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Exploring Public Support for Bolivia's Protected Areas: A Contingent Valuation Approach

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Abstract: This study investigates Bolivians' willingness to pay for an annual passport facilitating visits to protected areas (PAs) in Bolivia, aiming to address challenges in PA financing and management amidst escalating deforestation. Employing the contingent valuation method, a representative sample of citizens aged 18 or older from major cities across Bolivia participated in a telephone interviewing questionnaire. The findings reveal limited public awareness and recognition of PAs, alongside significant interest in visiting these areas for tourism purposes or simply donating to the system to reduce its current financial gaps. Concerns regarding trust and transparency in fund management are highlighted, with demographic factors and perceptions influencing willingness to pay estimated at approximately USD 35 for a one-year passport. This study underscores the necessity for targeted interventions to enhance public awareness, improve infrastructure, and ensure transparency in fund management, thereby promoting sustainable tourism and safeguarding Bolivia's PAs.

Keywords: Bolivia; protected areas; passport; contingent valuation; willingness to pay

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1. Introduction

Protected areas (PAs) at the national and subnational levels in Bolivia cover nearly 23% of the Bolivian territory, playing a crucial role in providing environmental services. However, their effective management is hindered by the absence of long-term financing mechanisms that would enhance their governance conditions. Part of this challenge stems from the lack of public awareness regarding the role and significance of PAs in sustainable development and human well-being. As a result of this situation, there is growing pressure for extractive and high-impact economic activities, posing a threat to the sustainability of these natural areas.

One of the primary threats facing PAs in Bolivia is the escalating levels of deforestation. Between 2016 and 2020, for example, Bolivia lost an annual average of 128,658 hectares of forest within PAs, resulting in annual emissions of 28 million tCO₂, wildlife traffic, illegal gold mining, and other environmental damages [1]. During the same period, 2.3% of the forest areas inside the national PAs managed by the National Service of Protected Areas (SERNAP) were deforested [2].

Presently, SERNAP struggles to enhance its management and monitoring capabilities, primarily due to longstanding financial gaps exacerbated by the COVID-19 pandemic. According to the Strategic Plan for the Financial Sustainability of the National System of Protected Areas (SNAP) [3], there is a projected average annual financial gap of over BOB 49 million (USD 7 million) for SERNAP between 2022 and 2031. In this context, it is important to develop income-generating mechanisms to enable SERNAP to meet its

financial requirements, ensuring better conditions for safeguarding national protected areas (NPAs).

Among the financial mechanisms existing currently in Bolivia to fund its NPAs, we highlight parks' entrance fees. Among the 22 NPAs in Bolivia, 15 require visitors to pay an entrance fee. These fees vary across parks and depend on the visitor's nationality, with some parks offering discounts to students. For nationals, entrance fees typically range from BOB 10 to BOB 50, while for international visitors, fees can range from BOB 20 to BOB 200.

While entrance fees represent an important revenue source, they alone are insufficient to close Bolivia's funding gap. In this context, innovative solutions should be considered by national authorities to not only increase revenue but also to provide a more stable stream of cash flow throughout the year. One of the possible solutions we highlight here is the one-year passport, also known as an annual pass, for visiting NPAs. As explained later, the passport could serve as both an entrance fee and a donation. For those planning to visit multiple PAs, the one-year passport could offer savings. From the government's perspective, the passport could potentially make a positive contribution to the local economy.

As far as we know, a passport for visiting PAs in Latin America can be found in Mexico, Costa Rica, Colombia, and Chile. In Mexico, the "Conservation Passport" (or *Pasaporte de la Conservación*), is valid for one year and allows visitation to any of the 186 protected areas for approximately USD 100, supervised and managed by the National Commission of Protected Natural Areas (CONAP). Access is granted by creating an account on CONAP's website platform, with subsequent payment using a credit or debit card. A personalized digital document is generated for each user [4].

In Costa Rica, the membership program named "Friends of National Parks" (or *Amigos de los Parques Nacionales*) was valid for only one year due to implementation challenges. The program, created and implemented by ProParques, Fundecor, and the National System of Conservation Areas (SINAC), in 2008, aimed to promote responsible and sustainable tourism. The costs of this program varied from USD 39 to USD 500 depending on the number of entries and other products included in the membership, such as products discounts [5].

Two other experiences in Colombia and Chile, focused on generating awareness and promoting responsible and sustainable tourism, present different characteristics. In Colombia, the passport includes selected parks, offering a free visit for every four visits, symbolizing a commitment to being "Guardians of Conservation". In Chile, the "Patagonia Parks Route Passport" is currently distributed for free, serving as a symbolic commitment to responsible tourism, requiring advance requests and providing a personalized, informative design for park visits.

In this study, we aim to calculate Bolivians' willingness to pay for a one-year passport to contribute to the conservation of Bolivia's NPAs.

2. Materials and Methods

To assess Bolivians' willingness to pay for an annual passport to visit NPAs in Bolivia, we use the contingent valuation (CV) method. CV is a stated preference method that measures individuals' willingness to pay for non-market goods through a survey [6]. Despite its known limitations [7,8], CV remains the sole method available for measuring total economic value, including non-use values [9].

In the case of this study, the population of interest included men and women aged 18 or older from all socioeconomic levels residing in the 15 major cities across the nine departments of Bolivia. A proportional sampling strategy based on the population weights of these major cities was used according to the population projections for 2022 from the National Institute of Statistics (INE). The survey was conducted through a Computer-Assisted Telephone Interviewing (CATI) questionnaire from 16 March 2023 to 11 April 2023. This survey method was chosen based on the characteristics of this study. The

advantages of telephone surveys over face-to-face interviews include increased access to populations that would be hard to reach, more convenience and flexibility for respondents, reduced non-response bias, and enhanced respondent honesty, as it reduces social pressures or biases [10,11]. The sample design was probabilistic and utilized random digit dialing (RDD) for cellular phones.

