

Socioeconomic value of Tabtaban lake for the local community of Sablayan, Occidental Mindoro

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Abstract

Small lakes such as Tabtaban Lake in the municipality of Sablayan have received limited attention in research. Existing studies often focus on larger freshwater bodies or well-known ecotourism destinations, leaving smaller lakes less explored. This study aimed to examine the socioeconomic value of Tabtaban Lake to the local community. The findings are expected to provide community-based evidence that can support the development of local policies, livelihood programs, ecotourism initiatives, and sustainable management plans in Sablayan. This study employed an exploratory sequential design, where qualitative data were first collected and analyzed, followed by quantitative data collection and analysis. The research instrument was designed for the households of Sitio Tabtaban. In addition, the water quality of Tabtaban Lake was assessed using a quantitative, descriptive, and observational (non-experimental) research design, along with descriptive site characterization, to evaluate its physicochemical parameters. The study found that most respondents live in households of 4–6 members, earn a monthly income of ₱10,001–₱20,000, and depend mainly on fishing as their primary source of income. Most have resided in Sablayan for over 20 years and live within one kilometer of Tabtaban Lake. The key characteristics of a lake's systems, including fish diversity, aquatic plants, invasive species, and water quality, were rated as very high. Tabtaban Lake also showed a very high socioeconomic value in terms of livelihood, food security, recreational tourism, and irrigation. Significant differences were observed based on monthly income, primary source of livelihood, and proximity to the lake. Fish diversity significantly influenced the lake's socioeconomic value. Based on these findings, a socioeconomic development plan was proposed to promote the sustainable use and management initiatives of Tabtaban Lake for the long-term benefit of the local community.

Keywords: socioeconomic value, ecotourism potential, livelihood sustainability, sustainable lake management, Tabtaban Lake

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1. Introduction

Natural resources, particularly the lakes, sustain life on Earth by meeting vital needs such as food production, recreation, and ecosystem support. Essential to economic livelihoods, cultural identity, drinking water supply, industries, and spiritual significance, they underpin thriving communities (Abbasov et al., 2022). Lakes play a vital role as major sources of freshwater, supporting agriculture, industry, and biodiversity conservation (Cull, 2023). The United Nations Environment Program (UNEP) reports that lakes hold about 90% of the world's surface freshwater (UNEP, 2022), making them vital for wildlife, ecosystems, and human needs such as clean water, irrigation, transportation, recreation, and tourism. They serve as essential habitats for aquatic species that regulate water flow and prevent floods (Melo et al., 2024). Lakes also enhance well-being through cultural and recreational value (Schirpke, 2021; Ho & Goethals, 2019), offering activities such as swimming, boating, fishing, and birdwatching (Sterner et al., 2019), as well as aesthetic, educational, and spiritual benefits (Schirpke et al., 2021). Yet, cultural ecosystem services studies often overlook small lakes, favoring large ones, with local-scale research remaining limited (Sterner et al., 2019; Hossu et al., 2019).

Sablayan stands proudly as the geographical center of the province of Occidental Mindoro, endowed with remarkable natural beauty and rich environmental resources that position it toward sustainable development. The municipality is characterized by diverse and breathtaking scenery, from lush landscapes and expansive seascapes to interconnected ecosystems sustained by a network of rivers and streams. Even within the town proper and nearby communities, numerous scenic destinations reflect its ecological richness and tourism potential (Sablayan LGU Official Page, n.d.). Economically, Sablayan thrives on farming and fishing, supported by fertile plains and abundant water resources. Farmers and fishers rely on nearby lakes and rivers for irrigation, food production, and livelihood, making these water bodies essential to daily life and local sustenance (UPMSIadmin, 2024). Among its natural assets are several lakes, including Libuao, Panikian, Marabong, Carindan, Cabacungan, and Tabtaban (List of Lakes in MIMAROPA – PhilAtlas, n.d.), which contribute to the municipality's environmental and economic stability. However, despite their importance, only a few studies have examined the socioeconomic value of smaller lakes such as Tabtaban Lake, as research often focuses on larger freshwater systems or well-known ecotourism sites. Notably, Tabtaban Lake stands out due to its direct role in supporting local livelihoods, food security, and community activities. Its accessibility and close connection to nearby residents make it a relevant site for understanding the link between natural resources and human well-being. These factors led to the selection of Tabtaban Lake as the focus of this study.

This gap highlights the need for a focused study exploring the socioeconomic value of Tabtaban Lake to the local community, aligning with national and global imperatives for water resource stewardship. Executive Order No. 22 (s. 2023) created the Water Resources Management Office (WRMO) within the DENR to integrate government efforts, implement Integrated Water Resources Management (IWRM) per UN SDGs, formulate the Integrated Water Resources Master Plan (IWMP), and generate data for evidence-based policies on sustainable water availability. Complementing this, DENR Administrative Order (DAO) 2021-19 updates the Water Quality Guidelines (WQG) and General Effluent Standards tailored to water body classifications and beneficial uses such as agriculture, fishing, and recreation. Globally, Sustainable Development Goal (SDG) 6 targets improved water quality (Target 6.3) by reducing pollution and untreated wastewater, alongside support for local community participation in water management (Target 6.b). Conducting this research generated concrete, community-based data to guide policies, livelihood projects, ecotourism initiatives, and sustainable development plans in Sablayan. By addressing this knowledge deficit, the study can raise awareness among stakeholders and ensure that Tabtaban Lake is protected for its ecological importance and used wisely as a lasting source of social and economic benefits

for the people of Sablayan.

Statement of the Problem - This study aimed to determine the socioeconomic value of Tabtaban Lake for the local community of Sablayan. Specifically, it sought to answer the following questions: (1) What is the profile of the respondents in the local community in terms of household size, average monthly income, primary means of income, years of residency in Sablayan, and proximity to Tabtaban Lake? (2) What is the socioeconomic value of Tabtaban Lake for the local community of Sablayan? (3) What is the extent of the characteristic of Tabtaban Lake in Sablayan in terms of fish diversity, aquatic plants, presence of invasive species, and water quality (Physicochemical parameters: Temperature, pH, Electrical conductivity (EC), Total Dissolved Solids (TDS), and Salinity)? (4) What is the socioeconomic value of Tabtaban Lake for the local community of Sablayan in terms of livelihood, food security, recreational tourism, Recreational Tourism; and a source of Irrigation? (5) Is there a significant difference in the socioeconomic value of Tabtaban Lake for the local community when grouped according to their profile? (6) Is the socioeconomic value of Tabtaban Lake significantly related to the profile of the respondents in the local community and the Lake's characteristics? (7) What socioeconomic development plan may be proposed to ensure the sustainable use of Tabtaban Lake for the benefit of the local community of Sablayan, Occidental Mindoro?

Significance of the Study - This study is significant because it highlights the socioeconomic value of Tabtaban Lake for the local community of Sablayan. By identifying the economic and social benefits the lake provides, the research offers insights useful not only to residents who depend on it directly but also to policymakers, educators, and future researchers who aim to promote sustainable development. To Local Residents and Fisherfolk, this study emphasizes the role of Tabtaban Lake in providing livelihood, food security, cultural identity, and recreational opportunities. It can raise residents' awareness of the importance of protecting and sustaining the lake as a vital resource that enhances their quality of life. The findings serve as a valuable reference to the Local Government Unit (LGU) of Sablayan and other policymakers for formulating programs, policies, and continuity plans to ensure the sustainable management of the lake. This will help balance economic activities with environmental protection, benefiting both present and future generations. The results of this study can guide the DOT in developing sustainable, community-based ecotourism initiatives that highlight the natural beauty and cultural significance of Tabtaban Lake.

The insights gathered can also help promote the lakes as an emerging tourism destination while ensuring that tourism activities remain environmentally responsible and beneficial to residents. The results of this study provide baseline data for the Water Risk Management Office (WRMO) to support environmental monitoring, water resource management, and risk mitigation planning. It can help the office strengthen conservation efforts and address potential ecological threats, ensuring the long-term sustainability of Tabtaban Lake. The findings of this study can assist DENR-CENRO Sablayan in enhancing environmental conservation strategies, monitoring the lake's ecosystem, and implementing programs that promote sustainable management of the lake's resources. This study provides relevant data to the Municipal Agriculture Office (MAO) to support the development of sustainable fisheries and agricultural practices in the areas surrounding Tabtaban Lake. It can guide the office in implementing programs that enhance productivity while conserving aquatic resources. The findings can assist MENRO in strengthening local environmental policies, implementing conservation initiatives, and monitoring ecological conditions to preserve the lake's biodiversity and environmental integrity. The study serves as a guide for barangay leaders in crafting localized policies, community-based programs, and awareness campaigns that promote environmental stewardship and sustainable use of the lake's resources at the grassroots level. This research contributes to the body of knowledge on the socioeconomic significance of small inland lakes in rural communities. It also serves as an example of community-responsive research that strengthens the partnership between the university and the LGU. The study provides baseline data for future researchers and a framework that may be expanded in future studies on environmental economics, community development, and natural resource management.

Scope and Delimitation of the Study - This study determined the socioeconomic value of Tabtaban Lake to

the local community of Sablayan, Occidental Mindoro. Specifically, it examined how respondents' profiles within the community and the lake's ecological characteristics influence the lake's overall value to residents. The respondents of the study were limited to selected households from Sitio Tabtaban, Barangay Tuban, Sablayan, Occidental Mindoro. The respondents' profile included household size, average monthly income, primary source of income, years of residency in Sablayan, and proximity to Tabtaban Lake. The study also considered the lake's characteristics, particularly its ecological conditions, including fish diversity, aquatic plants, invasive species, and water quality. To support this, in situ assessment of selected physicochemical parameters was conducted, including temperature, pH, electrical conductivity, total dissolved solids (TDS), and salinity. The socioeconomic value of Tabtaban Lake was measured by its contributions to livelihoods, food security, recreational tourism, and irrigation within the community. Data collection was conducted over three months from December 2025 to February 2026.

2. Methodology

Research Design - To gather the necessary data, the study used an exploratory sequential design, in which qualitative data are collected and analyzed first, followed by quantitative data collection and analysis. This mixed-methods approach allowed the researcher to explore key questions and develop initial ideas or hypotheses through qualitative insights, then to use quantitative results to test or support those findings (Berman, 2017). A qualitative method was employed, using an interview schedule, to validate responses regarding the socioeconomic value of Tabtaban Lake. This approach was used to gain a deeper understanding of the importance of Tabtaban Lake and its contribution to the local community's well-being. Subsequently, a quantitative method using a survey questionnaire was employed to determine significant differences in the socioeconomic value of Tabtaban Lake when respondents were grouped by profile, as well as the significant relationships among socioeconomic value, respondents' profiles, and the lake's characteristics. To assess the water quality of Tabtaban Lake, the study employed a quantitative descriptive research design combined with an observational (non-experimental) research design and a descriptive site characterization methodology. The observational research design was used to collect data on area parameters, primarily through direct observation. At the same time, the descriptive site characterization methodology was applied to understand the lake's physical, biological, and socioeconomic components.

