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Willingness to pay for the recovery and conservation of urban green areas for public use in the city of Juliaca, Peru

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Abstract: The objective of the research was to determine the willingness to pay for the recovery and conservation of existing urban green areas for public use in the city of Juliaca, as an approximation of their economic value. The methodology used was the contingent valuation method (CVM), through the application of 383 surveys to people who visit green areas, these data were analyzed using the STATA and SPSS programs. For the estimation, the cloglog regression model was used, where the results obtained show that the main variables that influence the willingness to pay for recovery and conservation are their level of monthly family income, education, the proximity of the green area to their home. ,

the frequency with which you visit the green area and the perception of the state of the green area. 80% of citizens are willing to pay for the recovery and conservation of existing green areas, where the average willingness to pay is S /. 5.16 soles. Finally, it is to be expected that the results obtained may be a useful and necessary source of information on urban planning, environmental education and environmental culture.

Keywords: Green areas, conservation of the natural environment, willingness to pay, contingent valuation, public use.

1. INTRODUCTION

In recent years, population growth has presented enormous challenges in urban planning (Flores-Xolocotzi, 2017; Reyes & Flores, 2011), as well as the marked expansion of real estate activity and the growing demand for spaces for the construction of new roads and housing complexes, have led to an increase in built-up areas to the detriment of public spaces; especially squares, recreational and sports areas; having economic, political and social implications, environmental problems being an important part of this puzzle (Flores-Xolocotzi, 2019; Freeman et al., 2009; Galeano, 2009).

In addition, the rapid urban growth of cities has compromised the existing landscape within them, generating environmental problems and affecting the quality of life of its population (Cavalheiro et al., 1992; Tibbatts, 2002). Therefore, adequately planning the growth of urban areas and foreseeing the maintenance involved in managing them properly is of great importance (Azqueta, 2013).

The growing concern for the natural heritage and the quality of the environment, together with the need to conserve it due to the enormous benefits it brings in terms of use and non-use values, makes natural spaces called "green areas" made up of all those parks, gardens and natural areas that are part of a city stand as true eco-social assets (Pinto, 2016; Quesada & Research, 2010; Yánez et al., 2019).

The importance of recreational spaces lies in the fact that they increase the social well-being of the population by regulating and reducing their levels of stress, generating greater interpersonal relationships, leisure and recreational activities; it also constitutes a space for the development of social participation events. The decrease in this welfare may represent an economic problem, from the point of view of the welfare economy, because it is possible to know if the achievements of the market and the political decisions taken are those that the population values the most (Timothy, 2008).

In addition, green areas are important, since they provide the inhabitants with environmental, economic and social benefits; such as, for example, the improvement of air quality, the aesthetics of the city, recreation and the appreciation of real estate, among others (Cattaneo et al., 2007). Building cities with green spaces not only increases urban biodiversity, improves air quality and reduces stress, but also increases property prices and reduces spending on air conditioning and heating (Lacasaña-Navarro et al., 1999).

Green areas are spaces where vegetation and natural elements such as lagoons, estuaries and unpaved trails predominate; which provide multiple benefits to the population and the urban environment, favoring physical activity, social integration and a better quality of life for the

population; They also provide environmental services such as urban temperature control, carbon capture, air quality improvement, biodiversity protection, erosion reduction, flood control, energy saving, noise control, among others (Naess, 2007; Orrego & Bedoya, 2002).

However, although the social and environmental benefits provided by urban green areas for public use are varied and recognized, the lack of information about them and the absence of an appropriate and easily understood methodology that can be used to evaluate such benefits , has prevented the real valuation of these areas as environmental assets of a city or region, which hinders proposals and interventions for the improvement, remodeling and / or creation of new green areas, thus running the risk of an endowment insufficient green areas to meet the needs and expectations of the population (Gallego-Álvarez & García-Rubio, 2018; Gallegos, 2017).

In addition, it must be taken into account that carrying out the economic valuation of urban green areas is not immediate because, from an economic point of view, they are characterized by being public goods without market price (Bengochea, 2000), But about what there is no doubt, is that the environmental assessment processes can serve to make decisions with greater rationalism, by having all the information and not only that provided by the market (De Frutos & Esteban, 2009).

For this reason, this study proposes an environmental valuation exercise that quantifies the value of environmental goods and services provided by the urban green areas existing in the city of Juliaca. In this context, the existing information about the area of green areas per inhabitant (m2 / inhab) within the scope of study was collected, thus being able to observe a noticeable decrease in recent years, mainly due to population growth and the notorious urbanization of various sectors formerly intended for various uses. According to figures from the National Institute of Statistics and Informatics (INEI) Juliaca is the most populated city in the Puno region, since it is the main commercial and industrial center of the highlands, which in 2007 had 239,969 inhabitants and in the year 2017 increased to 307,417 inhabitants (INEI, 2020).

