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RESEARCH ARTICLE

Gender-Based Assessment of Indigenous People towards Conservation, Management, and Perception in Taguibo Watershed, Butuan City, Philippines

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ABSTRACT
The Taguibo Watershed is a key biodiversity area in Caraga Region, providing a source of water to the entire city of Butuan. A gender-based analysis of Indigenous Peoples (IPs) in Taguibo watershed aims to determine the socioeconomic, conservation, environmental management practices and perception of male and female respondents. Following a mixed-method approach, the data were gathered through the use of structured survey questionnaires, key informant interviews, and validation through a focus group discussion. Data were analyzed using Spearman Correlation to determine the relationship. A total of 323 IP respondents, 113 (35%) were male and 210 (65%) were female. Most had low education and family income, high percentage of the occupation were housewives and farmers. Gender had a very highly significant (p.<0001) relationship on occupation, but household members (p 0.4460), educational attainment (p 0.0335), and family income (p 0.1299) have no significant relationship. The study reveals that gender should not be a basis for determining one's ability to participate in the conservation and effective management of the Taguibo Watershed. Respondents expressed confidence that continued direct management and conservation of the watershed by members of the indigenous cultural community can lead to sustainable outcomes.

1. INTRODUCTION

Watersheds are composed of different geomorphology, geology, climates, land uses, soils, ecological communities, and vegetation covers. The watershed landscapes have been established over geologic time while being shaped by patterns of climate, vegetation, and lithology (Hazbavi, 2018). Watershed ecosystems are economically significant, yet frequently endangered by anthropogenic disturbances, and they continue to be major foci for long-term research in support of ongoing biodiversity management and conservation programs (Wang et al., 2016). The Taguibo Watershed, formally known as the Taguibo River Watershed Forest Reserve (TRWFR), is a major biodiversity habitat in the Caraga Region of the Eastern Mindanao biodiversity corridor and the primary source of a continuous supply of fresh drinking water for the entire city of Butuan. It is situated south of Mt. Hilong-hilong range (Sanguila, 2020).

President Fidel V. Ramos declared the Taguibo River a Watershed Forest Reserve on September 4, 1997, per Proclamation No. 1076 (Apdohan et al., 2019). The Taguibo River region encompasses 4,367.44 hectares, including Barangay Anticala in Butuan City, Barangay San Antonio in Remedios Trinidad Romualdez (RTR), and Barangay Mahaba in Cabadbaran, Agusan del Norte, as well as a section of Sibagat, Agusan del Sur (Ariston et al., 2015). In 2009, the National Commission on Indigenous Peoples (NCIP) issued a Certificate of Ancestral Domain Title (CADT 135) to the Manobo tribe, which resides in the Taguibo watershed (BCWD, 2015).

According to Salvaa and Arnibal (2019), indigenous communities play an important part in determining how conservation efforts and biodiversity are managed. Using custom and customary practice, the Manobo tribe makes a positive contribution to society by adopting the values, norms, products, tradition, and technologies that are generally accepted. In which Ostrom's principle firmly believes in self-governed institutions for managing resources.

Gender equality is crucial for effective and equitable biodiversity conservation (Ally et al., 2024). Ensuring women and men have equal opportunities to participate in and benefit from conservation efforts is essential for respecting, protecting, and promoting human rights. This requires recognizing diverse gender roles and addressing power imbalances that can hinder conservation outcomes (Lau,

2020).

Thus, this study aims to examine the gender-differentiated socio-demographic and economic characteristics, perceptions, and management practices of Indigenous Peoples (IPs) within the Certificate of Ancestral Domain Title (CADT) areas in Taguibo Watershed, and to analyze the interrelationships among these variables to inform culturally responsive and inclusive watershed management strategies. Specifically, it seeks to (1) determine the socio-demographic and economic profile of IPs across gender, (2) assess and compare the perceived importance, perceptions, and management practices of IPs across gender that aligns with the Ostrom's principles, and (3) analyze the interrelationships between socio-demographic and economic profile, perceived importance, perceptions, and management practices of IPs across gender of IPs in relation to the Taguibo Watershed.

This study aligns with SDG 5 (Gender Equality), SDG 15 (Life on Land), and SDG 13 (Climate Action) by recognizing the gender-differentiated roles and contributions of Indigenous Peoples in the sustainable management of the Taguibo Watershed. It further contributes to SDGs 6, 10, and 16 by promoting inclusive, water-secure, and equitable environmental governance rooted in indigenous knowledge systems.

