



Exploring the Influence of Demographic Factors on Biodiversity Awareness in Municipality of Ilog, Negros Occidental, Philippines

Diana Therese Samson^{*1}, Eza Marie Espeja¹, Jeffrey Winston Lazaro¹, Aragon Dechimo Jr²

¹ Provincial Government of Negros Occidental, Philippines

² Philippine Normal University-Visayas, Philippines

Received : April 12, 2026

Revised : July 18, 2026

Accepted : August 26, 2026

Online : August 31, 2026

Abstract

Biodiversity conservation has become one of the global priorities due to human activities such as habitat destruction, deforestation, and the introduction of invasive species, which have caused significant biodiversity loss. The Philippines, recognized as a global biodiversity hotspot, includes Negros Occidental, a province known for its rich ecosystems. This study focuses on the Municipality of Ilog in southern Negros Occidental and primarily used a descriptive quantitative survey design, employing individual interview surveys with 40 respondents. Quantitative data served as the primary basis for analysis using frequency counts and percentage distributions, while selected open-ended responses were summarized thematically to provide supplementary contextual insights. The study explored biodiversity awareness within the local community and examined how demographic characteristics may relate to local ecological knowledge and conservation awareness. The study aimed to investigate the role of demographic factors in biodiversity awareness within the local community, specifically examining age, years of residence, distance to the nearest LCA, among others. It also explored the coexistence of diverse ethnic groups and demographic characteristics, highlighting the complexity of challenges and opportunities in biodiversity conservation. Furthermore, the study examined the local community's knowledge of extinct and existing plant species, revealing that a significant percentage of respondents show in-depth awareness regardless of educational backgrounds. The reasons for plant extinction, such as typhoons, use of plants for fuel and housing, natural aging, and fire, as well as the location and abundance of current plant species, were also identified. The findings emphasize the vital role of community involvement in conservation efforts and demonstrate the need for strategies that address demographic, economic, and cultural factors to preserve plant species and ecosystems effectively. By integrating theory with local data, this study contributes to guiding future conservation initiatives and promoting ecological sustainability through informed and inclusive approaches.

Keywords: *Demographics, Community, Biodiversity, Awareness, Local Conservation Area*

INTRODUCTION

Human activities have a profound effect on biodiversity, presenting challenges to the conservation of natural resources. Practices such as habitat destruction, deforestation, overexploitation, and the introduction of non-native species have led to significant losses in biodiversity. These actions disturb ecosystems and reduce their capacity to provide essential services such as clean air, water, and fertile soil. Over the past century, anthropogenic forces have drastically altered ecosystems, making the preservation and restoration of biodiversity a global priority (Prakash & Verma, 2022; Khaleghi, 2017). For instance, agricultural expansion and urbanization are also key drivers in ecosystems, increasing pressures on species and biodiversity (Gibbs et al., 2010).

Deforestation continues to be a major cause of habitat loss, with large-scale land conversions resulting in long-term consequences for biodiversity. The illegal wildlife trade and the spread of

Copyright Holder:

© Samson, Espeja, Lazaro & Dechimo Jr. (2026)

Corresponding author's email: dthrs.samson@gmail.com

This Article is Licensed Under:



invasive species also contribute to ecosystem disruptions. Invasive species have led to the extinction of native species, highlighting the negative impact of such species on local ecosystems (Wiles et al., 2003). Additionally, climate change accelerates these threats by altering habitat availability and disrupting species distributions, creating further complexity for conservation efforts.

Diversity is central to understanding its value and role in supporting life on Earth. Biodiversity encompasses the variability among living organisms across terrestrial, marine, and aquatic ecosystems, and it provides vital ecosystem services such as clean air, water, food production, and cultural and recreational benefits. In the Municipality of Ilog, local biodiversity is deeply connected with community livelihoods, cultural identity, and food security. Recognizing this, community engagement has become central to conservation efforts, as local knowledge and participation enhance the effectiveness and sustainability of these initiatives. By involving residents in awareness programs, monitoring, and traditional resource management, Ilog demonstrates how local participation strengthens biodiversity conservation and promotes environmental stewardship at the local level.

Amidst these environmental challenges, demographic factors play a crucial role in shaping how individuals and communities perceive and engage with conservation issues. Factors such as age, education, and the duration of residence in an area influence how people respond to biodiversity conservation initiatives. Studies have shown that communities with a better understanding of their environment are more likely to participate in conservation efforts (Kollmuss & Agyeman, 2002). Understanding these demographic dynamics is vital for improving biodiversity awareness and engagement.

Local Government Units (LGUs) have made significant progress in conservation, particularly through the establishment of Local Conservation Areas (LCAs), which help safeguard biodiversity while also promoting community engagement.

This study aims to explore how demographic factors such as age, years of residence, and proximity to the nearest LCA affect biodiversity awareness within local communities. The findings will be valuable for the development of effective conservation strategies and policies. This approach not only increases environmental awareness among local communities but also provides policymakers with crucial data to design more inclusive and impactful conservation programs (Singh et al., 2020; Sujarwo et al., 2015). This study contributes to the improving body of knowledge on biodiversity awareness by addressing underexplored areas: the role of socio-demographic factors and traditional ecological knowledge within a local conservation context in the Philippines. The study helps bridge gaps between grassroots environmental practices and formal conservation frameworks, supporting more inclusive and localized policies.

LITERATURE REVIEW

Biodiversity and its Importance

The Convention on Biological Diversity defines biodiversity, a simplified term for “biological diversity,” as the “variability among living organisms from all sources including, inter alia, terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species, and of ecosystems.” Biodiversity connects people and the environment, which considers elements such as human well-being, threats, economic, ethical, and cultural dimensions, and even in terms of conservation (Rathoure, 2024). Biodiversity's importance is categorized into utilitarian and intrinsic values, with utilitarian values further divided into direct use, indirect use, and non-use values (Cullman et al., 2003). It ensures diverse food sources and raw materials and enables adaptation to different environmental conditions (Mika, 2004). However, biodiversity faces threats from anthropogenic activities,

including habitat destruction and selective breeding practices. Scientists estimate there are about 1.4 million species on Earth, but only a fraction are utilized in large-scale agriculture (Mika, 2004). Conservation efforts are vital, as biodiversity loss can have severe consequences for ecosystems and human societies (Rathoure, 2024). Despite the biodiversity threats, local knowledge has a significant role in shaping community perceptions and conservation behaviors. The Manobo Tribe, as an Indigenous community in Southern Mindanao, Philippines, has traditional practices, knowledge, and beliefs that are closely tied to biodiversity protection (Salvana and Arnibal, 2019). These embedded cultures serve as conservation mechanisms, promoting sustainable interactions with local ecosystems.