The Ministry of the Environment (MINAM) in 2016, shows that in Peru the most representative departments with the presence of green areas per capita are Moquegua with 4.18 m2 / inhab, followed by Lima with 3.97m2 / inhab, La Libertad with 3.56m2 / hab, while the Puno Region with 0.4m2 / hab, regarding the city of Juliaca according to the Juliaca Master Plan 2004-2015 indicates that the green areas for the Juliaca district in 2014 is 50,647.00 m2 (5,065 Has) equivalent to 0.25 m2 / hab. This means that it is below that recommended by the World Health Organization (WHO), which proposes a fairly moderate standard of 9 m2 of green areas per inhabitant and Spanish standards indicate an optimum of 13 m2 per inhabitant (Garcia-Yi, 2004; Hernández, 2015).

Those responsible for the management of green areas are the Municipalities, who are aware of the numerous tangible and intangible benefits included in the management of green areas; however, they have financing difficulties for this type of investment (T Besley, 2002; Gonzales et al., 2014). Consequently, the planning and management of parks in particular, citizen participation is very important, as a basic strategy to solve difficult situations that arise, it also allows to ensure inclusive processes, especially to meet the demands of recreation of vulnerable social groups (García-Barrios & González-Espinosa, 2017).

Taking into account the aforementioned spatial differences, the proposal arises to collect the perception that the inhabitants have about the existence, uses and importance of urban green areas, in this sense the present study aims to estimate the willingness to pay for recovery and conservation of urban green areas for public use in the city of Juliaca, based on the use of the contingent valuation method, by conducting surveys of the population. The results obtained can become a useful source of information when carrying out the decision-making process as a strategic tool in the management and design of public policies for the recovery and conservation of green areas (Hernández et al., 2019).

Therefore, due to the loss of vegetation cover, generated by growing urbanization, it threatens the ecological and social functions of green areas, which are essential for people's well-being (Chen et al., 2006). The lack of knowledge of the economic value of green areas has led to an imbalance in the proportion between the natural environment and the built environment, to this it is added that of the total green areas existing in the city of Juliaca, most of it is in a total neglect, which leads to deterioration.

The deterioration and neglect of urban green areas for public use, brings with it a degradation of green areas by the population, which represents a bad image in parks, gardens and other areas that are destined for recreation, thus generating the little attendance of the population from Juliaca to these places, which encourages the presence of people who live badly, triggering an increase in citizen insecurity, which consequently represents negative effects on the well-being of society. In this sense, the research problem of this study consists of an approximation of the economic value of green areas for public use by estimating the willingness to pay (DAP) of the population in the city of Juliaca due to a favorable change in the quality of the environmental good in question.

Consequently, the central problem investigated was: What will be the Willingness to Pay (DAP) of the inhabitants of the city of Juliaca for the recovery and conservation of urban green areas for public use? What are the main variables that influence the the willingness to pay (DAP) for the recovery and conservation of urban green areas? and What are the main socioeconomic factors that determine the price assigned by the population for the recovery and conservation of urban green areas? In this sense, the objective of the research was to determine the willingness to pay for the recovery and conservation of existing urban green areas for public use in the city of Juliaca; In order to test the hypothesis that there is willingness to pay, by the inhabitants of the city of Juliaca, for the recovery and conservation of urban green areas, for an amount greater than S /. 5.00 soles.

2. THEORETICAL PERSPECTIVES

Public goods and economic valuation

From the perspective of economic valuation, the most important aspects of public goods have to do with the information that is feasible to obtain from a specific market. For public goods there is no market where you can get information about the price or quantity, for semi-public goods, the price can be inferred from the behavior of individuals with respect to a well private (Lavín et al., 2007).

Table 1. Public goods and economic valuation

Service category	Service flow characteristics
Pure private services	Usually, goods are exchanged in normal markets, consumption by one individual excludes the possibility of another individual enjoying the service. Access to the property can be controlled. The quantity of the good or service is indirectly observable in the market. Example: commercial fishing.
Quasi public services	Generally, goods are not traded in markets. Up to a point, but beyond that point congestion reduces the enjoyment of all individuals. Access can be controlled, but it is often not strictly regulated. The quantity of the good or service is inferred from observations about the behavior of individuals. Example: Recreational Fishing.
Pure public services	Goods are not exchanged in markets; any number of individuals can enjoy the good and it does not reduce the amount available to others. Access cannot be controlled. The quantity of the good or service cannot be determined by observation or inference. Example: existence value of a wild animal.

