Sustainability of Forest Park as Space Break: A case study of Arroceros Forest Park in Congested City of Manila

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Abstract: The study illustrates how urban forest parks as scarce resources in congested Manila could be sustainable to enhance the social values of a stressful urban life. Urban forest is considered as woodland located in or near urban area that entails transformed forest vegetation and provides green spaces to the communities (Zhang et al., 2007). It is widely regarded as a chain of trees where services are considered non-consumptive use value that includes clean air, serene and calmness environment, as well as sports and recreational activities.

The Arroceros Forest Park (AFP) is one of the urban forests in congested Manila. It is a 2.2-hectare green space that contains different varieties of trees, plants and birds. Considered as the "last lung" of the city of Manila (Roces, 2015), it is located along the riverside of Pasig River, only few urbanites are aware of.

The objective of the study is to present the ecological values of AFP as space break to promote urban sustainability of Manila. This study is anchored on the concept of willingness to pay (WTP) that tries to determine its bequest value using total economic value as framework. According to literature, willingness to pay is being used to elicit the values put people on green spaces as Hadker et al. (1996) used a similar approach in the case of Borivli National Park in Bombay, which shares the same characteristics as that of AFP, in terms of location in an overly crowded metropolis, faced with the challenges of severe degradation and neglect.

The study used mixed methods combining key informant interviews and field observations as well as survey in gathering qualitative data and quantifiable values placed on the forest park.

Results show that the AFP is maintained by a non-government organization with limited funding and volunteers. Selected respondents are not fully aware on the role of the forest park. There is no city ordinance to protect the forest park, but there are environmentally aware institutions, student organizations, advocacy groups and civil societies that are willing to protect the forest park from deterioration. In conclusion, due to limited awareness on the ecological value of AFP, it became susceptible to vandalism, waste disposal and proliferation of informal settlers.

Keywords: Arroceros Forest Park, space breaks, total economic value, willingness to pay

Introduction

Urban forest is a space break for people living in congested cities. It is generally regarded as a series of trees in the city and a filter to sunlight, air and water that provides habitat to different species (Zhang et al., 2007). Tyrvainen et al. (2003) averred that this kind of forest is woodland located in or near urban area that entails transformed forest vegetation and also provides green space to the communities (Zhang et al., 2007). Konijnendijk (2003) came up with several definitions of urban forest that were based on different countries. In Finland, it is defined as forest situated in or near an urban area where the focal function is recreation. In Germany, there is no sufficient term offered that would cover forests and urban forestry. It is worth mentioning to state that in Greece, urban forest is defined as trees along the streets of town and cities; parks and garden with city boundaries; and

forests around towns and cities. In Iceland, it is related to planting trees within legal boundaries. The term urban forest in Italy has hardly been used. It is associated with the concept of "urban greenery". The Netherlands documented urban forestry as 10% urban woodlands. Alejandro Roces (2007) succinctly claimed that this forest park is an ideal relaxation spot in the middle of stress from traffic and work. According to Zoolish et al in their 2015 published journal, it is not necessary that a public open space is green or a mini-forest but should have the objective of providing an amenity or recreational space to the public where they can engage in physical activity. An open space is an avenue where working people can take cardiovascular activities such as walking during their break times. It also serves as a destination where people become active and where they can socialize. Public open space can be used as part of a route to pass through to reach another destination.

However, there are times where the public open spaces are not being utilized. People's hesitation in using or spending time in a forest park are mainly due to limited awareness about the features and amenities of a forest park and is highly perceived as a crime prone area, gang and frat assembly, the presence of stray dogs and poor housekeeping of the site. Konijnendijk (2003) affirmed that there is lack of records or assessment on urban trees. Regrettably, less attention is given to the type of nature close to where people live and work (Chiesura, 2004).

In the study of Alex Y. Loa and C.Y. Jim (2010), they made a research about the city of Hongkong resident's willingness to pay and intentions for conservation of urban green spaces (UGS). The Urban Green Spaces in Hongkong are undersized and extremely developed limited natural components with too many cemented areas and edifices. The researchers were able to have face-to-face interview with 495 respondents around Hong Kong and used Contingent Valuation Method (CVM) to vet the non-use facets of Urban Green Spaces, as well as a linear regression analysis of the factors affecting the willingness to pay of the respondents. Result shows that the respondents Willingness To Pay (WTP) resulted to a mean of HK $77.43 per household per month that will accumulate to HK $46,458 over a 5-year period, signifying that the residents of the City of Hongkong were willing to pay a significant amount for the support of the hypothetical greening program.

They believe that citizen's lingering contact to the constricted urban form has sensitively molded their leisurely behavior. The results signified that Urban Green Spaces could extend communal outdoor recreational sites for residents of Hongkong. The socioeconomic status of residents would result to visit variations to the Urban Green Spaces (e.g., the elderly). It likewise suggests that UGS use may be associated to the density compact living environment. Children living in high-density edifices in Hong Kong are supported to play by their parents in public areas so as to be momentarily freed up from the high-density housing units. The research also ruled out that people age and income level were materially correlated with the WTP levels.

