

A Pilot Survey on the Recreational Use and Existence Values of Sinarapan (*Mistichthys luzonensis*) in Lakelet Manapao, San Ramon, Buhi, Camarines Sur, Philippines

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ABSTRACT

This exploratory pilot study evaluates recreational and existence perceptions of Sinarapan (*Mistichthys luzonensis*) [*italicized*] in Lakelet Manapao, San Ramon, Buhi, Camarines Sur, Philippines. Lakelet Manapao acts as both the breeding area and refuge for the Sinarapan, a fish species that has suffered from overharvesting and habitat loss, surrounded by a moderately populated residential zone, creating a valuable setting to record how neighboring communities regard this endemic and endangered fish species. Researchers used a structured survey to interview 12 adult residents who live in or around the Lakelet Manapao area. The survey measured their knowledge of Sinarapan, how they view its importance, their recreational activities and spending, and their stated willingness to pay for both recreation and conservation efforts. The team analyzed responses using descriptive statistics and basic visual summaries to identify response patterns. Initial findings indicate that most participants have knowledge about Sinarapan and consider Lakelet Manapao extremely valuable for both recreational purposes and biodiversity conservation. Residents typically participate in affordable leisure activities. Survey participants expressed moderate but positive willingness to pay per visit and showed interest in making small yearly donations for conservation purposes, while also demonstrating strong non-use values related in ensuring Sinarapan's existence.[space]Given the small, non-probability sample and lack of formal contingent valuation framework, these results should be considered preliminary and illustrative rather than definitive monetary estimates. However, the pilot study demonstrates the possibility for conducting more comprehensive valuation research using established contingent valuation or choice experiment methods with larger, more representative population samples throughout the Lakelet Manapao area.

Keywords: pilot survey; non-market valuation; existence value; Sinarapan; Lakelet Manapao; recreation

INTRODUCTION

Lakelet Manapao is quite small compared to the nearby Lake Buhi in Camarines Sur. It is recognized as a haven where people would try to capture with their nets and bring to other lakes small species and the Sinarapan (*Mistichthys luzonensis*) [*italicized*], which is documented to be over harvested commercially due to it being one of the smallest fishes (NFRDI, 2025).

Given these pressures, the need to explore the local residents' value of Sinarapan and its ecosystem beyond just commercial interest. It is also important to understand the recreational and inherent value of Sinarapan and similar freshwater activities that local residents attach to Lakelet Manapao. Studies that assessed the value of watersheds in the Philippines and other parts of Southeast Asia show that these ecosystems were perceived by local communities to have high intrinsic value. More specifically, local communities believe that endemic aquatic species and the ecosystems that support them are culturally important and represent heritage and other values such as ecological services. Local communities also attributed little or no direct economic value to the

ecosystems or species as previously reported in the literature. (Vicente et al., 2023; Rahman & Yaakub, 2020; Niroshini et al., 2022)

This exploratory study involved a survey of twelve (12) adult members of the community located around Lakelet Manapao. The purpose of the study was to measure how aware residents are of Sinarapan and their perception of the recreational and biodiversity conservation value of Lakelet Manapao; the amount of recreational use they make of Lakelet Manapao, as well as any associated expenditures; and how much they are willing to pay (WTP) for Sinarapan-related recreation use and conservation. The sample size is small, and therefore survey results cannot be statistically generalized to other community members; the pilot survey provides some early empirical evidence on how a less populated lakelet community views the recreational and existence values of Sinarapan and its associated habitat. The results serve as a foundation for more in-depth non-market valuation studies within Lakelet, using more comprehensive contingent valuation and choice experiment design.

REVIEW OF RELATED LITERATURE

The valuation of freshwater ecosystems remains essential for understanding how communities perceive and benefit from natural resources, particularly in areas with unique biodiversity. Recent work in the Philippines and neighboring countries highlights the socio-economic importance of rivers and lakes as sources of recreation, cultural identity, and ecological services. For example, Vicente, Loja, and Subade (2023) showed in the Balatin River sub-watershed that households derive both use and non-use benefits from watershed ecosystems and that integrating these values reveals how freshwater bodies contribute simultaneously to livelihoods, cultural practices, and ecological regulation. Regional studies on seagrass and forested freshwater systems likewise document that households value clean water, recreation space, and regulating services such as flood control and habitat provision, and that these preferences are reflected in positive willingness-to-pay for conservation interventions (Rahman & Yaakub, 2020; Niroshini et al., 2022).

