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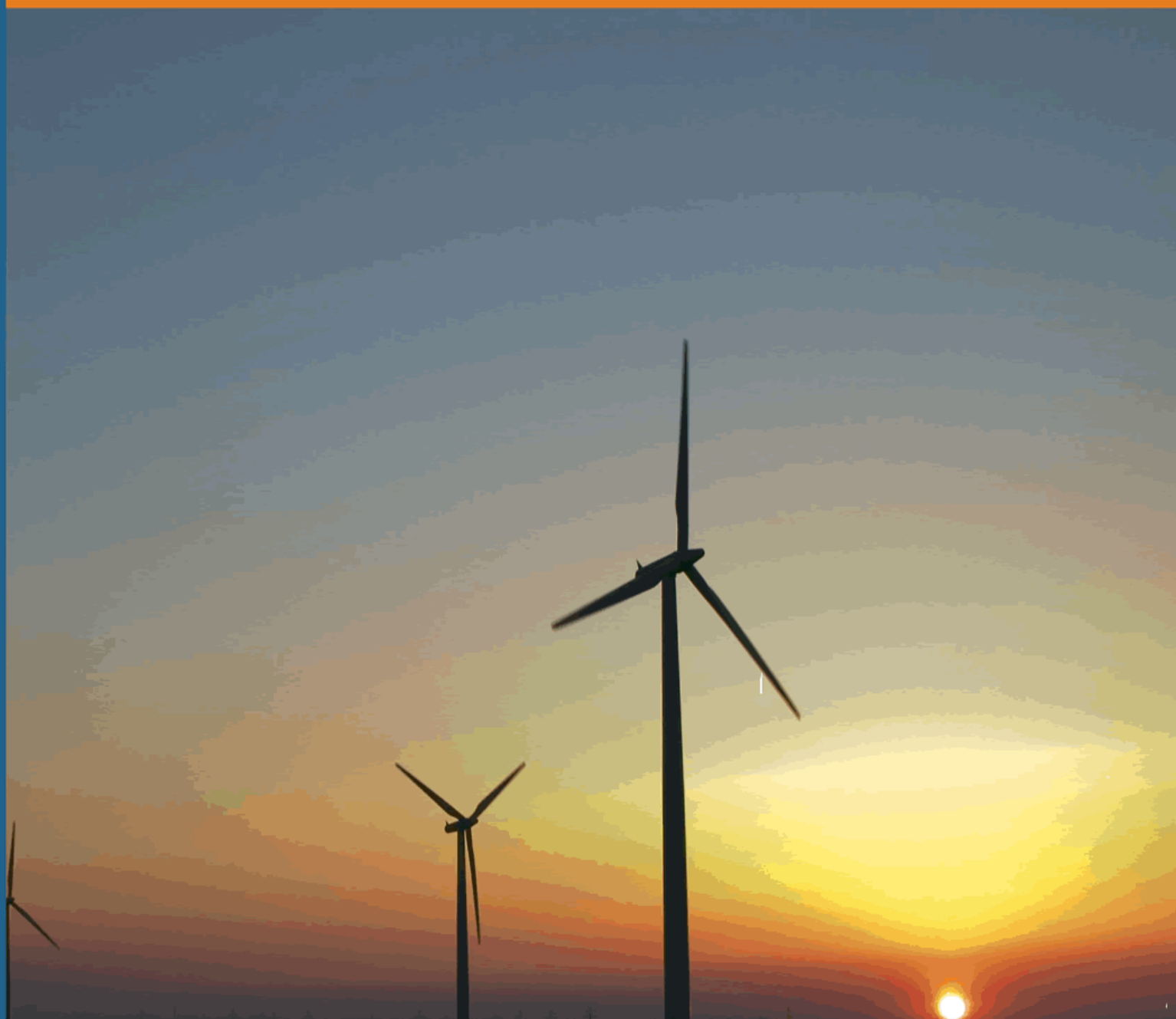

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Contingent Valuation Study: Understanding Filipinos' Support for Mangrove Forest Restoration and Conservation in Ipil, Zamboanga Sibugay, Philippines

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Abstract

Purpose: This study aimed to determine the economic value that residents of Ipil, Zamboanga Sibugay, Philippines, place on the restoration and conservation of mangrove forests.

Methodology: A quantitative research design employing the contingent valuation method (CVM) was utilized. A survey was conducted with 388 residents to assess their willingness to pay (WTP) for mangrove conservation. Two funding mechanisms were examined: dedicated taxes and price increases on goods/services, each with varying bid amounts (Php 32, Php 64, and Php 8).

Findings: The study found that 70.4% of the residents were willing to pay for mangrove conservation. Dedicated taxes, specifically at a bid amount of Php 32, were the preferred funding mechanism. Socioeconomic factors, such as income and livelihood dependence on mangroves, significantly influenced WTP.

Unique Contribution to Theory, Practice and Policy (Recommendations): The government should implement dedicated taxes as a primary funding mechanism for mangrove conservation in Ipil, Develop targeted conservation programs focusing on residents with higher incomes and those whose livelihoods depend on mangroves. In addition, it should conduct community engagement programs to raise awareness and understanding of the ecological and economic importance of mangroves. Further research is needed to investigate the factors that did not significantly influence WTP (education level, coastal proximity, residency duration, and environmental awareness) to gain a more comprehensive understanding of resident attitudes and behaviors.

Keywords: Contingent Valuation, Mangrove Forest Restoration, Willingness to Pay (WTP)

1. Introduction

The Importance of Mangrove Ecosystems: Mangrove forests are unique coastal ecosystems found in tropical and subtropical regions worldwide, acting as a buffer between land and sea. They provide critical habitats for diverse marine and terrestrial species (UNEP, 2023). Mangroves protect coastlines from extreme weather, support fisheries, and offer economic benefits through timber, medicine, and eco-tourism (Viray-Mendoza, 2017; Preeti, 2023).

Threats to Mangrove Ecosystems Worldwide: Mangroves face global threats such as deforestation for agriculture, aquaculture, and infrastructure development. Climate change exacerbates these issues with rising sea levels and saltwater intrusion, jeopardizing these vital ecosystems (Romañach et al., 2018; Ward et al., 2016).

The Case of Zamboanga Sibugay: Zamboanga Sibugay in the Philippines, known for its mangrove resources since the 1960s, has faced significant degradation due to agricultural expansion, infrastructure development, and unsustainable practices. This has led to habitat destruction, reduced fish populations, and harmful fishing practices (Senoc, 2022). Conservation efforts led by local leader Roberto "Ka Dodoy" Ballon, fisherfolk organizations like KGMC, and the COMFAS federation focus on mangrove rehabilitation, environmental education, coastal cleanups, and innovative planting techniques (Batino, 2021).

Restoring mangroves in Zamboanga Sibugay is critical for its ecological and economic health. Long-term conservation success depends on understanding residents' valuation of mangroves to secure sustainable funding mechanisms.

Existing research on mangrove conservation often overlooks the economic value these ecosystems provide to local communities. This study aims to address this gap by focusing on Ipil, Zamboanga Sibugay. While conservation efforts are underway, a comprehensive understanding of the economic value residents place on mangroves, and the factors influencing their willingness to contribute to restoration efforts needs to be improved.

This study has the following objectives:

1. To estimate the willingness to pay (WTP) of residents in Zamboanga Sibugay for improved mangrove conservation efforts using a contingent valuation (CVM) survey approach.
2. To investigate the relationship between income and WTP, hypothesizing that individuals with higher income levels will demonstrate a higher willingness to pay for mangrove restoration.
3. To examine the relationship between education and WTP, hypothesizing that individuals with higher education levels will show a greater willingness to pay for mangrove restoration.

4. To assess the influence of coastal proximity on WTP, hypothesizing that residents living closer to the coast will have a higher WTP due to the direct benefits of healthy mangroves.
5. To evaluate the impact of residency duration on WTP, hypothesizing that individuals who have lived in the area longer will have a stronger attachment to the environment and a greater willingness to pay for restoration.
6. To determine the influence of livelihood dependence on mangroves on WTP, expecting that individuals whose livelihoods rely on mangroves (e.g., fishers) will exhibit a higher WTP due to potential economic benefits.
7. To explore the relationship between environmental awareness and WTP, hypothesizing that individuals with greater environmental awareness will demonstrate a stronger willingness to pay for mangrove restoration.
8. To compare WTP under different funding mechanisms, analyzing preferences for dedicated taxes versus price increases on goods/services to support mangrove restoration.