Household income had a strong positive effect on WTP level, reflecting a heightened concern about financial limitation in making a 'buying' decision. Age had negative association, indicating that younger respondents would pay more whereas the more senior age groups were reluctant. WTP might be connected to the higher environmental level of awareness and readiness to commit that typifies the younger age group, despite its limited visit and support of the green sites.

Urban Open Spaces

Currently, there are very few open spaces and green parks located in Metro Manila where urbanites can enjoy the natural amenities of nature. The table below presents the green spaces as mapped by the Department of Environment and Natural Resources.

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Table 1 presenting the green spaces in Metro Manila

NAME	LOCATION	SIZE	NUMBER OF TREES	DOMINANT TREE SPECIE
Arroceros Forest Park	Manila	2,200 hectares	1,357 trees	Native trees including Narra and Molave
Quezon Memorial Circle Park	Quezon City	22,700 hectares	2,134 trees	Native Trees
Lagro Dulo Forest Park	Quezon City	Approx 4 hectares	518 trees	Exotic and native species
BF Homes Subdivision Park	Quezon City	Approx 2 hectares	629 trees	Exotic and native species
San Francisco High School	Quezon City	Approx 3 hectares	381 trees	Exotic and native species

Source: Department of Environment and Natural Resources

According to the renowned urban planner Architect Felino Palafox, "it could also help if Filipinos have many other options to pass the time within the city". He emphasized the necessity for more open and green spaces in the congested urban areas like Manila. These space break or open spaces and green parks will serve as the lungs of the city and can be a healthier alternative to malls where people frequently go and has myriads of traffic within its vicinity. It can be a place where man can commune with nature. Open and green spaces may alleviate the plight of the people in Manila from congestion and this can host countless of activities like recreational, cultural, physical, sports and other human developmental activities.

As of May 1, 2010, Manila is considered as a highly congested city with a population of 1,652,171 (Philippine Statistical Authority, 2013). These people are all living within the city's limited land area of 2, 498 hectares (Philippine Statistical Authority, 2015). A distribution of 661 people per hectare makes it the most densely population of the world (Philippine Statistical Authority, 2015). The continuing exodus of people from the provinces to Manila contributes to the annual population growth rate of 0 .44 percent (Philippine Statistical Authority, 2013). Manila also ranks 9th in the worst traffic in the world with a traffic index of 202.31 based on the study of Research Firm Number (2015) that aggravates pollution problem in the capital city.

In Manila, green spaces where people have access to are; the Manila Zoological and Botanical Garden in Malate, Manila and the Rizal Park in Ermita, Manila, and the Arroceros Forest Park restricted to the public and adjacent to the Pasig river. The three parks are located within the 5th District of Manila, characterized as highly commercial and institutional areas.

Arroceros Forest Park is 2.2 hectares and its land area ratio to entire Manila land area ratio is only .0008: 1. Yet though considered insignificant, it could provide relaxation, environmental education and natural amenities to urbanites

This paper examined how stakeholders and interest groups value the Arroceros Forest Park, by determining its use and bequest value and how it can be sustained as a space break in the congested **C**ity of Manila

Theoretical Framework of the Study

This study anchors on the model of Total Economic Value (TEV), focused on direct use, indirect use and bequest value. In theory, the TEV includes both use and non-use values of an environmental asset (See Figure 1).

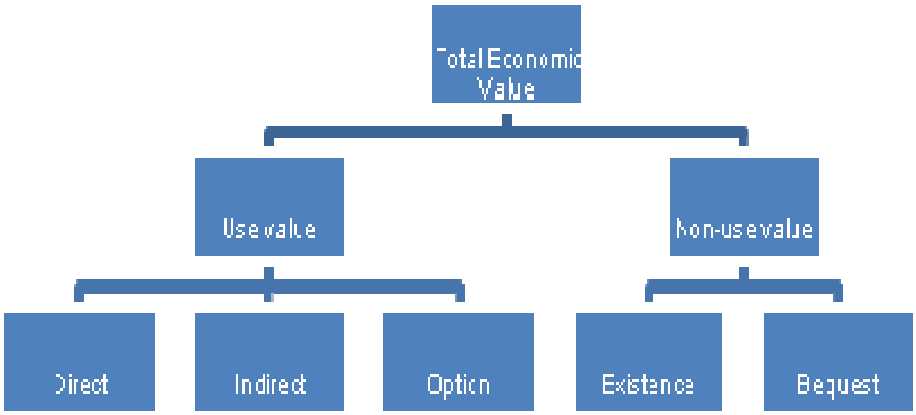

Figure 1. Total Economic Value (TEV) Model

According to the Organizational for Economic Co-operation and Development (Pearce, D, Atkinson, G & Mourato, S., 2006), the concept of TEV gives an all-encompassing measure of the economic value of any environmental asset (Pearce, D, Atkinson, G & Mourato, S., 2006). The TEV model can be decomposed into the use and non-use value of the resource. Broadly, the use value of an environmental resource covers the approximation of the 'consumptive' or 'productive' utilization of the subject (direct use), the less tangible benefits of the resource (indirect use), and the perceived usefulness of the resource in the future (option).

