policies, governance systems, environmental agencies and the non-governmental organisations that control the tourism activities and promote sound management of resources. These dimensions are intertwined with the social exchange processes in which the local inhabitants evaluate the extent to which tourism may have more positive than negative impacts. Communities view economic, social, and environmental benefits and endorse tourism development, but negative effects may be perceived, which may cause opposition. Community support, as such, emerges as a decisive factor of sustainability. The collaboration of ecological management, community reactions, and institutional governance has resulted in sustainable development, which is seen in conserving the environment, socio-economic growth, and social well-being. Finally, these deliverables lead to the sustainability of ecotourism, which is defined by the long-term stability of the waterfall ecosystem, the sustainability of the tourism and the enhancement of the welfare of the community.

Thus, this framework shows that sustainable ecotourism at a tropical waterfall is rooted in the concept of a balanced interplay of natural attractions, tourism use, environmental protection, community acceptance, and efficient institutional management.

Material and Method

The research employed a quantitative method of research to explore ecotourism potentials, ecological situation, community perceptions, and sustainable development activities surrounding the Erin-Ijesa (Olumirin) and Ayikunugba waterfalls in the Osun State, Nigeria. Data on community residents were gathered through a cross-sectional survey design, using a structured questionnaire which was designed in three sections, and it captured the multidimensional nature of the study. Section A addressed the socio-demographic characteristics of the respondents, and Section B employed a 5-point Likert Rating Scale (Strongly Disagree to Strongly Agree) to evaluate the ecotourism potentials and ecological health of the two sites. Section C focused on sustainability practices in both sites. The use of closed-ended questions ensured that the data remained quantifiable and facilitated a direct comparative analysis between the two host communities. The instrument was validated through expert review to ensure contextual relevance, and the reliability of the study was confirmed through a reconnaissance study using Cronbach's Alpha to guarantee internal consistency across the study areas.

The questionnaire allowed systematic analysis of the local populace's experiences and perceptions related to tourism development and environmental sustainability. The population of the study was the residents of the Erin-Ijesa and Oke-Ila Orangun communities, which are considered to be the major stakeholders in tourism and environmental resources. Simple random sampling was used to select 160 respondents (80 in each community) with the aim of having equal representation and reducing bias. The structured questionnaire used in the study was consistent with the study goals, targeting socio-demographic issues, ecotourism potentials, ecological observations, community involvement, institutional support, and sustainability perceptions. The systematised strategy provided consistency in responses to be analysed quantitatively. Data were coded and analysed in SPSS by applying descriptive statistical methods like frequencies and percentages to summarise the community perceptions and environmental considerations, and these effectively show the trends in ecotourism sustainability in host communities. The study adhered strictly to research ethics by securing informed consent, ensuring participant privacy, and obtaining permission from traditional authorities in both communities to uphold cultural values and community standards.

Study Area

The study was conducted at Erin Ijesa, also known as Olumirin and Ayikunugba waterfalls in Osun State, Nigeria. The two sites were selected due to their environmental significance, popularity among tourists, and a growing interest in sustainable tourism development.

Erin-Ijesa is endowed with a beautiful landscape with projecting hills within the range of 1,200 to 1,300 feet above sea level. It is one of the large nuclei in Ijesa land. It is situated in the

eastern part of the Oriade Local Government Area, Osun State, Nigeria, at a latitude of 7.34 and longitude 4.54'E. It is about 15 kilometres from Ilesa on the trunk "A Federal highway road to Akure, the capital city of Ondo State. It shares boundaries in the east with the northwest of Efon Alaye, in the North with Ipole- Iloro, in the northeast with Ikeji-Ile, and in the south with Odo. The waterfall has a cliff that consists of seven steps. The seven steps derive their water from spring sources. This feature of seven steps command tourist in flow every time. Erin-Ijesa is geographically situated at the base of the Yoruba Hills, offering upward views of forested, rocky hills.

Ayinkunugba waterfall is located in Oke-Ila Orangun, a historic city in Osun State, Nigeria. It is located at coordinates 7˚ 57′ 18″ N and 4˚ 59′ 6″ E, with an altitude of 568 m. It is found on one of the several mountains that border the eastern slopes of the Oke-Ila Orangun range. It is characterised by a gorge and showers of water from the hilltop into a pool. The gorge is located about 4 kilometres from the centre of Oke-Ila town, with a depth of about 21 metres and surrounded by a lush array of trees.

An attractive environment appeals to tourists, whether natural or man-made. Both sites have attractive physical environments which has diverse range of biodiversity which made the environment serene.

