



## Tourism Economic Value of Bukit Pangonan Urban Forest, Lampung, Indonesia

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### ABSTRACT

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The quite high community activities in urban areas have caused the Bukit Pangonan Urban Forest to become an alternative tourism spot easily accessible by urban communities. There is, however, the need for natural tourism development in regional planning and conservation towards increasing the economic value of these urban forests. Therefore, this study was conducted to analyze the economic value of nature tourism in Bukit Pangonan Urban Forest and its role in environmental conservation. This involved the selection of 100 respondents as samples through incidental sampling techniques. Data was collected using interviews and analyzed quantitatively with the travel cost method and descriptively. The results showed the economic value of the Bukit Pangonan Urban Forest is Rp 4,557,944,880 per year, with visitors having a surplus of Rp 119,433 per visitor per visit and spending Rp 96,630/person/visit with the highest on transportation. The role of urban forests in environmental conservation is quite significant in preventing environmental damage, and it is possible to enhance this through the addition and diversification of tree species, protection of biodiversity, selection of appropriate tree species, development of environmentally friendly tourism facilities, providing conservation education to visitors, and policy support from the government. Moreover, it is also possible for the government to use Bukit Pangonan Urban Forest as a model to develop urban forest tourism in other areas.

## 1. INTRODUCTION

In recent times, fresh air, comfort, and beauty are required, especially in urban communities with high-stress levels caused by different activities, traffic jams, garbage, air and noise pollution, and other things. The factors influencing stress in Indonesia are modern urban life patterns characterized by dietary changes, family life, and work patterns such as busy routines, high workloads, and intense competition [1]. The authors [2, 3] also found noise, traffic, density, air pollution, and lack of a healthy environment to be causing stress symptoms in the urban population prevalence is usually higher compared to rural areas. A study in China showed higher stress levels to be positively related to social class [4]. Furthermore, Azizah and Jaya [5] stated that urban dwellers are more at the risk of developing mental health problems due to several factors attached to both lifestyle and urban conditions. There is, therefore, the need to minimize the vulnerable stress conditions in urban communities due to their long-term impacts, which usually lead to a reduction in the quality of human resources.

One way to reduce these stress levels is by developing urban forests as recreational areas for people. This is also believed to have the capability to increase the surrounding community's economy if managed properly. According to Konijnendijk et al. [6], the urban forest is defined as the art, science, and technology of managing the tree and forest resources around an urban community ecosystem to harness their physiological, sociological, economic, and aesthetic benefits for humans. It

is also a form of green open containing plants and both endemic and introduced vegetation to support ecological, socio-cultural such as medicinal plants [7], and architectural benefits thereby leading to economic gains for the people [8].

Some studies have proven urban forest development's ability to increase the income of surrounding communities [9-11]. Still, the threats to these forests' sustainability in their use as recreational facilities and environmental services also need to be considered. According to Bertram and Rehdanz [12], the use of green open spaces, including urban forests for housing, commercial areas, and several other public infrastructures, has limited these areas' availability [13]. Therefore, the pressure to develop urban areas is a double-edged knife due to its ability to degrade Green Open Space or serve as a good opportunity to promote reforestation through integrated planning [14]. Sukarta [15] found the constructions made on green open spaces to be one of the pressures caused by population growth and development.

The change in the urban forest's function to build commercial structures is associated with the lack of data on economic value to be used by planners. According to Harnik and Crompton [16], the absence of economic value city parks usually leads to abandonment. Dewanto et al. [17, 18] also showed it is possible to avoid mistakes and errors in natural resource allocation and future development planning using economic assessments. This, therefore, means economic assessment of urban forests is critical to ensure they are utilized for more profitable activities and avoid being eroded by development [19, 20].

One of the economic assessment techniques developed for recreational areas is the Travel Cost Method (TCM), which is usually applied to evaluate natural beauty, in monetary terms, based on visitors' cost incurred in a tourist attraction environment [21]. It is one of the techniques mostly used to estimate recreational sites' value using consumption behavior in related markets [22, 23]. Moreover, TCM is a non-market procedure that estimates the value of recreational sites by considering the amount of money spent by people, including the travel costs, entry fees, and on-site expenses to access a site, and also consider the willingness to pay visitors (WTP) for the costs of visiting the recreation site [24-26]. This study aimed to analyze the economic value of nature tourism in the Bukit Pangonan Urban Forest based on the TCM method and the role of the urban forest in environmental conservation.