Source: Own Elaboration, adapted from Vásquez et al. (2007)

METHODS OF ECONOMIC VALUATION

There are various economic valuation methods in order to partially or comprehensively quantify the economic value of an eco-systemic good or service. The choice of the valuation method generally depends on the objective of the valuation, the information available, the eco-systemic good or service, the type of economic value, financial resources, time, among others (Sarmiento, 2003).

The choice of the valuation method goes according to the valuation objective, the information available, the economic resources for its development and the time available; among some. Then the methods shown economic valuation (Mogas, 2004).

a) Methods based on market values

Market Prices: Money that is paid for the commercialization of ecosystem services. For example: wood, fish, among others.

b) Methods based on revealed preferences

Changes in Productivity: It is about assigning an economic value to human life. Health costs as a result of changes in ecosystem services. Example: air or water pollution.

Travel Cost: It assumes that the value of a place is reflected in what people are willing to pay to travel to visit it. The costs include the distance to get there, the travel expenses, entrance to the place of visit and the value of time.

Hedonic Prices: Try to discover all the attributes of the good that explain its price, and discriminate the quantitative importance of each of them.

Avoided Costs: The value is based on the costs of measures taken to avoid the damage that would occur if there were no specific green areas. Example: the cost of protecting a property against flooding as a consequence of wetland degradation.

Contingent Valuation Method

The contingent valuation method (CVM) is the modern name for the method of preparing questionnaires to calculate the benefits generated by an asset. This method is used to build demand for any good, whether it is market or non-market (Uribe et al., 2003).

The contingent valuation method emerged in the late 1950s. This method has had different names in its beginnings. It has been known as the survey method, the hypothetical estimation of the demand curve, the indifference map, the estimation of preferences, and the constructed markets. It wasn't until the late 1970s that the name contingent valuation, by which we commonly know it now, was used. The term contingent is used here in the sense of "dependent" on how the valuation exercise was carried out (Del Saz et al., 2002).

The eighties and nineties were of statistical advances in this field. This allowed for considerable sophistication in empirical applications and the popularization of other declared preference methods such as so-called choice models. At present, the methods of declared preferences, compared with those of revealed preferences, mainly the contingent valuation and in recent times the choice models, are clearly the most used in practice (Sarmiento, 2003).

General Overview of Urban Green Areas

The trend towards increasing urbanization is a widespread global phenomenon with great environmental, social, economic and political consequences. It is estimated that by the year 2030, more than 60 percent of the world's population will live in urban settlements, the general environmental situation of cities in Latin America and the Caribbean being worrying (Ortega-García et al., 2020).

Within each town or city there is a great variety of public green areas, including: parks and gardens; recreation centers and playgrounds; urban forests; zonal parks; riverbanks; central berms; etc. It is the variety of types of green areas, and the contrast between them, that helps to ensure that the recreational and outdoor leisure preferences of all inhabitants can be covered and that as many benefits as possible are delivered (Tibbatts, 2002). This is why the WHO (World Health Organization) considers green spaces as essential for the benefits reporting on the physical and emotional well-being of the inhabitants, helping to mitigate the urban decay of cities more liveable making healthy (Galeano Ruiz, 2009).

Conservation of Urban Green Areas

Green areas constitute the main element of natural ecosystems, the sum of them forms places for the nesting of other forms of life, it is also essential in the production of oxygen, the main element for life. Likewise, the green areas make up a natural laboratory allowing the relationship of man with his environment, starting from this reality, and being the educational institutions the center of the action of the teaching - learning process must be structured and function as organized spaces that are interconnected with the material and human elements in

the search for ecological balance to achieve meaningful learning. In this regard, conservation of green areas reinforces the need for educators and regulatory mechanisms to maintain the green areas under appropriate conditions (Gallegos, 2017; Morales-Cerdas et al., 2018; Quispe et al., 2019; Reyes, 2011).

Importance and benefits of Urban Green Areas

The conservation of green areas is a very important factor for human development as they ensure multiple social and environmental benefits for urban residents, it must be borne in mind that the effect that green areas have on the fulfillment of social benefits such as recreation and leisure outdoors, it will depend on their property, thus, a private green area will have an evident effect on air purification and noise attenuation, but only a limited effect in relation to the recreation of people and the community; On the other hand, being public in nature, it gives the whole community the possibility of recreation. Framed in the above, it is important to conserve green areas because they allow man to fully enjoy the outdoors as they provide (Flores-Xolocotzi & González-Guillén, 2010; Reyes & Figueroa, 2010):

- Shade, which translates into freshness thus balancing the climate in hot cities.
- Pure oxygen, this is due to the fact that through the photosynthetic process it exchanges the CO2 produced by animals, vehicles and others into O2, this process is constantly repeated and is partly responsible for the life of species on the planet.
- Comfort, possibly for a person affected by the daily routine.
- Safe soil, this is due to the tie that the roots produce to the soil, thus avoiding erosion.
- Absorption of pollution, is achieved since the plants in their foliage, retain fine dust and all kinds of oils produced by vehicles and industries, which are highly harmful to human health.
- They muffle noise, beautify and provide peace that determine the culture and characteristics of a pleasant city.