The restoration of mangrove forests in Zamboanga Sibugay can enhance residents' economic well-being by supporting fisheries, increasing fish stocks, and protecting communities from storms and floods. Estimating Filipinos' willingness to pay (WTP) for restoration provides critical data on the economic value of these ecosystems and highlights the financial benefits of preventive measures for safeguarding lives and property. The study offers valuable insights for key stakeholders. For government agencies, it provides data that can guide policy decisions on environmental conservation and sustainable development, ensuring that public preferences are considered to create policies maximizing ecological and economic benefits. Environmental NGOs can use the findings to enhance advocacy, fundraising, and outreach efforts, while also informing economic assessments of mangrove ecosystem services, such as coastal protection and fishery support. For local communities, the study highlights the economic advantages of mangrove restoration, empowering them to actively participate in conservation initiatives. This fosters sustainable livelihoods, enhances ecosystem services, and promotes overall community development. By quantifying the WTP for restoration, the study highlights the ecological, economic, and social benefits of mangrove conservation for various stakeholders.

The study aims to determine the willingness to pay (WTP) of residents in Ipil, Zamboanga Sibugay, Philippines, for mangrove restoration and conservation using the contingent valuation method (CVM). By presenting hypothetical scenarios with specific bid amounts, the survey will estimate the average WTP for environmental improvements. However, the CVM's reliance on hypothetical scenarios may result in discrepancies between stated and actual WTP.

2. Literature Review

2.1 Willingness to Pay (WTP)

Mangrove forests are critical ecosystems that provide vital services but face severe threats, necessitating substantial financial resources for their restoration and conservation. Understanding willingness to pay (WTP) offers valuable insights for designing effective conservation strategies. Research shows that socioeconomic factors, coastal proximity, livelihood dependence, awareness campaigns, and funding models significantly influence WTP for mangrove restoration. Ecological assessments highlight mangroves' provisioning, regulating, and cultural services, which can be quantified through the Total Economic Value (TEV) framework. Within this framework, WTP serves as a critical non-use value, capturing motivations such as bequest and existence.

Key studies illustrate these dynamics. Roldan (2022) applied the TEV framework in Tawi-Tawi, Philippines, estimating a high WTP of PHP 992 (USD 19.84) per household for mangrove conservation. However, a subset of respondents unwilling to pay highlighted the need for targeted interventions addressing both environmental and community well-being. Gonzales et al. (2017) found that while local communities valued mangroves for direct uses like housing materials and charcoal, they lacked awareness of broader ecological benefits, such as carbon sequestration, which is strained by significant resource extraction. Bundal et al. (2018) showed that education, gender (women exhibiting higher WTP), and economic independence strongly influenced WTP, with non-use values like bequest and existence driving contributions despite higher bid prices. Matso et al. (2024) used market price methods, finding a lower mean WTP of PHP 5.13/month/household compared to similar studies, suggesting the importance of public consultations before implementing Payment for Ecosystem Services (PES) policies. Meanwhile, Menéndez et al. (2018) demonstrated mangroves' protective value, mitigating flood risks for over 600,000 Filipinos and preventing billions in property damage, underscoring the urgency of integrating mangrove value into national policies.

These findings highlight the multifaceted importance of WTP as a metric for understanding public support and guiding conservation strategies. Incorporating mangrove value into policymaking is crucial to ensuring sustainable conservation efforts and safeguarding vital ecosystem services.

2.2 Willingness to Pay (WTP) and Income

Studies across Southeast Asia demonstrate a generally positive relationship between income and WTP for mangrove conservation. In Indonesia, Diswandi & Saptutyningsih (2018) and Fauziyah et al. (2023) find that those with higher incomes are willing to pay more. Similar trends are observed in Vietnam (Trung et al., 2020). These findings suggest that while recognizing the

importance of mangroves, lower-income communities often face financial constraints that limit their ability to contribute significantly to conservation efforts (Gagarin, 2022). This highlights the need for alternative funding models or tiered contribution systems to ensure inclusivity.

2.3 Willingness to Pay (WTP) and Education

Education significantly influences willingness to pay (WTP) for mangrove conservation, but its impact varies across contexts. Diswandi & Saptutyningsih (2018) found that higher educational attainment positively correlates with WTP in Indonesia due to increased awareness of mangrove benefits. However, Fauziyah et al. (2023) observed no significant impact of education on WTP, suggesting that contextual factors may mediate this relationship. Jadin & Rousseau (2022) emphasized the effectiveness of targeted educational campaigns in addressing low education levels and increasing conservation support.

Other studies highlight the interplay between socioeconomic factors and WTP. In the Philippines, Gagarin (2022) demonstrated that while understanding mangrove benefits is strong, low income often limits WTP. Similarly, Jadin & Rousseau (2022) showed that proximity to mangroves in Mexico influences preferences for specific ecosystem services. In Bangladesh, Iqbal (2020) revealed that awareness campaigns and fostering a sense of ownership are essential to maximizing WTP across income levels.

These findings underscore the complexity of socioeconomic influences on WTP. While income frequently supports WTP, financial constraints can limit contributions in low-income communities. Education enhances support by increasing awareness, but targeted campaigns are crucial for overcoming financial and informational barriers. Effective conservation policies should combine financial support for low-income groups with sustained education programs to bolster WTP and community participation in mangrove conservation efforts.

2.4 Willingness to Pay (WTP) and Coastal Proximity

Proximity to mangroves significantly impacts communities' reliance on mangrove-derived resources and their willingness to pay (WTP) for conservation. Ickowitz et al. (2023) highlighted that households near high-density mangrove forests in Indonesia consume more fish and aquatic species, underscoring mangroves' role in food security and likely increasing WTP among adjacent communities. Proximity also supports economic opportunities such as ecotourism. Musa et al. (2020) found that communities in Marudu Bay, Sabah, Malaysia, recognized sustainable ecotourism's economic benefits, driving higher WTP for mangrove conservation.

The relationship between proximity and WTP is complex. Marlianingrum et al. (2021) showed that understanding mangrove benefits increases perceived value and WTP, regardless of distance, while Wang et al. (2021) noted that pro-environmental attitudes and interaction with protected

areas could outweigh the effect of proximity. Aipassa et al. (2023) emphasized that cultural practices and traditional knowledge systems can amplify WTP even in distant communities. Similarly, Su & Gasparatos (2024) revealed variations in WTP within China based on location, demographics, interaction with mangroves, and ecological knowledge, stressing the importance of tailored conservation strategies.

This review highlights that while proximity often enhances WTP due to direct resource dependence and ecotourism potential, targeted awareness campaigns can increase support in communities further afield by bridging knowledge gaps and emphasizing mangrove benefits.

2.5 Willingness to Pay (WTP) and Residency Duration

Ballad and Mangabat (2021) studied the relationship between socio-economic factors and mangrove conservation perceptions among coastal villagers in the Philippines. They found that long-term residency fosters environmental awareness, as many villagers had strong connections to the environment. However, despite recognizing the ecological importance of mangroves, they were hesitant to contribute financially, highlighting the impact of economic constraints on WTP and the need for tailored conservation strategies.

Studies on community-based conservation (CBC) also explore how residency length influences participation. Sunoto and Ponrahono (2019) and Kamariah et al. (2014) suggest that longer residency can cultivate environmental attitudes, but socio-economic factors like income may have a greater influence on financial contributions to conservation. This underscores the need to consider the interplay between residency, socio-economic conditions, and WTP for effective initiatives.

Owuor et al. (2019) found that long-term residents, having witnessed environmental changes like shoreline erosion, are more likely to recognize mangroves' benefits and may support conservation, though not necessarily through direct financial contributions. Tools like Contingent Valuation Methods (CVM) and Choice Experiments (CE) are useful in assessing WTP, as noted by Ngei (2021). However, studies by Ogeh et al. (2016) and Tuan et al. (2014) indicate that income, education, and direct knowledge of mangrove benefits significantly influence WTP. Abdullah (2014) found no significant correlation between WTP and residency length, emphasizing the complexity of the factors influencing conservation attitudes.

In conclusion, while long-term residency may enhance environmental awareness, WTP is shaped by a mix of factors like income, education, and direct knowledge of ecosystem benefits. More research is needed to fully understand these influences, and community-based approaches with local leadership, as suggested by Abdullah (2014), are crucial for successful mangrove conservation.