## 2. METHODS

### 2.1 Study area

The study was conducted on Bukit Pangonan Urban Forest, Pringsewu Regency, Lampung Province, Indonesia, for two months from December 2018 to January 2019. The forest has 8 hectares with several Multi-Purpose Tree Species (MPTS) and 3,200 wood trees. It provides a beautiful natural panorama with different supporting facilities such as a selfie area, outbound, cottage for resting, rides for children's games, and others.

### 2.2 Data type

The data collected consists of primary and secondary data with the primary focusing on the visitors' characteristics, including age, sex, education, occupation, income, leisure time, number of dependents, marital status, area of origin, visitation destination, visitation motivation, frequency of visits, and travel costs obtained from interviews with selected respondents. Meanwhile, the secondary data include the number of visitors, ticket prices, regional conditions, and others obtained from managers and related institutions.

### 2.3 Respondents selection

The respondents were selected using accidental sampling, and they include individuals visiting the study area at the time of the research [27]. The sampling was conducted at different time conditions such as weekdays, weekends, and holidays. Based on the Slovin formula [28] and the population of visitors recorded in 2016-2017 to be reaching 38,160 with an error limit of 10%, the number of research respondents selected for this study was 100 people.

### 2.4 Data analysis

#### 2.4.1 Travel cost

The TCM concept is a method used based on the complementarity between tourist goods and goods used to travel to tourist destinations. The TCM approach uses econometric techniques, such as simple regression. The premise is that tourist attraction visits will be highly influenced by travel expenses and negatively correlated, resulting in a demand curve with a negative slope.

The basic equation of TCM is as follows:

$$V_{ij} = f(C_{ij}, I_{ij}, x_{ij})$$

where,

$V_{ij}$ = Number of visits

$C_{ij}$ = Tourist's cost/expenditure per visit

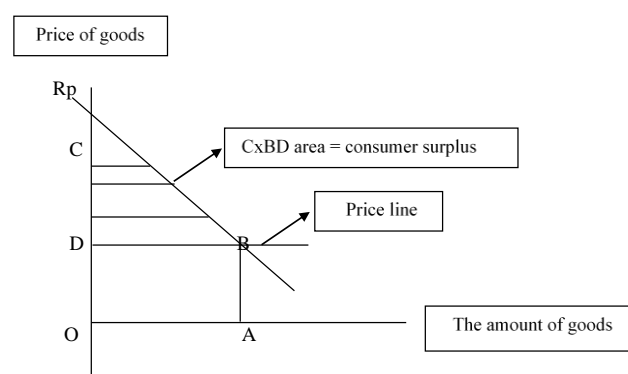
$I_{ij}$ = Income

$x_{ij}$ = Sociodemography variables.

TCM is used to build demand models in concept, while the concept of consumer surplus is employed to determine and compare value.

#### 2.4.2 Consumer surplus

Consumer surplus is the difference between the amount paid or sacrificed by consumers for a product and the willingness to pay. It is possible to calculate this concept by determining the area under the demand curve and above the price line, as shown in Figure 1.



Source: [29]

**Figure 1.** Consumer surplus

According to the marginal utility approach, the demand curve is a marginal utility curve evaluated using money, while the OABC area is the total utility obtained by consumers for consuming OA goods or their total willingness to pay for a number of OA goods. Moreover, the total sacrifice is the amount of money paid to obtain goods as much as OA or the multiplication of OA with OD's price or OD with the BA area. Consumer surplus is the difference between the OABC or willingness to pay reflected in the cost of travel incurred by consumers and OD x BA, which is the amount of money paid and calculated as DBC.

#### 2.4.3 Economic value of Bukit Pangonan Urban Forest

The forest's economic value was obtained by multiplying the consumer surplus with the total number of visits per year [30].

#### 2.4.4 The role of urban forests in environmental conservation

This was analyzed descriptively based on the results of interviews and observations in the field, with the data retrieved tabulated and evaluated to obtain conclusions.

## 3. RESULTS AND DISCUSSION

### 3.1 Regional general conditions

Bukit Pangonan Urban Forest is located in Fajar Esuk Village, Pringsewu Regency, Lampung Province. It was

established in 2006 in the urban forest park area of the Pringsewu District as an effort to develop tourism in urban areas according to the Regional Regulation No. 02 of 2012 article 38 paragraph (2) point C concerning Pringsewu District Spatial Planning 2011-2031. On October 23<sup>th</sup>, 2016, the 8-hectare tourist attraction was inaugurated by the local government as a nature tourism area and opened to visitors. The Bukit Pangonan Urban Forest is expected to reduce Pringsewu's urban community and surrounding cities' stress levels while increasing income.

