

Toward tourism-oriented community-based natural resource management for sustainability and climate change mitigation leadership in rural municipalities

Azwindini Isaac Ramaano

Department of Geography and Environmental Sciences, Faculty of Science, Engineering and Agriculture, University of Venda, Thohoyandou, South Africa

Journal of
Humanities and
Applied Social
Sciences

107

Received 7 July 2024
Revised 6 September 2024
17 October 2024
21 November 2024
Accepted 21 November 2024

Abstract

Purpose – The study aimed to outlay the substantial relationship to information and studies on sustainable tourism, environmental sustainability and local resource governance issues. It further contextualizes the essence of natural biodiversity, ecotourism and residents integrated subsistence. Meanwhile, delving into the community's sustainability and climate change perceptions within the Vhembe district of Limpopo Province of South Africa's Musina Municipality.

Design/methodology/approach – The municipality's circumstances for managing its natural and tourism resources were investigated through a general review of the literature, document reviews, focus groups and field observations. The data analysis procedure was finished with manual sorting, central tendencies and frequency distribution.

Findings – It was discovered that there is a negative correlation between activities that have the potential to contribute to climate change and the environmental consequences of rural ecotourism. Sustainable ecotourism management can lead to sustainability accomplishments when tourism activities follow the principles of ethical and sustainable travel, enhancing public leadership and livelihood values.

Social implications – The possible and present effects of ecotourism and integrated rural livelihoods on local communities, pertaining to sustainability and climate change, are brought forth with notions for significant enhancement measures for social sustainability.

Originality/value – Within the municipality, the study compares ecotourism, conservation and environmental degradation in terms of sustainability, responsible tourism and sustainable tourism. Moving forward, the essence of tourism-based public leadership within the context of community-based natural resources management and

© Azwindini Isaac Ramaano. Published in *Journal of Humanities and Applied Social Sciences*. Published by Emerald Publishing Limited. This article is published under the Creative Commons Attribution (CC BY 4.0) licence. Anyone may reproduce, distribute, translate and create derivative works of this article (for both commercial and non-commercial purposes), subject to full attribution to the original publication and authors. The full terms of this licence may be seen at <http://creativecommons.org/licences/by/4.0/legalcode>

The author conveys gratitude to the editors and anonymous reviewers for their management and direction on the manuscript. The earlier credentials in environment and development, land reform and development and ecotourism management from the Centre for Environmental Studies and Tourism Management Division of the University of Pretoria and human geographies and ecology and resource management (ERM) from the University of Venda (UNIVEN) Environmental Sciences School strengthened this examination and deserve recognition. They strongly endorse various humanities, environmental paradigms and biodiversity values for environmental sustainability and socioeconomic and leadership initiatives. Ultimately, expertise acquired in urban and rural planning (URP), rural development geography, tourism geography, settlement geography, conservation biology, social biology and ethnobiology from the Urban and Regional Planning, Geography and Geo-Information Sciences and Biological Sciences departments at UNIVEN was worthwhile. To this end, it is the essence of public administration (PAD) from the management sciences school. Extensive knowledge on integrated planning and rural livelihoods and sustainability was manifest. Original support on the backing study from SANSA Earth Observation and all participants from the study area are acknowledged.



Journal of Humanities and Applied Social
Sciences
Vol. 7 No. 2, 2025
pp. 107-131
Emerald Publishing Limited
2632-279X
DOI 10.1108/JHASS-07-2024-0099

community-based tourism that supports integrated livelihoods and strategies for environmental sustainability is highlighted and can be enhanced by the endorsement of various technologies within the emerging economies.

Keywords Sustainable tourism, Ecotourism management, Climate change, Community-based natural resource management, Public leadership, Integrated development plan, Environmental sustainability, Sustainable development

Paper type Research paper

1. Introduction

Low-income areas are typically inhabited by a large number of rural residents in Southern Africa and Africa; Musina Municipality is no different. These neighborhoods have abundant natural biodiversity, including the host areas of tourism entities, but they are vulnerable to the effects of climate change. [Leung et al. \(2018\)](#) recommended that education be provided to visitors and local communities regarding the inherent worth of biodiversity and the importance of responsible tourism and conservation practices. Climate change puzzles stem from a pattern of impacts caused by pollution, deforestation, and environmental degradation ([Fahad et al., 2022](#)). Within such environments, ecotourism and sustainable tourism can manage the effects of climate change while forming a cohesive whole for local community development initiatives. Ecotourism is therefore an innately sensible option and a tactic to combat climate change when applied and sustained decently ([Hall, 2021](#)). Although rules and standards do not allow for detailed and specific data on the future of climate change, it is conceivable that global warming is getting worse. As a result, climate change has become a concerning trend in recent years, with obvious negative effects on economic activity and livelihood across the globe ([Hussain et al., 2020](#)). While ecotourism helps to enhance sustainable tourism by fostering social, economic, and environmental efficiency levels within its core values and ideals, badly executed and carried out ecotourism activities surrounding natural areas can have disastrous environmental effects in remote and destination locations ([Stronza, 2019](#); [Ramaano, 2021a](#)). It is sufficient to say that, even though environmental changes can happen naturally in these areas, careless human activities, unified lifestyles by residents and neighboring communities, visitors, and insignificant actions by supervisors can intensify environmental concerns and stimulate climate change. Despite a wealth of research on the topic of how ecotourism helps people live better lives and reduce poverty, the problem statement centers on the apparent lack of attention given to the two-way folded environmental effects of ecotourism products in light of the climate change and sustainability crises. There is a dearth of scholarly information pertaining to the relevant and probed field in the study area, and the goal of this research is to bridge such a gap. Although taken in topical isolation but yet generally on climate change, amongst others, such as [Mpandeli and Maponya \(2013\)](#) on climate variability and [Ubisi et al. \(2017\)](#) with smallholder farmers's perceived consequences of climate change on crop production and household subsistence within the region. The study area has insufficient literature and research on sustainable tourism, CBNRM, and their role in climate change adaptation strategy; thus, this examination contributes largely to the scholarly input. Moreover, despite [Ramaano's \(2021a, 2021b, 2021c, 2021d, 2021e\)](#) main developments on sustainable tourism and integrated rural development livelihoods, CBNRM, sustainability, and their potential influence on climate change remain insufficiently probed topics in the area.

Given that (1) there hasn't been much research done in the area, (2) a baseline for future studies needs to be established, and (3) the municipality and selected villages and the nearby protected areas have characteristics that are found in many other parts of the country's provinces and the African continent. Hence, the results of this exploratory study may help researchers evaluate other rural municipalities and their biodiversity and local development policies. Therefore, in this article we show that relatedly, it suffices to realize that within the rationale of CBNRM, community-based tourism (CBT), community-based organizations (CBOs), and the integrity of integrated development plans (IDPs), public leadership on biodiversity and sustainability initiatives can be boosted within the local rural communities. To

support sustainable rural livelihoods in Africa and developing nations, [Ndwandwe and Gumbo \(2022\)](#) stress the necessity of investigating the possibilities of integrating stakeholders in rural infrastructure improvement initiatives. As to [Ramaano \(2023a\)](#), the municipality has, among others, been raveled by service delivery protests regarding water and road facilities in the past year. Rural tourism presents itself by offering various job opportunities in rural areas through agritourism and ecotourism, and well-executed public leadership goals and an integrated development plan (IDP) that are cognizant of climate change consequences are critical in achieving this. Hence, the three rationales of sustainable tourism in terms of economic, social, and environmental efficiencies can meet the half-way local government efforts to distribute public leadership and service delivery while cognizant of climate change. Thus, sustainable ecotourism includes environmental awareness education within its core principles and leader values. Productive planning concepts have become the main resources for combating poverty in light of these factors and the IDP ideals. IDP lays out the precise targets, goals, and objectives for every area, along with the plans and methods that will be used to get there.

Promoting integrated and coordinated development throughout the municipality is one of the IDP's main goals ([Asha and Makalela, 2020](#)). These strategies include providing high-quality services, empowering women, spurring public mentoring, promoting environmental sustainability, and enforcing government oversight and accountability. This is particularly pivotal for rural youth and sustainability education, as they are tomorrow's leaders and future biodiversity stewards ([Kensler and Uline, 2016](#); [Ramaano, 2024d, e](#)). Hence, [Brookes and Grint \(2010\)](#) and [Brookes \(2011\)](#) posit that public leadership entails a form of collective governance in which public bodies and agencies cooperate in achieving a common aspiration based on aims and values and disseminate this through each organization in a collegiate way. Likewise, the present study aims to highlight the essence of tourism-oriented and biodiversity management-effective public leadership and sustainability implications in rural areas by exploring the sustainable tourism rationales, advantages, and disadvantages of ecotourism activities as well as the impact of human beings on climate change issues. In light of this, ecotourism has an effect on the climate but is not immune to the fluctuations and effects of climate change. For the people in the research area who live in and around the Big Tree and Nwanedi nature reserves, the suggested alternative may be a suitable one. It is therefore essential to the creation of a more sensible, enabling policy for the tourism industry as well as the training of local communities in important environmental leadership, conservation, and ecotourism management expertise and practices. In dry land and coastal areas alike, harmful ecotourism practices like vehicle-trampled vegetation and pollutant dumping, for instance, have the potential to eventually cause climate change. Nevertheless, there is a reciprocal relationship between ecotourism and climate change, as the former disrupts the latter by interfering with favorable travel seasons and locations. It is occasionally true that, in exceptional circumstances and locally, certain unique climatic conditions can favorably affect the influx of tourists influenced by an area's pleasant climate.

The RQ is: Is it possible to adequately mitigate the effects of ecotourism-induced climate change and human behavioral activities in remote regions within remote tourist destinations that are based on conservation? Consequently, gain important knowledge about how, among the many general effects of climate change, poor environmental conservation kills important, inherent, and prevalent animal and plant species, ultimately resulting in their endangerment to probable extinction. The earth will become hotter going forward as a result of the changed natural state of biodiversity, which increases the risk of climate change effects. With these in mind, tourism-oriented biodiversity management and public leadership through CBNRM should form a gestalt of necessary livelihood strategy in the study area.

2. Literature review and theoretical attribute

2.1 Theoretical attribute

The current study, thus, takes into consideration the theory of sustainable tourism ([Johnston, 2014](#)) through the administration of ecotourism and responsible tourism, with an emphasis on

social responsibility, corporate governance, sustainability, and social behavior in the fight against environmental degradation and climate change. These have implications for enhanced integrated livelihoods and sustainable development in rural communities. According to [Tang \(2015\)](#), there is a significant increase in tourism and a more holistic approach as a result of climate change; however, this is only the beginning and requires coordinated efforts to address environmental catastrophes. Global ecotourism developments have benefits and drawbacks ([Hussain et al., 2020](#)). Like its benefits, ecotourism combats climate change by assisting the industry in lowering carbon emissions since it is centered on natural resources. It supports the maintenance of the attractions and provides a source of revenue for the locals ([Baloch et al., 2023](#)). As such, it promotes conservation and teaches both tourists and locals ([Mondino and Beery, 2019](#)). However, careless ecotourism can result in trash, pollution, and noise that disrupts wildlife routines and damages the environment, as was previously mentioned. The potential for local wildlife to suffer as a result of visitor lodging emphasizes the detrimental effects of ecotourism ([Shannon et al., 2017](#)). Although parks and conservation areas support conservation efforts and provide products for ecotourists, geoheritage hobbyists, and outdoor enthusiasts, it is true that climate change eventually causes irreversible harm to species and landscapes ([Lloret et al., 2022](#)). In addition to the quick extinction of many plant and animal species, high temperatures also reduce floristic lushness and tree density. Furthermore, it dramatically slows down the rate at which the ecosystem produces new plant and animal species ([Loarie et al., 2009](#)). Additionally, it reduces the viability of ecotourism, impedes the species diversity of trees and their capacity to reproduce, modifies the migration routes of birds and other animals, and invites for an appropriate standard of disruption and destabilization that can be attained through responsible behavior, laws, and local social integration in sustainable and ethical tourism practices ([Ramaano, 2019, 2021b](#)). One development strategy that is essential to the variety of livelihoods in many nearby neighborhoods within and adjacent to protected areas is ecotourism. However, climate change weakens subsistence in some places, especially in remote areas, and is linked to the implications of ecotourism on natural areas and their abundant biodiversity ([Menbere and Menbere, 2018](#)).

