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Sustainable Management of an Urban Green Space in a Papua New Guinean City: Accessibility, Use and Preferences

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Abstract: Urban green spaces provide recreation opportunities that contribute to physical wellbeing, health, and social wellbeing. However, managing green spaces to promote access and use for recreation and at the same time meet the preferences of visitors is often challenging, especially in developing countries. Using Port Moresby Nature Park (PMNP) in Papua New Guinea as a case study, the objective of this study was to examine visitors' perceptions of how to manage the park to improve its use for recreation, perceptions of acceptable user fees and preferences for nature types and recreation amenity alternatives. Data were obtained using interviews with 295 visitors to PMNP, of which 291 responses was valid for this study. The data were analysed using descriptive statistics and a multinomial logit regression marginal effect model. The results showed that PMNP can be improved by constructing more toilets, providing more benches at strategic positions, providing water fountains, expanding the children's playgrounds and training more PMNP staff in customer care. A picnic area was the most preferred and an area containing the Papuan hornbill was the least preferred. On average, the visitors would pay 35% more than the park user fee. A recreation amenity associated with reptiles and birds of paradise was the most preferred and an amenity with only reptiles was the least preferred. Multinomial logit regression model results revealed that preferences for recreation amenity alternatives were influenced by demographic characteristics, the nature type visited, recreation activities, the level of the park user fee, and the time spent at and distance of the interviewees' dwelling to PMNP. The most important explanatory variables associated with the choice of each of the recreation amenities as reflected by marginal effects include the use of a children's playground for recreation, grilling and partying during recreation, engagement in walking in natural areas during recreation, the use of animal-dominated areas during recreation and the use of picnic areas during recreation. These findings will assist park managers in making informed decisions by considering visitors' preferences, the affordability of the park user fee and how to improve an urban green space in a sustainable manner.

Keywords: nature types; preferences; recreation; tradition and customs; urban park; user fee; Papua New Guinea

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1. Introduction

The availability of natural areas such as urban green spaces provides opportunities for outdoor recreation for urban residents [1]. The benefits that nature-based recreation provides to visitors include improved mental and physical health and a place of peace and stress reduction [2–4]. The use of an urban green space for recreation has continued to increase as a result of a shift in the trend towards healthier lifestyles [5]. However, several attributes, such as the proximity of a green space from dwellings, safety, the maintenance of green space facilities, amenities, safety, aesthetics and user fees, play an important role in visitors' decision to use an urban green space for recreation [6,7]. In the recent past, green space managers have often been curious to understand the potential reason that visitors choose a green space such as a nature park over other spaces for recreation [8]. As visitors from all walks of life to the park increased, the attention of the managers shifted to

understanding visitors' recreation preferences and motivations. The knowledge of visitors' perceptions, preferences and motivations can assist green space managers and planners in developing and managing an urban green space to meet visitors' needs.

User fees have been used to restrict the access of visitors to some urban green spaces [9]. The fee is often used to offset the cost of managing and conducting maintenance of amenities in a green space. For a user fee to be efficient, it must be set equal to the marginal costs of supplying the green space for recreation where the costs are known [9]. In cases where the costs are unknown, the fee is often set below the current recreation demand, to the marginal recreation benefit of each visitor and/or above the current recreation demand curve. However, determining an efficient urban green space user fee is often challenging for green space managers, especially in developing countries where willingness to pay for recreation may be low as a result of low household incomes. The knowledge of payment for ecosystem services such as a user fee for an urban green space is important to understand the value that people attach to recreation; however, only a few publications in the literature have focused on user fees for green spaces for recreation in developing countries. For instance, Mulwa et al. (2018) focused on optimal pricing of Maasai Mara National Park in Kenya [10]. Others include a Zambian study by Thapa and Parent (2020) on willingness to pay an increased entrance fee for park improvement projects [7]. A Ghanian study by Lamyoh and Awanyo-Vitor (2016) investigated user value for Kumasi zoological garden [11]. The study reported in this paper contributes to the literature by providing an analysis of user fees for an urban nature park for recreation in Port Moresby, Papua New Guinea (PNG).

Similar to some developing countries, the user fee for an urban nature park for recreation in PNG is often determined arbitrarily by park managers without considering whether visitors would be able to afford the fee [9–11]. The visitors are primarily price takers because they are not involved in determining the fee for accessing the nature park. Thus, the user fee is either undervalued or overvalued. If the intention is to provide a fair and efficient user fee for a park for recreation, visitors should be involved in determining the user fee they pay. This will provide the visitors with the opportunity to know what they are paying for and to use the information to make an informed decision regarding the frequency of their visits to the nature park for recreation. This study contributes to this by involving visitors in determining the entrance fee for recreation in Port Moresby Nature Park (PMNP). According to Zyl et al. (2019), national park entrance fees in some developing countries includes USD 8.43 for Benin; USD 3.59 for Ghana; USD 27.40 for Tanzania; USD 4.23 for Kenya; and USD 5.25 for Fiji. However, there are no data on national park entrance fees for PNG [12].

In my experience, another aspect of recreation which nature park managers in developing countries do not often consider when planning an improvement project is the preferences of visitors for different nature types and amenities. Recreation-related improvement projects are often implemented in a park without considering the preferences of visitors. As the preferences of visitors for nature types are important for their decision on whether to visit or revisit the nature park, potential visitors may not visit or revisit the park if their preferences for recreation are not reflected in the nature types and amenities that are available in the park. This suggests that it is important for nature park managers to have knowledge of the different nature types and amenities preferred by the different categories of visitors. Visitors' preferences should be incorporated in the planning and development of a nature park improvement project. This will assist the park managers in meeting the needs of visitors while, at the same time, the park will benefit from the inflow of streams of revenue needed for the maintenance of the nature park. The study reported in this paper contributes to the discourse by examining visitors' preferences for different nature types and amenities at an urban nature park in a city of a developing country.

PNG has the third largest tropical rainforest area in the world and has five percent of the world's biodiversity, which makes the country a potential hotspot for nature-based recreation [13]. However, like some developing countries, the protection of biodiversity

is challenging to the Government of PNG (GoPNG), primarily because the livelihoods of most Papua New Guineans are strongly linked to agriculture, which competes with biodiversity conservation for resources [14]. As people continue to migrate from rural areas to major cities in the country in search of job opportunities, cities such as Port Moresby's forests and other green spaces have been converted to residential and industrial areas. In order to provide opportunities for outdoor recreation for city residents and to conserve biodiversity, urban nature parks such as PMNP were established. However, the value that urban residents attach to a nature park and their preferences for the different nature types are not well known in PNG. To the best of our knowledge, there are only a few published papers that have focused on economic value in the country. For instance, a paper by Pondorfer and Rehdanz (2018) focused on the use of labour time as an alternative payment method to elicit preferences for public goods [15]. The other paper was by Ezebilo (2016) and focused on willingness to pay for maintenance of nature conservation areas [16]. There are no papers in the literature that have focused on visitors' preferences for recreation and payment of user fees for recreation in PNG. The findings from this study will fill the knowledge gap and contribute to the wider literature on the recreational value of urban nature parks and how to manage parks more effectively by considering visitors' preferences and demand. In terms of the difference between the study reported in this paper and that of previously published papers in the literature, this study focuses on several nature types and recreation activities in a country where the economic valuation of recreation is not well known. Most publications in the literature have focused on a single nature type and recreation activity [17,18].

Using PMNP as a case study, the objectives of this study are the following:

- To find how an urban nature park can be improved to meet visitors' needs, examine their preferences for different nature types and green space amenities and assess visitors' ability to pay park user fees.
- To examine the influence of distance from dwellings to and length of time spent at PMNP, user fees, socio-economic factors and visitors' recreation activities on the visitors' preferences for green space amenities and to identify initiatives that can be used to make PMNP more attractive to visitors.

This study involves Port Moresby residents who visited PMNP for recreation. The findings from this study will provide greater understanding of how to manage an urban nature park to meet visitors' needs and how the visitors respond to the shocks associated with an increase in the nature park user fee. The findings will contribute to filling the knowledge gap on the subject in PNG and it will be useful for developing countries that have similar experiences to PNG. It will assist nature park managers in improving the effectiveness and efficiency in managing parks in a sustainable manner.

2. A Brief Literature Review on User Fees and Preferences

As this study is based primarily on the use of interviews to generate primary data, a brief review of the literature on the subject of this study was conducted. The review was conducted using a traditional or narrative literature review approach. This involves critiques and summarising a body of literature on the relevant subject, and no specific criteria are often used to select relevant publications. The primary purpose for using a narrative literature review approach is to provide a comprehensive background of the current knowledge and the need for new research on the subject. For the review of the literature for this study, Google Scholar was used to search for the published papers on the subject. Papers that have high citations and are relevant to the subject of this study were downloaded; the abstract, methods section and results section were read several times. This continued until all relevant papers were exhausted and the findings from the papers were summarised.

