Taiwania 70(1): 156–170, **2025**
DOI: 10.6165/tai.2025.70.156

Assessment of conservation benefits of ecotourism in secondary forest ecosystems using PD-ZTCM-WTP in Mt Yangbew, Benguet, Philippines

Allen Rey S. POTINGAN[1], Collen C. COIS[1], Remo M. BASILIO[1], Jones T. NAPALDET[2,*]

1. *Department on Environmental Science, Benguet State University, La Trinidad, Phillipines.* ***2.*** *Biology Department, Benguet State University, La Trinidad, Phillipines.* [*]*Corresponding author's email: j.napaldet@bsu.edu.ph*

(Manuscript received 15 July 2024; Accepted 9 February 2025; Online published 14 February 2025)

ABSTRACT: The study developed the PD-ZTCM-WTP Protocol for quantifying ecotourism benefits in secondary forest sites using Mt. Yangbew as a study case. The protocol consists of three major components namely plant diversity (PD), Zone Travel Cost Method (ZTCM) and willingness to pay (WTP) corresponding respectively to measurement of environmental protection, economic benefits and psychosocial benefits. Using the protocol, a total of 120 plant species under 101 genera and 54 families were identified in Mt. Yangbew with mostly native species but were generally the common/least concern type with only few conservation important species. Nonetheless, the relatively high species richness of plants in the area could be attributed to its protection from the annual bush fires that were prevalent before its inception as ecotourism site in 2020. In terms of economic value, tourisms in Mt. Yangbew is estimated at Php 5,558,974.55 for the year 2023 with Zone 1 (nearest zone) contributing the bulk of visits and the corresponding economic value. Majority of the visitors are satisfied with their visits and are willing to pay additional fee for the site's continuous protection and improvement. Their satisfaction is mostly based on the scenic view, natural landscape, trail quality and the solitude that the mountain site offers. The conduct of this protocol for the first time would serve as baseline data and its successive conduct, eg. every 3-5 years, could readily quantify the claimed benefits of ecotourism in secondary forest ecosystem.

KEY WORDS: plant diversity, quantification of ecotourism benefits, Benguet, Zone Travel Cost Method, willingness to pay.

INTRODUCTION

Ecotourism is commonly viewed to be highly compatible with conservation as it contributes a number of important benefits, including revenue generation, support for conservation, and educational opportunities for visitors and local communities (Shannon *et al*., 2017). These activities provided visitors the chance to explore the natural world, to gain an appreciation and understanding of diverse habitats and native species, while also lending financial and political support for their continued protection. The amount spent on ecotourism is estimated to be 10 times more than that spent by official aid agencies and the UN Global Environment Facility on conservation projects (Waldron *et al*., 2017). Ecotourism accounts for as much as 40% of gross domestic product (GDP) in some countries and is growing 10% per year in other countries (WTTC, 2014). Despite this major investment, there is limited empirical evidence that ecotourism achieves biodiversity conservation goals in the long term and at the landscape scale.

In a recent review conducted by Samal and Dash (2023), the overall publication trend in ecotourism is growing. Majority of ecotourism researches are being conducted in developing nations that highlighted their struggle in managing their resources and insufficient evidence base for the actual functioning of ecotourism. Moreover, only few ecotourism studies have considered the importance of good governance, the role of tour guides, and the impact of psychosocial, technical, and political factors as well as the issue of climate change and carbon footprints. Additionally, the empirical evidences on the conservation effects of ecotourism were mostly documented in protected primary forest. These include the studies of Brandt *et al*. (2019) in Himalayan biodiversity hotspot, Broadbent *et al*. (2012) in Manuel Antonio, Costa Rica, Pickering and Hill (2007) in protected areas in Australia, and Zarghi and Hosseini (2014) in Tandurah National Park, Iran.

However nowadays, several destinations with secondary forests are being offered for ecotourism with no baseline studies. Guron *et al*. (2022) lamented the fact that only few empirical studies are available in developing nations which makes ecotourism planning as more of a guesswork. This highlights the need to conduct more empirical studies in ecotourism sites in the tropics that could indicate the actual effects of ecotourism, particularly in understudied ecotourism sites like secondary forests.

Ecotourism activities do not just affect the physico-chemical environment but also the socio-cultural aspect of both the locals and tourist alike (Shang *et al*., 2023). However, ecotourism studies in developing countries often limit their methods and coverage to purely physico-chemical aspect or the socio-cultural aspect only without considering the interplay of these aspect and their methods. For example, in the Philippines, literature review on ecotourism studies in the past decades showed that majority focused on perceptions or contingent valuation and few on biodiversity aspects. In terms of methodology, the national government have recommended

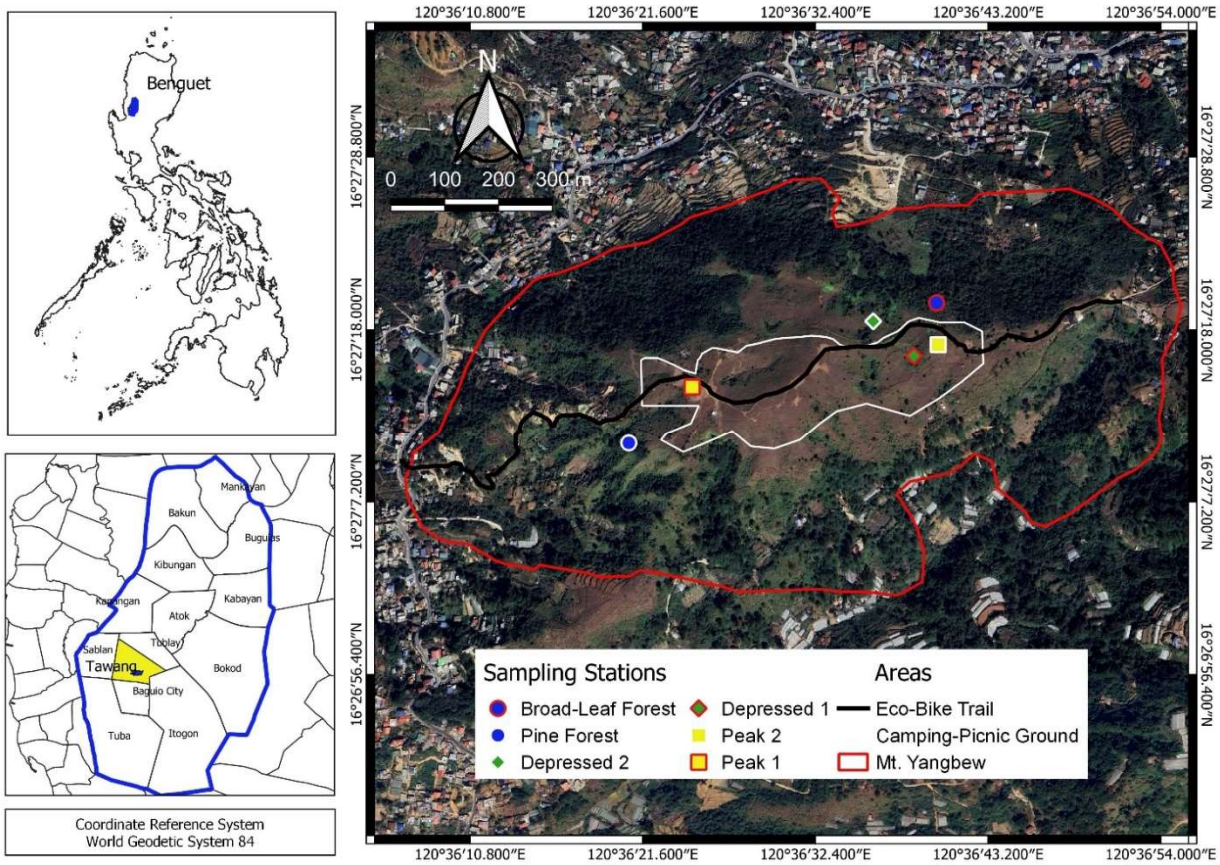

Fig. 1. The sampling stations in Mt. Yangbew, La Trinidad

methods for biodiversity assessment by DENR and recommended framework for ecotourism economic valuation by NEDA. However, there is need to develop a more integrative and specific protocol that would combine the general principles from these national protocols for more direct measurement of ecotourism benefits, particularly for secondary forest ecosystems.

This makes the case of Mt. Yangbew in Benguet, Philippines interesting. The study aims to present its plant diversity, economic valuation and the willingness to pay as part of status report and to encourage the build-up of baseline information on ecotourism sites with secondary forests. Such information, if done successively would build-up the data showing the quantitative benefits of ecotourism in secondary forest sites. Hence, in this study, we would be recommending these as the standard baselining and monitoring protocol for secondary forest ecotourism sites.

MATERIALS AND METHODS

Ecotourism Studies from 2004-2024

We reviewed published studies on ecotourism in the Philippines from 2004–2024. These were analyzed thematically based on their major topic and major findings. Thematic analysis is a comprehensive process of cross-references data from several researches to determine the prevailing and evolving themes (Alhojailan, 2012). It provides flexibility for approaching research patterns in two ways, i.e. inductive and deductive making the process more appropriate for analyzing and determining the relationship between variables and to compare different sets of evidence that pertain to different situations within the same topic (Halldorson 2009; Niece, 2011). From these, trends and data gaps were identified. Needed improvements in ecotourism studies were identified and applied in this study.

Study Site

With a height of 1648 masl, Mt. Yangbew is the tallest mountain in La Trinidad, Benguet that has developed into a popular location for both local hikers and visitors travelling from Baguio City, which is just about 10 km away. The mountain site is also dubbed as the "Little Pulag" of La Trinidad since several of its locations are similar to those on Mt. Pulag such as the "sea of clouds" scenery which one can see before sunset, and it's the same large, grassy summit with magnificent views of the dawn and sunset. In addition to mountain climbing, Mt. Yangbew also offers opportunities for motorcycling and equestrian riding.

