

Economic Valuation of Pagutan Green Open Space in Mataram City as a Basic for User Fee Determination and Sustainable Management Strategy

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ABSTRACT

Rapid urban development is putting pressure on the availability of green open spaces and the quality of the urban environment. This study aims to analyse the economic value of Pagutan green open space from the perspective of public, formulate a fee structure and sustainable management strategy for it. The study employed a mixed-methods approach with a sequential explanatory design, combining quantitative analysis using the Contingent Valuation Method with a bidding game approach, as well as qualitative analysis through informant interviews and observation. Data were collected from 145 respondents that analysed using multiple linear regression and community participation analysis. The results indicates that the yearly total economic value of the green urban space is about Rp476.056.512 counted from visitors' willingness to pay for its existence. Visitors' age, income, education, visit frequency, distance from residence, and perceptions of green open spaces significantly impacting visitors' willingness to pay. Community participation was relatively high, particularly in maintaining cleanliness and adhering to regulations, but direct involvement in maintenance activities remained moderate. Based on an analysis of ability to pay, the most realistic fee is Rp3,000/person/visit, applied selectively to the Special Sports Zone, the Environmental Education Zone/Greenhouse, and the Children's Playground Zone. The sustainable management strategy for the Pagutan Green Open Space is divided into three categories based on the three pillars of sustainable development: the economic aspect, through the implementation of user fees as a supplementary funding source; the social aspect, through increased community participation and education; and the environmental and institutional aspects, through enhanced vegetation maintenance and strengthened area management.

INTRODUCTION

Rapid urban development is putting pressure on the availability of public and ecological spaces, particularly green open spaces. Urbanization not only increases the demand for developed land but also reduces environmental carrying capacity, air quality, and community well-being (Aakhirul *et al.*, 2020; Saputra *et al.*, 2024). In addition, the growing demand for land for development is also reducing the availability of green open spaces in urban areas (Latifah *et al.*, 2020). Various studies show that green open spaces play a key role in reducing pollution, lowering surface temperatures, and improving social well-being and quality of life (Semeraro *et al.*, 2021; Wilson and Xiao, 2023; Jones *et al.*, 2024).

Within the framework of sustainable development, green open spaces are a key element that integrates environmental, social, and economic aspects (Allam *et al.*, 2022). Act No. 26 of 2007 on Spatial Planning (Indonesia) stipulates that at least 30% of a city's area must be allocated to green open space, of which 20% should be designated as public green open space. However, conditions in many cities in Indonesia, including Mataram city, still do not meet these requirements. Data shows that as of 2023, the area of public green open spaces in Mataram city has only reached about 4% of the city's total area (Environmental Agency of Mataram City, 2024). This situation indicates limitations in the provision and management of green open spaces.

One of the green open spaces in Mataram City is Pagutan Green Open Space, which serves ecological, social, and recreational functions. This area has been equipped with various facilities to support community activities, but its management still faces challenges, particularly regarding the quality of facilities and maintenance due to budget constraints based on the budget allocation in the Budget Implementation Document of the Mataram City Environmental Agency. Budget allocations for the 2021–2025 period tend to prioritize physical development over ongoing maintenance, which could potentially affect the quality of green open space services in the long term (Environmental Agency of Mataram City, 2024).

From a public economics perspective, green open spaces are public goods that are non-rivalrous and non-excludable (Samuelson, 1954), making it vulnerable to free-riding, which is a situation where people enjoy the benefits without contributing to the costs (Stiglitz, 2000). Therefore, government intervention is needed in its provision and management (Musgrave and

Musgrave, 1989). In addition, green open spaces also generate positive externalities in the form of improved environmental quality and community well-being (Perman *et al.*, 2011).

One approach that can be used to support sustainable financing is economic valuation based on willingness to pay. This method allows for the measurement of the value of green open spaces that do not have a direct market price (Idris *et al.*, 2022).

Several empirical studies indicate that the public is willing to pay for improvements in the quality of green open spaces, but research has so far focused primarily on estimating their economic value. Odhengo *et al.* (2024) found that green open spaces make a significant contribution to public well-being, but have not yet linked the valuation results to fiscal policy. Cheung *et al.* (2022) and Idris *et al.* (2022) indicates that income, health benefits, and frequency of visits influence willingness to pay, but the findings have not yet been incorporated into the formulation of financing policies. Similar findings were also reported by Zegeye *et al.* (2023) and Song *et al.* (2021) which emphasizes the importance of green open spaces, but has not yet linked the results of the valuation to fee structures or management strategies at the local level.