2.6 Willingness to Pay (WTP) and Livelihood Dependence on Mangroves

Research shows that communities with direct livelihood dependence on mangroves are more likely to exhibit a willingness to pay (WTP) for conservation efforts. Ogeh et al. (2015) found that in Nigeria, communities interacting with mangroves valued their conservation, although education and income did not significantly affect WTP. Similarly, Sunoto et al. (2020) in Malaysia and Pham et al. (2018) in Vietnam found that economic dependence, especially among fishermen, was strongly linked to conservation support. Idrus et al. (2019) in Indonesia noted that communities relying on mangrove resources, such as fish and shellfish, were more likely to support conservation.

Susilo et al. (2017) found that in the Mahakam Delta, over 80% of respondents considered mangroves essential to their livelihoods, with WTP tied to the perception of mangrove health as crucial to local economies. Hema & Devi (2015) observed significant WTP in Kerala, noting that livelihood types (e.g., farmers vs. fishermen) influenced preferred contribution methods (cash or labor). Sachin et al. (2020) found that inland fishers in Karnataka had higher WTP than marine fishers due to their closer dependence on mangrove ecosystems.

Despite strong WTP, financial constraints remain a barrier, as seen in Pham et al. (2018), where residents in Vietnam's Cat Ba Biosphere Reserve recognized mangrove value but faced economic limitations. Das et al. (2022) and Aheto et al. (2016) emphasized the role of sustainable mangrove-based livelihoods in poverty alleviation and conservation, advocating for community involvement through models like Joint Forest Management. Debrot et al. (2020) highlighted the potential of non-timber forest products (NTFPs) to create sustainable business opportunities, helping alleviate poverty and reduce degradation.

The research underscores that communities with livelihoods tied to mangrove health feel a stronger sense of ownership and are more willing to invest in conservation. Promoting sustainable mangrove-based livelihoods can drive both ecological preservation and economic development, informing the study of Filipinos' support for mangrove restoration in Ipil, Zamboanga Sibugay.

2.7 Willingness to Pay (WTP) and Environmental Awareness

Mangrove ecosystems in the Philippines face significant threats from degradation and deforestation, making their conservation essential for environmental, social, and economic reasons (Creencia and Querijero, 2018). Understanding community perceptions of mangrove value and willingness to pay (WTP) for restoration efforts is crucial for developing effective conservation programs. This review explores the factors influencing WTP, particularly environmental awareness.

Research shows a strong link between environmental awareness and WTP for conservation. Studies indicate that individuals with greater environmental knowledge, especially regarding the importance of mangroves, tend to have higher WTP (Firdaus et al., 2021; Creencia and Querijero, 2018). Sociodemographic factors such as education level also influence WTP, with more educated

individuals generally showing greater awareness and higher WTP (Ahmed, 2019; Firdaus et al., 2021).

Other variables influencing WTP include age, with younger generations often showing more concern for the environment (Ahmed, 2019); gender, which affects roles, knowledge, and participation in conservation (Creencia and Querijero, 2018; Cudiamat and Valdez, 2022); and occupation and income, as people who depend on mangroves for their livelihood tend to have higher WTP (Ahmed, 2019). A combination of broad ecological knowledge and specific mangrove knowledge also impacts WTP (Cudiamat and Valdez, 2022; Creencia and Querijero, 2018).

While awareness is linked to support for conservation, it does not always translate into active participation, highlighting the need to explore barriers and motivations for community involvement (Kunz, 2015; Llanza et al., 2016). The proposed contingent valuation study in Ipil will build on these findings, focusing on the community's support for mangrove conservation, awareness of ecosystem services, threats to mangroves, and knowledge of conservation strategies (Manalo, 2023).

In conclusion, this literature emphasizes the strong connection between environmental awareness and WTP for mangrove protection in the Philippines. The Ipil study aims to further investigate the factors influencing community support for mangrove restoration and conservation.

This literature emphasizes the strong link between environmental awareness and WTP for mangrove protection in the Philippines, with the study in Ipil aiming to fill the knowledge gap regarding factors influencing community support for mangrove restoration and conservation.

2.8 Willingness to Pay (WTP) and Bid Amounts for different funding mechanisms (dedicated taxes for restoration or price increase of goods)

The Contingent Valuation Method (CVM) has become a key tool for assessing public support and willingness to pay (WTP) for environmental initiatives like mangrove restoration (Llanza et al., 2021; Basri et al., 2020; Fauzi et al., 2015; Tuấn et al., 2014; Ramli et al., 2017; Friess & Thompson, 2016; Zaiton et al., 2016). By simulating hypothetical market scenarios, CVM reveals the non-use value of ecological resources, providing insights for effective conservation strategies and financing mechanisms. A common finding in CVM studies is that higher bid amounts often lead to lower WTP, reflecting supply and demand principles (Llanza et al., 2021; Basri et al., 2020; Ramli et al., 2017). To address biases, researchers use various survey formats, such as single-bounded and double-bounded approaches, the latter offering more precision (Basri et al., 2020; Zaiton et al., 2016).

Socioeconomic factors like income, education, and environmental organization membership significantly influence WTP for mangrove conservation (Llanza et al., 2021; Fauzi et al., 2015; Zaiton et al., 2016). Awareness of ecological and economic benefits also shapes community

support, emphasizing the need for targeted outreach (Basri et al., 2020; Tuấn et al., 2014). Understanding preferred funding mechanisms, including direct contributions, usage fees, and tax adjustments, is vital for sustainable conservation (Llanza et al., 2021; Basri et al., 2020; Fauzi et al., 2015).

Despite its value, CVM faces methodological challenges, requiring careful survey design and the exploration of alternative valuation approaches like choice experiments (Friess & Thompson, 2016; Zaiton et al., 2016). Cultural norms and livelihood dependencies further influence community perceptions and WTP (Tuấn et al., 2014; Zaiton et al., 2016). Policymakers can use CVM findings to design conservation strategies and funding mechanisms that align with local priorities (Llanza et al., 2021; Friess & Thompson, 2016).

Razzaque (2017) stresses the need to consider the full range of ecosystem services provided by mangroves in WTP studies, highlighting the importance of equitable benefit distribution and participatory mechanisms. The study advocates for hybrid funding models, combining public, private, and individual contributions, which could be a valuable avenue for future research. Bundal et al. (2018) provide additional insights from a study on seagrass conservation in the Philippines, showing that nearly 90% of respondents were willing to contribute to a conservation trust fund, with preferred payment schemes involving familiar mechanisms like property or utility taxes. Their findings suggest that future WTP studies could benefit from exploring various contribution levels and comparing different funding mechanisms, such as taxes versus price increases on goods.

Together, these studies underscore the complex relationship between bid amounts, socioeconomic factors, and community values in mangrove restoration efforts, offering insights for designing sustainable, community-driven conservation strategies (Llanza et al., 2021; Basri et al., 2020; Fauzi et al., 2015).

2.9 Synthesis

Research indicates that socioeconomic factors such as income and education positively influence willingness to pay (WTP) for environmental conservation initiatives (Llanza et al., 2021; Ramli et al., 2017; Fauzi et al., 2015; Zaiton et al., 2016), suggesting the rejection of the null hypothesis regarding their impact on WTP. Coastal proximity is also important, with studies like Tuấn et al. (2014) showing that individuals living near mangroves tend to have a stronger connection and higher WTP, leading to the rejection of the null hypothesis for coastal proximity.

Longer residency duration may increase WTP as long-term residents often have greater awareness of mangrove value and changes over time (Tuấn et al., 2014), potentially rejecting the null hypothesis for this factor. Additionally, livelihood dependence on mangroves increases WTP, as individuals relying on these ecosystems for their livelihoods are more likely to support conservation (Tuấn et al., 2014), suggesting the rejection of the null hypothesis for livelihood dependence.

Environmental awareness is also closely linked to WTP, with studies like Tuấn et al. (2014) showing that increased knowledge about mangroves' ecological and economic services enhances support for conservation, leading to the rejection of the null hypothesis for environmental awareness. Lastly, bid amounts generally influence WTP, with higher bid amounts resulting in lower WTP, as seen in studies by Llanza et al. (2021), Zaiton et al. (2016), and Tuấn et al. (2014). The study may reject the null hypothesis for bid amounts, though preferences for funding mechanisms, like taxes versus price increases, might be more complex.

