

# Conservation at a Crossroads: Evaluating the Socio-Economic Impact of the Las Piñas-Parañaque Wetland Park on Adjacent Communities

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Received 29<sup>th</sup> June 2025; Accepted 29<sup>th</sup> July 2025; Published Online 12<sup>th</sup> August 2025

DOI: 10.63941/DIT.ADSimrj.2025.1.3.1.31

## ABSTRACT

The Las Piñas-Parañaque Wetland Park (LPPWP), a critical ecological refuge within Metro Manila, faces mounting environmental pressures and complex socio-economic dynamics. This study examines the socio-economic impacts of LPPWP's conservation policies on neighboring communities through a mixed-methods design, integrating quantitative survey data (n = 2,235) with qualitative insights from interviews and focus group discussions. Results indicate marked disparities in well-being across demographic groups, with lower-income, less-educated, and informally housed populations reporting significantly poorer health outcomes and heightened food insecurity. Chi-square and Spearman correlation analyses reveal statistically significant relationships between education, income, tenure security, and socio-economic vulnerability, affirming that marginalized groups are disproportionately affected. Unexpectedly, geographic proximity to the wetland park did not consistently correlate with positive perceptions of its benefits; in some instances, residents of more distant barangays reported more favorable impacts than those living closer. Additionally, perceptions of community participation in conservation efforts were inversely associated with views of the park's socio-economic benefits—suggesting potential disillusionment with existing participatory mechanisms. These findings highlight the need for inclusive and equitable conservation strategies that prioritize participatory planning, benefit-sharing, sustainable livelihoods, and strengthened education and waste management systems. The study contributes to broader discourses on urban environmental justice, sustainable development, and the socio-ecological governance of protected areas, offering practical recommendations for aligning biodiversity conservation with local development imperatives.

**Keywords:** *Biodiversity Conservation, Community Participation, Environmental Justice, Food Security, Urban Wetlands*

## INTRODUCTION

"Where cities end, wetlands begin—quietly performing life-saving work amidst urban chaos." These ecosystems, often overlooked in the shadow of urban infrastructure, are increasingly acknowledged as vital to the ecological resilience and socio-economic well-being of metropolitan regions. Urban wetlands provide a range of critical services: they regulate floods, filter water, store carbon, support biodiversity, and sustain livelihoods for adjacent communities (Cordeiro et al., 2021). Yet despite their importance, urban wetlands remain among the most vulnerable ecosystems worldwide, threatened by rapid urbanization, pollution, weak institutional coordination, and limited public engagement.

The Las Piñas-Parañaque Wetland Park (LPPWP), a Ramsar-designated site in Metro Manila, embodies both the promise and challenges of conserving ecological assets in high-density urban contexts. Covering approximately 181 hectares, LPPWP functions as a habitat for migratory birds, a carbon sink, and a buffer against coastal flooding and storm surges (DENR, 2018). However, the park

faces mounting pressures from illegal fishing, informal settlement expansion, and chronic waste dumping—issues that mirror broader regional trends in Southeast Asia’s urban wetland degradation (Acuña, 2020; Villanueva, 2023).

Institutional fragmentation further complicates effective management. Multiple agencies with overlapping mandates result in regulatory ambiguity and weak enforcement, while chronic underfunding and limited technical capacity hinder ecological monitoring and program delivery (Cruz, 2022; Dizon, 2021). The lack of a unified governance framework not only threatens the park’s ecological functions but also undermines the benefits it could provide to surrounding communities.

Environmental degradation has direct consequences for local residents, particularly those in informal or vulnerable settlements. Flooding, waste accumulation, and declining fishery yields impact food security, income, and public health—exacerbating existing social inequities (Manila Observatory, 2024). While conservation strategies often assume benefits are evenly distributed, evidence from LPPWP suggests that socio-economic disparities significantly shape how such benefits are accessed and experienced.

Although participatory conservation is widely recognized as a best practice, meaningful community involvement in LPPWP’s management remains limited. Barriers include low levels of environmental literacy, inadequate communication, and the absence of inclusive decision-making mechanisms (Yap, 2022). Awareness campaigns and youth engagement programs led by organizations like Wetlands International Philippines have shown potential (Wetlands International Philippines, 2021), but broader behavioral change and public stewardship have yet to materialize at scale (Cruz, 2022; DENR, 2020).