Drivers of Biodiversity Loss

Recent studies identify five key drivers of global biodiversity loss, such as agricultural expansion, climate change, marine exploitation, urbanization, and invasive species (Hald-Mortensen, 2023). Agricultural expansion, affecting 85% of threatened species, is the leading cause through habitat alteration (Hald-Mortensen, 2023; Jaureguiberry et al., 2022). It includes deforestation, unsustainable farming, and even draining of wetlands that contribute to habitat fragmentation and loss, thus reducing ecosystem integrity. Climate change impacts ecosystems by warming oceans and altering weather patterns that affect the flora and fauna in the area. Rising temperatures and acidification threaten coral reefs, belonging to the biodiverse ecosystems. Marine exploitation also includes overfishing and habitat destruction are caused by unsustainable fishing practices leading to depletion of marine species. Urbanization and urban sprawl contribute to the reduction of wildlife corridors and may increase pollution, harming biodiversity in urban spaces. Invasive species, which are often introduced by human activities unintentionally, may also disrupt natural ecosystems by competing with native species for nutrients and resources. These drivers are contributing to ecosystem strains, hindering the provision of essential services. Effective biodiversity policies must target these drivers and their interactions, particularly on impacts across terrestrial and marine systems (Jaureguiberry et al., 2022).

Local Conservation Areas (LCAs)

Conservation areas are specifically designated zones aimed at safeguarding the unique ecological, historical, or cultural value of a location. These areas play a crucial role in sustainable development by preserving biodiversity, maintaining ecosystem services, and fostering community engagement. However, managing such areas involves overcoming challenges like controlling gradual ecological changes and enforcing policies suited to local contexts (Skea, 1996). In the United Kingdom, conservation areas are managed at a local level, which allows for community-based decision-making but also risks inconsistent standards when compared to national approaches used in other European countries (Larkham & Jones, 1993). In the Philippines, almost 50% of terrestrial key biodiversity areas are officially protected under the national law. Since the process of declaring protected areas is time-consuming, the Department of Environment and Natural Resources (DENR), with support from international partners, has introduced Local Conservation Areas (LCA). These are locally managed sites intended to protect the environment, with the Local Government Units (LGUs) and communities as lead implementers (UNDP-GEF-BMB NewCAPP, 2014). LCAs offer a practical way to conserve biodiversity while empowering local communities. LCAs complement national conservation strategies by integrating solutions to specific regional or community concerns, promoting a sense of local ownership, and ensuring long-term stewardship of natural resources. These areas not only safeguard biodiversity but also promote eco-tourism, climate resilience, and sustainable livelihoods, showing the value of conservation at the local level.

Demographic Factors Influencing Conservation Awareness

Demographic factors have important roles in shaping environmental conservation awareness and practices, offering insights for formulating effective strategies. Younger individuals often exhibit greater environmental consciousness, potentially driven by increased exposure to ecological education and media, which shows proactive attitudes toward sustainability ([Abdul-Wahab & Abdo, 2010](#); [Kiplagat et al., 2023](#)). Educational attainment further enhances this effect, as individuals with higher education levels demonstrate a deeper understanding of environmental challenges and are more likely to engage in conservation efforts. This shows the value of integrating environmental literacy into formal education to promote informed ecological behaviors. Gender-related trends in conservation practices vary across contexts. While some studies suggest that men engage more frequently in conservation activities, potentially due to access to decision-making roles or physical labor demands ([Abdul-Wahab & Abdo, 2010](#)), others report no significant gender differences, emphasizing the context-dependent nature of these aspects ([Praimee et al., 2023](#)). In terms of household characteristics, including family size and land ownership, also influence conservation practices. Larger families may adopt resource-efficient behaviors, while landowners are often more attuned to sustainable practices due to their direct access to natural resources ([Kiplagat et al., 2023](#)). Additional factors, such as exposure to environmental news and participation in conservation initiatives, further strengthen environmental awareness by promoting a sense of responsibility and understanding of natural resource management ([Praimee et al., 2023](#)). Understanding the influence of demographic variables enables policymakers, stakeholders, and even educators to develop targeted, inclusive, and effective conservation strategies.

Empirical research presents a mix of various findings on the influence of demographic variables such as age, gender, education, and occupation, among others, on biodiversity awareness and conservation behaviors. There are studies emphasizing that personal interest in nature and participation in animal-related activities significantly contribute to the improvement of species knowledge ([Härtel et al., 2024](#)). However, the influence of demographics on biodiversity awareness is complex, with contextual factors such as population aging or decline that may yield varying outcomes across regions, and long-term effects remain underexplored ([Mehring et al., 2019](#)). These insights suggest the importance of adopting a more understanding and interdisciplinary approach to how demographic factors shape attitudes and behaviors toward biodiversity conservation.

There are recent case studies in rural and resource-dependent communities wherein demographic factors play in shaping conservation attitudes. For instance, factors such as awareness, connection to nature, and concern about biodiversity issues significantly influence conservation behaviors and policy support ([Borg et al., 2024](#)). Demographic variables like age, education level, and number of dependents can impact conservation awareness ([Ibrahim et al., 2022](#)).

Community Involvement in Conservation

Community participation in conservation offers transformative ecological and socio-economic benefits, with well-documented successes in both rural and urban approaches. The collective power of local stakeholders is being promoted to address environmental challenges while improving livelihoods. For example, Nepal's Annapurna Conservation Area showcases the potential of community-based management in enhancing biodiversity, reducing dependency on non-renewable resources like fuelwood, and increasing wildlife populations compared to areas lacking such frameworks. These outcomes are achieved through sustainable resource utilization, localized governance, and targeted environmental education, which together empower communities to adopt long-term conservation roles ([Bajracharya et al., 2005](#)). Importantly, these initiatives

emphasize inclusive and participatory decision-making in protected area management. By integrating community needs with conservation goals, such approaches align environmental stewardship with sustainable livelihoods. This strategy enhances public buy-in and strengthens long-term ecosystem resilience while addressing local socio-economic challenges. For example, projects that support livelihoods such as sustainable tourism and agriculture not only protect natural resources but also provide incentives (Warf, 2010). Community-based conservation efforts in Ilog can be analyzed through Arnstein's Ladder of Citizen Participation and the Institutional Analysis and Development (IAD) framework. Arnstein's model highlights different levels of citizen involvement, from tokenism to genuine power-sharing. In Ilog, efforts to engage communities in decision-making about biodiversity conservation reflect a movement towards partnership and delegated power. Arnstein's Ladder of Citizen Participation, which categorizes engagement levels from nonparticipation to citizen power, is applied to various contexts, including built environment projects (den Boer, 2024).