Before the ecotourism activities, this mountain site is just a pastureland annually grazed by bush fires. But upon its offering as ecotourism site in 2020, the site now is protected from the annual fires. Three types of vegetation are now observed in the site such as grassy summit, shrub patches in depressed slopes, the secondary pine forest in the southeast slope and secondary lowland evergreen forest in the northwestern slope. The sampling stations for plant diversity were conducted in these major vegetation (Figure 1). Below the mountain sites are the residential areas.

Developing the PD-ZTCM-WTP Protocol

Three major benefits are usually associated with ecotourism namely environmental protection, economic benefits and psychosocial benefits. To capture these, the study introduces the PD-ZTCM-WTP Protocol (Plant Diversity – Zone Travel Cost Method – Willingness to Pay) for quantifying these benefits in secondary forest ecotourism sites using Mt. Yangbew as case study. These include plant diversity inventory as indicator of environmental protection, zone travel cost method for economic valuation and willingness to pay for psychosocial benefits. The details and justification for these parameters are explained in the following sections.

Plant Diversity Sampling. Plant diversity is the usual base of major food webs and thus its conservation and improvement lead to corresponding improvement in the overall biodiversity and ecosystem functions/ environmental services. Thus, the improvement of plant diversity in ecotourism sites through time could be direct way of quantifying the conservation benefits of ecotourism. The plant diversity of Mt. Yangbew was analyzed using several ecological measures such as importance value (IV) and biodiversity indices using nested plot method adopted from Guron *et al*. (2019) and Balangen *et al*. (2023). Sampling stations were identified based on major vegetation in the area namely grassland, scrubland and forest. For the grassland summit, two sampling stations were established with 10 1×1 m plot each. On other hand, three 5×5 plot for shrubs and six 1x1 m plot for ground vegetation were used. For the forest stations, three nested plots were utilized with each nested plot having one 20×20 m plot for trees, two 5×5 for shrubs and three 1×1 m plot for ground vegetation. IV assesses species dominance in a specific forest area. This nested plot method is a modification from the national standard one 20×20 m for trees, one 5×5 for shrubs and one 1×1 for herbs (Biodiversity Management Bureau, 2017) wherein we added additional shrub and herb plots for more balance inventory. Additionally, the endemicity and conservation importance index developed by Bullong *et al*. (2024) were employed.

Economic Valuation. The study adopted the Zone Travel Cost Method (ZTCM) by von Grünigen (2016) which is the standard quantitative valuation method for ecotourism sites. This method involves counting and grouping the tourist/ visitors into major zones where they came from. Data needed for this method are travel time (hrs), travel distance (km), admission cost, visit per year and average wage rate. These information could be readily determine from the visitor's logbook of many tourism sites which is often the only available information in many newly established ecotourism sites, highlighting the efficient simplicity of ZTCM. To calculate the value of the asset (V) of Mt. Yangbew, the following equation was used:

$$V = \big((T \times W) + (D \times v) + Ca\big) \times Va$$

Where,
T = travel time (in hours)
w = average wage rate (Php/hour)
D = distance (in km)
v = marginal vehicle operating costs
Ca = cost of Admission to asset
Va = average number of visits per year

Willingness to Pay (WTP). The usefulness and theological principle of WTP is well founded and had been used in several ecotourism studies due to its ability to capture important information not covered by traditional economic valuation like psychosocial motivation and benefits to tourist (Abansi, 2012; Hultman *et al*. 2015). The study used the contingent valuation method or CVM to determine and characterize the WTP. The contingent valuation method is a survey-based economic technique for the valuation of non-market resources, such as environmental preservation or the reduction of externalities (Carson, 2000; Whitehead and Taab, 2023). It was also one of the few available methodologies able to capture all types of benefits from a non-market good or service, including those unrelated to current or future use, thereby making it applicable to almost all non-market goods because of its hypothetical nature and non-reliance on existing markets (Jin, 2014).

The study used random sampling in gathering 200 respondents from December 2023 to May 2024. This number was based from the recommendation of Morse (2000) wherein semi-structured interviews like CVM typically involves 60 or more participants to yield a small amount of data per question in order to obtain sufficient data richness for qualitative analysis. Some ecotourism studies have also used 200 respondents or less like Navrud and Vondolia (2005), Samdin (2008), Yacob *et al*. (2009) and Surendran and Sekar (2010). The participants were administered questionnaires covering various aspects of their interaction with Mt. Yangbew. These included socio-demographic information, primary activities during visits, aspects of Mt. Yangbew that influenced their visits, transportation methods used, and total travel expenditures. Additionally, participants were asked to rate the impact of Mt. Yangbew's scenery on their well-being and their satisfaction with the services offered. Furthermore, participants were queried about their willingness to pay

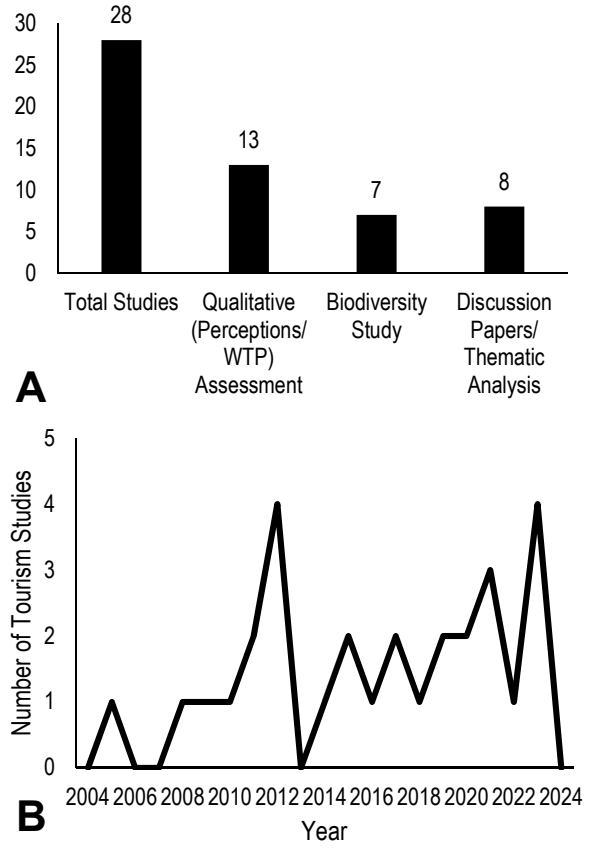

Fig. 2. Status of published tourism-related studies in the Philippines from 2004-2024. **A.** Number of ecotourism studies by topic; **B.** number of ecotourism studies by year.

additional fees (in specified amounts of Php 10, 15, and 20) to support park preservation and maintenance. In cases where participants were open to contributing more than 20 pesos, they were asked to specify their maximum amount. Subsequently, participants were asked to explain their reasons for either willingness or unwillingness to pay.

RESULTS

Ecotourism Studies in the Philippines from 2004 – 2024

A total of 28 studies related to tourism in the Philippines from 2004–2024 were gathered and reviewed (Figure 2; Table S1). Majority of these studies are qualitative in nature regarding perceptions (13 studies) and thematic analysis (8) on the status, potential and the things needed to improve on Philippine tourism. On the other hand, seven studies focused on biodiversity of certain tourism sites in the country, mostly on its plant diversity. The qualitative studies showed the high knowledge and appreciation of stakeholders on the economic and ecological benefits of ecotourism. This was supported by the thematic/ discussion papers showing the high but still not fully-tapped potential of ecotourism in the country. Majority of the local respondents' focus on ecotourism is its economic benefits while environmental protection is only secondary but was nonetheless protected as shown by the high plant diversity in the studied ecotourism sites. Additionally, one encouraging indicator on the positive effects of the ecotourism is the protective function of the lack of interest of tourist to handle delicate biodiversity rather than learning how to do it. This led to less disturbance and giving time for biodiversity to regenerate rather than being handle most of the time.

In Figure 2B, the number of ecotourism studies are trending upward particularly from 2021–2023. In 2004–2008, only two studies were recorded then slowly increased to eight in 2009–2012 and six in 2013–2018. This shows the increasing number of ecotourism studies in the country but this increase may not accurately and adequately represent the increasing number of ecotourism sites in the country. It could also be readily observed among the ecotourism studies that these are mostly single-disciplined, either focusing on perception or biodiversity with no attempt done to integrate the biophysical and social dynamics of ecotourism. These highlight the need to develop standards on quantification of tourism benefits in the Philippines and other tropical countries.

Plant Diversity of Mt. Yangbew

A total of 120 species under 101 genera and 54 families were identified in Mt. Yangbew, Benguet, Philippines. Of these, majority are dicot (83) with some monocot (21), pteridophytes (15) and one gymnosperm (Figure 1). In terms of distribution, majority are indigenous (81) with some endemic (18), naturalized (17) and few exotic species (4). Amongst these, only 11 species of conservation importance with three endangered, four vulnerable, one near threatened and three other threatened species while majority are unassessed (Figure 2).

The most represented families in ground vegetation are Poaceae and Asteraceae both in species richness and individuals (Figure 3A). On the other hand, the most represented families in the understory are Euphorbiaceae (5), Moraceae (6), Phyllanthaceae (5) and Rubiaceae (4) but still the tall grasses Poaceae dominate in terms of number (Figure 3B). In terms of overstory vegetation (trees), Euphorbiaceae and Phyllanthaceae have the highest number of species with three each but *Pinus kesiya* of Pinaceae dominate in terms of number (Figure 3C).

Overstory vegetation was only recorded in the pine and broad leaf forest with 14 and 13 species each while both understory vegetation (tree sapling, shrubs and large grasses) were recorded in the forest and depression stations ranging at 18–27 species (Figure 4A). On the other hand, only ground vegetation (herbs/grasses) were recorded in peak station with the highest number individuals (Figure 4B) while the species richness is comparable with ground vegetation under depression and forest stations at 16–26 species.

