

Empowering women for biodiversity conservation in Mt. Lantoy Key Biodiversity Area Argao, Cebu, Philippines

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Abstract. Lillo EP, Alcazar SM, Malaki AB, Cutillas AL, Chavez MLM, Abejo III MR, Cañarijo III DM, Redoblado BR, Margate MA, Diaz JL, Mago JE, Belanizo J, Beceril R, Revillas MJ, Davirao C, Obando ME, Diaz GGG, Gonzaga CF, Cagara BN, Dano VL. 2025. *Empowering women for biodiversity conservation in Mt. Lantoy Key Biodiversity Area Argao, Cebu, Philippines. Asian J For 9: 137-143.* Women play a vital role in agricultural production and natural resource management. However, they often face barriers that limit their decision-making power and leadership in environmental initiatives. This study investigates the role of gender in biodiversity conservation, focusing on women's participation, practices, challenges, and perceptions in the Mt. Lantoy Key Biodiversity Area (KBA) in Argao, Cebu, Philippines. Using a mixed-methods approach, the research employed structured surveys, Key Informant Interviews (KIIs), and Focus Group Discussions (FGDs) with the same respondents to cross-check results. The findings reveal that while women are actively involved in daily resource use such as household provisioning and small-scale farming, only 36.7% have participated in formal conservation activities like tree planting and community cleanups. Societal expectations, including caregiving and household responsibilities, significantly constrain their involvement, alongside a lack of specialized training and limited access to decision-making platforms. Despite these challenges, respondents expressed strong support for women's leadership in conservation, recognizing its potential to improve ecological outcomes and community resilience. The study emphasizes the need for gender-responsive strategies in local and national policies, such as flexible participation schedules, capacity-building programs, and mechanisms to recognize women's contributions to conservation. Empowering women through targeted reforms and inclusive governance can enhance biodiversity conservation in the Mt. Lantoy KBA, contributing to goals like food security, climate adaptation, and poverty reduction.

Keywords: Biodiversity conservation, climate resilience, community participation, conservation policy, women's leadership

INTRODUCTION

Women play a critical yet often under-recognized role in biodiversity conservation, particularly in rural and marginalized communities. Broeckhoven and Cliquet (2015) emphasizes that gender minorities, particularly women, face discrimination that contributes to biodiversity loss. Despite these challenges, women are increasingly assuming leadership positions to enhance their families' and communities' resilience against climate-related impacts and disaster risks (Broeckhoven and Cliquet 2015). In addition, women have traditionally been responsible for meeting their families' food, medicinal, and nutritional needs and play an essential role in households. Women are involved in almost all aspects of farming, from seed selection, planting, weeding, winnowing, harvesting to storing seeds (Pradhan et al. 2021).

The development sector has made significant strides in addressing gender disparities, aiming to engage and empower women through targeted interventions in both policy and practice. Empowering women and promoting gender

equality is critical in achieving the Sustainable Development Goals (SDGs) and is at the core of efforts to eradicate poverty and hunger, improve education and health, combat climate change, and addressing environmental challenges (Pradhan et al. 2021). Addressing gender inequality in biodiversity conservation is fundamental in attaining goals and targets under the Global Biodiversity Framework 2030 by Convention on Biological Diversity's and aligning them with the Sustainable Development Goals (SDG) (Pradhan et al. 2021). Evidence supports the notion that gender equity leads to more effective, inclusive, and sustainable conservation efforts (Alvarez and Lovera 2016; Lau 2020). Increased participation of women in conservation science, gives multiple benefits to societies at local and national level (Alvarez and Lovera 2016; Cook et al. 2019). A study by Widiastuti (2024) demonstrates that natural resource conditions improve when women are actively involved in management, and environmental policies are strengthened when women participate in decision-making processes.