Simultaneously, IAD, developed by Elinor Ostrom, is used to analyze decision-making processes in common pool resources (den Boer, 2024) and biodiversity conservation in the Amazon (Orihuela & Mendieta, 2021). Ortiz-Riomalo et al. (2022) demonstrate how combining IAD with other frameworks can enhance understanding of participatory interventions in watershed management. These theories help explain how building trust, shared responsibility, and local governance can encourage long-term stewardship of biodiversity while reinforcing community resilience and ownership.

RESEARCH METHODS

In this research endeavor, the establishment of Local Conservation Areas (LCAs) was proposed for two distinct sites: (1) the Binalawan Dam/ National Irrigation Administration (NIA) Dam and (2) the Kanto-tigbaw Peak as part of Barangay Balicotoc to protect the remaining ecosystem in the area and promote ecological tourism in the area to improve the local biodiversity and introduce specific programs for its flora and fauna as well as boosting the local economy of the stakeholders.

Ilog is a second-class municipality of Negros Occidental. The Municipality of Ilog is composed of 15 barangays with a total land area of 281.7 km² and a population of 59,855 and a population density of 210/km² as of the 2020 census, with its household number reaching to 14,097.

Research Design and Approach

This study primarily employed a descriptive quantitative survey design to examine biodiversity awareness among residents of Barangay Balicotoc, Municipality of Ilog, Negros Occidental. Structured interviews consisting mainly of closed-ended questions were used to gather information on demographic characteristics, local ecological knowledge, and biodiversity awareness. Data were analyzed using descriptive statistics, specifically frequency counts and percentage distributions, to identify patterns and trends within the study population. To provide additional context, selected open-ended questions were included. Responses to these questions were grouped into themes and used only as supplementary qualitative insights to enrich interpretation of the quantitative findings. Given the exploratory nature of the study and its purpose of generating baseline information for Local Conservation Area (LCA) planning, emphasis was placed on identifying patterns and community perspectives rather than establishing statistically significant relationships.

Study Setting

This study was conducted in Barangay Balicotoc, a rural community situated near ecologically important sites such as Kantotigbaw and the Binalawan Dam, potential Local Conservation Areas (LCAs) in the Municipality of Ilog, Negros Occidental. Barangay Balicotoc, situated in the Municipality of Ilog, Negros Occidental (as shown in Figure 1), was selected for its ecological significance. Ilog, a second-class municipality, encompasses 15 barangays, with a population of 59,855 and a density of 210/km² as of 2020.

The area is characterized by its proximity to natural habitats and agricultural landscapes, making it a suitable context for exploring demographic factors and biodiversity awareness. The presence of traditional ecological knowledge, combined with residents' daily interactions with their environment that may contribute to local conservation efforts.

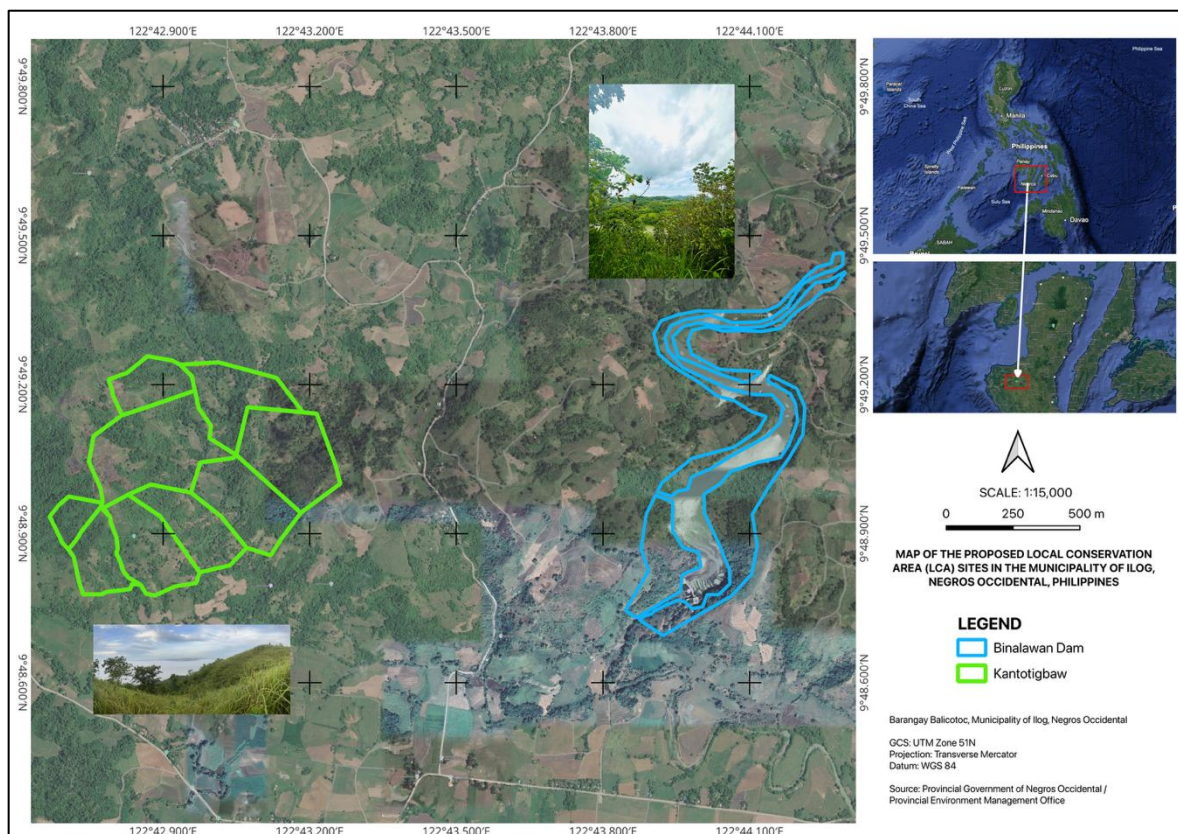


Figure 1. Map of the proposed Local Conservation Area (LCA) Sites in the Municipality of Ilog, Negros Occidental, Philippines

METHODOLOGY

Survey Instrument and Sampling

The survey instrument collected information on demographic characteristics, biodiversity awareness, knowledge of local plant and animal species, perceived causes of species decline, and attitudes toward conservation. Survey items were informed by concepts and indicators used in previous biodiversity-awareness and traditional ecological knowledge studies. The individual adult respondent served as the unit of analysis, while households provided the sampling frame. A total of forty (40) completed responses were obtained from residents of Barangay Balicotoc. Given the exploratory nature of the study, the sample was intended to provide baseline

information regarding biodiversity awareness rather than generate statistically representative estimates for the entire Municipality of Ilog.