In addition, conservation initiatives often fall short in addressing the economic dislocation of communities traditionally reliant on fishing or foraging. While proposals for ecotourism and green employment have emerged, implementation has been slow and uneven due to logistical and market-related challenges (Acuña, 2020). Without strong support systems—such as skills training, fair benefit-sharing, and market access—alternative livelihoods risk being insufficient substitutes (Cordeiro et al., 2021).

Notably, the economic valuation of LPPWP’s ecosystem services remains underutilized. Research elsewhere has demonstrated that quantifying the financial value of flood control, air purification, and biodiversity can strengthen the case for conservation investment and political prioritization (Gómez-Baggethun & Barton, 2022). In the absence of such valuation exercises at LPPWP, mobilizing sustained resources and policy support remains a challenge.

In response to these interlinked socio-ecological challenges, this study adopts a mixed-methods approach to assess the socio-economic impacts of LPPWP’s conservation policies on surrounding communities. Drawing on quantitative survey data from 2,235 residents across six barangays, complemented by qualitative interviews and focus group discussions, it investigates the relationships between household income, tenure security, educational attainment, food security, perceived participation, and overall well-being.

Ultimately, this research seeks to inform the development of inclusive, community-based conservation strategies that align biodiversity protection with social equity. In line with the United Nations Sustainable Development Goals—particularly SDG 11 (Sustainable Cities and Communities) and SDG 15 (Life on Land)—it contributes to broader efforts to promote just, participatory, and ecologically resilient urban governance.

## **MATERIALS & METHODS**

This study employed a mixed-methods research design to comprehensively assess the socio-economic

impacts of protected area conservation policies on local communities surrounding the Las Piñas–Parañaque Wetland Park (LPPWP). By integrating both quantitative and qualitative approaches, the study aimed to capture generalizable patterns alongside rich, contextualized insights—thus enabling a holistic understanding of how conservation interventions shape local livelihoods, well-being, and perceptions.

### **Quantitative Component**

The quantitative phase involved the administration of structured survey questionnaires to a randomly selected sample of residents from six barangays adjacent to the LPPWP. The survey instrument collected data on key demographic characteristics, including age, gender, household income, and educational attainment. It also examined variables related to the impacts of conservation policies, such as changes in income and employment, participation in alternative livelihood programs, perceived environmental quality, and overall well-being.

A probability-based sampling technique was utilized to ensure representativeness across socio-demographic strata, with sample size calculated using standard statistical formulas to achieve adequate analytical power and minimize sampling error. The resulting dataset was analyzed using statistical software packages including SPSS and R. Analytical techniques encompassed descriptive statistics (means, frequencies, standard deviations) and inferential statistical tests, such as independent samples t-tests, ANOVA, and multiple regression analyses, to examine the relationships between conservation policies and socioeconomic indicators. Additionally, chi-square tests and Spearman correlation analyses were conducted to assess associations among categorical and ordinal variables.

### **Qualitative Component**

To complement and enrich the quantitative findings, the study incorporated a qualitative strand consisting of semi-structured interviews and focus group discussions (FGDs). Key informant interviews were conducted with community leaders, local government officials, and representatives from non-governmental organizations (NGOs) involved in conservation and development programming. These interviews explored perceptions of conservation effectiveness, institutional roles, and policy gaps.

In addition, FGDs were held with local residents to elicit more nuanced accounts of their lived experiences with LPPWP's conservation efforts. Topics included access to resources, livelihood transitions, environmental changes, and trust in governance processes. These discussions encouraged collective reflection, fostered inclusive dialogue, and surfaced diverse community perspectives, including those that might not be captured through structured surveys.

All qualitative data were recorded, transcribed, and analyzed using thematic analysis. Transcripts were coded iteratively to identify recurring patterns, emergent themes, and context-specific narratives. To facilitate systematic data organization and interpretation, NVivo software was used throughout the analysis.

## **RESULTS AND DISCUSSION**

The results in Table 1 indicate a statistically significant relationship between educational attainment and general health status, with a moderate effect size. The highest proportion of respondents reporting "Excellent" health was found among those with Higher Education (44.3%), followed by those in the Lower Education group (42.3%), and then those in Secondary/Vocational Education (34.4%). Although the proportion reporting excellent health in the lower education group was relatively high, it is important to note that individuals in this group also had slightly lower scores in the "Very Good"

category and no responses in the "Poor" or "Fair" categories—raising questions about self-reporting variation or perceptions of health by education level.

