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Wildlife Value Orientations towards Hunting among Communities in Bintulu, Sarawak: A Comparison of the Demographic Factors

Alexander Anak Thomas[1], Evelyn Lim Ai Lin[1,2*], Shazali Bin Johari[1], Manohar Mariapan[1]

[1]Faculty of Forestry and Environment, Universiti Putra Malaysia, UPM Serdang, Selangor Darul Ehsan, Malaysia 43400
[2]Institute for Social Science Studies, Universiti Putra Malaysia, Serdang, Selangor, Malaysia 43400

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Abstract

Communities living near forest areas have long hunted wildlife for food and other products. Among the communities in Bintulu, Sarawak, traditional hunting and the consumption of wildlife meat are deeply ingrained in their culture. This study identifies wildlife value orientation among communities in Bintulu, Sarawak, and compares their values with demographic factors, including gender, residency, age, and education level. A survey was developed to identify the communities' value orientation towards hunting, specifically the utilitarian, cultural/traditional, and conservation values. A total of 413 residents were surveyed, including hunters, non active hunters who have knowledge of traditional hunting practices and those who consume wildlife products. Findings revealed that communities in Bintulu hold moderate stance of multiple compared with WVOs, values towards wildlife hunting, with a stronger tendency towards conservation values. When the demographic factors were compared with WVOs, significant differences were observed for all factors. Rural males exhibited stronger utilitarian and cultural/traditional values, yet they also had stronger conservation values. Communities aged 40 and above displayed higher utilitarian, cultural/traditional, and conservation values. Those with lower levels of education, including primary and no formal education, show stronger conservation values than those with tertiary education. These findings emphasize the diversity of perspectives toward wildlife use and highlight the need for conservation strategies that align with local cultural contexts. Balancing traditional practices with ecological sustainability offers a more inclusive and region-specific approach to wildlife management and conservation policy.

Keywords: *wildlife value orientation, wildlife hunting, wildlife conservation, community, Sarawak*

**Correspondence author, email*: *limailinevelyn@upm.edu.my*

Introduction

Malaysia is a megadiverse country with various natural forest ecosystems on land and waters, providing habitats for various species. One of the critical aspects of managing the forest ecosystem is its wildlife. Communities, especially those in rural areas, have long relied on wildlife for their source of protein and other economic benefits. Wildlife products are valuable commodities, and wild meat is considered a premium value because it has a high value per unit weight compared with other forest products (Pattiselanno & Nasi, 2015). Thus, hunting persists due to the demand for wildlife products. However, hunting has also resulted in the decline of approximately 50% of all mammals worldwide, and 25% are facing extinction because of illegal hunting (Benítez-López et al., 2017; Gren et al., 2018).

In Sarawak, wildlife hunting is deeply ingrained in indigenous traditions and significantly affects human-wildlife interactions. Traditional hunting is a means of securing food and part of ceremonial and medicinal practices (Nelson et al., 2015; Bennett, 2016). According to Mulhern (2020), wildlife consumption in Southeast Asia is deeply ingrained in cultural traditions and often linked to food, medicine, and ceremonial practices. Nelson et al. (2015) illustrate the reciprocal relationship between these communities and forest ecosystems, highlighting how land use, proximity to forests, and resource utilization affect sustainability and biodiversity. Many of the forest dwellers in this region rely on wildlife for subsistence and have developed unique relationships with the animals and ecosystems surrounding them. These relationships are influenced by cultural beliefs, ecological factors, and socio-economic needs, shaping their values and behaviors toward wildlife conservation and management (Bennett, 2016; Plieninger et al., 2023).

The Wild Life Protection Ordinance 1998 has had a notable impact on hunting practices and conservation efforts among indigenous communities in Sarawak, such as the Iban, Orang Ulu, and Melanau. For these groups, hunting remains an important aspect of daily life, not only for subsistence but also for cultural traditions and community bonding (Bennett, 2016). While the ordinance permits indigenous communities residing in native areas to hunt for

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personal consumption, it explicitly prohibits the commercial sale or purchase of wildlife-including non-protected species and the public display of hunted animals on social media platforms (Dayak Daily, 2020; Lineil, 2023).

These legal restrictions have contributed to shifts in hunter behavior, particularly discouraging commercial exploitation and encouraging more sustainable, non-commercial hunting practices. In some communities, this has led to a gradual cultural shift, with younger and more urbanized individuals increasingly viewing hunting as a recreational or cultural activity rather than an economic one (Anthony, 2020). As enforcement of the ordinance improves, there is growing awareness about wildlife conservation, and traditional hunting practices are being interpreted within a framework that supports ecological sustainability. This evolving relationship between legislation, culture, and conservation reflects a broader move toward balancing indigenous rights with environmental protection (Anthony, 2020).

Studies have shown a decrease in the dependence of local communities on wildlife as their food source due to the continuous depletion of wildlife in the region's forests. However, local communities continue to consume them for social rituals, cultural celebrations, and festivities (Cawthorn & Hoffman, 2015; Manfredo et al., 2020; Thomas et al., 2023). A cultural shift has recently been reported among modern hunters who view hunting as a hobby or a challenge (Malay Mail, 2025). As the local community navigates the evolving landscape of conservation, hunting activities become an essential point of analysis for understanding how communities in Sarawak perceive wildlife and conservation. Hence, this is particularly relevant since hunting is often motivated by subsistence needs, and its implications on biodiversity conservation are crucial for developing region-specific management strategies (Bennett, 2016). One of the foundations of understanding the social psychology of communities in wildlife conservation is understanding their values towards wildlife.