On the other hand, the non-use value under the TEV model refers to the perceived value of people on a given environmental resource, even if it has no actual or known use to them. The non-use value can be further classified as existence value and bequest value. Under existence value, people are willing to pay for a resource because they simply want to preserve its presence. Meanwhile, bequest value is a measure of how much people are willing to pay for a resource that is perceived to be of likely importance to the future generations.

To compute for the total economic value of an environmental resource, the following formula is used:

TEV = Use value + Non-use value
Where: Use value = direct value + indirect value + option value
Non-use value = existence value + bequest value

Thus: **TEV = direct value + indirect value + option value + existence value + bequest value**

Assumptions

1. Proximity of the respondents to AFP determines the bequest value.
2. Salaries of the employees are based on basic pay based on the standard of the National Capital Region.
3. Current market selling price of a ripe carabao mango is Php104.08 per kilogram based on Bureau of Agricultural Statistics and has a yield of 200 kilograms of 200 kilos based on Philippine Mango Seedling Farm Corp.
4. Price of one piece of lumber is Php122.55 per bdft based on Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development and a size of 2165.5 based on DENR Philippine Forestry Statistics 2015.

Methodology

Study area

Arroceros forest park (AFP) is a riverside park (see figure 2) along Arroceros street in Manila. It is adjacent to the Central light railway system in Plaza Lawton. It is located along Antonio Villegas street, formerly known as Arroceros street, in Barangay 659-A Zone 71, Ermita, 5th District of Manila. The forest park is surrounded by the Pasig River, Metropolitan Theater, Quezon Bridge, LRT Central station, various government offices, SM Manila and is nearby to various universities like Unibersidad de Manila, Philippine Normal University and Technological University of the Philippines.

Figure 2 The Map of Arroceros Forest Park

The forest park is a home to 60 types of trees, particularly some 150 hundred-year old narra, molave, balete and acacia trees (KAPI, 2005) and a variety of resident bird species (Lu, 2015) such as Eurasian Tree Sparrow, Yellow-vented Bulbul, Golden-bellied Fly eater, Zebra Dove, Collared Kingfisher, Asian Glossy Starling, Pacific Swallow, Large-billed Crow and Black-crowned Night Heron that the Wild Bird Club of the Philippines have identified. It is interesting to note that the forest park serves also as a habitat to Philippine Pied Fantail and Philippine Pygmy Woodpecker, bird species that can only be found in the Philippines and other migrant species like Arctic Warbler, Common Kingfisher and Brown Shrike (Lu, 2015). It is noteworthy to state that the AFP is considered as the “last lung” of this highly congested city (Roces, 2015).

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Interview

Table 2. List of key informants

Key Informants	Designation
Mr. Tony Magno	AFP Caretaker
Mr. Onofre Boncodin	OIC, Security of Department of Education and Arroceros Forest Park
Mr. Nestor Amacio	OIC, Physical Facilities (School Plant Office) of the Department of Education
PS1 Dionelle Brannon	PCP Commander (Lawton PCP)
Brgy. Kagawad Tupas and Kagawad Bunda	Barangay Kagawad (Bgy 659A, Zone 71)
Mr. Ronnie Canlas	Proxy representative for Mr. Amado Bagatsing (Congressman of the 5th District of Manila) Treasurer of the KABAKA Foundation
Ms. Chiqui Mabanta	President, Winner Foundation
Mr. Art Calderon	DENR – Urban Forestry Division

Survey

A purposive and quota random sampling was conducted to determine the bequest value of AFP. A total of 324 students from Philippine Normal University, Technological University of the Philippines – Manila and Universidad de Manila were surveyed. The table below shows the age of the respondents. Most of the respondents are college students around the area, age range of 16-19 years old.

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Table 3. Age of the Respondents

	Frequency	Percent	Valid Percent	Cumulative Percent
13 and below	48	14.8	14.8	14.8
13	1	.3	.3	15.1
15	3	.9	.9	16.0
16	58	17.9	17.9	34.0
17	102	31.5	31.5	65.4
18	74	22.8	22.8	88.3
19	18	5.6	5.6	93.8
20	8	2.5	2.5	96.3
21	6	1.9	1.9	98.1
22	3	.9	.9	99.1
23	2	.6	.6	99.7
29	1	.3	.3	100.0
Total	324	100.0	100.0	

Results

Awareness of the AFP

Table 4.1. Awareness to the Forest Park

	Frequency	Percent	Valid Percent	Cumulative Percent
They are aware of AFP	131	40.4	40.4	40.4
They are not aware of AFP	193	59.6	59.6	100.0
Total	324	100.0	100.0	

Source: Survey from students studying near the AFP

Table 4.1 below illustrates that 59.6 percent of the respondents are not aware on the existence of the AFP near their universities, simply because it is not well maintained and out of the way.