2.2 Sustainable tourism, ecotourism, livelihoods, and the climate change intersection

Because climate change is a real phenomenon, [Wondirad \(2020\)](#) contends that ecotourism needs to be protected alongside other potentially disparate and depressing tourism-related endeavors. These, along with the goals of CBNRM, CBT, biodiversity management, and climate change awareness initiatives, can help rural communities' public leadership efforts focused on sustainability and rural resource management through a variety of technology-oriented platforms in digital marketing and integrative geographic information systems (GIS). The significance of studies exploring the perceptions of ecotourism stakeholders in conservation areas regarding climate change is then confirmed by [Lopes and Videira \(2017\)](#). Unquestionably, the future of climate change-ecotourism transactions in international travel, the preservation of natural resources, and hospitality venues depend on risk administration and management models and paradigms ([Spencer, 2018](#)). To this end, [Rasheed and Balakrishnan \(2024\)](#) use an Indian case study to explore the importance of citizenship conduct and minimalism on proenvironmental behavior in order to shape sustainable tourism in areas rich in biodiversity and UNESCO World Heritage Sites. Accordingly, it is in line with the essence that this study is having with the communities that are close to the Big Tree and Nwanedi nature reserves. To this end, it includes the biodiversity of Tshipise and the Dambale, Domboni, Makavhini, Mukununde's rich cultural heritage of the mountains, and other conservation and ecotourism destinations that are important to the region for CBNRM, CBT, cultural heritage management initiatives (CHMI), the South African Heritage Resources Agency (SAHRA), and sustainable development. As such, the IDP and local economic development (LED) can be heightened by CBNRM, tourism-strengthened public leadership efforts, and elevated community participation in the biodiversity-enriched

rural municipality (Sandbrook, 2006). Issues of participatory rural appraisal (PRA) and participatory geographic information system (PGIS) have the ability to synergize CBNRM and CBT in rural municipalities, enhance public leadership in land use management (LUM), and improve rural livelihoods (Ramaano, 2021a). Similar to this, Forje *et al.* (2021) believe that protected areas are essential locations for ecotourism worldwide; however, because of their increased dependence on natural environments and wild ecosystems, protected domains and ecotourism efforts are seen as part of a larger set of climate change issues. As a result, it is essential to the preservation of ecotourism-based livelihood strategies and for achieving the Sustainable Development Goals (SDGs) and the South African Vision 2030 National Development Plan. The necessity of integrated development plans (IDPs), public leadership ideals, and strengthening commitments to livelihoods and service delivery options are crucial in achieving this goal (Ramaano, 2021a, 2023a). As per Grimm *et al.* (2018), businesses involved in the tourism industry must deal with the challenges presented by climate change. This is consistent with the journey on the World Business Council for Sustainable Development's (WBCSD's) Vision 2050 project and climate change concern (DiPiazza Jr., S.A.).

2.3 Local governance, community involvement, responsible tourism, and climate change

It is significant to improve universal measures on sustainable development initiatives that are embedded in local biodiversity, integrated tourism livelihoods, and climate change adaptation and mitigation efforts. With a case study of the Nigerian tourism sector, Adebayo (2018) reminds us of the capacity of local governance towards fostering desirable tourism development policies that endorse community participation and support sustainable and responsible tourism rationales. These efforts can be valuable cornerstones towards sustainability and climate change adaptation strategies in various municipalities, study regions, and in Africa, benchmarking globally, particularly the biodiversity rich but yet marginalized and impoverished. However, in southern Africa, including the study area, according to the abovementioned, better community participation and sustainable tourism development are not without challenges, as shown by the Malawi case study (Bello *et al.*, 2017), Setokoe and Ramukumba (2020), and Ramaano (2024a), with a South African case study on constraints that face CBT and community involvement in remote areas. It is thus further demonstrated in a Nigerian context by Adebayo and Butcher (2021), dissecting essential steps for counteracting such constraints and catalysts of community participation and empowerment in tourism designing and development. To this end, various governance and service delivery complications are deemed potentially detrimental to responsible tourism and latent stumbling blocks to climate change adaptive and migratory environments.

According to Mihalic (2016) and Mathew and Sreejesh (2017), "responsible tourism" refers to a set of tourism practices that aim to minimize adverse effects on the economy, society, and environment of the destination while optimizing positive effects on local communities and the environment. Here are a few examples of ethical travel. The organization's mission is to "create better living and tourism environments for people." Governments, operators, hotel owners, residents, and tourists must all take accountability for their actions and work to improve the environmental impact of tourism. Similar to sustainable tourism, the three main priorities are social, economic, and environmental integrity (Mathew, 2022). Hoogendoorn and Fitchett (2018) explicate the relationship between tourism and climate change and the significance of responsible tourism as a means of adaptation. But they also notice that despite possessing a much lower ability to adjust to the effects of climate change and many nations with rapidly expanding tourism industries, the developing world has received a lot less examination. Particularly compared to other nations in the global south (Scott *et al.*, 2019), the African continent has seen noticeably fewer studies, which calls for increased study and efforts toward efficient climate change adaptation mechanisms based on sustainable and responsible tourism. Thus, this study is based on the idea that, by emphasizing

responsible tourism as a means of promoting sustainable development and tourism, it is possible to guarantee a decrease in activities that contribute to climate change through CBNRM and CBT, ultimately leading to sustainability in rural areas rich in biodiversity.

2.4 CBNRM, public leadership, sustainability and technology implications

[Grint \(2005\)](#) reminds us pertinently that leadership is about group activity by communities or individuals, and in order to promote, affect, and distribute improved public value as demonstrated by sustained social, environmental, and economic well-being within a dynamic and evolving context, the values of public leadership are integral. Importantly, CBNRM is a plan that will work in unison to protect natural resources in communities and, at the absolute least, allow residents to have permanent access ([Pailler et al., 2015](#)). It indicates that the locals are fighting to preserve their land, water, wildlife, and plants so they can manage these natural resources to improve their quality of life as well as that of their descendants and peers. It is a strategy for enabling each and every current community member to contribute to raising the level of economic, cultural, and spiritual participation ([Gosling et al., 2017](#)). Successful CBNRM can yield a wide range of profits, including youth empowerment initiatives. It can, for instance, improve farming and the food supply, give people access to resources, and generate employment ([Ayoo, 2007](#)). Small businesses are boosted, opportunities for education and training are provided, community organizations are developed, community health is improved and cultural and spiritual beliefs are maintained and strengthened ([DEAT, 2003](#)). As previously indicated, CBNRM has the potential to significantly impact environmental awareness behaviors and values in CBT, as well as local resource management and public leadership in the study area and rural areas rich in biodiversity. Suffice to realize that in these modern days, in addition to the nature of CBNRM and its usage of traditional ecological knowledge (TEK), CBNRM initiatives can be boosted by technology applications and innovations ([Roka, 2020](#)). The latter includes integrating PGIS ideals, the internet of things (IoT), artificial intelligence (AI), and the fourth industrial revolution (FIR) technologies ([Madhav and Joseph, 2024](#); [Mpofu, 2024](#)), such as the usage of remote sensing (RS) and quantum GIS in managing and monitoring ecotourism and agritourism initiatives for integrated rural resource management, biodiversity conservation, and agricultural enterprises cognizant of climate change threats. To this end, digital and technology platforms in social marketing and digital marketing of these integrated rural resources can boost CBNRM activities and climate change awareness actions and forums ([Child, 2019](#)). Accordingly, social marketing is a tactic used to develop programs aimed at sustaining or changing people's behavior for both the benefit of individuals and society as a whole. It applies social concepts to the elements of commercial marketing. Consequently, digital marketing encompasses a broad range of online marketing activities beyond social media, including website development and email marketing ([Lee and Kotler, 2011](#)). CBT guarantees that the economic advantages of tourism stay in the community by guaranteeing that local communities completely control and oversee the tourism experience ([Dodds et al., 2018](#)).

Analogously, bioprospecting refers to any endeavor to identify biological resources and associated indigenous knowledge for commercial use. It is sometimes called prospecting for biodiversity. It endorses the application of phytochemistry and the usage of technologies to reach its productivity objectives ([Mateo et al., 2001](#)). As such, it may be a necessary component of medical and cultural tourism for the rural communities adjacent to the protected areas. In spite of this, arrangements and understandings regarding the stages of resource utilization are essential. Thus, reasonable bioprospecting can be a vital component of CBNRM, sustainability, community development, and sustainable tourism while being mindful of upsetting ecosystem stability and climate change for the pharmaceuticals from the ethnobotanicals within the operations of conservancies ([Ramaano, 2021a](#)). The fundamental tenet of CBNRM is that, instead of the government or other regularities, people who live close to a resource and whose survival depends on it immediately have an interest in sustainable land use and supervision. According to its charges, CBNRM meets or exceeds all expectations in

terms of accomplishing conservation goals (DeGeorges and Reilly, 2009). The impoverished rural communities that were denied their basic right to meaningful participation in settlements that improve their lives and well-being must now be given priority. When it comes to the use and management of resources, sustainability generally refers to the notion that the needs of the present generation should be satisfied without compromising those of future generations.