Bukit Pangonan is an ordinary hill with the name "Pangonan" originated from the word "angon" which is a language of the local community used to represent the activity of herding goats or cows on the hill. The local community initially used the place as a path to rice fields or gardens but due to its beautiful natural panorama, the village youth organization and residents took the initiative to make it one of the tourist destinations. In the beginning, the urban forest was built through self-help and mutual cooperation by the youths and the community [31], but the government later developed it for tourism by managing the environment and constructing simple infrastructure and facilities by collaborating with the surrounding community.

The tourist activities being conducted in the Bukit Pangonan Urban Forest include enjoying the beauty of nature, taking photographs, tree planting, and several others. It currently has 3,200 trees consisting of wood species such as acacia (*Acacia auriculiformis*) and mahogany (*Swietenia mahagoni*) and Multi-Purpose Tree Species (MPTS) such as durian (*Durio zibenthinus*), guava (*Syzygium malaccense*), and avocado (*Persea americana*). Some of the facilities constructed include parking space, a cottage for resting, photo area, outbound, worship place, bathroom, and food stall. Figure 2 shows the condition of the Bukit Pangonan Urban Forest's natural tourism in all its beauty.

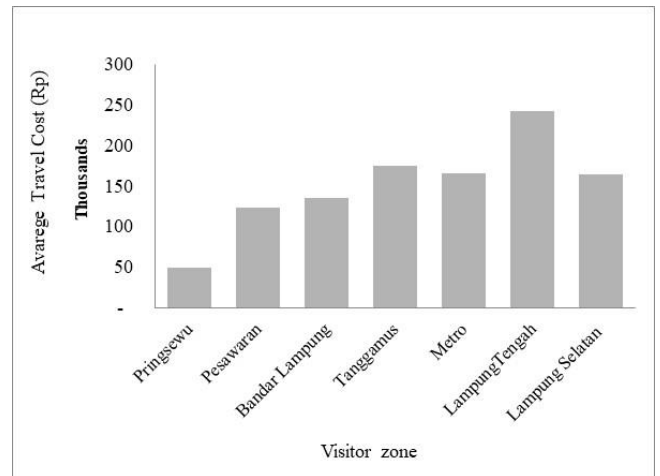


**Figure 2.** The condition of the Bukit Pangonan Urban Forest's natural tourism

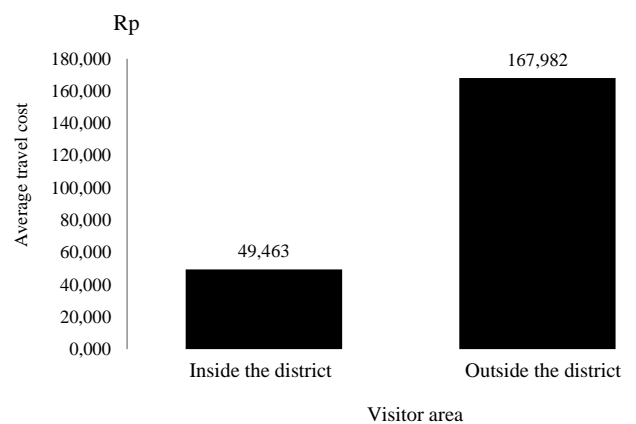
### 3.2 Travel cost

The results showed the total travel costs of visitors to Bukit Pangonan Urban Forest is Rp 9,663,000 (where US \$1 = Rp 14.432,45) with the highest being the money spend on vehicle fuel which was 45%, while the remaining 55% was spent on consumption, tickets, parking, documentation, and others. However, these figures are different from the values recorded by Zulpikar et al. [32] where the largest cost incurred in a marine tourism visitation on a small island was the consumption cost, which was 35% of the total money spent.

The average travel cost was calculated by dividing the total cost of Rp 9,663,000 by 100 people, which produced Rp 96,630/person/visit. Moreover, the researcher grouped the travel costs based on the zone of the visitors. The average cost of travel per visitor based on the different zones and districts/municipalities in Lampung Province originated in Figure 3. Seven areas were evaluated, including five districts - Pringsewu, Tanggamus, South Lampung, Central Lampung, and Pesawaran - and two cities - Bandar Lampung and Metro - with the assumption that Bukit Pangonan Urban Forest is their leading destination.