Research on lake and river ecosystems further supports the relevance of non-market valuation in determining community preferences and conservation needs. Villaruel (2024), in a study of Tadalac Lake in Laguna, found that local households were willing to contribute financially toward improving water quality, showing that residents value not only direct recreational benefits but also the long-term sustainability of freshwater environments. Findings from this study closely align with the context of Lake Buhi, where the presence of Sinarapan, one of the world's smallest commercial fish, adds ecological significance to the lake. International studies similarly affirm this pattern. Sierra et al. (2021) found that households living near the San Juan River Wetland in Colombia recognized both recreational and ecological functions of freshwater resources, demonstrating that willingness to support conservation transcends direct economic benefits.

The significance of non-use values, especially existence and bequest values, has also been reinforced by recent conservation valuation studies focusing on rare or endemic species. Recent work on community-managed fish sanctuaries shows that local stewardship can significantly improve freshwater fish diversity and support conservation of endemic species (Jumani et al., 2023). Similarly, ecosystem-service valuation work in Malaysia and Sri Lanka reported that households assign substantial existence and heritage value to aquatic biodiversity and wetland habitats, treating the continued presence of these species and ecosystems as a benefit in itself, independent of direct economic returns (Rahman & Yaakub, 2020; Niroshini et al., 2022).

Studies in Southeast Asia further reinforce the pattern that both use and non-use values shape community perspectives on ecosystem conservation. Rahman and Yaakub (2020), examining seagrass ecosystems in Malaysia, found that communities derive well-being benefits from aquatic resources even without direct extraction activities, highlighting the emotional, cultural, and recreational dimensions of ecosystem services. Research in Sri Lanka by Niroshini et al. (2022) echoed this, showing that freshwater ecosystems provide multiple ecological services valued by local residents regardless of income level. These insights strengthen the argument that the existence value of small, endemic species like Sinarapan can be significant even in economically constrained communities.

In addition to primary valuation studies, several meta-analyses and reviews provide strong theoretical grounding for non-market valuation methodologies. Baliwag (2022) analyzed forest-protected area valuations across Southeast Asia and demonstrated that demographic and cultural factors influence how residents value ecosystems, factors that are likewise applicable to Lake Buhi's fishing and farming communities. At a broader scale, Moreira, Simioni, and Vieira (2024) reviewed global freshwater valuation research and concluded that recreational and existence values remain among the most frequently assessed and highly valued components of freshwater ecosystem services. Complementing these is the review by Gargaran, Sy, and Bumanglag (2024), who noted that valuation frameworks in aquatic ecosystems, particularly contingent valuation and willingness-to-pay surveys are effective tools for capturing community-level values for conservation.

Overall, the literature consistently demonstrates that freshwater ecosystems possess substantial recreational and existence values that communities recognize, even in the absence of direct economic benefits. Studies in the Philippines and abroad collectively support the relevance of assessing the non-market value of endemic species such as Sinarapan. Given its ecological uniqueness and cultural symbolism, Sinarapan's conservation aligns with global findings that communities place strong intrinsic value on preserving rare species and maintaining healthy freshwater ecosystems. These insights provide robust academic grounding for evaluating the recreational and existence values associated with the Lakelet Manapao Sanctuary and its endemic biodiversity.

METHODOLOGY

Research Design

This study employed an exploratory, descriptive quantitative approach that involved a structured pilot questionnaire administered to residents living near Lakelet Manapao in Buhi, Camarines Sur, Philippines to obtain information about their perceptions of the recreational and existence values of Sinarapan (*Mistichthys luzonensis*) and its habitat. The objective of the research was not to estimate full non-market values but rather to describe local perceptions of the site and its resources.

Study area and local population

Lakelet Manapao is a relatively small freshwater body located within the Lake Buhi ecosystem and is surrounded by a sparsely populated lakeside community. Unlike the more densely populated barangays surrounding Lake Buhi, the area immediately adjacent to Lakelet Manapao is made up of scattered residential units and small clusters of homes. As such, the potential pool of respondents located near the lakelet was relatively small, but it was also representative of individuals who use the area in their daily lives.