3. METHODOLOGY

The study area was delimited to the city of Juliaca, taking into account only the urban area; so that the units of analysis for this research are the population (citizens) that live in this city. This research corresponds to a type of mixed research, since it has both a qualitative and a quantitative analysis (Hernández, R., Fernández, C. & Baptista, 2010). The qualitative analysis is carried out in the review of the responses of the survey application, which presents variables that affect the decision-making of the respondents. In this way, numerical results are obtained which are analyzed. The quantitative analysis is carried out to know the interrelation of the variables through a statistical analysis and later the application of econometric models (Pedace, 2017). The methodological design applied in this research is descriptive, correlational and explanatory type (Mendoza, 2014).

The technique used to estimate the willingness to pay of the urban population of the city of Juliaca for the conservation and recovery of green areas is considered the cabinet phase, with the collection of the necessary information on the scope of the main green areas existing in

the city of Juliaca, analyzing the socioeconomic aspects. In the field phase, surveys were applied to determine the population's willingness to pay; identification of the areas where there is a green area, biotic and abiotic characteristics of the area, in addition to zoning the study area according to the radius of impact of each area identified as a green area. Finally, in the information systematization phase, all the information generated in the field was subjected to a process of statistical ordering and respective analysis in order to implement the diagnosis of reality, considering an evaluation of natural resources (Haro-Martínez & Taddei-Bringas, 2014).

Methodology by objectives

To identify the main variables that influence the willingness to pay (DAP) for the recovery and conservation of urban green areas; The methodology used was correlational and explanatory, in addition, the CVM is applied through the cloglog binary regression model for dummy variables, in this way to determine the main variables that influence the willingness to pay for the conservation and recovery of green areas, for which a survey will be used as an instrument (Mendoza Bellido, 2014).

The specific econometric model to estimate is cloglog, according to the following way:

$$DAP = \alpha_0 + \beta_1 \log(frecuency\ of\ visit) + \beta_2 \log(estate\ of\ green\ area) + \beta_3 \log(level\ of\ education\ reached) + \beta_4 \log(distance\ to\ green\ area) + \beta_5 \log(montly\ household\ income) + e$$

To analyze the main socio-economic factors that determine the price assigned by the population for conservation and recovery of urban green areas, correlational and explanatory methodology was used in order to identify socioeconomic characteristics of the population that influence the price they are willing to pay for the recovery and conservation of green areas. For the fulfillment of this objective, a probabilistic linear model will be used, having the price as the dependent variable and the other following variables as the independent variable (Mendoza Bellido, 2014).

$$PRICE = \alpha_0 + \beta_1(age\ of\ the\ respondent) + \beta_2(level\ of\ education) + \beta_3(household\ size) + \beta_4(tenure\ regime) + \beta_5 \log(montly\ family\ income) + \beta_6(distance) + e$$

To determine the willingness to pay for the recovery and conservation of the existing urban green areas for public use in the city of Juliaca, a descriptive and explanatory methodology was considered, analyzing the percentage of the population that is willing to pay, followed by the price average that they assign for the recovery and conservation of urban green areas for public use, for which a survey will be used as an instrument. Then the information collected is processed and evaluated, through statistical tables in the SPSS, STATA programs.

The universe of study is made up of the entire population of the city of Juliaca. The number of inhabitants according to the 2017 census amounts to 217,743 inhabitants in the city of Juliaca, already subtracting the population of San Miguel, from which the application of surveys to people between the ages of 18 to 65 years is prioritized, without distinction of gender. In this sense, to determine the sample, the simple probabilistic and random method was applied, in which all have the same probability of being chosen. Thus, the confidence

level is 95%, the maximum accepted error is 5%, and the probability is 0.5 (p = 0.5 and q = 0.5). The applied formula is as follows (Lacort, 2014):

$$n = \frac{p * q * Z^2 * N}{e^2 * (N-1) + Z^2 * p * q}$$

Where n is the sample size, N is the population, e is the error or maximum difference between the sample mean and the mean of the population willing to accept, Z is the confidence margin, p is the probability of success, and q is the probability of failure. $d$which obtains a sample of 383 people.