Thus, there remains a research gap in the form of limited integration between estimates of willingness to pay and the formulation of fee policies and sustainable management strategies for green open spaces. Therefore, this study aims to estimate visitors' willingness to pay, analyze the factors influencing it, and formulate a fair, proportional, and sustainable fee scheme and management strategy for the Pagutan Green Open Space.

RESEARCH METHODOLOGY

This study employs a mixed-methods approach with a sequential explanatory design, which combines quantitative and qualitative methods in sequence to gain a more comprehensive understanding (Caracelli, 2006). The study was conducted at the Pagutan Green Open Space in West Pagutan, Mataram City. Data were collected through questionnaires for quantitative analysis and semi-structured interviews for qualitative analysis.

The population in this study is all visitors, the exact number of whom is unknown. Therefore, the sample was selected using a non-probability sampling technique with a purposive sampling method, in which respondents were chosen based on specific criteria (Tongco, 2007; Purwanza *et al.*, 2020). The criteria for this study were visitors at the study site who were at least 18 years old and willing to participate as respondents.

Quantitative analysis using the Contingent Valuation Method with a bidding game approach to estimate the average Willingness to Pay and Total Economic Value (Lipton *et al.*, 1995). Next, the factors influencing willingness to pay were analyzed using multiple linear regression, along with tests of classical assumptions, the F-test, the t-test, and the coefficient of determination (Ghozali, 2012; Widarjono, 2018; Kuncoro, 2013). Qualitative analysis was conducted through interviews to support the interpretation of quantitative results and to formulate recommendations for a fee structure and strategies for managing green open spaces based on community participation analysis.

RESULTS AND DISCUSSION

a. Overview of the Research Location

Pagutan Green Open Space is administratively located in the Pagutan Barat neighborhood of Mataram City and covers an area of 8.2 hectares. The area is easily accessible and is used by the community for various activities such as sports, recreation, and social interaction.

Physically, the Pagutan Green Open Space is generally well-maintained, particularly in the central activity area. However, there are still some areas where management could be improved, such as vegetation arrangement, facility maintenance, and cleanliness during periods of high visitor traffic.

Because green open spaces are public goods, their benefits are not reflected in market mechanisms; therefore, an economic valuation approach is necessary, such as through a willingness-to-pay analysis.

b. Respondent Characteristics

The study included 145 respondents. The characteristics of these respondents were used to describe the socioeconomic status of visitors and as a basis for analyzing the factors influencing willingness to pay. The results of the analysis of respondent characteristics are presented in Table 1

Tabel 1. Respondent Characteristics

Variable	Dominant Category	Percentage
Age	28–37 years old	55,17%
Income	IDR 1-3 Million	31,72%
Education	Bachelor's-Doctoral	62,07%
Visit frequency	1–6 times/month	84,83%
Distance from residence	≤5 km	55,86%

Sources: Primary data from a questionnaire, processed, 2026

These characteristics indicate that the Pagutan Green Open Space in this study is primarily used by young adults with relatively high levels of education and good accessibility, thereby potentially supporting community participation in the management and financing of green open spaces.

c. Perceptions of Pagutan Green Open Spaces

Visitors' perceptions of the Pagutan Green Open Space were measured using five indicators on a 1–5 Likert scale. The results show that the total perception scores ranged from 13 to 25, with the most common score among respondents being 21 and the majority falling within the range of 19 to 23. This indicates that visitors tend to have a positive perception of the condition, comfort, cleanliness, and management of the Pagutan Green Open Space. These perception scores were then used as independent variables in a regression analysis to test their influence on willingness to pay.

d. Willingness to Pay Analysis

The Willingness to Pay analysis shows that respondents' willingness to pay ranged from Rp0 to Rp10,000, with the majority falling within the Rp2,000–Rp5,000 range and an average of Rp3,917/person per visit. The right-skewed distribution indicates that the majority of respondents chose low values, suggesting that the public is willing to contribute, but still within the limits of their limited economic capacity.

e. Total Economic Value

Based on observations, the average number of visitors to the Pagutan Green Open Space on weekdays is 219 people/day, while on weekends it reaches 828 people/day. Visits on weekdays tend to increase in the afternoon after work and school, while on weekends visitor numbers are relatively even between the morning and afternoon. These differences in visitation patterns were used as the basis for estimating

the number of visitors for the calculation of the economic value of the Pagutan Green Open Space.