2. MATERIALS AND METHODS

2.1. Study area

The study was conducted in selected CADT areas within the Taguibo Watershed, Butuan City, Agusan del Norte, Philippines. Sampling took place in eight sitios of Barangay Anticala—Bungadman, Dugyaman, Zigzag, Suong, Sinaka, Mahayahay, Tagkiling, and Iyao and Barangay Pianing. Barangay Anticala (9.0040, 125.6472) has an elevation of 73.5 m, while Barangay Pianing (8.9870, 125.6413) is at 46.5 m. CADT 135 covers both barangays, with a total population of 2,510 and 647 households.

2.2. Ethical consideration

Before data collection, approval and Free, Prior, and Informed Consent (FPIC) were obtained from the NCIP. Customary rituals were performed with tribal leaders to ensure ethical and cultural compliance. Participation was voluntary, with respondents informed of the study's purpose and assured of confidentiality and anonymity.

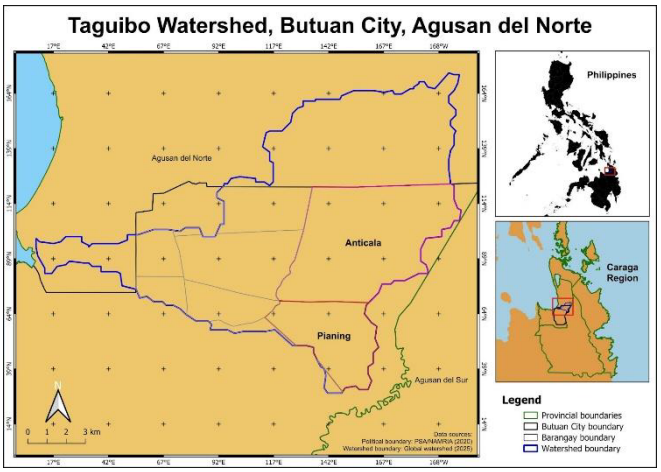

Figure 1. Location of the study area.

2.3. Research design

This study used a descriptive-correlational design to examine the socio-demographic and economic profiles, perceptions, and management practices of IPs by gender within CADT 135 in the Taguibo Watershed. The descriptive part outlined community profiles and perceptions, while the correlational part analyzed relationships among gender, socio-demographic and economic factors, and watershed management perceptions and practices.

2.4. Determining the sample Size

The total 647 IPs households within the Taguibo watershed was used as the population frame for computing the sample size. Cochran's formula (Cocharan, 1940) was applied, resulting in a target sample size of 323 respondents.

2.5. Data collection

The survey was conducted in selected sitios within the CADT areas of the Taguibo Watershed, Butuan City, Agusan del Norte. A structured questionnaire, written in English and translated into Bisaya to ensure comprehension and cultural appropriateness, was used to assess age-specific practices of IPs. It consisted of three sections: (1) socio-economic and demographic profile, (2) perceived importance and perception of the watershed based on Ostrom's principles, and (3) watershed management practices. Data were collected from March to April 2022.

2.6. Data analysis

Collected data were encoded and analyzed using descriptive statistics to summarize socio-demographic and economic characteristics, as well as perceptions and management practices. In Table 1, a modified 5-point Likert scale (Sözen & Güven, 2019) and in Table 2, a 3-point Likert scale (Pimentel, 2019) were used for questions on perceived importance, perceptions, and management practices of IPs in the Taguibo Watershed.

Table 1. Scoring range of five-point Likert scale of the survey.

Scale	Mean Range	Interpretation
1	4.21 – 5.00	Strongly Agree
2	3.41 – 4.20	Agree

3	2.61 – 3.40	Undecided
4	1.81 – 2.60	Disagree
5	1.00 – 1.80	Strongly Disagree

Table 2. Scoring range of the three-point Likert scale of the survey.

Scale	Mean Range	Interpretation
3	2.50 – 3.00	Yes
2	1.50 – 2.49	Neutral/ Uncertain
1	1.00 – 1.49	No

Inferential statistical tools such as correlation analysis using spearman rho were applied to determine the significant relationship between gender, socio-economic variables, perceived importance, perceptions, and management practices. All data were categorized by gender (male and female) to enable comparative analysis.