2.10 Theoretical Framework

Numerous studies in environmental economics have used the Total Economic Value (TEV) framework to assess the economic importance of mangroves in the Philippines. According to Ahmed et al. (2020), TEV has become the dominant method for recognizing and classifying ecosystem values over the past two decades. TEV consists of Use Values (UV) and Non-Use Values (NUV). UV includes Direct Use Values (DUV), like products and eco-tourism, and Indirect Use Values (IUV), such as ecosystem services like carbon sequestration and storm protection. However, due to the lack of market prices for these services, they are often undervalued, leading to overexploitation (Ballad & Mangabat, 2021).

This study will employ the Contingent Valuation Method (CVM), a survey-based approach under the TEV framework, to estimate the value of mangrove ecosystem services (Mitchell & Carson, 1989). CVM involves asking respondents about their willingness to pay (WTP) for environmental gains or willingness to accept (WTA) compensation for losses. WTP represents the maximum amount someone is willing to pay to receive benefits, while WTA is the minimum compensation needed to tolerate losses (Hasan-Basri et al., 2015).

CVM is well-suited to this study's objectives, especially for estimating non-market values like those of mangroves (Ahmed et al., 2020; Roldan, 2022). Additionally, the Double Bounded Dichotomous Choice (DBDC) approach, a popular technique for eliciting WTP in CVM studies, will be used to estimate coastal communities' WTP for mangrove conservation, as supported by studies like Gagarin et al. (2022) and Hasan-Basri et al. (2020). This approach will allow the study to effectively measure Filipino support for mangrove restoration in Ipil, Zamboanga Sibugay.

2.11 Conceptual Framework

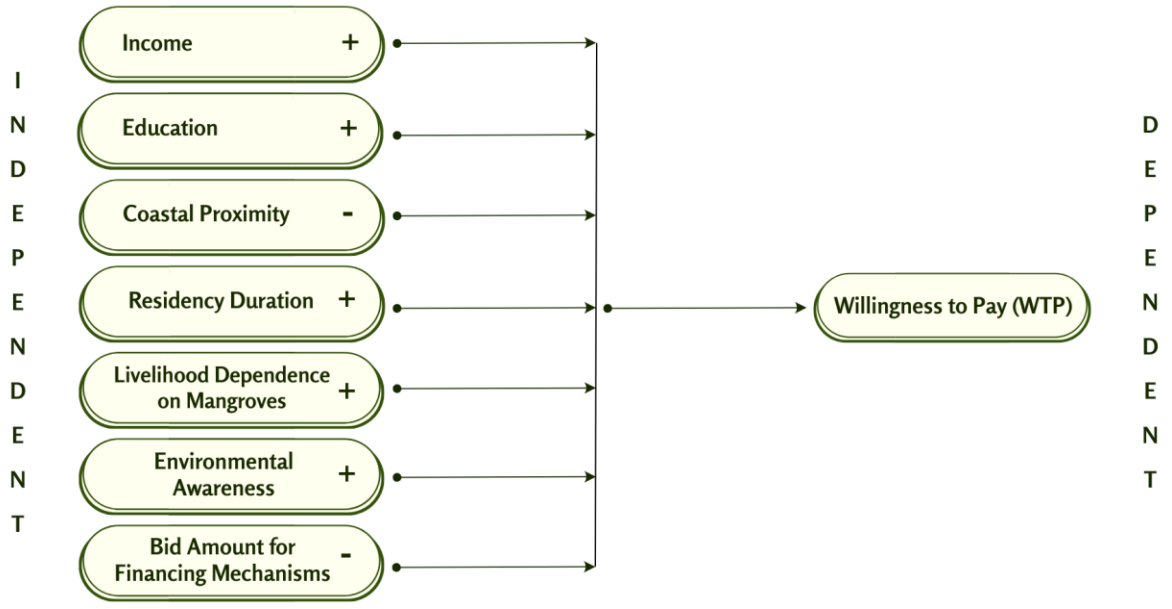
The dependent variable in this study is the willingness to pay (WTP) of individuals in Ipil, Zamboanga Sibugay, which reflects the monetary value they are willing to contribute toward mangrove restoration efforts. This indicates their financial commitment to environmental conservation.

The independent variables include several factors that may influence WTP: (1) Socioeconomic characteristics like income and education, which may affect environmental awareness and

understanding of the restoration project's importance. (2) Coastal proximity and (3) residency duration, as individuals closer to or living longer in the area may have a stronger connection to the mangroves. (4) Livelihood dependence on mangroves assesses how respondents' income is influenced by the health of the forests. (5) Environmental awareness evaluates individuals' understanding of environmental issues and its potential impact on their WTP. Lastly, (6) bid amounts, presented in a survey format, measure individuals' willingness to pay for proposed funding mechanisms, such as dedicated taxes or price increases for goods.

The study uses the DBDC contingent valuation method, asking respondents to choose "Yes" or "No" regarding their willingness to contribute to these funding mechanisms. By exploring the relationship between these independent variables and WTP, the study aims to offer insights into factors influencing support for mangrove restoration in Ipil, Zamboanga Sibugay, informing policies for sustainable mangrove management and conservation.

2.12 Simulacrum



3. Research Method

3.1 Research Design: This study investigates residents' willingness to pay (WTP) for mangrove restoration in Ipil, Zamboanga Sibugay, using a primarily quantitative research design with the Contingent Valuation Method (CVM). The study will employ the double-bounded dichotomous choice (DBDC) format, where respondents are asked if they are willing to pay a specific bid amount (e.g., 32 Php per month). If they answer "Yes," a higher bid (e.g., 62 Php) is presented; if they answer "No," a lower bid (e.g., 8 Php) is offered, allowing researchers to bracket the maximum WTP (Gagarin, 2022). The survey explores socioeconomic and attitudinal factors influencing WTP, including income, education, coastal proximity, length of residency, livelihood dependence on mangroves, and environmental awareness. Respondents will be presented with a range of bid amounts to quantify their financial support for mangrove restoration efforts. To ensure representativeness, the survey will be administered both online and in person. Data analysis will involve descriptive statistics, regression modeling to explore the influence of factors on WTP, and the use of secondary data from academic journals, government and NGO reports, and local authorities to complement primary survey findings.

3.2 Data and Sources: This research will be conducted in Ipil, Zamboanga Sibugay, Philippines, a coastal municipality rich in mangrove resources, which significantly contribute to the local economy through fisheries, aquaculture, and potential ecotourism. The study aims to explore residents' willingness to pay (WTP) for mangrove restoration. The target population includes adult residents of Ipil, totaling around 89,401 individuals, with a representative sample of 383 calculated using a 95% confidence level and 5% margin of error. Stratified random sampling will be used, with stratification based on socioeconomic factors, coastal proximity, residency duration, livelihood dependence on mangroves, environmental awareness, and bid amounts. This method ensures diverse representation and minimizes selection bias, enhancing the study's validity and reliability. Participants must be Filipino citizens, 18 years or older, have resided in Ipil for at least a year, and be aware of local mangrove forests. This approach will provide valuable insights into public support for mangrove conservation in Ipil.

3.3 Method of the Study: This study will use an online survey to assess residents' willingness to pay (WTP) for mangrove restoration in Ipil, Zamboanga Sibugay, along with collecting socioeconomic and attitudinal data. The online format ensures broad reach, but paper-based surveys will also be conducted in areas with limited internet access. Data will be analyzed using IBM SPSS and Microsoft Excel, with descriptive statistics summarizing respondents' social and economic backgrounds. A correlation analysis will examine relationships between various factors, and binary logistic regression will be used to analyze WTP data, identifying the factors influencing residents' willingness to contribute financially to mangrove restoration.