Respondents and Sampling

An interview has been conducted to a total of twelve (12) adult respondents (men and women) residing in or very near Lakelet Manapao using convenience and proximity-based sampling methods by approaching household located along the access trails and roadways adjacent to Lakelet Manapao and invited a maximum of one (1) adult per household who was 18 years or older to participate. Inclusion criteria required that respondents had lived in the area for at least one year to ensure basic familiarity with Lakelet Manapao and Sinarapan local fish. Because the residential area around the lakelet has a relatively small population and the sampling was non-probabilistic, the resulting sample is modest and not statistically representative of the broader Lake Buhi communities. Instead, the data serve as an exploratory subset appropriate for a pilot survey.

Instrument

The survey consisted of four sections:

- 1.) Awareness and perception of Sinarapan (e.g., familiarity, perceived importance).
- 2.) Recreational visitation and spending related to Lakelet Manapao.

- 3.) Willingness to pay per visit for Sinarapan-[remove space]related recreational activities
- 4.) Existence value and willingness to participate in protection, including support for conservation even without direct personal use and indicative ranges of annual contributions.
- 5.) Closed-ended questions used Likert-type scales, frequency categories, and expenditure or willingness-to-pay brackets, complemented by open-ended questions on perceived benefits of Lakelet Manapao and Sinarapan and suggested measures to improve conservation and recreational use.

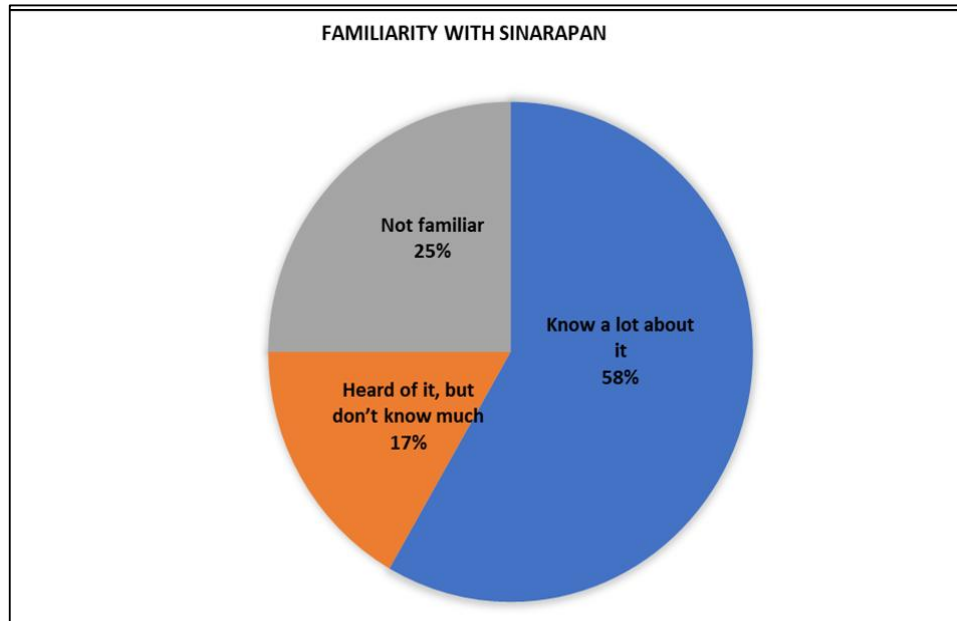


Figure 1. Awareness among survey respondents with the Sinarapan fish in Lakelet Manapao. Distribution of the survey respondents in relation to their awareness level, ranging from “not familiar” to know a lot about the species. Data show that a majority report high awareness, reflecting the species’ cultural importance in the Lakelet Manapao area.

Data Analysis

The survey responses were quantified and organized using descriptive statistics such as percentages and frequencies. Data was graphed to provide a visual representation of the major findings related to awareness, perceived value, frequency of visitation, level of expenditure, and self-reported willingness to pay for recreation and conservation. Due to the small, non-probability sample size, as well as the exploratory nature of the study, no formal contingent valuation models or inferential statistics were utilized. As a result, the analysis is strictly descriptive, focusing on observed patterns and illustrating how local residents of a lower populated lakelet community perceived the recreational and existence values of Sinarapan and Lakelet Manapao.