2.1. User Fee for Recreation in Nature Parks

Several papers in the literature have focused on user fees for recreation in nature parks, including a paper by Keske and Mayer (2014), who found that visitors to Colorado "Fourteener" peaks are willing to pay an additional user fee for recreation [19]. Mendes (2003) concluded in a Portuguese study of pricing recreation use that user fees are efficient if a park has positive recreation costs and if the fee's administration costs are low [9]. Wang and Jia (2012) found that most visitors to Dalai Lake Protected area would accept a higher user fee and that income level, awareness of being in a protected area, educational level and institutional trust influence their willingness to accept the fee [20]. Mulwa et al. (2018) found in a Kenyan study of the recreational value and the pricing of Maasai Mara National Park that the visitors' consumer surplus is higher than the optimal conservation fee [10]. In a Zambian study of willingness to pay an increased user fee for improvement projects at Kafue National Park, Thapa and Parent (2020) found that most visitors would pay for improvement towards natural resources and amenities, followed by facilities and services provided by the park's managers [7]. They also found that the visitors would pay a higher amount than the user fee. In a United States study of the impact of user fees on visitation to national parks, Schwartz and Lin (2006) found that a change in the revenue policy may have an adverse impact on visitation to the park [21]. Lamyoh and Awanyo-Vitor (2016) found in a Ghanian study that the actual prices paid by visitors to Kumasi Zoo understates the true value they attach to a visit [11]. Thus, there is a need for an increase in the user fee to the Zoo.

2.2. Preferences for Recreation in Nature Parks

In terms of the literature on preferences for recreation in nature parks, papers that have been published on the subject include that of Aasetre et al. (2016), who found similarities between recreational preferences for physical, social and managerial settings in Norway and the Netherlands [22]. In a German study of preferences for urban parks' contextual dependency, Bertram et al. (2017) found that visitors prefer an urban park closer to their homes and that the size of the park does not matter for recreation during weekdays [1]. For instance, a larger park with picnic facilities is preferred during weekends and the distance of the park from the dwellings of the visitors does not matter. But cleanliness and maintenance of the park are preferred both during the weekend and weekdays. In a Chinese study of recreational visits to urban parks, Zhang and Zhou (2018) found that large urban parks had more numbers of visits than smaller parks and that park size and user fee influence visits [23]. Bertram and Larondelle (2017) found in a German study of recreational benefits of urban forest sites that the demand for recreational visits is elastic and that recreation benefits can be monetised to increase public funding [17]. In a Swiss study of factors influencing teenagers' forest visit frequency, Oppliger et al. (2019) found that frequent forest visits during childhood are associated with more frequent visits as a teenager [18]. In an American study of recreation motivation and site preferences, Whiting et al. (2017) found a strong link between motivations and site preferences [8]. In a Nigerian study of perceived personal safety at urban recreation centres, Odufuwa et al. (2019) found that people who are familiar with the recreation site feel safer than those who visit the site less frequently [24].

Other papers on the preferences for recreation include that of Tu et al. (2016), who concluded that willingness to pay for access to a recreation site decreases with an increase in transport cost [25]. The presence of alternative urban green spaces in the vicinity of the site is important in determining the value of the recreation site. In a study of visitors' preferences for global geopark management and conservation, Cheung et al. (2014) found that the visitors are willing to pay, which is influenced by visitors' demographic characteristics and preferences [26]. In a Ghanian study of user value for Kumasi Zoological Garden, Lamyoh and Awanyo-Vitor (2016) found that socio-economic factors influence visits to the garden [11]. In a Dutch study of typology that accounts for variations in landscape preferences, visitation behaviour and socio-demographic information, Komossa et al. (2019)

found that some visitors prefer convenient, short-term recreation that is close to home [27]. They concluded that understanding the heterogeneity of recreation preferences can assist managers in articulating effective management strategies.

2.3. Factors Influencing Visitors' Preferences for Nature Parks for Recreation

Several factors that influence visitors' preferences for a nature park for recreation have been identified in the literature. The factors include the park's characteristics such as size of the park, cleanliness and the presence of facilities, e.g., playgrounds, sport facilities, toilets, washroom, facilities for a variety of recreation activities and facilities that promote the safety of visitors [6,28–30]. The accessibility of the park, available nature types and distance between visitors' dwellings and the park were also important [1,31,32]. Others include the user fee, proximity of alternative recreation sites, travel time to the park and length of time spent in the park [23,25,33,34]. Socio-economic and demographic characteristics of the visitor include income, age, gender, family size, education level, membership of environmental organisation and the frequency of visits to recreation sites during childhood [18,32,35–38]. These factors can assist urban park managers and planners in making informed decisions associated with managing the park in an effective and sustainable manner.

3. Conceptual Framework

According to the economic theory of individual preferences and demand, consumers often have the correct information of the utility of goods and services they consume [39]. Thus, if an individual prefers one consumption bundle over another bundle, the individual will maximise their utility by consuming the former bundle [40]. However, the individual choice of the consumption bundles is subject to the level of their income [39]. PMNP provides opportunities for nature-based recreation experience; however, individuals who want to access the park for recreation must pay a user fee, which was PGK 7 or USD 2.1 during the period of this study. In the past, PMNP had a few reptiles, especially in captivity, which attract visitors. In order to improve visitors' recreation experience, PMNP managers have considered reintroducing reptiles in captivity in the park. They have also considered improving the bird of paradise walk-through. However, the improvements sought for will increase the cost of operating PMNP. A potential way to offset the operating costs associated with the proposed improvement would be to increase the park's user fee. However, the fee should be at a level that most of the visitors can afford and that does not reduce the current level of number of visits. Thus, for the proposed improvement to be effective, it is important for visitors to be involved in negotiations concerning the type of improvement and the corresponding user fee they are being offered. In this study, the interviewees were required to indicate their most desirable preferred recreation amenity from a set of alternatives that the park managers have been considering providing (which would be in addition to the current amenities at PMNP). All things being equal, an interviewee would choose an alternative that maximises their utility. If the interviewee chooses alternative c, we assume that the utility from that alternative is greater to them than the utility from the other alternatives d as follows:

$$U_c > U_d = \forall d \neq c \quad (1)$$

where U_c is the utility to the interviewee of alternative c, and U_d is the utility to the interviewee of another set of alternatives d. The interviewee's choice can be modelled as maximising the expected utility from alternative c as follows:

$$Max_c E(U_c) = f_c(p, y, b, a) + \varepsilon_c \quad (2)$$

where $E(U_c)$ is the expected utility of alternative c to the interviewee, f_c is a function of the price of composite goods p (i.e., other goods bought by the interviewee), y is income, b is the characteristics of recreation amenities and, a is the personal attributes of the interviewee and ε_c is a disturbance term, which is assumed to be independently and identically distributed.

As $E(U_c)$ is not observable, let L_c be the random variable representing the alternative chosen by the interviewee. It is assumed that the interviewee faces a set of discrete, mutually exclusive choices of exhibit alternatives and that the final choice depends on the interviewee's personal attributes, such as their income, recreation activities the interviewee engaged in and the entrance fee associated with the chosen alternative. The conceptual framework is used to explore the heterogeneity of visitors' recreation preferences as influenced by the visitors' personal attributes, characteristics of the park and the user fee.

4. Material and Methods

4.1. The Study Area

PMNP is located in Port Moresby, which is the capital of PNG (Figure 1). It covers an area of 30 acres [41]. The park is home to several endemic plant species such as palms, gingers, heliconias and orchids [42]. Animal species found there include tree kangaroos, cassowaries, birds of paradise, parrots, pigeons, crocodiles, wallabies, hornbills and fruit bats. It is the only area in PNG where botanical and zoological parks are combined with the aim of promoting plant and animal species found in the country [42]. PMNP is also intended to promote community nature-based education. Officials of the park often conduct environmental education programmes such as school excursions that help students learn more about the natural environment.

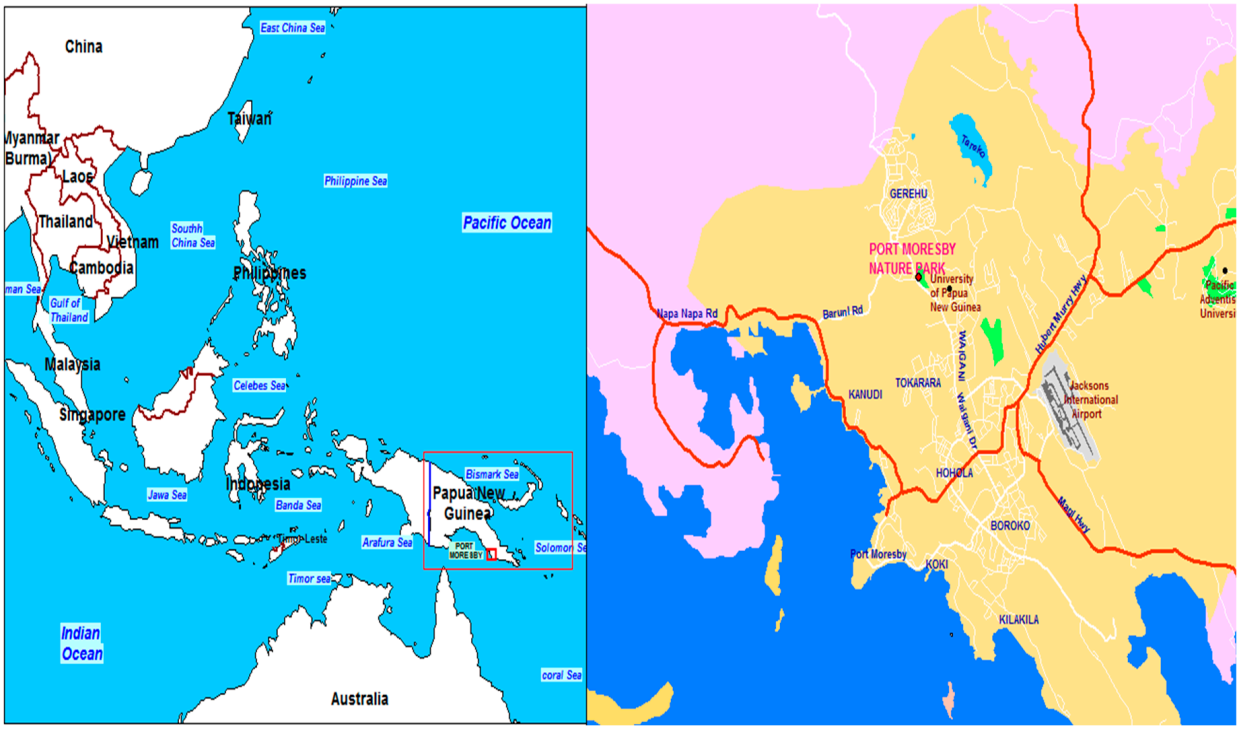

Figure 1. Map of Papua New Guinea showing the location of Port Moresby Nature Park. Map prepared by Lewis Iwong.