3. RESULT AND DISCUSSION

3.1 Socio-Demographic and Economic Profile of IPs across gender

Table 3 presents the socio-demographic and economic profile of Indigenous People (IPs) respondents in the Taguibo watershed, highlighting key differences and patterns between male and female.

The results revealed that female respondents make up the majority of 65%, with a significant proportion 38% belonging to the 18-30 age group, suggesting greater participation of younger women in the study area. In contrast, male respondents are mostly concentrated in the 31-60 age group (58%). Notably, a higher percentage of elderly respondents (61-90 years old) are female (26%) compared to males (7%), possibly reflecting longer female longevity or caregiving roles within households, which is consistent with the demographic trends (PSA, 2021). All respondents identified as members of the Manobo tribe, indicating ethnic homogeneity in the study area.

In terms of education (Table 3), both genders are largely represented at the elementary level, with 57% of males and 42% of females falling into this category. However, more males reached high school graduate level (22%) than females (20%), while only females attained college-level or college graduate status, though in small percentages (2% each). This somewhat contradicts with the findings of UNESCO (2021) that IP women often face more barriers to higher education, since there is a slightly higher representation of women in higher education as found in this study.

Moreover, household size data shows that the most common household composition is 4-6 members for both genders, followed by 1-3 members, 7-10 members, and more than 11 members, respectively.

Table 3. Socio-demographic and economic profile of the IP respondents.

		Male (%)	Female (%)
		35	65
Age			
	18-30	3	38
	31-60	58	37
	61-90	7	26
	Total	**100**	**100**
Ethnicity			
	Manobo	100	100
Education			
	No Educational Attainment	3	3
	Elementary Level	57	42
	Elementary Graduate	3	9
	High School Level	14	18
	High School Graduate	22	20
	College Level	1	7
	College Graduate	0	2
	Total	**100**	**100**
Household Member			
	1-3 member	31	24
	4-6 members	50	55
	7-10 members	17	13
	> 11 members	3	8
	Total	**100**	**100**
Family Income			
	Below–1,000 PHP (17.14 USD)	0	3
	1,001–5,000 PHP (17.16-85.71 USD)	33	68
	5,001–10,000 PHP (85.73-171.42 USD)	49	61
	10,001–20,000 PHP (171.44-342.85 USD)	14	26
	20,001 PHP – up (342.87 USD)	5	3
	Total	**100**	**100**
Occupation			
	House wife	0	47
	Farmer	51	37
	Tribal Leader	2	1
	Construction worker	26	0
	Business owner	1	1
	Security Guard	2	0
	Fish vendor	0	1
	Watch man	2	0
	Student	0	2
	Others	16	13
	Total	**100**	**100**

Income distribution reveals that most respondents belong to low-income brackets, with 61% of females and 9% of males earning PHP 5,001-10,000 (85.73 - 171.42 USD) monthly. A higher percentage of females (68%) reported earnings between PHP 1,001-5,000 (17.16 - 85.71 USD), while no male respondents reported earnings below PHP 1,000 (17.14 USD). This reflects existing gender disparities in economic opportunities and income levels, especially in rural and Indigenous contexts (ADB, 2018).

Gender differences are also evident in occupational roles. Female respondents are predominantly housewives (47%) and farmers (37%), with some engaged in vending and other informal jobs, while males are mostly farmers (51%) and construction workers (26%), with notable participation as tribal leaders (10%). These patterns highlight a clear gender division in labor, education, and income, emphasizing the need for gender-sensitive approaches in conservation, livelihood support, and watershed management programs that recognize and empower both men and women in Indigenous communities (FAO, 2020; UN Women, 2019).

3.2.1 Perceived importance of IPs across gender towards Taguibo Watershed

Table 4 shows the perceived importance of Indigenous Peoples (IPs) across gender toward the protection of the Taguibo watershed. Based on the results, both male and female respondents generally expressed strong positive perceptions regarding the importance of watershed protection. Female respondents consistently rated higher scores in individual items related to watershed importance, particularly in terms of flora, but overall, both genders demonstrated an equally strong sense of environmental responsibility. Specifically, female respondents rated the protection of the Taguibo watershed at 4.276, interpreted as "Strongly agree", while males rated it slightly lower at 4.186 ("Agree"). On the importance of protecting the flora around the watershed, both genders rated this item as "Strongly agree", with females again showing a higher mean score (4.409) than males (4.319). When it comes to fauna protection, both males (4.035) and females (3.867) showed agreement, though female responses were slightly lower. The overall mean scores were identical, both interpreted as "Agree".