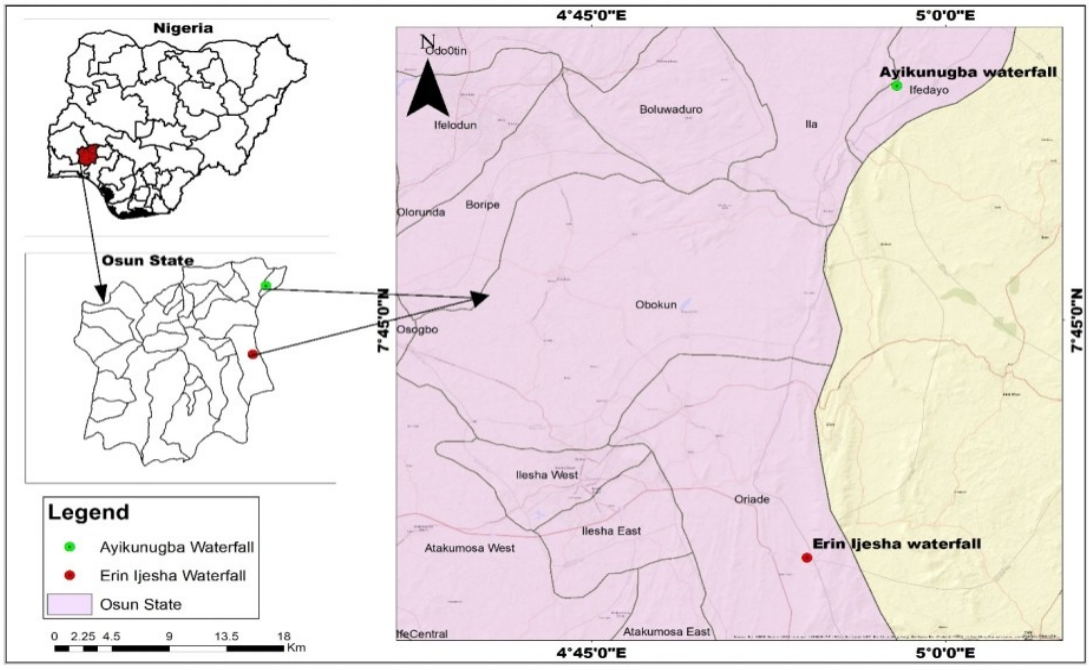


Figure 2: Map of the Study Areas

Results and Discussions

Tourism Potentials of Erin Ijesa and Ayikunugba Waterfalls in Osun State

Table 1 presents a comparative evaluation of the perceived tourism potentials of Erin-Ijesa and Ayikunugba Waterfalls based on the responses given by residents of the community. The

results indicate that there are similarities and significant differences in the tourism characteristics of the two destinations. Regarding natural beauty and scenic value, both waterfalls were rated high by the respondents and hence, the potential for ecotourism. Ayikunugba Waterfall has a slightly higher perception (95.0%) than Erin-Ijesa (92.5%). This is an indication that the two locations have outstanding environmental aesthetics that have the potential to draw tourists. This is consistent with Makanjuola (2023), who has described Ayikunugba Waterfall as a natural recreational space that can be used to relax, sightsee, and have fun due to a calm environment and calming water sounds.

But a distinct distinction arises in the historical and mythical meanings. The rating of the Erin-Ijesa community on its cultural attachment and heritage value was higher (80.0% on Erin-Ijesa Waterfall and 68.7 on Ayikunugba). This confirms the results of Oyelami et al. (2023), who point out that the cultural discourses, ecological peculiarity, and geological peculiarities of waterfall settings are considered to have a significant effect on their tourism identity and appeal. On the aspect of accessibility, Erin-Ijesa showed a significant advantage with 66.3% of the respondents affirming good road networks and transport links as opposed to only 37.5 percent of respondents in Ayikunugba. Likewise, the development of infrastructural facilities like toilets, shops and signage were more advanced in Erin-Ijesa (55.0%) as compared to Ayikunugba (31.3%). These variations imply an unequal growth of tourism in the two locations. Field observations also indicated that, despite the fact that the access roads to both sites need to be improved, Erin-Ijesa is enjoying a relatively better infrastructural investment. Ojebode (2023) claims that the development of infrastructure helps to increase the attractiveness of the tourism industry and allows for raising visitor satisfaction, which is why the constant investment in the infrastructure of both destinations is justified.

The gap can be attributed to the variation in institutional focus and tourism advertisement. According to Adesina (2025), the government has historically been more exposed and collaborated with Erin-Ijesa, which contributes to the relatively advanced tourism facilities. On the other side, the lower scores in Ayikunugba in terms of infrastructure and accessibility indicate the need to implement specific interventions in terms of planning, investment, and strategic tourism development plans, as highlighted by Oladeji et al. (2022). In addition, security presence and tourism recognition also favoured Erin-Ijesa, which registered higher ratings in security apparatus (70.0%) than Ayikunugba (50.0%), and recognition and collaboration (56.0% versus 42.0%). These indicators imply that institutional partnership, tourism governance as well as visitor safety structures are more established at Erin-Ijesa.

In general, the comparative results show that although both Erin-Ijesa and Ayikunugba Waterfalls have high potential for natural tourism, Erin-Ijesa currently shows better approaches to tourism preparedness because of better access, infrastructure, security arrangements, and institutional cooperation. Though it has great scenic value, the Ayikunugba Waterfall is underdeveloped and needs a conscious policy consideration, expansion of the infrastructure, as well as promotion of the destinations to fully exploit the tourism potential.