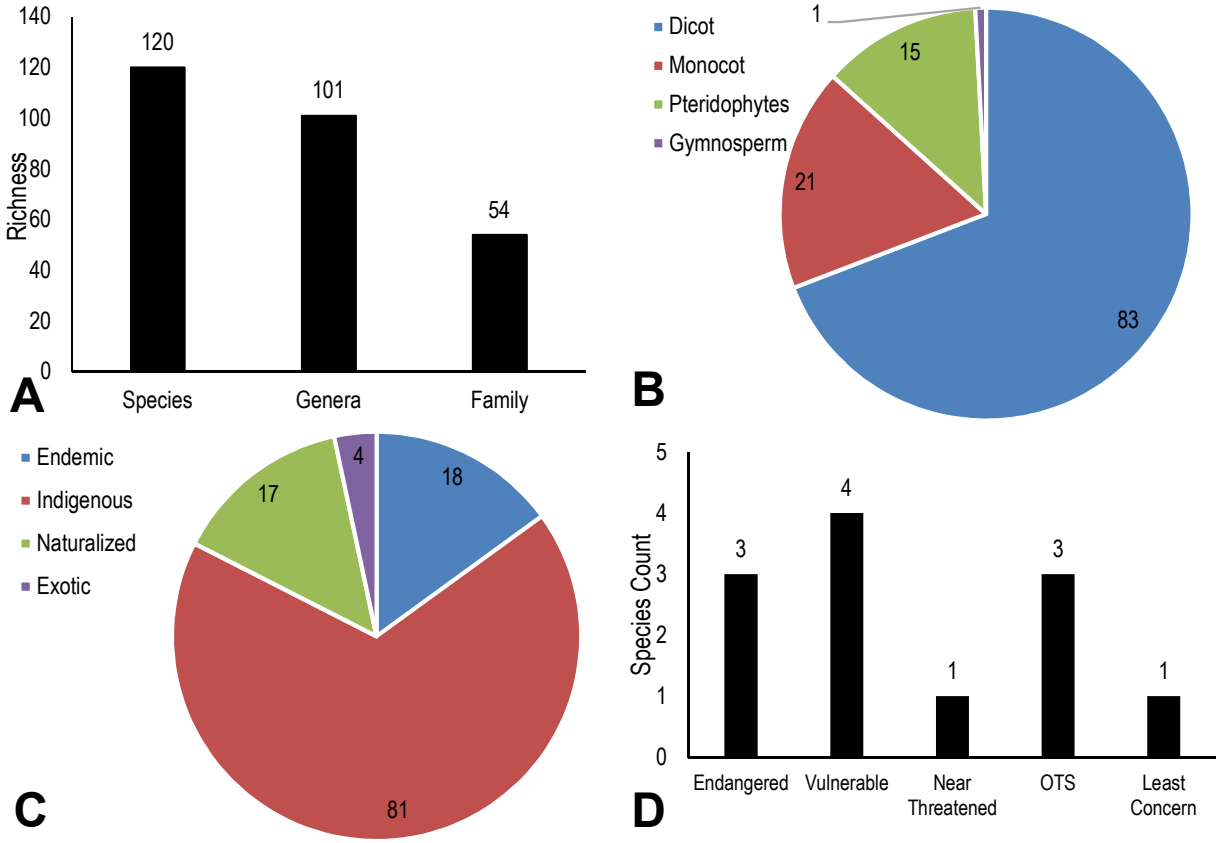

Fig. 3. Plant diversity in Mt. Yangbew, Benguet, Philippines (**A.** Plant richness; **B.** major plant groups; **C.** distribution category; **D.** conservation status).

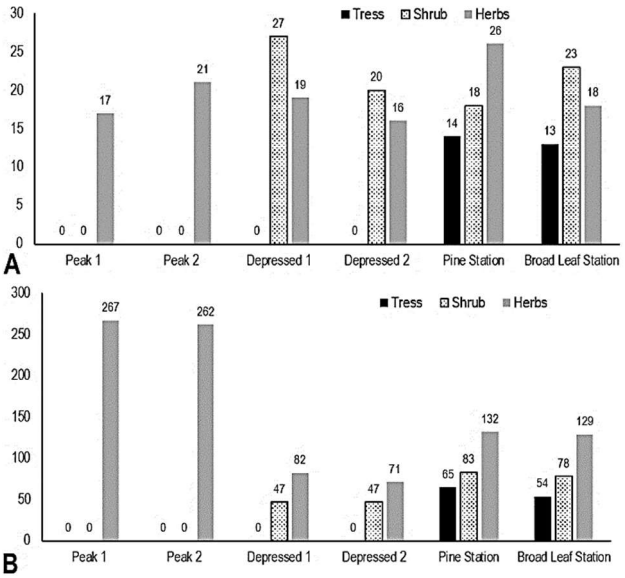

Fig. 4. Richness and Population Counts in the Sampling Stations of Mt. Yangbew, Benguet, Philippines (**A**. species richness; **B**. total abundance)

The peak stations were mostly dominated by grasses such as *Ottochloa nodosa*, *Themeda triandra* and *Imperata cylindrica* (Table 1) while the ground vegetation in depression and forest stations were dominated by *Ageratina riparia*. Under forest stations, *A. riparia* is co-dominant with plants characteristics of dry conditions such as *Pteridium aquilinum* and *Elephantopus tomentosus* while under depression stations, shade loving plants such as *Alpinia flabellata, Ageratina adenophora, Coniogramme macrophylla* and others were interspersed with *A. riparia*.

In terms of understory vegetation, the depression stations were dominated by tree saplings such as *Eurya chinensis, Bischofia javanica, Ficus septica* and *Cinnamomum mercadoi* interspersed with shrub species like *Viburnum luzonicum*, *Deutzia pulchra, Maesa indica* and *Leea manillensis*. On the other hand, the understory in forest stations were dominated by tall grasses like *Miscanthus floridulus* interspersed with tree saplings and shrubs. In terms of overstory vegetation, the pine forest is thoroughly dominated by *Pinus kesiya* with few interspersed broad leaf species while the same broad leaf species (*Ficus benguetensis*, *Homalanthus fastuosus*, *Mallotus mollissimus,* among others) were the dominant trees in broadleaf forest.

The biodiversity indices of Mt. Yangbew were presented in Figure 5A. The Shannon index ranged at 1.92 – 3.37 with increasing trend from peak stations to

Table 1. Dominant ground, understory and overstory vegetation in Mt. Yangbew, Benguet, Philippines.

Sampling Stations	Dominant Species	Ni	IVi	Distribution
Dominant Ground Vegetation				
Peak 1	*Ottochloa nodosa* (Kunth) Dandy	102	29.97	Native
	Themeda triandra Forssk.	50	19.15	Native
	Pteridium aquilinum (L.) Kuhn	47	17.50	Naturalized
Peak 2	*Imperata cylindrica* (L.) Raeusch.	56	18.06	Introduced
	Ottochloa nodosa (Kunth) Dandy	52	17.30	Native
	Themeda triandra Forssk.	50	16.10	Native
Depression 1	*Ageratina riparia* (Regel) R. M. King & H. Rob	32	28.89	Naturalized
	Alpinia flabellata Ridl.	8	8.00	Native
	Pteridium aquilinum (L.) Kuhn	5	6.17	Naturalized
	Ageratina adenophora (Spreng.) R.M.King & H.Rob.	5	6.17	Introduced
	Poikilospermum suaveolens (Blume) Merr.	5	6.17	Native
	Coniogramme macrophylla (Blume) Hieron.	5	6.17	Native
Depression 2	*Ageratina riparia* (Regel) R. M. King & H. Rob	24	26.89	Naturalized
	Pteridium aquilinum (L.) Kuhn	10	13.04	Naturalized
	Pseudelephantopus spicatus (Juss. ex Aubl.) C.F.Baker	5	9.52	Introduced
Pine Forest	*Ageratina riparia* (Regel) R. M. King & H. Rob	54	28.62	Naturalized
	Pteridium aquilinum (L.) Kuhn	12	14.23	Naturalized
	Elephantopus tomentosus L.	9	6.47	Introduced
Broadleaf Forest	*Ageratina riparia* (Regel) R. M. King & H. Rob	41	25.08	Naturalized
	Ageratina adenophora (Spreng.) R.M.King & H.Rob.	20	15.92	Naturalized
	Ottochloa nodosa (Kunth) Dandy	19	11.44	Native
Dominant Understory Vegetation				
Depression 1	*Eurya chinensis* R.Br.	3	6.32	Native
	Bischofia javanica Blume	3	6.32	Native
	Viburnum luzonicum Rolfe	3	6.32	Native
	Leea manillensis Walp.	3	6.32	Native
	Maesa indica (Roxb.) Sweet	4	5.82	Native
	Ficus septica Burm.f.	4	5.82	Native
	Cinnamomum mercadoi S.Vidal	2	5.25	Native
Depression 2	*Melastoma malabathricum* L.	6	11.94	Native
	Miscanthus floridulus (Labill.) Warb. ex K.Schum. & Lauterb.	7	11.15	Native
	Ficus septica Burm.f.	5	9.03	Native
	Deutzia pulchra S.Vidal	5	9.03	Native
Pine Forest	*Miscanthus floridulus* (Labill.) Warb. ex K.Schum. & Lauterb.	26	24.49	Native
	Maesa indica (Roxb.) Sweet	13	13.72	Native
	Mnesithea laevis var. *cochinchinensis* (Lour.) de Koning & Sosef	8	7.76	Native
Broadleaf Forest	*Miscanthus floridulus* (Labill.) Warb. ex K.Schum. & Lauterb.	18	18.20	Native
	Maesa indica (Roxb.) Sweet	10	10.86	Native
	Deutzia pulchra S.Vidal	8	9.57	Native
Dominant Overstory Vegetation				
Pine Forest	*Pinus kesiya* Royle ex Gordon	35	53.23	Native
	Mallotus mollissimus (Geiseler) Airy Shaw	5	8.98	Native
	Ficus benguetensis Merr.	3	5.44	Native
Broadleaf Forest	*Ficus benguetensis* Merr.	13	23.51	Native
	Deutzia pulchra S.Vidal	9	11.89	Native
	Homalanthus fastuosus (Linden) Fern. Vill.	9	11.25	Native

depression to pine and highest in broad-leaf station. In fact, the linear trend was good with r^2 value of 78%. The peak stations were of low diversity while the depression and forest stations were of high diversity. Additionally, the endemicity and conservation importance indices were presented in Figure 5B. Endemicity indices ranged at 42–54 following the same trend with those observed in Shannon index (peak<depression<pine<broad leaf stations). These values indicated the presence of predominantly native species in the area, thus the need for management and conservation efforts. However, the conservation-importance indices were low at 1.25–9 following the same trend with those observed in Shannon index (peak<depression<pine<broad leaf stations). A significant linear trend with r^2 value of 82% was observed indicating increasing number of conservation important