This survey was conducted in three stages. In the first stage, cognitive interviews were implemented, applying the survey to a selected group of individuals in the cities of La Paz and Cochabamba to identify possible issues with question interpretation or confusion in question-wording. In the second stage, a pilot survey was carried out, randomly applied to 21 citizens aged 18 or older in the cities of Santa Cruz, Beni, Oruro, Potosí, and Tarija (Figure 1), aiming to identify additional adjustments to the questionnaire and to establish the price vectors for the willingness to pay (WTP) question. In the third and final stage, the adjusted questionnaire was administered to the entire sample, with the respondents selected randomly.

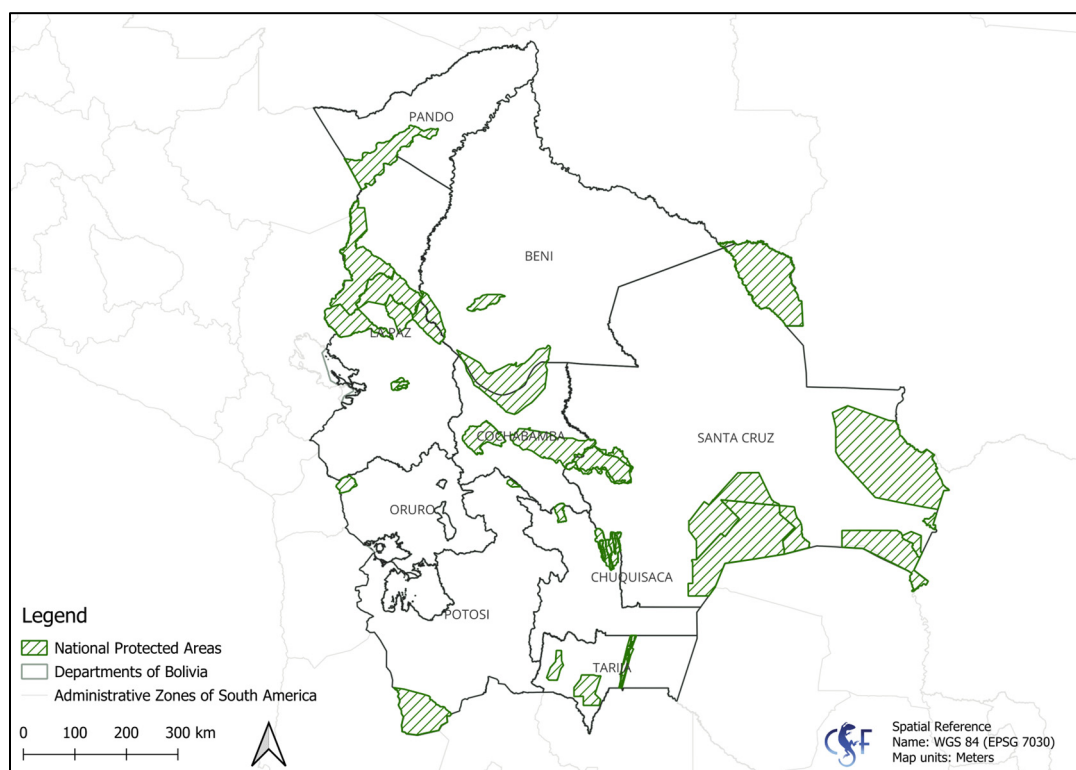


Figure 1. Map of Bolivia and its NPAs.

Approximately 22,000 individuals were contacted, with a response rate of 5.1%, according to the definitions of the American Association for Public Opinion Research (AAPOR). The data collection results were presented by the company DATAVOZ, which conducted the process with a total of 6653 contacted numbers, generating a final sample of 1106 respondents, with an estimated sampling error of $\pm 2.9\%$ at a 95% confidence level (see Supplementary Materials for the survey).

In designing the survey, an effort was made to obtain a representative sample that would allow for extrapolation of the results to the general population. However, problems related to a lack of coverage or non-response during survey implementation can arise, potentially introducing biases in the analysis and conclusions [12]. To correct for these biases, weighting the sample based on the sociodemographic characteristics of the population distribution in Bolivia is necessary. Various methods can be employed, such as post-stratification or cell weighting, raking, or the generalized regression estimator (GREG) [12,13].

The methodology used for the weighting process in this study is “Raking” or iterative proportional fitting (IPF), which was implemented using the R program, as suggested for such estimations [13]. Raking is an iterative proportional adjustment procedure to estimate individual weights until a balanced sample is achieved. In each iteration, the weights are adjusted to match the totals of each dimension (weighting variable). The advantage of this method compared to other weighting methods like cell weighting is that it reduces the likelihood of collapsing categories, providing greater flexibility and allowing for a larger number of control variables to be included, as it does not aim for cell-by-cell estimation [14].

Following the recommendations of [15], to ensure proper sample weighting, it is necessary first to identify control or weighting variables that can be compared with reliable and official data sources, such as censuses or population projections. Typical variables include age groups, gender, education level, income level, and region. For this study, four sociodemographic variables were used: department, gender, age, and education level. To assess the sample’s representativeness, unweighted and weighted distributions of key sociodemographic variables (department, gender, age, and education level) were compared with the corresponding distributions obtained from INE. The values of the variables after sample weighting are presented in the Results section.