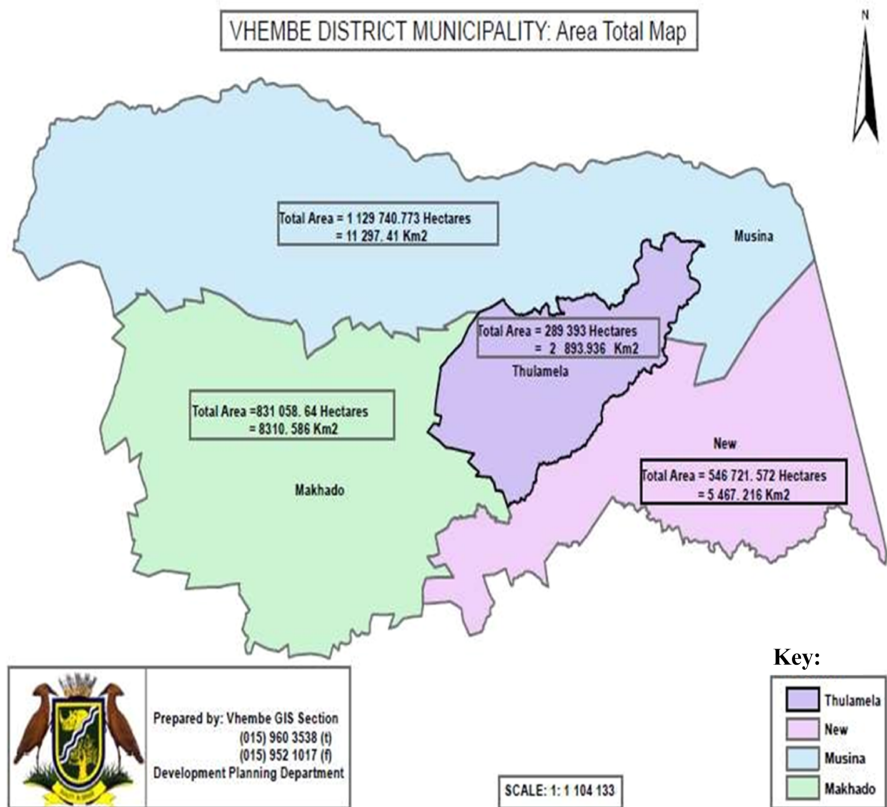
Ecotourism and sustainability principles share the promotion of socially, economically, and environmentally sound models for sustainable tourism, the achievement of sustainable development, and effective public leadership (Ramaano, 2024a). Remarkably, the growing emphasis on sustainability around the world has put pressure on companies to show the value of their products and services beyond individual profit and to account for the negative effects of their operations (Loucks *et al.*, 2010). The current state of affairs in Musina municipality is symbolized by protests against a variety of socioeconomic activities, such as the town's and the study area's inadequate water service supply and the improper application of IDP ideals toward improved livelihoods, improved service delivery, and environmental sustainability. In actuality, one of the main benefits of sustainable tourism is that it creates opportunities for revenue generation by bolstering the regional economy (Abuhay *et al.*, 2023). This could result in a number of things, like most communities obtaining their own boreholes and water reservoirs, enhanced ecotourism entrepreneurship revenue-generating platforms, and established road networks connecting access points to tourism and hospitality services within municipalities. One of ecotourism's most notable qualities as an ethical form of travel to unspoiled places that protects the environment and improves community well-being is its ability to educate communities about sustainability (Johnston, 2014), to develop public leadership skills, and to empower communities regarding their indigenous rights (IR), TEK, and indigenous knowledge systems (IKS) (Tanyanyiwa, 2019). Improved ownership of businesses and natural resource-oriented public leadership for better livelihoods, acquaintances of basic amenities, and value chain are among the previously mentioned merits when they are combined with CBNRM activities (Garrod, 2003). They also establish better planning system networks around the use of locally available environmental resources based on tourism, the role of community-based organizations (CBOs), and traditional leaders in service delivery synergies with local governments.

Nzimakwe (2011) and Hartley (2018) proposed that public leadership plays a role in achieving national policy objectives and plans, as well as improving the environment, the economy, and the standard of living for individuals and communities. Hameduddin and Engbers (2021) assert that there is a cumulative effect between public service motivation and leadership, particularly when considering various national scenarios. In light of this, local service delivery—which is the provision of public services at the local level and is a separate area of public policy—is a component of service delivery (Pepinsky *et al.*, 2017). The next part presents the study area and methods.

3. Study area and methods

3.1 Location and attributes

Vhembe District Municipality's territory is a part of Musina Municipality. It is tucked away in the far-reaching northeastern region of the province of Limpopo, bordering Kruger National Park to the east and Zimbabwe to the north. Therefore, the municipality in the far north is Musina Town, which is a part of Thulamela Municipality. Based on the area map (Musina Municipality, 2019; Ramaano, 2021a, b, c, d), it is thus lodged between 22°25'00" and 22°50'00"E lines of latitude and between 30°20'15" and 31°01'22"S lines of longitude (see [Figure 1]). There are pockets of citrus and tomato businesses along Musina Municipality's northeastern and northwest borders (Ramaano, 2021a, b). In Musina Municipality, there is potential for synchronization between agricultural production and tourism development goals. According to this cultural explanation, tourism and agricultural activities have a dual relationship; as a result, the ideas of ecotourism and agrotourism, along with heritage,



Source(s): Musina Municipality (2019)

Figure 1. Research location

ethnocultural tourism, and geotourism, are the main ways that tourism can be sustained in rural areas. Agritourism and ecotourism byproducts within such environments, for instance, will be impacted by unsustainable agricultural practices in tourist destinations contributing to climate change. Suffice to say that, among other things, cottage boarding contributes to the income that farmers receive from agritourism. From this point on, an agreement between the two successors (agricultural provision and tourism providers) in rural areas' vacation spots can be achieved; for instance, the local residents generate deals at negotiated and partially funded rates for the nearby ecotourism and hospitality channels.

3.1.1 Sustainable tourism development, rural, and ecotourism exercises. The municipal area of Musina offers ecotourism, agritourism, and tourism destination services. Community-based agricultural and irrigation projects in Folovhodwe Nwanedi and Tshipise Sagole, Zwigodini [Madifha] Big Tree, Gumela river-based agricultural businesses, Tshipise Forever Resorts, Tshiphale Park and Resort, and other initiatives are evident in old and recent ecotourism and hospitality enterprises.

3.1.2 Tourist attractions and enterprises. The results of the study showed that the Musina Municipality benefits from a multitude of tourism-related initiatives. Numerous tourist destinations can be found both inside and close to the most rural areas of Musina Municipality. They own the Domboni Caves, the Nwanedi Nature Reserve, the Big Tree Accommodation Lodge, the Big Tree Nature Reserve, and a resort. However, Musina Town and Musina

Municipality have additional tourist attractions. These include, for example, Mapungubwe National Park, Beria Madzonga Resort, Manalani Lodge, Bush Babe, Limpopo River Lodge, Dongola Ranch, Baobab Caravan Park, and Baobab Chalets (Ramaano, 2008, a, b, c, d).

3.2 Data and methods

The study collected data through a combination of qualitative survey methods while it utilized manual sorting, frequency distribution, and central tendencies. As a result, it further converted the qualitative interview while sticking to the traditions of qualitative research to portray a quantitative nature. Regarding the University of Venda's ethical clearance procedures, all ethical research methods and permissions were originally acknowledged in the methodology. While comparatively quantitative research requires numerical or quantifiable data, qualitative studies rely on firsthand accounts or written materials that paint a comprehensive picture of how people behave or think within a particular society. Henceforth, qualitative data are characterized by language, interpretation, and descriptiveness. Consequentially, the study is predominantly qualitative, despite sporadic supplementary numbers, counts, or measurements that represent simple statistics quantitatively. A purposive sample was used in the investigation. The researcher's background experience of the region and the pilot work providing hints about tourism, agricultural resources, and signs of environmental degradation had an impact on purposeful sampling. These motivate the researcher to carry out a formal investigation. Consequently, the bulk of research methods consisted of literature reviews and focus groups. Although the criteria for selecting focus group discussion would be to find the most active citizen of the society, such as a civil association group, to avoid limiting sentiments from the grassroots and ordinary community members, the focus group was open to every member of the society per research design. The pilot work represented the first step of the research design, while manually dominated qualitative analysis manifested the last step before actual focus group sessions, which were complemented by general literature, document reviews, and field observation. The researchers believed it would be quicker and easier to obtain the desired sample by using the analytical mind and the experience from the pilot study, which is why this type of sampling was established (Patton, 2001; Ramaano, 2021b).

3.2.1 Sample size calculation and rationale of the study. The supporting sample size was calculated employing Taro Yamane's formula (Yamane, 1973). $n = N/(1 + Ne^2)$, where n is the sample size, N is the population size, and e is the precision level. With 4,947 residents, the study area includes the villages of Folovhodwe, Gumela, Tshipise, and Zwigodini in the Musina Municipality. As a result, the sample size for the research area was approximately 370, and the sample was established at 5% ($e = 0.05$). The study area was chosen because of the poor living conditions and the villages' construction around protected zones and natural biodiversity areas. Four villages (Ramaano, 2021a, b, c) were deliberately nominated and described. The tourist destinations around Folovhodwe, Gumela, Tshipise, and Zwigodini are adjacent, including the Nwanedi Nature Reserve and the "Big Tree Nature Reserve," among others. Thus, the given original sample only serves the referral basis of the initial surveyed area, leading to the final sample size ($n = 20$) of the current investigation, where four focus group discussions with 20 participants were held within the communities in the Musina municipal area (5 participants per 4 villages was deemed enough to source information).

Every member of the community was welcomed to participate in the focus group discussions, to include the very active and those on lower class levels. As a result, the initial sample size pertains to the initial study sample size, which is the only one that starts the current inquiry. The allocations of focus group talks from specific questionnaires on villages in the study area are shown in Table 1. Because of this, a focus group discussion subsample is employed in this study in addition to the auxiliary methods for gathering data.

Primary and secondary methods were used to gather the data, which was then manually sorted based on the study's objectives and subjected to Microsoft Excel frequency distribution, central tendencies, and contingency tables for analysis. Therefore, information was gathered

Table 1. Allocations of focus group discussions from designated questionnaires on villages in the study area

Villages	Focus group discussion sample size and individuals per village (n = 20)
Folovhodwe	5
Gumela	5
Tshipise	5
Zwigodini	5
Total	20

Source(s): Musina municipality (2011, 2019), Ramaano (2021a)

using the following methods: (A) general literature reviews from 1 March to June 2022 and extended presently; (B) reviews of previously published documents from 1 March to June 2022 and extended presently; (C) focus group discussions ($n = 20$) in the mornings and afternoons of all the sampled villages [17/18/19/20 March 2019]; and (D) field observations (field survey from 1 March to June 2019). The justification and fundamentals of the study's data collection techniques were vital. (A) Review of the literature: A review of the literature is an overview of an early investigation into a topic. Fink (2014) asserts that conducting a literature review as part of a research methodology strengthens the groundwork for all kinds of studies and enables researchers to examine the materials they used in preparation. The literature review delves into academic data, publications, and additional factors related to a relevant field of study (Fink, 2014). (B) Reviews of existing documents: Reviewing documents requires not only understanding the background story and cases but also comprehending the reasoning behind the relevant study. According to Tracy (2014), "documents" are any written materials that provide information on a social phenomenon that is applied and exists apart from the researcher's intervention. Although they are obtained by individuals or organizations for purposes other than societal research, documents can be crucial for study and education. They could consist of individual, institutional, and private compositions. (C) Focus group discussions: these are among the most highly esteemed primary data sources; in this research, their relevant importance lies at the center of the study domain and the main goal of the investigation (Wong, 2008; Tracy, 2014). Thus, focus group discussions were an essential method for gathering data that aligned with the research question. Discussions in focus groups typically center on people's perspectives, knowledge, beliefs, feelings, and specifics about a given subject. Focus group talks about ecotourism, rural activities, and sustainability issues were therefore appropriate for the study area. (D) Field observations: providing first-hand understanding of data through actual captions and physical captions, field observations are an essential complementary tool in data collection.

Direct observation is one method of accurately portraying an object, according to Thompson and Borrero (2011). The physical landscape, biodiversity status, and human actions, behaviors, and activities in the study area were all precisely mapped out using data from field observations. As a result, the participants' preferences for focus group appointment times varied; some went for morning sessions, while others went for midday ones. Moreover, the research assemblage efforts were governed by the distance. Closer locations received morning slots for the entire research process and field observation, while locations that were too far away received midday slots. As a result, information was gathered from nearby towns as well as their territories. The main realization of the study required the completion of the literature review. In order to achieve this, the prior data was supplemented by field observations and focus group discussions ($n = 20$). Although secondary sources, which included information from persons who were not witnesses (literature review), were somewhat detached from primary sources and contained useful information, primary sources were helpful sources, such as eyewitness accounts of the event (focus group discussions) (Aspers and Corte, 2019; Ramaano, 2022a, b). As a result, while quantitative data was also

manually and through frequency distribution and central tendency analyzed, qualitative data was primarily analyzed by hand, with the questions posed serving as the primary themes. In the end, no advanced software was employed. The study's findings and discussions are presented in the following section.

4. Results and discussion

4.1 *The demographics of the respondents*

Fundamental factors linked to any community's development are its demographics. There are 45% females and 55% males in the study area (Ramaano, 2021a).