Household unavailability and scheduling constraints were encountered during data collection. However, records of the exact number of households initially approached were not maintained; therefore, a precise response rate could not be calculated. This limitation is acknowledged and should be considered when interpreting the findings.

Validity and Reliability

Content validity was established through expert review by individuals with experience in biodiversity conservation, environmental management, and social research. Suggestions and recommendations were incorporated to improve questionnaire clarity, relevance, and cultural appropriateness. A pilot test was conducted prior to implementation to identify potential ambiguities and improve the survey instrument. The questionnaire primarily consisted of demographic variables, species-identification questions, and biodiversity-awareness indicators rather than a multi-item psychometric scale designed to measure a single latent construct. Consequently, Cronbach's alpha was not considered appropriate for this instrument.

Reliability was strengthened through pilot testing, standardized interview procedures, and consistent administration of survey questions. Open-ended responses were grouped into themes and reviewed by members of the research team to improve consistency of interpretation.

Ethics

All research protocols were guided by ethical standards. Informed consent was obtained from all participants, who were briefed on the purpose of the study, their rights as respondents, and the confidentiality of their responses. Anonymity was assured by excluding personally identifiable information during data collection and analysis. The research was approved and supported by the Provincial Environment Management Office (PEMO) and the Philippine Normal University-Visayas (PNUV), with additional coordination from the local government unit and barangay officials.

Data Collection

Data collection occurred on September 4 and 5, 2023. Researchers conducted face-to-face individual interviews using printed survey forms. This format accommodated participants with limited access to digital tools, ensuring inclusivity, especially among older residents. Geo-tagging and photo documentation supported spatial referencing and transparency. Preparatory steps included coordinating with LGU and barangay authorities and pilot testing the instrument, which led to adjustments for clarity and contextual relevance. Key principles for developing survey materials include using simple language, communicating empathy, and providing reassurance to participants (Ayre et al., 2024). Survey examples featured local flora and fauna to increase participant engagement.

Geo-tagging

Geo-tagging and photo documentation were used primarily for validation and documentation purposes. Geo-tagging confirmed interview locations and respondent references to biodiversity sites, while photographs documented environmental conditions and existing vegetation within and around the proposed Local Conservation Areas. These materials were not analyzed as independent datasets but were used to support field observations and strengthen interpretation of survey findings.

Data Processing and Management

On the post-survey, responses were reviewed for completeness and accuracy. Data were encoded into a centralized digital master file using Microsoft Excel and Google Sheets. Quality control procedures included error checks and de-identification of personal data to maintain confidentiality. Statistical summaries and visual checks were used to confirm data consistency. Peer review of the processing steps further ensured reliability.

Data Analysis

Data analysis was conducted using descriptive statistics, including frequencies and percentage distributions, to summarize responses related to demographic variables and biodiversity awareness indicators. This approach allowed for straightforward interpretation of community-level data and facilitated the generation of baseline insights relevant for local policy-making and environmental education strategies. Data were exhibited using charts and tables to highlight emerging trends. Qualitative remarks from participants during the surveys were noted and categorized thematically to provide additional insight into perceptions of local species, conservation threats, and community-based practices. The interpretive approach of the study emphasized the residents' subjective experiences and local knowledge to contribute on how demographic variables such as age, education, and length of residency shape awareness and engagement with biodiversity issues in Barangay Balicotoc.

The survey generated baseline information useful for the establishment and management of Local Conservation Areas. Community knowledge of local species, perceived causes of species decline, awareness of biodiversity issues, and identification of biodiversity-rich locations may assist local government units in prioritizing conservation actions, environmental education programs, habitat restoration initiatives, and participatory management strategies.

FINDINGS AND DISCUSSION

The demographic background of the local community involved in the study provides important contextual information that can shape the interpretation of the findings of the study and guide future research and conservation efforts.

Socio-demographic Characteristics of Respondents

Understanding the socio-demographic characteristics of respondents is important in providing context for biodiversity awareness and conservation-related perceptions within the study area. Demographic variables such as sex, ethnicity, educational attainment, and household income may influence access to environmental information, interactions with natural resources, and participation in conservation initiatives. Although this study utilized descriptive statistics only, examining these characteristics provides useful baseline information for understanding the composition of the community and for guiding future biodiversity conservation and Local Conservation Area (LCA) planning efforts. The following tables present the demographic profile of the forty (40) respondents who participated in the study.

Table 1. Distribution of Respondents by Sex

Sex	Frequency	Percentage (%)
Male	23	57.5
Female	17	42.5

Total	40	100.00
--------------	----	--------

The study involved forty (40) respondents, of whom 57.5% were male and 42.5% were female. The slightly higher proportion of male respondents may reflect the composition of household representatives available during data collection. The participation of both sexes provided a balanced perspective regarding biodiversity awareness and local conservation concerns within the community. The findings indicate that biodiversity knowledge and conservation perceptions are not restricted to a single gender group but are shared among various members of the community.

Table 2. Distribution of Respondents by Ethnicity

Ethnicity	Frequency	Percentage (%)
Non-IP	19	47.5
Bukidnon	8	20.0
IP	5	12.5
IP-Tumandok Bukidnon	5	12.5
Tablanun	2	5.0
Lumad	1	2.5
Total	40	100.0

The respondents represented diverse ethnic backgrounds, with non-Indigenous peoples comprising the largest group (47.5%). Indigenous groups, including Bukidnon and Tumandok-Bukidnon communities, were also well represented. The presence of multiple cultural groups suggests that biodiversity awareness in Barangay Balicotoc is influenced by both contemporary experiences and traditional ecological knowledge. Indigenous respondents contributed valuable information regarding historical species occurrence, environmental changes, and resource use practices, highlighting the importance of integrating local knowledge into conservation planning.