**Table 1**  
**Cross-tabulation of Educational Attainment and General Health Status ( $N = 2,235$ )**

| Educational Attainment | Poor             | Fair              | Good               | Very Good          | Excellent          | Total              |
|------------------------|------------------|-------------------|--------------------|--------------------|--------------------|--------------------|
| Lower Education        | 0 (0.0%)         | 83 (8.0%)         | 186 (18.0%)        | 326 (31.6%)        | 437 (42.3%)        | 1032 (100%)        |
| Secondary/Vocational   | 0 (0.0%)         | 0 (0.0%)          | 69 (22.2%)         | 135 (43.4%)        | 107 (34.4%)        | 311 (100%)         |
| Higher Education       | 38 (4.3%)        | 42 (4.7%)         | 167 (18.7%)        | 250 (28.0%)        | 395 (44.3%)        | 892 (100%)         |
| <b>Total</b>           | <b>38 (1.7%)</b> | <b>125 (5.6%)</b> | <b>422 (18.9%)</b> | <b>711 (31.8%)</b> | <b>939 (42.0%)</b> | <b>2235 (100%)</b> |

Note: Pearson  $\chi^2(8) = 111.73, p < .001$ , Cramer's  $V = .158$ .

The results in Table 1 indicate a statistically significant relationship between educational attainment and general health status, with a moderate effect size. The highest proportion of respondents reporting "Excellent" health was found among those with Higher Education (44.3%), followed by those in the Lower Education group (42.3%), and then those in Secondary/Vocational Education (34.4%). Although the proportion reporting excellent health in the lower education group was relatively high, it is important to note that individuals in this group also had slightly lower scores in the "Very Good" category and no responses in the "Poor" or "Fair" categories—raising questions about self-reporting variation or perceptions of health by education level.

This finding supports Hypothesis 1, which posits that socioeconomic disparities influence well-being. Educational attainment is not only a proxy for socio-economic advantage but also impacts access to health-related knowledge, services, and economic opportunities. The implications are clear: conservation and development strategies in areas like the LPPWP must integrate **educational interventions** and awareness-building as part of broader efforts to enhance community resilience and equity. Health-focused initiatives should especially target those with lower educational backgrounds to ensure that ecological protection efforts do not deepen pre-existing inequalities.

**Table 2**  
**Cross-tabulation of Household Income and General Health Status ( $N = 2,235$ )**

| Income Group                | Poor             | Fair              | Good               | Very Good          | Excellent          | Total              |
|-----------------------------|------------------|-------------------|--------------------|--------------------|--------------------|--------------------|
| Low Income (<₱10,000)       | 0 (0.0%)         | 42 (8.8%)         | 107 (22.4%)        | 124 (25.9%)        | 205 (42.9%)        | 478 (100%)         |
| Middle Income (₱10k–29,999) | 0 (0.0%)         | 41 (3.3%)         | 168 (13.6%)        | 415 (33.7%)        | 607 (49.3%)        | 1231 (100%)        |
| High Income (≥₱30,000)      | 0 (0.0%)         | 0 (0.0%)          | 64 (20.8%)         | 116 (37.8%)        | 127 (41.4%)        | 307 (100%)         |
| No Answer                   | 38 (17.4%)       | 42 (19.2%)        | 83 (37.9%)         | 56 (25.6%)         | 0 (0.0%)           | 219 (100%)         |
| <b>Total</b>                | <b>38 (1.7%)</b> | <b>125 (5.6%)</b> | <b>422 (18.9%)</b> | <b>711 (31.8%)</b> | <b>939 (42.0%)</b> | <b>2235 (100%)</b> |

Note: Pearson  $\chi^2(12) = 643.20, p < .001$ , Cramer's  $V = .310$ .

Table 2 confirms a significant association between household income and general health status, with a moderate effect size (Cramer's  $V = 0.310$ ). Respondents in the Middle Income group reported the highest proportion of "Excellent" health (49.3%), slightly exceeding the High Income group (41.4%). The Low Income group had a mixed distribution, with 42.9% reporting "Excellent" health but also higher levels of "Fair" and "Good" health compared to higher-income counterparts. Most notably, the "No Answer" group reported the worst health outcomes, with 17.4% indicating "Poor" health and **zero respondents** indicating "Excellent" health.