Regarding the willingness-to-pay questions for the annual passport, the respondents were asked a series of questions. Initially, we asked if they would be interested in acquiring the passport. When asking this question, we explained that the passport could be used either for visiting national protected areas or simply for donating. In that sense, when evaluating the passport we accounted for the options of “use” (visit to the parks) and “non-use” (donation). If the response was affirmative, the respondents were asked if they would be willing to pay a certain amount. This dichotomous approach was chosen to reduce potential biases that an open-ended response question might introduce into the final values [16]. Depending on the response to the willingness-to-pay question, a follow-up question with a higher or lower amount was asked. The use of follow-up questions to establish willingness to pay is justified by literature suggesting that using the double-bounded dichotomous choice model is more efficient than the single-bounded model, especially in finite samples, as it enhances precision [17]. However, in sufficiently large samples, the efficiency difference between the single-bounded and double-bounded models tends to decrease [18].

Table 1 displays the amounts for the first and second questions for the defined payment scenarios. In this study, five initial amounts were assumed, resulting in five survey versions being randomly assigned to the respondents. The second question’s amount depended on the response to the first question. If the response to the first question was “yes”, the amount in the second question was higher than the first. If the response to the first question was “no”, the amount in the follow-up question was lower than the first. Consequently, there are four possible outcomes: (a) “yes, yes”, (b) “yes, no”, (c) “no, yes”, and (d) “no, no”. In cases where the respondents were not willing to pay (“no, no”), they were asked to select the main reasons for their lack of willingness from a set of possible alternatives (see Supplementary Materials).

Table 1. Bid strategy.

Survey	Bid 1 BOB (USD)	Response to Bid 1	Bid 2 Bs. (USD)
Survey 1	50 (7.2)	Yes	80 (11.6)
		No	30 (4.3)
Survey 2	80 (11.6)	Yes	120 (17.4)
		No	50 (7.2)
Survey 3	120 (17.4)	Yes	190 (27.5)
		No	80 (11.6)
Survey 4	190 (27.5)	Yes	300 (43.4)

		No	120 (17.4)
Survey 5	300 (43.4)	Yes	400 (57.9)
		No	190 (27.5)

Note: Exchange rate: BOB 1 = USD 0.1448.

To estimate the double-bounded model, we followed Lopez-Feldman’s method [19]. The two main assumptions of this model are that the WTP follows a linear function and the error term follows a normal distribution:

$$WTP_i = Z_i \cdot \beta + u_i, \quad u_i \sim N(0, \sigma^2) \tag{1}$$

where i corresponds to the respondent, Z_i is a vector of explanatory variables, β is a vector of parameters, u_i is the error term, and σ is the standard deviation of the error. In addition to the bids, the following demographic characteristics were included as explanatory variables: gender, age, education level, and income. Three additional explanatory variables were also included: visitation to PAs (i.e., user), an interaction between visitation and the number of visits (or frequency), and the respondent’s perception of the creation of new PAs (Table 2).

Table 2. Explanatory variables.

Variable	Description	Expected Sign
Bid	Continuous variable with the bids from the surveys	Negative
Gender	Binary variable: 1 if male and 0 if female	-
Age	Continuous variable (18 years old or older)	-
Education level	Binary variable. 1 if high education and 0 otherwise.	Positive
Income	Categorical variable: Income 1 refers to the group of people with a net monthly income lower than or equal to BOB 2500; Income 2 refers to the group of people with an income between BOB 2501 and BOB 4000; and Income 3 refers to the group of people with income greater than BOB 4000.	Positive
User	Binary variable: 1 if the respondent has visited at least one PA in the last five years and 0 otherwise	Positive
Interaction	Interaction variable: <i>visitation of PAs</i> · <i>number of visits</i>	Positive
Importance	Binary variable: 1 if the respondent considers it important to create new PAs and 0 if otherwise	Positive

Under the Lopez-Feldman model, the probability of each of the four possible outcomes is as follows:

$$\begin{aligned} Prob(yes, yes) &= Prob(WTP < bid_2) \\ Prob(yes, no) &= Prob(bid_1 < WTP < bid_2) \\ Prob(no, yes) &= Prob(bid_2 < WTP < bid_1) \\ Prob(no, no) &= Prob(WTP < bid_2) \end{aligned}$$

To estimate the WTP, we followed a two-step procedure. In the first step, we substitute Equation (1) in the probabilities above and estimate the parameters β and σ based on maximum likelihood. The log-likelihood function is defined as follows:

$$\begin{aligned} L(\beta, \sigma) = \sum_i & \left(d_i^{yes, no} \ln \left(\Phi \left(Z_i' \frac{\beta}{\sigma} - \frac{bid_1}{\sigma} \right) - \Phi \left(Z_i' \frac{\beta}{\sigma} - \frac{bid_2}{\sigma} \right) \right) + d_i^{yes, yes} \ln \left(\Phi \left(Z_i' \frac{\beta}{\sigma} - \frac{bid_2}{\sigma} \right) \right) + \right. \\ & \left. d_i^{no, yes} \ln \left(\Phi \left(Z_i' \frac{\beta}{\sigma} - \frac{bid_2}{\sigma} \right) - \Phi \left(Z_i' \frac{\beta}{\sigma} - \frac{bid_1}{\sigma} \right) \right) + d_i^{no, no} \ln \left(1 - \Phi \left(Z_i' \frac{\beta}{\sigma} - \frac{bid_2}{\sigma} \right) \right) \right) \end{aligned} \tag{2}$$

where:

- $d_i^{yes,yes}$ equals 1 if the respondent i answered “yes” to both questions; 0 otherwise.
- $d_i^{yes,no}$ equals 1 if the respondent i answered “yes” to the first question and “no” to the second question; 0 otherwise.
- $d_i^{no,yes}$ equals 1 if the respondent i answered “no” to the first question and “yes” to the second question; 0 otherwise.
- $d_i^{no,no}$ equals 1 if the respondent i answered “no” to both questions; 0 otherwise.