Table 3. Educational Attainment

Educational Attainment	Frequency	Percentage (%)
Elementary Level	10	25.0
Elementary Graduate	7	17.5
High School Level	12	30.0
High School Graduate	4	10.0
SHS Level	1	2.5
SHS Graduate	1	2.5
College Level	3	7.5
College Graduate	2	5.0
Total	40	100.0

Most respondents attained either elementary or high school education, with high school level representing the largest category (30.0%). The educational profile indicates that biodiversity awareness was assessed primarily among community members with basic to intermediate levels of formal education. Despite relatively modest educational attainment, respondents demonstrated considerable knowledge regarding local species, biodiversity decline, and environmental conditions. This suggests that environmental awareness may be acquired not only through formal

education but also through direct interaction with natural resources and long-term residency within the community.

Table 4. Monthly Household Income

Monthly Household Income	Frequency	Percentage (%)
Less than ₱1,000	2	5.0
₱1,000–₱5,000	23	57.5
₱5,001–₱10,000	9	22.5
₱10,001–₱20,000	5	12.5
Above ₱20,001	1	2.5
Total	40	100.0

More than half of the respondents (57.5%) reported monthly household incomes ranging from ₱1,000 to ₱5,000, indicating that most households belong to the low-income sector. This finding is consistent with the predominantly agricultural character of the community, where farming serves as a major livelihood source. Economic conditions may influence resource utilization patterns and participation in conservation activities. Consequently, biodiversity conservation initiatives in the area may benefit from integrating livelihood-support mechanisms that encourage community participation while promoting sustainable resource management.

Level of Knowledge on Biodiversity Awareness

Beyond demographic characteristics, respondents were asked about their knowledge of plant and animal species formerly present in the area, species that remain abundant today, perceived causes of biodiversity decline, and locations where biodiversity is still observed. These responses provide insights into local ecological knowledge and community perceptions regarding environmental change. Such information is particularly important for conservation planning because residents possess firsthand observations of species occurrence, habitat conditions, and threats affecting biodiversity within and around the proposed Local Conservation Areas. The succeeding tables summarize respondents' knowledge regarding biodiversity in Barangay Balicotoc.

Table 5. Plant Species Previously Present but No Longer Existing

Plant Species Mentioned	Percentage (%)
Kubi, Anonang, Banaba, Ipil-ipil, Bangkal	27.5
Trees (general responses)	7.5

Most of the respondents (27.5%) have a good knowledge of the plant species that were present in the area (proposed Local Conservation Areas) 15 years ago but have become extinct or no longer exist. This is evidenced by their ability to list some of the plant species; regardless that they are from a non-professional group. Community knowledge of local biodiversity plays a key role in conservation efforts and even in healthcare practices. Indigenous communities possess valuable traditional knowledge about local flora and fauna, which can contribute to biodiversity management and conservation (Salvaña & Arnibal, 2020; Mary et al., 2011). This suggests a deep-rooted connection between the community and its environment. The ability to list specific plant species, despite the passage of time, indicates a keen awareness and a possible cultural or historical link to these plants.

Moreover, the most stated reasons (27.5%) with regard to the extinction of the said plant species are due to typhoons, use of materials for housing and fuel, caused by natural death, and fire.

In comparison, the respondents were also asked about the plant species that can still be found in the area at present time; most of them (25.0%) stated plant species (both trees and agricultural plants) such as *Kansilay*, *Payhod*, *Banitlong*, *Taluto*, *Pakol*, *Batuan*, *Cogon*, and *Tugnaw-tugnaw*. This indicates ongoing awareness of the local flora. The ability to list these species suggests that the community maintains a connection with its natural surroundings and is actively observing and recognizing the plant life that exists in their environment today.

Table 6. Location and Abundance of Existing Plant Species

Location	Percentage (%)
Around household/property	17.5
Kanto-Tigbaw LCA	15.0
Binalawan Dam LCA	12.5

The most frequently reported locations of existing plant species were household surroundings, followed by Kanto-Tigbaw and the Binalawan Dam area. Respondents perceived these locations as important sites where biodiversity remains relatively abundant. The findings suggest that the proposed Local Conservation Areas continue to serve as habitats for various plant species and may therefore represent priority locations for future conservation and habitat management initiatives.

Some studies show that local understanding of extinction and its causes can vary significantly, highlighting the importance of incorporating context-specific perspectives in conservation planning (Ma et al., 2021). Traditional knowledge systems are valuable for biodiversity assessment, monitoring, and sustainable management (Nanyunja, 2006; Jasmine et al., 2016). This knowledge is passed down through generations and is closely linked to cultural diversity (Jasmine et al., 2016). Rapid biodiversity assessment approaches based on indigenous knowledge have been developed to provide information for conservation planning and environmental monitoring (Nanyunja, 2006). However, challenges remain in integrating traditional knowledge into formal conservation strategies and policies.

Indigenous respondents, particularly those identifying as Bukidnon and Tumandok-Bukidnon, demonstrated detailed knowledge of local flora and fauna. Respondents identified species such as Narra, Bangkal, Mahogany, Acacia, and Kubi as historically important components of the local landscape and associated their decline with housing construction, charcoal production, illegal logging, hunting activities, and increasing human pressure. They also identified surviving species including Kansilay, Taluto, Pakol, Batuan, Gmelina, and Pawa. These observations demonstrate how Indigenous ecological knowledge may complement formal biodiversity assessments and support future conservation planning initiatives.

This study shows a Demographic-Biodiversity Awareness Model that integrates demographic profiles and proximity to Local Conservation Areas (LCAs) as factors influencing environmental knowledge and conservation behavior. Building upon established frameworks such as environmental education and local ecological knowledge, this model emphasizes three interrelated elements:

Demographic Influence

Findings show that factors such as age, gender, education, and household income significantly influence environmental awareness. Younger respondents and those with higher education levels demonstrated greater biodiversity awareness, affirming prior research by Abdul-Wahab and Abdo (2010). Additionally, gender differences align with Libelo and Tracy (2022), which highlight men's slightly higher environmental engagement. However, this study

also shows the unique contribution of non-indigenous and indigenous populations, particularly IPs from Bukidnon, in enriching conservation efforts with traditional knowledge. Community forest management (CFM) in Southeast Asia has been used as an approach to biodiversity conservation and livelihood improvement ([Diansyah et al., 2021](#)). Studies show that CFM can enhance local livelihoods and socio-economic conditions while regulating non-timber forest product (NTFP) extraction ([Thammanu et al., 2021](#)). Nevertheless, demographic factors influence awareness and participation in CFM. In Thailand, land ownership and education levels affect CFM participation, with lower-income families less likely to engage ([Thammanu et al., 2021](#)).