PMNP has several facilities for recreation (Figures 2–5), such as walkways through a rainforest jungle, as well as a walk-through exhibit for tree kangaroos, a wallaby exhibit and aviaries that house parrots. Other facilities include a café, souvenir shop, and a picnic area that includes facilities for grilling and parties. During the period of this study, Michelle McGeorge, who was the former manager of PMNP, reported that the park attracts an average of 120,000 visitors annually. At the time of this study, PMNP had 71 employees.

Figure 2. Port Moresby Nature Park's bird aviary. Picture by Eugene E. Ezebilo (the author).

Figure 3. Children's playground in Port Moresby Nature Park. Picture by Eugene E. Ezebilo (the author).

Figure 4. Port Moresby Nature Park's grilling area. Picture by Eugene E. Ezebilo (the author).

Figure 5. Port Moresby Nature Park's picnic area. Picture by Eugene E. Ezebilo (the author).

4.2. Survey Design and Data Collection

The data for this study were collected using face-to-face structured interviews with visitors to PMNP in which the questions were developed through review of the relevant literature on the subject [6,7,11,23–25,28,30,34], the author's experience on the subject, discussions with academics and practitioners and pre-test interviews. The development of questions used for the interviews started first with a brief review of the relevant literature on the subject by the author using Google Scholar. Highly cited published papers on the subject (willingness to pay for recreation and preferences for recreation experience) in both developing and developed countries were identified and reviewed. The data collection method, the questions used and findings from each of the published papers captured were documented. Potential questions and variables were identified from the papers captured. Some questions were also identified by the author based on his experience with the subject. Second, questions based on the review of the literature on the subject and those based on the

experience of the author were drafted. Third, three academics whose works were related to recreation and land use planning and practitioners (manager and supervisor of PMNP) were consulted for discussion about the study and the activities of PMNP, respectively. Questions were drafted based on the questions generated from the review of the literature, the author's experience and information from the academics and PMNP manager. Fourth, the draft of the questions was sent to the academics and the PMNP manager for their comments. The draft was modified and subsequent drafts were sent to the academics on two further occasions before a final draft was produced. Fifth, to validate the question draft, pre-test interviews were conducted in August 2017 with eight PMNP visitors. This was followed by feedback from research assistants (i.e., interviewers) on concerns raised by the pre-test interviewees. The concerns resulted in further modification of the draft and a final version of the questions was produced. The questionnaire used for the interviews consists of 43 questions (see Appendix A). This paper reports on data from 14 of the 43 questions.

The main interviews were conducted in September 2017 with the help of 12 research assistants, which included undergraduates from the University of Papua New Guinea and Project Research Officers from the PNG National Research Institute. They were trained in interview techniques for two days. Potential interviewees were chosen using purposive or judgemental sampling techniques. This involves purposively choosing visitors in PMNP who the interviewer, in this case a research assistant, believed were relevant to the subject of the study. Only visitors that the interviewer believed were adults (i.e., at least 18 years old) were approached for interviews. As we wanted to obtain the views of both men and women, the interviewer approached both women and men for interviews.

The main interviews were administered at PMNP for four days. The research assistants were designated to different areas of PMNP, where they approached adult visitors and asked them whether they would like to be interviewed. Visitors who said 'yes' were asked whether they have been interviewed recently on the subject (visitors' preferences for recreation experience at PMNP and entrance fees). The visitors who said they had not been interviewed were told about the purpose of the interview (i.e., increasing the understanding of the potential strategy for improving visitors' recreation experience at PMNP). They were also assured of the confidentiality of their responses and were asked whether they would participate in the interview. Only the visitors who agreed to participate were interviewed.

The visitors who agreed to participate in the interview were asked a series of socio-economic and demographic questions, such as income, education and age, and their gender was registered. They were asked about the area that they mostly visited at PMNP and the number of times they had visited PMNP in the last 12 months (i.e., September 2016 to September 2017), the average length of time they often spend during their visit(s), the recreation activity they mostly engaged in, and the distance from their home to PMNP. They were asked questions about potential strategies for improving their recreation experience at PMNP. The interviewees were asked about how much they would pay as a user fee in Papua New Guinea Kina (PGK) for an improvement in recreation amenities in the park (PGK 7, PGK 8, PGK 9, or PGK 10). The interviewees were asked about the recreation amenity alternatives they preferred most, as detailed in the choice question below:

The Choice Question

The recreation amenity alternatives were developed to determine how to improve visitors' recreation experience. The alternatives were described to the interviewees and the costs and benefits associated with each alternative were highlighted. The interviewees were asked to choose the alternative that they preferred most.

First, the interviewees were asked whether they would support a park improvement project that provides new recreation amenities at PMNP. Interviewees who said 'yes' were asked whether they would still support the project if it would cost them money. Second, the interviewees who reported they would support the improvement project if it cost them money were asked to choose their most preferred recreation amenity alternative from the following four alternatives:

- STATUS QUO. A new recreation amenity will not be introduced to PMNP. The user fee, PGK 7 for a full-fee-paying adult, will remain the same.
- REPTILE. In addition to the current amenities at PMNP, about 20 species of venomous and nonvenomous snakes in captivity will be provided. However, the user fee for a full-fee-paying adult will increase by PGK 1 (i.e., the user fee will be PGK 8).
- PARADISE. In addition to the current amenities at PMNP, a bird of paradise walk-through with seven big aviaries will be constructed. The user fee to PMNP for a full-fee-paying adult will increase by PGK 2 (i.e., the user fee will be PGK 9).
- REPTILE + PARADISE. In addition to the current amenities at PMNP, about 20 species of venomous and nonvenomous snakes in captivity and a bird of paradise walk-through with seven big aviaries will be provided. The entrance fee to PMNP for a full-fee-paying adult will increase by PGK 3 (i.e., the user fee will be PGK 10).

4.3. The Econometric Model

In this study, we want to know whether visitors would pay an increased user fee to access PMNP for an improved recreation experience. Four recreation amenity alternatives were presented to the interviewees and they were asked to choose the one they preferred most. For this reason, the variable to be predicted (recreation amenity alternatives) is discrete and the discrete model can be used for data analysis. The ordered and multinomial regression models can be used for analysing data that have more than two dependent variables. The ordered regression model, which has a restrictive assumption known as the Parallel Regression Assumption, was first explored. The Parallel Regression Assumption posits that the relationship between each pair of dependent variables (recreation amenity alternatives) is the same [43]. The Brant test [44] was used to explore whether the data met the Parallel Regression Assumption. The test revealed that the Chi-squared statistic was 68.53, which corresponds to a p-value of 0.00001, and was statistically significant at 0.001 levels. This indicates that the assumption required for using the ordered model was violated.

The multinomial regression model, which could be used for analysing unordered data, was applied. However, the multinomial has a restrictive assumption known as the Independence of Irrelevant Alternatives (IIA). The IIA implies that the ratio of the probability of choosing an amenity alternative c over other alternatives d is independent of the offered choice [45]. The Hausman–McFadden test [46,47] was used to explore whether the data from this study met the IIA. The Hausman–McFadden test was not statistically significant, which indicates that the IIA assumption was not violated and that the use of multinomial regression for data analysis was justified.

Multinomial probit and multinomial logit regression models could be used for data analysis. However, the probit model has restrictive assumptions [47]. These include normal distribution and that the variance around the regression line is the same for all values of the predictor variance (homoscedasticity). To explore whether the probit model is suitable for modelling the data, the Lagrange multiplier statistic was calculated as 62.69. This is asymptotically distributed as Chi-squared with 14 degrees of freedom. Given that the Chi-squared value of 14 degrees of freedom at a 1% statistical significance level is 29.14, the hypothesis that the model is homoscedastic was rejected. The test for normality was computed as 231.77 with 2 degrees of freedom. Given that the Chi-squared statistic at 2 degrees of freedom is 9.21, the hypothesis that the error term is normally distributed was also rejected at a 1% significant level. These test results indicate that the assumptions required for using multinomial probit could not be satisfied. The multinomial logit model was used in the continued analysis. The data used for the analysis originated from the survey conducted with selected visitors to PMNP by the author in collaboration with research assistants. In terms of the selection of variables, it was preceded by collinearity and multicollinearity tests. For the final variables used in the model, the correlations between independent variables did not exceed 0.4 and the variance inflation factor did

not exceed 2, which indicates that collinearity and multicollinearity were not a serious problem [48] in the estimated model.