4. DATA ANALYSIS AND RESULTS

Descriptive analysis of the variables that explain the willingness to pay for the recovery and conservation of urban green areas

The city of Juliaca is experiencing great population growth, and yet this growth is not being reflected in investments to improve public services; specifically in expanding and recovering green areas; Very although according to the Master Plan 2004-2015 Juliaca indicates that green areas for the district of Juliaca 2004 is 50,647.00 m2 (5,065 hectares) equivalent to 0.25 m2 / hab (Figure 1). Still below the recommended by WHO (World Health Organization) minimum requirement, indicating that should be at least 8.0 m2 / hab.

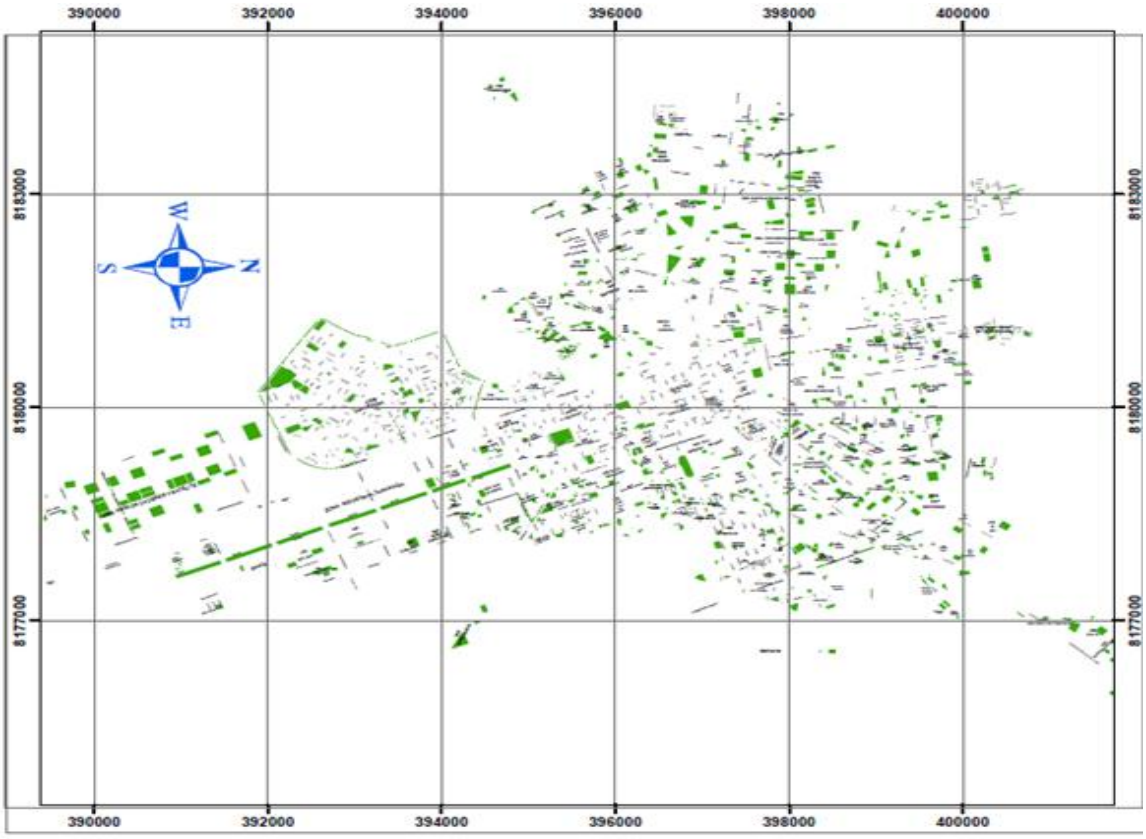

Fig. 1: Current map of green areas in the city of Juliaca (2018)

At the level of the city of Juliaca there are 252 urbanizations, of which only 49 of them allocated land for green areas, 80% of which do not have spaces for the construction of parks and gardens, the same neighbors, who do not have spaces to recreate.

We must indicate that each urbanization must allocate 13% of its total land, for parks or recreational spaces, educational centers, markets, police posts, health centers, among others; since so far there are only 93 spaces for green areas. In this sense, the perception that the population of the city of Juliaca have about urban green areas for public use is that 51% visit at least once a week, 33% visit at least once a month, on 15 % indicated that they visit daily and 0.5% visit rarely a year (Table 2), this perhaps due to the fact that people dedicate themselves more to other activities, including work, therefore they do not give themselves the necessary time for leisure.