These results again support Hypothesis 1, reinforcing the notion that economic security is closely linked to physical well-being. The findings have direct policy implications: conservation interventions must be accompanied by livelihood support, especially in communities facing income insecurity. Development partners should be cautious of neglecting the “No Answer” demographic, as their hesitation to disclose income may be linked to deeper vulnerability. Addressing income-related disparities through alternative livelihood support (e.g., skills training, microenterprise development) is critical to the LPPWP's success in fostering both environmental and human health.

**Table 3**  
**Cross-tabulation of Housing Tenure Status and General Health Status ( $N = 2,235$ )**

| Tenure Status                          | Poor             | Fair              | Good               | Very Good          | Excellent          | Total              |
|----------------------------------------|------------------|-------------------|--------------------|--------------------|--------------------|--------------------|
| Owner (Secure Tenure)                  | 38 (3.1%)        | 38 (3.1%)         | 212 (17.5%)        | 410 (33.8%)        | 515 (42.5%)        | 1213 (100%)        |
| Renters/Rent-Free with Consent         | 0 (0.0%)         | 83 (9.1%)         | 206 (22.5%)        | 281 (30.7%)        | 346 (37.8%)        | 916 (100%)         |
| Rent-Free without Consent (Precarious) | 0 (0.0%)         | 4 (3.8%)          | 4 (3.8%)           | 20 (18.9%)         | 78 (73.6%)         | 106 (100%)         |
| <b>Total</b>                           | <b>38 (1.7%)</b> | <b>125 (5.6%)</b> | <b>422 (18.9%)</b> | <b>711 (31.8%)</b> | <b>939 (42.0%)</b> | <b>2235 (100%)</b> |

Note: Pearson  $\chi^2(8) = 122.45, p < .001$ , Cramer's  $V = .166$ .

As shown in Table 3, housing tenure is significantly associated with self-reported general health, with homeowners more likely to report "Excellent" and "Very Good" health than renters or individuals with insecure tenure. Interestingly, the Rent-Free without Consent group reported the highest percentage of "Excellent" health (73.6%), despite their precarious living situation. However, the small sample size ( $n = 106$ ) and the group's relatively younger average age may explain this anomaly and should be interpreted with caution.

These results partially support Hypothesis 1, confirming that tenure security is generally associated with better health. Secure tenure offers not just physical shelter but psychological and economic stability, both of which influence health outcomes. Conservation planners working in protected areas like LPPWP should consider land and housing security as part of broader socio-environmental strategies. Programs offering land titling, housing upgrades, or tenure recognition may contribute to both ecological stewardship and public health improvement.

**Table 4**  
**Cross-tabulation of Household Income and Frequency of Skipped Meals ( $N = 2,235$ )**

| Income Group  | Every Day        | Never               | Worst Months Only | Some Days Monthly | Total              |
|---------------|------------------|---------------------|-------------------|-------------------|--------------------|
| Low Income    | 4 (0.8%)         | 291 (60.9%)         | 103 (21.5%)       | 80 (16.7%)        | 478 (100%)         |
| Middle Income | 53 (4.3%)        | 987 (80.2%)         | 75 (6.1%)         | 116 (9.4%)        | 1231 (100%)        |
| High Income   | 0 (0.0%)         | 282 (91.9%)         | 25 (8.1%)         | 0 (0.0%)          | 307 (100%)         |
| No Answer     | 0 (0.0%)         | 215 (98.2%)         | 0 (0.0%)          | 4 (1.8%)          | 219 (100%)         |
| <b>Total</b>  | <b>57 (2.6%)</b> | <b>1775 (79.4%)</b> | <b>203 (9.1%)</b> | <b>200 (8.9%)</b> | <b>2235 (100%)</b> |

Note: Pearson  $\chi^2(9) = 256.92, p < .001$ , Cramer's  $V = .196$ .

Table 4 shows a clear income-based disparity in food security, measured by the frequency of skipped meals. Respondents in the High Income group were least likely to skip meals, with 91.9% reporting "Never." By contrast, only 60.9% of the Low Income group reported the same. Notably, the Middle Income group also showed signs of food insecurity, with 4.3% skipping meals daily.

This finding strongly supports Hypothesis 1 and underscores food security as a key dimension of well-being impacted by economic status. Conservation interventions must be accompanied by livelihood

and food access programs to mitigate unintended burdens on vulnerable populations, particularly if access to traditional wetland-based food sources is restricted.