The wildlife value orientations (WVO) framework, originally developed by Kellert (1993), has been refined through recent research to better understand human attitudes and behaviors toward wildlife. Contemporary studies have expanded upon Kellert's typology, focusing on two predominant orientations: mutualism and domination. Building upon this, contemporary studies have refined and expanded the WVO framework to better understand human-wildlife relationships. For instance, Manfredo et al. (2016) introduced a dual-axis model emphasizing 'domination' and 'mutualism' orientations, reflecting a societal shift towards recognizing wildlife as part of an extended social community. This shift is evident in cross-cultural studies. Jacobs et al. (2022) found significant variations in WVOs among university students across seven countries, including Malaysia, highlighting the influence of cultural and demographic factors on wildlife perceptions. Moreover, Notaro et al. (2024) observed that in the Italian Alps, urban residents and women were more inclined towards mutualistic orientations, advocating for non-lethal wildlife management strategies.

Recent studies in Asia have refined and contextualized the WVO framework, highlighting that demographic variables significantly influence wildlife-related attitudes. For example, Jacobs et al. (2022) examined cultural differences in WVOs across seven countries, including Malaysia, and found that demographic factors play a key role in shaping wildlife value orientations. Their research indicated that nationality accounted for a larger portion of the variation in mutualism (21%) compared to domination (6%) (Jacobs et al., 2022). This trend has also been supported by other research, which emphasizes the importance of cultural and demographic contexts in understanding wildlife values (Gomez et al., 2022; Tien et al., 2024). In Malaysia, Saikimi et al. (2023) found that hunting is primarily driven by food procurement, market demand, and cultural factors. It also observed that younger individuals are increasingly less involved in hunting, possibly due to urbanization and changing lifestyles. Davis (2022) highlighted increasing female participation in conservation across Southeast Asia. Meilani et al. (2019) reported that higher incomes in Kalimantan reduce dependency on hunting. In other word, the transition from hunting to alternative livelihoods has been met with resistance due to cultural practices and economic hardships. Additionally, the expansion of oil palm plantations has displaced traditional communities, disrupting their access to forest resources and potentially increasing reliance on hunting for subsistence (Meilani et al., 2019)

In Malaysia, WVO plays a critical role in understanding public attitudes toward wildlife, particularly given the nation's rich biodiversity and the cultural importance of wildlife among indigenous communities. Over time, localized research has advanced the conceptualization and measurement of WVO, highlighting the strong influence of cultural, religious, and socio-demographic factors such as age, gender, education level, and urban-rural background. Zainal Abidin (2019) proposed an integrated model that combines WVO, emotional valence, and risk perception to better capture the complexity of Malaysian attitudes toward wildlife. This model aligns with findings from Bintulu, Sarawak, where traditional hunting practices among indigenous groups such as the Iban and Orang Ulu are influenced by cultural heritage and subsistence needs (Bennett, 2016). Communities such as the Iban, Orang Ulu, and Melanau in Sarawak often exhibit utilitarian and dominionistic value orientations, prioritizing wildlife for practical and traditional purposes.

However, recent studies indicate a generational and demographic shift. Younger, urban, and more educated Malaysians are increasingly adopting mutualistic and moralistic orientations, driven by growing environmental awareness and formal education (Grilli et al., 2018; Karim et al., 2022). These shifts suggest that wildlife-related values are dynamic and evolve with social changes, education, and exposure to conservation messages (Martell & Rodewald, 2024). Mei et al. (2017) further emphasize that WVOs remain central to understanding conservation behaviors and public support for wildlife management. The increasing popularity of wildlife legislation and community-based conservation initiatives reflects a broader national movement toward conservationist values (Mei et al., 2017; Tong, 2020).

Globally, similar patterns have emerged. Manfredo et al. (2020) demonstrated that modernization-particularly urbanization and education is associated with a transition

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from dominionistic and utilitarian views to mutualistic perspectives, where wildlife is regarded as part of one's social community. Liordos et al. (2021) also found that younger, more educated, and urban populations tend to support non-lethal, ecosystem-based wildlife management strategies. In Latin America, Chase (2016) showed how regional WVOs are rooted in historical and cultural contexts, advocating for the integration of local values into wildlife governance. In Asia, studies in China and Southeast Asia echo these findings. For instance, Zhang et al. (2022) reported that urban youth in China, influenced by education campaigns, are increasingly adopting mutualistic and moralistic views. Similarly, within the Malaysian context, Hasan & Csányi (2023), affirmed that education, age, and rural-urban background significantly influence wildlife perceptions. Traditional communities continue to engage in practices grounded in cultural necessity, while urban populations exhibit stronger conservationist attitudes.

By aligning conservation practices with these diverse value orientations, it is possible to promote forest sustainability in ways that emphasize ecological integrity yet respect local communities' social, cultural, and economic needs (Ihemezie et al., 2021; Fariss et al., 2022). Accordingly, the research questions have been reframed as follows to explicitly reflect demographic comparisons: a) what are the primary WVOs (utilitarian, cultural/traditional, and conservation) among communities in Bintulu, Sarawak? and b) how do demographic factors such as gender, age, residency, and education level influence wildlife value orientations in Bintulu?