Table 1: Perceived Tourism Potential at Erin-Ijesa and Ayikunugba Waterfall (N= 80)

Tourism Attribute	Erin-Ijesa		Ayikunugba	
	Frequency	Percentage	Frequency	Percentage
Natural beauty and scenery	74	92.5	76	95.0
Historical/mythical significance	64	80.0	55	68.7
Accessibility (good roads, transport links)	53	66.3	30	37.5
Infrastructural facilities (toilets, shops, signage)	44	55.0	25	31.3
Security apparatus/tour guard	56	70.0	40	50.0
Recognition and collaboration	45	56.0	34	42.0

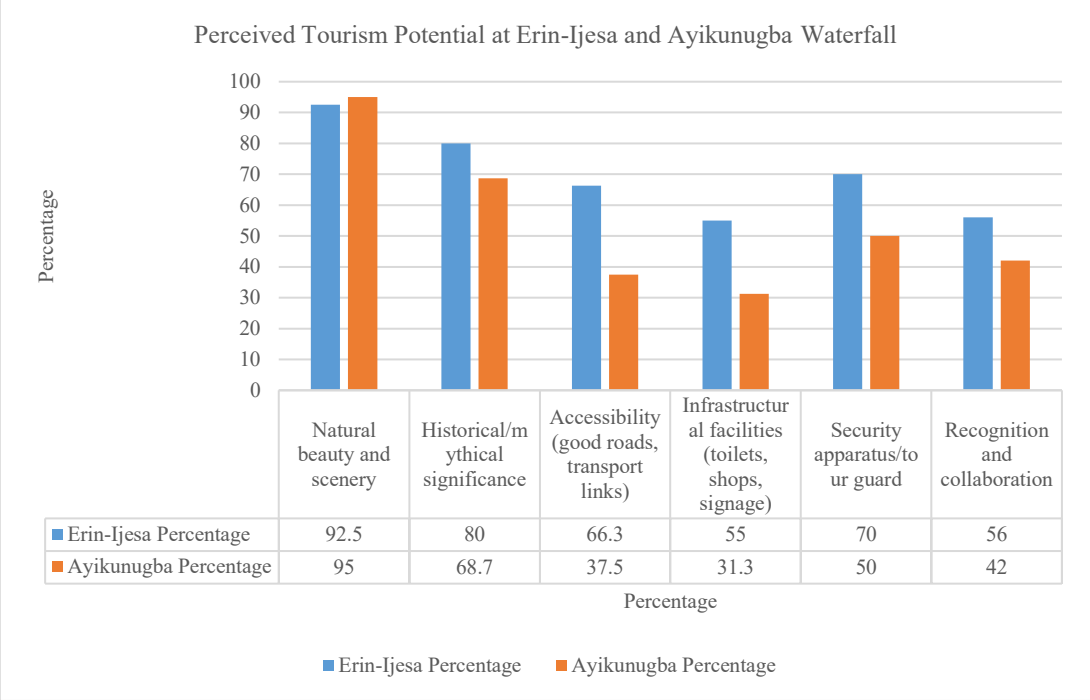


Figure 3: Perceived Tourism Potential at Erin-Ijesa and Ayikunugba Waterfall

Community Perception of Tourism Development/ Impact

Table 2 presents valuable insights into the perception of tourism development among community residents in Erin Ijesa and Ayikunugba, Nigeria. The findings reveal a generally positive outlook on the potential opportunities of tourism, with some variations across different indicators and between the two communities. This positive perception is consistent with Adebayo et al. (2025), that resident communities tend to enhance tourism development when they perceive significant economic and social benefits.

On the educational and cultural potential, community members in both Erin Ijesa and Ayikunugba hold a strong positive perception of the educational and cultural benefits of tourism. This is particularly evident in the high percentages for cultural origin/history, which

is 72.6% in Erin Ijesa and 70.0% in Ayikunugba. Also, knowledge about the waterfall was 70.2% and 67.2%, respectively. The residents view tourism as a way of showcasing and protecting their cultural heritage and providing opportunities for research and academic conferences.

The respondent's perception of "Hosting of seminars/conferences" was also notably high at Erin Ijesa, with 74.0% and 72.2% for Ayikunugba. The high-rating for-seminar hosting at these sites by the respondents can be attributed to their function as a "third space" that allows groups to escape the rigid and stressful environment of daily activities or urban centres. The waterfalls' aesthetic beauty and cultural prestige foster deeper social and spiritual bonding during social gatherings, whether it's academic, social, or religious activities. People use this to relax, even if the locations are insufficient of the infrastructural facilities required for formal scientific research. This concurred with Adebayo et al. (2025) that tourism's role in boosting national pride, enhancing cultural awareness, and promoting the conservation of historical sites is of great importance. Concerning the recreational potential of tourism in the two destinations, activities such as "Camping" 82.5% in Erin Ijesa and 75.0% in Ayikunugba and "Swimming" 81.3% and 66.3% in both sites, respectively, therefore, receiving the highest approval ratings. The excitement around these sites encourages residents to view tourism as a means to boost their own leisure and recreational opportunities. Meanwhile, the perception of "Boating" is extremely low in both locations (6.3% and 15.0%, respectively). This may be as a result of a perceived lack of suitable infrastructure and a lack of boating opportunities at the waterfall itself. According to Rahmat et al. (2023), Water-based tourism entails more than just the tourist experience, but examines these places as sites for sporting activities, such as canoeing, rowing, surfing, and academic purposes. Musostov et al. (2023) highlight that recreational opportunities are key components of the quality of life that is enhanced by tourism.