These findings suggest that IPs, regardless of gender, recognize the value and urgency of conserving the Taguibo watershed and its biodiversity. However, women slightly outscore men in perceived importance, especially concerning flora protection. This aligns with previous studies showing that women in indigenous and rural communities often have strong environmental stewardship roles, particularly in relation to biodiversity, due to their responsibilities in food gathering, herbal medicine, and domestic water use (UN Women, 2019; Aguilar, 2009). Additionally, women's knowledge systems are closely tied to the sustainable management of natural resources, which may explain their heightened concern for plant biodiversity (FAO, 2020).

Furthermore, these gendered differences highlight the need to ensure that women's perspectives are meaningfully included in environmental planning and policy-making, especially in Indigenous conservation efforts (Reyes-Garcia et al., 2019). The generally high scores across both genders reinforce that any degradation of the watershed would be a shared concern and could significantly impact community livelihoods, cultural practices, and ecological stability.

Table 4. Perceived importance of IPs across gender towards Taguibo watershed protection using 5-point Likert scale.

	Male	Interpretation	Female	Interpretation
2. How important do you think it is to protect the Taguibo watershed?	4.186	***Agree***	4.276	***Strongly Agree***
4. How important do you think it is to protect the flora around the Taguibo watershed?	4.319	***Strongly Agree***	4.409	***Strongly Agree***
7. How important do you think it is to protect the fauna around the Taguibo watershed?	4.035	***Agree***	3.867	***Agree***
Mean	4.18	***Agree***	4.184	***Agree***
Interpretation	***Agree***		***Agree***	

Table 5 shows the responses of male and female participants regarding the importance of conserving the Taguibo watershed and its surrounding flora and fauna. Using a 3-point Likert scale, the results indicate a strong agreement among both genders on the significance of these conservation efforts.

Table 5. Perceived importance of IPs across gender towards Taguibo watershed protection using a 3-point Likert scale.

	Male	Interpretation	Female	Interpretation
1. Do you think it is important to conserve the Taguibo watershed?	2.938	***Yes***	2.886	***Yes***
3. Do you think it is important to conserve the flora around the Taguibo watershed?	2.805	***Yes***	2.847	***Yes***
6. Do you think it is important to conserve the fauna around the Taguibo watershed?	2.655	Yes	2.629	Yes
Mean	2.799	Yes	2.787	Yes
Interpretation	Yes		Yes	

The participant responses on the importance of conserving the Taguibo Watershed, Male mean 2.938 (Yes) interpretation, and for the Female 2.886 means (Yes). Both males and females express a high level of agreement on the importance of conserving the Taguibo watershed. In the importance of conserving flora, Male show a 2.805 mean while females show a 2.847 mean. This response shows the importance of conserving flora around the Taguibo Watershed. Lastly, for the importance of conserving Fauna Male mean is 2.655, and the female mean is 2.629. This result suggests that both genders still agree on the importance of conserving fauna, but the mean scores are lower compared to

the importance of conserving the Taguibo Watershed and flora. This could mean lesser awareness or perceived importance of fauna conservation. Overall, both genders believe in the necessity of conservation efforts within the Taguibo watershed (Celeste, 2025).

Taking into consideration gender diversity, according to Asteria et al. (2018), women can get an advantage from participating in watershed protection and provide a deeper knowledge not limited in projects, including economic, social, and cultural factors.

3.3 Perception of Indigenous Peoples towards the Taguibo Watershed

Table 6 presents the perceptions of Indigenous Peoples (IPs) across gender in the Taguibo Watershed using a 5-point Likert scale. Results show that both male and female respondents hold positive perceptions, generally agreeing with the statements provided. The mean scores were 3.805 for males and 3.83 for females, both interpreted as "Agree," indicating shared recognition of the watershed's importance and optimism about its condition. For the future view of the Taguibo Watershed in the next 20 years, males recorded a mean of 3.991 and females 3.986, the highest agreement levels it suggesting confidence in the watershed's long-term sustainability, possibly reflecting growing environmental awareness and conservation efforts in the area.