Localized Biodiversity Knowledge

Local knowledge about plant species, including those that have become extinct and those that persist in the area, emerged as a vital component. Respondents identified key species, such as Kansilay and Taluto, while attributing species loss to typhoons, resource use, and fire. This aligns with research by [Salvaña and Arnibal \(2020\)](#), which highlights the role of community knowledge in biodiversity assessment and conservation planning. By building on this perspective, social value creation through community-based entrepreneurship can promote resource conservation, agri-food practices, and biodiversity in the communities ([Korneeva et al., 2024](#)). Conservation entrepreneurship, defined as the process of exploiting opportunities to solve conservation problems within social-ecological systems, offers approaches to supplement existing conservation efforts ([Lobo et al., 2023](#)). In Indonesia, tourism focused on social entrepreneurship has shown potential to enhance entrepreneurial attitudes and community understanding of creative village development in marine resource conservation areas ([Zamzami & Effendi, 2023](#)).

Proximity to Local Conservation Areas (LCAs)

Spatial proximity to LCAs, such as Kanto-tigbaw and the Binalawan Dam, significantly influenced biodiversity awareness. These findings resonate with [Ma et al. \(2021\)](#), who highlight the spatial dimensions of local conservation knowledge, demonstrating that community awareness is heightened in areas closer to LCAs. This research introduces an innovative approach by examining the demographic characteristics and spatial proximity to LCAs in shaping biodiversity awareness. While prior studies have explored either demographic or traditional ecological knowledge dimensions (e.g., [Abdul-Wahab & Abdo, 2010](#); [Jasmine et al., 2016](#)), this study uniquely synthesizes these variables to create a more comprehensive understanding of community-level conservation dynamics.

Notably, the findings contribute to the literature by documenting the role of non-professional local knowledge in biodiversity conservation, highlighting its complementarity with traditional ecological insights from indigenous groups (IPs). The study also shows the discourse on plant species extinction and persistence by incorporating community-reported data into conservation planning, a practice supported by [Nanyunja \(2006\)](#).

The research also fills a gap by identifying how localized factors, such as proximity to LCAs, influence biodiversity knowledge and awareness. This perspective challenges and extends prior findings, which often focused on broader conservation contexts. Moreover, the study provides empirical evidence that integrates traditional and scientific approaches, addressing the challenges identified by [Jasmine et al. \(2016\)](#) in reconciling traditional knowledge with formal conservation policies.

Community Participation and Conservation Governance

Findings may be interpreted through Arnstein's Ladder of Citizen Participation and Ostrom's Institutional Analysis and Development (IAD) Framework. Community members demonstrated awareness of local biodiversity issues, identified species requiring conservation attention, and expressed support for biodiversity conservation and Local Conservation Area establishment. From Arnstein's perspective, community members move beyond passive recipients of information by contributing local ecological knowledge that may inform conservation planning. Likewise, the IAD framework emphasizes the importance of local actors, shared knowledge, and collective action in the management of common environmental resources. Integrating community knowledge into conservation planning may therefore strengthen community ownership, stakeholder participation, and long-term conservation outcomes.

CONCLUSIONS

This study explored biodiversity awareness among residents of Barangay Balicotoc and examined how demographic characteristics may relate to local ecological knowledge and conservation awareness. Descriptive observations suggest that biodiversity awareness varies across demographic groups. However, because the study employed descriptive statistics and involved a relatively small sample size, these observations should be interpreted as indicative patterns rather than statistically verified relationships.

Respondents demonstrated substantial knowledge regarding plant and animal species that previously occurred in the area and species that remain present today. Participants identified typhoons, fuelwood extraction, housing construction, fire, hunting activities, and other human-related pressures as major contributors to biodiversity decline. The findings also highlight the importance of Indigenous and local ecological knowledge as complementary sources of information for biodiversity conservation and environmental management.

The study contributes to biodiversity-awareness research by integrating demographic characteristics, local ecological knowledge, and proximity to proposed Local Conservation Areas within a localized conservation framework. This approach provides baseline information that may support participatory conservation planning, environmental education, and community-based biodiversity management in rural Philippine communities.

Unique contributions include the understanding of generational and residency-related differences in biodiversity awareness and the role of traditional knowledge in complementing modern conservation practices. As based on the findings, Local Government Units (LGUs) may be encouraged to include and implement youth-targeted environmental campaigns, especially by tapping academia, and to include extracurricular programs and activities in relation to biodiversity awareness. Moreover, providing incentives such as community recognition programs, nature tours, or even material support for communities residing near the proposed LCAs can promote stewardship and deeper engagement.

LIMITATION & FURTHER RESEARCH

Several limitations should be considered when interpreting the findings. First, the relatively small sample size ($n = 40$) limits the generalizability of results beyond Barangay Balicotoc. Second, the study relied on self-reported information, which may be affected by recall bias and subjective interpretation. Third, only descriptive statistical techniques were employed; therefore, findings should be interpreted as exploratory patterns rather than statistically confirmed relationships. Fourth, records of households initially approached were not maintained, preventing calculation of a precise response rate and formal assessment of non-

response bias. Finally, qualitative responses were used only as supplementary contextual information and were not subjected to a formal qualitative analytical framework. Future studies may utilize larger samples, inferential statistical methods, and more extensive qualitative approaches to strengthen understanding of biodiversity awareness and conservation behavior.