The economic potential of tourism is also very important. As is often the case in tourism impact studies on local communities, the economic benefits are a key driver of positive perception (Jackson, 2025). In both Erin Ijesa and Ayikunugba, the respondents have a strong positive view of "Employment creation," with high percentages of 78.0% and 71.3%, respectively. "Improvement of standard of living" is also highly rated with 70.0% in Erin Ijesa and 63.8% in Ayikunugba. Meanwhile, "Foreign investment attraction" and "Infrastructural development" received comparatively lower percentages, especially in Ayikunugba waterfall, with 42.0% for foreign investment and 37.5% for infrastructure. This suggests a recognition of the opportunities of local job creation. This is possibly a less direct or tangible link to larger-scale investment projects. According to Asifat et al. (2025) and Rahmat et al. (2023), tourism development in Nigeria creates job which enhanced revenue for the hotel sector, restaurants, transportation, and small-scale industries in the vicinity of the tourist sites. This leads to significant positive impacts in infrastructural development. The tourism sector, according to Adesina (2025), substantially drives economic growth across local government, regions, and the national economy at large, leading to a high income for hotels, food services, transportation, and retail, as well as a wide range of small-scale businesses.

On the social-cultural potential and community involvement, both communities show a great respect for the social-cultural benefits of tourism, particularly the "Promotion of cultural heritage", which is 62.5% in Erin Ijesa waterfall and 66.3% in Ayikunugba waterfall, Oke Ila. This supports the idea that locals value the preservation of their culture and traditions (Martin et al., 2024; Oduntan, 2021). However, there is a crucial result showing a low perception of "Community engagement in planning" (38.8%) in Erin Ijesa and (30.0%) in Ayikunugba. This shows a great concern, and numerous studies emphasised that insufficient community involvement in tourism planning and decision-making can lead to resistance and also jeopardise the sustainable tourism development in the long run (Asifat et al., 2025; Zielinski et al., 2020). Without involving the community, there is a risk that the development will not align with resident needs and desires, ultimately leading to unpleasant impacts.

However, residents of both communities, Erin Ijesa and Oke Ila, hold a generally positive perception of tourism development, particularly concerning its educational, recreational, and economic opportunities. However, the low perception of "Community engagement in planning and management" presents a critical challenge that needs to be addressed for sustainable tourism to thrive. In order to capitalise on the positive perceptions and mitigate potential resistance, future tourism development initiatives in these communities must prioritise the active involvement of local residents in the planning and management processes Asifat et al., 2025). This approach ensures that tourism development benefits the host communities and contributes to the preservation of their unique social and community identity.

Furthermore, to enhance its visibility and attain national recognition, Ayikunugba Waterfall should be strategically integrated into a tourism marketing circuit alongside Erin Ijesa Waterfall, thereby promoting destination complementarity within Osun State. The state government should also stimulate sustained visitation by encouraging organized programmes such as annual departmental retreats, academic workshops, conferences, and seminars to be hosted at the Ayikunugba site. Such institutional engagements would not only increase tourist traffic but also foster local economic development. In addition, deliberate efforts should be made to rehabilitate and upgrade the road network leading to the waterfall to improve accessibility, visitor experience, and overall tourism competitiveness.

Table 2: Community Perception of Tourism Development/ Impact

Indicator	Erin Ijesa		Ayikunugba	
	Frequency	Percentage	Frequency	Percentage
Educational Potential				
Knowledge about the waterfall	56.0	70.2	54.0	67.2
Cultural origin/history	58.0	72.6	56.0	70.0
Hosting of seminar/conferences	59.0	74.0	58.0	72.2
Research opportunities	41.0	51.6	38.0	48.0
Antique preservation	57.0	70.8	56.0	69.6
Recreational Potential				
Swimming	65.00	81.3	53.0	66.3
Picnics	56.0	70.0	52.0	65.0

Indicator	Erin Ijesa		Ayikunugba	
	Frequency	Percentage	Frequency	Percentage
Boating	5.0	6.3	12.0	15.0
Rock Climbing	51.0	63.8	46.0	57.5
Camping	66.0	82.5	60.0	75.0
Economic Potential				
Employment creation	62.0	78.0	57.0	71.3
Improvement of standard of living	56.0	70.0	51.0	63.8
Infrastructural development	53.00	66.3	30.0	37.5
Foreign Investment attraction	50.0	58.0	51.0	42.0
Social-cultural Potential				
Promotion of cultural heritage	50.0	62.5	53.0	66.3
Respect for local customs	39.0	48.8	49.0	61.3
Community engagement in planning	31.0	38.8	24.0	30.0