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Table 4.2 Willingness to keep the park open to the public

	Frequency	Percent	Valid Percent	Cumulative Percent
They are uncertain	6	1.9	1.9	1.9
They want AFP to be open to public	263	81.2	81.2	83.0
They do not want AFP to be open to public	55	17.0	17.0	100.0
Total	324	100.0	100.0	

Willingness to pay

Results show that majority of the students are willing to keep the park. (See table 4.2) Reasons provided by the respondents (showing the statistical distribution of responses) in their willingness for the park's continuity of existence are enumerated below:

1. Respondents believe that the park gives them a sense of stability considering the congestion in Manila.
2. Student's acknowledged the natural amenities of the park
3. They think that the park is a good source of entertainment in Manila City.
4. The park provides trees in Manila that could reduce air pollution.
5. The respondents feel that the park could be a tourist attraction in the future.
6. They believe that if the park will be conserved and well maintained, it could increase business opportunity in the area.
7. They believe that the protection of the park would create environmental awareness.
8. The park could be used for educational purposes, historical significance and biological research.

The respondents were asked on "how much are they willing to pay as admission fee". The values below show the results exhibiting the various price ranges and the corresponding willingness to pay percentage distribution.

Table 4.3 Amount that respondents are willing to pay in case the park would charge an entrance

	Frequency	Percent	Valid Percent	Cumulative Percent
Uncertain	10	3.1	3.1	3.1
Php 10 and below	126	38.8	38.8	41.9
Php 11 to 20	84	25.9	25.9	67.8
Php 21 to 30	32	9.8	9.8	77.6
Php 31 to 40	12	3.7	3.7	81.3
Php 41 to 50	42	13.0	13.0	94.3
Php 51 to 60	1	0.3	0.3	94.6
Php 61 to 70	1	0.3	0.3	94.9
Php 71 to 80	2	0.7	0.7	95.6
Php 91 to 100	8	2.5	2.5	98.1
Php 101 and above	6	1.9	1.9	100.0
Total	324	100.0	100.0	

Table 4.3 shows that majority of the students are willing to pay from Php 10 to 30 which is already close to 75% of the respondents. The respondents also probed the reasons for their willingness to pay for an admission fee to the park. The common responses of the respondents were in the discussion part.

Table 4.4 The willingness of the students to maintain the park instead of establishments

	Frequency	Percent	Valid Percent	Cumulative Percent
Uncertain	8	2.5	2.5	2.5
Yes, I want the park to be removed	32	9.9	9.9	12.3
No, I want the park to be maintained.	284	87.7	87.7	100.0
Total	324	100.0	100.0	

Students who specified that they are not willing to remove the park (conversely, maintain the AFP) were asked for their WTP to ensure that the AFP would not be replaced by commercial and residential establishments (see table 4.4).

Table 4.5 Respondent's option value

	Frequency	Percent	Valid Percent	Cumulative Percent
Uncertain	65	20.1	20.1	20.1
Php 100 and below	144	44.4	44.4	64.5
Php 100 to 200	25	7.7	7.7	72.2
Php 201 to 300	2	.6	.6	72.8
Php 301 to 400	1	.3	.3	73.1
Php 401 to 500	21	6.5	6.5	79.6
Php 601 to 700	1	.3	.3	79.9
Php 901 to 1000	38	11.7	11.7	91.7

Majority of the respondents were willing to pay less than Php 100 to maintain the park because of limited allowance. There are also sixty five (65) respondents who are uncertain about the values to be given, not because they don't want the park to be maintained but other things have to be considered, personal or financial related matters.

The values in Table 4.6 is the breakdown of the values that the respondents are willing to pay to keep the park for future generations.

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Table 4.6 Respondent's Bequest Value

	Frequency	Percent	Valid Percent	Cumulative Percent
Uncertain	45	13.9	13.9	13.9
Php 100 and below	145	44.8	44.8	58.6
Php 101 to 200	29	9.0	9.0	67.6
Php 201 to 300	10	3.1	3.1	70.7
Php 301 to 400	8	2.5	2.5	73.2
Php 401 to 500	21	6.5	6.5	79.7
Php 601 to 700	1	.3	.3	80.0
Php 901 to 1000	31	9.5	9.5	89.6
Php 1000 and above	34	10.5	10.5	100.0
Total	324	100.0	100.0	

The table shows that majority of the respondents were also willing to pay less than Php 100 to maintain the park with the similar reason earlier that it is commensurate to their allowance or it is the amount that they could save for a day. There are also forty five (45) respondents who are uncertain about the values to be given and majority of them still believe that it is the role of the government to help in preserving the beauty of the park, considering that it has a lot of environmental benefits. On the other hand, there are still sixty five (65) respondents who are willing to give a range of 901 and above. This time, there are more students who are willing to pay greater than 1000 pesos because they see its importance for future generations.

Discussion

Arroceros from the word "Arro" (rice) and "Ceros" (pier) is a piece of land adjacent to the Quezon bridge and Pasig River, near LRT Central Station. Arroceros has been the site of the *Fabrica de Cigarillos* and a source of revenue during the colonial period. (KAPI, 2005)

A 1720 city map already highlighted the existence of the Arroceros Forest Park (KAPI, 2005). Two other dated maps were identified, 1872 and 1899 and they both claimed that the *Fabrica de Cigarillos* could be found in Arroceros Forest Park (KAPI, 2005). It serves as a source of revenue during that colonization period.