In the second step, we calculate the average WTP as $E(WTP|Z) = \bar{Z}' \cdot \hat{\beta}$, where \bar{Z} is a vector containing the weighted average of the explanatory variables—the weights are necessary to make inferences about the Bolivian population—and $\hat{\beta}$ is a vector with the parameters estimated based on the maximum likelihood in the first step.

Once we estimate the WTP, we calculate the demand curve. This is obtained by calculating the proportions of individuals with specific levels of Z who would be willing to make the payment and then integrating based on the distribution of Z :

$$D(p) = \iint 1\{Z_i \cdot \beta + u_i \geq p\} f(u_i) du_i dz_i \tag{3}$$

where p is the price, and β and σ are maximum likelihood estimates.

Using the empirical distribution of Z as an approximation of the population distribution and some algebraic manipulations, the demand curve (as a fraction of the population willing to make the payment) is estimated using Equation (4):

$$\frac{D(p)}{N} = 1 - \frac{1}{N} \cdot \sum_i \omega_i \cdot \Phi\left(\frac{p - z_i \hat{\beta}}{\hat{\sigma}}\right) \tag{4}$$

where $\hat{\beta}$ and $\hat{\sigma}$ are maximum likelihood estimates, ω_i is the sample weight, and N is the number of respondents.

3. Results

3.1. Sample Representativeness

Table 3 shows the demographic characteristics of the respondents. The results suggest that the sample provides a good representation of the Bolivian population in terms of geographical distribution, age, gender, and education level. The descriptive statistics of each one of these variables can be found in the Supplementary Materials.

Table 3. Distribution of the sample, weighted sample, and population.

Variable	Description	Sample	Weighted Sample	Population (Census 2022)
Department	La Paz	29.60%	26.40%	26.50%
	Oruro	5.20%	4.75%	4.76%
	Potosí	3.50%	7.36%	7.30%
	Chuquisaca	5.10%	5.45%	5.45%
	Cochabamba	18.90%	17.72%	17.80%
	Tarija	3.60%	5.12%	5.10%
	Santa Cruz	29.60%	28.10%	28.0%
	Beni	3.30%	3.83%	3.82%
	Pando	1.20%	1.27%	1.27%
Gender	Male	41.90%	49.70%	49.70%
	Female	58.10%	50.30%	50.30%
Age	18–24	19.30%	19.90%	19.90%

	25–34	38.90%	24.60%	24.60%
	35–44	23.10%	19.40%	19.40%
	45–54	11.30%	14.30%	14.40%
	55 or more	7.30%	21.80%	21.80%
Education	Middle or lower	4.70%	29.30%	29.3%
	High school	32.10%	39.10%	39.10%
	University or higher	63.20%	31.60%	31.60%

3.2. Responds' Familiarity with PAs

In the initial phase of our investigation into the WTP for an environmental passport to visit PAs in Bolivia, we asked Bolivians two types of questions to identify PAs. The first was an open-ended query where the participants named the areas they recognized as PAs. The second was a closed question where the respondents were presented with a list of PA options.

Surprisingly, over 60% of the respondents struggled to identify PAs. Approximately 47% were unsure or could not recall if there was a protected area near their home, and about 14.% confused them with other locations. Among the areas commonly confused with PAs, the Salar de Uyuni stood out, accounting for nearly 2% of all respondents. Other locations included the zoo and botanical gardens, which are not PAs in Bolivia. These findings highlight a significant gap in public awareness regarding PAs in Bolivia and also underscore a notable level of confusion and a lack of information regarding what constitutes a PA, reflecting a broader issue of unfamiliarity. Such limited recognition poses challenges for initiatives promoting environmental conservation and sustainable practices. However, it also presents an opportunity for targeted educational campaigns to enhance public understanding of these areas.

In addition to the confusion, we also noted that there was a bias towards four PAs (out of 23). More than 60% of visits were concentrated in Amboró (21%), Madidi (17%), Eduardo Avaroa (16%), and Torotoro (13%). These PAs are among the most well-known and representative sites, likely attracting most of the tourism in PAs nationwide. Interestingly, when asked about their interest in visiting a particular PA, nearly 50% of intended visits were once again focused on these four PAs, with the addition of Sajama. Similarly, preferences in supporting a specific PA indicated a clear trend, with Amboró receiving the highest percentage of responses at 23%. These findings underscore the importance of enhancing the visibility of PAs across the board, as the population appears to be familiar with or interested in only a subset of PAs.

3.3. Importance of PAs

To ascertain opinions regarding the significance of PAs, the participants were asked to validate the following statements:

- PAs are crucial for nature conservation.
- PAs are vital in maintaining clean air and/or water.
- PAs serve as important recreational spaces.
- PAs are essential for the well-being of local communities and their economies.
- Bolivia should establish additional NPAs.

Despite a lack of knowledge about designated PAs in Bolivia, the participants exhibited a clearly articulated perception of their importance for nature conservation and the preservation of natural resources. The first two statements, alongside the expressed necessity for establishing new PAs, garnered an acceptance level exceeding 97%.

Conversely, notwithstanding the high level of acceptance, the perceived interconnection of PAs with the development of local communities appears to be less discernible. This is evident in the respondents' stated reasons for visiting these areas, with only 3% indicating a visit to support local communities.

An additional finding revealed that 41% of the respondents had visited PAs with the purpose of discovering new tourist destinations within the country. This result suggests the need to consider the tourism potential of those PAs that have not yet gained recognition as tourist destinations. Thus, these data indicate the possibility of leveraging the tourist appeal of such areas to promote their value and increase their visibility.