**Figure 3.** Average travel costs per zone



**Figure 4.** Average travel costs inside and outside the district

The most negligible travel cost, Rp 49,463/zone/visit, was recorded for Pringsewu Regency, and this is associated with the relatively close distance traveled, which is 5-15 km, and the majority represented by 55% travel using private vehicles while 49% use motorcycles. Meanwhile, the highest travel cost was recorded to be Rp 242,333/zone/visit for people

coming from Central Lampung Regency, and this is because the distance traveled is quite far. According to Fauzi [33], there is a direct relationship between travel cost and distance to the tourist attractions, which means a further distance requires higher travel costs.

The average visitor travel costs based on visitation from inside and outside the district are presented in Figure 4. The results showed the average travel costs from within was Rp 49,463/zone/visit times while those from the outside spent Rp 167,982/zone/visit times.

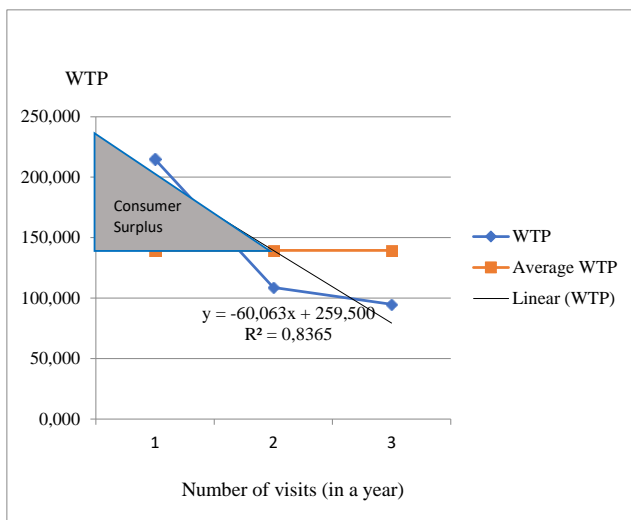
### 3.3 Consumer surplus

The consumer surplus value from the recreational demand in Bukit Pongan Urban Forest tourism was determined by finding an average travel cost based on the number of visits, reflecting the willingness to pay (WTP) by visitors to enjoy the forest shown in Table 1. In Table 1, the number of visits decreases in line with visitors' increasing willingness to pay.

**Table 1.** The number of visits per year and average WTP

Number of visits	WTP (Rp)	Average WTP (Rp)
1	214,862	139,466
2	108,800	139,466
3	94,737	139,466

The graphical equation of the WTP data for each number of visits per year is presented in Figure 5.



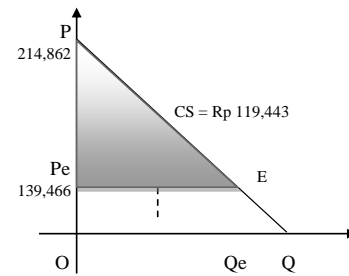
**Figure 5.** Graphical equations of WTP with the number of visits

Furthermore, the R2 value of 0.836 indicates that the demand for recreation (Y) can be explained by the variable number of visits (X) together of 83.6%. Other unknown variables explain the remaining 16.4%. With a sizeable R2 value, the model is suitable for use (appropriate) close to the original data.

The area of the triangle representing the consumer surplus value was calculated using the equation  $y = -60,060x + 259,500$ , and Rp 119,433 per individual per visit was produced. A clearer description of the consumer surplus for a visitor to Bukit Pongan Urban Forest tourism is presented in Figure 6.

The consumer surplus was observed to have a greater value in comparison with the actual Rp 96,630 per individual/one

visit paid by consumers. This means the visitors benefit more from the urban forest tourism services and are willing to pay more. Meanwhile, the costs incurred by an individual in visiting a tourist location reflect the limitations in their willingness to visit [34].