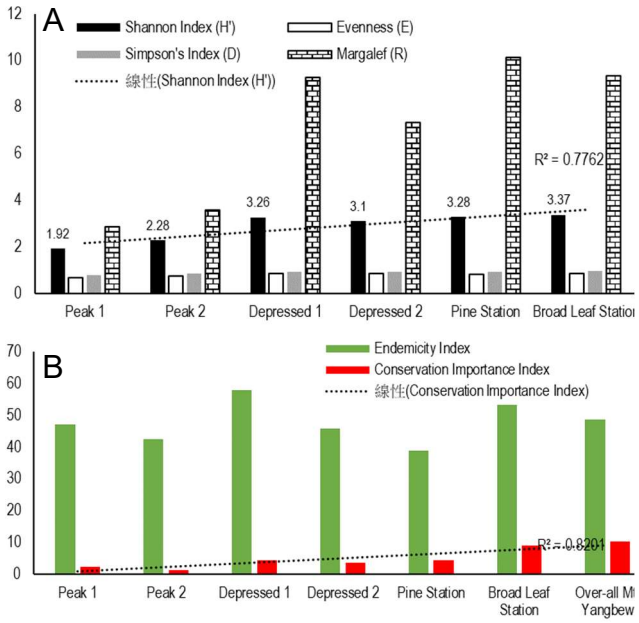

Fig. 5. Biodiversity indices of Mt. Yangbew, Benguet, Philippines (**A**. generic biodiversity indices; **B**. specific-area indices namely endemicity and conservation importance indices adopted from Bullong *et al.* (2024))

species from peak to depression to broad leaf stations. Nonetheless, these values would indicate the area is not priority for conservation due to low presence of conservation important species.

Economic Valuation of Mt. Yangbew as Ecotourism Destination

The economic valuation of Mt. Yangew based from tourist visits were presented in Figure 6. The tourists were cluster into four zones based primarily from the distance of their origin/residence to Mt. Yangbew. These zones were visualized in Figure 6A. Zone 1 has a travel time of 30 minutes and a travel distance of 7 kilometers, followed by Zone 2 with a travel time of 1 hour and a distance of 10 kilometers. Zone 3 had a travel time of 2 hours and a distance of 20 kilometers, while Zone 4 required 4 hours or more of travel time and had a distance exceeding 40 kilometers.

During 2023, the admission fee at Mt. Yangbew was set at Php 50, a fixed price established by Barangay Tawang, which was then responsible for managing the mountain. This fee, collected as an environmental fee, contributed to various management tasks such as garbage cleanup, providing tour guides, and visitor registration. It's worth noting that ecotorurism management of the mountain was only transferred to its owners in December 2023.

Zone 1 emerged with the highest population count of 13,563, attributed to its proximity to the study site. This resulted in Zone 1 having the highest zone value, totalling Php 2,781,296.60. Zone 2 followed with a zone value of Php 1,719,223.55, Zone 4 with Php 590,663.80, and Zone 3 with Php 467,790.60. Cumulatively, the four zones contributed to a total zone value of Php 5,558,974.55 which represents the estimated asset value of Mt. Yangbew based on ZTCM.

Willingness to Pay for Conservation and Management

Demographic Profile of the Respondents. Majority of respondents were youth aged 21-30 years old, comprising 52% of the sample size (Figure 7) followed by teenagers (aged 20 and below) comprising 39%. The ages of the respondents ranged from 14 to 60 years old, with 19 years old having the highest individual frequency at 33 counts. Male respondents predominate, totaling 113 individuals (56.5%), with 87 females. In terms of civil status, single individuals were the majority at 88.5% while married individuals at 11.5% (23 respondents). Regarding educational attainment, the largest group consists of college students at 66.5%, followed by high school students at 17% and post-graduates at 13%. The respondents primarily hail from La Trinidad municipality comprising 61.5%, followed by Baguio City at 26.5%, Tublay at 5.5% and few others from farther municipalities/provinces. Majority of respondents (77%) have a monthly income below Php 10,000, which correlates with their educational status as many were still students.

Tourist Visitation Profile. The tourist visitation profile of the respondents were presented in Table 2. Among them, 31.5% visited Mt. Yangbew for the first time, while 68.5% had already visited once (57.66%), twice (20.44%) or more (8.76%). The highest number of visits reported in a year was 10, recorded by 1 respondent, followed by 8 visits by 2 respondents and 6 visits reported by 3 respondents. Public transportation was the most utilized, accounting for 71.5% due to fact that majority of the tourists were from La Trinidad and Baguio City, areas close to Mt. Yangbew. Private vehicles were used by 16% followed by walking (9%), and biking (3.5%). In terms of group size, pairs were the most common with 27.5%, followed by groups of 3 (19.5%) and groups of 4 with 12.5%. The smallest groups were individuals visiting alone at 8.5% while the largest group consisted of 13 individuals accounting 6.5% of the respondents.

Regarding travel expenses, 74% reported total costs below Php 500, 13% spent between Php 501 and Php 1000, 7.5% spent between Php 1001 and Php 1500, and 5.5% had expenses exceeding Php 1500. The lowest recorded travel cost was Php 100, while the highest was Php 5000. The primary activities being done in Mt. Yangbew were picture taking (100%) and walking/hiking (96%) followed by running, picnic, horseback riding, others, and mountain biking at 63.5%, 49%, 27%, 12% and 7.5%, respectively. Regarding the characteristics of Mt Yangbew prompting their visit, all respondents (100%) cited the panoramic view from the site while 91% mentioned the over-all natural resources of the site and

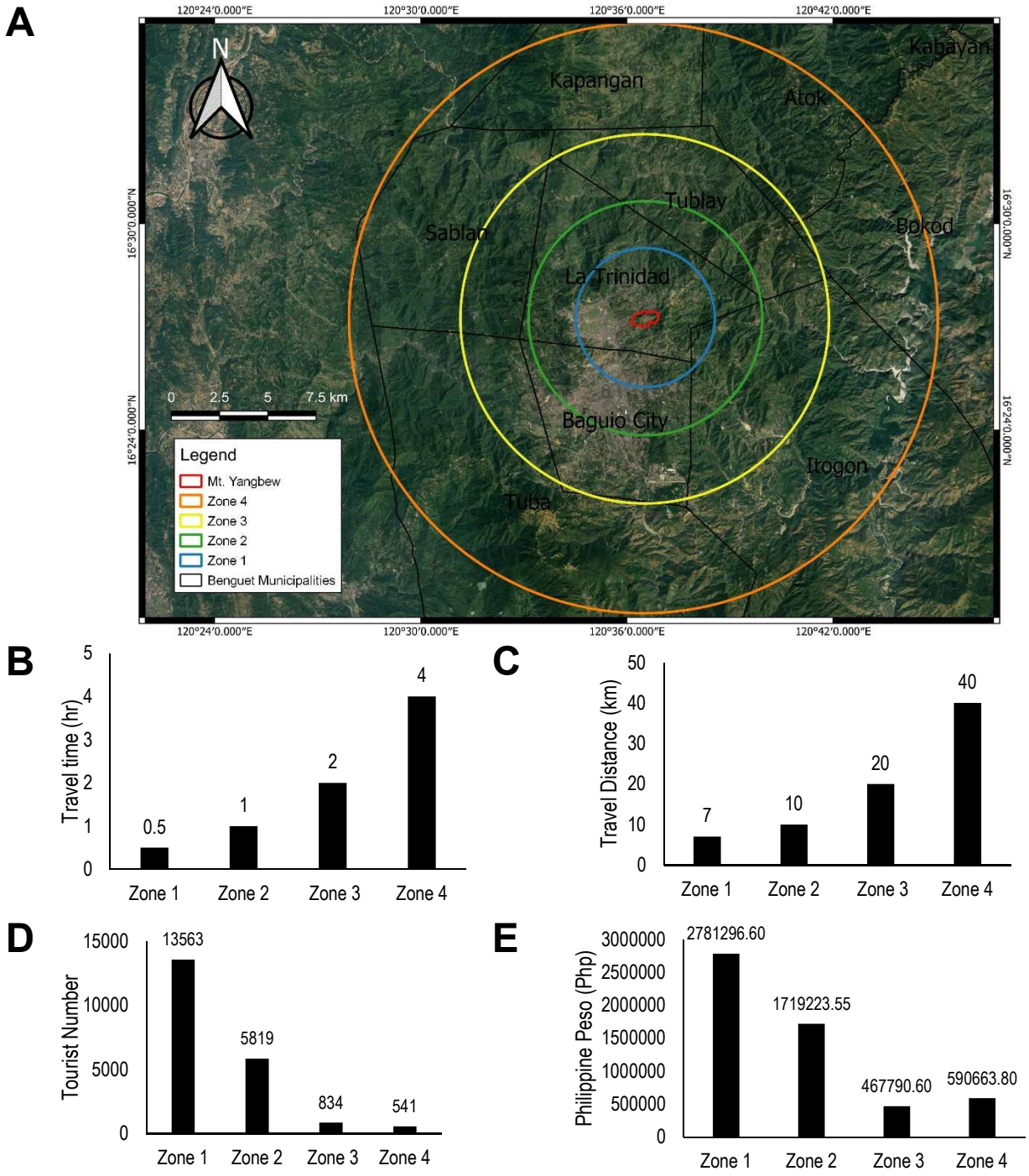

Fig. 6. Economic Valuation of Mt. Yangbew, Benguet, Philippines (**A**. visual representation of the four zones clustering the point of origin of visitors; **B**. travel of time per zones; **C**. travel distance per zone; **D**. tourist number per zone; **E**. estimated economic cost per zone).