Assuming that the error term is independently and identically distributed according to the logistic function, the probability that the interviewee will choose alternative L_c can be modelled [47] as

$$pr(L_c = c) = \frac{\exp(\beta_c)}{\sum_{d=0}^{C} \exp(\beta_c)} \quad (3)$$

where $pr(.)$ is the probability that the interviewee prefers alternative c and β_c represents the parameters to be estimated. Normalisation of the alternatives by one of the categories $(\beta_d = 0)$ yields the multinomial logit model as

$$pr(L_c = c) = \frac{\exp(\beta_c)}{1 + \sum_{d=1}^{C} \exp(\beta_c)} \quad (4)$$

The valuation function for the probability of choosing recreation amenity alternative c, i.e., the interviewee's preference for an amenity alternative (Pr_c), could be written as follows:

$$\begin{aligned} Pr_c = {} & ß_0 + ß_1 INCO + ß_2 DIST + ß_3 TIME + ß_4 FEE + ß_5 EDUC + ß_6 AGE + ß_7 GEND \\ & + ß_8 PICNIC + ß_9 BIRD + ß_{10} GROU + ß_{11} GRILL + ß_{12} WALK + ß_{13} ANIM + \varepsilon \end{aligned} \quad (5)$$

Equation (5) is used to identify the heterogeneity of the interviewees' choice of recreation amenities for improved recreation experiences as determined by the interviewees' attributes, characteristics of the park and the user fee. Here, $ß$ is a vector of parameters to be estimated, *INCO* is household disposable income, *DIST* is the distance from home to PMNP, *TIME* is the length of time spent at PMNP, *FEE* is the expected annual entrance fee, *EDUC* is educational level, *AGE* is the age of the interviewee, *GEND* is the gender of the interviewee, *PICNIC* is picnic area, *BIRD* is bird aviary, *GROU* is children's playground, *GRILL* is grilling and partying, *WALK* is wandering in nature, *ANIM* is animal exhibits and ε is the error term. The multinomial logit regression marginal effect model was estimated using the LIMDEP NLOGIT version 4.01 econometric software [49] and factors influencing the interviewee's preferences for recreation amenity alternatives were analysed.

5. Results

5.1. Areas Visited at PMNP and Assessment of User Fee

Of the 295 interviewees, 99% (291) answered all questions relevant to this study. Of the 291 interviewees, 285 (98%) were Papua New Guineans and 6 (2%) were Australians. The high response rate may be because the survey was based on a face-to-face interview with visitors to the park and in the park. The subject appears to be of interest to the visitors because the findings can be used for making informed decisions to improve recreation experiences. Approximately 20% of the interviewees visited the picnic area followed by the cassowary/rainforest area (19%) and bird aviary (14%) and only a few (1%) visited the Papuan hornbill area (see Figure 6).

On average, the interviewees had visited PMNP 4.47 times in the last 12 months, which corresponds to an aggregate of 1301 visits each year (i.e., 4.47 multiplied by 291 interviewees). The interviewees would pay an average of PGK 2.5 (USD 0.76) above the effective user fee (PGK 7) per visit during the period of this study. This corresponds to PGK 11.18 (USD 3.4) each year and an increase in the fee by 35.7%. The aggregate annual value that the interviewees attached to the improvement in recreation amenities at PMNP is PGK 3253 (USD 985.4) each year.

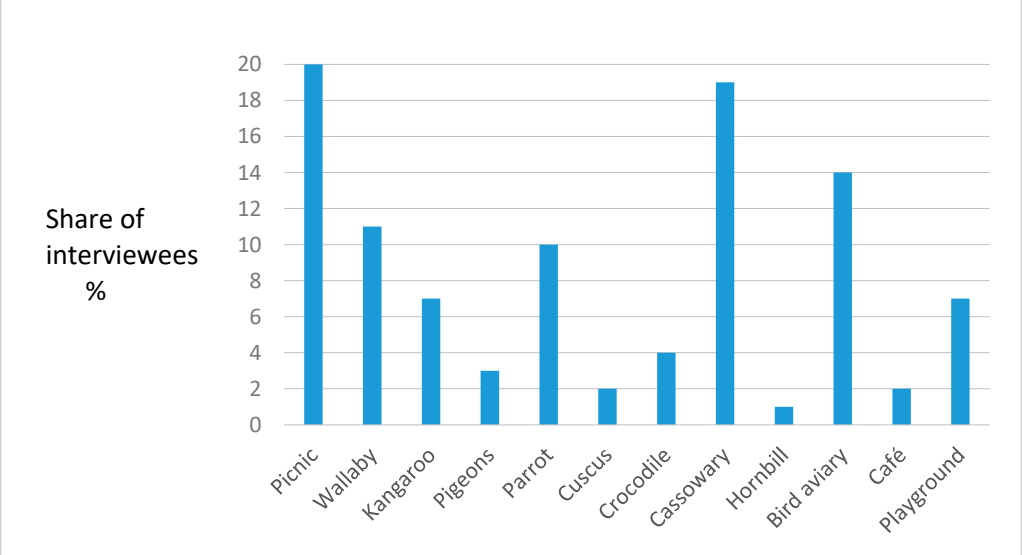

Figure 6. Areas of Port Moresby Nature Park visited by interviewees. Data source: survey by the author.

As PMNP attracts 120,000 visits each year, assuming that all the visitors are full-fee-paying adults (i.e., not students), the aggregate value for the improvement is PGK 1,341,600 (USD 400,000). This is the perceived value of the improvement in recreation experience to the visitors each year.

In terms of the value of improvements in recreation experiences in relation to nature types, the parrot aviary had the highest (PGK 23 or USD 7) and the Papuan hornbill area had the lowest (Table 1). The interviewees spent the longest time in Nature's Café and the shortest time in the crowned pigeons' area.

Table 1. Areas visited in relation to value of improvement and time spent there.

Recreation Area	Value (PGK)	Time in Hours
Picnic area	17.41	3.41
Wallaby walk	17.02	2.94
Tree kangaroo trail	8.72	3.31
Crowned pigeons	6.18	2.78
Parrot aviary	23.10	3.34
Cuscus	12.60	3.33
Crocodile	14.41	3.00
Rainforest/cassowary	12.83	3.03
Papuan hornbill	3.50	3.00
Walk-through bird aviary	12.35	2.87
Children's playground	15.98	2.79
Natures Café	12.83	3.67

Data are from the survey by the author. Value is the improvement in value per year; 1 USD = 3.3 PGK.

As PMNP managers wish to increase the user fee from PGK 7 to PGK 8, here we analyse the characteristics of visitors who would pay at least PGK 8 and those who would pay more than PGK 8. The results showed that visitors who would pay more than PGK 8 in user fees to access PMNP visited the park more and had higher incomes than those who would pay PGK 7 (Table 2). The visitors who would pay more than PGK 7 in user fees had a higher age in years, more had university education, more lived closer to PMNP, more of them engaged in wandering in nature and more spent less time in the park compared to the visitors who would pay more than PGK 7 in user fees.

Table 2. Interviewees that would pay PGK 8 in user fees and those that would pay more.

Characteristic	Mean	SD
Number of visits to PMNP per year	4.07	6.11
	(4.68)	[6.89]
Income per year in PGK	29,896	50,869
	(66,644)	[93.59]
Distance of home to PMNP in km	4.67	5.12
	(4.46)	[4.92]
Time spent at PMNP for recreation in h	3.44	1.83
	(2.96)	[1.60]
Interviewees who had university education	0.37	0.49
	(0.57)	[0.50]
Age of the interviewees in years	28.98	8.82
	(32.40)	[10.79]
Female interviewees	0.55	0.50
	(0.56)	[0.49]
Interviewees who mostly use picnic areas for recreation	0.21	0.41
	(0.21)	[0.41]
Interviewees who mostly use bird aviary for recreation	0.13	0.34
	(0.14)	[0.36]
Those who mostly use children's playground for recreation	0.05	0.22
	(0.07)	[0.26]
Interviewees who mostly engaged in grilling and partying	0.11	0.31
	(0.14)	[0.35]
Interviewees who mostly engaged in wandering in nature	0.47	0.50
	(0.53)	[0.50]
Interviewees who mostly engaged in visiting animal exhibits	0.12	0.32
	(0.14)	[0.35]

Data are from the survey by the author; 1 USD = 3.3 PGK; PMNP is Port Moresby Nature Park; the mean of visitors who would pay more than PGK 8 in user fees is in parenthesis and their SD is in square brackets.

5.2. How Recreation Experience Can Be Improved as Perceived by Interviewees

If the intention is to improve visitors' recreation experience at PMNP, the managers should consider the following:

- The park should install appropriate rails on the sides of footbridges to reduce the tendency of visitors, especially children, to fall off the bridge.
- It is common to see some adults kissing or caressing themselves in the presence of toddlers and teenagers in the park. This is not in line with PNG culture and tradition. It is important to develop an area for use by adults who wish to show love to their loved ones.
- The park should construct more toilets because the current toilets appear not to be enough for visitors. The toilets should be cleaned more frequently and toilet paper should be replaced as needed.
- There are only a few benches where visitors, especially the elderly, can rest. The children's playground contains only a few benches too, which makes it difficult for parents to relax while their children play. There is a need to increase the number of benches for visitors at strategic positions in the park.
- Water is one of the most important nature types. However, water features and facilities are lacking at PMNP. Water fountains should be provided in various areas of the park.
- To improve visitors' satisfaction, it is important to train more PMNP staff in customer care services.
- It is important to expand the children's playground because it is becoming crowded. More facilities, such as swings and water fountains, should be provided at the site.