**Figure 6.** Graph of consumer surplus

### 3.4 Economic value of Bukit Pongan Urban Forest

The economic benefits of nature tourism in the Bukit Pongan Urban Forest were obtained by multiplying the consumer surplus value, which was Rp 119,443/individual/one visit with the total visits for one year were 38,160 visitors to produce Rp 4,557.944,880. This means the urban forest natural tourism object has quite high economic value compared to the Rp 0.0071369 per year obtained for Bagan Pete Urban Forest, Jambi [35], and the Rp 487,996,600/year for nature tourism waterfall Way Lalaan of the Lampung Province [36, 37] but lower than RM 0.44 million for Srengseng's natural forest tourism, West Jakarta [13] or approximately Rp 14,000,000,000 if 1 RM = Rp 3,400 and Rp 10,888,284,096/year for the natural tourism of the Tangkil Island of Lampung Province [38]. It is, however, possible to increase the economic value by developing the tourist objects such as adding facilities, improving infrastructure, improving services, and preserving the environment to make visitors feel satisfied, comfortable, and make a return visit. This is in line with [39] findings that tourists' comfort needs to be considered by managers. The level of comfort is influenced by air temperature, which subsequently affects the visitors' productivity [40].

### 3.5 The role of urban forests in environmental conservation

Bukit Pongan Urban Forest functions as a forest and a tourist attraction site, and it is possible to increase visitors' satisfaction and comfort through several conservation efforts. Moreover, it has hilly areas, and this means there is a need for soil and water conservation efforts such as ex-situ conservation (addition and diversity of tree species), in-situ conservation (biodiversity protection), selection of appropriate tree species, development of environmentally-friendly tourist facilities, and others to avoid adverse environmental impacts on the area below.

According to Febryano et al. [41-43], developing a tourist site to preserve the environment is very important to balance both protection and tourism purposes. The achievement of this balance in Bukit Pongan Urban Forest tourism has possible economic impacts by increasing the number of visits and ecological impacts such as lowering temperatures around the urban forest, increasing biodiversity, reducing air pollution,

preventing erosion and flooding, and several others. Meanwhile, Enedino et al. [44] also found a significant role of urban forests in conserving forest birds as well as the ability of tree cover to reduce air pollution and carbon emissions in London, UK.

There is an expectation of an increase in the number of visits due to the increment in economic value and the increase needs to be managed to avoid exceeding the carrying capacity of the urban forest and causing damage to it being a buffer zone. Moreover, conservation education also needs to be provided to visitors through learning, raising awareness, and motivations on the environment in an effort to prevent damaging the tourist site. This is in line with the findings of [45] that improving the quality of environmental services has the ability to increase the number of visitors and the willingness to pay in Lake Kongar even though there are several other influential factors such as cost, visitor's characteristics, work, distance to the lake and others.

The calculation of the high economic value in the Bukit Pangonan Urban Forest of Rp 4,557,944,880 and a good  $R^2$  value of 0.836 indicates that the Bukit Pangonan Urban Forest has a significant role economically and ecologically so that it needs to be developed and improved its comfort through improving the quality of environmental services. The government, in this case, needs to provide support through a regulation to develop Bukit Pangonan Urban Forest to ensure its sustenance and avoid its conversion based on its potential for economic benefits. The urban forest is also expected to be used as a model to develop urban forest tourism in other regions because it is proven to provide economic and ecological benefits. Moreover, Zulpikar et al. [46] found the large economic benefits from tourism activities at Batu Karas Beach to have a positive influence on the socio-economic improvement of the local community, while [47-49] reported all types of forest-resting environments to have the ability to produce stress relief effects to a certain extent. This is very suitable for urban communities which often experience stress due to routine to enjoy nature tourism.

#### 4. CONCLUSIONS

The results showed the visitors spend Rp 96,630/person/visit with the largest percentage expended on transportation, and they were also observed to have a surplus of Rp 119,433 per visitor per visit. This means the visitors were willing to pay a higher fee for the benefits they derive from the Bukit Pangonan Urban Forest tourism. Moreover, the economic value calculated using the consumer surplus value and the number of visitors per year was Rp 4,557,944,880 per year. Several conservation efforts have been proposed to sustain nature tourism in urban forests and increase the number of visits. These include adding and diversifying tree species, protecting biodiversity, selecting appropriate tree species, building environmentally-friendly tourist facilities, and several others. There is also the need to provide conservation education to visitors to prevent environmental damage, especially because Bukit Pangonan Urban Forest is located in a hilly area and has the potential to cause adverse effects on the surrounding environment if not properly managed. Furthermore, the government needs to provide support through a regulation to develop Bukit Pangonan Urban Forest to ensure its sustenance and avoid its conversion based on its potential for economic benefits. The urban forest is also

expected to be used as a model to develop urban forest tourism in other regions because it is proven to provide economic and ecological benefits.

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