87.5% noted its proximity to their residence. Additionally, 69.5% like the lack of congestion, 39% the "trail length and 32% indicated the solitude in the area.

Majority (92%) of the tourist visitors had positive impact from visiting Mt. Yangbew while 4.5% reported no impact, and 3.5% were unsure of the view's effect on their well-being. Consequently, majority (85.5%) of the respondents rated their satisfaction as high, 11% as moderate and 3.5% as low.

Willingness to Pay (WTP). Out of 200 respondents, majority (91.5%) expressed their willingness to pay an extra Php 10, while 17 (8.5%) were unwilling. Among the willing participants, 80.33% were willing to pay Php 15, 72.11% were also willing to pay Php 20 and 41% were

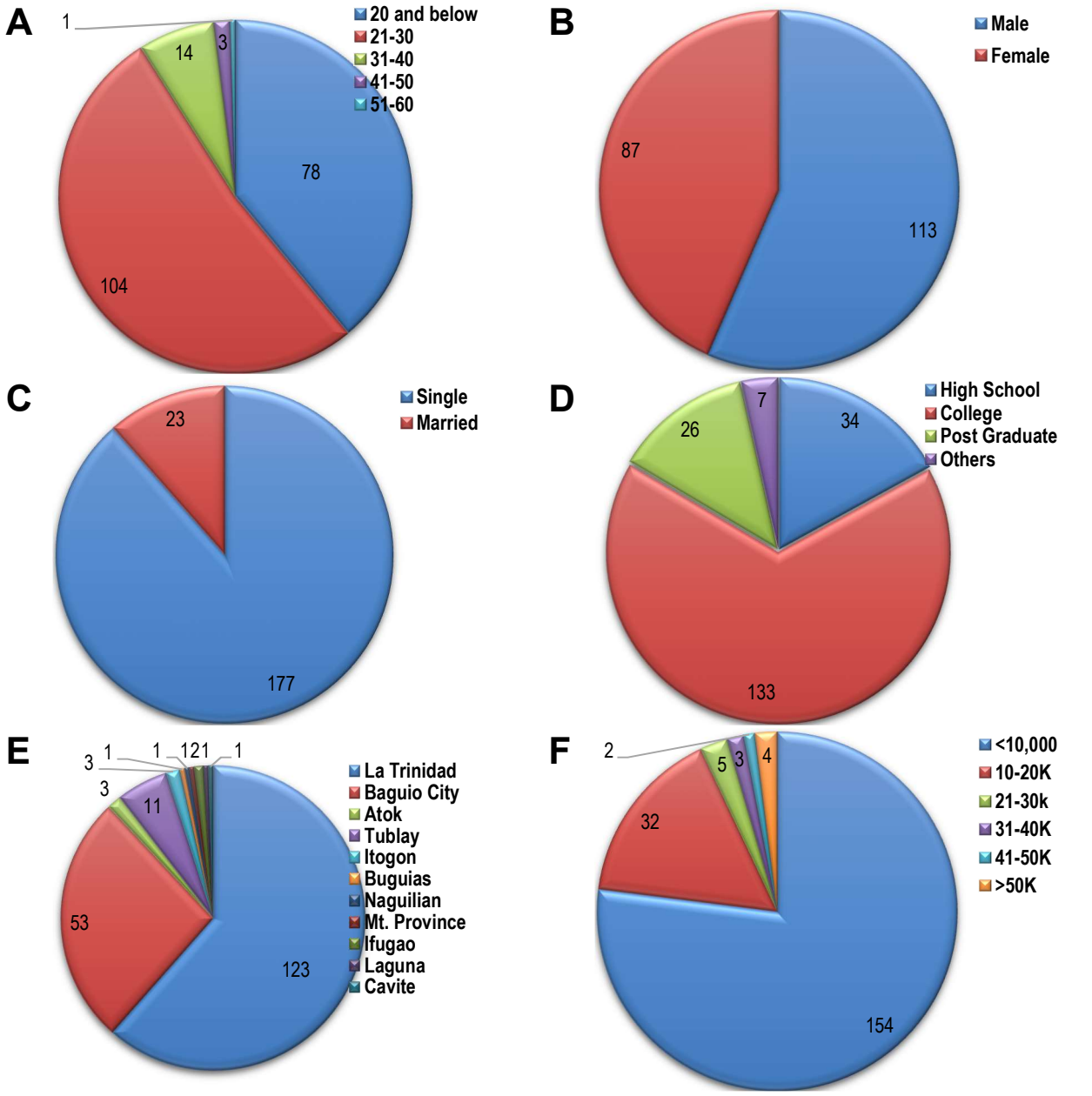

Fig. 7. Demographic profile of the respondents in the study (**A**. Age; **B**. sex; **C**. civil status; **D**. educational attainment; **E**. place of origin; **F**. monthly income

willing to pay more than Php 20. Among these, 15.85% were willing to pay Php 25, 23.17% were willing to pay Php 30, 39.02% were willing to pay Php 50, and only 21.95% were willing to pay Php 100 (Table 3).

Reasons for willingness to pay include the need to protect mountain environment for future generations" with 100% response. This was followed by the belief that the problem is important (96.17%), and the idea of protecting the environment for the sake of the flora and fauna (85.79%). Concerns about avoiding further deterioration of the mountain received 83.61% response while 63.93% respondents wanted to protect the environment for others' enjoyment. Lastly, 37.70% respondents expressed satisfaction from contributing to a good cause as a motivating factor. On the other hand, reasons for unwilling to pay additional fee included the presence of other similar services nearby (7%), the inability to afford additional fee (6%), 5.5% stated the needed improvements by the site managers and 3.5% do not feel the problem to be priority.

DISCUSSION

Literature review on ecotourism studies in the Philippines showed that majority are qualitative focusing

Table 2. Tourist Visitation Profile of Mt. Yangbew, Benguet, Philippines.

Profile Characteristics	Frequency	Percentage (%)
Frequency of Visits		
First timers	137	68.5
More than once	63	31.5
Total	200	100
Frequency of Visits in the past year		
1-3	170	85
4-7	24	12
7-9	6	3
Total	200	100
Form of transport used in getting to Mt. Yangbew		
Car	32	16.00
Bike	7	3.50
Walk	18	9.00
Public Transportation	143	71.50
Total	200	100.00
Type of vehicle used		
AUV	10	31.25
Pick-up truck	7	21.88
LCV	1	3.13
Motorcycle	7	21.88
SUV	2	6.25
Van	1	3.13
Total	32	100.00
Typical number of people visiting Mt. Yangbew		
1-3	111	55.5
4-6	62	31
7-9	8	4
10-12	6	3
13 and above	13	6.5
Total	200	100
Travel cost (Php) incurred when visiting Mt. Yangbew		
0-500	148	74.00
501-1000	26	13.00
1001-1500	15	7.50
1501 and above	11	5.50
Total	200	100.00
Primary activity when visiting Mt. Yangbew		
Mountain Biking	15	15.31
Running	127	129.59
Walking/Hiking	192	195.92
Horseback Riding	54	55.10
Picnic	98	100.00
Picture Taking	200	204.08
Others	24	24.49
Primary characteristics of Mt. Yangbew that influence the visit		
Trail length	78	39.00
Trail quality	34	17.00
Views	200	100.00
Proximity to your residence	175	87.50
Natural resources	182	91.00
Solititude	64	32.00
Lack of congestion	139	69.50
Other activities when visiting Mt. Yangbew		
Camping	3	12.50
Meditation	1	4.17
Practicing hobbies	6	25.00
Sunset/Sunrise viewing	14	58.33
Total	24	100.00
Effect of visiting Mt. Yangbew to well-being		
No Impact	9	4.5
Positive Impact	184	92
Don't see it	7	3.5
Total	200	100
Satisfaction rating to the service provided		
Low	7	3.5
Moderate	22	11
High	171	85.5
Total	200	100

Table 3. Willingness to Pay and Reasons by Tourist Respondents in Mt. Yangbew, Benguet, Philippines.

WTP Characteristics	Frequency	Percentage (%)
Willing to pay additional Php 10		
Yes	183	91.50
No	17	8.50
Total	200	100.00
Willing to pay additional Php 15		
Yes	147	80.33
No	36	19.67
Total	183	100.00
Willingness to pay Php 20		
Yes	106	72.11
No	41	27.89
Total	147	100.00
Willingness to pay more than Php 20		
25	13	15.85
30	19	23.17
50	32	39.02
100	18	21.95
Total	82	100.00
Reasons for willingness to pay		
I/we think this problem is important.	176	96.17
I /we would like to avoid further deterioration of the mountain.	153	83.61
We should protect the mountain environment for the sake of animals and plants living on it.	157	85.79
We should protect the mountain environment for future generations	183	100.00
We should protect the mountain environment for other people to enjoy.	117	63.93
I /we get satisfaction from giving to a good cause.	69	37.70
Reasons for unwillingness to pay		
I/our household cannot afford to pay.	12	70.59
I/we think this problem is not a priority.	7	41.18
I am/ we are not very interested in this matter.	2	11.76
There are many other similar goods around.	14	82.35
I object to paying higher fee.	5	29.41
The owner should pay for this.	11	64.71

on perceptions and social aspect of ecotourism and some plant diversity studies. From 2004-2024, an increasing number of ecotourism studies in the country was observed but this increase may not accurately and adequately represent the increasing number of ecotourism sites in the country. Most of the ecotourism studies are single-disciplined, either focusing on perception/ social aspect or biodiversity with no attempt done to integrate the biophysical and social dynamics of ecotourism. Hence, our study is an attempt to fill in that data gap.

Plant Diversity. The plant diversity of Mt. Yangbew shows a recovering secondary forest ecosystem at the early stages of secondary succession. With the offering of the mountain site as a tourism destination in 2020, the area is now protected from the annual bush fire. As such, the plants in the area are now starting to recover giving rise to different habitat fragments from grassland to scrubland to pine forest and broad leaf forest.