Based on research questions, the present study aims to understand WVOs towards hunting among the communities in Bintulu and compare the differences in their WVO with selected demograpghic factors.

Methods

Study area The research was conducted in the Bintulu Division in Sarawak. The Bintulu Division is one of Sarawak's twelve administrative divisions, covering an area of 12,166.2 km^2. Located in the central region of Sarawak, it records a population of 266,200 as of 2020 (Department of Statistics Malaysia, 2020). Bintulu Division consists of two districts, Bintulu and Tatau, and a sub-district, Sebauh (Figure 1).

Bintulu is home to diverse indigenous communities, including the Iban, Orang Ulu, Melanau, Kedayan, and Malay and Chinese populations. According to the Department of Statistics Malaysia (2020), indigenous groups comprise 61.2% of the town's population, while the Chinese population accounts for 25.0%. Non-Malaysians represent 13.1%, and Indians make up 0.3%. These indigenous communities have long relied on the forest and its resources for their livelihoods, a dependence that spans many generations (Kato & Hiromitsu Samejima, 2019). As Bintulu becomes more urbanized, shifts in these cultural practices and their implications for conservation efforts are observed (Kato & Hiromitsu Samejima, 2019). Given this deep connection to the land, Bintulu was chosen as the location for this study.

Figure 1 Study sites (Source: Google Map Data 2025).

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Sample and sampling Data collection was conducted from January to February 2022. The study gathered responses from 413 participants, exceeding the required minimum sample size. The population of the Bintulu district was recorded at 266,200 in 2020. To determine an appropriate sample size, the study referred to the sample size table developed by Krejcie and Morgan (1970), which provides recommended sample sizes for populations of various sizes. For a population of 266,200, the table recommends a sample of 384 respondents to achieve a 95% confidence level with a 5% margin of error. Additionally, Creswell (2018) and Fowler (2020) support that a sample size of around 400 is generally sufficient for large populations to ensure statistical reliability. This aligns with the rationale that, for populations greater than 100,000, sample size requirements tend to stabilize, making 400 a robust and commonly accepted benchmark (Mustățea & Pătru-Stupariu, 2021).

Purposive sampling was employed to ensure a comprehensive capture of perspectives within a population, allowing for targeted sampling to address specific research questions regarding the demographic impact on wildlife value orientations (Liordos et al., 2021; Yeshey et al., 2023). The study collected data from residents aged 18 years and above who had knowledge of hunting practices and those who consume wildlife products, even if not active hunters themselves. The purposively identified respondents were then conveniently sampled based on their availability and willingness to participate in the study.

Despite efforts to ensure inclusivity and representation, the study's sampling approach carries certain limitations. Although the use of purposive and convenience sampling are effective for targeting specific demographic segments, it may limit the generalizability of the findings. Participants were selected based on their availability and willingness to respond, which could introduce self-selection bias, as individuals more interested or informed about wildlife issues may be more inclined to participate. Moreover, the over-representation or under-representation of certain demographic groups (e.g., age, ethnicity, or education level) might skew results, particularly if these factors correlate with wildlife value orientations.

Instruments A quantitative, self-administered survey was conducted using closed-ended questions. The survey includes structured questions categorized into three primary wildlife constructs: utilitarian, cultural/traditional, and conservation/protection orientations. Only three values were selected, as they capture the core human-wildlife relationships in Sarawak.

The survey questions were adapted from Fiebelkorn and Menzel (2020), with modifications made to suit the cultural context of communities in Bintulu, Sarawak. Specifically, certain terminologies and examples from the original instrument were reworded to reflect local wildlife species and traditional hunting customs and practices so that it is more relevant to the indigenous populations. Items that referenced western conservation scenarios were adjusted or replaced with culturally relevant contexts, such as traditional taboos, community hunting roles, or customary laws. Input from local community leaders and academics familiar with Sarawak's socio-cultural landscape was also obtained to ensure the adapted items were contextually appropriate and easily understood by respondents. The questionnaire employs a 5-point Likert scale and is organized into three wildlife value constructs, comprising a total of 15 items: utilitarian (6 items), cultural/traditional (4 items), and conservation/ protection (5 items). This structure enables a quantifiable and comparative analysis of respondents' values regarding wildlife conservation.

Pilot testing The instrument was pilot tested among local communities in Bintulu to ensure its relevance and clarity. The questionnaire was conveniently distributed at the local *tamu*, or marketplace in Bintulu, where the community members are frequently exposed or engaged in hunting activities. A total of 45 respondents participated in the pilot test. This pilot test was crucial to ensure that the instrument aligned with the local context and provided respondents with a clear understanding of the study. It also ensured that the statements were comprehensible and culturally appropriate for the Bintulu community.

Factor analysis was used to validate the items grouped into the utilitarian, cultural/traditional, and conservation categories, as theorized. The reliability of the instrument was assessed using Cronbach's alpha. The WVO constructs of utilitarian (0.83), cultural/traditional (0.86), and conservation/protection (0.78) meet the minimum threshold of 0.70 (Hair et al., 2013; Whitehouse - Tedd et al., 2020; Vaske et al., 2022), indicating that the instrument used in this study is reliable. Hence, reliability testing and confirmatory factor analysis demonstrated that the scale assessing the three values toward wildlife hunting was valid and reliable.