Additionally, when surveying the participants about their plans to visit a PA throughout the year, it was observed that 40% responded affirmatively. Regarding the frequency of visits in the last five years, it is noteworthy that 36% of the respondents had only made a single visit during that period.

However, when focusing on the group of respondents interested in acquiring the passport, a significant increase in the intention to visit more than one area was evident. The willingness to visit three PAs in the case of acquiring the passport reached 29%. Comparing this result with the frequency of visits made in the last five years, a significant increase is evident compared to the initial percentage, where only 17% had visited three PAs. These data reflect a positive change in visitation habits and demonstrate the potential for the promotion and support of PAs.

Lastly, we highlight that a significant number of the respondents who were interested in acquiring the passport (54%) did not intend to visit a PA during 2023. For this group, the passport should be considered as a donation, since they did not plan to make use of it.

3.4. Willingness to Pay

To determine the WTP, we only considered the individuals who were interested in acquiring the passport for one year. The number of observations, in this case, is 772. Based on the sample, the passport would have an acceptance rate of close to 70%. However, when using weighted averages and extrapolating this to the population, the acceptance level would reduce to 65%. For this group—the ones willing to purchase the passport—the results of this question are corroborated by the confidence scale in the respondents' answers, of which 45% are confident in their response and 27% are very confident. The respondents who said "no" to the annual passport (i.e., 334 respondents) were asked if they would consider paying for a passport with a duration of two years instead of one. From this subgroup, 47% of the respondents said "yes."

By analyzing the subset of respondents that said "yes" to the one-year passport (i.e., $N = 772$), we note an inverse relationship between the percentage of people willing to pay p and the willingness to pay, indicating that as the price increases, the inclination to acquire the environmental passport decreases. It was also evident that there was a wide-spread disposition among the respondents, with high acceptance levels to pay the initial amounts proposed.

This trend is also reflected in the results presented in Table 4, which illustrate how the respondents answered the question about their willingness to pay the initial amount and the follow-up question that allowed us to determine the final price based on the scenario. Except for the last two surveys, most of the respondents were willing to pay both the initial amount and the immediately higher amount (yes, yes).

Table 4. Percentage of respondents by response type.

Bid 1 BOB (USD)	Yes, Yes	Yes, No	No, Yes	No, No
50 (7.2)	72.19	21.85	3.97	1.99
80 (11.6)	58.17	31.37	5.23	5.23
120 (17.4)	48.73	37.97	4.43	8.86
190 (27.5)	33.33	43.33	9.33	14.00
300 (43.4)	31.25	35.63	12.50	20.63

Note: Exchange rate: BOB 1 = USD 0.1448.

In relation to the group of individuals who showed no interest in acquiring the environmental passport, one of the main reasons, both for the one-year and two-year periods, was the lack of trust in the proper allocation of the funds collected, as they believed that these would not be utilized for the benefit of the PAs. Within the first group, 26% of the respondents expressed a lack of confidence in the appropriate management of the revenues generated by the passport, while in the second group, this percentage reached 23%. These findings highlight a notable concern among a significant portion of the surveyed population regarding the perceived misuse or mismanagement of financial resources associated with the environmental passport program, thereby shedding light on potential barriers to its widespread acceptance and adoption.

Indeed, the lack of confidence in the public administration of funds is evident in the question related to preferences regarding the entities responsible for managing the funds collected through the passport program, where a substantial proportion of the respondents, approximately 65%, indicated a greater sense of security if the management were entrusted to an institution independent of the public sector. Based on the surveys, 45% of the respondents suggested that a private company should handle this administration, while another 20% mentioned the option of a foundation or organization independent of the public sector. These findings underscore a preference for entities external to the government sphere to ensure transparency and efficiency in utilizing the collected resources. The acceptance and trust in SERNAP were manifested in 32% of the respondents, who expressed confidence in this institution's ability to administer the funds raised. This observation highlights the complex landscape of stakeholder perceptions regarding the suitable custodianship of financial resources generated through the environmental passport initiative.

3.4.1. Average Willingness to Pay

For the calculation of the average willingness to pay of Bolivians for the one-year environmental passport, using the STATA statistical software, two models were initially estimated: (1) a dichotomous model without explanatory variables and (2) a dichotomous model with explanatory variables. The latter specification is preferred, as it allows us not only to identify the socio-economic profile of the respondents but also to capture the effects of visitation habits and perceptions about the importance of the PAs. It is noteworthy that the number of valid observations for estimating willingness to pay was 713. Only the respondents who answered affirmatively to the initial question about their willingness to purchase the annual passport and declared a monthly income amount were considered, eliminating all observations lacking this information. This methodological approach enhances the precision of the willingness to pay estimation by focusing on a subset of respondents with consistent and relevant data, facilitating a more nuanced understanding of the factors influencing their valuation of the environmental passport program.

Table 5 displays the outcomes of the double-dichotomous model where the responses to both questions regarding the payment amount are considered, following the previously described methodology. The WTP in the double-dichotomous model without explanatory variables (Model 1) is determined based on the beta coefficient. Under this specification,

WTP is BOB 247 [approximately USD 36]. Including the explanatory variables in the double-dichotomous model (Model 2) yields coefficients for each of the variables in the first step (Equation (2)). As observed in Table 4, except for gender, higher education, and the importance of creating new PAs in Bolivia, all the variables are significant. Regarding the coefficients, income, education level, having visited a PA in the last five years, and awareness of the importance of creating new PAs in Bolivia have a positive relationship with the probability of paying for the passport, as expected.

Table 5. Regression results.