Interestingly, item 1, "How do you view the Taguibo Watershed right now?" elicited slightly different responses across gender, males agreed (3.460), while females leaned toward undecided (3.409). This minor difference may reflect gendered experiences with or access to information, visibility of conservation issues, or participation in watershed-related programs in the area. Also, the different views on the present state suggest a need for improved communication and education to ensure all community members have an awareness regarding the watershed's status. Previous studies have noted that women may feel less confident in current environmental governance due to underrepresentation in formal decision-making (Agarwal, 2001; Origenes et al., 2024). Nonetheless, both genders expressed agreement that illegal activities such as illegal logging or kaingin adversely affect the watershed, which suggest shared environmental concerns and a potential foundation for collective action.

These findings support the value of engaging both men and women in environmental planning and stewardship, especially in Indigenous context where gender roles shape access, perceptions, and responsibilities (Origenes et al., 2024). As highlighted in previous research, gender-inclusive participation contributes to more effective and equitable natural resource management (FAO, 2020; Meinzen-Dick et al., 2014).

Table 6. Perception of IPs across gender towards Taguibo watershed using 5-point Likert scale.

	Male	Interpretation	Female	Interpretation
1. How do you view the Taguibo watershed right now?	3.460	***Agree***	3.409	***Undecided***
2. How do you view the Taguibo watershed 10 years from now?	3.717	***Agree***	3.767	***Agree***
3. How do you view the Taguibo watershed 20 years from now?	3.991	***Agree***	3.986	***Agree***
4. What can you say about the management of your leaders toward the Taguibo watershed?	3.876	***Agree***	3.819	***Agree***
6. Do you think that illegal activities such as illegal logging or kaingin can affect the Taguibo watershed?	3.982	***Agree***	4.119	***Agree***
Mean	3.805	***Agree***	3.83	***Agree***
Interpretation	***Agree***		***Agree***	

Using 3-point Likert scale, the Table 7 shows the perception of IPs in the Taguibo watershed based on gender (male and female) regarding the influence of individual actions on the condition of resources within the Taguibo watershed.

Table 7. Perception of IPs across gender towards Taguibo watershed using 3-point.

	Male	Interpretation	Female	Interpretation
5. Do you think one person alone can influence the condition of the resources?	2.513	***Yes***	2.548	***Yes***

For the individual influence on resource conditions, both male (2.513) and female (2.548) IP respondents agree that one person can indeed influence the condition of resources, reflecting a shared belief in the influence of individual activity and responsibility. The slightly higher score among females may suggest a stronger recognition of individual contributions to environmental stewardship. This result highlights the importance of fostering a culture of individual accountability and active participation in conservation efforts, reinforcing that collective actions can lead to meaningful changes in resource management and sustainability.

3.4 Management practices of IPs across gender towards the Taguibo watershed

Table 8 shows the management practices of IPs across gender toward the Taguibo Watershed using a 5-point Likert scale. Male respondents recorded a mean score of 3.319 and females 3.324 for the watershed's condition both falling under "undecided," suggesting limited awareness or

visibility of changes in the area. For the importance of watershed management, males scored 4.133 ("Agree") and females 4.224 ("Strongly Agree"), indicating strong recognition of its significance, particularly among women. The overall means is 3.717 for males and 3.781 for females it shows that both genders generally agree with current management practices. However, the neutral stance on the watershed's condition signals a need to enhance community awareness and monitoring efforts.

In conclusion, the results emphasize the need for targeted awareness programs, inclusive participation strategies, and strengthened communication efforts to ensure that all community members, regardless of gender, are equipped with knowledge, tools, and platforms necessary to contribute effectively to the stewardship of the Taguibo watershed.

Table 8. Management practices of IPs across gender towards the Taguibo watershed using 5-point Likert scale.

	Male	Interpretation	Female	Interpretation
1. How is the condition of the Taguibo watershed right now?	3.319	***Undecided***	3.324	***Undecided***
2. How important is it to have management in the Taguibo watershed?	4.133	***Agree***	4.224	***Strongly Agree***
3. How is the management of your organization towards the Taguibo watershed?	3.699	***Agree***	3.795	***Agree***
Mean	3.717	***Agree***	3.781	***Agree***
Interpretation	***Agree***		***Agree***	

Using a 3-point Likert scale, Table 9 shows the management practices of IPs across gender towards the Taguibo watershed, specifically focusing on resource-related challenges and perceptions on sustainable management. Both male (M = 2.460) and female (M = 2.386) respondents demonstrated a neutral perception regarding resource availability in the Taguibo watershed. This neutrality indicates a level of uncertainty or limited awareness of resource-related issues within their community. The findings suggest the need for improved communication and participatory assessments to enhance understanding of local resource conditions.