The AFP was purchased by Mayor Lim (1992-1998 & 2007-2013) from Land Bank through a Memorandum of Agreement (MOA) in November 1993 for 65 million pesos (interview with Mr. Magno, 2015). Responsible for managing AFP was turned over to the Winner Foundation, an NGO. AFP is also supported by various advocacy groups, City of Manila, Manila Seedling Bank, the Department of Environment and Natural Resources (DENR), UP Los Banos, Clean and Green Foundation, Araneta University, and Wilfredo Dizon of Philippine Association of Landscape Architects.

With the help of Mrs. Ming Ramos (Former First lady of the Philippines) and then Mayor Alfredo Lim, the property was acquired by the city government from the national government. Winner Foundation raised funds with the support of President Fidel Ramos and First Lady Ming Ramos from the proceeds of a successful concert providing seed money for the Arroceros Forest Park (AFP) was created. The vision is for the AFP to be a recreational park, while the mission is to provide the people of Manila a space where they can relax and experience natural amenities.

An office was constructed inside the AFP during the time of Mayor Atienza (1998-2007). The Winner Foundation together with other environmental groups contested the construction with a well-publicized legal battle.

Mayor Atienza won the legal front, subsequently closed the park, uprooted trees and a total of 1/3 of its original size has been permanently lost due to construction. He appointed the Department of Environment and Natural Resources (DENR) to be responsible for the uprooting of trees.

After the term of Mayor Atienza, the forest park was again opened to the public and its management was continued by the Winner Foundation.

Presently, there is no current office managing the AFP. Moreover, an absence of a city ordinance protecting the forest park means that it is not a priority of the local government (KAPI, 2005).

Winner foundation believes that a total of 300,000 to 500,000 a year as financial contribution from various stakeholders are needed to sustain the existence of the park. The foundation allots 20,000 to 30,000 pesos a month for the maintenance of the park.

AFP used to be a plant nursery until trees were allowed to grow. It was previously open to the public but due to vandalism and petty crime inside the park, it was closed to limited visitors. Due to these incidents, the Winner Foundation put up gates in the forest and petty crimes reduced with 24/7 security and gate closes at 7pm. Aside from the Winner foundation, it is financially supported by MetroBank and Manila Doctor's Hospital (interview with Mr. Nestor Amacio). With limited visitors, urban people are not aware of its natural amenities where residents and tourists can enjoy like green space, picnic site, social gathering and relaxing environment (interview with Mr. Tony Magno).

Though AFP is under the jurisdiction of the fifth district of Manila, it is not being funded for further improvement due to limited funds

High Willingness to Pay by the Respondents

Majority of the respondents who wanted the park to be accessible have a good understanding on the importance of the park to the environment. The following statements articulated their answers:
1. AFP would help in mitigating the pollution in Manila City.
2. A solution to climate change.
3. Remediate for the Carbon Dioxide (CO_2) combustion
4. It helps sustain balance in nature and in the urban ecosystem.
5. It is a home of many natural species such as birds, insects and promotes biodiversity

Based on Table 4.3, 87.7 percent of the respondents are not willing to remove the park in exchange for the construction of commercial establishments or residential real estate. And common responses were:
1. The amount they gave is based on their budget.
2. The amount is at par with the current admission fee for the parks that they can see in Metro Manila.
3. The given amount is commensurate with what the park could offer at the moment e.g. amenities, security
4. Respondents want lower prices to encourage more students or tourists in the future.
5. Other respondents are willing to pay higher to avoid the potential destruction of trees and other amenities of the park.

In Table 4.5, most of the respondents who are uncertain believe that it is the role of the government to help in preserving the beauty of the park, considering that it has a lot of environmental benefits. On the other hand, there are also sixty five (65) respondents who are willing to give a range of 901 and above. There are very few cases that the respondents would give 6-digit values with a maximum amount Php 200,000. Some students would give 5-digit values such as 50,000 or 10,000 since they value its importance for future generations.

Below are the responses of the students on the importance of the park for future generations:
1. They want more trees in Manila, because it's too congested.
2. It could be a potential tourist spot in the future.
3. Helps in mitigating pollution in the city.
4. If the park would be maintained, it could provide space for academic exercise and help in the overall development in Manila City in the future. This is because it could be a space for students to learn more about Biology and other sciences.
5. It could be a place for family to bond together or just a place where an individual could meditate in Manila.
6. They don't want Manila to a city of buildings without trees.
7. They should have other places to visit other than malls.
8. Preserving the park would also mean preserving its rich historical existence in the Philippines.
9. It could serve as an "inspiration" for future young students or professionals to do their part in supporting the environment.

In general, despite the fact that very few respondents knew the park exist, most of them are still willing to keep it instead of constructing buildings or other similar establishments. Majority of the students believe that it is the role of the government to help in sustaining the park. Others on the other hand have a high willingness to pay because they really want to keep the park for future uses. Regardless whether students have low willingness to pay, all of them want to keep it for future generations.