RESULTS AND DISCUSSION

Awareness and perceived importance (Q1–Q2)

Figure 1 shows that seven (7) of the respondents, which comprise 58% of the interviewees, indicate that they know “a lot” about the species. While a smaller share of two (2) respondents, which corresponds to 17% of interviewees, reported only basic awareness, and a minority, which is 25% or three (3) of the respondents, indicated no familiarity.

The high level of familiarity is consistent with the cultural importance of the Sinarapan and the fact that it is the smallest commercially viable fish on Earth (NFRDI, 2025). Recent research that values species has determined that when people in an area have greater awareness of, and understanding of their local species, they tend to show greater support for conservation and higher levels of stated willingness-to-pay. Households living along the Balatin River Sub-Watershed in Sri Lanka's Yagirala Forest who were aware of and able to identify the ecological and cultural significance of their local freshwater species consistently provided more support and higher levels of contribution toward protection programs than those who were less aware of these species (Vicente et al., 2023; Niroshini et al., 2022).

Respondents rated the importance of Lakelet Manapao on a five-point scale for both recreation and biodiversity conservation. Results are presented in Figure 2.

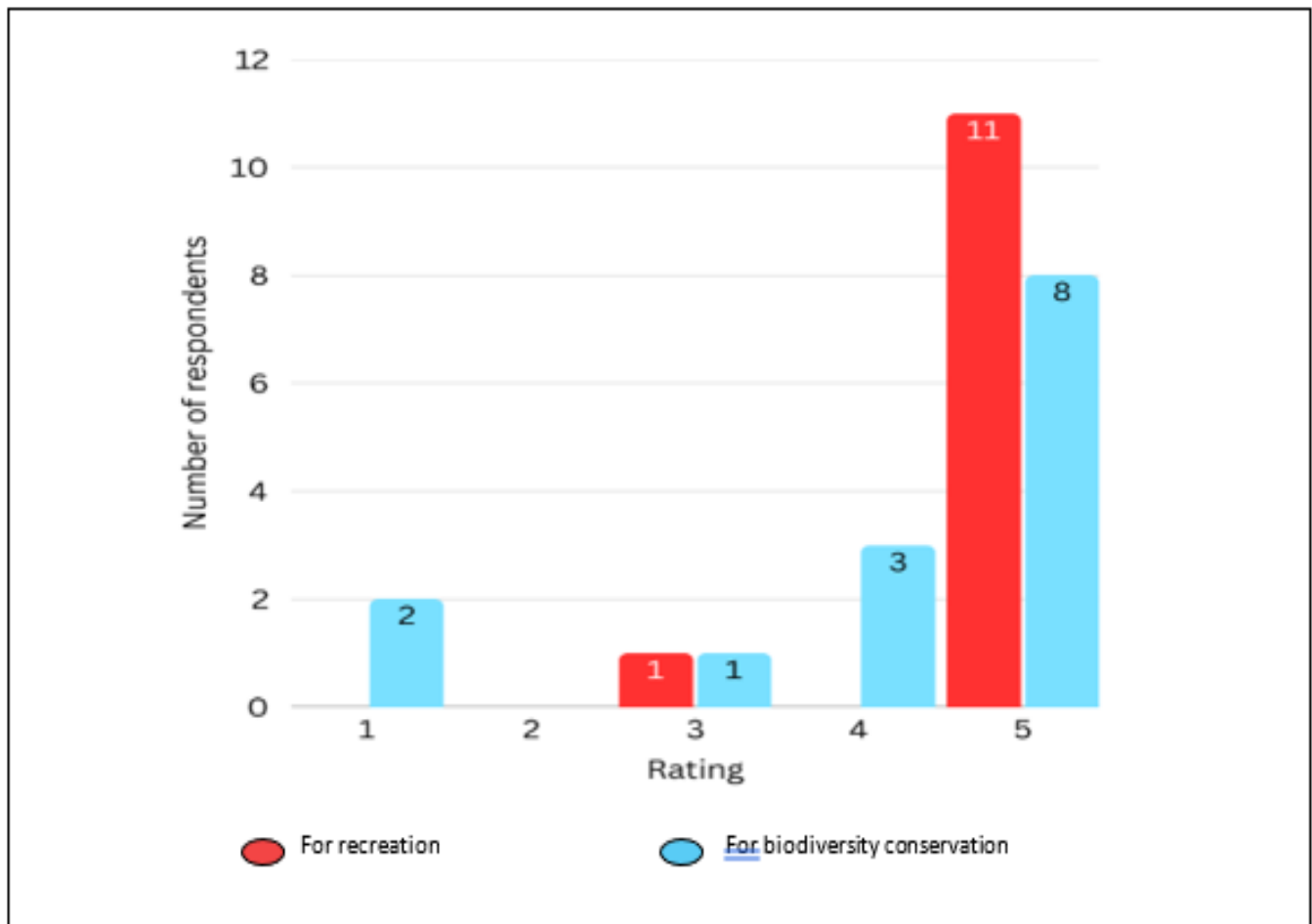


Figure 2. Perceived importance of Lakelet Manapao For recreation and biodiversity. Importance level of Lakelet Manapao for recreation and biodiversity conservation as rated by the respondents on a 5-point scale. Respondents regard Lakelet Manapao as highly important for both recreation and biodiversity conservation.

The vast majority of eleven (11) participants rated the lakelet as "very important" for recreation, indicating that people living near Lakelet Manapao consider it an important local space for leisure and everyday outdoor activities. Findings from recent research on lake and river valuation suggest that lakes and rivers that are easy to access provide substantial recreational value for people living in the vicinity of these bodies of water, such as the residents of Tadalac Lake, Laguna and the San Juan River Wetlands in Colombia, who reported using lakes/streams near them for low-cost leisure activities, and were willing to support quality improvement and habitat restoration efforts in their vicinity (Villaruel, 2024; Sierra et al., 2021).

Importance ratings for biodiversity conservation were also high, with most respondents, or eight (8) of them, assigning “very important” and three (3) scoring as “important”. This reflects recognition of the Lakelet’s ecological roles as a habitat for Sinarapan and other freshwater species. Also, this trend of education and environmental literacy having an effect on people's perception of value for biodiversity as demonstrated in more recent research on aquatic (freshwater) and peatland ecosystems has shown that people with higher levels of environmental knowledge place a higher sense of value and existence value on both aquatic and peatland ecosystems (Yunus et al., 2024; Gilles et al., 2025).

Recreational use, spending, and WTP (Q3–Q6)