Variables	(1)	(2)
Beta		
Age		−1.90 *** (0.58)
Gender (male = 1)		−6.45 (13.03)
Income group 2		39.50 ** (15.14)
Income group 3		52.56 *** (18.71)
University or higher-education level		17.98 (13.76)
User		44.38 * (26.04)
Interaction		−12.76 * (7.21)
Importance		18.28 (42.06)
Constant	246.85 *** (6.75)	262.56 *** 47.81
Sigma		
Constant	144.23 *** (246.86)	142.35 *** (6.04)
Log-likelihood	−890.92	−878.59
Number of observations	713	713

Note: The variables ‘income’ and ‘education level’ were included in the model as categorical variables. The baseline income group corresponds to the group with the lowest income. The baseline education level corresponds to the group with the lowest education (secondary or lower). The higher education levels correspond to superior or higher levels of education. We also note that the number of observations was 713 instead of 772 due to missing information. Standard errors are reported in parentheses. *** represents coefficient significance at 1%, ** represents coefficient significance at 5%, and * represents coefficient significance at 10%.

For the gender variable, the negative coefficient indicates that men exhibited less interest in acquiring the passport. Similarly, for the age variable, considering that the sample includes individuals between 18 and 77 years old, younger individuals showed greater interest in the environmental passport.

Despite expecting a positive relationship for the interaction variable—the respondents who visit PAs multiple times would have a higher WTP for the passport—the results showed an inverse relationship, which could be explained initially by the sample not being large enough to capture the effect of this variable in the model. Further analysis of the specific case of Bolivia identified a series of possible explanations. One of the most probable, in the current context, is the visitor experience, as services and infrastructure in PAs are deficient, potentially discouraging visitors from repeating their visits. Similarly, travel

costs and accessibility represent significant limitations for many domestic tourists. It was also identified that the groups with higher income levels preferred to spend their vacations abroad rather than visiting a national destination, especially if they were already familiar with it.

Once the coefficients for each variable were calculated, the average WTP was estimated following López-Feldman's method [19]. The final value obtained was BOB 245 [approximately USD 35], which is consistent with the results obtained for Model 1. Additionally, to provide a reference, this value represents less than 1% of the lowest-income group's annual net income.

3.4.2. Comparison to Prior Research

Worldwide, there is extensive literature concerning WTP in the context of environmental economics. These studies typically fall into two main categories: those focused on determining the optimal fee structures for conservation areas and those aimed at estimating the economic value, often non-use value, of PAs. Much like our own study, the objective of these studies is to provide policymakers with insights to guide their decisions on budget allocation.

Specifically, regarding the WTP results found in the literature, the closest study to ours in terms of the research question is, as far as we know, Laarman and Baldares (1990) [20]. Focusing on Costa Rica's national parks, the authors estimate visitors' WTP for an annual pass. Their findings indicated that while residents were willing to pay CRC 600 (approximately 2023 USD 19), non-residents were willing to pay CRC 800 (about 2023 USD 26). These findings are significantly lower than the ones found here. However, comparisons are challenging due to the differences regarding the time of the study, the target population, and the country.

In Bolivia, specifically, there are various studies aimed at understanding WTP for ecosystem services and conservation efforts within its protected areas. These studies encompass a diverse range of objectives and methodologies. For instance, studies have assessed urban households' willingness to pay for watershed protection, revealing an average annual WTP of USD 15 [21], while rural farmers demonstrated a mean annual WTP of USD 17 per hectare for improving irrigation water [22]. Additionally, research has explored the feasibility of altering entrance fees in the Eduardo Avaroa reserve, proposing potential fee increases from USD 22 to something between USD 37 and USD 40 [23]. We note the higher proposed values in comparison to those estimated here for the annual passport.

Indeed, there are many studies conducted for different places aiming at calculating the optimal entrance and/or user fees. For example, a 2009 study conducted a global review of users' WTP to access marine protected areas. The study revealed that the mean WTP per day was close to USD 7, suggesting that visitors were willing to pay more than the fees charged at the time of the survey [24]. Another example is a study that evaluates entrance fees in game reserves and wildlife management areas (WMAs). They found that travelers were often willing to pay more than the established fees, indicating the potential for fee adjustments to enhance revenue [25]. With similar results, a study in Mexico showed that tourists would be willing to pay higher entrance fees, with mean maximum WTP estimates ranging from 2.8 to 9.8 times the current fees. The study also highlights the relatively inelastic nature of visitor demand, indicating that aggregate fee rises of 26% would result in only a modest 5% decrease in visitation. These findings corroborate the larger literature on the topic [26].

In terms of studies aimed at calculating the WTP for conservation, we highlight two. The first one investigates Chileans' WTP for conserving protected areas. The authors find that approximately half of the respondents were willing to pay either USD 6 or USD 8 per month, depending on the payment vehicle, which in this case was an increase in the electricity bill and a donation, respectively [27]. Similarly, another study uses a contingent valuation survey to assess WTP for forest conservation (in terms of avoiding annual

deforestation of 500 km²). The study found a monthly average WTP ranging from USD 3 to 6, indicating the residents' willingness to contribute to conservation efforts [28].

3.4.3. Demand Curve

To illustrate the effects of prices on the respondents' preferences, a demand curve for the environmental passport was derived using data collected on the WTP of the population in relation to the passport price based on Equation (4). As depicted in Figure 2, the shape of the curve aligns with expectations, demonstrating an inverse relationship between the proposed prices and the proportion of the population willing to make the payment. For the tariff set as the average WTP, the percentage of individuals willing to purchase the environmental passport is 46%.