High value of the park - Identification of AFP use values

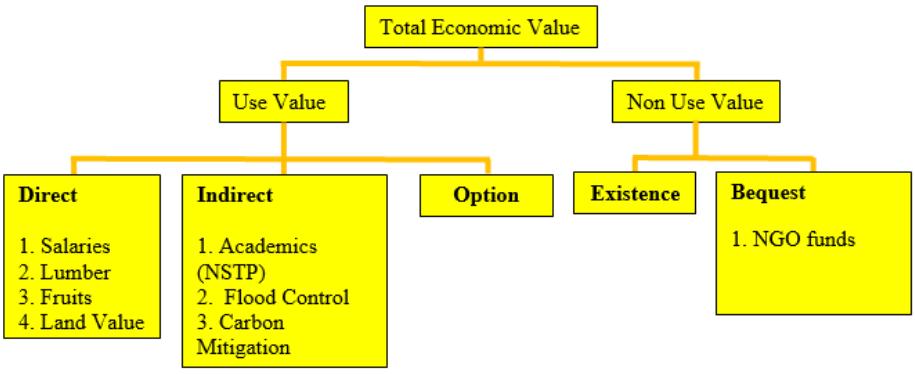

Figure 3. AFP's TEV indicators

Direct Use Value

Salaries

AFP currently employs three (3) maintenance staff and two (2) coast guards according to our interview with Onofre Boncodin, OIC of the Arroceros Forest Park. According to the Department of Labor and Employment, basic pay as a minimum wage earner are:

> P446.00 (Basic Wage P426.00 + COLA P20.00) is the current minimum wage in National Capital Region (NCR) including Metro Manila under Wage Order NCR-17 which took effect on June 03, 2012 and P456.00 (additional P10.00 COLA) effective November 1, 2012

Assuming the basic wage for minimum earner the annual salary of the key personnel:

*466 per month amount * 260*[1] ** 5 personnel =* ***Php 605,800 (or USD*[2] *13,447.28)***

Land Value

Based on the Register of Deeds in Manila, the zonal value of AFP is Php13, 650 per sq.m while the Market Value based on the prevailing real property rate development ranges from Php50, 000 – P125, 000 per sq.m.

Land value computation of AFP is:

*Php13, 650 * 22,000 (Total Land Size Area of AFP) =* ***Php. 300,300,000 (or USD 6,665,926.75)***

Therefore, AFP has a Land Value of Php 300,300,000 or USD 6,665,926.75 based on the zonal value, which is a conservative computation as compared to using market value as multiplier.

[1] Based on the regular working days of an employee in the Philippines

[2] Assumption is Php 45.05 is equal to USD 1 based on the average monthly peso-dollar exchange from January to September 2015 based on the Philippine Statistical Authority. Retrieved from http://www.nscb.gov.ph/stats/pesodollar.asp

Value of the narra trees as lumber

It is assumed that the dominant tree species is narra. The values were computed based on the computation below:

(national average domestic price of narra lumber per board foot X number of board feet per narra tree) X estimated number of trees

*Php225[3] * 2,165.5[4] = Php487,237.5 (or USD 10,815.48)* ***per narra***

X 57[5] =27,772,537.5 (or USD 616,482.52)

It is assumed that the lumbers are 20-year old narra with 1 meter diameter, 6.5 m merchantable height, raised under favorable conditions. We need to the cost of lumber per narra to the number of narra trees in AFP. Also, although we also consider that there were some trees that are around 100 years old up, which are normally prohibited for lumber use.

Preferred age for narra for lumber use is around 50 to 60 years old, price is around Php200 to Php250 per board foot. The above example was a conservative estimate with a median of 225.

Value of the Fruits

Fruit bearing trees in AFP are mostly mango trees. The researchers also looked into the value of fruits of the said forest park, because the mango tree is also a dominant fruit bearing species.

(retail price per kilo of mango X tree yield per year) X estimated number of trees

Php104.08 per kilogram[6] X 200 kilograms[7] = Php20,816 (USD 462.06) per mango tree per year ***X82[8] = 1,706,912 (or USD 37,889.28)***

The values uses the January 2015 retail price of a kilogram of ripe carabao mango. This means that every mango tree has a potential value of Php. 20,816 or USD 462.06 if it is fully utilized by the people.

Indirect Value

NSTP Activity Site (National Service Training Program)

The park is also used for the National Service Training Program (NSTP) activity by the university students from the University of the East and other universities in Metro Manila. Assuming that the park management charges PhP 100.00 (USD 2.22) to each individual entering AFP, then it would generate entrance fee of:

Php. 100 X 100 students X 5 times = ***Php. 50,000 (or USD 1,109.88)***

Php 100 is a conservative estimate based on the entrance fee in Manila Zoo which is the other park in Manila that charges an entrance fee to visitors.

Flood Control

According to the Government Agency Department of Public Works and Highways (DPWH) there are eleven (11) recommended short-listed structural mitigation action items under the "Flood Management Master Plan for Metro Manila and Surrounding Areas" that will serve as the Government's roadmap, which is projected to be take effect from today until 2035 (23 years).