Respondents of the Study - The respondents of the study were household members residing in Sitio Tabtaban, Barangay Tuban, Sablayan, Occidental Mindoro, where Tabtaban Lake is located. Based on the 2025 census, Barangay Tuban had a total population of 4,425, comprising 1,025 households. Of these, Zone 2, Sitio Tabtaban, consisted of 113 households. The study employed complete enumeration as the sampling approach, in which all members of the identified population were included as respondents. Consequently, the study involved 113 respondents. In addition, personal interviews were conducted with 15 randomly selected household members residing in Sitio Tabtaban, Barangay Tuban.

Research Instrument - The first instrument used in the study was an interview guide. Personal interviews were conducted with 15 randomly selected household members to gather insights into the importance of Tabtaban Lake to the local community's well-being. The primary data-gathering instrument was a questionnaire developed for the respondents. It was divided into three major parts: the respondents' profile, the characteristics of Tabtaban Lake, and its socioeconomic value. Each item in the questionnaire was answered using a Likert scale to measure the respondents' level of agreement or perception. Moreover, to assess the water quality based on its physicochemical characteristics, including temperature, electrical conductivity, salinity, alkalinity, and turbidity, measurements were taken directly on-site at each designated sampling station. A digital multiparameter water-quality tester was used to collect accurate, real-time data for the assessment.

To ensure the accuracy and credibility of the research instrument, the researcher sought validation from five (5) experts from the academe. Four of the validators were faculty members of the Graduate School of Divine World College of San Jose, while one (1) validator was from Sablayan National Comprehensive High School and also served as a part-time faculty member of the Polytechnic University of the Philippines, majoring in Filipino. After

receiving the research adviser's approval, the instrument was reproduced, and reliability testing was conducted.

The researcher developed a questionnaire for the residents of Marabong Lake in Barangay Batong Buhay, Sablayan, who served as respondents for reliability testing. The instrument underwent reliability analysis to test the internal consistency of the scales using the Split-Half method. The analysis included 30 valid cases, as 30 Sablayan residents responded to the 42-item questionnaire. This group was no longer included in the final administration of the questionnaire. The Spearman-Brown coefficient is the primary metric for assessing reliability in split-half analysis, and the results are presented in the table below.

Table 1
Result of Reliability Analysis

Items	Number of Items	Reliability Coefficients*	Analysis
Characteristics of Tabtaban Lake (6 items each)			
1. Fish Diversity	6	0.853	High Reliability
2. Aquatic Plants	6	0.852	High Reliability
3. Presence of Invasive Species	6	0.905	Very High Reliability
Status of the Socioeconomic Value of Tabtaban Lake (6 items each)			
1. Livelihood	6	0.855	High Reliability
2. Food Security	6	0.956	Very High Reliability
3. Recreational Tourism	6	0.953	Very High Reliability
4. Source of Irrigation	6	0.887	High Reliability

*Based on equal length

Based on the dataset's reliability analysis, the food security and recreational tourism scales showed the highest reliability, with Spearman-Brown coefficients of 0.956 and 0.953, respectively. This indicates a very strong correlation between the two halves of the instrument, suggesting a stable measurement tool. Consistent reliability is also evident in the remaining scales: presence of invasive species (0.905), source of irrigation (0.887), livelihood (0.855), fish diversity (0.853), and aquatic plants (0.852), all of which exceeded the standard threshold. This confirms that the items in these scales consistently measure the same underlying construct.

Data Gathering Procedure - For the qualitative component of the study, the researcher used a single set of questions contained in an interview guide and conducted face-to-face interviews to gather responses. Data collection was completed over a period of two days. The interview questions focused on the importance of Tabtaban Lake to the welfare of the local community of Sablayan, Occidental Mindoro. Before collecting both qualitative and quantitative data, permission was obtained from the Barangay Tuban Chairman's Office to administer the questionnaires. After approval and upon passing validity and reliability testing, copies of the questionnaire were reproduced and distributed to household members. During data collection, the researcher clearly explained the purpose and contents of the questionnaire to ensure that respondents fully understood each item. Respondents were also assured that all information provided would be kept confidential. After retrieval, the completed questionnaires were systematically organized, tabulated, and prepared for analysis and interpretation.

The assessment of physicochemical water quality parameters was conducted in situ at designated sampling stations in Tabtaban Lake. Five sampling stations were established to represent spatial variability across the lake: two stations were located in the limnetic zone (open water). In comparison, three stations were situated in the littoral zone (nearshore areas). At each station, triplicate in situ measurements were obtained to ensure data reliability and accuracy. The measured parameters included temperature, pH, electrical conductivity, total dissolved solids (TDS), and salinity, following procedures adapted from the Atlas Scientific Journal. Given that the lake was 2–5 meters deep, measurements were taken only within the euphotic layer. Data collection for these physicochemical parameters was conducted from December 2025 to February 2026. All measurements were conducted using a compact 5-in-1 handheld digital water quality tester measures pH, EC, TDS, salinity, and temperature, featuring a backlit LCD, waterproof probe, simple calibration buttons, low battery indicator, and auto-off for portable field use; it also assesses drinking water, aquariums, hydroponics, pools, and environmental samples to detect contaminants and acidity for safety. To ensure accuracy and consistency, the instrument was calibrated and cleaned with distilled water before and after each use in accordance with the manufacturer's

guidelines. For accurate readings, the probe's sensing element, specifically the electrode tip or sensor cell, was fully submerged in the water sample to ensure complete contact and prevent exposure to air. The probe was submerged to at least the minimum submersion line indicated on the device. The average of the triplicate readings for each parameter was calculated and used for statistical analysis to assess spatial variation among sampling stations.

Statistical Treatment of the Data - The qualitative data collected from participant interviews were analyzed using thematic analysis. This process involved recording, transcribing, tabulating, and coding the responses to identify recurring ideas and patterns. Based on these procedures, initial and final thematic maps were developed to determine the key themes that emerged from the data. For the quantitative component of the study, SPSS version 26 was used to examine significant differences in socioeconomic value among groups classified according to respondents' profiles, lake characteristics, and socioeconomic status. Descriptive statistics, including the mean and other relevant measures, were used to summarize central tendencies in the responses, while the standard deviation and variance were used to assess variability. Moreover, Pearson's correlation was conducted to determine the strength and direction of the relationships among the respondents' profiles, the lake's characteristics, and the lake's socioeconomic value. In addition, simple linear regression analysis was used to examine how the respondents' profiles and lake characteristics influenced the socioeconomic value of Tabtaban Lake for the local community of Sablayan. To summarize the measurements of each physicochemical parameter at the sampling stations, descriptive statistics were applied. One-way analysis of variance (ANOVA) was performed to determine whether significant differences in water quality existed among the sampling stations, followed by Tukey's post hoc test for pairwise comparisons of means. A significance level of 0.05 was applied. Before conducting ANOVA, the Shapiro–Wilk test was used to assess the normality of the data distribution and to ensure that the statistical assumptions were met.

Ethical Considerations - Before conducting the study, the researcher sought permission from the Barangay Chairman of Tuban and from the cooperatives managing the lake in Barangay Tuban, Sablayan, Occidental Mindoro. The respondents, who were household members, were informed of the research's objectives and procedures to ensure their full understanding and voluntary participation. The purpose and content of the questionnaire were clearly explained to help respondents answer each item accurately. The researcher also assured the confidentiality of all survey responses. After the required number of completed questionnaires had been collected, the data were carefully organized and tabulated in preparation for analysis and interpretation. Fieldwork was conducted in accordance with established safety protocols to minimize risks to both the researchers and the environment. The researchers wore appropriate personal protective equipment (PPE), including gloves, boots, and masks when necessary. Field activities were carried out under safe weather conditions to avoid potential hazards, and all sampling equipment was sanitized before and after use to prevent contamination. Compliance with the Data Privacy Act was ensured by implementing safeguards to protect personal and sensitive information. All data were securely stored and accessed only by authorized personnel, and any personal identifiers were removed or anonymized to maintain confidentiality and privacy throughout the research process.

3. Results and Discussions

Table 2

Respondents' Profile in Terms of Household Size, Average monthly income, primary means of income, years of residency in Sablayan, and proximity to Tabtaban Lake (n=113)

Household Size	Frequency	Percent
1 - 3 members	8	7.1
4 - 6 members	88	77.9
7 - 9 members	17	15.0
Average Monthly Income		
P10,000 and below	4	3.5
P10,001 - P20,000	68	60.2
P20,001 - P30,000	41	36.3

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Primary Means of Income		
Fishing	53	46.9
Farming	32	28.3
Employment (public/private)	28	24.8
Years of Residency (in years)		
Less than 5	0	0
5-10	0	0
11 - 20	14	12.4
More than 20	99	87.6
Proximity to Tabtaban Lake (in km)		
Less than 1	101	89.4
1-3	12	10.6
Total	113	100.0

Table 2 presents the respondents' profiles by household size, average monthly income, primary source of income, years of residency in Sablayan, and proximity to Tabtaban Lake. The majority of the respondents belong to households with 4–6 members (88 households out of 113 or 77.9%), followed by households with 7–9 members (17 households out of 113 or 15.0%), while only a small proportion fall under 1–3 members (8 households out of 113 or 7.1%). This distribution indicates that most families in Sitio Tabtaban are medium-sized households. This type of household composition is common in rural communities in the Philippines, where extended families often live together. The result indicates that the socioeconomic importance of Tabtaban Lake is closely linked to the needs of families in the area. This aligns with the findings of Tandoh et al. (2025), which indicate that larger households typically have higher food and income demands, making them more dependent on available natural resources. Similarly, Bitana et al. (2024) found that larger households typically have higher consumption needs and rely more heavily on resources such as fisheries and freshwater systems for both daily sustenance and livelihoods. Therefore, the prevalence of households with 4–6 members suggests a stronger dependence on Tabtaban Lake, particularly for ensuring food security and generating income to support everyday living.

The distribution of respondents by average monthly income shows that majority of families (68 households out of 113 or 60.2 %) earn between ₱10,001 and ₱20,000 per month, followed by those earning ₱20,001–₱30,000 with (41 households out of 113 or 36.3%), while only a few households (4 households out of 113 or 3.5%) fall within the ₱10,000-and-below category. According to the Philippine Institute for Development Studies' 2021 income classification, most households living near Tabtaban Lake fall into the low-income group, with only a few reaching the lower-middle-income level. This shows that many families in the community have limited financial resources. This finding was supported by Monsura (2021), who explained that income level affects how households use and protect natural resources. Since most families earn less, they are more focused on meeting daily needs than on long-term environmental conservation. Likewise, this is supported by Tembo et al. (2025) and Vicente et al. (2023), who found that low-income households near lakes depend heavily on ecosystem services such as fishing, water for farming, and food supply. For many residents, the lake is essential for daily survival and livelihood.

Furthermore, only a small number of households earn between ₱20,001 and ₱30,000. This shows limited income diversification in the community, leaving many families vulnerable to environmental problems affecting the lake. Palanca-Tan (2020) noted that while higher income can improve food security, it does not fully remove dependence on natural resources, as cultural and social ties to the lake remain strong. Therefore, the findings show that Tabtaban Lake plays a vital role in supporting food, livelihood, and daily needs, especially for low-income households. Any damage to the lake would significantly affect the community's well-being, underscoring the need for effective lake management to protect both the environment and the people who depend on it.