Intentionally including women in conservation efforts leads to positive social and environmental outcomes

(Taukobong et al. 2016). Nevertheless, globalization, climate change, land degradation, and biodiversity loss present new challenges and opportunities for women. In mountainous and upland areas, rapid depletion of natural resources results in declining agricultural productivity and ecosystem health (Pradhan et al. 2021). In the Philippines, karst landscapes, which cover 11.7% of the nation's landmass, significantly impact endemic flora and fauna (BMB-DENR 2019). Mount Lantoy in Cebu Island Philippines is identified as a Key Biodiversity Area (KBA) and home to several endemic species of flora and fauna (Lillo et al. 2019). The area harbors 112 plant species, classified into 64 families and 84 genera, including 88 native tree species, with 17 classified as threatened. Of these, two species are critically endangered, three are endangered, nine are vulnerable, and three are categorized as other threatened species. The high species diversity index in the area proves the ecological significance of Mount Lantoy and its potential for conservation initiatives (Lillo et al. 2019).

Mount Lantoy faces significant threats, including illegal logging, hunting, and the conversion of forests to agricultural land, leading to moderate ecological disturbances (Lillo et al. 2019). Despite their critical ecological roles, local communities, including women, have limited participation in conservation efforts, as observed in the area. This study aims to explore the role of empowering women for leadership in biodiversity conservation within the Mt. Lantoy Key Biodiversity Area (KBA) in Argao, Cebu, Philippines. This investigation seeks to examine the intersection of gender and conservation leadership, emphasizing the role of women in achieving long-term, sustainable biodiversity outcomes in the region (Pascual et al. 2014; Broeckhoven and Cliquet 2015; Kariuki and Birner 2016; Yang et al. 2018).

This study specifically focuses on the role of women in biodiversity conservation within the Mt. Lantoy KBA, exploring their participation, challenges, and perceptions

regarding conservation practices in the area. It aims to highlight the significance of fostering women's leadership in conservation efforts to enhance not only the ecological resilience of Mt. Lantoy but also to promote broader societal benefits. These benefits include advancing gender equity, improving sustainable livelihoods, and ultimately contributing to the realization of national and global biodiversity conservation goals. By empowering women, particularly in leadership roles, this research seeks to promote inclusive conservation practices that recognize and leverage the invaluable contributions women can make to protect our natural heritage. Through this study, we emphasize the importance of gender in achieving effective and sustainable conservation outcomes, particularly in areas with rich but vulnerable biodiversity like Mt. Lantoy.

MATERIALS AND METHODS

Study area

This study was conducted in the vicinity of Mount Lantoy (9°54'9"N, 123°32'9"E), a designated Key Biodiversity Area (KBA) in Cebu, Philippines (CI, DENR, and Haribon 2006). Six barangays, including Butong, Conalum, Cansuje, Catang, Tabayag, and Usmad, comprise the surrounding community (Lillo et al. 2019) (Figure 1). Mount Lantoy is one of 117 terrestrial KBAs in the Philippines, identified based on criteria of vulnerability and irreplaceability, and is part of a larger KBA of Mount Lantoy and Nug-as which covers 10,457 hectares. These areas serve as habitat to a number of threatened species, including two that are critically endangered, two endangered, four vulnerable, and sixteen classified as restricted-range (CI, DENR-PAWB, and Haribon 2006). Consequently, the conservation and protection of Mount Lantoy as KBA depend largely on the management and supervision of local communities.