According to the survey responses (refer to Figure 3), the ratio of visitors to

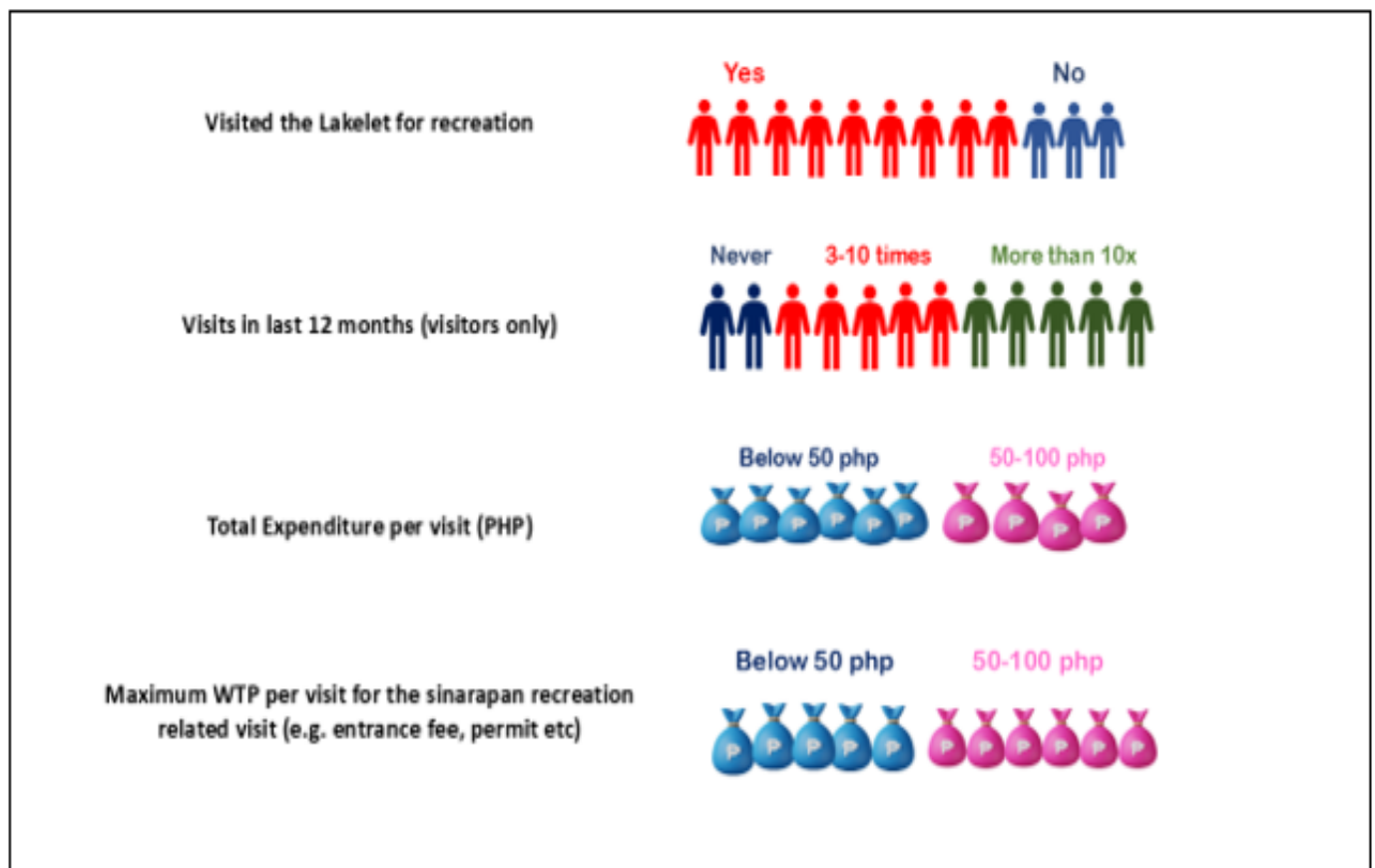


Figure 3. Recreational visits, spending, and per trip willingness to pay for Sinarapan related activities. Distribution of respondents by (b) frequency of recreational visits to Lakelet Manapao during the past year, (c) typical expenditure per visit, and (d) maximum stated willingness to pay per recreational visit. The figure illustrates frequent low- cost use and modest but positive willingness to pay among local users.

Lakelet Manapao for recreation was approximately 9:3, with nine (9) respondents (75%) reporting recent trips, whereas some of the respondents, which consist of three (3) or 25%, stated that they had never visited the lakelet for recreation. Among those who had visited, five (5) of them reported frequent visits, including more than twenty (20) visits to the site in the past year (also in Figure 3), indicating that it has become a part of their daily routine complement of recreational activities. The frequency of visitation underscores how accessibility and cultural attachment shape recreational use, consistent with recent lake and wetland valuation studies showing

that inland waters embedded in local landscapes receive more frequent use and are perceived as everyday recreational spaces (Villaruel, 2024; Sierra et al., 2021).

The amount of money spent by respondents for recreation per visit was generally low. Of the respondents, six (6) indicated that they would spend less than PHP 50.00, while four (4) indicated that their average was between PHP 5.00 and PHP 100.00; that is primarily for transportation to and from the lakelet, as well as for minor expenditures.

The low expenses incurred on the part of nearby users for their recreational use of the Lakelet Manapao support the research from other relevant studies of lakes and rivers, such as local users of Tadalac Lake in Laguna and the wetlands along the San Juan River in Colombia, who incurred minimal travel and on-site costs and still received high levels of recreational and amenity benefits from regular access to freshwater (Villaruel, 2024; Sierra et al., 2021).

Similarly, the stated maximum willingness-to-pay per recreational visit was relatively high. The majority of respondents, which corresponds to seven (7), expressed maximum WTP within PHP 50.00 - 100.00 per visit, and none were willing to pay more than PHP 100.00 per recreational visit. The majority of individual respondents were willing to pay less than Php 50.00 per trip for a recreational fee, while none were willing to pay over Php 100.00 for such a fee (Villaruel, 2024; Moreira et al., 2024). Similar to previous studies, these results mirror freshwater valuation research that indicates low- to middle-income households typically indicate small but significant contributions towards enhanced recreational and ecosystem quality (Rahman & Yaakub, 2020).