5.3. Description of Variables Used in Multinomial Logit Regression Model

In terms of a description of the characteristics of interviewees, they had an average annual disposable income of PGK 53,763 (USD 16,291) and spent an average of three hours

at PMNP during each visit (Table 3). More women visited PMNP than men and 50 percent of the interviewees had university education. All 291 interviewees reported that they would support the introduction of new recreation amenities at PMNP to improve recreation experiences. However, 94% (273) would support the new recreation amenity if it would cost them money. Of these interviewees, 22% preferred the STATUS QUO amenity, 13% preferred the REPTILE amenity, 14% preferred the PARADISE amenity and 51% preferred the REPTILE + PARADISE amenity.

Table 3. Description of variables used in statistical analysis.

Variable	Description	Mean	SD
Pr_c	Interviewee preferences for amenity alternatives:		
	PMNP without improvement in amenities (STATUS QUO)	0.22	
	PMNP remains the same plus reptile amenity (REPTILE)	0.13	
	PMNP remains the same plus bird of paradise amenity (PARADISE)	0.14	
	PMNP remains the same plus reptile and bird of paradise amenities (REPTILE + PARADISE)	0.51	
INCO	Interviewee's household disposable income in PNG Kina (PGK) per year	53,763	82,995
DIST	Distance in kilometres from interviewee's home to PMNP	4.53	4.98
TIME	Length of time in hours that the interviewee spent at PMNP	3.13	1.69
FEE	PMNP entrance fee the interviewee would pay each year	42.19	63.91
EDUC	The interviewee had university education: Yes = 1, No = 0	0.50	0.50
AGE	The interviewee's age in years	31.19	10.26
GEND	The gender of the interviewee: Female = 1 Male = 0	0.55	0.49
PICNIC	The interviewee mostly uses the picnic area for recreation: Yes = 1 No = 0	0.21	0.41
BIRD	The interviewee mostly uses the bird aviary for recreation: Yes = 1 No = 0	0.14	0.35
GROU	The interviewee mostly uses children's playground for recreation: Yes = 1 No = 0	0.07	0.25
GRILL	The interviewee mostly engages in grilling and partying: Yes = 1 No = 0	0.13	0.33
WALK	The interviewee mostly engages in wandering in nature: Yes = 1 No = 0	0.51	0.50
ANIM	The interviewee mostly engages in visiting animal-dominated areas: Yes = 1 No = 0	0.13	0.34

Data are from the survey by the author; 1 USD = 3.3 PGK; PMNP is Port Moresby Nature Park.

Multinomial Logit Regression Results of Factors Influencing Preferences for Amenity Alternatives

To examine factors that might have influenced visitors' preferences for PMNP recreation amenity alternatives, a multinomial logit regression marginal effect model was estimated (Table 4). The result of the Hausman–McFadden test for IIA assumption was not statistically significant, which indicates that the assumption was not violated and that the use of the multinomial model for data analysis was justified. The result of the loglikelihood ratio test was statistically significant, which is an indication that the model has a good fit. The variance inflation factor of the included explanatory variables did not exceed 2. This indicates that multicollinearity [48] was not a serious concern in the estimated model. The model requires that one of the dependent variables (amenity alternatives) should be used as a base or control (redundant variable), i.e., 'no-change' alternative, which could be used for comparison with other alternatives. STATUS QUO was used as the redundant variable because it was in use during this study.

Table 4. Multinomial logit marginal effect results for factors influencing preferences for amenity alternatives.

	REPTILE			PARADISE			REPTILE + PARADISE		
Variable	**Coeff.**	**SE**	**ME**	**Coeff.**	**SE**	**ME**	**Coeff.**	**SE**	**ME**
Constant	−2.45	0.59	-	−0.12	0.63	-	−2.15	0.47	-
INCO	0.00	0.00	0.00 ****	0.00	0.00	0.00 ****	0.00	0.00	0.00 ****
DIST	0.05	0.02	0.01 **	−0.06	0.03	−0.01 *	−0.10	0.02	−0.02 ****
TIME	−0.09	0.07	−0.01	−0.34	0.09	−0.02 ****	−0.24	0.06	−0.02 ****
FEE	−0.00	0.00	−0.00 **	−0.01	0.00	−0.00 ****	0.00	0.00	0.00 ***
EDUC	0.14	0.27	0.06	−0.38	0.28	−0.00	0.47	0.20	0.10 **
AGE	0.01	0.02	0.00	−0.01	0.02	−0.01	0.06	0.01	0.01 ****
GEND	0.93	0.26	0.03 ****	1.25	0.28	0.08 ****	0.66	0.20	0.02 ***
PICNIC	0.44	0.43	0.09	0.99	0.41	0.02 **	1.81	0.33	0.25 ****
BIRD	1.09	0.44	0.01 **	0.52	0.49	0.07	1.54	0.39	0.19 ****
GROU	−2.39	0.64	−0.23 ****	−0.74	0.53	−0.02	−0.27	0.39	−0.15
GRILL	0.09	0.54	0.11	1.79	0.45	0.12 ****	1.33	0.35	0.12 ****
WALK	1.99	0.31	0.06 ****	1.61	0.32	0.02 ****	1.98	0.24	0.14 ****
ANIM	0.03	0.52	0.15	1.47	0.46	0.03 ***	1.97	0.34	0.27 ****
Loglikelihood function			−983.86						
Restricted loglikelihood function			−1287.24						
Chi-squared statistic			606.76						
McFadden pseudo R^2			0.24						
Number of observations			273						

Data are from the survey by the author. *, **, *** and **** represent 10%, 5%, 1% and 0.1% levels of statistical significance, respectively. SE is standard error and ME is marginal effect. It is the probability of the change in favour of a specific recreation amenity with respect to each explanatory variable measured at the mean of that variable [46]. Note that the current situation with no change at PMNP (STATUS QUO) is the omitted choice.

For marginal effect, a positive or a negative sign indicates an increase or a decrease in the probability of preferring a given recreation amenity under consideration. Generally, the coefficients associated with the children's playground, grilling and partying, visits to animal-dominated areas and the picnic area provided the most predictive power on whether the interviewees preferred REPTILE, PARADISE or REPTILE + PARADISE recreation amenity alternatives, respectively (Table 4). This implies that these coefficients are the most important in the estimated model.

For the REPTILE amenity, the results show that the coefficients associated with income, distance of home from PMNP, gender, bird aviary and wandering in nature had a positive and statistically significant effect on the preference for the amenity (Table 4). This suggests that the interviewees who had more income, lived further away from PMNP, were female, visited the bird aviary and engaged in wandering in nature during recreation were more likely to choose the REPTILE than the STATUS QUO amenity. In terms of marginal effects, the coefficient associated with walking in nature had the highest increase in the probability of choosing the REPTILE amenity compared to the STATUS QUO alternative (6%), followed by the coefficient associated with gender (3%) and the coefficient associated with income, which was the lowest.

The coefficients associated with payment of an entrance fee to PMNP and the use of the children's playground had a negative, statistically significant effect on the preference for the REPTILE amenity (Table 4). This means that the interviewees who would pay for an improved recreation experience and those who used the children's playground were less likely to choose the REPTILE amenity over the STATUS QUO. For marginal effects, the coefficient associated with the use of the children's playground was 23% less likely to use REPTILE amenity.

The coefficients associated with time spent at PMNP during recreation, education, the age of the interviewee, the use of the picnic area for recreation, grilling and partying during recreation and visits to animal-dominated areas were not statistically significant. This suggests that these explanatory variables do not matter when it comes to preference for the REPTILE amenity compared to the STATUS QUO. Of all the coefficients, the coefficient

associated with the use of the children's playground, wandering in nature and gender were the most important in the preference for the REPTILE amenity based on the magnitude of their marginal effect values (Table 4).

In terms of the PARADISE amenity, the results revealed that the coefficients associated with income, gender, the picnic area, wandering in nature, visits to animal-dominated areas and grilling and partying had a positive and statistically significant effect on the preference for the amenity (Table 4). This suggests that the interviewees who had more income, were female, used the picnic area, engaged in wandering in nature, visited animal-dominated areas and engaged in grilling and partying were more likely to choose the PARADISE amenity than the STATUS QUO amenity. In terms of marginal effects, the coefficients associated with grilling and partying (12%), gender (8%) and visits to animal-dominated areas (3%) had the highest increase in the probability of choosing the PARADISE amenity compared to the STATUS QUO amenity.

The coefficients associated with the distance of homes from PMNP, time spent in the park and payment of an entrance fee to PMNP had a negative statistically significant effect on the preference for the PARADISE amenity (Table 4). This means that the interviewees who lived further from PMNP, spent a lot of time at PMNP for recreation and would pay more as an entrance fee to access the park for an improved recreation experience were less likely to choose the PARADISE amenity than the STATUS QUO amenity.

For marginal effects, the interviewees who spent a lot of time at PMNP for recreation were 2% less likely to choose the PARADISE amenity compared to the STATUS QUO amenity (Table 4). Those whose home was located further from the park were 1% less likely to choose the PARADISE amenity compared to the STATUS QUO amenity. The coefficients associated with education, age and bird aviary were not statistically significant. This suggests that the explanatory variables do not matter in the preference for the PARADISE amenity compared to the STATUS QUO amenity. Of all the coefficients, the coefficient associated with grilling and partying (12%), gender (8%) and visits to animal-dominated areas (3%) was the most important in the preference for the PARADISE amenity based on the magnitude of their marginal effect values (Table 4).