4.1.1 Gender and the respondents. In addition to the detailed description, Musina Municipality has 56.6% male-headed families and 43.4% female-headed families. It is thus approximately consistent with the deductions made by Ramaano (2021a, b), indicating an uneven but natural imbalance between men and women, especially among the younger generation in the study region.

4.2 *Integrated document reviews on ecotourism, climate change and sustainability actions*

Although no stringent criteria was based on in selecting the documents for reviews, the main focus was on ecotourism management, sustainable and responsible tourism perspectives, and climate change and sustainability initiatives from the study and continent with close benchmarking to global perspective. The availability and abundance of documents and the most applicable extended general literature pertaining to the topic at hand would thus drive the whole effort on critical reviews. To this end, the municipality's IDP and the LED provide ingenious additional data in the face of insufficiently available data regarding potential climate change threats.

Ecotourism and comprehensive livelihood exercises and their impacts on climate change in the study area are indeed critical topics. Because it compares the sampled area and the municipality to other related scenarios surrounding local government, public leadership, biodiversity management, and sustainability issues, this section provides mixed data and is not limited to just those pertinent entities and the study area. These requirements and findings were included in necessary disclosures by a number of well-known writers on ecotourism, climate change, sustainable development, and tourism (Sasidharan *et al.*, 2011; Kutzner, 2019). Musina municipality IDP and LED strategy documents were, in fact, crucial secondary data sources for this research. Notable writers and the theoretical discoveries of Ramaano (2008, 2021c, d) were also essential. Abraham and Rajasenan (2015) provide innovative insights into the ways in which ecotourism programs can support inclusive participatory development in rural, isolated places. Thus, the researcher contends that corporate efforts in agronomy, ecotourism, and conservation can be accelerated by sustainable tourism. Therefore, it is necessary to comprehend how irresponsible behavior in the study area contributes to climate change in order to adopt such comprehensive community development initiatives. According to Zuccaro *et al.* (2020), the specification is in line with the pressing need for creative tourism destination management in light of climate change. Ecotourism, agritourism, equitable tourism, conservation administration, and CBNRM-oriented public leadership may have a crucial intersection in the region and other underserved rural areas (Musina Municipality, 2019; Kayamandi Development Services, 2007; Ramaano, 2021a, d). According to Tsaor *et al.* (2006), the aforementioned is therefore analogous to community development and sustainability in sustainable tourism. With these, the authenticity of corporate strategy, regional planning, and the tourism industry takes sustainability principles into consideration. The mentioned initiatives would align with Adams' (2008) and Bruno and Karliner's (2002) efforts to promote sustainable development and appropriate land use management for business development in opposition to greenwashing and depressing acquisition tendencies, in addition to efforts to combat climate change. Likewise, it is implied that such policies would support

new policies for rural entrepreneurship development within the pastoral areas of emerging economies through obligations for adequate government and the corporate performance of small and medium enterprises (SMEs) within tourism and agriculture in rural localities (Adewumi and Keyser, 2002; Ndofirepi, 2024). Simply put, rural tourism is yet another latent economic activity in many marginalized rural communities via different enterprise and commodity platforms. Therefore, it is crucial in the direction of sustainability and a strategy motivated by efforts to minimize climate change effects. Hence, the role of local governance and its public leadership implications for impoverished local communities in rural but biodiversity-rich areas are crucial. In light of this, Stoddart (2008) promoted regional economic growth and rural tourism in Southern Africa. As such, it is essential for evaluating inclusive tourism participation in the South African Magalies Meander case.

Malhi *et al.* (2020) caution that extreme weather events are altering the composition and productivity of forests worldwide, frequently lowering their capacity to provide ecosystem services. As a result, immediate and serious conservation actions are required. Based on a case study of Ethiopia, Abuhay *et al.* (2023) suggested that community-based ecotourism places a higher priority on environmental, sociocultural, and economic sustainability. In light of these elements, the welcoming environment and increased biodiversity of mountain resources offer additional benefits for the growth of neighboring rural communities' tourism industries. Stone and Nyaupane (2016) used a case study from Botswana CBNRM and CBT to find that the shift from government-run to multi-level governance structures that recognize the potential for community wildlife-based tourism to coexist with protected areas, impact local subsistence, and foster positive relationships was what allowed for the improvement of community capital.

Hosseini *et al.* (2021) remind us of the importance of protecting World Natural Heritage sites for the growth of the tourism industry and the fact that climate change continues to pose a threat to their best possible preservation and has detrimental effects on thriving tourism industries. According to Stringer *et al.* (2009) and Rogerson (2016), in order to improve environmental management and livelihoods, it is necessary to increase knowledge about climate change and the growth of tourism in Africa, as well as policy and regulatory issues. Concerns about climate change and its possible effects on tourism, as demonstrated by Dube and Nhamo's (2019) case study of Zimbabwe and Victoria Falls, lend support to this. In this sense, the financial justifications for increased responsible behavior and the growth of tourism are legitimate global priorities. Relatedly and consistent with the prior significant work of Jordan's "Environment Committees in the Nineteenth Parliament for the Year 2020," Al-Hammouri *et al.* (2024) urge all countries to recognize the damage that climate change and other related plights cause to the environment and support various organizations that work to mitigate and adapt to it, including the use of artificial intelligence to shield the environment.

4.3 Exhaustive focus group discussion data within the study area

4.3.1 Awareness campaign on responsible tourism and alternative tourism in local climate change and ecosystem management strategies. According to Table 2's data, three respondents agreed with the awareness campaign regarding the importance of alternative tourism strategies and tourism management in the area that falls under their purview. Thus, the vast majority of the 17 participants opposed this kind of investigation. Lastly, only 15.0% of participants expressed satisfaction with the local appraisal campaign. *To this end, the central tendency for the negative responses was 4.25 mean value (μ), 4 median value (M), and 4 mode value (Mo) with a standard deviation value (σ) of 0.433, while the positive response was 0.75 mean value (μ), 1 median value (M), and 1 mode value (Mo) with a standard deviation value (σ) of 0.433. The higher the mean value, the more pressing the issue, and a low standard deviation would implicate data that is more clustered around the mean.*

[...] Although this community-based tourism project was intended to empower communities, only a few tourists visit. Both locals and visiting tourists behave irresponsibly and dump things around the

Table 2. Focus group discussion acknowledgments on any awareness campaign about the role of responsible tourism and alternative tourism in local climate change and ecosystem management strategy in your area

		Focus group discussion Q.6.(d) Are there awareness campaigns on the role of responsible tourism and alternative tourism in local climate change and ecosystem management strategy in your area?		
		No	Yes	Total
Gumela	Count	4	1	5
	%	80.0%	20.0%	100.0%
Folovhodwe	Count	5	0	5
	%	100.0%	0.0%	100.0%
Tshipise	Count	4	1	5
	%	80.0%	20.0%	100.0%
Zwigodini	Count	4	1	5
	%	80.0%	20.0%	100.0%
Total	Count	17	3	20
	%	85.0%	15.0%	100.0%

Source(s): Focus group discussions by the author, 2019

“big tree,” which itself is threatened by reckless behaviors. The lapas that were built at the onset of the project are now completely damaged. [Participant from Zwigodini Madifha village]

[...] There is overuse of our biodiversity for livelihood sourcing, including the ones in our neighboring villages. This raises even more doubt about the future of our heritage hot spring, and now that the spa has long been halted for tourism usage, it is evident proof that alternative tourism has not been achieved and climate change is looming. [Participant from Tshipise village]

[...] Here environmental degradation around here starts with the over-cultivated fields, both on dry lands and in areas around river banks, eradicating endemic species and changing the ecosystem. Overharvesting of trees for fuel wood and building materials threatens the local biodiversity, and poaching is a problem within the nearby Nwanedi nature reserve. A responsible tourism and environmental management awareness campaign can assist. [Participant from Folovhodwe village]

4.3.1.1 Expatiations on the role of responsible tourism and alternative tourism in local climate change and ecosystem management strategies. It was unclear from their explanations what 85.0% of replies said in opposition to the particularized awareness campaign’s veracity. Thus, it is clear that the impartiality of community tourism, sustainable tourism precepts, and community-based natural resource management within the study area are all necessary for such a progression.

4.3.2 *Knowledge on the main contributing factors for environmental management and the local climate crisis.* Table 3 shows that 20% of participants, or most of the participants, agreed that unsustainable tourism activities are the primary contributing factor. This report claims that damaging activities like cars trampling on vegetation and ecotourists scratching and pruning trees are more prevalent. From then on, all five contribution groups had the same 15% representation. These include overusing biomass and tree resources for fuel wood and overdebarking trees due to the removal of riparian vegetation for orchards and roof thatching materials. Therefore, these effects can be attributed to other economic motives as well as traditional medicine. As a result, just 5% of informants selected overusing tree resources and mountain vegetation, such as harvesting timber. This presents an evident need for improved public leadership in biodiversity management and enhanced CBNRM and CBT against dismal environmental consequences and potential climate change shocks in the area.

4.3.2.1 Expatiations on the main contributing factors to environmental management and the local climate crisis. The 20% representation that has been specified indicates that the most advanced environmental crisis that requires immediate attention is unsustainable eco-tourism activities. Therefore, substantial reductions are required for activities related to climate

Table 3. Focus group discussion acknowledgments on any knowledge about the main contributing factors for environmental management and the local climate crisis in your area from the table below

Focus group discussion Q.6.(c) What do you think is the main contributing factors for environmental management and the local climate crisis in your area from the table below?									
		Unsustainable eco-tourism activities, e.g. <i>trampling of vegetation by vehicles; scratching and cutting of trees by tourists</i>	Over-cultivation of the local forest areas, e.g. <i>land degradation</i>	Cutting of riparian vegetation, e.g. <i>for orchards and roof thatching materials</i>	Over-utilization of biomass and tree resources, e.g. <i>for fuel woods</i>	Over-debarking of trees, e.g. <i>for indigenous medicine and other material purposes</i>	Over-utilization of mountain vegetation and tree resources, e.g. <i>for timber harvest</i>	Excessive dumping of residues by tourists, e.g. <i>empty cans, plastic and other pollutants</i>	Total
Gumela	Count	1	0	1	1	1	1	0	5
	%	20.0%	0.0%	20%	20%	20%	20%	0.0%	100.0%
Folovhodwe	Count	1	1	2	1	0	0	0	5
	%	20.0%	20.0%	40%	20%	0.0%	0.0%	0.0%	100.0%
Tshipise	Count	0	2	0	1	1	0	1	5
	%	0.0%	40.0%	0.0%	20%	20%	0.0%	20%	100.0%
Zwigodini	Count	2	0	0	0	1	0	2	5
	%	40.0%	0.0%	0.0%	0.0%	20%	0.0%	40.0%	100.0%
Total	Count	4	3	3	3	3	1	3	20
	%	20.0%	15.0%	15.0%	15.0%	15.0%	5.0%	15.0%	100.0%

Source(s): Focus group discussions by the author, 2019

change. The 5% who stand for lessened use of the mountain resource show potential for ecotourism to blend in with other types of travel. Activities related to heritage, geotourism, and green tourism will now continue in the area (Torabi Farsani *et al.*, 2012). The equally distributed fifteen percent represents the pinnacle of apparent diverse environmental consequences that call for better natural resource management workshops for the general public. Nevertheless, local and provincial governments must support these initiatives by holding targeted campaigns, symposiums, and seminars. Sustainable tourism, in particular, can boost local community tourism and sustainability while enhancing eco-tourism and agricultural endeavors. CBNRM and CBT efforts can be boosted by accommodating and utilizing social marketing, digital marketing, and assorted technology platforms for heightened productivity and improving local resource leadership awareness of climate change (Ramaano, 2024d).