Existence Value(Q7–Q9) Importance of Sinarapan’s Continued Existence (bold)

All of the respondents valued the existence of Sinarapan very highly, even those who had never traveled to the lakelet (Figure 4). Not a single respondent among the total number of twelve (12) rated existence below “moderate” (Scores of “1” or “2”). To be more specific, two (2) respondents (17%) viewed Sinarapan’s existence as having “moderate” (score of 3) importance, whereas ten (10) respondents (83%) viewed it as very important (score of 5), with no scores of 4 reported. Such results suggest that all respondents regard Sinarapan as important and that a considerable majority find it very important.

It became obvious that such high existence value is consistent with the findings in the literature that indicate high existence and bequest values assigned to rare/endemic species regardless of their direct usage as well as willingness of the population to finance the conservation activities (Rahman & Yaakub, 2020; Moreira et al., 2024). In view of Sinarapan, being endemic and having historical ties with the Municipality of Buhi, it may be assumed that residents maintain strong emotional ties to the fish and its natural habitat.

As for willingness-to-pay in the case when no direct benefits from using the lakelet are received, all twelve (12) respondents (100%) stated that they would support conservation measures. Among seven (7) respondents who were asked to estimate annual sponsorship/financial contribution to the conservation project, three (3) respondents were ready to contribute to the cause with an annual amount of PHP 100.00, four (4) respondents with an annual amount of PHP 100.00 - PHP 300.00, and no one with an amount above PHP 300.00. The other five (5) respondents did not specify their annual contribution. It should be noted that such behavior of survey participants is typical of contingent valuation research when respondents experience problems stating long-term contributions (Vicente et al., 2023).

To conclude, all respondents agreed to participate in the conservation of Sinarapan and its habitat regardless of any personal gains from this venture. At the same time, their willingness to donate money is relatively low, probably due to the fact that they live in economically vulnerable areas. As found in other studies, similar patterns were revealed in relation to conservation efforts concerning lakes and wetlands, where participants supported conservation and showed low willingness to donate money due to financial limitations (Sierra et al., 2021; Villaruel, 2024)

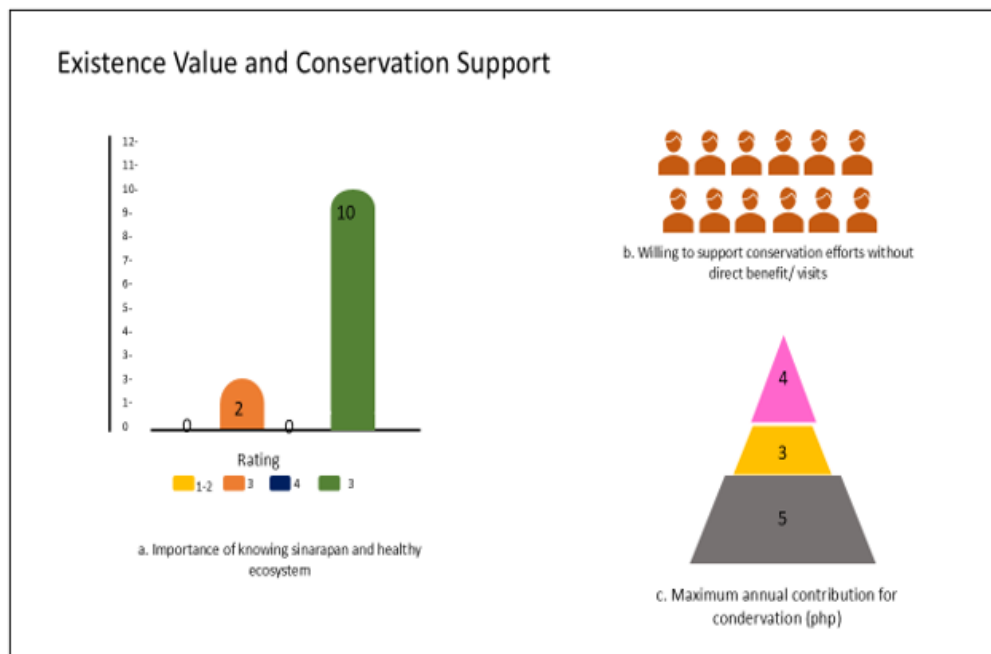


Figure 4. Existence value and conservation support for Sinarapan in Lakelet Manapao. Ratings of the importance of maintaining the existence of Sinarapan, reported readiness to back conservation efforts irrespective of individual gain, and estimates of possible annual financial contribution. This chart shows high existence values and pronounced declared backing for conservation activities despite poor capacity to make