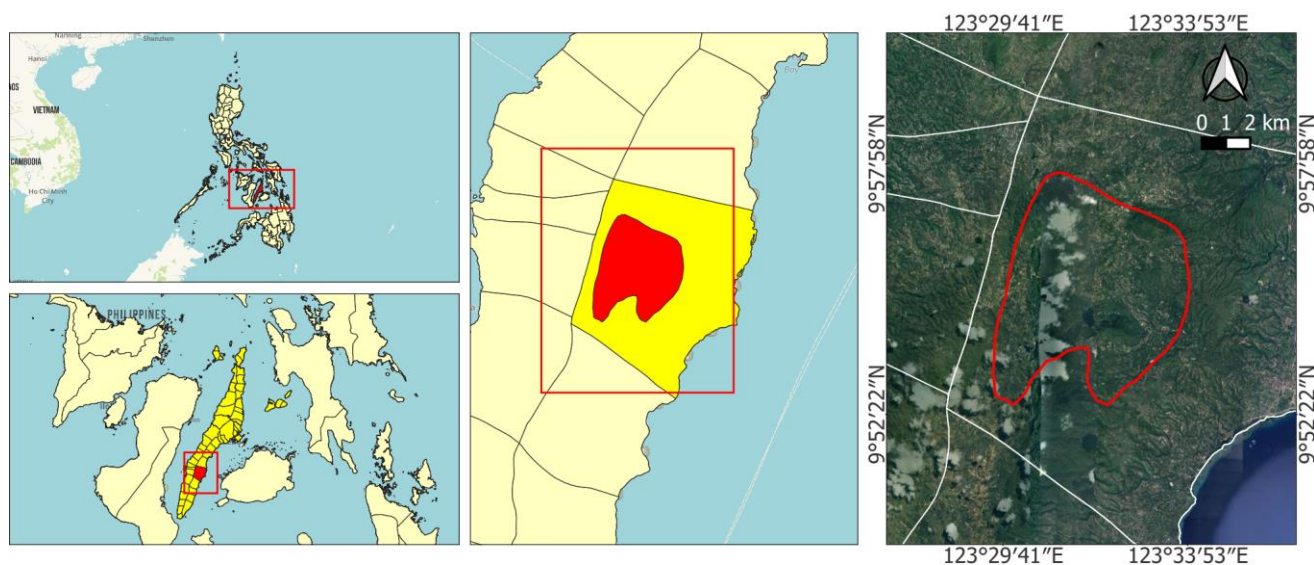


Figure 1. Map of study area in the Mt. Lantoy Key Biodiversity Area (KBA) in Argao, Cebu, Philippines

Data collection

In this study, data collection was focused on assessing the pivotal role of women in biodiversity conservation within six barangays adjacent to Mount Lantoy Key Biodiversity Area (KBA). A representative sample comprising 10% of the total female population in these barangays was selected using simple random sampling, resulting in 89 participants. A structured questionnaire served as the primary data collection tool, and included questions on demographic profiles, participation in biodiversity conservation activities, problems and issues encountered in conservation efforts, perceptions of gender equity's impact on conservation, and views on incorporating gender-responsive approaches in conservation policies.

To enrich and validate the quantitative data collected, qualitative data were gathered through Key Informant Interviews, and Focus Group Discussions (FGDs) with the same respondents to cross-check results. This mixed-methods approach enabled a more comprehensive understanding of women's involvement in conservation initiatives in the Mount Lantoy KBA.

Data analysis

The data were initially encoded in an Excel spreadsheet for analysis of frequency and percentage distributions. These encoded data were subsequently imported into IBM SPSS version 20.0 software for verification. The use of SPSS for verification allows for rigorous checks, minimizing errors related to data entry and ensuring that the results are reliable and consistent.

RESULTS AND DISCUSSION

Demographic profile of the respondents and its correlation with conservation

Marital status

As presented in Table 1, the majority of respondents (75.3%) are married, while only 7.9% are widowed. During the focus group discussions, the research team asked participants how their current civil status influenced their potential involvement in biodiversity conservation efforts in Mount Lantoy Key Biodiversity Area (KBA). The married respondents expressed their willingness to participate in environmental conservation activities, provided these efforts do not conflict with their household responsibilities. Married women, in particular, highlighted that they often take on the primary role in managing household tasks, especially when their husbands are away for work. They indicated that they would be more likely to engage in environmental activities, particularly those funded by the government. This aligns with their belief that government-supported initiatives would be more feasible for participation, as such programs are often seen as beneficial to their families and communities. According to Van Aelst and Holvoet (2016) married women in Tanzania were more likely to access external projects and resources, thereby enhancing their ability to participate in conservation initiatives.

Furthermore, under the Philippine government's Pantawid Pamilyang Pilipino Program (4P's), households that are members of the program are required to participate in activities related to environmental conservation, especially if they reside within areas like the KBA. Many respondents, particularly those in the 4P's program, emphasized that their participation in conservation activities would be dependent on the alignment of these activities with their household duties.