The total economic value of the Pagutan Green Open Space was calculated by multiplying the average willingness to pay of Rp3,917/person by the estimated annual number of visitors of 121,536 people. The calculation results indicate a total economic value of Rp476,056,512/year. This figure demonstrates that the Pagutan Green Open Space provides tangible economic benefits to the community and can serve as a basis for consideration in the sustainable management and improvement of the area’s quality.

f. Instrument Test Results and Classical Assumptions

- All questionnaire items were found to be valid and reliable (Cronbach’s Alpha >0.60)
- No multicollinearity was found (Mean VIF = 1.14)
- No heteroscedasticity was found (Prob = 0.2846 > 0.05)

This indicates that the model is suitable for regression analysis.

g. Multiple Linear Regression Analysis

Regression equation:

$$WTP = 2725,398 - 34,638X_1 + 1145,697X_2 - 259,372X_3 - 24,462X_4 + 52,451X_5 + 5,053X_6 + \epsilon$$

Tabel 2. Result of Multiple Linear Regression

Variable	Koefisien	Sig. (p-value)	Description
Age (X1)	-34,6378	0,066	Significant (10%)
Income (X2)	1145,697	0	Significant (1%)
Education (X3)	-259,3717	0,198	Not significant
Visit frequency (X4)	-24,46224	0,471	Not significant
Distance from residence (X5)	52,4507	0,063	Significant (10%)
Perceptions of Pagutan Green Open Spaces (X6)	5,053237	0,933	Not significant

Source: Data processed in 2026, STATA17

h. Simultaneous Test (F-Test)

The model is statistically significant (Prob = 0.000), indicating that all variables collectively influence Willingness to Pay.

i. Partial Test (t-test)

Based on the results of the partial test (t-test), the income variable was found to have a positive and significant effect at the 5% significance level on willingness to pay. This is consistent with the findings of the study Yao *et al.* (2024) where economic income is the factor with the most positive and significant influence on willingness to pay. Thus, these results support the hypothesis that income has a positive and significant influence on willingness to pay.

These findings also suggest that income plays a role in determining the level of willingness to pay, and can thus serve as a basis for formulating more equitable and proportional fee policies that take into account the public's economic capacity.

Meanwhile, both age and distance from home were significant at the 10% level. However, age had a negative effect on willingness to pay, suggesting that as age increases, willingness to pay tends to decrease. Conversely, distance from home had a positive effect, indicating that the farther visitors live, the higher their willingness to pay becomes.

The results of this study are consistent with Annisa and Harini (2017) which found that age has a significant negative effect on willingness to pay, meaning that the older an individual is, the lower their willingness to pay. In addition, Letidena (2023) findings indicates that residential distance has a positive and significant effect on willingness to pay, suggesting that the farther respondents live from green open spaces, the higher their willingness to pay tends to be.

Although age and distance from residence had a relatively weak influence in this study—as evidenced by a significance level of 10%—these findings contribute to the literature by showing that social factors and accessibility remain relevant in determining willingness to pay and should be considered in the development of more flexible policies regarding fees for green open spaces.

Meanwhile, other variables such as education, visit frequency, and perceptions of the Pagutan Green Open Space did not have a significant effect on willingness to pay. Thus, these three variables do not support the hypotheses proposed in this study. Interview results with informants indicate variations in behavior that align with the quantitative findings. Older age groups tend to use the Pagutan Green Open Space for

light activities and consider the facilities to be less comfortable, whereas younger people are more active in utilizing various recreational facilities and thus exhibit a higher willingness to pay.

In terms of income, respondents with higher incomes tend to be willing to pay higher fees, provided that the facilities provided are commensurate with the benefits received. Meanwhile, the higher a respondent's level of education, the greater the tendency to question the transparency and accountability of management, which in some cases leads to a decrease in willingness to pay.

Furthermore, respondents who visit frequently tend to view Green Open Spaces as public facilities that can be accessed without the obligation to make additional financial contributions. Meanwhile, respondents who live closer to the Pagutan Green Open Space location demonstrate a lower willingness to pay, as the higher frequency of visits leads them to perceive the payment of fees as a burden when made repeatedly.