Table 2. Frequency of visits to urban green areas

Description	Frequency	Percentage
Daily	56	14.6
At least once a week	195	50.9
At least once a month	130	33.9
Rarely a year	2	0.5
Total	383	100.0

In addition, the time spent in green areas as an important variable is that you can see the time spent in each visit to green areas, which predominates 30 min with 44%, up to 15 min 31%, 1 hour 17% and only more than an hour with 8%. Respondents maintain that in that time they can comply with their benefits, either for the use they give them (Table 3), so the degree of satisfaction they have obtained during their visit to this space is that 40% of the population shows dissatisfaction, with only 7% being very satisfied.

Table 3. Time spent on each visit to the green areas

Description	Frequency	Percentage
15min	121	31.6
30min	168	43.9
1 hour	64	16.7
More than 1 hour	30	7.8
Total	383	100.0

The aforementioned is justified, because urban green areas are in abandonment and not very pleasant to look at, this caused by solid waste and soil contamination. It is also considered that the neglect of urban areas generate problems of insecurity. Most of the people surveyed believe that the neglect of urban areas generates insecurity problems represented by 96% of the population, while the remaining 4% believe the opposite. The most common problems you see in the green areas is drug addiction and alcoholism by 44%, the presence of people of

unsavory 31%, burglary 21%, other 4%. 48.3% of the population surveyed responded that the most important park is Main Square, followed by a 27.7% Square Bolognesi, 12.3% Square Zarumillas, 10.2% Park the Pulmoncito and 1.6% for other parks such as Grau Park, Los Collas Park, Alameda Love, Mother Park, Park pool, Musician Park, Park Santa Rosa of Lima, Journalist Park, Triangle Park and other (Table 4).

Table 4. Main green area in Juliaca

Description	Frequency	Percentage
Main Square	185	48.3
Bolognesi Square	106	27.7
Zarumillas Square	47	12.3
The lung park	39	10.2
Others	6	1.6
Total	383	100

Almost the entire population is aware of the existence of green areas and everyone considers that the conservation of green areas is important; therefore, the population of Juliaca recognizes that the importance of green areas is beneficial for their health. According to the results provided by those surveyed, 97.9% say that urban green areas are important for their well-being (Table 12) and 96.87% consider that green areas help control pollution. The activity that people carry out the most in urban green areas is relaxation with 34%, for the enjoyment of the landscape with 19%, while the meeting point with 16%, Enjoy pure air with 6%, Reading with 8%, walk the dog with 6% and finally with 6% perform other activities.

Table 5. Activities you do most frequently in urban green areas

Description	Frequency	Percentage
Relaxation	131	34.2
For the enjoyment of the landscape	74	19.3
Meeting point	62	16.2
Enjoy the pure air	24	6.3
Observation of plants and flowers	13	3.4
Reading	32	8.4
Walking the dog	24	6.3
Other	23	6.0
Total	383	100.0

The most frequent problem observed in green areas is drug addiction and alcoholism in 44%, the presence of poor living in 31%, theft 21%, another 4%. (Table 6).

Table 6. Most frequent problem observed in green areas

Description	Frequency	Percentage
Robberies	80	20.9
Drug addiction and alcoholism	168	43.9
Presence of people with bad living	121	31.6
Other	14	3.7
Total	383	100.0

Therefore, of the people who answered the interview, it can be observed that the highest percentage (80%) is willing to pay for the recovery and conservation of public urban green areas in the city of Juliaca (Table 7).

Table 7. Willingness to pay for the recovery and conservation of public urban green areas

Answer	Frequency	Percentage
Not	75	19.6
Yes	308	80.4
Total	383	100.0

The surveyed population that is willing to pay monthly for the recovery and conservation of green areas, 33% of the population is willing to pay S /. 5.00 soles per month, 23% would pay S /. 4.00 soles, 15% would pay S /. 6.00 soles, also only 0.3% would be willing to pay an amount of S /. 15.00 soles. Of the respondents (49.35%) of the population said that the way in which this charge is materialized is by an increase in the rate of other services, such as the payment of water or electricity.

In this understanding, it can be established that 97% of the surveyed population believes that urbanization processes have directly affected the availability of urban green areas in the city of Juliaca. With what various factors would be affecting the availability of green areas such as the socioeconomic level of its inhabitants, greater concentration of the population, the location in the geographical space, which does not come to be benefits for some parts of the city, development urban, commercial and industrial areas of the city would be affecting the availability of urban green areas (Table 8). On the other hand, to contrast the aforementioned we can also say that the 43% that the actors attributed to the exist districts with a greater surface of public urban green areas is due to municipal management.