**Table 5**  
**Cross-tabulation of Household Income and Worry About Food (Past Year) (*N* = 2,235)**

| Income Group  | No                  | Yes                 | Total              |
|---------------|---------------------|---------------------|--------------------|
| Low Income    | 187 (39.1%)         | 291 (60.9%)         | 478 (100%)         |
| Middle Income | 588 (47.8%)         | 643 (52.2%)         | 1231 (100%)        |
| High Income   | 266 (86.6%)         | 41 (13.4%)          | 307 (100%)         |
| No Answer     | 110 (50.2%)         | 109 (49.8%)         | 219 (100%)         |
| <b>Total</b>  | <b>1151 (51.5%)</b> | <b>1084 (48.5%)</b> | <b>2235 (100%)</b> |

Note: Pearson  $\chi^2(3) = 188.15, p < .001$ , Cramer's  $V = .290$ .

The findings in Table 5 reinforce the previous analysis by adding a psychological dimension to food insecurity. While 86.6% of High Income respondents did not worry about food, a significant 60.9% of Low Income respondents reported doing so. Even within the Middle Income group, over half (52.2%) reported concern.

This result again supports Hypothesis 1 and emphasizes that food insecurity is both a material and psychological burden. Conservation policies—especially those that restrict access to local natural food sources—must be balanced with community-level food systems planning. The implementation of community gardens, food subsidies, or alternative livelihood training can help ensure conservation does not inadvertently deepen food-related inequalities.

**Table 6**  
**Cross-tabulation of Educational Attainment and Frequency of Skipped Meals (Past 12 Months) (*N* = 2,235)**

| Education Group      | Every Day        | Never               | Worst Months Only | Some Days Monthly | Total              |
|----------------------|------------------|---------------------|-------------------|-------------------|--------------------|
| Lower Education      | 26 (2.5%)        | 713 (69.1%)         | 153 (14.8%)       | 140 (13.6%)       | 1032 (100%)        |
| Secondary/Vocational | 31 (10.0%)       | 220 (70.7%)         | 24 (7.7%)         | 36 (11.6%)        | 311 (100%)         |
| Higher Education     | 0 (0.0%)         | 842 (94.4%)         | 26 (2.9%)         | 24 (2.7%)         | 892 (100%)         |
| <b>Total</b>         | <b>57 (2.6%)</b> | <b>1775 (79.4%)</b> | <b>203 (9.1%)</b> | <b>200 (8.9%)</b> | <b>2235 (100%)</b> |

Note: Pearson  $\chi^2(6) = 273.35, p < .001$ , Cramer's  $V = .247$ .

Table 6 reveals a strong association between educational attainment and food security, as measured by the frequency of skipped meals. Respondents with Higher Education were least likely to skip meals, with 94.4% reporting "Never." In contrast, individuals in the Lower Education group had a higher likelihood of skipping meals regularly or seasonally. Notably, Secondary/Vocational respondents were the most likely to skip meals "Every Day" (10%).

This finding strengthens support for Hypothesis 1. Education influences both economic capacity and food resilience. These insights highlight the need for education-integrated interventions in conservation areas. Promoting adult education, skills training, and literacy programs—especially those that connect to sustainable livelihood options—can help reduce food insecurity among vulnerable populations near the LPPWP.

**Table 7**  
**Cross-tabulation of Educational Attainment and Worry About Food**  
**(Past Year) (*N* = 2,235)**

| Education Group      | No                  | Yes                 | Total              |
|----------------------|---------------------|---------------------|--------------------|
| Lower Education      | 396 (38.4%)         | 636 (61.6%)         | 1032 (100%)        |
| Secondary/Vocational | 224 (72.0%)         | 87 (28.0%)          | 311 (100%)         |
| Higher Education     | 531 (59.5%)         | 361 (40.5%)         | 892 (100%)         |
| <b>Total</b>         | <b>1151 (51.5%)</b> | <b>1084 (48.5%)</b> | <b>2235 (100%)</b> |

Note: Pearson  $\chi^2(2) = 146.69, p < .001$ , Cramer's  $V = .256$ .

Contrary to expectations, Secondary/Vocational respondents reported the lowest level of worry about food (28%), even lower than those with Higher Education (40.5%). The Lower Education group, however, was most vulnerable, with 61.6% expressing concern.