Econometric Model: $\mathbf{logit(P)=ln(P/1-P)= \beta 0 + \beta 1I + \beta 2E - \beta 3CP + \beta 4RD + \beta 5\ LD + \beta 6EA - \beta 7\ FM + \epsilon}$

This study examines the factors influencing residents' willingness to pay (WTP) for mangrove restoration in Ipil, Zamboanga Sibugay, using a double-bounded dichotomous choice format. Respondents are asked if they are willing to contribute to mangrove restoration under two funding mechanisms: a dedicated tax and a price increase on goods/services. The bid amounts for these mechanisms are Php 32 (initial), Php 64 (higher), and Php 8 (lower). The key variables influencing WTP include:

- Income (I): Categorized into four brackets (Php 1-10,000, 10,001-20,000, 20,001-30,000, and above 30,000 per month).
- Education (E): Divided into no formal education, primary/elementary, secondary/high school, and tertiary/college.
- Coastal Proximity (CP): Measures how far respondents live from mangrove areas (less than 1 km, 1-5 km, 6-10 km, or more than 10 km).
- Residency Duration (RD): The length of time respondents have lived in Ipil, categorized into four ranges (1-19 years, 20-39 years, 40-59 years, more than 60 years).
- Livelihood Dependence on Mangroves (LD): Assesses how respondents' occupations rely on mangroves (e.g., fishing, mussel farming, ecotourism).
- Environmental Awareness (EA): Measures respondents' knowledge of mangrove ecosystem services and their importance in storm surge mitigation.
- Funding Mechanism Preference (FM): Compares respondents' preferences for a dedicated tax or a price increase on goods/services.
- The model includes an error term (ε), and the survey aims to uncover relationships between these factors and WTP for mangrove conservation.

4. Results and Discussion

This chapter presents the findings of the study on the willingness to pay (WTP) of Ipil, Zamboanga Sibugay residents for mangrove forest restoration and conservation. The results are based on the data collected through a contingent valuation method (CVM) survey, which employed a double-bounded dichotomous choice (DBDC) format. The survey was administered to a stratified random sample of 388 adult residents, with bid amounts presented for two funding mechanisms: dedicated taxes and price increases on goods/services. The data were analyzed using descriptive statistics, cross-tabulations, and a logit regression model to identify the factors that influence WTP. The findings provide valuable insights into the socioeconomic and attitudinal factors that shape community support for mangrove conservation and inform the development of effective strategies to secure funding and promote community participation in mangrove restoration and protection.

Table 1. Frequency and Percentage Distribution

	n	%
Income		
1 to 10,000 per month	244	62.9
10,001 to 20,000 per month	74	19.1
20,001 to 30,000 per month	26	6.7
Education		
No Formal Education	4	1.0
Primary/elementary graduate	12	3.1
Secondary/High school graduate	176	45.4
Tertiary/college graduate	196	50.5
Coastal Proximity		
Less than 1 km	52	13.4
1-5 km	107	27.6
6-10 km	72	18.6
More than 10 km	157	40.5
Residency Duration		
1-19 years	169	43.6
20-39 years	165	42.5
40-59 years	41	10.6
More than 60 years	13	3.4
Funding Mechanism		
Dedicated Tax	257	66.2
Price Increase on certain goods/services	131	33.8
Total	388	100.0

This study investigated public support for improved mangrove conservation efforts in Zamboanga Sibugay, Philippines, through a survey of 388 residents. A key finding was a significant majority (70.4%) expressing willingness to contribute financially towards conservation initiatives. This positive sentiment, however, was nuanced by several factors. The study revealed that a substantial portion (62.9%) of the surveyed population belonged to lower income brackets, earning between 1-10,000 pesos monthly. This economic reality likely influences their ability and willingness to contribute financially. Despite this, a majority of respondents (50.5%) were tertiary/college graduates, suggesting a relatively high level of education that could potentially foster environmental awareness and understanding. The survey captured a diverse range of respondents with varying proximity to the coast. While 40.5% lived more than 10 kilometers from the coast, a significant portion resided within 5 kilometers, potentially influencing their perceptions of mangrove ecosystem services. Notably, 75% of respondents did not directly depend on mangroves for their livelihood. This suggests that support for conservation may stem from broader environmental concerns rather than solely from direct economic benefits. The study explored two primary funding mechanisms: a dedicated tax and price increases on certain goods and services. While a dedicated tax was the preferred option (66.2%), the level of support varied significantly

depending on the proposed tax amount. Willingness to pay decreased substantially as the tax amount increased, indicating price sensitivity among residents. Resistance to price increases was even more pronounced, with a vast majority (89.4%) unwilling to accept any price increase, regardless of the amount. This suggests a strong aversion to this funding mechanism, potentially due to concerns about affordability, perceived unfairness, or a lack of trust in the effective utilization of funds.

4.1. To estimate the Zamboanga Sibugay residents' willingness to pay (WTP) for improved mangrove conservation efforts

To address the objective of estimating the willingness to pay (WTP) of Zamboanga Sibugay residents for improved mangrove conservation efforts, a contingent valuation survey was conducted. The survey employed a double-bounded dichotomous choice (DBDC) format, presenting respondents with bid amounts for two funding mechanisms: dedicated taxes and price increases on goods/services and their preferred bid amounts (Php 8, Php 32, and Php 64).

The study found that the preferred funding mechanism among the respondents was the ***dedicated tax, specifically at a bid amount of Php 32***. This suggests that individuals are more willing to contribute to the funding of the product/service through a dedicated tax rather than a price increase.

4.2. To investigate the relationship between income and the willingness to pay (WTP)

This section examined the relationship between income level and willingness to pay (WTP) for mangrove conservation in Zamboanga Sibugay, Philippines. A cross-tabulation and Chi-square test were conducted to analyze data collected from 388 respondents. The cross-tabulation of income level and WTP revealed a clear pattern: as income increased, so did the proportion of respondents willing to pay for mangrove conservation. While 66.8% of those in the lowest income bracket (1 to 10,000 pesos per month) expressed WTP, this figure rose to 90.9% for those in the highest income bracket (30,001 to 40,000 pesos per month). This observation suggests a ***positive association between income and WTP***, indicating that financial capacity may play a significant role in individuals' willingness to contribute to conservation efforts as shown in the studies of Diswandi & Saptutyningsih (2018) and Trung et al., (2020) that those with higher incomes are willing to pay more for Mangrove conservation and shows that lower-income communities often face financial constraints that limit their ability to contribute significantly to conservation efforts (Gagarin, 2022).

To confirm the statistical significance of this association, a Chi-square test of independence was performed. The results showed a ***significant relationship between income level and WTP ($\chi^2(3) = 12.350$, $p = 0.006$).*** This finding provides statistical support for the observed trend in the cross-tabulation, confirming that ***the relationship between income and WTP is statistically significant***.

4.3. To investigate the relationship between education and the willingness to pay (WTP)

The cross-tabulation of education level and WTP revealed a nuanced pattern. While a majority of respondents across all education levels expressed a willingness to pay, there was a noticeable trend: as education levels increased, so did the proportion of individuals willing to pay. Specifically, 50% of respondents with no formal education expressed WTP, compared to 73.5% of those with a tertiary/college education. This observation suggests a potential positive association between education and WTP, indicating that ***higher levels of education may be linked to a greater willingness to contribute financially to conservation***, which is correspondingly relates to study by Diswandi & Saptutyningsih (2018) in Indonesia that demonstrate that higher educational attainment positively influences WTP.

However, the Chi-square test of independence yielded a less conclusive result. Although the Pearson Chi-square statistic showed a potential association between education and WTP ($\chi^2(3) = 6.533$), the p-value was slightly above the conventional significance level of 0.05 ($p = 0.088$). This indicates that the ***observed association could potentially be due to chance or Not statistically significant***, and further investigation may be needed to confirm a definitive relationship, as observed in the study of Fauziyah et al. (2023), that the impact of education is not always clear-cut, the study found no significant impact of education on WTP. This indicates that other contextual factors may interact with education to influence conservation support.

This notion is supported by several studies that highlight the complex interplay between socioeconomic factors and WTP for mangrove conservation. For instance, research in the Philippines (Gagarin, 2022) has shown that even with a strong understanding of mangrove benefits, low-income levels can constrain WTP, demonstrating the interconnectedness of awareness and financial capability. *confirming that the relationship between education and WTP is not statistically significant.*

4.4. To examine how coastal proximity influences the willingness to pay (WTP)

The cross-tabulation of coastal proximity and WTP presented a mixed picture. While a majority of respondents across all distance categories expressed a willingness to pay, there was no clear linear trend. Interestingly, those living closest to the coast (less than 1 km) showed the highest WTP (78.8%), while those furthest away (more than 10 km) had the lowest (63.7%). This observation suggests that proximity to the coast may have a complex influence on WTP, with those ***living closest potentially having a stronger connection to the mangrove ecosystem and a greater appreciation for its benefits.***

However, the Chi-square test of independence did not reveal a statistically significant association between coastal proximity and WTP ($\chi^2(3) = 6.527$, $p = 0.089$). This indicates that the observed differences in ***WTP across distance categories could be due to chance or other confounding factors.***

Despite the lack of strong statistical significance, the observed pattern in the cross-tabulation warrants further consideration, especially in light of existing literature on the relationship between coastal proximity and WTP for mangrove conservation. Several studies have demonstrated the complex and multifaceted nature of this relationship. For instance, Ickowitz et al. (2023) found that households residing near high-density mangrove forests in Indonesia consume significantly more fish and aquatic species, highlighting the direct link between proximity and reliance on mangrove-derived resources. This reliance can foster a greater appreciation for mangroves and a stronger willingness to contribute to their conservation, as evidenced by Musa et al. (2020) who found that WTP in Marudu Bay, Malaysia, was strongly driven by communities recognizing the potential for sustainable ecotourism and economic benefits associated with mangroves.