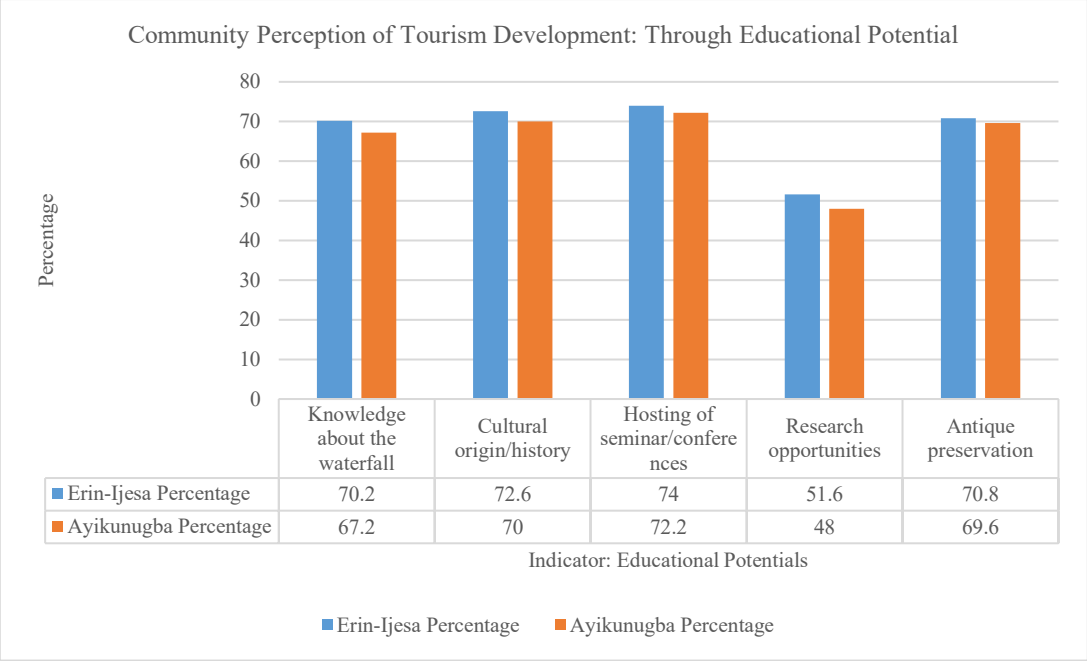


Figure 4: Community Perception of Tourism Development Through Educational Potentials

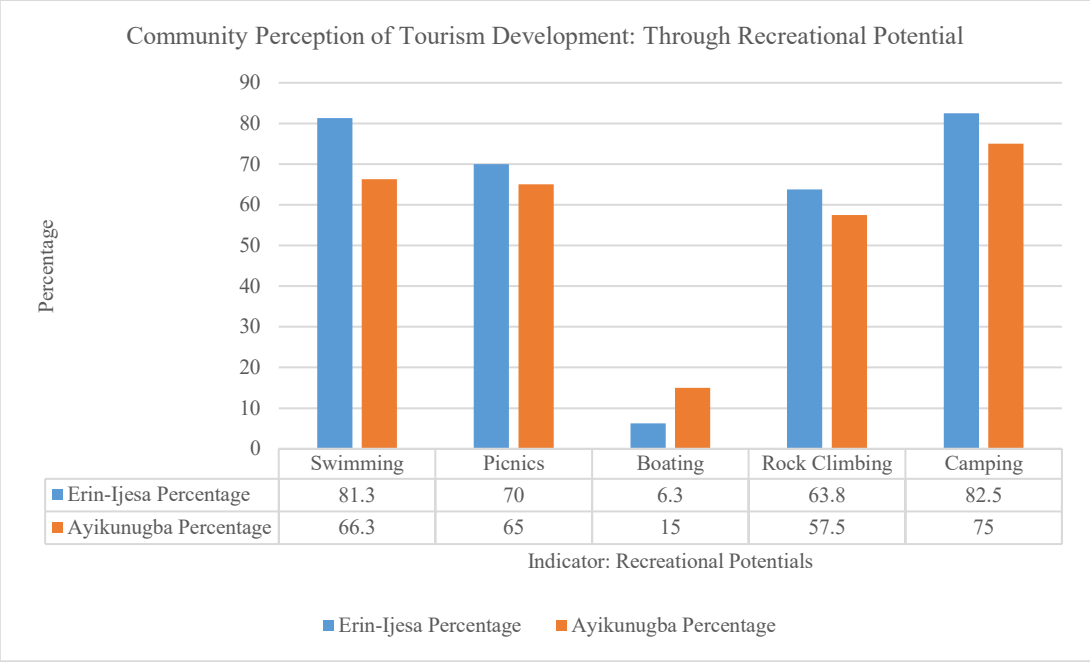


Figure 5: Community Perception of Tourism Development Through Recreational Potentials