For the REPTILE + PARADISE amenity, the results show that the coefficients associated with income, payment of fees for an improved recreation experience, education, gender, visits to the bird aviary, grilling and partying, wandering in nature, visits to animal-dominated areas, visits to the picnic area and age had a positive and statistically significant effect on the preference for the amenity (Table 4). This indicates that the interviewees who had more income, would pay an entrance fee, had a university education, were male, visited the bird aviary, engaged in grilling and partying, engaged in wandering in nature, visited animal-dominated areas, visited the picnic area and who had a higher age in years were more likely to choose the REPTILE + PARADISE than the STATUS QUO amenity. In terms of marginal effects, the coefficients associated with visits to animal-dominated areas (27%), use of the picnic area (25%) and wandering in nature (14%) had the highest increase in the probability of choosing the REPTILE + PARADISE amenity over the STATUS QUO alternative.

The coefficients associated with the distance of home from PMNP and the time spent at PMNP for recreation had a negative, statistically significant effect on the preference for the REPTILE + PARADISE amenity (Table 4). This means that the interviewees who lived further away from the park and those who spent more time at PMNP for recreation were less likely to choose the REPTILE + PARADISE amenity over the STATUS QUO amenity. The marginal effects revealed that the interviewees who lived further from the park and those who spent more time at the park for recreation were 2% less likely to prefer the REPTILE + PARADISE amenity over the STATUS QUO (Table 4). The coefficient associated with the use of the children's playground was not statistically significant. This indicates that the use of the children's playground does not matter when it comes to the choice of the REPTILE + PARADISE amenity over the STATUS QUO alternative.

6. Discussion

The visitors' views concerning potential initiatives that can be used to improve PMNP reaffirms the importance of involving key stakeholders in decision-making. The findings from this study underscore the need to consider the tradition and customs of locals when developing a recreation site. For instance, it is rare to see people kissing and caressing in public places in PNG because it is not in line with the tradition of the people. This suggests that green space managers should consider enlightening visitors about the customs and traditions of the indigenous people. The findings make it important for visitors to recreation areas, especially in developing countries, to consider that during recreation activities the customs and tradition of the host communities must be respected. The findings are in line with that of Moore et al. (2010) who found, in a Canadian study of associations among urban park users, that adults are not likely to use a park that young people use for recreation [50].

People may not use a site for recreation if they think their safety might be compromised [51]. The finding from this study is in line with this premise: visitors to PMNP raised concerns about their safety, especially in relation to the use of the park's footbridges. This conforms to the findings by Tarrant and Smith (2002), who found in their United States study of customer satisfaction for outdoor recreation that hazards are one of the most important attributes considered by customers when choosing a site for recreation [52]. To encourage revisits to a green space for recreation, it is important for the managers of the space to address the safety concerns raised by visitors.

The findings from this study show that visitors to an urban nature park would pay an increased user fee for an improved recreation experience. Though almost 80% of the interviewees would pay an increased the fee, their preferences for recreation are strongly linked to the nature type they often visit. The results are supported by findings from several published papers in the literature on the subject. For instance, in a United States study of willingness to pay for recreation at Colorado "Fourteener" Peaks, Keske et al. (2014) found that 62% of the respondents were willing to incur an additional fee of USD 20 for recreation [19]. In a Chinese study of tourist willingness to pay for the biodiversity conservation and environmental protection of Dalai Lake Protected Area, Wang and Jia (2012) found that 73.6% of the respondents would accept a higher user fee to the Protected Area [20]. Thapa and Parent (2020) found in their study of willingness to accept an increased user fee for park improvement projects that most visitors were willing to accept an increased user fee for an improvement towards natural resources and amenities [7]. The findings suggest that though our study was conducted in a city in a developing country where the importance of recreation seems not to be well known and appreciated by most of the residents, most of the visitors to an urban nature park would pay an increased user fee to access the park. This indicates that some of the residents are becoming more aware of the value of nature-based recreation to the physical and psychological wellbeing of their existence. The findings suggest that urban planners and urban green space managers in PNG and potentially other developing countries should consider the dynamics of the demand for natural areas by urban residents in implementing a green space improvement project.

The findings from this study show that the picnic area was mostly used for recreation by visitors. Several activities such as jogging and grilling could be carried out in the area, which could be a reason for attracting many visitors there. It is made up of evergreen lawn and few shrubs, which makes it easier for people to access it. This indicates that ease of moving around and the availability of facilities is linked to the preference for an area for recreation. The findings conform to those of Won et al. (2008), who found that the condition of amenities in a recreation area is strongly linked to visitation [51]. Our findings are also supported by those of Bertram et al. (2017), who found that visitors to a park for recreation prefer a large park with picnic facilities especially during weekends [1]. If the aim of a park manager is to improve the picnic area to meet visitors' needs, it is necessary to carry out maintenance work on the facilities used for grilling and have more benches

provided there. The cleanliness of the picnic area should be paramount to the managers in order to attract visitors and improve the chances of people revisiting the area [1]. The findings from this study also conform to those of Ezebilo (2013), who found in a Nigerian study of preferences for different incentives to promote local support for conservation that locals preferred an incentive that provided them with the greatest benefit [53]. In this study, more than 50 percent of the interviewees preferred the REPTILE + PARADISE amenity alternative. This could be because it contains more amenities, which has the potential to provide the greatest recreation experience to the visitors. This suggests that, if a green space manager intends to sustain and attract more visitors to the space, it is important to introduce and promote new amenities in a timely manner.

According to the economic theory associated with payment for environmental resources, people who have more money would pay more for the improvement of resources [54]. The findings from this study conform to this theory. For instance, an increase in income is associated with a preference for the REPTILE, PARADISE and REPTILE + PARADISE amenity alternatives. This is in line with findings from published papers on the subject, such as that by Hakim (2011), who found in an Indonesian study of economic valuation of nature-based tourism that people who have more money would pay more for tourism than people who have little money [35]. In a Swiss study of recreational benefits of urban forests, Bernath and Roschewitz (2008) found that an increase in the income of visitors results in an increase in willingness to pay for urban recreational forests [38]. In a Nigerian study of willingness to pay for the maintenance of a recreation amenity, Ezebilo (2014) found that locals who have a higher income would pay more [55]. Visitors to a nature park are often heterogeneous in terms of income (i.e., low-, middle-, and high-income groups). This makes it important for nature park managers to consider this heterogeneity in the development of a recreation area and in any improvement project of the area. If low-income households find it difficult to afford the user fee to a nature park, recreation in the park might become a luxury good to them. This has the potential to restrict low-income households from using the park for recreation. Thus, nature park managers should consider this in the event of determining a user fee to a park for recreation.

The findings from this study show that the interviewees who lived a further distance from PMNP preferred STATUS QUO compared to the PARADISE and REPTILE + PARADISE amenity alternatives. This is in line with the findings of del Saz Salazar and Menendez (2007) in their Spanish study of willingness to pay for recreation in an urban park [56]. They found that people who live furthest from the park would pay the least for recreation. In a French study of preferences for urban green spaces, Tu et al. (2016) found that an increase in distance to urban forests reduced visitors' willingness to pay for its use for recreation [25]. In a Chinese study of willingness to pay for river network protection, Shang et al. (2012) found that an increase in distance of one's home from the river results in a decrease in willingness to pay for recreation there [57]. In a Swedish study of preferences for distance to recreational forests, Hörnsten and Fredman (2000) found that residents would pay to avoid an increase in the distance to forests [58]. This highlights the need for urban nature park managers to consider that visitors to a park come from different segments of a city or town where the park is located and the associated transport costs in determining user fees to the park.

It was found that interviewees who spent more time at PMNP preferred the STATUS QUO than the PARADISE and REPTILE + PARADISE amenity alternatives. This finding conforms to that of Rulleau et al. (2012) who found, in a French study of recreational value of urban forests, that residents of Gironde who spent a long time in the forest had lower willingness to pay than those who spent a short time in the forest [33]. However, this finding is not in line with that of Mwebaze and Bennett (2012), who found in an Australian study of value of botanic collections that people who spent a long time at the recreation site had a higher willingness to pay than people that spent a short time at the site [59]. A possible reason for the difference is that the study by Mwebaze and Bennett (2012) focused

on only one recreation amenity, whereas several amenity alternatives and attributes was considered in this study [59].

According to the theory of demand, as the price of a good increases the quantity that it will be bought decreases [39]. The findings from this study are in line with this theory. The interviewees preferred the STATUS QUO amenity alternative, which is associated with a lower user fee, than the REPTILE and PARADISE amenities. The findings conform to those of Asafu-Adjaye and Tapsuwan (2008), who found, in a study of scuba diving benefits in Thailand, that visitors faced with higher prices were less likely to pay to dive in Mu Ko Similan Marine National Park [60]. In a South Korean study of economic value of a World Heritage site, Kim and Cho (2007) found that an increase in price to access the site resulted in a decrease in willingness to pay to access the site [61]. This highlights the need for park managers to consider the potential reaction of visitors to changes in price when determining the user fee for accessing the park.