The overall mean scores for males (2.645) and females (2.589) IP respondents acknowledge the necessity of sustainable management practices, despite expressing some resource challenges. This highlights a critical insight that community members recognize the importance of sustainability but may not be fully aware or informed of the specific resource issues impacting their tribes. As emphasized by Wani (2015), collective action and community participation are essential for successful and sustainable watershed management. Therefore, efforts should be made to strengthen local knowledge-sharing systems, conduct participatory resource assessments, and foster inclusive dialogue to ensure all community members are engaged, informed, and empowered to contribute to conservation and sustainable development.

Table 9. Management practices of IPs across gender towards the Taguibo watershed using a 3-point Likert scale.

	Male	Interpretation	Female	Interpretation
1. Does the organization/village face any problems with resources?	2.460	***Neutral***	2.386	***Neutral***
2. Do you think sustainable management of the Taguibo watershed is important?	2.831	***Yes***	2.791	***Yes***
Mean	2.645	***Yes***	2.589	***Yes***
Interpretation	***Yes***		***Yes***	

3.5 Ostrom's principles for managing the common resources

Using the 3-point Likert scale, Table 10 presents the gender-based perceptions of Manobo respondents regarding key aspects of Ostrom's design principles (Ostrom, 1990), specifically, clearly defined boundaries, provision of environmental services, participation in decision-making, monitoring practices, responses to rule violations, and conflict resolution mechanisms. The responses shed light on governance and resource management practices within the CADT 135 area of the Taguibo watershed.

For clearly defined boundaries, both male mean (2.912) and female (2.843) respondents. agree that the boundaries of their area are clearly defined. This shared perception supports effective resource management and territorial delineation within CADT 135. For the payment of environmental services, responses express a neutral interpretation from both male and female IP respondents, suggesting uncertainty or the absence of established payment mechanisms for ecosystem services, an area where governance structures may need strengthening. For the participation of Manobo members in the council, both male and female respondents agree that members of their organization are able to participate in council decisions and activities, emphasizing inclusive governance and democratic engagement. For the boundary monitoring of the CADT 135, both male and female respondents agree that boundaries of CADT 135 are regularly monitored by the tribal guard or *'bagani'*. Which is essential for maintaining territorial integrity and addressing any violations. Regular monitoring reflects a proactive approach to governance and resource

management. For the instances of any rule violations, perceptions differ slightly, males (2.593) generally agree that violations occur, while females (2.433) remain neutral. This discrepancy may stem from the fact that male '*bagani*' are more directly involved in boundary monitoring, giving them greater awareness of infractions. For the conflict resolution, both genders (M=2.796; F=2.719) report high agreement on their organizations ability to resolve conflicts, demonstrating confidence in institutional systems to address disputes and maintain harmony.

The overall mean scores shown in Table 10 reflect a shared agreement that supports effective management of the Taguibo watershed through clear boundaries, participatory governance, regular monitoring, and conflict resolution. However, the neutral responses regarding payment for environmental services and gendered differences in perceptions of rule enforcement highlight areas that require further attention and possibly targeted capacity building.

Table 10. Management practices of IPs across gender towards the Taguibo watershed using a 3-point Likert scale.

	Male	Interpretation	Female	Interpretation
1. Is the boundary of your area clearly defined?	2.912	***Yes***	2.843	***Yes***
2. Do they pay for maintaining the environmental services?	2.363	***Neutral***	2.333	***Neutral***
3. Can a member of your organization participate in the council?	2.619	***Yes***	2.624	***Yes***
4. Is the said boundary regularly monitored?	2.531	***Yes***	2.524	***Yes***
5. Were there instances when someone violated organization rules?	2.593	***Yes***	2.433	***Neutral***
6. Does your organization resolve the conflict?	2.796	***Yes***	2.719	***Yes***
Mean	2.636	***Yes***	2.579	***Yes***
Interpretation	***Yes***		***Yes***	

3.6 Gender-based variable interrelationships

Table 11 shows the correlation between gender and socio-economic variables of IPs in the Taguibo Watershed. The results indicate a very highly significant negative correlation between gender and occupation (r = -0.53032, at p<0.0001), suggesting substantial gender-based differentiation in livelihood roles. This reflects traditional gender norms, where men and women typically assume distinct occupational responsibilities due to cultural expectations, division of labor, or unequal access to employment opportunities, findings that align with previous studies on Indigenous and rural communities in the Philippines (FAO, 2020).