However, the relationship between proximity and WTP is not always straightforward. While adjacent communities often have a higher WTP due to direct livelihood dependence, targeted education and awareness initiatives can shape perceptions and WTP even in communities located further away. Marlianingrum et al. (2021) found that perceived value of mangroves increases with habitat quality, suggesting that communities with a better understanding of the full range of mangrove benefits are likely to be more willing to invest financially. This is further supported by Wang et al. (2021), who highlighted that an individual's level of interaction with a protected area and their pro-environmental attitudes can outweigh the impact of mere proximity. Furthermore, the role of cultural practices and traditional knowledge systems can significantly amplify WTP even in communities located further from the resource (Aipassa et al., 2023). This highlights the importance of considering cultural and social factors in understanding the relationship between proximity and WTP. Even within a single region, WTP for mangrove conservation can exhibit variations based on coastal proximity, influenced by factors such as location, demographics, interaction with mangroves, and ecological knowledge (Su & Gasparatos, 2024). This reinforces that successful conservation strategies need to consider the diverse perspectives of communities situated across different distances from mangroves. ***Confirming that the relationship between coastal proximity and WTP is not statistically significant, could be due to chance or other confounding factors.***

4.5. To assess the impact of residency duration on the willingness to pay (WTP)

A cross-tabulation of residency duration and WTP revealed a somewhat ambiguous pattern. While the majority of respondents across all residency duration categories expressed a willingness to pay, there was no clear linear trend. Interestingly, those who had lived in the area for a shorter time (1-19 years) showed a slightly higher WTP (75.7%) compared to those with longer residency durations. This observation raises the question of whether newer residents might have a different perspective on conservation, potentially driven by factors such as a greater appreciation for the natural environment or a lack of awareness of past conservation challenges in the area. However, the Chi-square test of independence yielded a p-value slightly above the conventional significance

level of 0.05 ($\chi^2(3) = 6.836$, $p = 0.077$). This indicates that the observed differences in WTP across residency duration categories could ***potentially be not statistically significant or other confounding factors or due to chance.*** While the association is not statistically significant, the p-value is close to the threshold, suggesting that further investigation is warranted.

Our findings contribute to a growing body of research exploring the complex relationship between residency duration and WTP for conservation. While some studies suggest that longer-term residency can foster environmental awareness and a connection to the environment (Ballad and Mangabat, 2021), others indicate that socio-economic factors like income level might outweigh the influence of residency duration on WTP (Sunoto and Ponrahono, 2019; Kamariah et al., 2014). Ballad and Mangabat's (2021) research in the Philippines found that long-term residency was associated with environmental awareness, but economic constraints limited villagers' willingness to make direct monetary contributions to conservation. This highlights the importance of considering the socioeconomic context when interpreting the relationship between residency duration and WTP. Owuor et al. (2019) found that longer-term residents may be more likely to witness the impact of environmental changes, which could potentially lead to a willingness to support conservation. However, they also acknowledged that this support may not always translate into direct financial contributions.

These studies highlight the complex interplay of factors that shape conservation attitudes and WTP. While longer residency can potentially foster environmental awareness and concern, WTP is influenced by a combination of factors, including residency duration, socio-economic conditions, education, and direct knowledge of ecosystem benefits. In the context of our study in Zamboanga Sibugay, the lack of a strong statistical association between residency duration and WTP could be attributed to the complex interplay of these factors. While newer residents may exhibit a slightly higher WTP, potentially driven by a greater appreciation for the natural environment, other factors, such as income level and awareness of past conservation challenges, may also be influencing their willingness to contribute financially. ***Confirming that the relationship between residency duration and WTP is not statistically significant, could be due to chance or other confounding factors.***

4.6. To determine the influence of livelihood dependence on mangroves on the willingness to pay (WTP)

The cross-tabulation of livelihood dependence and WTP revealed a striking pattern: those whose livelihoods were dependent on mangroves exhibited a significantly higher WTP (87.6%) compared to those whose livelihoods were not dependent (64.6%). This observation strongly suggests that a ***direct reliance on mangroves for income and sustenance fosters a greater appreciation for their value and a stronger motivation to support their conservation.*** This association was statistically confirmed by the Chi-square test of independence, which showed a highly significant relationship

between livelihood dependence and WTP ($\chi^2(1) = 18.493$, $p < 0.001$). This result indicates that the observed difference in WTP between the two groups is ***statistically significant and unlikely due to chance, and livelihood dependence is indeed a strong predictor of individuals' willingness to contribute financially to mangrove conservation.***

This finding aligns with a substantial number of Studies across various geographical contexts have consistently shown that communities who directly rely on mangroves for their livelihoods exhibit a greater willingness to invest in their protection. For instance, Ogeh et al. (2015) found that in Nigeria, research in Malaysia (Sunoto et al., 2020), Vietnam (Pham et al., 2018), and Indonesia (Idrus et al., 2019) has demonstrated a direct link between economic dependence on mangroves and support for conservation initiatives. These studies highlight that communities recognize the impact of mangrove degradation on their livelihoods, which influences their WTP.

To further explore the relationship between livelihood dependence and WTP in Zamboanga Sibugay, we conducted additional analyses:

- ***Mantel-Haenszel Common Odds Ratio Estimate:*** This estimate, adjusted for potential confounding factors, is 3.881. This signifies that individuals whose livelihoods depend on mangroves have almost four times higher odds of being willing to pay for mangrove conservation compared to those who do not. This difference is statistically significant ($p < 0.001$), reinforcing the strong influence of livelihood dependence on WTP.

These additional analysis, combined with the existing literature, provide compelling evidence that livelihood dependence on mangroves is a powerful and independent driver of individuals' willingness to contribute to their conservation. The substantial magnitude of the common odds ratio point to the crucial role of livelihood dependence in shaping conservation attitudes. ***Confirming that the relationship between livelihood dependence and WTP is statistically significant.***

4.7. To explore the relationship between environmental awareness and the willingness to pay (WTP)

The cross-tabulation of environmental awareness and WTP showed that a majority of respondents, both those who were environmentally aware (70.7%) and those who were not (65.0%), expressed a willingness to pay for mangrove conservation. This suggests that a general appreciation for conservation exists across different levels of environmental awareness. However, the difference in WTP between the two groups was relatively small, raising the question of whether environmental awareness plays a significant role in influencing individuals' willingness to contribute financially. The Chi-square test of independence provided further insight into this relationship. The results showed no statistically significant association between environmental awareness and WTP ($\chi^2(1) = 0.291$, $p = 0.590$). This indicates that the observed difference in WTP between those who are environmentally aware and those who are not could be attributed to chance, and environmental

awareness alone may not be a strong predictor of an individual's willingness to contribute financially to mangrove conservation.

This finding adds to a growing body of literature exploring the complex relationship between environmental awareness and WTP for conservation, particularly in the context of mangrove ecosystems in the Philippines. While research has demonstrated a clear connection between environmental awareness and WTP (Firdaus et al., 2021; Creencia and Querijero, 2018), our study suggests that this relationship may be less pronounced in Zamboanga Sibugay.

Several factors could explain this discrepancy. Firstly, As highlighted by Ahmed (2019) and Firdaus et al. (2021), Creencia and Querijero, (2018); Cudiamat and Valdez, (2022) sociodemographic factors such as education level, age, gender, and income may play a mediating role in the relationship between awareness and WTP. Furthermore, an understanding of the reliance on mangroves for direct economic benefits can be a significant factor in WTP (Ahmed, 2019). Secondly, the way in which environmental awareness is defined and measured can influence the observed relationship with WTP. As Creencia and Querijero (2018) point out, questionnaires adapted to specific local contexts are crucial for accurately assessing awareness. Moreover, awareness alone may not translate directly into active participation in conservation, as other factors, such as perceived barriers and motivations for community involvement, also come into play (Kunz, 2015; Llanza et al., 2016).