Education provides people with opportunities to access information about the benefits of nature-based recreation on wellbeing. In this way, people who have higher levels of education might pay more for an improved recreation experience. The findings from this study are in line with this assertion and conform to those in published papers such as that by Abuamoud et al. (2014), who found in a Jordanian study of willingness to visit cultural heritage site that people who had more education were more willing to visit and pay for recreation [36]. In a Chilean study of residents' willingness to pay for a cultural heritage site, Båez-Montenegro et al. (2012) found that residents who had higher levels of education would pay more to visit the site [62]. This highlights the need for visitors to be well informed about the recreation improvement strategy being proposed at a park before it is introduced. This can be achieved by developing an awareness program that informs visitors about a recreation strategy.

The interviewees who were older were more likely to choose the REPTILE + PARADISE amenity than the STATUS QUO amenity alternative. This is in line with the findings of Ransom and Mangi (2010), who found in a Kenyan study of recreational benefits of coral reefs that people who were older had a higher willingness to pay for recreation [63]. A possible reason is that people who are older are more likely to have experienced the importance of nature to human wellbeing and would therefore be more likely appreciate nature conservation than people who do not have much experience. This highlights the need for park managers to consider the age distribution of visitors when developing strategies for improving recreation areas. Women were more likely to choose the REPTILE, PARADISE, and REPTILE + PARADISE amenities than the STATUS QUO amenity alternative. This could be because women like to experience new things and appreciate nature more than men. This finding is in line with Ezebilo (2014), who found in a Nigerian study of willingness to pay for the maintenance of amenities for recreation that men would pay less for the amenities compared to women [55]. However, the finding is not in line with that of Kamri (2013), who found in a study of willingness to pay for the conservation of natural resources in Gunung Gading National Park that men had a higher willingness to pay than women [37]. Men and women might have different recreational needs, which should be reflected by park managers when developing a recreation site.

The findings from this study revealed that the choice of recreation amenity alternatives is strongly linked to the area of a park most often used by visitors. This is in line with the findings of Ezebilo (2016), who found in a Swedish study of travel cost to natural areas for recreation that nature types are strongly linked to recreation trips [64]. In this study, it was found that visits to picnic and bird aviary areas result in the choice of the REPTILE, PARADISE, and REPTILE + PARADISE amenity alternatives, whereas visits to the children's playground result in the choice of the STATUS QUO amenity alternative. As the nature types visited by visitors often reflect their interests, park managers should consider this in developing a park improvement strategy.

Recreation activities that visitors often engage in have the potential to determine their recreational preferences. In this study, it was found that visitors who engaged in grilling,

wandering in nature and visits to animal-dominated areas were more likely to choose the REPTILE, PARADISE and REPTILE + PARADISE amenity alternatives, respectively, than the STATUS QUO amenity alternative. This is in line with findings of Ovaskainen et al. (2012), who found in a Finnish study of recreational demand that the nature types visited are linked to the demand for recreation [65]. This highlights the need for park managers to develop a strategy that promotes different recreation activities that visitors often engage in. This has the potential to attract new visitors as well as returning visitors to the park.

In terms of the limitations of this study, the study focuses on one urban nature park in one city and in one country. It would be nice to also conduct similar studies in more urban nature parks in the different cities of PNG to capture location differences, socio-economic differences and cultural differences associated with the different locations. For instance, PNG has four major cities (Mt. Hagen, Kokopo, Lae and Port Moresby) located in each of the four regions (Highlands, New Guinea Islands, Momase and Southern regions) of the country. This study was conducted in Port Moresby, which is located in the Southern region, and the findings may not reflect strongly the preferences and willingness to pay an increased service fee of people from the different regions of PNG. However, Port Moresby is the capital of PNG and attracts people from the four regions of the country because of the different opportunities for employment and access to services there. For this study, the interviewees were from the different provinces in the four regions of PNG, which means that our findings may reflect the cultural differences found in the country.

Travel costs, which may have an impact on preferences for recreation and the frequency of visit to a recreation area, were not considered in this study. In the future, it will be nice to consider conducting another study using the travel cost method to elicit the value for recreation at PMNP and other similar urban nature parks in the country. This will provide us with a better account of visitors' behaviour and preferences for recreation amenities for improved recreation experiences and changes in urban park user fees.

The presence of a nearby urban park has the potential to influence the frequency of visit to PMNP and the value attached to recreation in the park. Apart from PMNP, there is another park (Adventure Park) located in the peri-urban segment of Port Moresby. The presence of Adventure Park may have an adverse impact on the value that a visitor may attach to PMNP. However, PMNP is located in the central part of the city and it is a nature park that contains a tropical forest, while Adventure Park contains mainly man-made environments. It will be nice to find the differences in values that visitors attach to the two parks located in Port Moresby. This can be conducted as a follow-up study in the future. It would also be nice to conduct a more extensive survey that includes more visitors that are not from PNG so that a comparative analysis can be conducted of values attached to recreation and preferences for recreation amenities by PNG citizens and non-PNG citizens. This will assist urban green managers in making informed decisions to provide recreation amenities that capture the preferences of both nationals and non-nationals.

7. Concluding Remarks

This study provides an insight into potential ways to improve a green space for providing ecosystem services such as recreation, to promote accessibility to the space and to meet visitors' preferences for recreation amenities. The findings revealed that in order to continue to attract visitors from host communities and those from outside the communities to an urban green space for recreation, it is important to address concerns often raised by different categories of visitors, such as safety issues. Visitors should be well informed about the need to respect the customs and traditions of host communities. The picnic area at PMNP is the most preferred, and preferences for recreation amenity alternatives are strongly linked to areas of the park visited, recreation activities, user fee levels, income, distance to the park and time spent in the park.

Visitors to an urban green space are often heterogeneous, which means that in determining the user fee to a green space for recreation, the heterogeneity should be reflected in the fee. The level of the fee should be determined in collaboration with visitors to the

urban green space and other key stakeholders. It is important to consider the impact of the user fee on the frequency of visits to the green space. If the fee is above the level that most visitors can afford, the frequency of visits may go down to a level that managers of the space may find difficult to offset the cost of managing the urban green space.

This study was conducted in a city in a developing country where the benefits of nature-based recreation are not well known. However, the findings from the study are in line with those from developed countries where the benefits are well known. This indicates that as a country develops, the importance of nature-based recreation also grows in the country. The findings from this study will assist urban nature park managers in managing the park more effectively by considering visitors' preferences for recreation and user fees that are affordable to most of the visitors.

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Data Availability Statement: The datasets used to support this study are available upon request from the author.

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Conflicts of Interest: The author declares no conflicts of interest.

Appendix A

Respondent No. _____
Date: _____
Research Assistant's name: _____

Preferences and demand for nature-based recreation in NCD—Port Moresby Nature Park

We are group of researchers from the Papua New Guinea National Research Institute (PNG NRI).

We are currently conducting research on access to nature-based recreation in National Capital District (NCD).

The main aim of this survey is to understand the value that people have for nature. It was also to understand the accessibility of nature-based recreation to NCD residents.

Findings from the survey will assist nature-based recreation managers in making informed decision on how best to manage nature by considering visitors' preferences and demand.

You are among the people who have been selected for the survey.

We assure you that your responses will be used for only the purposes of research and that they will be held strictly in confidence.

We thank you in anticipation for your cooperation.

Professor Eugene Ezebilo,
Property Development Program,
The National Research Institute,
Port Moresby

E-mail: eugene.ezebilo@pngnri.org
Telephone: 3260300

Socio-economic factors

1. What is your gender? (a) Female (b) male
2. Are you a citizen of Papua New Guinea (PNG)? Yes/No
3. If you are a citizen of PNG, which province do you come from?
   _____
4. If you are not a citizen of PNG, which country do you come from?
   _____
5. What is your marital status? (a) Married (b) single (c) divorced
   (d) widow/widower (e) living together but not married (de-facto)
6. Do you have children between the ages of 1 to 18 years who live with you? Yes/No.
   (6a) If 'Yes' to question 6, how many are they? _____
7. Please, tick one from the list below that indicates your age:
   (a) 18–25 years (b) 26–30 years (c) 31–35 years
   (d) 36–40 years (e) 41–45 years (f) 46–50 years
   (g) 51–55 years (h) 56–60 years (i) 61–65 years
   (j) 66–70 years (k) More than 70 years.
8. Please, tick one from the list below that indicates the highest education that you have attained:
   (a) No formal education (b) Primary school (c) High school
   (d) Secondary school (e) Technical school (f) University
   (g) Others, please, indicate _____
9. Where do you work?
   (a) I work for government (b) I work for a private company
   (c) I work for an NGO (d) I work for a church
   (e) I have my own business (f) I have retired from work
   (g) I am unemployed (h) others, please, indicate
   _____
10. If you work in the formal sector such as government, private company, NGO and a church, choose from the list below which best describes the last fortnight income after tax that you received:
    (a) Less than 250 Kina (b) 250–500 Kina (c) 501–1000 Kina
    (d) 1001–1500 Kina (e) 1501–2000 Kina (f) 2001–3000 Kina
    (g) 3001–4000 Kina (h) 4001–5000 Kina (i) 5001–6000 Kina
    (j) 6001–7000 Kina (k) 7001–8000 Kina (l) 8001–10,000 Kina
    (m) More the 10,000 Kina
11. If you work in the informal sector such as selling of vegetables, fish, and potatoes in the open market, choose from the list below which best describes the amount of money you made last week after removing the money you have used to buy the products.
    (a) Less than 50 Kina (b) 51–100 Kina (c) 101–200 Kina
    (d) 201–300 Kina (e) 301–500 Kina (f) 501–700 Kina
    (g) 701–1000 Kina (h) 1001–1500 Kina (i) 1501–2000 Kina
    (j) 2001–4000 Kina (k) 4001–6000 Kina (l) 6001–10,000 Kina
    (m) More the 10,000 Kina
12. Is your wife, husband or de-facto employed? Yes/No
13. If your wife, husband or de-facto is employed, choose from the list below which describes how much he or she gets from working in the formal or informal sector last fortnight?
    (a) Less than 50 Kina (b) 51–100 Kina (c) 101–200 Kina
    (d) 201–300 Kina (e) 301–500 Kina (f) 501–700 Kina
    (g) 701–1000 Kina (h) 1001–1500 Kina (i) 1501–2000 Kina
    (j) 2001–4000 Kina (k) 4001–6000 Kina (l) 6001–10,000 Kina
    (m) More the 10,000 Kina