Data analysis The analysis involved a descriptive analysis of the communities' WVOs and demographic information, providing insights into key characteristics such as age, gender, residency, and education level. Data were analyzed using SPSS version 26, with an α-level set at 0.05, employing independent t-tests and ANOVA to examine relationships between demographic factors and WVO. This approach is consistent with research assessing the demographic impacts on conservation attitudes, ensuring statistically significant interpretations (Jacobs et al., 2022). The demographic information, including age, gender, residency, and education level, was described. The interpretation of the mean scores is shown in Table 1.

Table 1 Means scale for interpretation communities for WVO in Bintulu

Scale	Mean rating	Interpretation
1.00–1.80	Strongly Disagree	Very Low
1.81–2.60	Disagree	Low
2.61–3.40	Neutral	Moderate
3.41–4.20	Agree	High
4.21–5.00	Strongly Agree	Very high

Source: Fiebelkorn and Menzel (2020)

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Results

Communities' demographic information The demographic information (gender, age, marital status, occupation, education, and income) provides information on the respondents from Bintulu, Sarawak (Table 2). Males dominate the sample (64.9%), reflecting the prevalence of male-dominated wildlife hunting activities. The age distribution is balanced, with the largest group aged 30–39 years (29.8%), followed by those aged 18–29 years (25.4%), 40–49 years (23.5%), and 50 years and older (21.3%). Based on the age distribution of the respondents, most respondents are married (68.8%). Employment status reveals that 61.2% are employed, 21.1% are self-employed, 11.2% are unemployed, and 6.5% are students. Many (45.0%) have a secondary education, 34.2% have a tertiary education, and 20.8% have a lower education. Regarding their level of education, the majority (91.0%) earn less than RM4,999 month^{-1}, indicating that the sampled communities consist of B40 income earners.

Wildlife values oreintation towards hunting among communities in Bintulu, Sarawak The mean scores in Table 3 provide a quantitative assessment of Bintulu communities' value towards wildlife hunting. The mean scores for the utilitarian (M = 2.66, SD = 1.10), cultural/traditional (M = 2.63, SD = 1.24), and conservation/protection (M = 3.31, SD = 1.07) orientations indicate a moderate stance. The results suggest that while Bintulu residents value wildlife as a resource for hunting, it is not universally prioritized for utilitarian or cultural/traditional purposes. The moderate stance may reflect a balanced perspective on the functional role of wildlife hunting in meeting their cultural and traditional needs. At the same time, the hunting activity is grounded by conservation values, which scored the highest among the three value orientations, suggesting a nuanced awareness and support for sustainable practices in hunting activities.

Wildlife value orientation towards hunting among Bintulu communities according to demographic information *Wildlife value orientation toward hunting by gender* Table 4 shows that males have stronger utilitarian (M = 2.82, SD = 1.06), cultural/traditional (M = 2.82, SD = 1.25), and conservation (M = 3.36, SD = 1.02) values compared to females. Significant differences in mean scores were observed between genders for the three wildlife value orientations (p-value < 0.05).

Wildlife value orientation toward hunting by residency Results in Table 5 show that urban and rural communities have low mean scores (M = 2.42, SD = 1.10) urban; (M = 2.83, SD = 1.06) rural for the utilitarian and cultural/traditional

Table 2 Demographic information of communities in Bintulu, Sarawak

Items	Frequency	Percentage (%)
Gender		
Male	268	64.9
Female	145	35.1
Age		
18–29	105	25.4
30–39	123	29.8
40–49	97	23.5
50 years above	88	21.3
Marital Status		
Single	120	29.1
Married	284	68.8
Divorced/Widow	9	2.1
Occupation		
Employed	253	61.2
Self Employed	87	21.1
Unemployed	46	11.2
Students	27	6.5
Level of Education		
No formal education	35	8.5
Primary School	51	12.3
Secondary School	186	45.0
Tertiary	141	34.2
Income		
< RM1000	157	38.0
RM1000–RM2999	152	36.8
RM3000–RM4999	67	16.2
RM5000 above	37	9.0

*Tertiary = level of education STPM/Diploma and above

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values (M = 2.41, SD = 1.35) urban; (M = 2.79, SD = 1.14) rural. However, they have moderate mean scores for conservation value (M = 3.06, SD = 1.04) for urban and rural communities (M = 3.39, SD = 1.07). When mean scores between the rural and urban communities were compared for the three value orientations, rural had significantly higher mean scores (p-value < 0.05) than urban communities. Therefore, results show that urban-rural communities display a mix of the three values with a stronger tendency towards conservation orientation.

Wildlife value orientation toward hunting by education level Results in Table 6 show that communities at all four education levels display moderate mean scores for utilitarian, cultural/traditional, and conservation values. However, communities with no formal education (M = 3.60, SD = 1.03) and primary education (M = 3.65, SD = 0.93) have high mean scores for the conservation value.

Results showed that significant differences were recorded across the four education levels for the utilitarian (F = 11.89, p-value = 0.001), cultural/traditional (F = 7.63, p-value = 0.001), and conservation values (F = 8.37, p-value = 0.001) (Table 6). Communities with primary education consistently had the highest utilitarian, cultural/traditional, and conservation values, followed by those without formal education. Communities with tertiary education had the lowest mean scores for all three values. This relationship can be explained by the communities' direct reliance on natural resources and their deeper interaction with the environment, which may foster stronger conservation practices.