To further explore this relationship, we conducted additional analyses:

- ***Mantel-Haenszel Common Odds Ratio Estimate:*** This provides an estimate of the overall odds ratio, adjusted for potential confounding factors. The estimated odds ratio of 1.296 suggests that those who are environmentally aware have slightly higher odds of being willing to pay for mangrove conservation compared to those who are not. However, this estimate is not statistically significant ($p = 0.591$), indicating that the difference in odds is not substantial enough to be considered.

These additional analyses reinforce the finding that ***environmental awareness alone may not be a strong predictor of WTP for mangrove conservation in Zamboanga Sibugay.*** While those who are ***environmentally aware may have slightly higher odds of expressing WTP, this difference is not statistically significant.*** This suggests that other factors, such as income, livelihood dependence, and perceived benefits of conservation, may play a more prominent role in influencing individuals' willingness to contribute financially.

4.8. To compare and estimate the willingness to pay (WTP) of residents in Ipil, Zamboanga Sibugay for mangrove restoration efforts under different funding mechanisms:

Dedicated Tax (Php 32) and Willingness to Pay

The researchers analyzed data from 257 respondents using a cross-tabulation and Chi-square test to examine the relationship between their WTP and their preferred funding mechanism. The cross-tabulation of WTP and the dedicated tax revealed a strong association. Among those who preferred the dedicated tax, a vast majority (85.6%) expressed a willingness to pay the proposed amount of Php 32. In contrast, among those who did not prefer the dedicated tax, only 30.6% were willing to pay. This suggests that ***residents who favor a dedicated tax as a funding mechanism are significantly more likely to contribute financially to mangrove restoration.***

This association was confirmed by the Chi-square test of independence, which showed a highly significant relationship between preference for the dedicated tax and WTP ($\chi^2(1) = 64.065$, $p < 0.001$). This result indicates that the observed difference in WTP between those who prefer the dedicated tax and those who do not is not due to chance, and ***preference for this funding mechanism is a strong predictor of WTP.***

To further explore this relationship, we conducted additional analyses:

- **Mantel-Haenszel Common Odds Ratio Estimate:** This estimate, adjusted for potential confounding factors, is 13.449. This signifies that individuals who prefer the dedicated tax have over 13 times higher odds of being willing to pay for mangrove restoration compared to those who do not prefer this funding mechanism. This difference is statistically significant ($p < 0.001$), reinforcing the strong influence of funding mechanism preference on WTP.

These findings suggest that residents in Ipil, Zamboanga Sibugay exhibit a strong preference for funding mangrove restoration through a dedicated tax. Those who favor this mechanism are significantly more likely to contribute financially compared to those who prefer alternative funding sources. This highlights the importance of considering community preferences when designing conservation financing strategies.

Dedicated Tax (Php 64) and Willingness to Pay

The researchers analyzed data from 257 respondents using a cross-tabulation and Chi-square test to examine the relationship between their WTP and their preferred funding mechanism. The cross-tabulation of WTP and the dedicated tax revealed a strong association. Among those who preferred the dedicated tax, a vast majority (89.4%) expressed a willingness to pay the proposed amount of Php 64. In contrast, among those who did not prefer the dedicated tax, only 57.8% were willing to pay. This suggests that ***residents who favor a dedicated tax as a funding mechanism are significantly more likely to contribute financially to mangrove restoration, even at a higher proposed tax amount.***

This association was confirmed by the Chi-square test of independence, which showed a highly significant relationship between preference for the dedicated tax and WTP ($\chi^2(1) = 33.988$, $p <$

0.001). This result indicates that the observed difference in WTP between those who prefer the dedicated tax and those who do not is not due to chance, and ***preference for this funding mechanism is a strong predictor of WTP.***

To further explore this relationship, we conducted additional analyses:

- **Mantel-Haenszel Common Odds Ratio Estimate:** This estimate, adjusted for potential confounding factors, is 6.143. This signifies that individuals who prefer the dedicated tax have over 6 times higher odds of being willing to pay for mangrove restoration compared to those who do not prefer this funding mechanism. This difference is statistically significant ($p < 0.001$), reinforcing the strong influence of funding mechanism preference on WTP, even at the higher tax amount.

These findings suggest that residents in Ipil, Zamboanga Sibugay exhibit a strong and consistent preference for funding mangrove restoration through a dedicated tax, even when the proposed amount is higher. Those who favor this mechanism are significantly more likely to contribute financially compared to those who prefer alternative funding sources. This highlights the importance of considering community preferences when designing conservation financing strategies and suggests that residents may be willing to contribute a substantial amount to support mangrove restoration.

Dedicated Tax (Php 8) and Willingness to Pay

The researchers analyzed data from 257 respondents using a cross-tabulation and Chi-square test to examine the relationship between their WTP and their preferred funding mechanism. The cross-tabulation of WTP and the dedicated tax revealed an interesting pattern. Among those who preferred the dedicated tax, a majority (80.5%) expressed a willingness to pay the proposed amount of Php 8. However, among those who did not prefer the dedicated tax, a smaller majority (64.8%) were willing to pay. This suggests that while there is general support for paying for mangrove restoration, those who favor a dedicated tax may be slightly more inclined to contribute financially, even at this lower proposed tax amount.

The Chi-square test of independence showed a statistically significant relationship between preference for the dedicated tax and WTP ($\chi^2(1) = 7.628$, $p = 0.006$). This result indicates that the observed difference in WTP between those who prefer the dedicated tax and those who do not is not likely due to chance, and ***preference for this funding mechanism is a predictor of WTP, although the association is not as strong as with the higher tax amounts.***

To further explore this relationship, we conducted additional analyses:

- **Mantel-Haenszel Common Odds Ratio Estimate:** This estimate, adjusted for potential confounding factors, is 0.446. This signifies that, contrary to the higher tax amounts, individuals who prefer the dedicated tax have lower odds (less than half) of being willing

to pay for mangrove restoration compared to those who do not prefer this funding mechanism. This difference is statistically significant ($p = 0.006$), suggesting that at this lower tax amount, other factors may be influencing WTP more strongly than the preference for a dedicated tax.

These findings suggest that while there is general support for funding mangrove restoration through a dedicated tax in Ipil, Zamboanga Sibugay, this preference may be less influential at lower tax amounts. The lower odds ratio indicates that other factors, such as individual income, perceived benefits of mangrove restoration, or trust in the local government, may play a more significant role in determining WTP when the proposed contribution is smaller.

Price Increase (Php 32) and Willingness to Pay

The researchers analyzed data from 388 respondents using a cross-tabulation and Chi-square test to examine the relationship between their WTP and their preferred funding mechanism. The cross-tabulation of WTP and the price increase revealed a strong association. Among those who preferred the price increase, a vast majority (81.5%) expressed a willingness to pay the proposed amount of Php 32. In contrast, among those who did not prefer the price increase, only 67.4% were willing to pay. This suggests that ***residents who favor a price increase as a funding mechanism are significantly more likely to contribute financially to mangrove restoration.***

This association was confirmed by the Chi-square test of independence, which showed a highly significant relationship between preference for the price increase and WTP ($\chi^2(1) = 37.194$, $p < 0.001$). This result indicates that the observed difference in WTP between those who prefer the price increase and those who do not is not due to chance, and ***preference for this funding mechanism is a strong predictor of WTP.***

To further explore this relationship, we conducted additional analyses:

- **Mantel-Haenszel Common Odds Ratio Estimate:** This estimate, adjusted for potential confounding factors, is 11.314. This signifies that individuals who prefer the price increase have over 11 times higher odds of being willing to pay for mangrove restoration compared to those who do not prefer this funding mechanism. This difference is statistically significant ($p < 0.001$), reinforcing the strong influence of funding mechanism preference on WTP.

These findings suggest that residents in Ipil, Zamboanga Sibugay exhibit a strong preference for funding mangrove restoration through a price increase on certain goods and services. Those who favor this mechanism are significantly more likely to contribute financially compared to those who prefer alternative funding sources. This highlights the importance of considering community preferences when designing conservation financing strategies.