Location of home and characteristics of neighbourhood

14. Do you live in Port Moresby? Yes/No
15. If you live in Port Moresby, which of the suburbs do you live?
    (a) Badili (b) Boroko (c) Erima (d) 8 Mile
    (e) 5 Mile (f) Gerehu (g) Gordons (h) Hohola
    (i) Korobosea (j) 9 Mile (k) Sabama (l) 6 Mile
    (m) 7 Mile (n) Tokarara (o) Town (p) Waigani
    (q) Others, please indicate _____
16. If you do not live in Port Moresby, where do you live? _____
17. Do you have a private garden around the house where you live? Yes/No
    (17a) If you have a private garden around the house where you live, are you involved in gardening activities there? Yes/No
    (17b) If you are involved in gardening activities, how many times do you do gardening each week? _____
18. How would you rate the scenic view of green spaces from the house where you currently live? (a) Poor (b) average (c) Good (d) Very good
19. Is there a playground or recreation area for children within a walkable distance from where you live? Yes/No
    (19a) If there is a playground or recreation area for children within a walkable distance from where you live, do your children often visit the area? Yes/No

Nature-based recreation in Port Moresby Nature Park

20. Have you visited Port Moresby Nature Park before? Yes/No
    (20a) From September 2016 to September 2017, how many times have you visited Port Moresby Nature Park? _____
21. Have you often visited Port Moresby Nature Park alone or with other people such as your family and friends? (a) Alone (b) With other people
22. If you often visit Port Moresby Nature Park with children, is there something that could hinder your children from moving freely in the Park? Yes/No
    (22a) If 'Yes' to question 22, please, explain
    _____
    _____
    _____
    _____
    _____
    _____
23. If you often visit Port Moresby Nature Park with other people, who often decides the area of the Park that should be visited by the group?
    (a) Myself (b) my wife/husband (c) my children (d) my friends
    (e) collective decision (g) others, please indicate _____
24. Are you a member of an environmental organisation/your work or study is related to environmental conservation? Yes/No
25. In your opinion, would you say that nature-based recreation is important for your wellbeing? Yes/No
26. In your opinion, would you say that nature-based recreation is important for educating your children about the environment? Yes/No
27. During your visits to Port Moresby Nature Park, do you visit other places on your way to or from the Park? Yes/No
    27a. If 'Yes' to question 27, explain and indicate time spent in the places
    _____
    _____
    _____
    _____

28. How do you often travel to Port Moresby Nature Park from home?
(a) I walk from home to the park (b) By public transport such as a bus and taxi
(c) by bicycle (d) by my private vehicle (e) by other people's private vehicle
29. What day of the week do you visit Port Moresby Nature Park?
(a) Weekend such as Saturday and Sunday (b) Weekday (c) Only during public holiday
(d) Weekend and weekday
30. During your visits to Port Moresby Nature Park, how long do you often stay there before going home? _____
31. What is the distance between where you currently live and Port Moresby Nature Park?
(a) Less 500 m (b) 500 m to 1 km (c)1.1 to 2 km
(d) 2.1 to 4 km (e) 4.1 to 6 km (f) 6.1 to 8 km
(g) 8.1 to 10 km (h) 10.1 to 12 km (i) 12.1 to 14 km
(j) 14.1 to 16 km (k) 16.1 to 20 km (l) More than 20 km
32. How long does it take you to travel from where you currently live to Port Moresby Nature Park?
(a) Less than 5 min (b) 5–10 min (c) 11–15 min (d) 16–20 min
(e) 21–25 min (f) 26–30 min (g) More than 30 min
33. Using the Port Moresby Nature Park areas listed below (a–k), mention one area you mostly visit and one area you rarely visit.
(33i) I mostly visit _____
(33ii) I rarely visit _____
(a) Picnic area (b) Wallaby walk (c) Tree Kangaroo trail
(d) Crowned pigeons (e) Walk through parrot aviary (f) Cuscus
(g) Crocodile (h) Rainforest/Cassowary (i) Papuan hornbill
(j) Walk through bird aviary (k) Natures Café
34. Please, explain what you like about the area in the Port Moresby Nature Park you mostly visit and what you would like improved in that area.
(34i) I like
_____
_____
(34ii) Improve _____
_____
35. Do you often buy food and drinks from the Nature's Café during your visits to Port Moresby Nature Park? Yes/No
36. To visit Port Moresby Nature Park is often associated with different sorts of costs such as car fuel, bus fees, food, drinks etc. On average, how much in Kina do you spend in relation to one visit to Port Moresby Nature Park?
(i) Transport to and from Port Moresby Nature Park _____ Kina
(ii) Food and drinks _____ Kina
(iii) Venue hire _____ Kina
(iv) Entrance fee _____ Kina
(v) other costs _____ Kina
37. Do you often pay entrance fee for each visit to the Port Moresby Nature Park or you have a subscription for annual membership?
(a) I pay entrance fee for each visit
(b) I have annual membership
(c) Others, indicate _____
38. If you often pay entrance fee for each visit to Port Moresby Nature Park. Imagine that you would have an annual membership which provides you these benefits:
    - Unlimited entry to the Nature Park for a year,
    - 5% discount at Nature's Gift shop,
    - Invitations to events and exhibit previews,
    - Express entry into the Nature Park at peak times,
    - Access to bi-annual e-newsletter,

- Support to research and conservation program
- 10% discount on venue hire.

(38a) Would you subscribe to the Nature Park's annual membership? Yes/No
(38b) If you would subscribe to the annual membership, if it would cost **80 Kina**, would you still subscribe to the membership? Yes/No
(38c) If you would not pay the amount offered to you for membership subscription in question 38b. Consider your income and expenditures and state the maximum amount of money in Kina that you would pay for the annual membership. _____ Kina
(38d) How sure were you when you answered the previous question (38c)?
(i) 1% (ii) 5% (iii) 10% (iv) 25% (v) 50% (vi) 75% (vii) 100% (viii) others, indicate _____ %
(38e) If you would not pay at all for the annual membership, give reasons
_____
_____
_____
_____

39. The Port Moresby Nature Park management is considering introducing more exhibits such as reptile house, which will feature some snakes. New bird of paradise walk-through experience with 7 big aviaries will also be introduced.
The proposed new exhibits, the continuous maintenance of the existing exhibits and the trail have the potential of increasing visitors' recreation experience. It will also provide materials for educating children about nature and support environmental conservation and nature research.
(39a) Would you support introduction of the new exhibits? Yes/No
(39b) If you answered 'Yes' to question 39a, would you still support introduction of the new exhibits if it would cost money in Kina? Yes/No
(39c) If you answered 'Yes' to question 39b, choose the one you prefer most from the table below:

Characteristics	**Alternative 1 (Status quo)**	**Alternative 2**	**Alternative 3**	**Alternative 4**
Current exhibits	Current exhibits remain in the Nature Park.	Current exhibits remain in the Nature Park.	Current exhibits remain in the Nature Park.	Current exhibits remain in the Nature Park.
New exhibit	No new exhibit.	About 20 individuals of venomous and nonvenomous snakes.	New bird of paradise walk-through experience with 7 big aviaries that visitors could walk through to see the birds.	About 20 individuals of venomous and nonvenomous snakes. + New bird of paradise walk-through experience with 7 big aviaries that visitors could walk through to see the birds.
Nature Park entrance fee for an adult.	K7/entrance	K8/entrance	K9/entrance	K10/entrance
I prefer				

(39d) How sure were you when you answered the previous question (39c)?
(i) 1% (ii) 5% (iii) 10% (iv) 25% (v) 50% (vi) 75% (vii) 100% (viii) others, indicate _____ %

(39e) If you answered 'No' to question 39b, give reasons.

_____

_____

_____

40. What recreational activity do you mostly engage in during your visit to Port Moresby Nature Park?
(a) Picnic or grilling in nature (b) Education
(c) Research (d) Site-seeing
(e) Meeting point with friends (f) Wandering in the forests and fields e.g., look at the nature
(g) Visit animal exhibits (h) Jogging (i) Party
41. Have you visited other parks in Port Moresby/NCD for recreation in the last 12 months? Yes/No
(41a) If you have visited other parks, provide name of the park and the number of times you were there in the last 12 months.
(41ai) Name of park _____
(41aii) Number of times visited: _____
42. In your opinion, what would you say that should be improved at the Port Moresby Nature Park to increase visitors' experience?

_____

_____

_____

_____

43. Please, should you have some comments you would like to make, feel free to write here.

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