4.4 Field observation data on integrated rural initiatives and tourism leadership

The fieldwork and field observation took into account various conservation, tourism, and agricultural activities in addition to the nature and results of the exploration. The researcher had to physically verify tourism, agriculture, and integrated rural operations while conducting the research; however, there were no set criteria for choosing the subjects for the field observation. It was possible to physically observe a profusion of tourism-related goods, businesses, and agricultural activities, the majority of which encountered difficulties. Consequently, a number of farming activities were included in the list of other entities surveyed. Overcultivation, environmental degradation, a hotter climate, and a lack of progress and corrective action to offset abrupt local climate change and dry conditions caused the enterprises to struggle. According to Yehong *et al.* (2021), traditional agricultural practices are essential components of eco-tourism, agritourism, and cultural heritage tourism. There were no intentional additional tourist-attracting features in the Big Tree Nature Reserve; the patches were overgrown, and the fence was practically nonexistent. The stunning mountains of Domboni, Makavhini, and Dambale, along with the Domboni cave and the paintings of the Dambale bushmen, among other things, imply that borderland tourism in Beitbridge and heritage tourism in Mapungubwe National Park and heritage sites should be linked to ecotourism, agritourism, geotourism, cultural heritage tourism, and rural and urban ecotourism in the area surrounding Musina town. Corporate governance should emphasize both the public and private aspects of livelihood welfare in addition to common sustainability goals. This assertion holds that disputes over land use and resource ambivalence shouldn't affect the growth of the tourism industry. For this reason, biological resource observation associations are valued for many reasons and often involve local populations. Such systems should encourage locals while providing comforting conservation, as suggested by Otto *et al.* (2013) and Ramaano (2022c, d). Accordingly, within the study area, it will offer fertile grounds for sustainable livelihood endeavors, hoisted public leadership in natural resource management (NRM), and improved CBNRM and CBT practices against potential climate change. While improving tourism governance, amongst others, sustainable and responsible tourism enterprises are encouraged against detrimental activities, such as the impact of unsustainable rural tourism, mass tourism, and overtourism (Andrews, 2017; Frias-Jamilena *et al.*, 2022).

5. Conclusion and recommendations

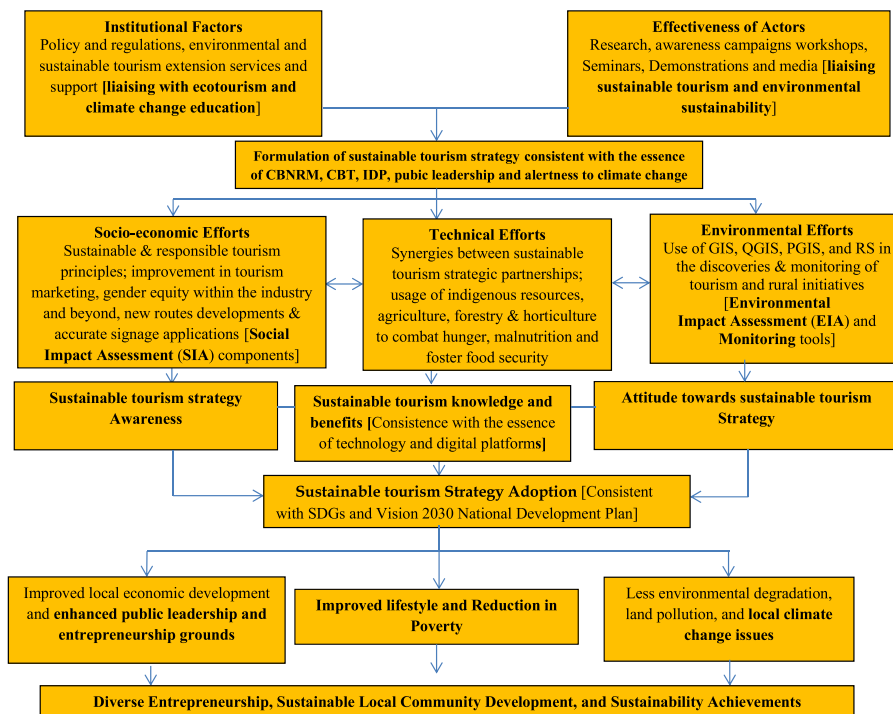
5.1 Theoretical, practical, policy, and socio-economic implications

5.1.1 *Theoretical implications.* Although it was demonstrated that responsible tourism and sustainable ecotourism can offer the best guidelines for managing local resources and that a variety of farming activities can support these businesses, Musina Municipality must adopt a holistic approach in order for all socioeconomic production to be aware of the threat posed by

climate change. Through the activation of various industry systems, their existences are responsibilities within national, regional, control, and public provincial government commodities that should tie into one common goal of biodiversity livelihood and decent preservation (Ring and Schröter-Schlaack, 2011). After all, the advantages of ecotourism initiatives can have an impact on the attitudes and perceptions of both visitors and residents, which are crucial for encouraging responsible tourism behavior and conservation and can be essential components of CBT, CBNRM, and the execution of public leadership goals (Ren et al., 2021).

5.1.2 Practical, policy, and socio-economic implications. Visitors, rural people, and nature conservation zones must all make a coherent pledge in order to support responsible tourism. For their integrated livelihoods, locals should concentrate on sustainable goals, and conservation area managers should have emergency plans in place for adaptation and mitigation, restoration, and remedy. This ought to align with the Agenda 2030 SDGs, practical ramifications, and policies for the development of tourism. Any rational tourism plan for rural communities should highlight the interdependence of forestry, ecotourism, agriculture, and integrated rural development activities (Ndofirepi, 2024; Bahnasy, 2024). Promoting environmental stewardship and integrated subsistence education for long-term results are two ways to achieve this. That being said, it makes sense to give sustainability top priority, address climate change from the standpoints of environmental and public leadership, and improve platforms for community participation. For true public leadership based on sustainable tourism and sustainability principles that CBNRM can support, it is also crucial to use locally accessible, sustainable resources to combat poverty, end hunger, reduce malnutrition, and advance gender parity in the workplace. The focus group and general data from the exploration site revealed a conspicuous ignorance of environmental degradation, ecotourism management activities, and knowledge related to climate change. These necessitate crucial intervention and thought-after strategy in line with the main objective of this study: integrated sustainability strategy anchored on biodiversity management leadership and sustainable tourism that CBNRM and ecotourism can channel. As a result, Figure 2 is based on the extensive suggestions made by this research and the essential elements of sustainable tourism. It demonstrates how aspects like policies and regulations impacting the importance of role players like journalists and investigators can support the growth of sustainable tourism and ecotourism, tourism opportunities, and strategies that address climate change, as well as rural provinces' means of subsistence. CBNRM and effective public leadership rationales.

Therefore, focusing on participatory ecotourism planning (PEP) in conjunction with CBNRM, CBT, and PGIS would highlight the development of tourism and community advancement in such a rural area while promoting environmental management, sustainable ecotourism, actions that address climate change, and sustainability goals. Hence, the value of IoT, social, and digital marketing platforms will supplement and sustain this interconnected rural resource management system. To this end, encouraging digitalization and digitization in rural areas. As a result, people can spur better lives, putting features into a digital representation and incorporating digital technology into modern activities to change business models (Maiti, Castellacci and Melchior, 2020; Ramaano, 2024b, c, d). It will be simple to defend an equitable tourism policy that seeks to operationalize biodiversity leadership and local resources, rectify historical leadership accounts, and control environmental risks and climate change dilemmas; in turn, it will comprehensively reinforce environmental stewardship and anchor tourism administration, equitable resource distribution, and the empowerment of each individual community member within their region (Borrini-Feyerabend et al., 2013; Adebayo and Butcher, 2023). To this end, the public leadership and livelihood endeavors of Musina Municipality may depend on the implementation of a profitable, integrated ecotourism and sustainable tourism implementation plan aware of climate change. Hence, planning, which is the process of putting ideas into concrete steps, is critical for rural resource management, climate change mitigation leadership, and sustainability



Source(s): Author's creation; adapted from Ramaano, 2023c, 2024a

Figure 2. Envisioned sustainable tourism and climate change model for conscious livelihoods

(Measham *et al.*, 2011; Bass and Dalal-Clayton, 2012). The document and literature reviews described various scenarios in which enhanced ecotourism management and environmental protection systems allowed for entrepreneurialism in the tourism and agricultural sectors, thereby mitigating the threats posed by climate change. The composition reviews on ecotourism and livelihoods in Musina Municipality that are currently available support these citations and show that there are substantial tourism potentials linked to the present ineffective effects on subsistence improvements due to a lack of proper planning and implementation strategies (Ramaano, 2021e). In light of sustainability and climate change, the potential and current impacts of ecotourism and integrated rural livelihoods on local communities are thus discussed, along with ideas for important social sustainability improvement measures, inclusive livelihoods, and equitable economies (Ramaano, 2022f, g, 2023c).

5.2 Limitations and further research

This study demonstrated the implied role of CBNRM-enabled sustainable tourism management, ecotourism, and responsible tourism behaviors in improving public leadership and potential mitigation of environmental crises and climate change issues in rural and agricultural activities, using the Musina Municipality case as a mirror. Its limitations still include its limited selection and use of only general literature, reviews of previously published documents, and focus group discussions combined with on-the-ground observation. As stated differently, the purpose of the 370-person sample size from the primary investigation was mainly to introduce the four villages for focus group discussions. Given the sample size and the preponderance of manual analysis, the focused group question posed largely reflected the

study's overall themes. It also only used older maps to support claims and the study area portrayal against more recent descriptions. In spite of all these, the study nonetheless stands to reason that responsible tourism incorporation would be a more useful lens through which to view ecotourism and activities related to climate change in sustainable tourism and rural sustainability (Ramaano, 2023 a, b). From this point on, any active and likely attempt to achieve all-encompassing tourism goals within the specific tourism policies, infrastructure, service quality, and marketing of destination areas could be strengthened by combining active geographic depictions, geographic information systems (GIS), and information and communication technologies (ICT) (van der Duim, 2005; Barile *et al.*, 2017; Ramaano, 2022e, 2024b). Therefore, in order to lower the risks associated with climate change and enable the local communities in Musina Municipality to achieve sustainability, the study has demonstrated the need for enhanced local governance, rural development, and integrated livelihood tactics with a better attitude from the locals. A strong ecotourism strategy, climate change-awareness leadership, and ongoing environmental sustainability training for locals are therefore essential. References are listed in the following section.