Wildlife value orientation toward wildlife by age Results in Table 7 show that communities across all age groups display moderate mean scores for the utilitarian, cultural/traditional, and conservation values. However, communities aged between 18 and 29 scored a low mean for utilitarian (M = 2.40, SD = 1.16) and cultural/traditional values (M = 2.46, SD = 1.26). Communities between the ages of 40 and 49 (M = 3.40, SD = 1.11) and those 50 years and above (M = 3.43, SD = 1.01) have high mean scores for the conservation value. When the mean scores of the three values were compared across different age groups, a significant difference was observed for utilitarian (F = 2.92, p-value = 0.034) and conservation values (F = 4.90, p-value = 0.003).

Table 3 Bintulu communities' wildlife values towards wildlife hunting

Wildlife value orientation dimension	No of items	Mean (M)	Standard deviation (SD)
Utilitarian	6	2.66	1.10
Cultural/traditional	4	2.63	1.24
Conservation	5	3.31	1.07

*Note: mean score (±SD) based on a 5-point Likert scale. 1. Strongly disagree, 2. Disagree, 3. Neutral, 4. Agree, 5. Strongly agree

Table 4 Wildlife value orientation towards wildlife hunting by gender

Value orientation	Gender[1]		*t*-value	*p*-value
	Male	Female		
Utilitarian	2.82 ± 1.06	2.35 ± 1.11	4.238	0.001
Cultural/traditional	2.82 ± 1.25	2.28 ± 1.16	4.314	0.001
Conservation	3.36 ± 1.02	3.06 ± 1.12	2.808	0.005

[1]Cell entries are mean score (±SD) based on a 5-point Likert scale. 1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree

Table 5 Wildlife value orientation towards wildlife hunting by residency

Value orientation	Locality [1]		*t*-value	*p*-value
	Urban	Rural		
Utilitarian	2.42 ± 1.10	2.83 ± 1.06	- 3.854	0.001
Cultural/traditional	2.41 ± 1.35	2.79 ± 1.14	- 3.000	0.003
Conservation	3.06 ± 1.04	3.39 ± 1.07	-3.089	0.002

[1]Cell entries are mean score (±SD) based on a 5-point Likert scale. 1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree

Table 6 Wildlife value orientation by level of education

Value orientation	Level of education[1]				*F*-value	*p*-value
	No formal	Primary	Secondary	Tertiary		
Utilitarian	2.80 ± 1.05	3.12 ± 0.88	2.78 ± 1.07	2.28 ± 1.10	11.89	0.001
Cultural/traditional	2.86 ± 1.22	3.00 ± 1.06	2.78 ± 1.22	2.25 ± 1.26	7.63	0.001
Conservation	3.60 ± 1.03	3.65 ± 0.93	3.32 ± 1.06	2.94 ± 1.05	8.37	0.001

[1]Cell entries are mean score (±SD) based on a 5-point Likert scale. 1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree

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Table 7 Wildlife value orientation towards wildlife hunting by age group

Value orientation	Age group[1]				*F*-value	*p*-value
	18–29	30–39	40–49	50+		
Utilitarian	2.40 ± 1.16	2.75 ± 1.11	2.81 ± 1.00	2.68 ± 1.07	2.92	0.034
Cultural/traditional	2.46 ± 1.26	2.63 ± 1.29	2.86 ± 1.19	2.61 ± 1.20	1.75	0.156
Conservation	2.95 ± 0.95	3.27 ± 1.12	3.40 ± 1.11	3.43 ± 1.01	4.90	0.003

[1]Cell entries are mean score (±SD) based on a 5-point Likert scale. 1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree

Discussion

Gender and wildlife value orientation The results suggest that males tend to play a more significant role in all orientations, serving as providers to the family (utilitarian) and upholding cultural and traditional practices, such as hunting, fishing, and other resource-based activities tied to ancestral customs (Bennett, 2016; Liordos et al., 2023). Hence, despite the consumptive nature of hunting (e.g., consumption of animal products, crafting tools from animal parts, and the use of medicine), males demonstrate a stronger tendency towards a conservation-oriented approach. The evident role of males in this study is typical in many Indigenous communities, where men have historically held more prominent roles in resource extraction and wildlife management. Menzies et al. (2024) highlights that Indigenous men often lead in managing natural resources, including hunting and wildlife conservation, which has been a significant aspect of their roles in traditional communities (Teow et al., 2023). Similarly, Ramos et al. (2016) discuss the central role of men in traditional ecological knowledge, particularly in wildlife conservation efforts. This aligns with findings by Massoi (2019), who notes that among the Kilosa Maasai in Tanzania, men are primarily responsible for natural resource management, especially in areas related to wildlife. Moreover, Shrestha et al. (2024) emphasizes that in many regions, including Madagascar, men have traditionally been the key figures in managing natural resources, with their leadership roles in resource extraction being a common feature across Indigenous communities. Additionally, gender dynamics in resource management in Southeast Asian countries are closely linked to local traditions and cultural practices such as prayer, rituals, or offerings that honor wildlife as part of their heritage (Neumann & Seidel, 2021). Male leadership in hunting and conservation practices is often seen as essential for ensuring the sustainable use of resources (Neumann & Seidel, 2021). In some communities, such as those in Indonesia and the Philippines, men are the primary agents responsible for protecting ecosystems vital to their cultural and economic well-being. A cultural imperative guides men's roles in resource extraction and enforcing sustainable practices, balancing human needs with ecological preservation. For instance, traditional hunting practices in these regions often come with unwritten rules regarding conservation, which are enforced by male community leaders (Fa et al., 2022).