REFERENCES

- Abdul-Wahab, S. A., & Abdo, J. (2010). The effects of demographic factors on the environmental awareness of Omani citizens. *Human and Ecological Risk Assessment*, 16(2), 380–401. <https://doi.org/10.1080/10807031003670410>
- Ayre, S. K., Johnston, E. A., Bourdaniotis, X. E., Zajdlewicz, L., Beesley, V. L., Pole, J. D., Hansen, A., Gasper, H., Cossio, D., Lock, G., & Goodwin, B. C. (2024). From many voices, one question: Community co-design of a population-based qualitative cancer research study. *PLOS ONE*, 19(8), e0309361. <https://doi.org/10.1371/journal.pone.0309361>
- Bajracharya, S. B., Furley, P. A., & Newton, A. C. (2005). Effectiveness of community involvement in delivering conservation benefits to the Annapurna Conservation Area, Nepal. *Environmental Conservation*, 32(3), 239–247. <https://doi.org/10.1017/S0376892905002298>
- den Boer, A. (2024). Citizen participation in the built environment: In a commons perspective. *Abstracts of the 6th World Conference on Arts, Humanities, Social Sciences and Education*, 30. <https://doi.org/10.62422/978-81-970328-4-4-013>
- Borg, K., Hatty, M., Klebl, C., Wibisono, S., Smith, L., Louis, W., & Dean, A. J. (2024). Backing biodiversity: Understanding nature conservation behaviour and policy support in Australia. *Biodiversity and Conservation*. <https://doi.org/10.1007/s10531-024-02875-0>
- Cullman, G., Gibbs, J., Johnson, E., Laverty, M. F., Murphy, L., & Sterling, E. J. (2003). *Why is biodiversity important?* Center for Biodiversity and Conservation. <https://doi.org/10.5531/cbc.ncep.0007>
- Diansyah, W., Abas, A., & Sakawi, Z. (2021). A systematic review on community forest management in Southeast Asia: Current practices and impacts on biodiversity conservation and livelihood quality of local communities. *Human Ecology Review*, 27(1), 3–21. <https://doi.org/10.22459/HER.27.01.2021.01>
- Doussard, C. (2023). Perceptions and representations of biodiversity in Lausanne, Switzerland: Acknowledging the importance of residential environments. *Urban Forestry & Urban Greening*, 86, 128004. <https://doi.org/10.1016/j.ufug.2023.128004>
- Gibbs, H. K., Ruesch, A. S., Achard, F., Clayton, M. K., Holmgren, P., Ramankutty, N., & Foley, J. A. (2010). Tropical forests were the primary sources of new agricultural land in the 1980s and 1990s. *Proceedings of the National Academy of Sciences*, 107(38), 16732–16737. <https://doi.org/10.1073/pnas.0910275107>
- Hald-Mortensen, C. (2023a). Avoiding a biodiversity collapse: The drivers of biodiversity loss. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.4539049>
- Hald-Mortensen, C. (2023b). The main drivers of biodiversity loss: A brief overview. *Journal of Ecology & Natural Resources*, 7(3). <https://doi.org/10.23880/JENR-16000346>
- Härtel, T., Vanhöfen, J., Großmann, N., & Randler, C. (2024). Unlocking biodiversity awareness: Influential factors on bird species knowledge and the links with environmental attitudes and connectedness to nature. *International Journal of Science Education, Part B*, 1–16. <https://doi.org/10.1080/21548455.2024.2381840>
- Ibrahim, M. S. N., Assim, M. I. S. A., Johari, S., Mohammad, S. K. W., Afandi, S. H. M., & Hassan, S. (2022). Public awareness on biodiversity conservation and well-being: Case of Gunung Mulu National Park, Sarawak. *GeoJournal*, 88. <https://doi.org/10.1007/s10708-022-10818-x>
- Jasmine, B., Singh, Y., Onial, M., & Mathur, V. B. (2016). Traditional knowledge systems in India for

- biodiversity conservation. *Indian Journal of Traditional Knowledge*, 15(2), 304–312. <http://nopr.niscair.res.in/bitstream/123456789/33984/1/IJTK%2015%282%29%20304-312.pdf>
- Jaureguiberry, P., Titeux, N., Wiemers, M., Bowler, D. E., Coscieme, L., Golden, A. S., Guerra, C. A., Jacob, U., Takahashi, Y., Settele, J., Díaz, S., Molnár, Z., & Purvis, A. (2022). The direct drivers of recent global anthropogenic biodiversity loss. *Science Advances*, 8(45), eabm9982. <https://doi.org/10.1126/sciadv.abm9982>
- Khaleghi, M. R. (2017). The influence of deforestation and anthropogenic activities on runoff generation. *Journal of Forest Science*, 63(6), 245–253. <https://doi.org/10.17221/130/2016-JFS>
- Kiplagat, E. J., Mutinda, M. N., Inoti, S. K., & Masinde, C. W. (2023). Effect of sociodemographic factors on the adoption of environmental conservation practices in Kimao Dam Catchment, Baringo County, Kenya. *Journal of Agricultural Science and Practice*, 8(6), 114–120. <https://doi.org/10.31248/JASP2022.364>
- Kollmuss, A., & Agyeman, J. (2002). Mind the gap: Why do people act environmentally and what are the barriers to pro-environmental behavior? *Environmental Education Research*, 8(3), 239–260. <https://doi.org/10.1080/13504620220145401>
- Korneeva, E., Alekseeva, N., & Cheremukhina, O. (2024). Promoting resource conservation, agri-food, and biodiversity through social value creation and community-based entrepreneurship. *BIO Web of Conferences*, 141, 04036. <https://doi.org/10.1051/bioconf/202414104036>
- Larkham, P. J., & Jones, A. N. (1993). The character of conservation areas. *Town Planning Review*, 64(3), 325–349. <https://www.jstor.org/stable/40113624>
- Libelo, H., & Tracy, S. (2022). Establishing a relationship between demographic factors and students' environmental awareness. *Journal of Student Research*, 11(1). <https://doi.org/10.47611/jsrhs.v11i1.2282>
- Lobo, D., Reich, P. B., & Ardichvili, A. A. (2023). Conservation entrepreneurship: A new frontier in conservation science. *Biological Conservation*, 282, 110078. <https://doi.org/10.1016/j.biocon.2023.110078>
- Lucky Zamzami, & Effendi, N. (2023). Cultural and entrepreneurial attitudes of fishermen involved in the production of fishery products in West Sumatra, Indonesia: Implications for marine resource conservation areas in village development. *Journal of Infrastructure, Policy and Development*, 7(3). <https://doi.org/10.24294/JIPD.V7I3.2629>
- Ma, H., Papworth, S. K., Ge, T., Wu, X., Yu, C., Zhang, H., & Turvey, S. T. (2021). Local awareness and interpretations of species extinction in a rural Chinese biodiversity hotspot. *Frontiers in Conservation Science*, 2, Article 689561. <https://doi.org/10.3389/fcsc.2021.689561>
- Macharia, J. M., Thenya, T., & Ndiritu, G. G. (2010). Management of highland wetlands in central Kenya: The importance of community education, awareness and eco-tourism in biodiversity conservation. *Biodiversity*, 11(1–2), 85–90. <https://doi.org/10.1080/14888386.2010.9712652>
- Mary, D. A., Franco, F. M., & Babu, V. (2011). Assessing the contribution of local and traded biodiversity in community health care: A case study from Keelakodankulam Village, South India. *Ethnobotany Research and Applications*, 9, 275–286. <https://doi.org/10.17348/ERA.9.0.275-286>
- Mehring, M., Mehlhaus, N., Ott, E., & Hummel, D. (2019). A systematic review of biodiversity and demographic change: A misinterpreted relationship? *Ambio*, 49(7), 1297–1312. <https://doi.org/10.1007/s13280-019-01276-w>
- Mika, A. (2004). The importance of biodiversity in natural environment and in fruit plantations. *Journal of Fruit and Ornamental Plant Research*, 12.