Table 11. Relationship between gender and socio-economic profile

	Household member	Education attainment	Family income	Occupation
Gender	-0.04289	-0.12262*	0.09662	-0.53032***

***** *Correlation is significant at p<0.05 and *** very highly significant at p<0.0001*

Moreover, a significant negative correlation was observed between gender and educational attainment (r =0.12262, p<0.05), implying that educational levels vary by gender, with one gender (most likely men) having slightly lower educational attainment on average (see Table 3). This gap may be influenced by socio-cultural factors that prioritize men's labor participation over formal schooling or limit women's access to higher education, issues documented in various gender and development assessments in indigenous settings (UNESCO, 2019; Quisumbing et al., 2014).

In contrast, household size and family income show weak and non-significant correlations with gender. These findings imply that gender is not a strong predictor of household size or income levels within the studied IP communities.

Overall, these findings underscore the importance of incorporating gender analysis into socio-economic planning and policy-making within the CADT areas, particularly in addressing occupational inequities and barriers to education. Promoting gender-responsive development is essential for inclusive and equitable natural resource governance (Agarwal, 2001; FAO 2020).

Table 12 presents the correlation between gender and various variables related to the perceived importance of conservation, perceptions, and management practices across gender of Indigenous Peoples (IPs) towards the Taguibo watershed. These variables were assessed using 3-point and 5-point Likert scales, including items aligned with Ostrom's principles of collective resource governance.

Table 12. Relationship between gender and perceived importance, perceptions, and management practices.

	Conservation		Management practices		Ostrom's principles	Perception (5-pt)
	3-pt	5-pt	3-pt	5-pt		
Gender	0.02234	-0.06571	0.05165	-0.03328	0.10430*	0.01167

***** *Correlation is significant at p<0.05 and *** very highly significant at p<0.0001*

Among the variables examined, a significant positive correlation was observed between gender and Ostrom's principle (r=0.10430, p<0.05), indicating that perceptions rooted in collective governance frameworks vary significantly

across gender. This suggests that gender influences how IPs engage with or relate to Ostrom's core principles such as participation in rule-making, monitoring, and recognition of rights. It reflects that men and women may have different levels of awareness, involvement, or perspectives when it comes to the governance and equitable sharing of common-pool resources such as water and forest systems. Previous studies support this, noting that women in Indigenous and rural communities are often excluded from decision-making, yet when included, they contribute valuable insights that enhance collective governance outcomes (Agarwal, 2001; Meinzen-Dick et al., 2014).

Thus, the observed gender-based variation in alignment with Ostrom's principles underscores the importance of integrating gender-responsive governance frameworks into community-based watershed management. In contrast, other variables such as perceived importance of conservation and management practices did not show statistically significant correlations. These non-significant correlations indicate that gender differences in these areas are minimal or not strongly associated with the measured responses on perceived importance or general management practices towards Taguibo watershed.

Nonetheless, the significant correlation between gender and Ostrom's principles highlights the need for a gender-responsive governance mechanism. As emphasized by Origenes et al. (2024) in their study on the conservation of limestone forests in Samar Island Natural Park (SINP), addressing gender disparities and leadership is essential for building inclusive and effective conservation models. Ensuring that both women and men have equal opportunities to influence decisions, access resources, and build capacity contributes to more sustainable and equitable natural resource management. Integrating such approaches can enhance the resilience of watershed governance systems, particularly in indigenous contexts where traditional knowledge and social norms play a central role (Agarwal, 2001; Meinzen-Dick et al., 2014; FAO, 2020).

4. CONCLUSION

The gender-based assessment of Indigenous Peoples (IPs) towards conservation, management, and perception in the Taguibo Watershed reveals its significance as an essential water source for Butuan City. Both genders expressed strong agreement on the importance of conserving the watershed, with females placing greater emphasis on flora protection. Gender-based relationships indicated significant correlations in occupational roles, emphasizing the need for gender-sensitive approaches in conservation efforts. While perceptions of conservation and management practices showed minimal gender differences, notable correlations with Ostrom's principles suggest gender influences governance perspectives. Overall, these findings emphasize the necessity of integrating gender analysis into conservation strategies for more effective management of the Taguibo Watershed.

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