Residency and wildlife value orientation Rural communities tend to have significantly stronger value orientations. These could be attributed to the stronger direct relationship and their dependence on wildlife for their livelihood (Sponarski et al., 2015) and their tradition. On the other hand, rural communities also exhibit significantly moderately high conservation values, indicating a recognition of the importance of sustainability and wildlife protection in the face of environmental challenges (Lee & Bond, 2018; Kurz et al., 2023; the Guardian, 2025) Research has shown that rural communities' dependence on natural resources for their livelihoods often leads to a stronger engagement in conservation practices (Sponarski et al., 2015; Lee & Bond, 2018). Furthermore, rural populations have been shown to value environmental protection-similar to urban populations, underscoring their shared commitment to sustainability efforts (Kurz et al., 2023).

Rural communities in Bintulu displayed higher mean scores for utilitarian (M = 2.83) and cultural/traditional (M = 2.79) values compared to urban residents. These findings reflect the rural communities' reliance on wildlife for subsistence, as hunting continues to be an essential part of their daily lives and cultural practices. As noted in studies by Sponarski et al. (2015) and Mahabale et al. (2025), rural populations often prioritize immediate, tangible benefits from wildlife, including food, medicine, and materials for tools. Moreover, cultural/traditional values are deeply embedded in rural communities, where hunting is not only a means of survival but also a way of maintaining cultural identity. In Bintulu, traditional practices such as seasonal hunting and the sharing of hunted resources during rituals or communal feasts continue to play a central role in the social fabric of rural communities (Bennett, 2016). These practices reflect a strong utilitarian perspective, rooted in necessity, as well as a cultural/traditional dimension that reinforces social cohesion and ties to ancestral customs (Burnette et al., 2018; Plieninger et al., 2025).

However, despite their heavy reliance on wildlife, rural communities also show moderate levels of conservation values (M = 3.39), suggesting a growing awareness of the need to balance resource use with sustainability. This is consistent with findings by Castilho et al. (2018), who observed that rural communities, while still relying on wildlife, are increasingly recognizing the need for sustainable management to ensure continued access to resources. The coexistence of utilitarian and conservation values in rural communities reflects a transitional shift towards incorporating more sustainable practices into traditional hunting activities, even when these communities remain dependent on wildlife for their livelihood. This dual mindset where immediate utilitarian needs are balanced with an awareness of sustainable resource use forms the core of the rural conservation paradox. Rural communities maintain strong utilitarian values tied to subsistence needs but are also

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embracing conservation values to ensure long-term access to wildlife. For instance, van Vliet et al. (2015a; 2015b) observed that rural hunters in the Brazilian Amazon incorporate both subsistence and conservation motives in their hunting practices. Similarly, Gómez-Baggethun et al. (2013) highlighted how rural communities balance the tension between resource extraction and environmental stewardship, often relying on traditional ecological knowledge to guide sustainable resource use. This interplay between immediate needs and long-term sustainability is a key feature of the rural conservation paradox, as emphasized by the Nicholas Institute for Environmental Policy Solutions (2019), which explored rural communities' evolving attitudes toward conservation in the United States. This paradoxical coexistence aligns with findings by Sponarski et al. (2015), who documented similar rural-urban differences in wildlife value orientations in the United States and noted that rural residents often express practical dependence alongside conservation awareness. In Bintulu, the paradox may stem from traditional hunting practices, such as seasonal hunting, which function as informal conservation mechanisms to ensuring wildlife populations remain viable for future generations (Bennett, 2016). These traditional practices are deeply embedded in cultural norms which promotes sustainability without formal regulation.

In contrast, urban communities in Bintulu scored lower on utilitarian and cultural/traditional values, with conservation values (M = 3.06) being more pronounced. Urban residents, who are less reliant on wildlife for subsistence, tend to adopt conservation values more strongly due to increased exposure to global environmental movements, educational programs, and media narratives that emphasize ecological sustainability (Kato et al., 2019). This urban orientation toward conservation reflects a broader trend seen in other regions. For instance, Zhang et al. (2022) found that urban residents, especially those with higher education, tend to prioritize conservation over utilitarian needs because they have less direct engagement with natural resources. This trend is consistent with studies in Southeast Asia, where urbanization is linked to a shift in priorities from resource extraction to environmental protection (Kurz et al., 2021). Urban populations are generally more removed from the direct consequences of hunting and resource use, making them more likely to emphasize long-term sustainability and ecological health over short-term material benefits (Moral, 2021).