These projects were ranked according to: 1) sternness of floods based on flood risk, flood area, length of time of floods and flood destruction impact, 2) technical feasibility, 3) environmental and social feasibility in early stage level, and 4) aerial dissemination of putting importance for the flood mitigation procedures for the rivers and Laguna

[3] Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development
[4] DENR Philippine Forestry Statistics 2015
[5] Number of trees are based on the field observation or actual count conducted by the researchers.
[6] Bureau of Agricultural Statistics
[7] Philippine Mango Seedling Farm Corp.
[8] Number of trees are also based on the field observation or actual count conducted by the researchers.

Lake.[9] Second to the highest priority in this area will be the Manila Core Area Drainage Improvement which has a budget of Php. 27.257 Billion.

If the City government of Manila protects AFP, then flood mitigation increases saving flood expenses. It is assumed that the indirect benefit provided by AFP is commensurate to its size and the amount allocated by DPWH to mitigate flood problems in Manila. The land area of the Arroceros Forest Park is 2.2 hectares, which is 0.08% of Manila"s size. If the budget of Php 27.257 is multiplied to 0.08, the indirect value would be Php21,805,600 (**or USD 484,031.08)**

Carbon mitigation of AFP

The presence of a forest park mitigates the pollution present in the locality. In the case of the Arroceros Forest Park, we have identified the air pollution level of the City of Manila where it is located and the value of the particulates it can dissipate.

Manila's Pollution Index where the Arroceros Forest Park is located ranges from 93.40 Yellow (Moderate) – 169.48 Red (Unhealthy). The table shows the air quality index and the relative conditions as developed by the United States Environmental Protection Agency (EPA).

Table 4. Breakdown of the Total Economic Value of the Arroceros Forest Park

Direct Values	**Amount in Php**	**Amount in USD**	**Indirect Values**	**Amount in Php**	**Amount in USD**
Salaries	605,800.00	13,447.28	Flood Control	21,805,600	484,031.08
Land Value	300,300,000.00	6,665,926.75			
Lumber	27,772,537.50	227,125.14			
Fruits	1,706,912.00	37,889.28			
Total	**330,385,249.50**	**6,944,388.45**			

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[9] DPWH Report: Flood management master plan for Metro Manila and surrounding areas. Retrieved December 16, 2015 from: http://www.gov.ph/2013/06/19/dpwh-report-flood-management-master-plan-for-metro-manila-and-surrounding-areas/

Table 5. Air Quality Index (US Environmental Protection Agency)

Air Quality Index (AQI) Values	Levels of Health Concern	Colors
When the AQI is in this range:	*..air quality conditions are:*	*...as symbolized by this color:*
0-50	Good	Green
51-100	Moderate	Yellow
101-150	Unhealthy for Sensitive Groups	Orange
151 to 200	Unhealthy	Red
201 to 300	Very Unhealthy	Purple
301 to 500	Hazardous	Maroon

Hence Arroceros Forest Park as a mixed forest which size is 2.2 hectares can remove 30 tons of particulates per year. (UK Forest Research Commission cited in Bolund, 1999). Arroceros Forest Park provides a "Lung" for the city. The carbon dioxide emitted from the city (from vehicles, factories, air conditions, etc.) is absorbed by the trees which reduces carbon dioxide and give out fresh oxygen. It provides Manila citizens a respite from the "concrete jungle". It also recreates the spirit of the city dweller by bringing them closer to nature.

NGO Fund Raising

Winner Foundation (interview with Chiqui Mabanta) believes that a total of Php300,000 to Php500,000 (USD 6,659.27 to USD[1] 11,098.78) a year as financial contribution from various stakeholders are needed to sustain the existence of the park. At present the foundation allots Php20,000 to Php30,000 (USD[1] 443.95 to USD[1] 665.93) a month for the maintenance of AFP (interview with Chiqui Mabanta).This means in average, the said NGO is helping for the minimum maintenance of the park.