These findings affirm Hypothesis 1 while also suggesting that vocational education may provide a buffer against food insecurity, potentially due to practical, employment-linked training. Conservation planners should consider expanding access to vocational programs as a means of building resilience against food-related stress. This also supports integrating environmental education into vocational curricula in wetland-adjacent communities.

**Table 8**  
**Cross-tabulation of Tenure Status and Frequency of Skipped Meals**  
**(Past 12 Months) (*N* = 2,235)**

| Tenure Group                 | Every Day        | Never               | Worst Months Only | Some Days Monthly | Total              |
|------------------------------|------------------|---------------------|-------------------|-------------------|--------------------|
| Owner (Secure Tenure)        | 53 (4.4%)        | 1017 (83.8%)        | 83 (6.8%)         | 60 (4.9%)         | 1213 (100%)        |
| Renters/Rent-Free w/ Consent | 4 (0.4%)         | 668 (72.9%)         | 108 (11.8%)       | 136 (14.8%)       | 916 (100%)         |
| Rent-Free w/o Consent        | 0 (0.0%)         | 90 (84.9%)          | 12 (11.3%)        | 4 (3.8%)          | 106 (100%)         |
| <b>Total</b>                 | <b>57 (2.6%)</b> | <b>1775 (79.4%)</b> | <b>203 (9.1%)</b> | <b>200 (8.9%)</b> | <b>2235 (100%)</b> |

Note: Pearson  $\chi^2(6) = 117.92, p < .001$ , Cramer's  $V = .162$ .

Tenure status was significantly associated with food security. Owners had the highest rate of “Never” skipping meals (83.8%), followed closely by those living rent-free without consent. Renters and those living rent-free with consent showed the highest levels of vulnerability, with 26.6% skipping meals seasonally or monthly.

While these results support Hypothesis 1, the unexpected food security in the “Rent-Free without Consent” group warrants cautious interpretation, possibly influenced by a younger demographic. This underscores the importance of tenure-sensitive food programs and suggests that tenure regularization may enhance household resilience.

**Table 9**  
**Cross-tabulation of Tenure Status and Worry About Food**  
**(Past Year) (*N* = 2,235)**

| Tenure Group          | No          | Yes         | Total       |
|-----------------------|-------------|-------------|-------------|
| Owner (Secure Tenure) | 733 (60.4%) | 480 (39.6%) | 1213 (100%) |

| Tenure Group                 | No                  | Yes                 | Total              |
|------------------------------|---------------------|---------------------|--------------------|
| Renters/Rent-Free w/ Consent | 373 (40.7%)         | 543 (59.3%)         | 916 (100%)         |
| Rent-Free w/o Consent        | 45 (42.5%)          | 61 (57.5%)          | 106 (100%)         |
| <b>Total</b>                 | <b>1151 (51.5%)</b> | <b>1084 (48.5%)</b> | <b>2235 (100%)</b> |

Note: Pearson  $\chi^2(2) = 84.80, p < .001$ , Cramer's  $V = .195$ .

Table 9 further confirms that housing security reduces food-related anxiety. A majority of homeowners did not worry about food (60.4%), whereas most renters (and informal residents) did. Renters reported the highest rate of concern (59.3%), reinforcing their vulnerable status.

This supports Hypothesis 1 and points to the psychosocial importance of secure tenure. Conservation strategies must include housing-related protections or improvements to avoid exacerbating household stress. Policy efforts should prioritize mixed solutions combining tenure recognition, rental subsidies, and urban food resilience programs.

**Table 10**  
**Cross-tabulation of Proximity (Barangay) and Perceived Livelihood Impact ( $N = 1,695$ )**

| Barangay (Proximity to LPPWP) | Yes                 | No                 | Total              |
|-------------------------------|---------------------|--------------------|--------------------|
| Daniel Fajardo                | 247 (85.5%)         | 42 (14.5%)         | 289 (100%)         |
| Elias Aldana                  | 315 (94.0%)         | 20 (6.0%)          | 335 (100%)         |
| Manuyo Uno                    | 150 (66.7%)         | 75 (33.3%)         | 225 (100%)         |
| Ilaya                         | 235 (90.0%)         | 26 (10.0%)         | 261 (100%)         |
| San Dionisio                  | 210 (83.0%)         | 43 (17.0%)         | 253 (100%)         |
| La Huerta                     | 332 (100%)          | 0 (0.0%)           | 332 (100%)         |
| <b>Total</b>                  | <b>1489 (87.8%)</b> | <b>206 (12.2%)</b> | <b>1695 (100%)</b> |

Note: Pearson  $\chi^2(5) = 160.73, p < .001$ , Cramer's  $V = .308$ .