The rural-urban divide in WVO observed in Bintulu is not unique. Sponarski et al. (2015) highlighted that rural communities in the United States tend to have stronger utilitarian and cultural/traditional values, reflecting a direct reliance on wildlife for survival, while urban communities were more likely to adopt conservation values. Similarly, the WVO framework extended to Asia and confirmed that rural populations in Southeast Asia, including Malaysia, exhibit stronger utilitarian values tied to subsistence hunting, while urban residents focus more on conservation (Lechner et al., 2021). In addition Kurz et al. (2021) observed that as communities transition from rural to urban environments in Borneo, they experience a shift away from traditional hunting practices toward more conservation oriented attitudes, as urban residents are less directly involved in wildlife utilization (Basak et. al, 2022). However, cultural/traditional values often persist even in urban areas, reflecting the resilience of cultural practices related to wildlife, even in the face of urbanization. Bennett (2016) also noted that rural communities often incorporate traditional conservation practices, such as seasonal hunting or the selective harvesting of certain species, alongside their reliance on wildlife for subsistence. This is similar to the findings in Bintulu, where rural residents exhibit both utilitarian and conservation values, indicating that sustainable practices are often rooteed within traditional knowledge and customs.

While utilitarian values dominate in rural areas due to the dependence on wildlife for food and resources, the conservation values in both rural and urban areas indicate an emerging recognition of the need for sustainable wildlife management. This growing conservation awareness can be attributed to several factors, including increased exposure to conservation education, local resource depletion, and global environmental movements. Rural communities, despite their reliance on wildlife for subsistence, are beginning to adopt practices that promote sustainability, such as regulated hunting seasons and resource sharing, while urban communities are increasingly advocating for policies that protect wildlife for future generations (Bennett, 2016; Zulauf & Wagner, 2021; Barkham, 2025).

Education and wildlife value orientation The relationship between education level and wildlife value orientations reveals that individuals with lower levels of education tend to place a greater emphasis on conservation values. Communities with primary education consistently had the highest utilitarian, cultural/traditional, and conservation values, followed by those without formal education. Communities with tertiary education had the lowest mean scores for all three values. This relationship can be explained by the communities' direct reliance on natural resources and their deeper interaction with the environment, which may foster stronger conservation practices. As education levels increase, individuals may focus less on conservation and more on abstract values, reflecting a shift in the weight placed on utilitarian and cultural/traditional values.

The lower-educated groups demonstrate a stronger attachment to conservation values, possibly because of their practical dependence on natural resources for survival. This reliance fosters an inherent need to protect and manage the environment, potentially explaining the higher conservation scores in these communities. In contrast, higher education correlates with a diminished emphasis on conservation, as individuals in these communities shift their focus to more abstract, post-materialist values like self-expression and autonomy. The results suggest that as individuals attain higher levels of education, their focus on utilitarian values decreases, and vice versa. Individuals with lower levels of education may emphasize practical, tangible outcomes more, while those with higher education might prioritize abstract or non-material considerations. Booth (2021) stated that individuals with higher education tend to adopt more post-materialist values, focusing on self-expression and intrinsic goals rather than utilitarian objectives. Similarly, Manfredo et al. (2020) suggested that education influences individuals

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to adopt more self-transcendent values, which may explain the decline in utilitarian values among those with tertiary education.

Similarly, communities shift away from cultural and traditional values as education levels increase because individuals may become less reliant on inherited cultural values for survival and are more focused on progressive or individualistic ideals. The findings align with the work of Inglehart and Welzel (2017), who argued that education often leads to the acquisition of cultural capital, shifting an individual's attachment to traditional cultural values in favor of a more global, modern, and cosmopolitan outlook. Inglehart and Welzel (2017) emphasized that higher education fosters individual autonomy and a broader worldview, which may weaken traditional cultural ties.

Interestingly, one would perceive that the higher the level of education, the more the conservation values would increase. In contrast, those with primary education and no formal education showed higher conservation values than those with a higher level of education. The finding supports the idea that communities with higher levels of education tend to shift their values away from security and conformity toward openness, self-expression, and change. Baierl et al., (2024), found that higher education encourages individuals to embrace change and innovation, often leading to a lower emphasis on tradition and security. Lechner et al. (2024) noted that education fosters openness to change and challenges authority, often leading to decreased emphasis on conservative values. Contrary to expectations, the finding that lower education correlates with higher conservation values contrasts with conventional assumptions that education fosters pro-environmental attitudes (Lechner et al., 2024). However, this aligns with studies from Malaysia, Indonesia and the Philippines, where communities with lower formal education but high dependency on natural resources demonstrate stronger practical conservation ethics rooted in traditional ecological knowledge (Karpudewan, 2021; Akhmar et al., 2023; Tumbali, 2025). Indigenous communities, often characterized by lower levels of formal education, show strong commitments to environmental stewardship, guided by traditional ecological knowledge (Sinthumule, 2023). Despite lower education, these communities maintain robust conservation practices, highlighting the connection between practical environmental management and education. Gómez-Baggethun et al. (2013) argue that indigenous knowledge systems, deeply tied to local ecosystems, foster sustainability and conservation (Sinthumule, 2023). These findings support the argument that lower education correlates with stronger conservation values due to a practical and direct relationship with nature.

The inverse relationship between education and conservation values warrants a deeper analysis, particularly considering the theories of post-materialism, where individuals with higher education prioritize self-expression, autonomy, and abstract goals (Peterson & Tollefson, 2024). Kilbourne et al. (2005) and suggest that higher education fosters post-materialist values, which decrease the emphasis on practical concerns like conservation. This could explain why tertiary-educated communities score lower in conservation values–they may prioritize broader social and personal freedoms over environmental conservation (Peterson & Tollefson, 2024).