- http://www.inhort.pl/files/journal_pdf/journal_2004spec/full2004-1spec.pdf
- Nanyunja, R. K. (2006). The role of indigenous knowledge in biodiversity assessment and monitoring: A case study in Uganda. https://www.fs.usda.gov/rm/pubs/rmrs_p042/rmrs_p042_543_549.pdf
- Newhouse, N. (1990). Implications of attitude and behavior research for environmental conservation. *The Journal of Environmental Education*, 22(1), 26–32. <https://doi.org/10.1080/00958964.1990.9943043>
- Newing, H. (2012). *The role of community conservation areas in biodiversity conservation: A review of the situation in England*. Semantic Scholar. <https://www.semanticscholar.org/paper/f52f681815079c41c97eb4e1d4112db01a34848c>
- Ohmer, M. L., Meadowcroft, P., Freed, K., & Lewis, E. (2009). Community gardening and community development: Individual, social and community benefits of a community conservation program. *Journal of Community Practice*, 17(4), 377–399. <https://doi.org/10.1080/10705420903299961>
- Orihuela, J. C., & Mendieta, A. (2021). One and three forests: Understanding institutional diversity in Amazonian protected areas. *Forest Policy and Economics*, 133, 102620. <https://doi.org/10.1016/j.forpol.2021.102620>
- Ortiz-Riomalo, J. F., Koessler, A.-K., Miranda-Montagut, Y., & Cárdenas, J. C. (2022). Participatory interventions for collective action and sustainable resource management: Linking actors, situations and contexts through the IAD, NAS and SES frameworks. *Sustainability Science*, 18(1), 79–96. <https://doi.org/10.1007/s11625-022-01215-x>
- Pejchar, L., & Mooney, H. A. (2009). Invasive species, ecosystem services and human well-being. *Trends in Ecology & Evolution*, 24(9), 497–504. <https://doi.org/10.1016/j.tree.2009.03.016>
- Praimee, U., Wongchantra, P., Junkaew, L., Ongon, S., Sookngam, K., Wongchantra, K., Phothisat, P., Bunnaen, W., & Sommala, L. (2023). Factors affecting awareness of environmental conservation of undergraduate students. *World Journal of Education*, 13(5), 23. <https://doi.org/10.5430/wje.v13n5p23>
- Prakash, S., & Verma, A. K. (2022). Anthropogenic activities and biodiversity threats. *International Journal of Biological Innovations*, 4(1), 94–103. <https://doi.org/10.46505/IJBI.2022.4110>
- Rampheri, M. B., Dube, T., Shoko, C., Marambanyika, T., & Dhau, I. (2022). Local community attitudes and perceptions towards benefits and challenges associated with biodiversity conservation in Blouberg Nature Reserve, South Africa. *African Journal of Ecology*, 60(3), 769–779. <https://doi.org/10.1111/aje.12989>
- Rathoure, A. K. (2024). Biodiversity and its importance. *Biodiversity International Journal*, 7(1), 1–2. <https://doi.org/10.15406/BIJ.2024.07.00204>
- Salvaña, F. R. P., & Arnibal, S. L. T. (2020). Importance of indigenous communities' knowledge and perception in achieving biodiversity conservation: A case study from the Manobo Tribe of Southern Mindanao, Philippines. *Asian Journal of Ethnobiology*, 2(2). <https://doi.org/10.13057/asianjethnobiol/y020203>
- Singh, R., Gan, M., & Barlow, C. (2020). What do rangers feel? Perceptions from Asia, Africa and Latin America. *PARKS*, 26(1), 63–76. <https://doi.org/10.2305/IUCN.CH.2020.PARKS-26-1RS.en>
- Skea, R. (1996). The strengths and weaknesses of conservation areas. *Journal of Urban Design*, 1(2), 215–228. <https://doi.org/10.1080/13574809608724382>
- Stipe, R. (1999). *Conservation areas: A new approach to an old problem*. Semantic Scholar. <https://www.semanticscholar.org/paper/0261598f40b6b2282e12d3953931de4eee73f056>
- Sujarwo, W., Keim, A. P., Savo, V., Guarrera, P. M., & Caneva, G. (2015). Ethnobotanical study of Loloh:

- Traditional herbal drinks from Bali (Indonesia). *Journal of Ethnopharmacology*, 169, 34–48. <https://doi.org/10.1016/j.jep.2015.03.079>
- Thammanu, S., Han, H., Marod, D., Zang, L., Jung, Y., Soe, K. T., Onprom, S., & Chung, J. (2020). Non-timber forest product utilization under community forest management in northern Thailand. *Forest Science and Technology*, 17(1), 1–15. <https://doi.org/10.1080/21580103.2020.1862712>
- United Nations. (n.d.). *Biological diversity*. <https://www.un.org/en/observances/biological-diversity-day/convention>
- United Nations Development Programme, Global Environment Facility, Biodiversity Management Bureau, & New Conservation Areas in the Philippines Project. (2014). *Guide to local conservation area (LCA) management planning*. <https://www.undp.org>
- Warf, B. (2010). Community-based conservation. In *Encyclopedia of geography*. SAGE Publications. <https://doi.org/10.4135/9781412939591.n200>
- Wiles, G. J., Bart, J., Beck, R. E., & Aguon, C. F. (2003). Impacts of the brown tree snake: Patterns of decline and species persistence in Guam's avifauna. *Conservation Biology*, 17(5), 1350–1360. <https://doi.org/10.1046/j.1523-1739.2003.01526.x>
- Zamzami, L., & Effendi, N. (2023). Cultural and entrepreneurial attitudes of fishermen involved in the production of fishery products in West Sumatra, Indonesia: Implications for marine resource conservation areas in village development. *Journal of Infrastructure, Policy and Development*, 7(3), 2629. <https://doi.org/10.24294/jipd.v7i3.2629>