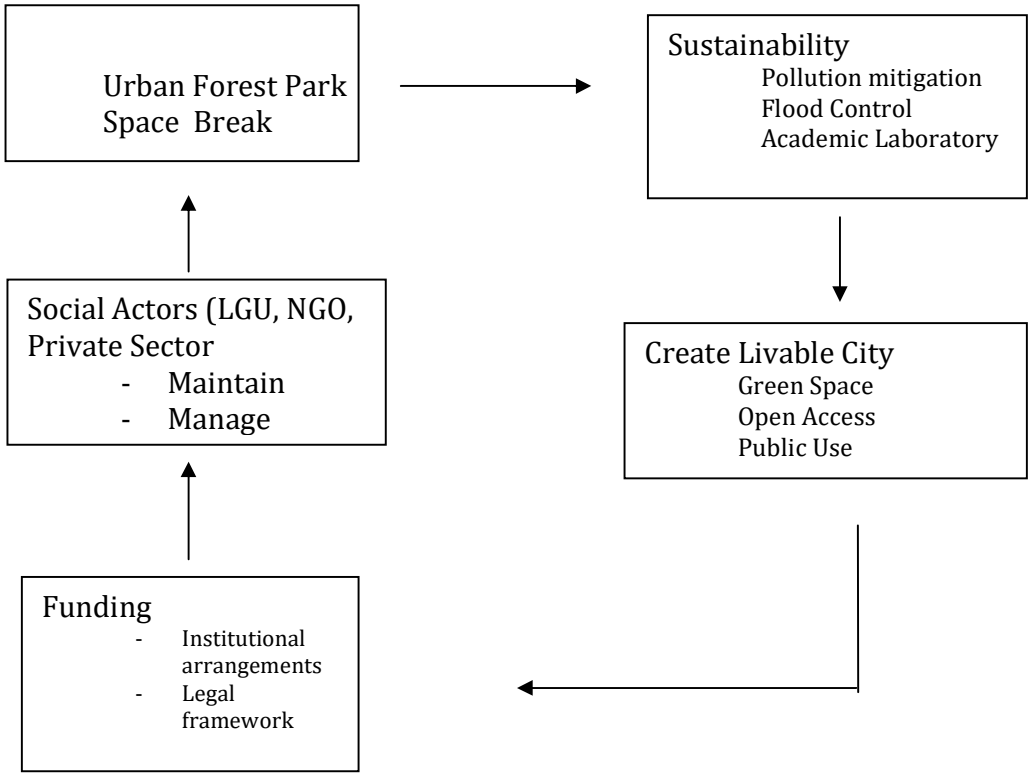
Conclusion

1. AFP is a neglected forest park in Manila. Very few are aware of its existence and its role in environmental protection.
2. The AFP has a high land value. Direct used value of AFP includes the salary, lumber and potential fruits,
3. The indirect used value of AFP are carbon sequestration, flood control, space break for urbanites; and academic laboratory for students (NSTP);
4. Aggregate bequest value given by the students is low, while NGOs and other groups place substantial amount for the sustainability of the forest park.
5. The bequest value given by people directly working in AFP is higher because of direct participation in the management, monitoring, maintenance, and protection of the forest park.
6. Willingness to pay (WTP) of the students is low because of their low paying capacity (non-income earners), but willing to protect AFP for future use.

Recommendations

1. The Dept of Education should promote awareness on the importance of the forest park. The park should be given educational importance specifically as laboratory environment for biology classes. Currently, it is being used as a community development site for NSTP classes. The nearby universities Unibersidad de Manila, Philippine Normal University and Technological University of the Philippines can utilize the Arroceros Forest Park in the conduct of official student academic-related activities.
2. Urban designers and policy-makers should enhance the landscape of AFP to attract visitors and enjoy its natural amenities.
3.Institutional arrangement between the city government and barangay should be addressed since there is no legitimate office from the city government that manages the Arroceros Forest Park.
4. Coordination and collaboration between the social actors should be strengthened, making the Local Government Unit as the main actor and the partner Winner Foundation as the minor social actor. Main ownership should be given to the LGU.

Cyclical Flow of Managing Urban Forest Park



The cyclical flow of managing an Urban Forest Park includes multi-steps and involves participation by relevant parties and actors. Urban Forest Park serves as a space break that has natural amenities that the public can use. It mitigates the perennial problem of pollution that is plaguing the city. It also serves to function as forest therapy that gives health and calming benefits to people. Its sustainability would alleviate flood control issues and at the same time could serve as academic laboratory to students in learning more specifically on topics of biology and botany. Sustainability would create a livable city that would have the elements of green space and open access for

public use. Funding via institutional arrangements and mandatory laws would ensure the urban forest park sustainability. Participation from local actors like the Local Government Unit, NGOs and the private sectors are equally vital specifically in its maintenance and management that would result to the sustainability of an urban forest park.

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ANNEX

A.1. Profile of the respondents

The first table would show that majority of the respondents are female. (gender and age in one table)

Table 3.1 Gender of the Respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	111	34.3	34.3	34.3
	Female	213	65.7	65.7	100.0
	Total	324	100.0	100.0	

Proximity of the respondents to AFP

When the student's were asked about the proximity of their residence to the Forest Park, majority of them (with 20.4%) said that they live more than 50 kilometers (km) away from the park. It is followed by the student's, which are less than 10 km on the park with 20.1%. Lastly, 15.7% said that they are 11-20 km away from the park and 14.8% said that they are 21-30 km away from the park. Therefore it is safe to say that majority of the respondents are near the Forest Park.

Table 3.3 Proximity of the student's to the Forest Park

	Frequency	Percent	Valid Percent	Cumulative Percent
	2	.6	.6	.6
uncertain	22	6.8	6.8	7.4
10 km and below	65	20.1	20.1	27.5
11 to 20 km	51	15.7	15.7	43.2
21 to 30 km	48	14.8	14.8	58.0
31 to 40 km	33	10.2	10.2	68.2
41 km to 50 km	37	11.4	11.4	79.6
51 km and above	66	20.4	20.4	100.0
Total	324	100.0	100.0	