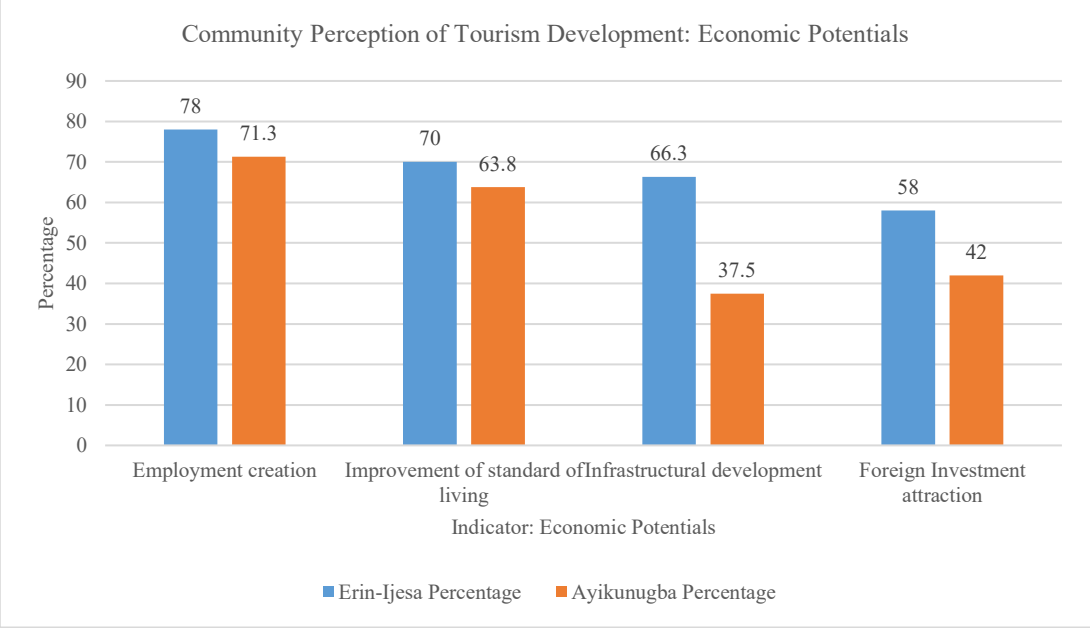


Figure 6: Community Perception of Tourism Development Through Economic Potentials

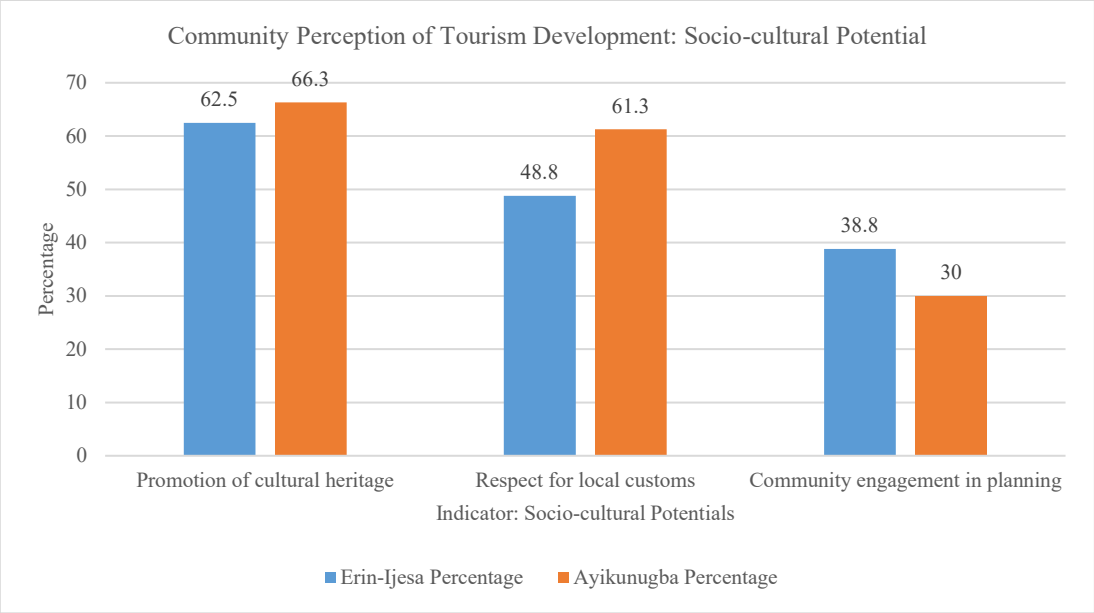


Figure 7: Community Perception of Tourism Development Through Socio-cultural Potentials

Ecological and Sociological Perspectives of Erin –Ijesa and Ayinkunugba Waterfall

The vegetation type at Erin-Ijesa waterfall is dense tropical rainforest, and that of Ayinkunugba waterfall is semi-deciduous forest with patches of savanna vegetation. Examples of common plant species at Erin-Ijesa and Ayinkunugba waterfalls, respectively, are *Milicia excels, Terminalia superba, Cola , acuminateAlstonia boonei, Ocimum gratissimum, and Daniellia oliveri, Thaumatococcus danielli, Khaya senegalensis, Elaeis guineensis,* Bamboo, Raffia palms, plaintain, etc. (Ojebode, 2023).

On the cultural/ Eco-spiritual activity, the site managers at Erin-ijesa waterfall during a key informant interview mentioned a strong Yoruba myth and that the site is sacred, while it was mentioned that Ayinkunugba waterfall is less mythological but more ecological (Adesina, 2025; Ojebode, 2023).

On the water resource value, the respondent at Erin-Ijesa explained that there is an adequate supply of water for drinking, irrigation, fishing and so on, while at Ayinkunugba, it was mentioned that there is limited direct water use by the populace. This concurred with Adesina (2025), that residents fetch water directly from the waterfall and supply it to neighbouring towns and cities near Erin Ijesa, and other livelihoods that emanate from this water supply include road construction and farming, which is boosted by the reliable water supply.

The biodiversity at both sites shows general fauna and flora species, but Ayinkunugba was said to have more distinct primates. Also, the tourism impact shows that there is high visitation, economic benefits, but ecological strain at Erin-ijesa, while at Ayinkunugba waterfall, potential eco-tourism is coming up. Therefore, Erin-Ijesa is experiencing a more sustainable tourism management, and there is habitat protection and biodiversity monitoring at Ayinkunugba waterfall.