On the other hand, widows expressed challenges in consistently participating in such initiatives. They explained that their primary focus is on livelihood activities that sustain their families, particularly their children. For many widows, the time and resources required for regular engagement in biodiversity conservation activities are limited, as they prioritize securing their family's immediate needs. These findings underscore the broader point that women are not a homogeneous group; varying social identities, including marital status, shape different lived experiences and power asymmetries (Murali et al. 2021). The varying levels of participation based on marital status highlight the importance of designing biodiversity conservation programs that consider the different roles and time commitments of community members. Policies that integrate family responsibilities, particularly for women and widows, will likely lead to higher and more sustained participation in conservation efforts. This approach ensures that everyone, regardless of marital status or social standing, has the chance to contribute to and benefit from the sustainable management and protection of natural resources, particularly in the Mount Lantoy Key Biodiversity Area.

Educational attainment

The majority of respondents (69%) have completed their high school education and enrolled college degree but failed to graduate, while 30% have graduated college and some (2%) pursued postgraduate studies (Table 1). Notably, all respondents who graduated college with postgraduate degrees are teachers working at the elementary and high school levels (Table 1). These individuals have earned Master's and Doctoral degrees in education and currently hold leadership positions within the Department of Education.

Table 1. Demographic profile of the respondents in the Mt. Lantoy Key Biodiversity Area (KBA) in Argao, Cebu, Philippines

Profile of the respondents	Attributes	Frequency	Percentage
Marital status	Live-in	7	7.9
	Married	67	75.3
	Widow	7	7.9
	Single	8	9.0
	Total		100
Educational attainment	Post graduate	1	2
	College graduate	13	28
	College undergraduate	6	13
	Vocational	1	2
	High school graduate	25	54
Total		100	

The Focus Group Discussion (FGD) further underscored distinct perspectives on biodiversity conservation across different educational groups. Respondents with high school and undergraduate education expressed a willingness to engage in conservation activities, though they highlighted concerns that such efforts must not interfere with their household responsibilities, particularly for married women or their livelihood activities, especially among widowed participants. This suggests that, for individuals with lower educational attainment, practical constraints related to daily life and livelihood often shape their ability and willingness to engage in biodiversity conservation activities (Oldekop et al. 2022).

Conversely, respondents with college degree and have postgraduate degrees, particularly those employed as teachers, focused predominantly on educating their students about the importance of biodiversity, the diverse species within the environment, and conservation strategies. Their role in conservation was more indirect, emphasizing raising awareness and fostering environmental responsibility among the younger generation, especially in relation to Mount Lantoy's Key Biodiversity Area (KBA). This aligns with the findings of Oldekop et al. (2022), which suggest that individuals with higher levels of education, particularly educators, are more inclined to prioritize environmental education and awareness-raising efforts.

The educational background of respondents also has significant implications for the effectiveness of biodiversity conservation initiatives. Those with higher educational attainment are more likely to engage with scientific discussions and contribute to strategies aimed at preserving biodiversity. However, their involvement is typically more focused on educational activities rather than direct fieldwork or community-based conservation efforts. On the other hand, respondents with lower levels of education may benefit from conservation programs that are tailored to their specific realities. Such programs should account for the practical challenges they face, including time constraints and household duties, which can limit their participation in conservation activities (Oldekop et al. 2022; Xu et al. 2022). Additionally, Børresen et al. (2022) highlights the importance of local knowledge of ecosystem services and their relationship with livelihoods in the sustainability of natural resources, which directly affects community well-being.

This study further illustrates that educational attainment plays a crucial role in shaping how individuals contribute to biodiversity conservation. As Majumder (2018) points out, education enhances personal capacity, helps individuals overcome obstacles, and expands opportunities for well-being. Emayavaramban et al. (2020) also notes that while men tend to travel far for work, women often remain on farms, working within their communities. These gendered roles may influence how individuals approach conservation, with women more likely to stay within the local context and engage in community-based activities.

Given these findings, it is clear that future conservation initiatives in the Mount Lantoy KBA should consider the varying educational levels and the specific needs of different groups. Programs should be designed to accommodate the practical constraints faced by individuals

with lower educational attainment, while also leveraging the specialized knowledge and advocacy skills of those with higher levels of education. Such tailored approaches will enhance the inclusivity and effectiveness of biodiversity conservation efforts.