Lower-educated groups, on the other hand, often have a more intimate connection with their environment due to their direct dependence on natural resources for survival. This dependency can foster stronger conservation values, as preserving the environment becomes a practical necessity. The conservation value orientation in these settings is not merely ideological but a survival strategy, highlighting the need for practical management of natural resources.

Berkes and Turner (2022) emphasizes that cultural capital, shaped through direct experience with the environment rather than through formal education, plays a crucial role in developing conservation values. In lower-educated communities, traditional ecological knowledge passed down through generations plays a central role in fostering environmental stewardship. This cultural transmission helps maintain strong conservation values, even in the absence of formal education.

Age and wildlife value orientation The study revealed that younger individuals, notably those aged 18–29, scored significantly lower on utilitarian and conservation values than other age groups. The results indicate that the younger generation places less importance on the practical use of wildlife for subsistence. This perspective may be shaped by broader global conservation movements and a less direct dependence on wildlife resources. In contrast, older age groups, especially those aged 40–49 and 50 years and above, exhibited a stronger connection to utilitarian values due to their historical reliance on wildlife for survival, cultural practices, and economic needs. Interestingly, the same age group (aged 40–49 and 50 years and above) holds significantly stronger conservation values than younger individuals (aged 18–29). The difference between the different age groups for the Utilitarian and conservation orientations may be attributed to their more substantial connection to traditional resource use and experience of the environmental consequences of resource depletion (Kgomo & Modley, 2022; Rai & Mishra, 2023). However, younger individuals, particularly those aged between 18 and 29, were more conservation-oriented, possibly influenced by global environmental movements and education (Manfredo et al., 2009; Sponarski et al., 2015; Manfredo et al., 2017).

Unlike the utilitarian and conservation values, cultural/traditional values towards hunting showed no significant difference across the different age groups, $F = 1.75$, p-value = 0.156. This suggests that Bintulu communities adhere to their traditional beliefs and practices related to wildlife, including hunting and the ritualistic use of wild animals as well as holding on to conservation value. Although cultural and traditional values may be lower than other values across all age groups, cultural ties are still ingrained and may remain relatively stable across generations, even as different values, such as utilitarianism and conservation evolves. This suggests that cultural traditions may be more deeply ingrained and less subject to generational shifts, particularly in regions like Sarawak, where cultural practices are closely tied to community identity and social norms (Andaya & Andaya, 2017).

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Conclusion

Communities in Bintulu, Sarawak scored moderate utilitarian, cultural/traditional, and conservation/protection value toward wildlife hunting. Despite the moderate stance, they tend to lean towards conservation/protection value, demonstrating sustainable practices have been grounded in the utilization of wildlife for their consumption, cultural and traditional needs. The results also reveals significant demographic variations in attitudes toward wildlife hunting have been grounded in the utilization of wildlife for their consumption, cultural and traditional needs. Rural, older, and less-educated individuals tend to prioritize utilitarian and cultural/traditional practices, while younger, urban residents exhibit stronger conservation values. This shift highlights a growing emphasis on environmental protection, especially among urbanized and younger populations. The findings suggest the importance of developing conservation strategies tailored to different demographic groups, respecting cultural traditions while encouraging more environmentally conscious practices. It is crucial to create conservation initiatives that align with these diverse value orientations to achieve long-term sustainability. To effectively address these needs, conservation strategies should be customized based on demographic factors such as gender, education, and residency. Rural communities and older generations, who continue to hold strong utilitarian and cultural/traditional values, may benefit from strategies that integrate cultural practices like seasonal hunting and communal sharing of resources. In contrast, younger and urbanized individuals should be engaged through targeted education programs focused on the ecological impacts of human-wildlife interactions. Schools, social media platforms, and community outreach initiatives could serve as key channels for raising awareness among urban youth. Additionally, integrating wildlife conservation topics into school curriculums from an early age would foster long-term environmental awareness and responsible behavior. Legal and regulatory frameworks should also be updated to reflect evolving conservation needs. The Sarawak Wild Life Protection Ordinance 1998 could be amended to introduce clearer criteria for sustainable wildlife populations, ensuring that hunting remains permissible only when species are not at risk. Regulations should also define acceptable hunting practices, including issuing permits, monitoring wildlife populations, and establishing penalties for violations. These legal updates would help balance cultural traditions with modern conservation goals, enabling sustainable hunting practices that do not compromise biodiversity. Furthermore, community involvement is vital for ensuring effective wildlife management. Strengthening local groups like the Honorary Wildlife Rangers can enhance wildlife monitoring and the enforcement of protection laws. To empower these groups, the government should provide financial support, training, and resources to ensure they are equipped to carry out their roles effectively. This support will help reinforce the role of communities in sustainable wildlife management, fostering collaboration between government and local populations. Finally, future research should expand its scope to include a wider range of communities across Sarawak and other regions to better understand the cultural, social, and economic drivers of WVO. Longitudinal studies could offer valuable insights into how these orientations evolve over time, especially in response to shifts in education, urbanization, and growing conservation awareness. This would provide a more comprehensive understanding of how to foster long-term, sustainable wildlife conservation efforts in diverse cultural contexts.

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