Consequently, these create several microhabitats that allow different plant species to thrive resulting to the 120 total species. This species richness is higher compared to recent inventoried nearby sites such as the results of Lumbres *et al*. (2014) in the nearby Alno Communal Forest with 78 species under 43 families; the 68 species under 63 genera and 40 families documented by Guron *et al*. (2019) in Talinguroy Research Station, La Trinidad; the 61 species under 25 families by Batani *et al*. (2023) in Palina River, Kibungan; and the 52 species under 40 genera and 31 families by Rabena *et al*. (2015) in a muyong forest in Ifugao. On the other hand, our result is lower compared with the study of Dulnuan and Napaldet (2023) with 249 vascular plant species belonging to 200 genera and 74 families in Amburayan River in Kapangan, Benguet; the study of Balangen *et al*. (2023) with 267 species belonging to 222 genera and 78 families in a secondary forest in Tadiangan, Tuba; the result of Bullong *et al*. (2024) in Mt. Nato-o, Benguet with 168 vascular plant species under 116 genera and 69 families; and, the result of Pocyoy and Napaldet (2024) in nearby Alapang Communal Forest with 187 plant species belonging to 145 genera and 70 families.

These show that disturbed tropical areas like Mt. Yangbew could still harbour high plant diversity. However, amidst its high species richness, its conservation importance is minimized by the presence and dominance of widely distributed plants including several weeds. Most notable among these weeds is the dominance of *Ageratina riparia*, a naturalized and invasive species, particularly under shaded conditions. This weed is reported to be the dominant ground cover in several other sites of Cordillera Central Range (Pelser *et al*. 2011-; Balangen *et al*. 2023; Dulnuan and Napaldet 2023; Napaldet 2023). Some endemic species and few threatened species were interspersed with these common and weedy plants. Nonetheless, this could indicate the recovering plant diversity in the area, thus, its continuous protection is highly encouraged for continuous monitoring.

In terms of biodiversity indices, the peak stations that are mostly grassland were of low diversity. This is advantageous for the ecotourism use of the area since most of the ecotourism activities are being conducted in these open grounds and thus not adversely affecting any significant plant diversity. The rest of the other stations namely depression and forest stations are of high diversity including the pine stations. The depression stations are patches of scrublands where runoff converge resulting to its more mesic condition and thereby supporting larger plants. With the continuous protection of the area from bush fires, these patches of scrubland are expected to expand and develop into broadleaf forest. The high diversity of pine station is attributed to its protection from forest fires such that other tree saplings, shrubs and several weeds are growing underneath. However amidst these high diversity values, majority of these are the common or least concern type; thus, the endemicity and conservation importance indices were developed by Bullong *et al*. (2024) to better capture the plant diversity in a tropical setting. The endemicity index of the area shows that majority of its plant diversity are native hence appropriate management is recommended. However, its conservation importance index is low.

Another interesting finding in the study was observed in the linear regression of Shannon and conservation importance indices between sampling stations. This indicates significant improvement of these indices from grassland (peak stations) to scrubland (depressed stations) to pine forest to broad leaf forest. This result is consistent with the result of Zhang and Dong (2009) where plant diversity improves from grassland stage to scrubland stage and forest stage including nine sub-stages in Loess Plateau, Shanxi Province, China. In their study, time from abandonment is the most important factor to the restoration process and species diversity is the main indicator of community changes in restoration. However, time could not be major factor for the difference in plant diversity in Mt. Yangbew since all habitat fragments experience the same annual bush fire. It would most likely to the impact intensity of the annual bush fire that shapes the difference of plant diversity in the habitat fragments of Mt. Yangbew. The annual bush fire would most likely scorched all the vegetation in peak stations, singe and prevent the expansion of the scrubland in depressed stations but not totally destroy its plants while scorching the ground vegetation and singe-ing the understory shrubs in pine forest. The broadleaf forest patches are mostly fire resistant but could not expand from its boundaries.

Plant diversity studies provide insights into the dynamics of ecosystems, helping scientists and researchers understand how different plant species interact, compete, and adapt. However, there are still gaps in understanding various aspects such as limited knowledge about the ecological roles of certain plant species, lack of comprehensive studies on the impact of climate change on floral diversity, and inadequate understanding of the long-term effects of human activities, such as ecotourism on plant communities (Bakure *et al*., 2022). Addressing these research gaps is essential for comprehensive conservation strategies, sustainable land use planning, and effective biodiversity management (Alafag and Napaldet, 2022). Plant diversity is the usual base of major food webs and thus its conservation and improvement leads to corresponding improvement in overall biodiversity and ecosystem functions/ environmental services. Thus, the improvement of plant diversity in ecotourism sites through time could be direct way of quantifying the conservation benefits of ecotourism. Additionally, the improvement in biodiversity were mentioned to be one of major reasons why tourists were willing to visit and to pay additional

services in the mountain site; hence, stressing the direct connection of plant diversity and ecotourism benefits.

Economic Valuation. The estimation of zone values of Mt. Yangbew visitors, where Zone 1 holds the highest value of Php 2,781,296.60 followed by Zone 2, Zone 4, and Zone 3, mirrors the interplay among accessibility, visitor counts, and economic input. Zones with elevated visitor counts and enhanced accessibility contribute more substantially to the collective zone value of Php 5,558,974.55, signifying the evaluated worth of Mt. Yangbew was derived from this analysis. These results underscore the significance of accessibility and travel convenience in shaping visitor statistics and economic significance within tourism locales like Mt. Yangbew.

The estimated value of Mt. Yangbew is higher compared to the estimated recreational value of Php 1,703,500–2,098,300/yr by Caranza and Calderon (2022) on the Caving Site in Kasibu, Neuva Viscaya that reveals significant insights into the dynamics of eco-park management. Their results, characterized by its single-use nature and low repeat visitation rates, recorded a steady increase in visitors over the years, with an average of 4,651 visitors annually. However, challenges such as low visitation in populous zones and a limited repeat rate of 10.02% indicate the need for diversification of activities to attract returning visitors. In contrast, this study for 2023 Mt. Yangbew estimation utilized distance-based zoning integrated with population and travel time metrics across four zones. March marked the peak season with 4,095 visitors, followed by April with 2,512 visitors, and November with 2,488 visitors. In contrast, July experienced the lowest visitation at 400 visitors, with May and August following closely behind at 600 visitors each. The analysis revealed Zone 1 as the most accessible and economically valuable, with a substantial population of 13,563 and a total zone value of Php 2,781,296.60. Enhancing transportation infrastructure and connectivity to outlying zones may potentially elevate visitation levels and economic input, fostering sustainable growth in tourism development.

The comparison underscores several key implications for eco-park management. Firstly, accessibility plays a crucial role in driving visitation rates, as demonstrated by Mt. Yangbew's higher accessibility leading to increased visitation from nearby zones. Secondly, engaging visitors through diverse activities is essential, especially for single-use sites like the caving area, to foster repeat visitation and sustain visitor interest. Finally, the economic impact of tourism can be maximized through strategic management practices and investments in infrastructure. These results show the tailored application of Zone Travel Cost Method (ZTCM) that consider the unique characteristics and visitor dynamics of each eco-park, emphasizing the integration of accessibility, visitor engagement, and economic assessment for sustainable management and development.

Willingness to Pay. The willingness to pay higher amounts by majority of Mt. Yangbew visitors indicates increasing levels of perceived value, quality, and satisfaction derived from the destination experience (Chen and Chen, 2010). This aligns with the concept of value-based pricing, where prices are determined by the perceived value of the product or service to the customer (Hinterhuber, 2013). Tourists are often willing to pay extra fees for the maintenance and enhancement of tourist spots when they perceive tangible benefits such as improved infrastructure, enhanced services, better experiences, and a positive impact on the local community (Gnanapala, 2015). These motivations reflect a holistic view of environmental protection, encompassing biodiversity conservation, ecosystem stability, and the sustainability of ecotourism activities (Newsome *et al*., 2012).

Since majority of the respondents are from areas near Mt. Yangbew, they are also the one most willing to pay for site's continuous protection and improvement. McKercher and du Cros (2002) and Weaver (2018) revealed the concept of proximal markets in tourism, arguing that visitors from surrounding places are more inclined to take day trips or short-term visits to natural sites due to their proximity and lower travel expenses. Garrod and Fyall (2018) also found that destination familiarity and perceived value influence visitor willingness to pay for tourism activities. Visitors from neighboring places, such as La Trinidad and Baguio City, are more likely to consider a Php 50 admission price reasonable and justifiable, given Mt. Yangbew's ease of access and unique natural charms.

The fact that 68.5% of respondents have visited Mt. Yangbew several times demonstrates the site's appeal and potential for repeat visits. This highlights the necessity of providing memorable and meaningful experiences during initial visits in order to inspire future visits and create destination loyalty. This also emphasizes the need of preserving high-quality visitor experiences while protecting the natural environment. The prevalence of public transportation among Mt. Yangbew visitors is consistent with Buckley's (2012) sustainable tourism principles, which advocate for the use of low-impact modes of transportation to reduce carbon emissions and traffic congestion. Additionally, the knowledge concerning visitor travel expenses can be used to improve pricing strategies for entry fees or guided tours, ensuring that income generation matches with long-term resource management objectives (Tisdell, 2018). Balancing affordability for visitors, particularly those with smaller travel budgets, with sufficient cash for conservation initiatives is critical for Mt. Yangbew's long-term environmental survival.

The willingness to pay among Mt. Yangbew visitors could be attributed to the many activities conducive in the mountain site. Foremost are picture taking and scenic viewing that are consistent with a broader trend in tourism, where photography has become an integral part of the

travel experience, driven by social media sharing, personal storytelling, and digital connectivity (Konijin *et al*., 2016; McCabe, 2018). Walking/hiking was the second most popular activity which emphasizes the appeal of outdoor exploration, nature immersion, and physical activity for tourists in Mt. Yangbew. Hiking and walking are frequently related with improved health and wellness, scenic appreciation, and a desire for immersive nature experiences (Olafsdottir *et al*., 2020). Further, the appeal of tourist spots lies in their offering of diverse trail lengths and qualities, breathtaking views, rich natural resources, convenient proximity to urban areas, peaceful solitude, and freedom from overcrowding. (Fesenmaier and Xiang., 2017; Butler, 2018; Garrod and Fyall, 2018). This is consistent with research in tourist psychology, which highlights the intrinsic value of natural landscapes, aesthetic appeal, and awe-inspiring views in attracting and engaging visitors (Wong and Huang, 2019; Chen *et al*., 2020; de Jong and O'Neill, 2020).