Table 8. The urbanization process affects the availability of green areas

Answer	Frequency	Percentage
Not	10	2.6
Yes	373	97.4
Total	383	100.0

The reason for building urban green areas, according to the information provided by the respondents, 40% is due to scenic beauty, 34% pure air, 17% conservation of local flora and fauna and 9% for the creation of a micro climate. With such information we highlight that both the flora and the construction of these green areas should be recovered, conserved and cared for (Table 9). Finally, 63% of the surveyed population affirm that they know policies related to the conservation of green areas but consider that these have not had the expected results. Also within the suggested policies are the following:

- Control excess garbage, promote respect and environmental conservation Local environmental commitments and opportunities.
- Reduce levels of air pollution, ensure environmental quality and the National system of environmental management.
- Promote environmental education.
- Solid waste management practices promoting the minimization of solid waste and environmental waste generation.
- Promote the conservation of the diversity of ecosystems and maintenance of ecology.
- Promote public and private investment in projects to improve collection systems, recycling operations, and final disposal of solid waste.
- Propose municipal ordinances to promote formal and legal mechanisms related to the conception, management and care of green areas.
- Rehabilitation of environmentally degraded areas.

Table 9. Reason for building urban green areas

Description	Frequency	Percentage
Creation of microclimate	35	9.1
Fresh air	129	33.7
Conservation of local flora and fauna	66	17.2
Scenic beauty	153	40.0
Total	383	100.0

Econometric analysis of the willingness to pay for the recovery and conservation of urban green areas

Considering the econometric application to identify the variables that influence the willingness to pay for the recovery and conservation of green areas, an estimation of three econometric models of binary regression was made: logit, probit and cloglog models used when the dependent variable is dichotomous, that is, it takes two values in Table 10, the results of the regression for the 3 models are presented in order to choose the most coherent model, some criteria were taken into account such as the logarithm of maximum likelihood (log-likelihood) is the most high, in addition that the values of the information criteria such as Akaike (AIC) and Schawarz (BIC) are the lowest, on the other hand with respect to the R-square, in models with binary regression they are not relevant, because they are not good indicators nor show any behavior.

The comparative analysis of the statistics already analyzed seems to be identical, but if we compare the logarithm of maximum likelihood, it is the cloglog model that has the highest coefficient with -131.41, with respect to the information criteria the lower Akaike has the model cloglog as well as that of Schwarzs is possessed by the cloglog model, considering these results, the selected model is the cloglog model (Table 10).

Table 10. Abstract of the regression results of the three models

Variable	Model		
	Logit	Probit	Cloglog
Frequency	.70336015***	.42146791***	.41838196***
Green area status	-.63693341***	-.36984391***	-.35341981***
Education level	.31841828***	.17619611***	.14730506***
Distance to the green area	-.40688293***	-.23534932***	-.22451014***
Family income	.5726215***	.33528574***	.32615957***
Constant	-1.6816356	-.96363317	-1.2302381**
R2_p	.29840487	.30320605	
Chi2	81.455689	87.418581	116.0225
p	4.161e-16	2.341e-17	2.182e-23
aic	277.78537	275.96654	274.80762
bic	301.47358	299.65475	298.49583
ll	-132.89268	-131.98327	-131.40381
N	383	383	383
Legend: * p<.1; ** p<.05; *** p<.01			

To carry out the inferential analysis of the chosen model in this case the cloglog model, the present work will place greater emphasis only on those variables that are significant, that is, variables that explain and influence the behavior of the dependent variable, in that sense the significant variables assuming a significance level of 5% are the status of the green space, education, income, frequency with which you visit the green space, and the distance between the home and the green space. Of which, the level of education achieved, the frequency of visits to the green area and the income of the interviewee are positively related to the willingness to pay. Such is the case, that if the person reaches a higher level of education, the probability of being willing to pay is increasing, while a higher level of education reaches, on the other hand, if the person attends the green area more frequently, they will have a greater probability of being willing to pay, this would respond to the fact that the person makes greater use of the green area. While the variables state of the green area and distance have a negative relationship with the willingness to pay, this responds to the fact that if the person considers that the green area is in a bad state, they will have a greater probability of being willing to pay, The same happens with the distance between the green area and the person's home, the greater the distance, the less likely they are to be willing to pay. In this sense,

analyzing the marginal effects of the clolog model (Table 10), the effect that a variation of one percentage point in the independent variable would have on the willingness to pay for the recovery and conservation of green areas is obtained (Table 11).