Participation of women in biodiversity conservation activities

The result of the study reveals that only 36.7% of the respondents in Mount Lantoy KBA reported involvement in biodiversity conservation activities, with the majority focusing on tree-planting and community cleanup initiatives. In contrast, 60.7% of women did not participate at all. This limited engagement raises concerns about the overall inclusivity and effectiveness of biodiversity conservation programs in Mount Lantoy KBA. According to Widiastuti (2024), meaningful representation of women in decision-making processes is crucial for achieving equitable conservation outcomes. Guha (2025) similarly emphasizes that environmental justice and gender equality are interconnected, necessitating inclusive strategies to address environmental challenges and foster social equity.

Norms and attitudes about women's roles in environmental management can be achieved by working closely with community leaders to champion women's participation and share success stories of female-led conservation projects (Staples and Natcher 2015). When women's voices and experiences are integrated into conservation planning, programs are more likely to be responsive to the needs of local communities, fostering both ecological integrity and social well-being (Staples and Natcher 2015; Baynes et al. 2019).

By considering and increasing women's participation in biodiversity conservation efforts, Mount Lantoy KBA and other KBA's in Cebu Island can develop more equitable, innovative, and durable solutions. Bridging gender gaps in biodiversity conservation decision-making, not only enhances the effectiveness of ecological initiatives but also contributes to broader social and economic development. The current high percentage of non-participation suggests potential barriers in the long run, such as cultural norms, limited awareness of conservation issues, unequal access to resources or education, and inadequate policy support that will restrict women's engagement. Identifying and addressing these obstacles can yield significant benefits.

Ensuring greater female representation in decision-making forums not only strengthens the legitimacy of conservation policies but also enriches the diversity of perspectives and skills brought to bear on biodiversity conservation issues. Staples and Natcher (2015), as well as Baynes et al. (2019), emphasize that promoting gender equity in conservation extends beyond simply inviting women to attend meetings; it requires active engagement, leadership opportunities, and support from the broader community. Training and awareness-raising sessions for women can enhance their leadership skills, technical knowledge, and confidence, enabling them to play more substantive roles in conservation initiatives (Widiastuti 2024). Local governments and non-governmental organizations should implement policies and funding mechanisms that encourage and facilitate women's

involvement, ensuring they have a seat at the table and a voice in key decisions (Guha 2025). In Mount Lantoy KBA, these steps are especially critical for the long-term sustainability of biodiversity conservation efforts.

Respondent's perception towards impacts of gender equity in biodiversity conservation

The majority of the respondents (60%) agreed that promoting gender equity can lead to more effective and sustainable biodiversity conservation outcomes, while 40% remain neutral or disagree. These results are consistent with Silvestri et al. (2012) who argue that both men and women are integral to the stewardship of landscapes and resources. The inclusion of women in conservation efforts is not just a matter of gender equality, but a strategic approach to harness diverse skills, knowledge, and perspectives, which enhances the effectiveness of these initiatives.

In addition, over half of the participants (55%) agreed that gender equity positively impacts biodiversity conservation, while 27% disagreed and not perceiving a direct link between gender equity and improved conservation outcomes. The majority of the respondents' agreement to the concept reflects a growing awareness that diverse perspectives, particularly those contributed by women, are essential to the success and sustainability of conservation efforts. Study by Ben-Amar et al. (2017) emphasizes the critical role that women, especially in leadership positions, play in advancing environmental strategies within organizations. In addition, studies by Bravo and Reguera-Alvarado (2019) and Carvajal et al. (2022) also highlight the benefits of female representation in decision-making processes, noting that women's involvement leads to better social and environmental outcomes.

In this study, the positive perception of gender equity's role in biodiversity conservation underscores the idea that inclusive and diverse decision-making processes are essential in addressing the complex challenges of biodiversity loss. Women's participation contributes not only to more comprehensive conservation strategies but also to a more equitable resource management, leading to more resilient ecosystems and communities. Furthermore, local knowledge and experiences often possessed by women are crucial for understanding and managing natural resources sustainably.