PD-ZTCM-WTP Protocol for Quantifying Ecotourism Benefits in Secondary Forest Sites. The results of the study could be used as protocol in quantifying the ecotourism benefits in secondary forest sites which is currently more of a guesswork. This is to check if truly ecotourism is accomplishing its major goals namely economic benefits, environmental protection and psychosocial benefits. The plant diversity as indicated biodiversity indices could answer the environmental protection part while the economic valuation would answer the economic benefit and the willingness to pay for the psychosocial benefits. Plant diversity being the base of food chain/webs could indicate the overall environmental status but it could be enhance to other biodiversity indicators as financial resources permit. In particular, the endemicity and conservation importance indices could serve as baseline information of the area's plant diversity and as basis for future monitoring to check if the area is increasing/decreasing in plant diversity due to the ecotourism activities. On the other hand, the Zone Travel Cost Method (ZTCM) consider the unique characteristics and visitor dynamics of each eco-park, emphasizing the integration of accessibility, visitor engagement, and economic assessment for sustainable management and development, thereby apt for estimating the economic value of the ecotourism site. Lastly, the willingness to pay could be a summative quantitative indicator of the psychosocial benefits since it covers satisfaction level of the visitors, repetitive visit and the fact that they are willing to put their money on what they claim. The conduct of these protocol (Plant Diversity for environmental protection; ZTCM for economic valuation; and Willingness to Pay for psychosocial benefits), hereto referred as PD-ZTCM-WTP, for the first time would serve as the baseline data and its successive conduct, eg. every 3–5 years, could readily quantify the benefits being claimed by ecotourism.

CONCLUSION

The study is proposing the PD-ZTCM-WTP Protocol for quantifying ecotourism benefits in secondary forest sites. The protocol consists of three major components namely plant diversity, Zone Travel Cost Method and willingness to pay corresponding respectively to measurement of environmental protection, economic benefits and psychosocial benefits. Using Mt. Yangbew as the study case, a total of 120 plant species under 101 genera and 54 families were identified with mostly native species but were generally the common/least concern type with only few conservation important species. Nonetheless, the relatively high species richness of plants in the area could be attributed to its protection from the annual bush fires that were prevalent before its inception as ecotourism site. In particular, the endemicity and conservation importance indices could serve as baseline information of the area's plant diversity and as basis for future monitoring to check if the area is increasing/decreasing in plant diversity due to the ecotourism activities. In terms of economic value, tourisms in Mt. Yangbew is estimated at Php 5,558,974.55 for the year 2023 with Zone 1 (nearest zone) contributing the bulk of visits and corresponding economic value. Majority of the visitors are satisfied with their visits and are willing to pay additional fee for the site's continuous protection and improvement. Their satisfaction is mostly based on the scenic view, natural landscape, trail quality and the solitude that the mountain site offers. The conduct of this protocol for the first time would serve as baseline data and its successive conduct, eg. every 3–5 years, could readily quantify the benefits being claimed by ecotourism. In doing this, the guesswork on quantifying the benefits of ecotourism would be minimized.

ACKNOWLEDGMENTS

The researchers are indebted to colleagues in the university for the encouragement and valuable feedbacks during the conduct of the study.

LITERATURE CITED

(Including in the supplementary)

Abansi, C. 2012 Willingness to pay for recreational benefits in Sagada, Philippines: a contingent valuation study. The Cordillera Review **4(1)**: 69–99.

Aguila, G.M., Ragot, R. 2014 Ecotourism industry in Ilijan Batangas City, Philippines: Assessing its effects as a basis of proposed tourism development plan. Quarterly Journal of Business Studies **1(1)**: 24–35.

Aguilar, M.G., Domasian, R.B. 2023 Ecotourism perception and engagement classification among residents of a nature city in the Philippines. Journal of Tourismology **9(1)**: 22–29.

Alafag, J.I., Napaldet, J.T. 2022 Taxonomic and ecological notes on *Gaultheria cumingiana* S.Vidal (Ericaceae) from the Cordillera Central Range, Northern Philippines. Taiwania **67(4)**: 497–509.

Alampay, RBA. 2005 Sustainable Tourism Challenges for the Philippines. Philippine Apec Study Center Network. Makati City, Philippines. pp304.

Alhojailan, M.I. 2012 Thematic analysis: A critical review of its process and evaluation. West East Journal of Social Sciences **1(1)**: 39–47.

Amata, J.P. 2021 Extent of community participation in the ecotourism project in Caramoan, Camarines Sur, Philippines. Open Access Library Journal **8(11)**:1–29.

Aujero-Blanza, Ma. G. 2020 Roadmap of ecotourism development for emerging tourism destination in the Philippines. Journal of Tourism, Hospitality & Culinary Arts **12(1)**: 305–319.

Balangen, D.A., Catones, M.S., Bayeng, J.M., Napaldet, J.T. 2023. Intensities of human disturbance dictate the floral diversity in tropical forest: the case of a secondary forest in Benguet, Philippines. J. Mt. Sci. **20(6)**: 1575–1588.

Bansil, P.D.D., Capellan, S.A.R., Castillo, R.C., Quezon, C.D., Sarmiento, D.M.B. 2015 Local community assessment on the economic, environmental and social aspects of ecotourism in Lobo, Philippines. Asia Pac. J. Multidiscip. Res. **3(4)**: 132–139.

Batani, R.S., Basbas, A.V. Jr, Loncio, R.S., Napaldet, J.T. 2023. Floral diversity in a secondary forest managed by indigenous community: the case of Mt. Kili-kili in Benguet, Cordillera Central Range, Northern Philippines. Biodiversity **24(4)**: 212–230.

Brandt, J.S., Radeloff V., Allendorf T., Butsic V., Roopsind A. 2019 Effects of ecotourism on forest loss in the Himalayan biodiversity hotspot based on counterfactual analyses. Conserv. Biol. **33(6)**: 1318–1328.

Brillo, B. B. C. 2016 Development of a small lake: Ecotourism enterprise for Pandin Lake, San Pablo City, Philippines. Lakes Reserv.: Res. Manag. **21(4)**: 284–292.

Brillo, B. B. C. 2020 Initiation and establishment of ecotourism development: Pandin Lake of San Pablo City and Tayak Hill of Rizal, Laguna, Philippines. GeoJournal **86(6)**: 2573–2586.

Brillo, B.B., Simondac-Peria, A. 2021 Sustainability of a Local Government-Instituted Ecotourism Development: Tayak Adventure, Nature and Wildlife Park in Rizal, Laguna, Philippines. Environ. Dev. Sustain. **23(11)**: 16145–16162.

Buckley, R. 2012 Sustainable tourism: Research and reality. Ann. Tour. Res. **39(2)**: 528–546.

Bullong, J.R.T., Silverio, J.P., Alafag, J.I., Guron, M.A., Napaldet, J.T. 2024 Development of endemicity and conservation importance indices for tropical forests and the floral diversity assessment of Mt. Natoo in Benguet, Philippines. J. Mt. Sci. **21(3)**: 786–804.

Buot, IE Jr. 2009 An ethnobotanical study of the plant biodiversity of Mt. Mayon, Bicol Peninsula, Albay, Philippines. J. Nat. Sci. **8(1)**: 1–10.

Buslon-Sia, V.M., Ferrater-Gimena, J.A., Etcuban, J.O., Tan, A.U. 2019 Ecotourism as a catalyst of poverty alleviation in rural economy in Cebu, Philippines. Asian Review of Social Sciences **8(3)**: 1–7.

Butler, R. 2018 Sustainable tourism in sensitive environments: A wolf in sheep's clothing? Sustainability **10(6)**: 1789.

Calanog, L.A., Reyes, D.P.T., Eugenio, V.F. 2012 Making Ecotourism Work: A manual on establishing Community-based Ecotourism Enterprise (CBEE) in the Philippines. Japan International Cooperation Agency, Makati City, Philippines.

Caranza, J., Calderon, M. 2022 Recreation valuation of caving using travel cost method in Capisaan Cave System, Nueva Vizcaya, Philippines. Philipp J. Sci. **151(5)**: 1761–1770.

Carson, R. 2000 Contingent Valuation: A User's Guide. Environmental Science & Technology **34(8)**: 1413–1418.

Catibog-Sinha, C. 2008 Zoo tourism: Biodiversity conservation through tourism. Journal of Ecotourism **7(2–3)**: 160–178.

Chen, C-F., Chen, F-S. 2010 Experience quality, perceived value, satisfaction and behavioral intentions for heritage tourists. Tour. Manag. **31(1)**: 29–35.

Chen, C., Rau, P., Lin, C. 2020 The influence of natural scenery on tourist behavior. J. Travel Res. **59(3)**: 451–465.

De Jong, A., O'neill, N. 2020 Sustainable Tourism and the Environment: A Global Perspective. Routledge. 311pp.

Dulnuan, M.M., Napaldet, J.T. 2023 Mosaic interplay of floral diversity, soil properties, disturbance intensity and elevation in the riparian ecosystem under semi-subsistence agriculture of Cordillera Central Range, Northern Philippines. Aquat. Ecol. **57(3)**: 613–631.

Fesenmaier, D., Xiang, Z. 2017 Design Science in Tourism: Foundations of Destination Management. Springer.

Gallato, C. G., Reamillo, K. A. G., Valdez, N. P., Warokka, A., Hilman, H. 2012 Eco-tourism in the Philippines: educational and recreational value of the Alayan cave systems. J. Glob. Bus. Adv. **5(2)**: 169–178.

Garrod, B., Fyall, A. 2018 Destination Marketing: An Integrated Marketing Communication Approach. Routledge.

Gnanapala, A. 2015 Tourists Perception and Satisfaction: Implications for Destination Management. American Journal of Marketing Research **1(1)**:7–19.