Regarding the primary source of income, nearly half of the respondents (53 households out of 113, or 46.9%) reported it as their primary source, making it the dominant livelihood in the community. Farming follows at 28.3% or 32 households out of 113, while 24.8% or 28 households out of 113 rely on salaried employment in the

public or private sector. This distribution indicates that the majority of households depend on lake-related and natural resource-based livelihoods. Only about one-fourth of respondents rely on non-resource-based employment. This suggests a strong economic connection between the community and Tabtaban Lake. According to DENR-ADB/GEF (2021), a family's main source of income affects how they value nature and ecosystem services. In this community, fishing is the main livelihood.

Because of this, residents place great importance on the lake, especially for its fish and other aquatic resources. Fishing provides both food and income for many families. This idea is supported by Palanca-Tan (2021), who explained that fishing communities value aquatic resources because these directly support their daily needs. Makwinja et al. (2021) also noted that fishing households are highly vulnerable when water quality deteriorates or fish stocks decline. Since almost half of the respondents depend on fishing, environmental damage to Tabtaban Lake could seriously affect household income and food security. For farming households, the lake is also an important source of irrigation water. This aligns with Zhou et al. (2023), who emphasized that lakes enhance agricultural productivity. However, they also stressed that water must be managed carefully to protect the lake's ecological balance. Moreover, households with public or private employment are less dependent on the lake because they have other sources of income. Camacho-Valdez et al. (2025) noted that having multiple livelihood sources helps reduce pressure on lake resources and supports sustainability. Similar to the findings in Lake Sebu by Paller et al. (2021), fishing in the community is not only a source of income but also part of local culture and identity. The results show that the lake is crucial to livelihoods, food security, and community life. Therefore, protecting the lake is necessary not only for environmental sustainability but also for the well-being of the people who depend on it.

Furthermore, the distribution of respondents by years of residency in Sablayan. The results indicate that most respondents have resided in the municipality for more than 20 years (99 of 113 households, or 87.6%). Meanwhile, only 12.4% (14 households out of 113) reported a residency period of 11–20 years, and no households reported residing for less than five (5) years or within the range of five (5) to ten (10) years. This finding indicates that most respondents are long-term residents who have spent much of their lives in the community and have maintained a close connection with Tabtaban Lake. The large number of long-term residents shows that most respondents are very familiar with the lake and its importance in their daily lives and jobs. This was consistent with Jacob (2025), who explained that people who live in one place for a long time usually develop greater happiness, stronger emotional attachment, and a stronger sense of belonging to their community. Since almost 9 out of 10 respondents have lived in Sablayan for more than 20 years, they are likely to have strong emotional and social connections to the area.

Additionally, this was also in line with the study of Melo et al. (2024), which found that long-term residents tend to have a deeper understanding of their environment and are more willing to engage in conservation efforts. Similarly, Thiemann et al. (2022) and Zent (2025) emphasized that extended residency contributes to the development of valuable local knowledge, including awareness of seasonal patterns and resource use. In rural Philippine contexts, Palanca-Tan (2021) noted that long-term residents often rely on natural resources such as fishing and aquaculture for their livelihoods. This suggests that the residents of Sablayan may be more environmentally aware and sensitive to ecological changes due to their dependence on local resources. Thus, the results show that Sablayan is predominantly composed of long-time residents. Their long stay in the community affects how they think about social, economic, and environmental issues. This shows that years of residency are important when studying people's views on natural resource management and local development.

Lastly, most households are located very close to Tabtaban Lake. With nearly 9 out of 10 (101 households out of 113, or 89.4%) respondents residing within less than 1 kilometer, and only 12 households out of 113 (10.6%) living 1–3 kilometers away, this indicates that the lake is physically accessible and likely part of residents' everyday environment. Because many families can walk to the lake, they rely on it for fishing, getting food, and other daily needs. This was consistent with the study by Paller et al. (2021), which reported that families living near water are more likely to fish, raise fish, and use water. In this study, 89.4% of respondents

live less than one kilometer from the lake, so they likely depend on it for food and income. This was supported by Tahiluddin et al. (2025), who also noted that people living near water may be more affected by issues such as pollution and runoff. This means that if the lake becomes polluted or damaged, many households will feel the effects immediately, both financially and in their daily lives. Moreover, living near the lake also brings cultural and emotional value. This corroborated the observations of Baltazar et al. (2022), who emphasized that people living near natural places feel more connected to them, enjoy their beauty, and can relax there. From an economic perspective, Rouwendal et al. (2014) and Shi et al. (2022) noted that living near water can increase property values. Likewise, Alimkulov et al. (2025) found that people living near lakes tend to care more about the environment and learn ways to protect it. Therefore, Tabtaban Lake is an important part of the community's daily life. Any changes to the lake affect people's jobs, culture, and well-being.

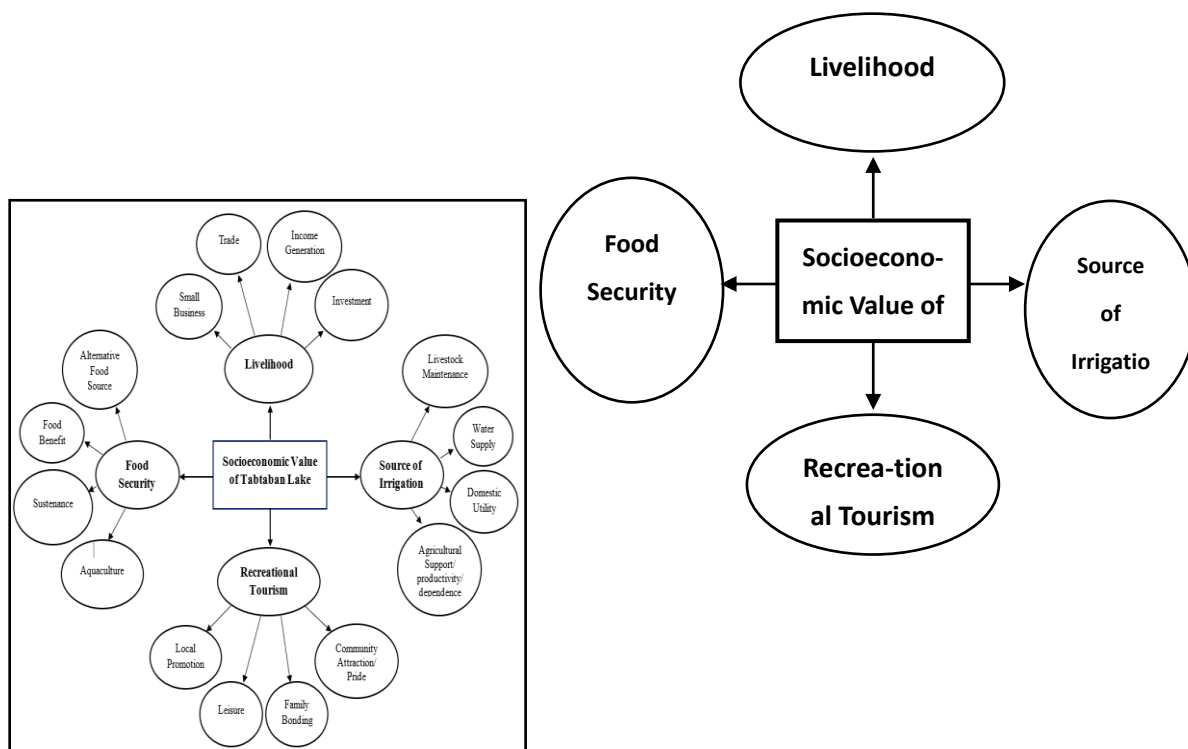


Figure 1. Initial Thematic Map for the Socioeconomic (Figure 2). Final Thematic for the Socioeconomic of Value of Tabtaban Lake

To identify the topics reflected in the thematic map, the initial responses of the 15 participants were recorded, transcribed, organized, and carefully categorized. The answers to the qualitative question were analyzed using thematic analysis. Figure 3 presents the resulting thematic map, which illustrates the central theme, the socioeconomic value of Tabtaban Lake, along with the surrounding sub-themes that emerged from the participants' responses. A total of 16 themes were initially identified from the participants' responses. The livelihood theme covered small businesses, trade, income generation, and investments. Participants emphasized the lake's importance as a major source of livelihood, supporting many households in Sitio Tabtaban. First, the food security theme included aquaculture, sustenance, food benefits, and the lake's role as an alternative food source. Participants expressed a sense of security, knowing that the lake helps ensure a regular food supply for their households and meets their families' daily nutritional needs. Next, the recreational and tourism theme encompassed local promotion, leisure, family bonding, and community pride. Participants described the lake as a place where people can relax, enjoy time with family and friends, and strengthen community ties. They also noted its strong potential as a local tourism attraction.

Lastly, the irrigation source theme included livestock maintenance, water supply, domestic use, agricultural

support, productivity, and dependence. Under this theme, participants highlighted the lake's vital role in sustaining agricultural activities, particularly by providing water for farming and daily household needs.

The socioeconomic value of Tabtaban Lake is summarized in Figure 2. Based on the analysis, four major themes emerged: livelihood, food security, recreational tourism, and irrigation source. These themes clearly explain how the lake supports the daily lives and well-being of the local community in Sablayan, Occidental Mindoro. Studies show that lakes serve as lifelines for nearby communities by providing food, income, water, and other essential resources that sustain both household needs and local economies (Bao et al., 2022). In particular, lakes support livelihoods through fishing, farming, small-scale businesses, and other lake-related activities, especially in rural areas where alternative income sources are limited (Xu et al., 2023). This supports the livelihood theme identified in the study, where the lake serves as a major source of income and economic security for many households. Moreover, the lake's fisheries help buffer the community against food insecurity, especially during economic or environmental stress (San Juan, 2022; Fiorella et al., 2021). Protecting the lake ensures that residents continue to have access to nutritious foods and reliable sources of income, which together support their overall well-being (Galang & Philippine Institute for Development Studies, 2022). Access to lake water for irrigation helps stabilize crop production, especially during dry seasons, thereby strengthening community resilience and food supply.

Likewise, the lake is a natural attraction, offering opportunities for boating, fishing, and sightseeing. These recreational activities create additional income for residents and support small businesses, contributing to community development (Yamagishi & Ocampo, 2024; Santiago et al., 2019). When managed sustainably, lake tourism strengthens social connections, encourages eco-friendly practices, and improves residents' quality of life, making it an important complement to traditional livelihoods (Chavez & Lunar, 2025; Sibulan et al., 2025). Additionally, inland fisheries and freshwater systems play a crucial role in providing affordable protein and supporting agricultural productivity, which directly affects household nutrition and food availability (San Juan, 2022; Akbari et al., 2022). In summary, these insights confirm that Tabtaban Lake is not only an environmental resource but also a central foundation of the community's socioeconomic life. Its value extends beyond income generation to include food security, agricultural support, recreation, and social well-being. This highlights the importance of protecting and managing the lake sustainably so it can continue to support the needs of the local community now and in the future.