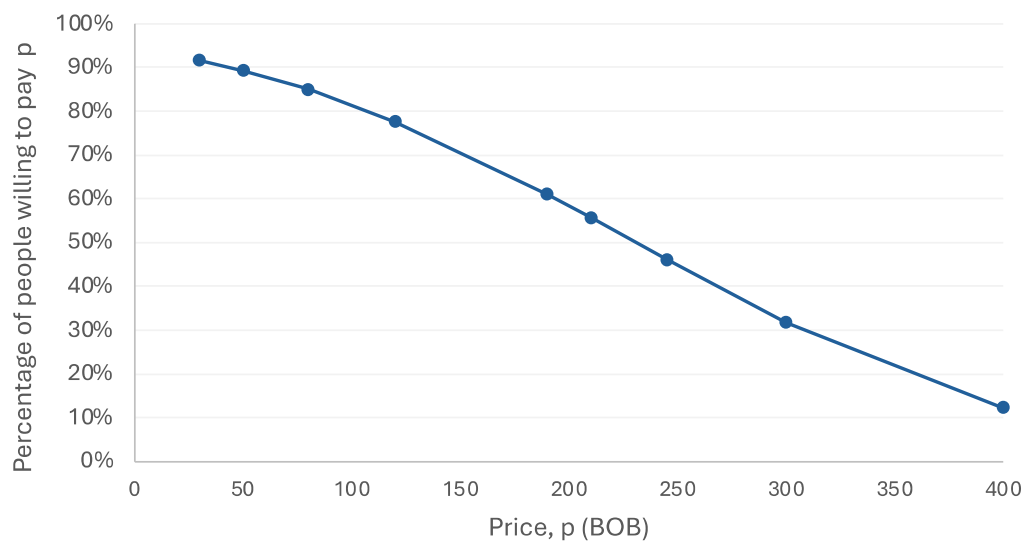


Figure 2. Demand curve for the one-year passport.

Thus, under the assumption that 46% of the population in Bolivia would buy the passport (i.e., 46% of 12.3 million people in 2023), the revenue generated by this finance mechanism would be BOB 1,386,210,000 [USD 200,802,420]. For the calculation, we considered the urban population aged 18 and over in the 15 major cities across the nine departments. This estimate used the INE population projection for the year 2022 and resulted in a total of 616,136 people.

4. Discussion

Based on the results found, we highlight five potential areas for deeper discussion and for which additional research is needed.

4.1. Public Awareness and Education

This study revealed a significant lack of public awareness regarding PAs in Bolivia, with many of the respondents struggling to identify these areas accurately. The reasons for this lack of awareness are not well understood and might represent an interesting research opportunity. It is possible that in addition to having limited access to information about NPAs in Bolivia, there might be other competing priorities for public attention.

The important thing to mention is that this lack of knowledge may represent an opportunity for initiating a comprehensive awareness campaign about PAs and their benefits to society through the passport. Therefore, the passport can serve not only as a means of fundraising but also as a tool for raising awareness.

In this context, government institutions should invest in strategies for improving public education and awareness campaigns to enhance understanding and appreciation of the importance of protected areas for conservation and sustainable development. The underlying assumption here is that once people are aware of the PAs' benefits and their local, national, and global importance, they might be more willing to contribute to their conservation. Indeed, the results found here and presented in Table 4 corroborate this hypothesis by showing a positive relationship between the WTP and the importance of creating new PAs.

However, although we highlight the importance of public awareness, we also acknowledge the limited funding available to PAs and for them to conduct local and national campaigns. In this sense, it is important to identify opportunities for collaboration between government agencies, NGOs, academic institutions, and local communities to overcome this challenge and amplify awareness efforts.

4.2. Willingness to Pay for Environmental Conservation

Based on a survey of citizens in Bolivia, this article has shown that Bolivians are willing to contribute to environmental conservation through the acquisition of a one-year passport. The effect of most variables on WTP for visiting PAs aligns with previous studies. The profile of potential users of this type of product shows consistency, and in general, it has been demonstrated that younger people with higher levels of education and income are the population that are most interested and willing to pay [29,30], as well as those who have visited protected areas before [29,31] and those who are aware of the importance of conserving protected areas to preserve resources and biodiversity [29,31]. In this sense, this study corroborates other studies' findings regarding the feasibility of a one-year passport.

In terms of value, we find that Bolivians would be willing to purchase the one-year passport for USD 35. One of the main limitations of the contingent valuation approach, however, relates to the hypothetical bias. Given the hypothetical nature of the survey conducted here, the respondents might have overstated their WTP for conservation. Indeed, a study conducted in Bolivia on the WTP for ecosystem services finds that correcting the hypothetical bias reduces the average WTP by approximately 70% [32]. If we were to conduct a very simple exercise and apply this percentage here, the WTP for the annual passport would be reduced from USD 35 to USD10.5. This calculated value is close to the lowest daily entrance fee currently paid by national visitors.

4.3. Perception of Trust and Transparency

This article has identified concerns among the respondents regarding the proper allocation and management of funds collected through the passport program. Other studies have also shown a negative relationship between willingness to pay and distrust in the management of funds collected [24,25].

In our survey, the lack of trust manifests in two distinct moments. First, some of the respondents who expressed unwillingness to purchase a one-year passport cited concerns over the perceived mismanagement of resources by government authorities or other overseeing organizations. Second, some of the respondents who indicated a willingness to purchase the passport advocated for its management by a private institution instead. Notably, 46% of the 772 respondents fell into the latter category, highlighting the prevalence of distrust in government institutions in Bolivia.

Therefore, it is important for policymakers to understand that the successful implementation of the passport depends on the rebuilding of trust in the management of funds. Generally, one could advocate for greater transparency and accountability measures, engaging stakeholders in decision-making processes or implementing mechanisms for independent oversight and monitoring of fund utilization. Deeper recommendations on how

to increase trust are out of the scope of this study but are surely an important research question with practical implications.