Guron, M.A., Lumpio, R.G., Napaldet, J.T. 2019 Comparison of Floral Diversity of Pine Forest, Agroforestry and Agricultural Land-Uses in Talinguroy Research Station, Benguet State University, Northern Philippines. Mountain Journal of Science and Interdisciplinary Research (formerly Benguet State University Research Journal) **79(2)**: 21–34.

Guron, M.A., Narvaez, G., Alafag, J., Napaldet, J.T. 2022 The plant diversity of Mt. Ulap Eco-Trail in Cordillera Central Range, Philippines: An insight on the effect of ecotourism in a secondary forest. J. Wetlands Biodiversity **12**: 25–50.

Halldorson, J.D. 2009 An Exploration of Tajfels Social Identity Theory and its Application to Understanding Metis as a Social Identity. University of Manitoba (Canada).

Hinterhuber, A. 2013 Value-Based Pricing: Drive Sales and Boost Your Bottom Line by Creating, Communicating and Capturing Customer Value. Wiley.

Hultman, M., Kazeminia, A., Ghasemi, V. 2015 Intention to visit and willingness to pay premium for ecotourism: The impact of attitude, materialism, and motivation. J. Bus. Res. **68 (9)**: 1854–1861.

Ignacio, J.G. 2019 Overview of the Environmental Impacts of Ecotourism in the Philippines. Parliamentary Institute of Cambodia (PIC). 14pp.

Jalani, J.O. 2012 Local People's Perception on the Impacts and Importance of Ecotourism in Sabang, Palawan, Philippines. Procedia Soc. Behav. Sci. **57**: 247–254.

Jin, J. 2014 Consumer Acceptance and Willingness to Pay for Genetically Modified Rice in China: A Double Bounded Dichotomous Choice Contingent Valuation Survey Calibrated by Cheap Talk. University of Arkansas, Fayetteville

Konijin, E., Mitas, O., Sluimer, N. 2016 Click to Share: Patterns in Tourist Photography and Sharing. Int. J. Tour. Res. **18(6)**: 525–535.

Lumbres, R., Palagnas, J., Micosa, S., Besic, E., Yun, C-Y., Lee, Y-J. 2014 Floral Diversity Assessment in Alno Communal Mixed Forest in Benguet Philippines. Landsc. Ecol. Eng. **10(2)**: 361–368.

Lunar, B.C., Arcega, C.V.S. 2011 Status of Plant Biodiversity in Mt. Malarayat, Batangas, Philippines. Asian Journal of Biodiversity **2(1)**: 1–13.

Mago, Y.M.F. 2011 Community Capacity Building for Ecotourism: A Literature Review. Conference Proceeding from the National Conference on Entrepreneurship and Innovation- 2011.

Mccabe, S. 2018 Understanding Tourist Behavior: Theory and Practice. Channel View Publications.

Mckercher, B., Du Cros, H. 2002 Cultural Tourism: The Partnership Between Tourism and Cultural Heritage Management. Routledge.

Morse, J.M. 2000 Determining sample size. Qualitative Health Research **10(1)**: 3–5.

Napaldet, J.T. 2023 Plant species and ecosystem diversity along national road in mountain Sites: The case of Kennon Road in Cordillera Centra Range, Philippines. Taiwania **68(3)**: 339–348.

Navrud, S., Vondolia, G.K. 2005 Using contingent valuation to price ecotourism sites in developing countries. Tourism **53(2)**: 115–125.

Niece, J. 2011 Exploring the influence of small vessel security strategy on U.S. Coast Guard multi-mission boat stations. Published thesis. USA: Northcentral University.

Nolan, R., Rotherham, I. 2012 Volunteer perceptions of an ecotourism experience: a case study of ecotourism to the coral reefs of Southern Negros in the Philippines. J. Ecotourism **11(3)**: 153–172.

Ocampo, L., Ebisa, J. A., Ombe, J., Geen Escoto, M. 2018 Sustainable ecotourism indicators with fuzzy Delphi method – A Philippine perspective. Ecol. Indic. **93**: 874–888.

Olafsdottir, G., Cloke, P., Schulz, A., van Dyck, Z., Eysteinsson, T., Thorleifsdottir, B., Vögele, C. 2020 Health benefits of walking in nature: A randomized controlled study under conditions of real-Life stress. Environ. Behav. **52(3)**: 248–274

Pearce, D. G. 2014 The internationalization of tourism research. J. Travel Res. **53(3)**: 267–280.

Pelser, P.B., J.F. Barcelona and D.L. Nickrent (eds.) 2011 onwards. Co's Digital Flora of the Philippines. www.philippineplants.org.

Pickering, C.M., Hill W. 2007 Impacts of recreation and tourism on plant biodiversity and vegetation in protected areas in Australia. J. Environ. Manag. **85(4)**: 791–800.

Pocyoy, M.P.P., Napaldet, J.T. 2024 Ecological insights on communal forests in the tropics: The case of Alapang Communal Forest of La Trinidad, Benguet, Philippines. Taiwania **69(3)**: 321–335.

Rabena, M.A.F., Macandog, D.M., Cuevas, V.C., Espaldon, V.O. 2015 A vegetation inventory of a traditional secondary forest (muyong) in Kinakin, Banaue, Ifugao, northern Luzon, Philippines. Philippine J. Syst. Biol. **9**: 10–32.

Replan, E.L., Malaki, A.B.B. 2017 Floral diversity and habitat assessment of Canbantug Forest, Argao, Central Visayas, Cebu, Philippines. Int. J. Sci. Eng. Res. **8(10)**: 775–780.

Reyes, T.D.Jr., Abadingo, J.B., Tabuno, S.G., Seriño, E.K.L., Mabanag, J.B. Mercadal, R.C. 2015 Floristic inventory of the proposed site for Tarsier Tourism Center in Villa Aurora, Bilar, Bohol, Philippines. Jurnal Ilmu Kehutanan **9(2):** 67.

Rivera, J.P.R., Gutierrez, E.L.M., David, I.B.M., Newsome, D. 2022 Implementing an Effective Ecotourism Strategy for the Philippines BT – Tourism in the Philippines: Applied Management Perspectives. Springer Nature Singapore.

Samal, R., Dash, M. 2023 Ecotourism, biodiversity conservation and livelihoods: Understanding the convergence and divergence. Int. J. Geoheritage Parks. **11(1)**: 1–20.

Samdin, Z. 2008 Willingness to Pay in Taman Negara: A Contingent Valuation Method. Int. Journal of Economics and Management **2(1)**:81–94

Shang, Y., Bi, C., Wei, X., Jiang, D., Taghizadeh-Hesary, F., Rasoulinezhad, E. 2023 Eco-tourism, climate change, and environmental policies: empirical evidence from developing economies. Humanit Soc. Sci. Commun. **10(1)**: 275.

Shannon, G., Larson, C.L., Reed, S.E., Crooks, K.R., Angeloni, L.M. 2017 Ecological consequences of ecotourism for wildlife populations and communities. In: Blumstein, D.T., Geffroy, B., Samia, D.S.M., Bessa, E. eds.Ecotourism's Promise and Peril: A Biological Evaluation 29–46pp. Springer.

Surendran, A., Sekar, C. 2010 An economic analysis of willingness to pay (WTP) for conserving the biodiversity. Int. J. Soc. Econ. **37(8)**: 637–648.

Tisdell, C. 2018 Ecotourism: Economics and management. Routledge.

Tolentino, P.J.S., Navidad, J.R.L., Delos Angeles, M., Fernandez, D.A.P. Villanueva, E.L.C., Obeña, R.D.R., Buot, I.E. Jr. 2020. Review: Biodiversity of forests over limestone in Southeast Asia with emphasis on the Philippines. Biodiversitas **21(4)**: 1597–1613.

Tomatao, H.D., Villanueva, G.V., Sultan, G.G.D., Rosauro, C.D., Elmedulan A.M. Jr., Susada, J.S., Villantes, Y.L. 2023. Exploring Knowledge, Attitude and Practices of Tourism Providers Contingent on Mt. Malindang Range Natural Park, Philippines: Basis for Interventions. International Journal On Hospitality And Tourism Research **2(4)**: 164–178.

Turak, E., DeVantier, L. 2010 Coral Biodiversity, Marine Tourism and Conservation Priorities in El Nido, Palawan, Philippines Final Report to El Nido Foundation. pp 108.

von Grünigen, S. 2016 Recreation function and travel cost method. Paper presented at the econcept workshop on economic valuation of forest ecosystem services. Available online at: www.hesge.ch/heg/ sites/default/fles/actualite/documents/Workshop-economic-valuation-forest-ecosystem-services/ von_grunigen.pdf

Waldron, A., Miller, D.C., Redding, D., Mooers, A., Kuhn, T.S., Nibbelink, N., Roberts, J.T., Tobias, J.A., Gittleman, J.L. 2017 Reductions in global biodiversity loss predicted from conservation spending. Nature **551(7680)**: 364–367.

Weaver, D. 2018 Sustainable Tourism. Routledge.

Whitehead, J., Haab, T. 2023 Reference Module in Earth Systems and Environmental Sciences.

Wong, I., Huang, S. 2019 The impact of visiting experiences on the emotional reactions and loyalty intentions of tourists: The case of sunrise viewing at Angkor Wat. J. Travel Res. **58(1)**: 111–125.

WTTC (World Travel and Tourism Council) 2014 The Economic Impact of Travel and Tourism, WTTC, London, United Kingdom.

Yacob, M.R., Radam A., Shuib, A. 2009 A contingent valuation study of marine parks ecotourism: The case of pulau payar and pulau redang in Malaysia. J. Sustain. Dev. **2(2)**: 95–105

Zarghi, A., Hosseini, S.M. 2014 Effect of ecotourism on plant biodiversity in Chelmir zone of Tandoureh National Park, Khorasan Razavi Province, Iran. Biodiversitas **15(2)**: 224–228.

Zhang, J-T., Dong, Y. 2010 Factors affecting species diversity of plant communities and the restoration process in the loess area of China. Ecol. Eng. **36(3)**: 345–350.

Supplementary materials are available from Journal Website