Table 3 shows the Mean Extent of the characteristics of Tabtaban Lake in Sablayan in terms of Fish diversity, Aquatic plants, and the presence of invasive species, with an overall mean of 4.69, interpreted as "Very High." This high score indicates that the lake is a highly active and productive ecosystem that serves as a vital foundation for the surrounding community. The results were rated "Very High" for all characteristics: Fish Diversity ($\bar{x} = 4.31$), Aquatic Plants ($\bar{x} = 4.86$), and the Presence of Invasive Species ($\bar{x} = 4.91$). These numbers suggest that the lake is currently rich in life and offers a variety of resources for residents. The abundance of aquatic vegetation acts as a natural "neighborhood" that supports a wide range of fish species. It also indicates that the invasive species in the lake are being monitored, managed, and controlled. Although they were all rated as very high, the presence of invasive species got the highest mean, indicating that respondents strongly agree that invasive species in the lake are being monitored, managed, and controlled. The results show that the community clearly understands the dangers posed by non-native or invasive species and recognizes that controlling them is important for protecting the lake and the benefits people derive from it. All indicators in the table were rated Very High, indicating that many people share similar positive views. The statement that the presence of non-native species in the lake is monitored indicates that residents perceive active observation or management of invasive species. This supports the study by Adobo et al. (2020), which found that early detection and regular monitoring are crucial for preventing invasive species from spreading and damaging the environment. Effective monitoring is critical in lakes where livelihoods depend on healthy fish populations. The second-ranked category is aquatic plants (4.86), indicating that respondents strongly recognize their importance to the lake's ecological health and socioeconomic value. The results show that aquatic plants in Tabtaban Lake are not only common but also well-managed and highly beneficial to both the lake and the local community. All

individual indicators received Very High ratings, reflecting consistent and positive perceptions among respondents. The lake has a variety of aquatic plants, which shows rich biodiversity. In the Philippines, freshwater lakes often host plants such as water hyacinth, duckweed, and lotus. These plants not only help the environment but also provide people with food, crafts, and other income-generating activities (25 Common Water and Aquatic Plants Grown in the Philippines, 2020). Having a variety of aquatic plants makes the lake more productive and supports many ecosystem functions.

Table 3

Mean Extent of the characteristic of Tabtaban Lake in Sablayan in terms of Fish diversity, Aquatic plants, and Presence of invasive species

Fish Diversity	Weighted Mean	Interpretation
1. The lake supports a diverse variety of fish species.	4.82	Very High
2. Fish diversity in the lake supports sustainable fishing activities of local households.	4.28	Very High
3. Native fish species remain abundant in the lake.	4.73	Very High
4. Fish resources in the lake are sufficient for local fishing needs.	3.05	Moderate
5. Fish diversity in the lake contributes to household income.	3.99	High
6. Preserving fish diversity is important for the community's future livelihood.	4.97	Very High
Composite Mean	4.31	Very High
Aquatic Plants		
1. The lake has a variety of aquatic plants.	4.74	Very High
2. Aquatic plants in the lake help maintain good water quality.	4.83	Very High
3. Aquatic plants provide habitat for fish.	4.96	Very High
4. Aquatic plants are useful to community members.	4.70	Very High
5. Aquatic plants in the lake are properly managed.	4.94	Very High
6. Proper management of aquatic plants supports lake productivity.	4.98	Very High
Composite Mean	4.86	Very High
Presence of Invasive Species		
1. The presence of non-native species in the lake is monitored.	4.93	Very High
2. The impact of invasive species on native fish is controlled.	4.94	Very High
3. Native species in the lake remain present despite invasive species.	4.91	Very High
4. The lake ecosystem remains generally stable.	4.75	Very High
5. Community actions help limit invasive species.	4.94	Very High
6. Controlling invasive species is important for lake conservation.	4.96	Very High
Composite Mean	4.91	Very High
Overall Mean	4.69	Very High

Scale: 4.20-5.00 Very High; 3.40 -4.19 High; 2.60-3.39 Moderate; 1.80-2.59 Low; 1.00-1.79 Very Low

Lastly, regarding fish diversity (4.31), respondents strongly agree that Tabtaban Lake supports a diverse and valuable fish community. The overall results show that fish diversity is one of the lake's greatest strengths, and the local community clearly recognizes its importance, as many people depend on the lake for their jobs and daily needs. The high average scores for statements such as "supports a diverse variety of fish species and "native fish species remain abundant in the lake, both rated Very High, suggest that people think the lake is healthy and productive. Sultana et al. (2022) also stated that having many fish species is a sign of a healthy lake and provides food, income, nutrition, and cultural value to nearby communities. More fish types also give fishers more options, helping them cope with environmental and economic changes.

This relationship is best explained by Peterson et al. (2025), who noted that aquatic plants are essential for lake health because they provide habitat complexity, offering both food and shelter for many species. A thriving plant community directly supports the long-term sustainability of fishing livelihoods by ensuring that fish populations have a safe place to grow and reproduce. Moreover, if invasive species are properly controlled and managed to prevent their spread and environmental harm (Adobo et al., 2020), a diverse fish population will consistently provide food and income for every household, even as environmental conditions change.

Table 4
Mean Extent of Characteristics of Water Quality

Physicochemical Parameters	Frequency	Percent
1. Temperature °C (Mean=28.43 °C)		
27 °C	4	26.7
28 °C	8	53.3
29 °C	3	20.0
2. pH (Mean=7.5)		
7.21 – 7.43 pH	8	53.3
7.44 – 7.66 pH	3	20.0
7.67 – 7.89 pH	4	26.7
3. Electrical Conductivity (Mean=367.13 µS/cm)		
353 – 360 µS/cm	3	20.0
361 – 367 µS/cm	5	33.3
368 – 375 µS/cm	7	46.7
4. Total Dissolved Solids (Mean=178.67 ppm)		
174 – 176 ppm	4	26.7
177 – 179 ppm	4	26.7
180 – 183 ppm	7	46.7
5. Salinity (Mean=.01 ppt/ppm)		
.01 ppt/ppm	15	100.0
Total	15	100.0

Table 4 presents the mean extent of key physicochemical parameters of water quality in Tabtaban Lake based on the statistical results gathered from fifteen (15) sampling observations. Physicochemical parameters are measurable physical and chemical characteristics of water, including temperature, pH, electrical conductivity, total dissolved solids (TDS), and salinity, and are essential indicators of aquatic ecosystem health. These parameters were considered because they directly influence biological processes, species distribution, and overall water usability for domestic, agricultural, and ecological purposes. Assessing these variables provides a scientific basis for determining the lake's environmental condition and its capacity to sustain aquatic life and support socioeconomic activities. Overall, the findings indicate that the lake's water quality remains within acceptable and healthy ranges for freshwater systems, suggesting favorable conditions for aquatic life and community use. The results indicate that the water quality of Tabtaban Lake remains generally within acceptable, healthy ranges for freshwater ecosystems, suggesting that the lake can continue to support aquatic life and meet community needs, including fishing, irrigation, and domestic use.

The mean water temperature of 28.43°C falls within the ideal range for tropical freshwater lakes. This condition is important because temperature directly affects fish metabolism, growth, and survival, as well as the availability of dissolved oxygen. This corroborated the observations of Redoble et al. (2025), who found that water temperatures between 20 and 30°C are favorable for most freshwater organisms in tropical regions. Similarly, the World Bank Group (2023) emphasized that stable lake temperatures help prevent ecological stress such as oxygen depletion and fish mortality. The clustering of temperature readings around 28°C in Tabtaban Lake suggests relatively stable thermal conditions, which support fisheries and other lake-dependent livelihoods. In terms of pH, the mean value of 7.5 indicates neutral to slightly alkaline water, which is ideal for freshwater ecosystems. This was reflected in the findings of Tecklie et al. (2024), that most aquatic organisms thrive within a pH range of 6.5 to 8.5, as values outside this range can disrupt reproduction and reduce biodiversity. Stable pH levels also help regulate nutrient availability and limit the release of toxic metals from sediments. This finding suggests that the chemical condition of Tabtaban Lake remains suitable for sustaining fish populations and maintaining ecosystem services that support food security and income generation for the local community. The electrical conductivity (EC) of Tabtaban Lake, with a mean of 367.13 µS/cm, reflects a moderate concentration of dissolved ions. This level is typical of clean freshwater lakes and indicates the absence of excessive pollution from agricultural runoff or domestic waste. Vasistha and Ganguly (2020) explained that moderate EC values indicate a balanced mineral content, supporting aquatic biodiversity without causing osmotic stress in fish. Likewise, Redoble et al. (2025) found that similar EC ranges in Philippine lakes were associated with healthy fish habitats and stable ecosystem conditions.

The mean total dissolved solids (TDS) of 178.67 ppm further confirms good water quality. TDS levels below 200 mg/L are considered favorable for freshwater organisms and indicate minimal contamination (*Total Dissolved Solids Significance to Fish and Aquatic Life - Basic Water Science 101*, 2022). Low TDS levels support fish spawning, reduce stress on aquatic species, and ensure that lake water is suitable for irrigation and domestic use. This suggests that Tabtaban Lake continues to provide reliable ecosystem services that contribute to both food production and livelihood stability. Lastly, the salinity level of 0.01 ppt across all samples confirms that Tabtaban Lake remains a true freshwater system. This aligns with Gatta (2022), which states that very low salinity is critical for freshwater fish species and agricultural use, as even small increases in salinity can reduce fish productivity and crop yields. Similarly, Pomelo (2026) emphasized that salinity levels below 0.5 ppt are safe for drinking water, irrigation, and aquatic life. The consistently low salinity in Tabtaban Lake indicates the absence of saltwater intrusion and supports its continued use by the surrounding community. Therefore, Tabtaban Lake's water quality is characterized by stable temperature, balanced pH, moderate conductivity, low TDS, and very low salinity. This indicates a healthy freshwater ecosystem, consistent with studies of tropical lakes. Maintaining these parameters protects aquatic biodiversity and socioeconomic benefits, such as livelihoods and food security. Continuous monitoring and management are vital to preserve its role in Sablayan's community well-being.

Table 5 presents the mean socioeconomic value of Tabtaban Lake across livelihoods, food security, recreational tourism, and irrigation. The results show an overall mean of 4.65, interpreted as Very High, indicating that the lake is a crucial resource for the community's survival, economic stability, and quality of life. Among the indicators, Source of Irrigation obtained the highest mean of 4.83 (Very High), showing the community's strong reliance on the lake for farming. This supports Naval (2016), who emphasized that irrigation is essential for increasing farm productivity and maintaining stable income, especially during dry seasons. Recreational Tourism followed with a mean of 4.72 (Very High), reflecting the lake's importance as a visitor attraction that generates additional income and helps diversify the local economy. The findings confirm that Tabtaban Lake has a very high socioeconomic value for recreational tourism. The lake provides recreational benefits, supports small businesses, and offers strong tourism potential for the community. However, as noted by Schafft et al. (2021), recreational use must be balanced with conservation efforts to protect freshwater ecosystems. Thus, sustainable and community-based tourism practices are essential to ensure that the recreational and economic benefits of Tabtaban Lake are maintained without compromising its ecological health.