Overall, the results of these interviews reinforce the quantitative findings that socioeconomic characteristics, accessibility, and patterns of land use play a role in shaping the public's willingness to pay for Pagutan Green Open Space.

j. Coefficient of Determination

The adjusted R^2 value of 0.3653 indicates that approximately 36.53% of the variation in Willingness to Pay can be explained by the model, while the remainder is influenced by other factors.

k. Community Participation Analysis

Tabel 2. Community Participation Analysis

Participation Indicators	Dominant Category	Percentage
Willingness to maintain cleanliness and facilities	High	94.48%
Compliance with the rules in the Pagutan Green Open Space	High	86.21%
Support for visitor fees (retribution)	High	64.83%
Participation in maintenance activities	Moderate	60.00%
Perception of government role in managing the Pagutan Green Open Space	High	71.03%

Source: Primary data from a questionnaire, processed, 2026

l. Pay Fee Structure Based on Willingness to Pay

The analysis results show:

- 95% of respondents can afford to pay \geq Rp2,000
- 62% of respondents can afford to pay \geq Rp3,000
- 45% of respondents can afford to pay \geq Rp5,000

Therefore, the most realistic rate is: Rp3,000 per visitor.

Tabel 3. Proposed Fee Structure for Pagutan Green Open Spaces

Facility Zone	Respondent Support	Proposed Rates	Management Objectives
Special Sports Zone	43,80%	Rp3.000/visitor	Maintenance of sports facilities and cleanliness of the area
Environmental Education Zone/Greenhouse	42,40%	Rp3.000/visitor	Plant care and development of educational facilities
Children's Playground Zone	34,70%	Rp3.000/visitor	Maintenance of playground equipment and safety improvements

This approach keeps public access open while providing additional funding sources.

m. Sustainable Management Strategy

The sustainable management strategy for the Pagutan Green Open Space was formulated by integrating three key aspects. On the economic front, the strategy focuses on implementing zone-based user fees and utilizing these fees as a supplementary funding source to support sustainable management. On the social front, efforts are directed toward increasing community participation and strengthening environmental education to foster greater awareness and more active engagement. Meanwhile, in terms of environmental and institutional aspects, the strategy focuses on improving the ecological quality of the area, strengthening management capacity, and optimizing policy implementation so that the management of green open spaces can proceed effectively and sustainably.

Overall, the research findings indicate that the public has a relatively limited willingness to pay, with income being the primary determinant influencing this willingness. On the other hand, the level of public social participation is relatively high, particularly in non-financial aspects, although direct involvement in maintenance activities still needs to be improved. Given these circumstances, the implementation of

a zone-based fee scheme is considered the most realistic and adaptable policy option. Therefore, the management of the Pagutan Green Open Space must strike a balance between economic, social, and environmental considerations to ensure effective and sustainable management.

CONCLUSION AND RECOMMENDATIONS

This study found that visitors' average willingness to pay for the management of the Pagutan Green Open Space was Rp3,917 per person per visit. Based on the average Willingness to Pay and an estimated annual visitor count of 121,536 people, the total economic value was calculated at Rp476,056,512 per year. These results indicate that the Pagutan Green Open Space has tangible economic value and the potential for public financial support for its sustainable management. Visitor income is the primary factor significantly influencing willingness to pay, followed by distance from home as the next determining factor. This confirms that economic capacity is the primary determinant of people's willingness to pay.

The level of community participation in the management of the Pagutan Green Open Space is generally high, particularly in terms of maintaining cleanliness, adhering to rules, and supporting the government's role. However, participation in the form of direct involvement in maintenance activities remains moderate and therefore needs to be improved.

Based on an analysis of willingness to pay and public preferences, the recommended fee structure is Rp3,000 per visitor, to be applied on a limited basis in specific zones, such as sports zones, environmental education zones, and children's playgrounds. The management strategy is formulated in an integrated manner based on the three pillars of sustainable development: the economic aspect through the implementation of user fees as a supplementary funding source; the social aspect through increased community participation and education; and the environmental and institutional aspects through strengthened area conservation and management capacity. Overall, the sustainable management of the Pagutan Green Open Space requires collaboration among the community, managers, and the government to support funding, policy implementation, and the promotion of public participation in the management of public spaces.

Based on the research findings, the zone-based fee scheme and the management strategies formulated can serve as a reference for local governments in optimizing the management of the

Pagutan Green Open Space, particularly in terms of financing, improving facility quality, and strengthening community participation. Policy implementation should be carried out in phases while continuing to uphold the principles of public accessibility and social justice.

In addition, efforts are needed to actively engage the community through community-based programs and to strengthen ongoing environmental education so that the awareness that has been fostered can be consistently reflected in everyday behavior.

For future research, it is recommended to expand the geographical scope and sample size, as well as to include other variables such as non-financial preferences, perceptions of service quality, and psychological factors. Further studies could also evaluate the implementation of user fee policies and compare different green open spaces to generate more comprehensive recommendations.

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