References

- Abraham, B.G. and Rajasenan, D. (2015), Community participation in ecotourism: an inclusive development option for Kerala (Doctoral dissertation, Cochin University Of Science And Technology).
- Abuhay, T., Teshome, E. and Mulu, G. (2023), "A tale of duality: community perceptions towards the ecotourism impacts on Simien Mountains National Park, Ethiopia", *Regional Sustainability*, Vol. 4 No. 4, pp. 453-464, doi: [10.1016/j.regsus.2023.11.007](https://doi.org/10.1016/j.regsus.2023.11.007).
- Adams, B. (2008), *Green Development: Environment and Sustainability in a Developing World*, Routledge, London.
- Adebayo, A.D. (2018), *Governance and Community Participation in the Nigerian Tourism Sector: A Stakeholder Analysis*, Canterbury Christ Church University, United Kingdom.
- Adebayo, A.D. and Butcher, J. (2021), "Constraints and drivers of community participation and empowerment in tourism planning and development in Nigeria", *Tourism Review International*, Vol. 25 Nos 2-3, pp. 209-227, doi: [10.3727/154427221x16098837280000](https://doi.org/10.3727/154427221x16098837280000).
- Adebayo, A.D. and Butcher, J. (2023), "Community empowerment in Nigeria's tourism industry: an analysis of stakeholders' perceptions", *Tourism Planning and Development*, Vol. 20 No. 4, pp. 583-603, doi: [10.1080/21568316.2022.2127865](https://doi.org/10.1080/21568316.2022.2127865).
- Adewumi, S.A. and Keyser, E. (2002), "Challenges and prospects of rural entrepreneurship: a discourse analysis of selected local government areas of Osun state, Nigeria", *International Journal of Business and Management Studies*, Vol. 12 No. 2, pp. 544-560.
- Al-Hammouri, A., Al-Billeh, T., Al-Billeh, H., Alhammouri, N. and Belghit, R. (2024), "International and constitutional efforts to protect the environment through the use of artificial intelligence techniques", *Pakistan Journal of Criminology*, Vol. 16 No. 1, pp. 387-398, doi: [10.62271/pjc.16.1.387.398](https://doi.org/10.62271/pjc.16.1.387.398).
- Andrews, H. (2017), "Mass tourism in Mallorca: examples from Calvià", in *Mass Tourism in a Small World*, CABI, Wallingford UK, pp. 181-190.
- Asha, A. and Makalela, K. (2020), "Challenges in the implementation of integrated development plan and service delivery in Lepelle-Nkumphi municipality, Limpopo province", *International Journal of Economics and Finance Studies*, Vol. 12 No. 1, pp. 1-15, doi: [10.34109/ijefs.202012101](https://doi.org/10.34109/ijefs.202012101).
- Aspers, P. and Corte, U. (2019), "What is qualitative in qualitative research", *Qualitative Sociology*, Vol. 42 No. 2, pp. 139-160, doi: [10.1007/s11133-019-9413-7](https://doi.org/10.1007/s11133-019-9413-7).
- Ayoo, C. (2007), "Community-based natural resource management in Kenya", *Management of Environmental Quality: An International Journal*, Vol. 18 No. 5, pp. 531-541, doi: [10.1108/14777830710778292](https://doi.org/10.1108/14777830710778292).

- Bahnasy, N. (2024), "A conceptual framework for characterization of agricultural heritage in desert-prone areas", *Journal of Humanities and Applied Social Sciences*, Vol. ahead-of-print No. ahead-of-print, doi: [10.1108/jhass-11-2023-0163](https://doi.org/10.1108/jhass-11-2023-0163).
- Baloch, Q.B., Shah, S.N., Iqbal, N., Sheeraz, M., Asadullah, M., Mahar, S. and Khan, A.U. (2023), "Impact of tourism development upon environmental sustainability: a suggested framework for sustainable ecotourism", *Environmental Science and Pollution Research*, Vol. 30 No. 3, pp. 5917-5930, doi: [10.1007/s11356-022-22496-w](https://doi.org/10.1007/s11356-022-22496-w).
- Barile, S., Ciasullo, M.V., Troisi, O. and Sarno, D. (2017), "The role of technology and institutions in tourism service ecosystems: findings from a case study", *The TQM Journal*, Vol. 29 No. 6, pp. 811-833, doi: [10.1108/tqm-06-2017-0068](https://doi.org/10.1108/tqm-06-2017-0068).
- Bass, S. and Dalal-Clayton, B. (2012), *Sustainable Development Strategies: A Resource Book*, Routledge, London.
- Bello, F.G., Lovelock, B. and Carr, N. (2017), "Constraints of community participation in protected area-based tourism planning: the case of Malawi", *Journal of Ecotourism*, Vol. 16 No. 2, pp. 131-151, doi: [10.1080/14724049.2016.1251444](https://doi.org/10.1080/14724049.2016.1251444).
- Borrini-Feyerabend, G., Farvar, M.T., Renard, Y., Pimbert, M.P. and Kothari, A. (2013), *Sharing Power, A Global Guide to Collaborative Management of Natural Resources*, London: Routledge.
- Brookes, S. (2011), "Crisis, confidence and collectivity: responding to the new public leadership challenge", *Leadership*, Vol. 7 No. 2, pp. 175-194, doi: [10.1177/1742715010394733](https://doi.org/10.1177/1742715010394733).
- Brookes, S. and Grint, K. (Eds), (2010), *The New Public Leadership Challenge*, Palgrave Macmillan Books, Palgrave Macmillan, number 978-0-230-27795-3, March.
- Bruno, K. and Karlner, J. (2002), *Earthsummit. biz: The Corporate Takeover of Sustainable Development*, Food First Books, Oakland, CA.
- Child, B. (2019), *Sustainable Governance of Wildlife and Community-Based Natural Resource Management: From Economic Principles to Practical Governance*, Routledge, London.
- DeGeorges, P.A. and Reilly, B.K. (2009), "The realities of community based natural resource management and biodiversity conservation in Sub-Saharan Africa", *Sustainability*, Vol. 1 No. 3, pp. 734-788, doi: [10.3390/su1030734](https://doi.org/10.3390/su1030734).
- Department of environmental affairs and tourism (DEAT) (2003), *Principles and Guidelines of Community Based Natural Resource Management*, DEAT, Pretoria.
- Dodds, R., Ali, A. and Galaski, K. (2018), "Mobilizing knowledge: determining key elements for success and pitfalls in developing community-based tourism", *Current Issues in Tourism*, Vol. 21 No. 13, pp. 1547-1568, doi: [10.1080/13683500.2016.1150257](https://doi.org/10.1080/13683500.2016.1150257).
- Dube, K. and Nhamo, G. (2019), "Climate change and potential impacts on tourism: evidence from the Zimbabwean side of the Victoria Falls", *Environment, Development and Sustainability*, Vol. 21 No. 4, pp. 2025-2041, doi: [10.1007/s10668-018-0118-y](https://doi.org/10.1007/s10668-018-0118-y).
- Fahad, S., Adnan, M., Saud, S. and Nie, L. (Eds), (2022), *Climate Change and Ecosystems: Challenges to Sustainable Development*, CRC Press, Boca Raton.
- Fink, A. (2014), *Conducting Research Literature Reviews: From the Internet to Paper*, 3rd ed., Sage, Los Angeles, CA.
- Forje, G.W., Tchamba, M.N. and Eno-Nku, M. (2021), "Determinants of ecotourism development in and around protected areas: the case of Campo Ma'an National Park in Cameroon", *Scientific African*, Vol. 11, e00663, doi: [10.1016/j.sciaf.2020.e00663](https://doi.org/10.1016/j.sciaf.2020.e00663).
- Frías-Jamilena, D.M., Fernández-Ruano, M.L. and Polo-Pena, A.I. (2022), "Gamified environmental interpretation as a strategy for improving tourist behavior in support of sustainable tourism: the moderating role of psychological distance", *Tourism Management*, Vol. 91, 104519, doi: [10.1016/j.tourman.2022.104519](https://doi.org/10.1016/j.tourman.2022.104519).
- Garrod, B. (2003), "Local participation in the planning and management of ecotourism: a revised model approach", *Journal of Ecotourism*, Vol. 2 No. 1, pp. 33-53, doi: [10.1080/14724040308668132](https://doi.org/10.1080/14724040308668132).

- Gosling, A., Shackleton, C.M. and Gambiza, J. (2017), "Community-based natural resource use and management of Bigodi Wetland Sanctuary, Uganda, for livelihood benefits", *Wetlands Ecology and Management*, Vol. 25 No. 6, pp. 717-730, doi: [10.1007/s11273-017-9546-y](https://doi.org/10.1007/s11273-017-9546-y).
- Grimm, I.J., Alcântara, L.C. and Sampaio, C.A.C. (2018), "Tourism under climate change scenarios: impacts, possibilities, and challenges", *Revista Brasileira de Pesquisa em Turismo*, Vol. 12 No. 03, pp. 01-22.
- Grint, K. (2005), "Problems, problems, problems: the social construction of leadership", *Human Relations*, Vol. 58 No. 11, pp. 1467-1494, doi: [10.1177/0018726705061314](https://doi.org/10.1177/0018726705061314).
- Hall, C.M. (2021), "Constructing sustainable tourism development: the 2030 agenda and the managerial ecology of sustainable tourism", in *Activating Critical Thinking to Advance the Sustainable Development Goals in Tourism Systems*, Routledge, London, pp. 198-214.
- Hameduddin, T. and Engbers, T. (2021), "Leadership and public service motivation: a systematic synthesis", *International Public Management Journal*, Vol. 25 No. 1, pp. 86-119, doi: [10.1080/10967494.2021.1884150](https://doi.org/10.1080/10967494.2021.1884150).
- Hartley, J. (2018), "Ten propositions about public leadership", *International Journal of Public Leadership*, Vol. 14 No. 4, pp. 202-217, doi: [10.1108/ijpl-09-2018-0048](https://doi.org/10.1108/ijpl-09-2018-0048).
- Hoogendoorn, G. and Fitchett, J.M. (2018), "Tourism and climate change: a review of threats and adaptation strategies for Africa", *Current Issues in Tourism*, Vol. 21 No. 7, pp. 742-759, doi: [10.1080/13683500.2016.1188893](https://doi.org/10.1080/13683500.2016.1188893).
- Hosseini, K., Stefaniec, A. and Hosseini, S.P. (2021), "World Heritage Sites in developing countries: assessing impacts and handling complexities toward sustainable tourism", *Journal of Destination Marketing and Management*, Vol. 20, 100616, doi: [10.1016/j.jdmm.2021.100616](https://doi.org/10.1016/j.jdmm.2021.100616).
- Hussain, M., Butt, A.R., Uzma, F., Ahmed, R., Irshad, S., Rehman, A. and Yousaf, B. (2020), "A comprehensive review of climate change impacts, adaptation, and mitigation on environmental and natural calamities in Pakistan", *Environmental Monitoring and Assessment*, Vol. 192, pp. 1-20, doi: [10.1007/s10661-019-7956-4](https://doi.org/10.1007/s10661-019-7956-4).
- Johnston, C.S. (2014), "Towards a theory of sustainability, sustainable development and sustainable tourism: Beijing's hutong neighbourhoods and sustainable tourism", *Journal of Sustainable Tourism*, Vol. 22 No. 2, pp. 195-213, doi: [10.1080/09669582.2013.828731](https://doi.org/10.1080/09669582.2013.828731).
- Kensler, L.A. and Uline, C.L. (2016), *Leadership for Green Schools: Sustainability for Our Children, Our Communities, and Our Planet*, Routledge, London.
- Lee, N.R. and Kotler, P. (2011), *Social Marketing: Influencing Behaviors for Good*, 4th ed., SAGE Publications, Thousand Oaks, CA.
- Leung, Y.F., Spenceley, A., Hvenegaard, G., Buckley, R. and Groves, C. (2018), "Tourism and visitor management in protected areas", *Guidelines for sustainability*, Vol. 27, Gland, Switzerland: IuCN.
- Lloret, J., Turiel, A., Solé, J., Berdalet, E., Sabatés, A., Olivares, A., Gili, J.M., Vila-Subirós, J. and Sardá, R. (2022), "Unravelling the ecological impacts of large-scale offshore wind farms in the Mediterranean Sea", *Science of the Total Environment*, Vol. 824, 153803, doi: [10.1016/j.scitotenv.2022.153803](https://doi.org/10.1016/j.scitotenv.2022.153803).
- Loarie, S.R., Duffy, P.B., Hamilton, H., Asner, G.P., Field, C.B. and Ackerly, D.D. (2009), "The velocity of climate change", *Nature*, Vol. 462 No. 7276, pp. 1052-1055, doi: [10.1038/nature08649](https://doi.org/10.1038/nature08649).
- Lopes, R. and Videira, N. (2017), "Modelling feedback processes underpinning management of ecosystem services: the role of participatory systems mapping", *Ecosystem Services*, Vol. 28, pp. 28-42, doi: [10.1016/j.ecoser.2017.09.012](https://doi.org/10.1016/j.ecoser.2017.09.012).
- Loucks, E.S., Martens, M.L. and Cho, C.H. (2010), "Engaging small-and medium-sized businesses in sustainability", *Sustainability Accounting, Management and Policy Journal*, Vol. 1 No. 2, pp. 178-200, doi: [10.1108/20408021011089239](https://doi.org/10.1108/20408021011089239).
- Madhav, N. and Joseph, M. (2024), "Exploring the impacts of AI and IoT in South African tourism and hospitality industry", in *Tourism and Hospitality for Sustainable Development: Volume Two: Emerging Trends and Global Issues*, Springer Nature Switzerland, Cham, pp. 203-211.