Although Food Security ($\bar{x} = 4.56$) and Livelihood ($\bar{x} = 4.48$) had slightly lower mean values, both remained within the Very High category. Regarding food security, the composite mean of 4.56, interpreted as Very High, indicates that the lake plays a very important role in ensuring food availability and nutritional support for the local community. The results confirm that Tabtaban Lake has a very high socioeconomic value for food security. The lake supports daily nutrition, reduces food expenses, and provides a stable source of protein for the community. This aligns with the findings of Ringler et al. (2021), which emphasized that healthy freshwater ecosystems are essential for long-term food and nutrition security. Therefore, protecting and sustainably managing Tabtaban Lake is crucial to maintaining its role in supporting household food security and community well-being.

Table 5
Mean Status of the Socioeconomic Value of Tabtaban Lake in terms of Livelihood, Food Security, Recreational Tourism, and Source of Irrigation

Livelihood	Weighted Mean	Interpretation
1. The lake provides income opportunities for local households.	4.58	Very High
2. The household earns income from lake-related activities.	4.20	Very High
3. The condition of the lake influences household income stability.	4.48	Very High
4. Lake-based activities support local employment.	4.20	Very High
5. The lake provides alternative sources of income for residents.	4.78	Very High
6. Residents are generally satisfied with lake-based livelihood opportunities.	4.64	Very High
Composite Mean	4.48	Very High

Food Security		
1. The lake provides a regular source of food for local households.	3.63	High
2. Fish from the lake are accessible to community members.	4.94	Very High
3. Fish from the lake contribute to household nutrition.	4.96	Very High
4. Lake resources help households meet food needs.	4.12	High
5. Access to lake resources reduces household food expenses.	4.96	Very High
6. A decrease in fish resources affects the community's food supply.	4.75	Very High
Composite Mean	4.56	Very High
Recreational Tourism		
1. The lake attracts visitors from nearby areas.	4.35	Very High
2. Tourists visiting the lake help increase local income through purchases.	4.20	Very High
3. The growth of recreational tourism around the lake creates small-business opportunities for locals.	4.85	Very High
4. The lake serves as a recreational area for residents.	4.96	Very High
5. Tourism activities in the lake (e.g., boating, sightseeing, and swimming) provide benefits to residents	4.96	Very High
6. The lake has tourism potential.	4.98	Very High
Composite Mean	4.72	Very High
Source of Irrigation		
The lake serves as a source of irrigation water for nearby farms.	4.96	Very High
Farmers depend on lake water during dry periods.	4.95	Very High
Lake water supports crop production.	4.84	Very High
Access to lake water reduces farming costs.	4.56	Very High
Irrigation from the lake supports agricultural income.	4.72	Very High
Proper management of lake water is important for the sustainability of irrigation.	4.96	Very High
Composite Mean	4.83	Very High
Overall Mean	4.65	Very High

Scale: 4.20-5.00 Very High; 3.40 -4.19 High; 2.60-3.39 Moderate; 1.80-2.59 Low; 1.00-1.79 Very Low

These results indicate strong confidence in the lake's ability to provide food and income. This finding is supported by Bao et al. (2022), who described lakes as "lifelines" that provide continuous food resources and support local economies. Generally, the findings indicate that the socioeconomic value of Tabtaban Lake lies in its multiple roles as a food and irrigation source and a tourist attraction. The consistently Very High ratings confirm that the lake is central to the community's economic and social life. However, this high dependence also highlights the community's vulnerability to environmental degradation, emphasizing the need for sustainable lake management.

Table 5
Analysis of Variance in the Socioeconomic Value of Tabtaban Lake When Grouped According to Profile

Profile	F-value	p-value*	Interpretation
Household Size			
Livelihood	.996	.373	Not Significant
Food Security	1.278	.283	Not Significant
Recreational Tourism	19.320	.000	Highly Significant
Source of Irrigation	2.211	.114	Not Significant
Average Monthly Income			
Livelihood	6.202	.003	Significant
Food Security	7.642	.001	Significant
Recreational Tourism	2.653	.075	Not Significant
Source of Irrigation	3.812	.025	Significant
Primary Means of Income			
Livelihood	276.318	.000	Highly Significant
Food Security	307.128	.000	Highly Significant
Recreational Tourism	10.022	.000	Highly Significant
Source of Irrigation	.340	.712	Not Significant
Years of Residency in Sablayan			
Livelihood	.062	.803	Not Significant
Food Security	1.301	.256	Not Significant
Recreational Tourism	1.834	.178	Not Significant
Source of Irrigation	.004	.951	Not Significant

Proximity to Tabtaban Lake			
Livelihood	33.703	.000	Highly Significant
Food Security	21.646	.000	Highly Significant
Recreational Tourism	2.893	.092	Not Significant
Source of Irrigation	.343	.559	Not Significant

Legend: *Significant at $p < .05$

The Analysis of Variance (ANOVA) was conducted to determine if significant differences exist in the perceived socioeconomic value of Tabtaban Lake across five demographic profiles: household size, average monthly income, primary means of income, years of residency, and proximity to the lake. The results indicate that the primary means of income and average monthly income are the most influential factors, showing significant to highly significant differences ($p < .05$) across nearly all socioeconomic indicators. This finding is supported by Palanca-Tan (2021), Makwinja et al. (2021), and Paller et al. (2021), who explained that fishing-dependent families rely heavily on good water quality, adequate fish supply, and a stable ecosystem. When these conditions decline, both food availability and income are immediately affected. This explains why respondents whose livelihoods depend on Tabtaban Lake value the lake more highly than businesspeople or salaried workers with other income sources. Furthermore, the influence of monthly income also reflects typical rural patterns. Vicente et al. (2023) and Tembo et al. (2025) found that low-income households rely more on ecosystem services, whereas higher-income households are better able to diversify their livelihoods. For poorer households, the lake remains a key source of food, income, and security.

More specifically, livelihood and food security perceptions were highly significant when grouped by the respondent's primary means of income ($F=276.318$ and $F=307.128$ respectively, $p=.000$) and their proximity to the lake ($p=.000$). When grouped by their primary means of income, respondents showed highly significant ($p=.000$) differences in how they value the lake for livelihood, food security, and recreational tourism. This indicates that a fisherman, for example, perceives the lake's value in fundamentally different ways from a businessperson or a government employee. This suggests further that the respondent's financial status directly influences their reliance on the lake's primary resources. This was supported by Akbari et al. (2022) and Tahiluddin and Terzi (2021). Their studies showed that fishing communities depend on lakes for both food and income, making them more sensitive to environmental changes. Similarly, Paller et al. (2021) and Tahiluddin et al. (2025) found that households living closer to lakes benefit more from resources but are also more vulnerable to pollution and degradation.

In contrast, years of residency showed no significant difference with any socioeconomic value, with p -values ranging from .178 to .951. Similarly, the value of the lake as a source of irrigation remained consistent across most profiles, except when grouped by average monthly income ($p=.025$). Jacob (2025) and Melo et al. (2024) explained that while long-term residents develop stronger attachment and knowledge, actual economic dependence depends more on income and livelihood than on years of residence alone. Furthermore, given the proximity to the lake, location matters to the respondents. The closer they are to the lake, the more significantly it affects their livelihood ($F=33.703$, $p=.000$) and food security ($F=21.646$, $p=.000$). This suggests that those living closest to the lake likely rely on it far more for daily sustenance and income than those farther away. Therefore, the highly significant differences found in the primary means of income and average monthly income categories suggest that the lake is a critical economic asset. This difference highlights the lake's role as a primary safety net for lower-income or resource-dependent households.

The regression analysis, as shown in Table 6, examines how various respondents' profile factors predict the perceived socioeconomic values of Tabtaban Lake. The regression results indicate that the respondents' profile has strong to moderate predictive power for how they value the lake, particularly regarding food security ($R = .906$), livelihood ($R = .892$), and recreational tourism ($R = .588$). The primary source of income is the only highly significant predictor ($p=.000$), indicating that a person's job largely determines how they view the lake as a food source. A strong relationship also exists between the respondents' profiles and the lake's perceived

livelihood value, driven by both the primary means of income ($p=.000$) and the average monthly income ($p=.001$). This indicates that households earning less or engaged in water-based occupations place greater importance on the lake for their livelihoods. These findings are supported by Palanca-Tan (2021), who explained that communities that depend on lakes for income, particularly through fishing, tend to assign high economic value to these resources. For such households, the condition of the lake directly affects their financial stability. Similarly, Vicente et al. (2023) noted that lower-income families rely heavily on provisioning services, such as fishing, to meet daily needs. This explains why residents in Sablayan with water-based jobs or lower income strongly value the lake as a source of security against poverty.

Table 6

Regression Analysis of the Relationship Between the Profile of the Respondents and the Socioeconomic Value of Tabtaban Lake

Dependent Variable (Socioeconomic Value)	Independent Variables	Multiple R	p-value	Interpretation
Livelihood	Primary Means of Income	.892	.000	Highly Significant
	Average Monthly Income		.001	Significant
Food Security	Primary Means of Income	.906	.000	Highly Significant
	Household Size		.000	Highly Significant
Recreational Tourism	Primary Means of Income	.588	.000	Highly Significant
	Proximity to Tabtaban		.033	Significant
Source of Irrigation	None	-	-	Not Significant

Legend: *Significant at $p<.05$

A moderate correlation is shown between recreational tourism and the combined factors of household size ($p=.000$), primary means of income ($p=.000$), and proximity to Tabtaban ($p=.033$). This suggests that families living closer to the lake and with more household members are more likely to recognize its value for leisure activities and tourism-related income. This finding is consistent with Baltazar et al. (2022), who emphasized that proximity increases people's appreciation of natural areas and their support for tourism development. Supera et al. (2024) also noted that larger households often have more working members, enabling them to pursue alternative livelihoods, such as ecotourism and small businesses. Meanwhile, no independent variables were found to be significant predictors for the source of irrigation. This indicates that none of the measured demographic factors reliably predict whether a person values the lake for irrigation. This suggests that the community views irrigation as a shared and universal benefit. Regardless of income level, occupation, or length of residence, residents recognize the lake's importance to agriculture. This supports Zhou et al. (2023), who stated that agricultural water resources are essential to food security and are often valued equally across different social groups. Ultimately, the dominance of the primary means of income as a predictor of three of the four socioeconomic values suggests that residents value the lake for livelihood, food security, and recreational tourism.