The 40% of the respondents who remained skeptical or neutral regarding the positive impact of women's participation may reflect deep-seated traditional gender norms or biases that undervalue women's roles in natural resource management. This reluctance of the respondents could be linked to societal structures that have historically placed men in positions of authority, particularly in environmental decision-making. Challenging these perceptions requires targeted educational and outreach programs that highlight the empirical evidence supporting gender equity's benefits in conservation. Studies by Pascual et al. (2014), Broeckhoven and Cliquet (2015), Kariuki and Birner (2016), and Yang et al. (2018) emphasizing the crucial importance of gender equity in achieving successful biodiversity conservation outcomes. Ensuring equal participation of women in conservation

initiatives is not just a matter of social justice, but a key to creating more inclusive, comprehensive, and ultimately more successful conservation strategies. However, these efforts will require ongoing advocacy, education, and the dismantling of gender-based barriers that limit women's roles in environmental stewardship, particularly in the conservation of Mount Lantoy KBA's.

Incorporating gender-responsive approaches in biodiversity conservation policies

The majority (62%) of the respondents believe prioritizing women's involvement in biodiversity conservation could lead to positive outcomes and project success. This strong endorsement underscores the importance of gender inclusion and reflects a growing awareness of the significant roles women play in community-based conservation, resource management, and environmental stewardship (Elias et al. 2017). However, 28% of respondents expressed skepticism or hesitation, which could stem from traditional gender roles, cultural norms, or limited exposure to gender-inclusive initiatives. Meanwhile, the 10.1% who remained neutral likely represent those who are either uninformed or uncertain about how gender dynamics influence conservation outcomes. These findings highlight the critical need for education and awareness campaigns to build a deeper understanding of the benefits of women's participation in environmental management (Widiastuti 2024).

To fully harness the potential of gender-responsive strategies, policymakers must prioritize the development of inclusive conservation frameworks. These frameworks should not only acknowledge and celebrate women's contributions but also actively address barriers that hinder their participation (Guha 2025). Conducting gender impact assessments is essential to identify gender-specific challenges and opportunities. These assessments will guide the equitable allocation of resources and empower women to participate more fully in conservation initiatives.

Engaging local communities is also critical to fostering support for gender equity in biodiversity conservation. Community participation is a key determinant of the success of such policies, as it creates a sense of ownership and shared responsibility. Policymakers and conservation organizations should work collaboratively with communities to raise awareness of the value of gender equity and to break down cultural and structural barriers that limit women's involvement. Encouraging examples exist in places like Tost, Mongolia, where women are increasingly taking on key roles in snow leopard conservation efforts (Mijiddorj et al. 2019). In such contexts, improvements in women's status through enhanced education and greater participation in governance structures have created opportunities for their involvement in community conservation initiatives. These examples demonstrate that empowering women can lead to tangible conservation successes.

To ensure long-term effectiveness, continuous monitoring and evaluation of gender-responsive policies must be institutionalized. This will help track progress, identify gaps, and make necessary adjustments to ensure conservation efforts remain inclusive and impactful over time. By

addressing gender equity, fostering local participation, and ensuring adaptive management, biodiversity conservation policies can be more effective and sustainable, with broader benefits for communities and ecosystems alike.

In conclusion, women play a crucial role in the daily use and management of natural resources in Mt. Lantoy Key Biodiversity Area, Argao, Cebu, Philippines. However, their formal participation in biodiversity conservation activities remains limited. Only 36.7% of women have engaged in activities such as tree planting or community cleanups, highlighting a gap between their everyday contributions to environmental management and their involvement in organized conservation efforts. Several barriers hinder women's full engagement in formal conservation activities. Societal expectations around caregiving and household responsibilities place significant limitations on their time and mobility, preventing their active participation. Furthermore, a lack of specialized training, along with limited access to decision-making platforms, restricts their capacity to contribute meaningfully to conservation initiatives. Despite these challenges, the study found strong support for women's leadership in conservation efforts. Respondents recognized that women's leadership could enhance ecological outcomes and strengthen community resilience, reflecting a growing appreciation for gender-inclusive approaches in biodiversity conservation. To bridge the gap in women's participation, the study underscores the importance of integrating gender-responsive strategies into both local and national policies. Key recommendations include providing flexible participation schedules, establishing capacity-building programs, and creating mechanisms to formally recognize and value women's contributions to conservation. By addressing these challenges, women can take on more leadership roles in environmental initiatives, ultimately improving biodiversity conservation, food security, climate adaptation, and poverty reduction.

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