- Maiti, D., Castellacci, F. and Melchior, A. (2020), *Digitalisation and Development: Issues for India and Beyond*, Springer Singapore, pp. 3–29.
- Malhi, Y., Franklin, J., Seddon, N., Solan, M., Turner, M.G., Field, C.B. and Knowlton, N. (2020), “Climate change and ecosystems: threats, opportunities and solutions”, *Philosophical Transactions of the Royal Society B*, Vol. 375 No. 1794, 20190104, doi: [10.1098/rstb.2019.0104](https://doi.org/10.1098/rstb.2019.0104).
- Mateo, N., Nader, W. and Tamayo, G. (2001), “Bioprospecting”, *Encyclopedia of biodiversity*, Vol. 1, pp. 471–487.
- Mathew, P.V. (2022), “Sustainable tourism development: discerning the impact of responsible tourism on community well-being”, *Journal of Hospitality and Tourism Insights*, Vol. 5 No. 5, pp. 987–1001.
- Mathew, P.V. and Sreejesh, S. (2017), “Impact of responsible tourism on destination sustainability and quality of life of community in tourism destinations”, *Journal of Hospitality and Tourism Management*, Vol. 31, pp. 83–89, doi: [10.1016/j.jhtm.2016.10.001](https://doi.org/10.1016/j.jhtm.2016.10.001).
- Measham, T.G., Preston, B.L., Smith, T.F., Brooke, C., Gorrdard, R., Withycombe, G. and Morrison, C. (2011), “Adapting to climate change through local municipal planning: barriers and challenges”, *Mitigation and Adaptation Strategies for Global Change*, Vol. 16, pp. 889–909, doi: [10.1007/s11027-011-9301-2](https://doi.org/10.1007/s11027-011-9301-2).
- Menbere, I.P. and Menbere, T.P. (2018), “Wetland ecosystems in Ethiopia and their implications in ecotourism and biodiversity conservation”, *Journal of Ecology and the Natural Environment*, Vol. 10 No. 6, pp. 80–96.
- Mihalic, T. (2016), “Sustainable-responsible tourism discourse–Towards “responsustable” tourism”, *Journal of Cleaner Production*, Vol. 111, pp. 461–470, doi: [10.1016/j.jclepro.2014.12.062](https://doi.org/10.1016/j.jclepro.2014.12.062).
- Mondino, E. and Beery, T. (2019), “Ecotourism as a learning tool for sustainable development. The case of Monviso Transboundary Biosphere Reserve, Italy”, *Journal of Ecotourism*, Vol. 18 No. 2, pp. 107–121, doi: [10.1080/14724049.2018.1462371](https://doi.org/10.1080/14724049.2018.1462371).
- Mpandeli, N.S. and Maponya, P.I. (2013), “Coping with climate variability in Limpopo province, South Africa”, *Peak J. Agric. Sci*, Vol. 1 No. 4, pp. 54–64.
- Mpofu, F.Y. (2024), “The fourth industrial revolution technologies in the tourism sector in African countries: opportunities, barriers, and ethical considerations”, in *Tourism and Hospitality for Sustainable Development: Volume Two: Emerging Trends and Global Issues*, Springer Nature Switzerland, Cham, pp. 179–201.
- Musina Municipality (2019), Limpopo province. South Africa.
- Ndofirepi, T.M. (2024), Challenges and possibilities for sustainable marketing in the agricultural sector of sub-Saharan Africa, fostering long-term sustainable development in Africa, p.189.
- Ndwandwe, B. and Gumbo (2022), “Examining prospects of stakeholders’ integration in rural infrastructure investment interventions to aid sustainable rural livelihoods”, in *Building Smart, Resilient and Sustainable Infrastructure in Developing Countries*, CRC Press, Johannesburg, 6–7 October 2022, pp. 119–127.
- Nzimakwe, T.I. (2011), “Public leadership in a transforming society for effective service delivery”, *Administratio Publica*, Vol. 19 No. 1, pp. 51–68.
- Otto, J., Zerner, C., Robinson, J., Donovan, R., Lavelle, M., Villarreal, R., Salafsky, N., Alcorn, J., Seymour, F., Kleyneyer, C. and Pearl, M. (2013), *Natural Connections: Perspectives in Community-Based Conservation*, Island press, Washington.
- Pailler, S., Naidoo, R., Burgess, N.D., Freeman, O.E. and Fisher, B. (2015), “Impacts of community-based natural resource management on wealth, food security and child health in Tanzania”, *PLoS One*, Vol. 10 No. 7, p. e0133252, doi: [10.1371/journal.pone.0133252](https://doi.org/10.1371/journal.pone.0133252).
- Patton, M.Q. (2001), *Qualitative Research and Evaluation Methods*, 2nd ed., Sage Publications, Thousand Oaks, CA.
- Pepinsky, T.B., Pierskalla, J.H. and Sacks, A. (2017), “Bureaucracy and service delivery”, *Annual Review of Political Science*, Vol. 20 No. 1, pp. 249–268, doi: [10.1146/annurev-polisci-051215-022705](https://doi.org/10.1146/annurev-polisci-051215-022705).

- Ramaano, A.I. (2008), *An Assessment of the Potential and Actual Contribution of Ecotourism to Poverty Alleviation in Mutale Municipality*, Doctoral dissertation, University of Venda.
- Ramaano, A.I. (2019), *The Prospects of Using Tourism Industry to Advance Community Livelihoods in Musina Municipality*, University of Venda, Limpopo.
- Ramaano, A.I. (2021a), "Prospects of using tourism industry to advance community livelihoods in Musina municipality, Limpopo, South Africa", *Transactions of the Royal Society of South Africa*, Vol. 76 No. 2, pp. 201-215, doi: [10.1080/0035919X.2021.1912847](https://doi.org/10.1080/0035919X.2021.1912847).
- Ramaano, A.I. (2021b), "Tourism policy and environmental impacts in Musina municipality: lessons from a case study of failure", *Tourism Critiques: Practice and Theory*, Vol. 2 No. 1, pp. 91-114, doi: [10.1108/trc-12-2020-0021](https://doi.org/10.1108/trc-12-2020-0021).
- Ramaano, A.I. (2021c), "Potential of ecotourism as a mechanism to buoy community livelihoods: the case of Musina Municipality, Limpopo, South Africa", *Journal of Business and Socio-economic Development*, Vol. 1 No. 1, pp. 47-70, doi: [10.1108/jbsed-02-2021-0020](https://doi.org/10.1108/jbsed-02-2021-0020).
- Ramaano, A.I. (2021d), "Potential for tourism to promote indigenous resources for community development in Musina municipality, Vhembe district, Limpopo province, South Africa", *Forestry Economics Review*, Vol. 3 No. 1, pp. 53-78, doi: [10.1108/fer-02-2021-0006](https://doi.org/10.1108/fer-02-2021-0006).
- Ramaano, A.I. (2021e), "Tourism development dilemmas in Musina municipality: evidence from the big tree nature reserve and neighboring entities, Vhembe district, South Africa", *Journal of Economic and Administrative Sciences*, Vol. 39 No. 2, pp. 504-522, doi: [10.1108/jeas-02-2021-0034](https://doi.org/10.1108/jeas-02-2021-0034).
- Ramaano, A.I. (2022a), "Views of utilizing sustainable tourism to improve community sustenances: a case study of the impoverished rural communities of Musina municipality", *International Hospitality Review*, Vol. 36 No. 2, pp. 220-243, doi: [10.1108/ihr-03-2021-0019](https://doi.org/10.1108/ihr-03-2021-0019).
- Ramaano, A.I. (2022b), "Tourism implications and challenges in Musina municipality: a case of the Big tree nature reserve and adjacent tourism ventures; Limpopo", *Rajagiri Management Journal*, Vol. 16 No. 3, pp. 239-259, doi: [10.1108/ramj-02-2021-0015](https://doi.org/10.1108/ramj-02-2021-0015).
- Ramaano, A.I. (2022c), "The implied significance of integrative geographical information systems in sustainable tourism and comprehensive community development in Musina Municipality, South Africa", *Technological Sustainability*, Vol. 1 No. 1, pp. 42-63, doi: [10.1108/techs-08-2021-0001](https://doi.org/10.1108/techs-08-2021-0001).
- Ramaano, A.I. (2022d), "Nature and impacts of tourism development facilities and activities on the livelihoods of communities in Musina municipality", *Tourism Planning and Development*, Vol. 20 No. 4, pp. 1-25, doi: [10.1080/21568316.2022.2115124](https://doi.org/10.1080/21568316.2022.2115124).
- Ramaano, A.I. (2022e), "The economic-administrative role of geographic information systems in rural tourism and exhaustive local community development in African marginalized communities", *Arab Gulf Journal of Scientific Research*, Vol. 40 No. 2, pp. 180-195, doi: [10.1108/agjsr-04-2022-0020](https://doi.org/10.1108/agjsr-04-2022-0020).
- Ramaano, A.I. (2022f), "The potential role of cultural heritage resources in tourism and community development at Musina municipality, Limpopo province, South Africa", *Journal of Cultural Heritage Management and Sustainable Development*, Vol. 14 No. 4, pp. 689-709, doi: [10.1108/JCHMSD-02-2021-0019](https://doi.org/10.1108/JCHMSD-02-2021-0019).
- Ramaano, A.I. (2022g), "Musina municipality tourism management and strategies: a sustainable-ecotourism inclusive business insights for the town, abutting peri-urban and countryside existences", *Management of Environmental Quality*, Vol. 33 No. 3, pp. 718-738, doi: [10.1108/meq-11-2021-0257](https://doi.org/10.1108/meq-11-2021-0257).
- Ramaano, A.I. (2023a), *The Prospects of Using the Tourism Industry to Advance Community Livelihoods in Musina Municipality*, Doctoral dissertation, Limpopo Province.
- Ramaano, A.I. (2023b), "Geographical information systems in sustainable rural tourism and local community empowerment: a natural resources management appraisal for Musina Municipality' Society", *Local Development and Society*, Vol. 4 No. 1, pp. 74-105, doi: [10.1080/26883597.2021.2011610](https://doi.org/10.1080/26883597.2021.2011610).
- Ramaano, A.I. (2023c), "Alternative ecotourism perspectives within the protected conservation sites and farming communities amid environmental degradation and climate change-bound rural