There is a significant but non-linear relationship between proximity and perceived livelihood impact. La Huerta, the farthest barangay from LPPWP, reported 100% positive impact, while Manuyo Uno, a closer barangay, reported the lowest (66.7%). This partially supports Hypothesis 2. Distance from LPPWP is not the sole determinant of perceived livelihood benefit. Instead, barangay-specific factors such as access to information, participation in programs, or leadership capacity likely mediate perceptions. Therefore, spatial targeting alone is insufficient. Conservation benefits must be equitably distributed based on local context, not just proximity.

**Table 11**  
**Cross-tabulation of Proximity (Barangay) and Perceived Food Source Impact ( $N = 1,819$ )**

| Barangay       | Yes                 | No                 | Total              |
|----------------|---------------------|--------------------|--------------------|
| Daniel Fajardo | 247 (85.5%)         | 42 (14.5%)         | 289 (100%)         |
| Elias Aldana   | 315 (94.0%)         | 20 (6.0%)          | 335 (100%)         |
| Manuyo Uno     | 150 (50.0%)         | 150 (50.0%)        | 300 (100%)         |
| Ilaya          | 157 (75.1%)         | 52 (24.9%)         | 209 (100%)         |
| San Dionisio   | 274 (86.4%)         | 43 (13.6%)         | 317 (100%)         |
| La Huerta      | 369 (100%)          | 0 (0.0%)           | 369 (100%)         |
| <b>Total</b>   | <b>1512 (83.1%)</b> | <b>307 (16.9%)</b> | <b>1819 (100%)</b> |

Note: Pearson  $\chi^2(5) = 351.09, p < .001$ , Cramer's  $V = .439$ .

As with livelihood impact, perceived food source improvement does not follow a distance-based trend. La Huerta again shows 100% positive perception, while Manuyo Uno is split evenly.

This reinforces that barangay-specific dynamics, not proximity alone, determine perceived benefit. For effective outreach and equitable conservation, targeted engagement, contextual program delivery, and inclusive communication are essential.

**Table 12**  
**Kruskal-Wallis Test for Proximity and Overall Well-being Impact ( $N = 1,902$ )**

| Barangay       | Mean Rank |
|----------------|-----------|
| Daniel Fajardo | 880.17    |
| Elias Aldana   | 1004.45   |
| Manuyo Uno     | 1076.98   |
| Ilaya          | 881.21    |
| San Dionisio   | 938.84    |
| La Huerta      | 935.98    |

Note:  $H(5) = 40.76, p < .001$

The Kruskal-Wallis test indicates significant differences in perceived well-being across barangays, but again not along a clear gradient of proximity. Manuyo Uno reported the lowest perceived well-being despite being centrally located.

This again suggests that perception of impact is more influenced by local governance, participation, and program quality than proximity. Conservation managers must go beyond spatial metrics and prioritize equity-driven, participatory planning.

**Table 13**  
**Spearman's Correlation Between Perceived Community Participation and Perceived Overall Impact of the LPPWP ( $N = 2,235$ )**

| Variables                                       | Spearman's $\rho$ | p-value |
|-------------------------------------------------|-------------------|---------|
| Perceived Participation $\times$ Overall Impact | .337              | < .001  |

The analysis reveals a statistically significant, positive correlation ( $\rho = .337, p < .001$ ) between perceived community participation and negative assessments of LPPWP's impact. This result is counterintuitive: rather than enhancing community satisfaction, increased perceptions of participation appear to correlate with less favorable views of the park's effects on household well-being.

This finding challenges traditional assumptions about participatory conservation. It may reflect disillusionment, unfulfilled expectations, or tokenistic engagement, where community involvement exists in form but not in substance. It suggests that current participatory processes may not be perceived as meaningful or empowering.

Thus, this supports Hypothesis 3 in an inverse direction—participation is statistically associated with impact perception, but not positively. For conservation governance at LPPWP, the implication is clear: authentic, inclusive, and outcome-driven engagement is essential. Planners must co-design policies with local communities, communicate transparently, and demonstrate tangible benefits to rebuild trust.