Table 11. Marginal Effects cloglog model

Variable	dy/dx	Error estándar	z	P>|z|
Visit frequency	.0907458	.02597	3.49	0.000
Green area status	-.0766557	.02242	-3.42	0.001
Level of education achieved	.03195	.00791	4.04	0.000
Distance to the green area	-.0486956	.01756	-2.77	0.006
Monthly family income	.070743	.01245	5.68	0.000

From the above table it can be seen that if the level of education achieved by the person increases by one level, for example: from primary studies to secondary studies, then the probability of being willing to pay for the conservation and recovery of green areas will increase by 3.2%. Faced with an increase in one sun in the monthly family income that the person receives, then the probability that they are willing to pay for the conservation and recovery of green areas will increase by 7.07%. At a one-block increase in the approximate distance that exists between the green area and the person's home, then the probability of being willing to pay for the conservation and recovery of the green areas is reduced by 4.87%. In the case of an increase in the frequency of visits to the green area (for example, if the person usually visited once a month and now does so once a week), then the probability of being willing to pay for conservation and recovery of green areas increases by 9.07% and if the person considers that the green areas in the city of Juliaca are in good condition, then the willingness to pay for the conservation and recovery of green areas is reduced by 7.67%, if On the contrary, if the person considers that the green areas are in poor condition, the probability of being ready increases by 7.67%.

When considering the econometric analysis of the previous model, it is evident that greater emphasis was placed on identifying the most relevant variables that influence the willingness to pay of the inhabitants who go to the green areas of public use in Juliaca for their recovery and conservation. However, this analysis does not include one of the most important variables, which is the price that the population would be willing to pay. In this sense, an analysis is carried out below identifying the main variables that influence whether the person is willing to pay a greater amount of monetary units measured in soles (S /.). For this purpose, a linear model will be used, taking greater emphasis on significant variables and explaining the impact that these would have on the price.

The following shows the results of the regression, where it shows that the coefficients that accompany the variables are those expected, the global significance is high, which indicates that the variables together influence the dependent variable. On the other hand, within the variables significant at 5%, the level of education of the interviewee was identified at age; Likewise, the size of your home, the tenure regime of your home, your income and the

distance of your home from the green area, the impact that each of these variables have on the price is detailed below with greater precision.

Table 12. Multiple Linear Probabilistic Regression Model

Price	Coefficient	Standard error	t	P>|t|
Respondent's age	.0491702	.007925	6.20	0.000
Education level	.1129464	.0335132	3.37	0.001
Household size	-.1996903	.071858	-2.78	0.006
Tenure regime	3061561	.1522007	2.01	0.045
Monthly family income	.2087953	.053507	3.90	0.000
Distance	-.2522613	.0855857	-2.95	0.003
Constant	2.06986	.6474567	3.20	0.002

Analyzing, it can be seen that if the age of the respondent increases by one year, then the price they would be willing to pay for the conservation and recovery of green areas would increase by S /. 0.049 soles; If the person's level of education increases by one level (for example, from secondary education to higher education), then the price that they would be willing to pay for the recovery and conservation of green areas would increase by S /. 0.11 soles. Furthermore, if the number of members living within a household increases by one person, the price that the interviewee would be willing to pay for the recovery and conservation of the green area would be reduced by S / 0.20 soles; If the person has their own home, the price that they would be willing to pay for the recovery and conservation of the green area would increase by S /. 0.31 soles, with respect to those who live in a rented home. In the case of the interviewee's monthly family income increases by one sol, then the price that they would be willing to pay for the recovery and conservation of the green area would increase by S /. 0.21 soles and if the distance between the house and the green area would increase by one block, then the price that would be willing to pay for the recovery and conservation of the green area would be reduced by S /. 0.25 soles.

Therefore, when estimating the average willingness to pay, taking only the respondents who gave an affirmative answer regarding the willingness to pay, the results show that the average price that respondents are willing to pay is S /. 5.16 soles, with a minimum value of S /. 2.00 soles and a maximum value of S /. 15.00 soles respectively (Table 13).

Table 13. Average willingness to pay

Variable	Observations	Mean	Standard error	Minimum	Maximum
Price	308	5.155	1.9257	2	15

5. CONCLUSIONS

The 80.4% of those surveyed are willing to pay for the recovery and conservation of green areas in the city of Juliaca; While 19.6% responded that they are not willing to pay, the main reasons were lack of economic resources, the state or public institutions must assume and that

they already pay a fee for it. However, the population's concern for the recovery and conservation of existing urban green areas is clearly shown. Of the people who are willing to pay, the amount that is intended to pay is S / 5.16 soles on average.

The main variables that determine the willingness to pay assuming a significance level of 5% are the monthly family income, the status of the green area, education, frequency with which the green area is visited, and the distance between the home and the green area. , variables such as household size, age, gender, level of satisfaction in their visit to the green area and others were not significant.

In addition, the variables that significantly influence the price assigned by the population for the conservation and recovery of the green area are the age, the level of education of the respondent, the size of their home, the tenure regime of their home, their family income. monthly and the distance of your home from the green area, all these variables are significant at 5%, as well as jointly they present a high level of global significance.

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