- exercises", *Forestry Economics Review*, Vol. 5 No. 1, pp. 77–104, doi: [10.1108/FER-11-2022-0011](https://doi.org/10.1108/FER-11-2022-0011).
- Ramaano, A.I. (2024a), "Sustainable tourism development activities and planning systems in Vhembe district, Limpopo province, South Africa: a comprehensive eco-touristic and sustainability perspective", *Arab Gulf Journal of Scientific Research*, Vol. 42 No. 4, pp. 1832-1848, doi: [10.1108/agjsr-04-2023-0140](https://doi.org/10.1108/agjsr-04-2023-0140).
- Ramaano, A.I. (2024b), "The potential significance of geographic information systems (GISs) and remote sensing (RS) in sustainable tourism and decent community involvement in African-rural neighborhoods", *Journal of Electronic Business and Digital Economics*, Vol. 3 No. 3, pp. 341-362, doi: [10.1108/jebde-03-2024-0006](https://doi.org/10.1108/jebde-03-2024-0006).
- Ramaano, A.I. (2024c), "Environmental change impacts and inclusive rural tourism development on the livelihoods of native societies: evidence from Musina Municipality, South Africa", *International Journal of Ethics and Systems*, Vol. 40 No. 3, pp. 495–525, doi: [10.1108/IJOES-04-2023-0089](https://doi.org/10.1108/IJOES-04-2023-0089).
- Ramaano, A.I. (2024d), "Environmental consequences and climate change linked ecotourism activities in remote and protected areas of South Africa", *Rural Society*, pp. 1–19, doi: [10.1080/10371656.2024.2368301](https://doi.org/10.1080/10371656.2024.2368301).
- Ramaano, A.I. (2024e), "Indigenous communities and tourism-integrated climate change outcomes on subsistence within the hinterlands: a development management perspective", *Southeast Asia: A Multidisciplinary Journal*, Vol. ahead-of-print No. ahead-of-print, doi: [10.1108/SEAMJ-05-2023-0042](https://doi.org/10.1108/SEAMJ-05-2023-0042).
- Rasheed, A.F. and Balakrishnan, J. (2024), "Shaping sustainable tourism: how minimalism and citizenship behavior influence tourists' proenvironmental behaviour", *Consumer Behavior in Tourism and Hospitality*, Vol. 19 No. 4, pp. 590-603, doi: [10.1108/cbth-08-2023-0134](https://doi.org/10.1108/cbth-08-2023-0134).
- Ren, L., Li, J., Li, C. and Dang, P. (2021), "Can ecotourism contribute to ecosystem? Evidence from local residents' ecological behaviors", *Science of the Total Environment*, Vol. 757, 143814, doi: [10.1016/j.scitotenv.2020.143814](https://doi.org/10.1016/j.scitotenv.2020.143814).
- Ring, I. and Schröter-Schlaack, C. (2011), *Instrument Mixes for Biodiversity Policies*, Helmholtz Centre for Environmental Research– UFZ, Leipzig, pp. 119-144.
- Rogerson, C.M. (2016), "Climate change, tourism and local economic development in South Africa", *Local Economy*, Vol. 31 Nos 1-2, pp. 322-331, doi: [10.1177/0269094215624354](https://doi.org/10.1177/0269094215624354).
- Roka, K. (2020), "Community-based natural resources management", in *Life on Land*, Springer International Publishing, Cham, pp. 161-174.
- Sandbrook, C.G. (2006), *Tourism, Conservation and Livelihoods: The Impacts of gorilla Tracking at Bwindi Impenetrable National Park, Uganda*, University of London, University College, London (United Kingdom).
- Scott, D., Hall, C.M. and Gössling, S. (2019), "Global tourism vulnerability to climate change", *Annals of Tourism Research*, Vol. 77, pp. 49-61, doi: [10.1016/j.annals.2019.05.007](https://doi.org/10.1016/j.annals.2019.05.007).
- Setokoe, T.J. and Ramukumba, T. (2020), "Challenges of community participation in community-based tourism in rural areas", *WIT Transactions on Ecology and the Environment*, Vol. 248, pp. 13-22.
- Shannon, G., Larson, C.L., Reed, S.E., Crooks, K.R. and Angeloni, L.M. (2017), "Ecological consequences of ecotourism for wildlife populations and communities", *Ecotourism's Promise and Peril: A Biological Evaluation*, pp. 29-46, Springer International Publishing, Cham, doi: [10.1007/978-3-319-58331-0_3](https://doi.org/10.1007/978-3-319-58331-0_3).
- Spencer, A. (2018), *Travel and tourism in the Caribbean: challenges and opportunities for small island developing states*.
- Stoddart, H.I. (2008), *Route tourism and local economic development in South Africa: the magalies meander and the crocodile ramble* (Doctoral dissertation, University of the Witwatersrand).
- Stone, M.T. and Nyaupane, G.P. (2016), "Protected areas, tourism and community livelihoods linkages: a comprehensive analysis approach", *Journal of Sustainable Tourism*, Vol. 24 No. 5, pp. 673-693, doi: [10.1080/09669582.2015.1072207](https://doi.org/10.1080/09669582.2015.1072207).

- Stringer, L.C., Dyer, J.C., Reed, M.S., Dougill, A.J., Twyman, C. and Mkwambisi, D. (2009), "Adaptations to climate change, drought and desertification: local insights to enhance policy in southern Africa", *Environmental Science and Policy*, Vol. 12 No. 7, pp. 748-765, doi: [10.1016/j.envsci.2009.04.002](https://doi.org/10.1016/j.envsci.2009.04.002).
- Stronza, A.L., Hunt, C.A. and Fitzgerald, L.A. (2019), "Ecotourism for conservation?", *Annual Review of Environment and Resources*, Vol. 44 No. 1, pp. 229-253, doi: [10.1146/annurev-environ-101718-033046](https://doi.org/10.1146/annurev-environ-101718-033046).
- Tang, Z. (2015), "An integrated approach to evaluating the coupling coordination between tourism and the environment", *Tourism Management*, Vol. 46, pp. 11-19, doi: [10.1016/j.tourman.2014.06.001](https://doi.org/10.1016/j.tourman.2014.06.001).
- Tanyanyiwa, V.I. (2019), "Indigenous knowledge systems and the teaching of climate change in Zimbabwean secondary school", *Sage Open*, Vol. 9 No. 4, 2158244019885149, doi: [10.1177/2158244019885149](https://doi.org/10.1177/2158244019885149).
- Thompson, R.H. and Borrero, J.C. (2011), "Direct observation", in *Handbook of Applied Behavior Analysis*, Guilford, New York, NY, pp. 191-205.
- Torabi Farsani, N., Coelho, C. and Costa, C. (2012), "Geotourism and geoparks as gateways to socio-cultural sustainability in Qeshm rural areas, Iran", *Asia Pacific Journal of Tourism Research*, Vol. 17 No. 1, pp. 30-48, doi: [10.1080/10941665.2011.610145](https://doi.org/10.1080/10941665.2011.610145).
- Tracy, S.J. (2014), *Qualitative Research Methods: Collecting Evidence, Crafting Analysis, Communicating Impact*, Wiley-Blackwell, New York.
- Tsaur, S.H., Lin, Y.C. and Lin, J.H. (2006), "Evaluating ecotourism sustainability from the integrated perspective of resource, community and tourism", *Tourism Management*, Vol. 27 No. 4, pp. 640-653, doi: [10.1016/j.tourman.2005.02.006](https://doi.org/10.1016/j.tourman.2005.02.006).
- Ubisi, N.R., Mafongoya, P.L., Kolanisi, U. and Jiri, O. (2017), "Smallholder farmer's perceived effects of climate change on crop production and household livelihoods in rural Limpopo province, South Africa", *Change and Adaptation in Socio-Ecological Systems*, Vol. 3 No. 1, pp. 27-38, doi: [10.1515/cass-2017-0003](https://doi.org/10.1515/cass-2017-0003).
- van der Duim, V.R. (2005), "Tourismsapes; an actor-network perspective on sustainable tourism development", PhD thesis, Wageningen University, Wageningen.
- Wondirad, A. (2020), "Ecotourism development challenges and opportunities in Wondo Genet and its environs, southern Ethiopia", *Journal of Place Management and Development*, Vol. 13 No. 4, pp. 465-491, doi: [10.1108/jpmd-12-2018-0109](https://doi.org/10.1108/jpmd-12-2018-0109).
- Wong, L.P. (2008), "Focus group discussion: a tool for health and medical research", *Singapore Medical Journal*, Vol. 49 No. 3, pp. 256-260.
- Yamane, T. (1973), *Statistics: an introductory analysis*.
- Yehong, S., Yuxin, S., Yuexin, C.H.E.N., Cancan, Y.A.O. and Wenhua, L. (2021), "Sustainable or not? Tourism development in agricultural heritage sites", *Journal of resources and ecology*, Vol. 12 No. 4, pp. 543-554, doi: [10.5814/j.issn.1674-764x.2021.04.012](https://doi.org/10.5814/j.issn.1674-764x.2021.04.012).
- Zuccaro, G., Leone, M.F. and Martucci, C. (2020), "Future research and innovation priorities in the field of natural hazards, disaster risk reduction, disaster risk management and climate change adaptation: a shared vision from the ESPRESSO project", *International Journal of Disaster Risk Reduction*, Vol. 51, 101783, doi: [10.1016/j.ijdrr.2020.101783](https://doi.org/10.1016/j.ijdrr.2020.101783).

Further reading

- DiPiazza, J.S.A. (2050), *About vision*.
- Kayamandi development services (2007), *LED Strategy Chapter 4*. Musina local municipality.
- Leedy, M. (1989), *Practical Research: Planning and Design 3rd*, Collier Macmillan, New York.
- Nthiga, R.W., Van der Duim, R., Visseren-Hamakers, I.J. and Lamers, M. (2015), "Tourism-conservation enterprises for community livelihoods and biodiversity conservation in Kenya", *Development Southern Africa*, Vol. 32 No. 3, pp. 407-423, doi: [10.1080/0376835x.2015.1016217](https://doi.org/10.1080/0376835x.2015.1016217).

Teshome, E., Aberaw, G., Tesgera, D. and Abebe, F. (2023), "The untold tourism potentials of Bela Mountain, for community-based-ecotourism development, ecosystem conservation and livelihood improvement, Waghimera Zone, Ethiopia", *Environment, Development and Sustainability*, Vol. 25 No. 5, pp. 3923-3944, doi: [10.1007/s10668-022-02223-8](https://doi.org/10.1007/s10668-022-02223-8).

About the author

Dr Azwindini Isaac Ramaano possesses a Ph.D. in Geography (centered on tourism geography, rural development geography, settlement geography and rural livelihood). He is Postgraduate Scholar from the University of Venda who holds a bachelor's degree in environmental science, conservation biology honors and a master's degree in environmental sciences. He also has a postgraduate course in Environment and Society, with modules in environmental change, environmental law, environmental paradigms, physical-bio resources & development, water conservation & demand management and a geographic information systems (GIS) certificate at the University of Pretoria (UP). He participated and presented at the South African National Space Agency (SANSA) Space Science student workshops in September 2017 and October 2019 in Western Cape Hermanus and in September 2021 at the Musina-Makhado Special Economic Zone (MMSEZ)-Univen Smart City Model Symposium. His research interests are within conservation and sustainability, rural tourism development and ecotourism management, agroforestry and ethnobiology, and sustainability and climate change. He imparted his scholarly outputs, among others, to Local Development and Society, International Hospitality Review and Tourism Planning and Development and Transactions of the Royal Society of South Africa publications (within both Taylor & Francis and Emerald avenues) and provided reviews for outlets such as *Global Knowledge, Memory and Communication*, *Transforming Government: People, Process and Policy*, *Competitive Review*, *International Journal of Ethics and Systems* and *Consumer Behavior in Tourism and Hospitality*, among others. Azwindini Isaac Ramaano can be contacted at: azwira@webmail.co.za