Table 7

Regression Analysis of the Relationship Between the Lake's Characteristics and the Socioeconomic Value of Tabtaban Lake

Dependent Variable (Socioeconomic Value)	Independent Variables	Multiple R	p-value	Interpretation
Livelihood	Fish Diversity	.556	.031	Significant
Food Security	Fish Diversity	.771	.001	Significant
Recreational Tourism	Fish Diversity	.533	.041	Significant
Source of Irrigation	None	-	-	Not Significant

Legend: *Significant at $p<.05$

This regression analysis in Table 7 evaluates how a specific characteristic of Tabtaban Lake predicts various aspects of its socioeconomic value. In the study, Tabtaban Lake is characterized by fish diversity, aquatic plants, invasive species, and water quality. Among these characteristics, only fish diversity is found to impact livelihood ($R=.556$, $p=.031$), food security ($R=.771$, $p=.001$), and recreational tourism ($R=.533$, $p=.041$). Fish diversity is statistically significant to food security, suggesting that the variety of fish species is a critical factor in ensuring a stable food supply for the local community. The strong relationship between fish diversity and fish

products supports the findings of Tahiluddin and Terzi (2021), who stated that fish products are a major source of protein for Filipinos and are important for meeting national nutritional needs. When fish diversity is high, communities have better access to nutritious food. This is further supported by Sultana et al. (2022), who explained that higher biodiversity leads to more stable fish yields, providing a safety net for households during environmental changes.

Livelihood and recreational tourism show moderate positive correlations with fish diversity. This implies that as fish diversity increases, opportunities for local jobs and the lake's appeal to tourists also increase. Romero et al. (2023) explained that fish diversity is closely linked to productivity and income among small-scale fishers. A diverse fish population allows fishers to sell different species, thereby stabilizing their income. Xu et al. (2023) also emphasized that natural resources, such as fish, strongly influence income generation and poverty reduction in communities that depend on aquatic ecosystems. Santiago et al. (2019) noted that lakes have high recreational value, especially when they are ecologically healthy. A biodiverse lake supports activities such as boating and fishing, which, according to Yamagishi and Ocampo (2024), create additional income opportunities and promote local business growth in rural areas.

However, the analysis shows no significant relationship between the lake's characteristics and its use for irrigation. From the biological standpoint, the chemical or volume requirements for watering crops are generally independent of the number of fish species living in the water. This suggests that irrigation depends mainly on water availability and volume rather than fish diversity. This finding supports Naval (2016), who described irrigation as a vital infrastructure for agricultural productivity. While the lake's water is essential for farming, the type or number of fish species does not affect its use for irrigation. The findings suggest that the biological health of Tabtaban Lake, specifically its fish diversity, is an important contributor to the local economy and community well-being. Since three of the four socioeconomic indicators are closely linked to fish diversity, conservation efforts to preserve aquatic biodiversity will likely yield direct benefits for the community's food supply and income. Thus, if fish diversity were to decline, the results suggest a predictable drop in the lake's socioeconomic value, particularly in terms of food security. That is why protecting the lake's biodiversity is essential not only for environmental sustainability but also for the long-term well-being of the people who depend on it.

Table 8
Socioeconomic Development Plan

Development Area	Objectives	Programs / Activities	Target Beneficiaries	Implementing Agencies	Time Frame	Estimated Budget (PHP)	Expected Outcomes
Livelihood Development	To increase the income of lake-dependent households	<ul style="list-style-type: none"> • Training on sustainable fishing and aquaculture • Fish processing livelihood (smoked/dried fish) • Formation of fisherfolk and women's livelihood groups 	Fisherfolk, women, and unemployed residents	LGU of Sablayan, Barangay Councils, NGOs	2-5 years	₱500,000 to ₱800,000	<ul style="list-style-type: none"> • Increased household income • Reduced unemployment • Strengthened community livelihood
Food Security	To ensure a stable and sufficient food supply	<ul style="list-style-type: none"> • Regulation of fishing activities • Distribution of fingerlings and seeds • Promotion of backyard 	Households near the lake	LGU, DA, Barangay Councils	2-5 years	₱400,000 to ₱700,000	<ul style="list-style-type: none"> • Improved food availability • Sustainable fish population • Better household

		gardening and fish farming					nutrition
Irrigation Support	To support agricultural productivity using lake water	<ul style="list-style-type: none"> • Maintenance of irrigation canals • Scheduling and regulation of water use • Farmer training on water conservation 	Farmers and irrigators	LGU, Irrigators' Associations	2–5 years	₱600,000 to ₱1 M	<ul style="list-style-type: none"> • Increased crop production • Efficient water use • Reduced water-use conflicts
Recreational Tourism	To develop eco-friendly tourism as an alternative livelihood	<ul style="list-style-type: none"> • Establishment of basic tourist facilities (view decks, signage) • Training of local tour guides • Promotion of Tabtaban Lake as an ecotourism site 	Residents, youth, and small entrepreneurs	LGU, DOT, Barangay Councils	2–5 years	₱700,000 to ₱1.2 M	<ul style="list-style-type: none"> • Increased tourism income • Job creation • Improved local tourism image
Environmental Management	To protect and sustain Tabtaban Lake	<ul style="list-style-type: none"> • Regular lake clean-up activities • Control of invasive species • Environmental awareness campaigns 	Entire community	LGU, Schools, NGOs, Barangay Councils	Continuous	₱300,000 to ₱600,000 annually	<ul style="list-style-type: none"> • Cleaner lake environment • Sustained lake resources • Increased environmental awareness

The Socioeconomic Development Plan is significant to the local community of Sablayan as it strengthens livelihoods, ensures food security, supports irrigation, and promotes sustainable recreational tourism through the responsible use of Tabtaban Lake. The importance of this development plan is supported by the Sustainable Livelihood Framework of Chambers and Conway (1992), as cited in Natarajan et al. (2022), which explains that people improve their quality of life when they have access to livelihood opportunities, natural resources, skills, and community support. The plan emphasizes the role of natural assets such as freshwater lakes in supporting income generation, food supply, and community resilience. Studies by Nath and Parameswar (2025) and the Lao People’s Democratic Republic (2021) further affirm that access to and proximity to natural resources enhance livelihood opportunities and socioeconomic well-being. In addition, the plan is also important because it teaches people to take care of the lake together. This idea is supported by the Social Exchange Theory (SET) advanced by Cook et al. (2013). According to this theory, people are more willing to protect natural resources when they see clear benefits. When the community benefits from the lake through food, income, and tourism, they become more motivated to cooperate to protect it. In return, the lake continues to benefit the people. This view is also supported by Cook and Hahn (2021), Ahmad et al. (2023), and Davlembayeva and Alamanos (2025), who highlighted that balanced benefits, trust, and cooperation encourage collective participation in resource conservation. Overall, the proposed plan provides a structured and sustainable approach to maximizing the socioeconomic value of Tabtaban Lake while ensuring long-term community development.

4. Conclusions

Based on the findings, the following conclusions were drawn: The respondents in the local community of Sablayan are highly dependent on the lake for their livelihood, food, and daily survival, with a strong familiarity

with and attachment to the environment. The respondents are predominantly medium-sized households. The respondents have limited financial resources with low to lower-middle income. The respondents rely on fishing as their primary source of income. The respondents are long-term residents. The respondents live very close to Tabtaban Lake. The socioeconomic value of Tabtaban Lake was assessed in terms of livelihoods, food security, recreational tourism, and irrigation. The lake serves as a multifunctional resource, acting as a lifeline that sustains the community's economic, social, and daily needs. The lake is an ecologically healthy and productive ecosystem, though emerging pressures on fish availability suggest the need for continued management. Tabtaban Lake has diverse fish species. Tabtaban Lake has abundant and well-maintained aquatic plants. Invasive species in Tabtaban Lake are effectively monitored and managed.

In addition, Tabtaban Lake has good water quality, with parameters within healthy and acceptable ranges. Tabtaban Lake served as a vital resource, supporting the community's economic stability and daily sustenance through livelihoods, food security, recreational tourism, and irrigation. Tabtaban Lake has significant value for livelihoods, serving as a major source of income and economic support for the local community in Sablayan. Tabtaban Lake has a very high value for food security, providing a reliable source of food and nutrition for the local community. Tabtaban Lake has significant recreational value, serving as an important source of leisure and tourism opportunities for the local community. Tabtaban Lake is highly valuable as an irrigation source, providing a reliable water supply for agricultural activities in the community. The socioeconomic value of Tabtaban Lake has a significant to highly significant difference when grouped according to the profile, particularly primary means of income, average monthly income, and proximity to the lake, indicating that respondents who are economically dependent on the lake and those living closer to its place place a higher value on its resources.

The years of residency showed no significant differences in any socioeconomic value. Thus, socioeconomic value is influenced more by economic dependence and access to the lake than by demographic duration or family composition. The socioeconomic value of Tabtaban Lake is significantly related to respondents' profiles in the local community and to the lake's characteristics. There is a significant relationship between socioeconomic status and the respondents' profiles in the local community. Since the primary source of income was the most consistent predictor and no respondents' profile variable significantly predicted the lake's irrigation value, this suggests that residents' assessment of the lake is largely shaped by their economic dependence on and access to its resources. There is a significant relationship between the socioeconomic value and the lake's characteristics. Fish diversity is statistically significant to food security. Therefore, the findings confirm that the lake's biological condition, especially fish diversity, strongly influences its socioeconomic importance to the local community. A socioeconomic development plan is proposed to ensure the sustainable use and management of Tabtaban Lake for the long-term benefit of the local community of Sablayan, Occidental Mindoro.

Recommendations - Based on the study's conclusions, the following recommendations are proposed to ensure the sustainable use and management of Tabtaban Lake in Sablayan: The Local Government Unit (LGU) of Sablayan, in partnership with other organizations, may implement programs to improve the living conditions of households in the community. The LGU of Sablayan, through the Municipal Social Welfare and Development Office (MSWDO) and the Municipal Agriculture Office (MAO), may implement family-centered livelihood and food support programs, such as backyard gardening and community food production, to address the needs of medium-sized households with higher consumption demands. The LGU, in coordination with PESO and Non-governmental organizations (NGOs), may provide income-generating opportunities, skills training, and access to microfinance to support low-income households and improve their financial stability. The LGU and the Bureau of Fisheries and Aquatic Resources (BFAR) may promote livelihood diversification programs, including aquaculture, ecotourism services, and small enterprises, to reduce overreliance on fishing and enhance economic resilience. The LGU and MENRO may strengthen community-based environmental education and participation programs, encouraging long-term residents to actively engage in conservation and sustainable resource management. The LGU and Barangay Tuban may implement zoning policies and resource-use regulations, prioritizing households living closest to the lake to ensure sustainable access while minimizing environmental

degradation.

The LGU of Sablayan, in coordination with the Barangay Local Government Unit of Tuban, Department of Environment and Natural Resources (DENR), and Department of Tourism (DOT), may develop a community-based lake management program. This may include regulated fishing policies, promotion of eco-friendly tourism, and equitable access to irrigation for farmers. The DENR, in partnership with the LGU, MENRO, and local academic institutions, may strengthen continuous environmental monitoring and conservation programs. These agencies can regularly assess water quality, biodiversity, and enforce control measures against invasive species. BFAR, in partnership with the LGU, may implement fish conservation measures such as fish sanctuaries, regulated fishing seasons, and restocking programs to address concerns about fish sufficiency while maintaining diversity. The LGU and MENRO may continue and strengthen the proper management of aquatic plants, including regular monitoring and controlled removal, to maintain their benefits for water quality and fish habitat. DENR and MENRO may enhance monitoring and control programs for invasive species, including community reporting systems and removal initiatives, to sustain the current effective management practices. The LGU, DENR, and local academic institutions may conduct regular water quality monitoring and pollution control programs to ensure that parameters remain within healthy and acceptable ranges. The LGU of Sablayan, with support from the Municipal Planning and Development Office (MPDO), may institutionalize a comprehensive sustainable development plan. This plan may integrate livelihood support, food security programs, biodiversity conservation, and responsible tourism management. The LGU, through MAO and PESO, may expand sustainable livelihood programs and provide technical support to strengthen the lake's role as a primary source of income while reducing environmental pressure. The LGU and MAO may promote sustainable fishing practices and community-based food programs to ensure continuous access to affordable, nutritious food from the lake.