4.4. Relationship between the Number of Visitations and WTP

Intuitively, the expected effect is that more visits to PAs in the past will lead to a positive effect on the WTP [30,31]. However, in this study, we found the opposite—the respondents who have visited PAs more frequently have a lower WTP. This negative effect seems counterintuitive, and further study is needed to understand it better. A possible explanation can be attributed to Bolivia's specific contextual factors. Many of Bolivia's PAs face significant challenges in terms of infrastructure for tourism. These challenges include limited accessibility, long distances, poor road conditions, and inadequate information for visitors. Furthermore, many PAs lack essential facilities such as maps, visitor centers, and basic amenities.

These infrastructure deficiencies likely contribute to negative visitor experiences, potentially discouraging repeat visits and impacting future WTP. Visitors may perceive these shortcomings as barriers to enjoying the natural beauty and recreational opportunities offered by the PAs. As a result, they may be less willing to pay for access or contribute financially to their conservation.

Addressing these infrastructure challenges is deemed important for enhancing visitor experiences and increasing WTP for Bolivia's PAs. Improving accessibility, providing accurate information, and investing in facilities like visitor centers and amenities can help create more positive and enjoyable experiences for visitors. By enhancing the overall quality of tourism infrastructure, Bolivia could encourage sustainable tourism practices and promote greater support for the conservation of its protected areas.

4.5. Revenue Curve

To complement the WTP analysis, we calculate the revenue curve. As before, we consider the population projected for 2022 from INE aged 18 and above from the 15 main cities across the nine departments. Solely considering this group, we apply the percentage of people willing to pay the average WTP (i.e., Bs. 245). We find that to maximize revenue, the price for the passport should be fixed at BOB 210 [approximately USD 30], resulting in an estimated revenue of BOB 156,187,369 (or approximately USD 23 million) (Figure 2 and Table 6). In this case, considering that the total extension of Bolivia's national PAs is 17,159,557 hectares [33], the estimated revenue per hectare would be BOB 9.

Furthermore, we constructed a revenue curve accounting for both users and non-users. Classification into these groups was determined based on the participants' responses to the question: "Do you plan to visit a National PA during 2023?" The respondents who indicated they did not intend to visit such areas were categorized as non-users, and their passport purchases were considered donations. Conversely, those answering affirmatively were categorized as users. As illustrated in Figure 3 and Table 6, the revenue collected under the "donation" category showed negligible variance compared to the projections for passport users, despite yielding a higher revenue.

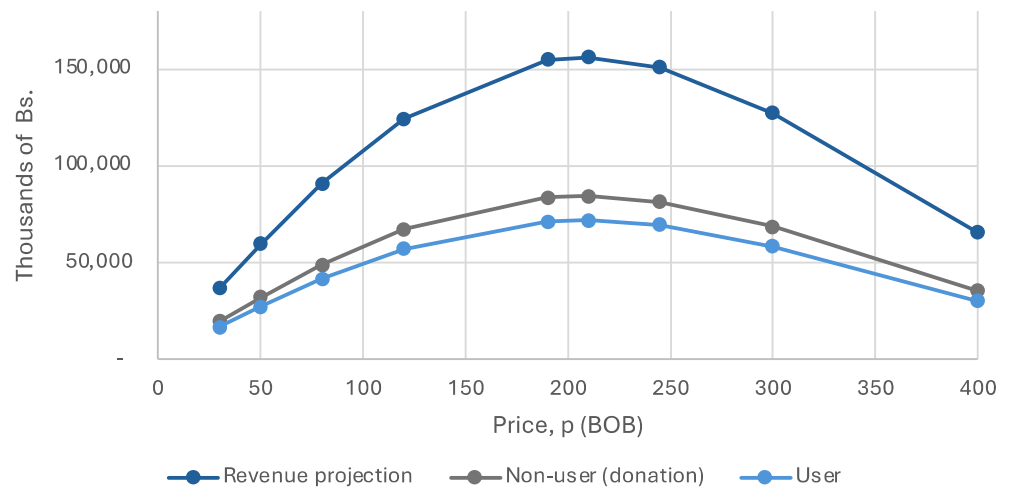


Figure 3. Revenue curve.

Table 6. Revenue.

Percentage (%) of People Will- ing to Pay the Price, p	Number of People (Users + Non-Users)	Price, p (BOB)	Revenue (Million BOB)
91.57	1,223,297	30	36,699
89.24	1,192,236	50	59,612
84.94	1,134,783	80	90,783
77.63	1,037,107	120	124,453
61.02	815,188	190	154,886
55.67	743,749	210	156,187
46.12	616,136	245	150,953
31.75	424,131	300	127,239
12	164,046	400	65,618

It is important to note that the results illustrated in Figure 3 and Table 6 stem from a theoretical exercise rather than observed transactions. Therefore, the estimates presented here should be interpreted cautiously and ideally complemented with additional information to inform policy decisions. We acknowledge that while contingent valuation methods can offer valuable insights for policymaking in the absence of market data, they are susceptible to various sources of bias that may constrain the accuracy of the estimates [7,34,35].

Additionally, it is worth considering that the exercise above did not account for the relationship between the optimal number of tourists and conservation targets. There is some evidence in the literature that a large number of tourists in PAs might degrade the environment, which is what we ultimately would like to avoid. Thus, further research is needed to understand how to maximize revenue to improve management and avoid further degradation of the natural areas.

To add to this challenge, one must consider allowing access to PAs from visitors with different income levels. This is true even in the case of the voluntary annual passport. Thus, a research opportunity exists here in terms of calculating potential mechanisms (e.g., cross subsidy) to allow all who want to buy the passport to purchase it.

Supplementary Materials: The following supporting information can be downloaded at: <https://www.mdpi.com/article/10.3390/land13060868/s1>, Survey in English. We note that the original survey was conducted in Spanish.

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Data Availability Statement: All data from the survey are available upon request.

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