## CONCLUSION

The findings of this study illuminate the complex and often contested interplay between biodiversity conservation and local livelihood security, using the Las Piñas-Parañaque Wetland Park (LPPWP) as a critical case study. Conservation policies implemented within the LPPWP-though ecologically necessary-have significantly disrupted traditional, resource-dependent livelihoods such as fishing, foraging, and small-scale extraction. These disruptions have disproportionately affected households with high dependence on wetland resources, exposing the uneven social costs of conservation and emphasizing how outcomes are deeply mediated by pre-existing socioeconomic vulnerabilities.

Mitigation efforts, including ecotourism and alternative livelihood programs, have produced mixed and unequal results. While some residents have successfully engaged with new economic opportunities, many-especially those with lower educational attainment or insecure tenure-remain excluded due to barriers such as limited training, poor market access, or weak institutional support. These implementation gaps underscore a critical flaw in current conservation-linked development approaches: the absence of inclusive design and equitable delivery mechanisms. Ecotourism holds potential but must be embedded within frameworks that prioritize community ownership, targeted outreach, and benefit-sharing, lest it exacerbate rather than alleviate existing inequalities.

Looking ahead, the long-term success of conservation at LPPWP depends on the adoption of a community-anchored and participatory governance model. This entails moving beyond consultative roles for residents to active co-creation of conservation strategies, formal integration of local ecological knowledge, and institutionalization of transparent benefit-sharing systems. Alternative livelihoods must be not only environmentally sustainable but also economically viable and socially just, tailored to the lived realities of affected communities.

By aligning ecological imperatives with community empowerment and social equity, the LPPWP can serve not only as a refuge for biodiversity but also as a model for inclusive, resilient, and just urban wetland conservation-a vision aligned with global sustainability frameworks such as the UN Sustainable Development Goals (SDGs), particularly SDG 11 (Sustainable Cities and Communities) and SDG 15 (Life on Land).

### **Recommendations**

1. Implement participatory planning by involving local communities in every stage of conservation decision-making-policy design, implementation, and monitoring. This fosters trust, ensures their needs are addressed, and improves overall conservation outcomes.
2. Establish equitable benefit-sharing mechanisms that directly compensate communities affected by conservation policies. This includes financial compensation for lost income, investments in public infrastructure, job creation through ecotourism and park management, and skills development programs tailored to community needs.
3. Support sustainable livelihood alternatives that are economically viable and environmentally appropriate. Programs may include responsible aquaculture, community-based ecotourism, sustainable harvesting of non-timber forest products, and artisan craft production using local materials.
4. Empower community-based resource management (CBRM) by providing training, funding, and legal authority to local groups to manage wetland areas. CBRM encourages ownership, improves conservation efficiency, and supports social cohesion.
5. Increase funding and resources for LPPWP management to ensure regular maintenance, water quality monitoring, enforcement of regulations, and the restoration of degraded habitats.

6. Strengthen enforcement of conservation regulations by deploying additional patrols, increasing penalties for violations, and integrating community-led monitoring systems to deter illegal fishing, dumping, and encroachment.
7. Improve waste management systems by establishing better waste disposal infrastructure, promoting recycling, and raising community awareness about the environmental impact of improper waste practices.
8. Launch targeted public awareness campaigns using mass media, social media, and community events to inform the public about the LPPWP's ecological significance, current threats, and the benefits of conservation.
9. Develop environmental education programs in schools and communities to foster early and lifelong understanding of wetland ecosystems, biodiversity, and sustainable practices through hands-on learning activities.
10. Promote environmentally responsible ecotourism as a dual strategy to raise conservation awareness and generate local income. These activities should be designed to directly benefit community members while preserving the ecosystem.
11. Conduct research to quantify the socio-economic impacts of conservation policies, measuring both the positive contributions to ecosystem services and the economic losses faced by affected households.
12. Evaluate mitigation strategies regularly to assess the effectiveness of benefit-sharing programs and livelihood support initiatives, identifying which approaches are most equitable and impactful.
13. Assess and monitor community perceptions through periodic surveys and focus group discussions to ensure that conservation efforts remain aligned with community needs and that local voices guide policy evolution.

By following these recommendations, the LPPWP can create a more inclusive conservation framework that supports both biodiversity and community resilience.

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