Sustainability Practices at Erin-Ijesa and Ayikunugba Waterfalls

Table 3 offers a compelling snapshot of sustainability indicators at two of Osun State's prominent waterfall sites: Erin-Ijesa and Ayikunugba. While both locations are major tourism assets, they have neither fully embraced a comprehensive sustainable tourism model. The results highlight significant deficiencies as follows;

Proper Waste Disposal

The result shows that proper waste disposal is a significant challenge at both waterfalls, with only 40% of respondents at Erin-Ijesa and 28.8% at Ayikunugba observing adequate practices. This is consistent with a broader national issue of poor waste management. Studies on waste management regularly show that indiscriminate waste disposal is a major problem, and it is often characterised by open dumping, burning, and a general lack of a formal waste management system. This is often linked to weak environmental policies, a lack of enforcement, and insufficient funding for local government waste management agencies. There are visible litter at Erin-Ijesa, and it is a direct consequence of this systemic failure (Adesina, 2025).

Environmental Conservation Awareness

The respondents on both sites show that there is adequate awareness of environmental conservation, with Erin-Ijesa waste disposal 52.5% and 46.3% at Ayikunugba. This suggests that while visitors and residents may be aware of the importance of conservation, their awareness is still low; it means that their awareness does not always translate into action. This "attitude-behaviour gap" is a known challenge in environmental psychology. Public awareness, enlightenment, and educational programs by government agencies and nongovernmental organisations are often sporadic and insufficient to create lasting behavioural change. Etim (2024) asserted that organised tours and trips that promote a "take it out as you brought it in" philosophy, organised by non-governmental organisations, are not integrated into the broader management of the sites.

Presence of Eco-Friendly Facilities

There are low percentages for eco-friendly facilities at both sites. About 31.3% respondents agreed that Erin-Ijesa has eco-friendly facilities, while 20% of respondents agreed that Ayikunugba has. This shows a critical condition. Such Eco-friendly facilities are designated recycling bins, compost toilets, solar-powered lighting, and sustainable accommodations. The absence of all these infrastructures is a key factor hindering the development of ecotourism in Nigeria. The Federal Government's National Development Plan 2021-2025 and Sustainable Bond Framework 2025 outline a commitment to a green economy and sustainable development, but these macro-level policies have yet to be effectively translated into concrete, on-the-ground projects at local tourist sites. This gap highlights a significant disconnect between national policy and local implementation (Adesina, 2025).

Trained Guides and Eco-Volunteers

About 35% of respondents at Erin-Ijesa and 25% at Ayikunugba agreed that there are the presence of trained guides or eco-volunteers. This is a critical missed opportunity for both visitor education and community empowerment. Most and Lina, (2023); Olubunmi-Ojo et al.,

(2022) opined that the role of trained local guides is to provide an astonishing experience for tourists, educate visitors on cultural and environmental sensitivity, and ensure that tourism revenue stays within the community. The low numbers suggest that visitors are largely left to explore on their own, which can lead to negative environmental impacts and a lack of cultural exchange. The absence of community-based tourism (CBT) initiatives, where local people are actively engaged in the management and activities at the sites, is a recurring theme in studies on tourism development in Southwest Nigeria (Bashiru et al., 2024).

Government/NGO Sustainability Programs

The respondents show low scores for government/NGO sustainability programs. About 22.5% of respondents at Erin-Ijesa and 15% at Ayinkunugba indicated low involvement of government and nongovernmental organisations in sustainable programs. Despite a series of programmes on sustainability, these programmes are not effective at the grassroots level. This is a reflection of documented challenges such as policy ambiguity, insufficient funding, and a lack of political will to enforce regulations (Etim, 2024).

These observations echo the concerns identified by Reid et al. (2011) and Prakoso et al. (2020), that inconsistent policy implementation and inadequacy of community-based capacity building are major setbacks for rural tourism in Nigeria.

Table 3: Sustainability at Erin-Ijesa and Ayikunugba Waterfalls (N = 80 each)

Sustainability Indicator	Erin Ijesa		Ayikunugba	
	Frequency	Percentage	Frequency	Percentage
Proper waste disposal	32.0	40.0	23.0	28.8
Environmental conservation awareness	42.0	52.5	37.0	46.3
Presence of eco-friendly facilities	25.0	31.3	16.0	20.0
Trained guides/eco-volunteers	28.0	35.0	20.0	25.0
Government/NGO sustainability programs	18.0	22.5	12.0	15.0