Open Feedback

Presented in Table 1 were the open-ended perceptions reveal that the respondents view Lakelet Manapao and the Sinarapan fish as offering many kinds of benefits to them in terms of livelihood and earnings, tourism, and the support services provided by vegetables grown around the lake. In terms of suggestions regarding actions, the respondents recommended conducting clean-up campaigns in order to ensure cleanliness of the environment, proper waste segregation, beautifying the place, and promoting it through social media to boost tourism.

Overall, through the pilot survey, it is apparent that there is an interrelationship between the quantitative data and the open-ended data collected from the respondents. The results show how they see the recreational and the existence value of the Sinarapan and Lakelet Manapao habitat and the income constraints that hinder them from donating for the conservation of the said lakelet and species.

Table 1. Open- [remove space] ended responses on perceived benefits of Lakelet Manapao and suggested conservation and recreation improvements. Summary of respondents' qualitative answers describing the main benefits of Lakelet Manapao and Sinarapan (e.g., livelihood, tourism, vegetable production near the lakelet) and their recommendations to improve conservation, site beautification, and social media promotion.

Question	Response
What do you think are the main benefits provided by Lakelet Manapao and Sinarapan? (Please describe)	➤ Provides livelihood and income from fishing ➤ Boost tourism ➤ Provide the residents with vegetables being planted surrounding the lake

Do you have any suggestions to improve the conservation and recreational uses of Lakelet Manapao?	➤ Implement regular cleanup to maintain the cleanliness ➤ Proper waste segregation ➤ Beautify the area ➤ Promote the lake through social media for tourism
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CONCLUSION

The current exploratory pilot study made use of a small descriptive sample of local residents who have been interviewed concerning their valuation of the Sinarapan fish (*Mistichthys luzonensis*) [italicized] and the freshwater resources that provide a habitat for it within Lakelet Manapao. It was found that surveyed local residents tend to be familiar with the species, place a high importance on Lakelet Manapao in terms of leisure activities and species preservation, and make use of the water resource for low-cost recreational purposes. Respondents expressed a willingness to spend moderate sums on Sinarapan-related leisure, with values per visit ranging from about PHP 100.00 down and non-use (or existence) values for the presence of Sinarapan fish and a well-functioning lake system. Every respondent emphasized the necessity to preserve Sinarapan and its habitat and stated that they were prepared to contribute financially for the purpose, even without any personal gains from it, although at relatively modest sums that reflect income limitations characteristic of the rural setting.

Findings obtained through such a small and non-probability sample are consistent with previous studies dealing with the value of biodiversity or freshwater systems, where it can be seen that communities frequently place an intrinsic value on threatened or endemic species, despite limited financial benefits (e.g., Rahman & Yaakub, 2020; Niroshini et al., 2022; Moreira et al., 2024; Sierra et al., 2021; Vicente et al., 2023). As applied to the case of Lakelet Manapao, the presence of both recreational and non-use values can serve as justification for future conservation programs that incorporate both local traditions and livelihood needs. At the same time, the nature of the small and non-probability sample involved means that monetary figures cited in this pilot cannot be considered representative or statistically significant and should be viewed only as illustrative. Future research would need to apply more reliable estimation methods in order to assess monetary value and develop alternatives to existing funding approaches.

RECOMMENDATION

Based on the pilot survey findings and the limitations evident in this present study, the following recommendations have been formulated:

1. Conservation activities for Lakelet Manapao and Sinarapan focus on the high existence value obtained from the survey;
2. There should be an increase in public education and outreach efforts at Sinarapan to help develop an appreciation and use of the site;
3. Financial strategies should focus on donations or voluntary payments instead of compulsory user fees, as that potential exists;
4. Support for the growing community activities consisting regular clean up, waste sorting and site improvements;

5. Buy social media promotion of Lakelet Manapao to increase tourism and also create revenue for reinvestment in conservation activities;
6. Avoid implementing high mandatory fees from the local community and;
7. A more accurate approximate value of Sinarapan's existence could be determined in further work with larger samples and refined contingent valuation techniques.

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