The LGU and DOT may develop eco-friendly and community-based tourism initiatives, such as guided tours and local enterprises, to enhance tourism benefits while protecting the lake. The LGU and MAO may strengthen sustainable water management systems and irrigation planning to ensure the equitable and efficient use of lake water for agriculture, especially during dry seasons. The LGU of Sablayan, through the MSWDO and MAO, may design targeted intervention programs for specific community groups. Priority support may be given to households highly dependent on fishing, while alternative livelihood opportunities may be provided to others. The LGU of Sablayan, in collaboration with cooperatives, non-government organizations (NGOs), and microfinance institutions, may implement economic empowerment programs such as financial literacy training, cooperative development, and access to microfinancing. The LGU of Sablayan, in coordination with PESO, MSWDO, and MAO, may implement profile-responsive programs that account for differences in income levels, primary means of livelihood, and proximity to the lake. Interventions such as targeted livelihood assistance, financial literacy training, and resource access programs may be prioritized for economically dependent households, as findings show that these factors strongly influence socioeconomic value. The LGU, BFAR, DENR, and MENRO may prioritize ecosystem-based management strategies, particularly focusing on maintaining fish diversity, as it significantly influences livelihood, food security, and tourism. Programs such as biodiversity conservation, habitat protection, and sustainable fishing practices can be strengthened to ensure that the lake's ecological condition continues to support its socioeconomic benefits. The BFAR, in coordination with the LGU of Sablayan, Barangay Tuban, and local fisherfolk organizations, may prioritize biodiversity conservation efforts. This includes establishing fish sanctuaries, regulating fishing seasons, enforcing sustainable fishing practices, and implementing fish restocking programs to sustain ecological balance and community benefits. Future researchers, academic institutions, and the LGU may further refine and implement the proposed management plan by conducting additional studies on the socioeconomic value of Tabtaban Lake, incorporating other relevant variables to support long-term ecological conservation and community development.

5. References

Abbasov, R., Karimov, R., & Jafarova, N. (2022). Ecosystem and socioeconomic values of clean water. In

- Springer eBooks (pp. 71–121). https://doi.org/10.1007/978-3-031-08770-7_3
- Adobo, E. D., Jr., Abesamis, R. R., Domingo, E. G., Lim, T. M. S., Adornado, H. A., Calderon, R. L., Cuna, J. M. T., Benavidez, P. J., League of Municipalities of the Philippines, Saikol, D. T. M., Canivel, J. A. A., De Leon, J. L., Villamor, C. I., Regunay, C. M., Eleria, E. M., Segui, Ma. A. P., Francisco, G. J., Briz, R. M., Aguda, R. B., Department of Environment and Natural Resources-Biodiversity Management Bureau (DENR-BMB). (2020). National Invasive Species Strategy and Action Plan (M. C. N. Rivera, M. P. Espina, & M. C. J. A. Layusa, Eds.; pp. i–xx). Department of Environment, Biodiversity Management Bureau, and Natural Resources.
<https://www.philchm.ph/wp-content/uploads/2024/01/NISSAP-2020-2030.pdf>
- Ahmad, R., Nawaz, M. R., Ishaq, M. I., Khan, M. M., & Ashraf, H. A. (2023). Social exchange theory: Systematic review and future directions. *Frontiers in Psychology*, 13.
<https://doi.org/10.3389/fpsyg.2022.1015921>
- Akbari, M., Foroudi, P., Shahmoradi, M., Padash, H., Parizi, Z. S., Khosravani, A., Ataei, P., & Cuomo, M. T. (2022). The evolution of food security: Where are we now, where should we go next? *Sustainability*, 14(6), 3634. <https://doi.org/10.3390/su14063634>
- Alimkulov, S., Makhmudova, L., Talipova, E., Baspakova, G., Myrzakhmetov, A., Smagulov, Z., & Zagidullina, A. (2025). Long-Term water level projections for Lake Balkhash using Scenario-Based Water Balance Modeling under climate and Socioeconomic uncertainties. *Water*, 17(13), 2021.
<https://doi.org/10.3390/w17132021>
- Baltazar, D. E., Labadz, J., Smith, R., Telford, A., & Di Bonito, M. (2022). Socio-Cultural valuation of urban parks: the case of Jose Rizal Plaza in Calamba City, the Philippines. *Sustainability*, 14(21), 13711.
<https://doi.org/10.3390/su142113711>
- Bao, P. N., Kimleang, K., Sophea, B., Amanuma, N., Shivakoti, B. R., & Khanal, R. (2022). Lake and livelihoods: threats to their sustainability. In *Water and Life in Tonle Sap Lake* (pp. 13–22).
https://doi.org/10.1007/978-981-16-6632-2_2
- Berman, E. A. (2017). "An exploratory sequential mixed methods approach to understanding researchers' data management practices at UVM: Integrated findings to develop research data services." *Journal of eScience Librarianship* 6(1): e1104. <https://doi.org/10.7191/jeslib.2017.1104>
- Bitana, E. B., Lachore, S. T., & Utallo, A. U. (2024). The influence of household size on socioeconomic conditions of rural farm households in Damot Woyde District, Wolaita Zone, *Southern Ethiopia*. *Cogent Social Sciences*, 10(1). <https://doi.org/10.1080/23311886.2024.2358153>
- Camacho-Valdez, V., Sáenz-Arroyo, A., Cazzanelli, M., Etxano, I., Hare, M., Costa, M. M., Del Valle, A. P., & Rodiles-Hernández, R. (2025). Local livelihoods dependence on ecosystem services: a participatory model developed in the Usumacinta floodplain, southeastern Mexico. *Local Environment*, 1–23.
<https://doi.org/10.1080/13549839.2025.2519371>
- Chavez, Q. S. A., & Lunar, A. S. (2025). Green tourism practices among Eco parks in the first district of Oriental Mindoro. *American Journal of Tourism and Hospitality*, 3(1), 127–143.
<https://doi.org/10.54536/ajth.v3i1.5154>
- Cook, K. S., & Hahn, M. (2021). Social exchange theory. In *Routledge eBooks* (pp. 179–205).
<https://doi.org/10.4324/9781003141372-14>
- Cook, K. S., Cheshire, C., Rice, E. R., & Nakagawa, S. (2013). Social exchange theory. In *Handbook of social psychology* (pp. 61–88). Dordrecht: Springer Netherlands. DOI: 10.1007/978-94-007-6772-0_3
- Cull, M. (2023). Why lakes are important resources. *Discover Magazine*.
<https://www.discovermagazine.com/planet-earth/why-lakes-are-important-resources>
- Davlembayeva, D. & Alamanos, E. (2025). Social Exchange Theory: A review. In S. Papagiannidis (Ed), *TheoryHub Book*. Available at <https://open.ncl.ac.uk> / ISBN: 9781739604400
- DENR-ADB/GEF. (2021). Economic valuation and the conservation and protection of wildlife. In TA 9461: Protecting and Investing in Natural Capital in Asia and the Pacific.
<https://www.philchm.ph/wp-content/uploads/2022/02/2021-0917-Economic-Valuation-Brief-Final.pdf>
- Executive Order No. 22, April 27, 2023: Creating the Water Resources Management Office in the Department of
-

- Environment and Natural Resources. https://lawphil.net/executive/execord/eo2023/eo_22_2023.html
- Fiorella, K. J., Bageant, E. R., Mojica, L., Obuya, J. A., Ochieng, J., Olela, P., Otuo, P. W., Onyango, H. O., Aura, C. M., & Okronipa, H. (2021). Small-scale fishing households facing COVID-19: The case of Lake Victoria, Kenya. *Fisheries Research*, 237, 105856. <https://doi.org/10.1016/j.fishres.2020.105856>
- Galang, I. M. R. & Philippine Institute for Development Studies. (2022). Is food supply accessible, affordable, and stable? The state of food security in the Philippines. In Discussion Paper Series [Report]. <https://pidswebs.pids.gov.ph/CDN/document/pidsdps2221.pdf> in Mindanao, Philippines. In AACL Bioflux (Vol. 15, Issue 2, pp. 796–798). <https://bioflux.com.ro/docs/2022.796-810.pdf>
- Gatta, P. P. (2022). The state of world fisheries and aquaculture 2022. In FAO eBooks. <https://doi.org/10.4060/cc0461en>
- Ho, L. T., & Goethals, P. L. M. (2019). Opportunities and challenges for the sustainability of lakes and reservoirs in relation to the Sustainable Development Goals (SDGS). *Water*, 11(7), 1462. <https://doi.org/10.3390/w11071462>
- Hossu, C. A., Iojă, I., Onose, D. A., Niță, M. R., Popa, A., Talabă, O., & Inostroza, L. (2019). Appreciation of ecosystem services of urban lakes in Romania. Synergies and trade-offs between multiple users. *Ecosystem Services*, 37, 100937. <https://doi.org/10.1016/j.ecoser.2019.100937>
- Jacob, A. (2025). How the length of residence moderates the relationship between time and community satisfaction in rural Utah. *BYU ScholarsArchive*. https://scholarsarchive.byu.edu/studentpub_uht/439
- Lao People's Democratic Republic. (2021). Five-Year National Socio-Economic Development Plan (2021-2025). https://rtm.org.la/wp-content/uploads/2022/12/ENG-9th-NSEDP_FINAL_PRINT_21.Oct._21_V1_CL_EAN.pdf
- List of lakes in MIMAROPA – PhilAtlas. (n.d.). <https://www.philatlas.com/lists/physical/lakes-mimaropa.html>
- Makwinja, R., Kaunda, E., Mengistou, S., Alemiew, T., Njaya, F., Kosamu, I. B. M., & Kaonga, C. C. (2021). Lake Malombe fishing communities' livelihood, vulnerability, and adaptation strategies. *Current Research in Environmental Sustainability*, 3, 100055. <https://doi.org/10.1016/j.crsust.2021.100055>
- Melo, R. H., Pambudi, M. R., & Niode, A. (2024). Socioeconomic status, lake knowledge, and community participation in the sustainable Lake Limboto management, Gorontalo Regency. *Journal of Water and Land Development*, 177–182. <https://doi.org/10.24425/jwld.2024.149119>
- Monsura, M. P. (2021). Socioeconomic characteristics of households, government programs on human capital, and natural shocks as determinants of Philippine household income mobility. *Asia-Pacific Social Science Review*, 21(4). <https://doi.org/10.59588/2350-8329.1445>
- Natarajan, N., Newsham, A., Rigg, J., & Suhardiman, D. (2022). A sustainable livelihoods framework for the 21st century. *World Development*, 155, 105898. <https://www.sciencedirect.com/science/article/pii/S0305750X22000882>
- Nath, S., & Parameswar, N. (2025). The sustainability of livelihoods during crisis - mapping evidence, gaps, and future directions. *Journal of Sustainability*, 1(1). <https://doi.org/10.55845/jos-2025-1126>
- Naval, R. C. (2016). Socioeconomic impact of small water impounding projects in Quirino Province, Philippines. *Journal of Geoscience and Environment Protection*, 04(06), 101–106. <https://doi.org/10.4236/gep.2016.46009>
- Palanca-Tan, R. (2020). Benefits from Laguna Lake: Perspective of Small Fisher Households. *Journal of Management for Global Sustainability*, 8(2). <https://doi.org/10.13185/jm2020.08202>
- Palanca-Tan, R. (2021). Livelihood and happiness in a resource-rich (Natural and cultural) rural municipality in the Philippines. *Ateneo De Manila University*, 10(3), 413–433. https://doi.org/10.20495/seas.10.3_413
- Paller, G., Magcale-Macandog, B., De Chavez, C., & Mendoza, S. (2021). The seven lakes of San Pablo: Assessment and monitoring strategies toward sustainable lake ecosystems. *Philippine Science Letter*, 14(01), 159–178.
- Peterson, M. I., Kondo, Y., Wada, N., Tsuda, Y., & Kitano, S. (2025). Benefits of aquatic vegetation for fish in an ecosystem dominated by an invasive piscivore. *Freshwater Biology*, 70(5). <https://doi.org/10.1111/fw.70045>
- Pomelo. (2026, January 5). 3 Main water quality parameters explained | Atlas Scientific. Atlas Scientific.