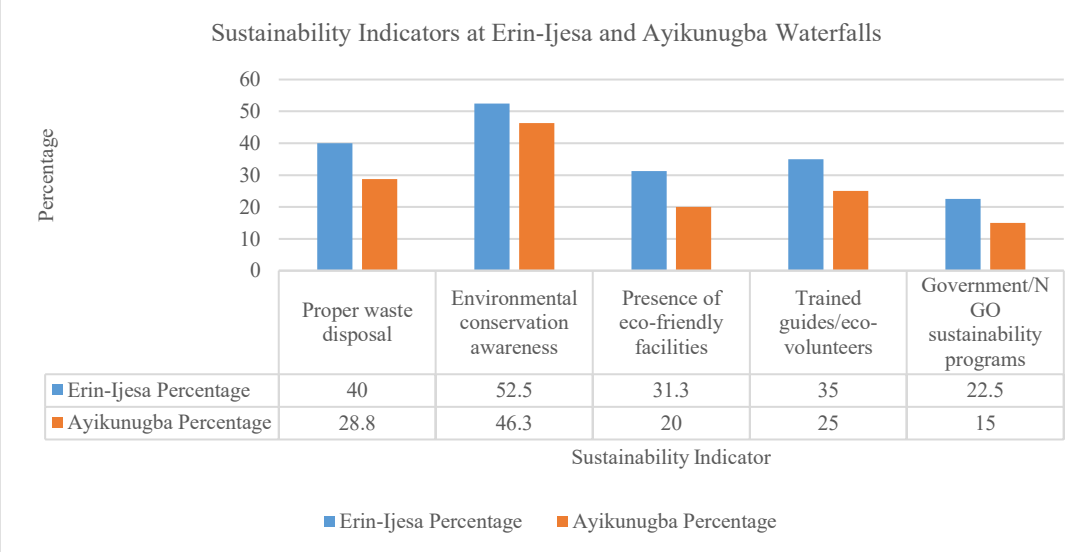


Figure 8: Sustainability Indicators of Erin-Ijesa and Ayikunugba Waterfalls

Conclusion

With this paper, Ecotourism Potentials, Ecological and Sociological Perspectives, and Sustainable Development at Renowned Waterfalls in the Tropical Region, Erin-Ijesa Waterfall and Ayikunugba Waterfall were critically looked at as key ecotourism sites in Southwestern Nigeria. Their ecological features, socio-cultural meanings, their role in the community, and their sustainability practices were analysed to comprehend the role of these natural attractions in local development and tourism growth.

The results show that the two sites have high ecotourism potential, especially with regard to scenic beauty, value of biodiversity, recreational value and cultural relevance. Visitors still visit these waterfalls to enjoy, learn, meditate and have cultural experiences, thus confirming their significance as community-based tourism properties. In the two destinations, the tourism activities are a source of economic opportunities by providing informal jobs, small-scale trading, guiding services and local entrepreneurship. Nevertheless, the research also found notable differences in the degree of development, the provision of infrastructure, systems of management, and sustainability practices between the two locations. It can be seen that Erin-Ijesa Waterfall has a comparatively better visibility and number of visitors; however, it is also facing a more severe environmental pressure because of overuse, poor waste disposal and lack of mechanisms to control visitors. Ayikunugba Waterfall, on the other hand, is not as commercialised; however, it illustrates a more natural and less disturbed ecosystem. It lacks sufficient infrastructure, accessibility and promotional coverage, which limits its tourism potential.

In spite of these variations, these two sites are similar in terms of socio-cultural and educational values. They are valuable learning sites in terms of environmental education and preservation of cultural heritage and identity. The paper also points out that local communities surrounding both waterfalls are instrumental in determining the outcomes of tourism and that their inputs in formal planning and decision-making are still minimal. This disparity has implications for sustainability initiatives and minimises the capacity of tourism to maximise long-term benefits to the host communities.

Notably, the research does not just focus on enumerating the issues but demonstrates the interrelationship between ecological degradation, poor infrastructure, poor governance systems, and poor community participation as issues that together impact the sustainability of the two destinations. It has been shown that issues in such sites are not a one-on-one problem but a systemic one where the development of tourism, environmental management and socio-economic conditions are interrelated.

Therefore, this paper is a good base to comprehend the present situation and future requirements of Erin-Ijesa and Ayikunugba Waterfalls. It underscores the relevance of the integrated planning strategies that integrate environmental conservation, community-based and sustainable tourism development strategies. The need to fill the identified gaps will not only increase the resilience of these ecotourism sites, but also enhance their role in supporting the livelihoods of the people and tourism development in the region in the long-run.

Recommendations

- Government, private sectors, and the community are to enhance infrastructural facilities and services such as good access roads and modern facilities like clean restrooms, food stalls, information centres, mini banking facilities, and shaded rest areas to improve visitor experience.
- The sites should be promoted through digital platforms to reach various groups of visitors.
- The board should be designed as themed cultural and ecotourism products like local festivals, traditional music performances, handicraft workshops, and guided nature hikes by local communities, traditional rulers, cultural groups, tourism operators and the Ministry of Culture and Tourism so that visitors can experience more than just viewing waterfalls.
- The local communities, are expected to intensify their involvement in the process of planning, decision-making and management of tourism activities to achieve equitable distribution of benefits like employment and income and other livelihood opportunities.
- NGOs, educational institutions, tourism training institutions, government agencies and community leaders must adopt educational and awareness programmes to foster awareness of the benefits of tourism, attitude towards visitors and establish effective communication and feedback among stakeholders.
- Sustainable tourism should be practiced by installing waste bins, proper waste management systems, discouraging littering, encouraging visitors to carry their waste, and providing environmental awareness signs and signage should be in place in both sites.
- Environmental conservation strategies like restricting the number of visitors to the site, especially in the peak season, establishing special walking trails to minimise environmental degradation, and encouraging the use of renewable energy to power tourism facilities should be encouraged.
- Revenue generated should be reinvested into conservation and community development projects to ensure that the two waterfalls are sustainable in the long run.

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