Price Increase (Php 64) and Willingness to Pay

The researchers analyzed data from 131 respondents using a cross-tabulation and Chi-square test to examine the relationship between their WTP and their preferred funding mechanism. The cross-tabulation of WTP and the price increase revealed a strong association. Among those who preferred the price increase, a large majority (79.7%) expressed a willingness to pay the proposed amount of Php 64. In contrast, among those who did not prefer the price increase, only 45.8% were willing to pay. This suggests that residents who favor a price increase as a funding mechanism are significantly more likely to contribute financially to mangrove restoration, even at this higher proposed amount.

This association was confirmed by the Chi-square test of independence, which showed a highly significant relationship between preference for the price increase and WTP ($\chi^2(1) = 15.608$, $p < 0.001$). This result indicates that the observed difference in WTP between those who prefer the price increase and those who do not is not due to chance, and preference for this ***funding mechanism is a strong predictor of WTP.***

To further explore this relationship, we conducted additional analyses:

- **Mantel-Haenszel Common Odds Ratio Estimate:** This estimate, adjusted for potential confounding factors, is 4.629. This signifies that individuals who prefer the price increase have over 4.6 times higher odds of being willing to pay for mangrove restoration compared to those who do not prefer this funding mechanism. This difference is statistically significant ($p < 0.001$), reinforcing the strong influence of funding mechanism preference on WTP, even at the higher price increase.

These findings suggest that residents in Ipil, Zamboanga Sibugay exhibit a strong and consistent preference for funding mangrove restoration through a price increase on certain goods and services. Those who favor this mechanism are significantly more likely to contribute financially compared to those who prefer alternative funding sources, even when the proposed price increase is higher. This highlights the importance of considering community preferences when designing conservation financing strategies and suggests that residents may be willing to accept a substantial price increase to support mangrove restoration.

Price Increase (Php 8) and Willingness to Pay

The researchers analyzed data from 131 respondents using a cross-tabulation and Chi-square test to examine the relationship between their WTP and their preferred funding mechanism.The cross-tabulation of WTP and the price increase revealed a less clear-cut association compared to the higher price increase amounts. Among those who preferred the price increase, a majority (65.9%) expressed a willingness to pay the proposed amount of Php 8. Similarly, among those who did not prefer the price increase, a slightly higher majority (58.9%) were willing to pay. This suggests that ***at this lower proposed amount, the preference for a price increase as a funding mechanism may not be a strong predictor of WTP.***

This observation was supported by the Chi-square test of independence, which showed no statistically significant relationship between preference for the price increase and WTP ($\chi^2(1) = 0.575$, $p = 0.448$). This result indicates that the observed difference in WTP between those who prefer the price increase and those who do not could be due to chance, and preference for this funding mechanism may not be a strong factor influencing WTP at this lower amount.

To further explore this relationship, we conducted additional analyses:

- **Mantel-Haenszel Common Odds Ratio Estimate:** This estimate, adjusted for potential confounding factors, is 1.346. This signifies that individuals who prefer the price increase have slightly higher odds of being willing to pay for mangrove restoration compared to those who do not prefer this funding mechanism. However, this difference is not statistically significant ($p = 0.449$), reinforcing the notion that the preference for a price increase may not be a strong predictor of WTP at this lower amount.

These findings suggest that while there is general support for funding mangrove restoration through a price increase on certain goods and services in Ipil, Zamboanga Sibugay, this preference may be less influential at lower price increase amounts. The non-significant association and the relatively small odds ratio indicate that other factors, such as individual income, perceived benefits of mangrove restoration, or trust in the local government, may play a more significant role in determining WTP when the proposed price increase is smaller.

Logistic Regression

The omnibus tests of model coefficients indicated that the logistic regression model, as a whole, was **statistically significant** ($\chi^2(20) = 145.312$, $p < .001$). This suggests that the included predictors collectively contribute meaningfully to explaining the observed variation in WTP. The model summary further revealed a moderate fit, with the Cox & Snell R-square indicating that the model explained approximately 31.2% of the variance in WTP, and the Nagelkerke R-square indicating an explained variance of 44.4%. While this suggests that the model captures a reasonable portion of the variability in the outcome, it also acknowledges that o***ther factors not included in the model may also play a role.***

The Hosmer and Lemeshow test was conducted to assess the goodness-of-fit of the model. The non-significant result ($\chi^2(8) = 4.127$, $p = 0.846$) indicates that the ***model's predictions are consistent with the observed data, suggesting a good fit.***

Binary logistic regression tests provide insights into the individual effects of each predictor on WTP. Several variables emerged as statistically significant predictors:

- **Coastal Proximity:** Residents living closer to the coast exhibited higher odds of expressing WTP compared to those living further away. This finding aligns with previous research highlighting the influence of proximity on the perceived value of mangroves and

the likelihood of benefiting directly from their ecosystem services (e.g., Ickowitz et al., 2023; Musa et al., 2020).

- **Livelihood Dependence:** Those whose livelihoods were dependent on mangroves had significantly higher odds of expressing WTP. This result confirms the strong link between direct reliance on mangroves and a willingness to invest in their conservation, as documented in numerous studies (e.g., Ogeh et al., 2015; Sunoto et al., 2020; Pham et al., 2018; Idrus et al., 2019).

Funding Mechanisms: Preference for specific funding mechanisms also significantly influenced WTP. Residents who favored a dedicated tax or a price increase on certain goods and services had higher odds of expressing WTP compared to those who did not prefer these mechanisms. This highlights the importance of considering community preferences when designing conservation financing strategies.

5. Summary, Conclusion, Policy Implications, and Recommendations

5.1 Summary

A study in Ipil, Zamboanga Sibugay, Philippines, examined the factors influencing residents' willingness to pay (WTP) for mangrove restoration and conservation. Using a quantitative approach and contingent valuation method (CVM), 388 adult residents were surveyed about their WTP under two funding mechanisms: dedicated taxes and price increases on goods/services, with bid amounts of Php 32, Php 64, and Php 8. The study found that 70.4% of residents were willing to pay, with a preference for dedicated taxes, especially at higher amounts (Php 32). Socioeconomic factors, such as higher income and dependence on mangroves for livelihoods, were significant predictors of WTP. Despite high environmental awareness, it did not significantly influence WTP, suggesting that economic factors and direct dependence on mangroves played a more prominent role in residents' financial commitment to conservation efforts.

5.2 Conclusion

This study explores the factors influencing residents' willingness to pay (WTP) for mangrove conservation in Ipil, Zamboanga Sibugay, Philippines. It reveals that socioeconomic factors such as income and livelihood dependence are strong predictors of WTP, with financial capacity and direct reliance on mangroves playing key roles in community support for conservation. While environmental awareness is generally high, it is not the primary driver of WTP; factors like income, livelihood dependence, and trust in funding mechanisms are more influential. Residents show a preference for a dedicated tax to fund conservation, particularly at higher proposed amounts, indicating a willingness to contribute if the amount is deemed acceptable. The study highlights the need for conservation strategies tailored to the community's socioeconomic context,

awareness levels, and funding preferences. Addressing financial constraints, promoting environmental education, and ensuring transparent management of funds are essential for fostering trust and encouraging participation in conservation efforts.

5.3 Policy Implications and Recommendations

The study's findings have important implications for mangrove conservation policy and behavior change in Ipil, Zamboanga Sibugay. It suggests implementing a dedicated tax for conservation, with the tax amount carefully designed to ensure community support. Targeted awareness campaigns should be developed to educate residents on the benefits of mangroves, addressing knowledge gaps and tailoring the message to sociodemographic factors. Additionally, fostering community engagement in conservation planning and decision-making is crucial to building a sense of ownership. Supporting sustainable livelihoods compatible with mangrove conservation can also strengthen community resilience. Overall, the study emphasizes the need for education, community involvement, and sustainable initiatives to protect and restore mangrove ecosystems for long-term benefits.

Economic Significance: This research highlights the economic value of mangrove ecosystems and informs the development of sustainable financing mechanisms for their conservation. By quantifying residents' willingness to pay (WTP) for mangrove restoration, the study provides policymakers and conservation organizations with data to guide resource allocation and conservation strategies. It offers estimates of the economic value of mangroves' non-market services, such as coastal protection and fisheries support, which can be used in cost-benefit analyses. The study also reveals residents' strong support for a dedicated tax as a funding mechanism, aiding the development of sustainable financing strategies. Overall, the research underscores the economic benefits of mangrove restoration, such as increased fish stocks and ecotourism opportunities, strengthening the case for investment in conservation and informing policy for sustainable mangrove management.

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