- <https://atlas-scientific.com/blog/water-quality-parameters/>
- Redoble, M. L. M., Espuerta, M. D. D., Baclay, K. J. O., Magdula, J. T., Tejero, K. J. G., & Saldo, I. J. P. (2025). Physicochemical analysis of the limnetic and littoral zones of Lake Pinamaloy, Don Carlos, Bukidnon, Philippines. *Asian Journal of Environment & Ecology*, 24(5), 39–50. <https://doi.org/10.9734/ajee/2025/v24i5693>
- Ringler, C., Agbonlahor, M., Baye, K., Barron, J., Hafeez, M., Lundqvist, J., Meenakshi, J. V., Mehta, L., Mekonnen, D., Rojas-Ortuste, F., Tankibayeva, A., & Uhlenbrook, S. (2021). Water for food systems and nutrition. United Nations Food Systems Summit 2021 Scientific Group. <https://sc-fss2021.org/>
- Romero, J., De La Cruz, J., Gerona-Daga, M. E., Tabornal, R., Dañal, R. M., & Neis, L. M. (2023). Diversity, abundance, and local use of fishes in Lake Danao, Ormoc City, Philippines. *The Philippine Journal of Fisheries*, 277–288. <https://doi.org/10.31398/tjpf/30.2.2023-0009>
- Rouwendal, J., Van Marwijk, R., & Levkovich, O. (2014). The value of proximity to water in residential areas. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.2427687>
- Sablayan LGU Official page. (n.d.). <https://sablayan.gov.ph/>
- San Juan, S. (2022, July 9). Fisheries Country Profile: Philippines 2025. Southeast Asian Fisheries Development Center. Retrieved July 9, 2022, from <https://www.seafdec.org/fisheries-country-profile-philippines/>
- Santiago, N. D. J., Philippine Statistics Authority (PSA) - Central Office, Bulayog, Ma. S. B., & Department of Economics (DOE), Visayas State University. (2019). Estimation of the recreational value of tourist destinations in Camotes Islands using the travel cost method. In *Review of Socio-Economic Research and Development Studies (Vols. 1–1, pp. 19–37)*. <https://reserds.vsu.edu.ph/wp-content/uploads/2020/06/Vol-3-2019-pp.-19-37-Paper-2.pdf>
- Schafft, M., Wegner, B., Meyer, N., Wolter, C., & Arlinghaus, R. (2021). Ecological impacts of water-based recreational activities on freshwater ecosystems: A global meta-analysis. *Proceedings of the Royal Society B Biological Sciences*, 288(1959), 20211623. <https://doi.org/10.1098/rspb.2021.1623>
- Schirpke, U., Ebner, M., Pritsch, H., Fontana, V., & Kurmayer, R. (2021). Quantifying ecosystem services of high mountain lakes across different socio-ecological contexts. *Sustainability*, 13(11), 6051. <https://doi.org/10.3390/su13116051>
- Schirpke, U., Scolozzi, R., & Tappeiner, U. (2021). “A gem among the rocks”—Identifying and measuring visual preferences for mountain lakes. *Water*, 13(9), 1151. <https://doi.org/10.3390/w1309115>
- Shi, D., Zhang, Y., & Liang, Z. (2022). The effects of park and sea landscape on property value in a tourist city. *Frontiers in Environmental Science*, 10. <https://doi.org/10.3389/fenvs.2022.967094>
- Sibulan, F. C. T., Galay-Limos, J. A., & Lazaro, N. J. (2025). The cultural significance of Mangyan products in the tourism development of Occidental Mindoro. *International Journal of Research Studies in Educational Technology*, 9(1). <https://doi.org/10.5861/ijrset.2025.25002>
- Sterner, R. W., Keeler, B., Polasky, S., Poudel, R., Rhude, K., & Rogers, M. (2019). Ecosystem services of Earth’s largest freshwater lakes. *Ecosystem Services*, 41, 101046. <https://doi.org/10.1016/j.ecoser.2019.101046>
- Sultana, M. A., Pandit, D., Barman, S. K., Tikadar, K. K., Tasnim, N., Fagun, I. A., Hussain, M. A., & Kunda, M. (2022). A review of fish diversity, decline drivers, and management of the Tanguar Haor ecosystem: A globally recognized Ramsar site in Bangladesh. *Heliyon*, 8(11), e11875. <https://doi.org/10.1016/j.heliyon.2022.e11875>
- Tahiluddin, A. B., Bornales, J. R. C., Limbaro, G. R. A., Paudac, M. a. U., Amarille, R. K., Sirad, N. R., Kabirun, M. C., Ujing, R. A., Gonzaga-Torino, F. M., Sabdani, M. H., Bacla-An, R. E., Hairal, M. a. S., Magcanta-Mortos, M. L. M., & Esguerra, J. P. (2025). Environmental impacts of aquaculture in the Philippines. *Israeli Journal of Aquaculture - Bamidgeh*, 77(2). <https://doi.org/10.46989/001c.133778>
- Tahiluddin, A., & Terzi, E. (2021). An overview of fisheries and aquaculture in the Philippines. *Journal of Anatolian Environmental and Animal Sciences*, 6(4), 475–486. <https://doi.org/10.35229/jaes.944292>
- Tandoh, S. N., Ries, R. J., & Xiaoxun, J. (2025). Examining the impact of socio-economic factors on residential water use in an aquifer-based urban environment, assessing urban hydrology: A case study of four communities in Alachua County, Florida. *Purdue University*, 1(1).

- <https://doi.org/10.7771/3067-4883.2051>
- Tecklie, A., Nigussie, Y., & Bilale, A. (2024). Assessment of water quality parameters in Lake Hayq, northeastern Ethiopia. *The Scientific World JOURNAL*, 2024(1), 7439024. <https://doi.org/10.1155/2024/7439024>
- Tembo, G., Banda, K., Chundu, M. L., Lyoba, C., Sichingabula, H., & Nyambe, I. (2025). Direct market valuation method to evaluate the economic value of provisioning ecosystem services on household income in Zambia's Bangweulu Wetland. *Frontiers in Environmental Science*, 13. <https://doi.org/10.3389/fenvs.2025.1538921>
- Thiemann, M., Riebl, R., Haensel, M., Schmitt, T. M., Steinbauer, M. J., Landwehr, T., Fricke, U., Redlich, S., & Koellner, T. (2022). Perceptions of ecosystem services: Comparing socio-cultural and environmental influences. *PLoS ONE*, 17(10), e0276432. <https://doi.org/10.1371/journal.pone.0276432>
- United Nations Environment Program (UNEP). (2022). The interlinked threats facing lakes and why we need to protect them. <https://www.unep.org/news-and-stories/story/interlinked-threats-facing-lakes-and-why-we-need-protect-them>
- UPMSIadmin. (2024, August 12). The West Philippine Sea: State of the Coasts Report (2024) - UP Marine Science Institute. UP Marine Science Institute. <https://msi.upd.edu.ph/downloads/wps-soc-2024/>
- Vasistha, P., & Ganguly, R. (2020). Water quality assessment of natural lakes and their importance: An overview. *Materials Today Proceedings*, 32, 544–552. <https://doi.org/10.1016/j.matpr.2020.02.092>
- Vicente, M. C., Loja, P. J., & Subade, R. (2023). Economic valuation of ecosystem services in Balatin River Sub-Watershed, Southern Philippines. *Agricultural and Resource Economics International Scientific E-Journal*, 9(1), 139–166. <https://doi.org/10.51599/are.2023.09.01.07>
- World Bank Group. (2023). Philippines country climate and development report. In the World Bank. <https://www.worldbank.org/en/country/philippines/publication/philippines-country-climate-and-development-report>
- Xu, Z., Qayum, M., Afzal, J., & Aslam, M. (2023). Availability and access to livelihood capital assets for developing sustainable livelihood strategies for fishermen: A case study of Manchar Lake, Pakistan. *Heliyon*, 9(12), e22549. <https://doi.org/10.1016/j.heliyon.2023.e22549>
- Yamagishi, K., & Ocampo, L. (2024). Exploring community support for sustainable tourism governance at Lake Balinsasayao and Lake Danao. *NRCP Research Journal*, 94–113, 94–113. https://researchjournal.nrcp.dost.gov.ph/assets/uploads/abstract/20240607132501_Abtract.pdf
- Zent, S. (2025). Indigenous knowledge, local knowledge, and climate change: interconnections for policy and practice. In Washington, DC: World Bank eBooks. <https://doi.org/10.1596/43486>
- Zhou, L., Guan, D., Sun, L., He, X., Chen, M., Zhang, Y., & Zhou, L. (2023). What is the relationship between ecosystem services and farmers' livelihoods? Based on measuring the contribution of ecosystem services to farmers' livelihoods. *Frontiers in Ecology and Evolution*, 11. <https://doi.org/10.3389/fevo.2023.1106167>
- Zhou, Y., Li, B., Han, J., He, G., Wang, K., An, C., & Huang, Y. (2023). Enabling efficiency-driven and low-impact water management from robust decision making: A risk- and robustness-based multi-objective decision support model. *Journal of Cleaner Production*, 394, 136277. <https://doi.org/10.1016/j.jclepro.2023.136277>
- 25 common water and aquatic plants grown in the Philippines. (2020, December 29). Collectors Connection. <https://renz15.wordpress.com/2020/07/07/20-common-water-aquatic-plants-grown-philippines/>