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# Visual Assessment of Native Species Replacement Candidates for the Acacia Tree (*Albizia saman*) in the U.P. Diliman Academic Oval Streetscape

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## Abstract

The acacia tree, botanically known as *Albizia saman*, has remained an integral element of the University of the Philippines Diliman campus landscape for almost seven decades (as claimed in the University of the Philippines website <http://www.upd.edu.ph/sitesofinterest.html>). In 2009, a university wide memorandum was passed limiting the planting of exotic tree species in all U.P. campuses. Since *A. saman* is an introduced species from the Americas and not native to the Philippines, it is debated what species could be used to replace the acacia trees in the academic oval in case specimens die or are fallen.

The study attempts to evaluate 14 native tree species already found growing within the U.P. Diliman campus as candidates to succeed the acacia trees as main street tree around the academic oval. The acacia is first scrutinized of its aesthetics based on the quality of space it creates in the campus landscape design. The candidate native tree species are then subjected to the same evaluation process and measured whether they could approximate *Albizia saman*'s design importance in U.P.'s unique urban landscape.

Keywords: Native Trees, Aesthetic Assessment, Acacia, U.P. Diliman Landscape

## I. Introduction

### A. Background

When the University of the Philippines Diliman campus was planned in the 1950's, *Albizia saman* was used as an integral part of the landscape design. The academic oval streetscape was planted with numerous specimens of the tree, predominantly ten meters apart from each other. *A. saman* is an introduced species to the Philippines, native to Mexico, Peru and Brazil. *A. saman* is internationally known as the rain tree but is more known in the Philippines as the acacia tree.

Approximately 65 years later, the acacia trees have grown as an important and iconic element of the U.P. academic oval landscape. The trees' arbor has enhanced the character of the streetscape creating a unique space underneath for people and vehicles passing through the main academic avenues. The trees also provide sufficient shade making the academic oval a favorite among joggers and strollers which is obvious especially after office hours and weekends.

In an ocular survey conducted for this research, it revealed that some portions of the academic oval tree ring have standing acacia tree specimens currently spaced at 20 meters. Some are even 30 meters apart suggesting that a number of specimens have probably disappeared from the original ten-meter interval and were not replaced over the span of the landscape's history. Also in the last ten years, the U.P. Diliman campus was struck by several strong typhoons. Two of them, Milenyo (2006) and Glenda (2014), caused many of the old acacia trees around campus to topple over. An inspection done a day after Glenda's occurrence showed that more than ten acacia trees fell because of the typhoon's strong winds, and at least two of them are located within the academic oval tree ring. At present, slots vacated by the fallen acacia trees are still awaiting to be replaced. Lightning also occasionally strikes some of the academic oval acacia trees inflicting additional damage.

In 2009, then University of the Philippines President Emerlinda Roman signed Memorandum No. PERR 09-24, stating that non-native species could no longer be planted for purposes other than educational within the numerous U.P. campuses and facilities around the Philippines. The memo was passed to heighten the educational value of

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using native species and hopefully contribute to the improvement of the different campuses' ecological awareness.



**Figure 1.** The U.P. Diliman Academic Oval streetscape has for decades been defined by the presence of the non-native species *Albizia saman* or the popular Acacia tree. But a new university memorandum dictates that acacia trees could no longer be planted in future landscape undertakings in the University of the Philippines.



**Figure 2.** After the typhoon Glenda hit Manila in 2014, a number of acacia trees fell down and a few are located in the academic oval.



**Figure 3.** Some acacia trees are said to easily topple down during strong winds because of its shallow roots not penetrating the hard adobe which comprises the vicinity's geology.



**Figure 4.** Map of U.P. Diliman showing the Acacia lane and academic oval in red.

## B. Statement of the Problem

The book *Philippine Native Trees 101* (Hortica Filipina Foundation and Green Convergence 2012) claims that the Philippines has approximately 3,600 identified native tree species having varied looks and appearances, growing in a variety of habitats. Less than 100 species are actually used for ornamental use and even far less are cultivated for landscape design use. But even the few available trees used in landscape projects are not familiar to most Filipinos in terms of appearance, much more their form and aesthetics.

*A. saman* is a popular species used in local landscape design. From its introduction more than a century ago to present, it has remained a favorite tree to use by landscape architects and design professionals because of its unique shape and arbor. For U.P.-trained architects and landscape architects, the presence of acacia in the academic oval and the campus landscape has been imprinted in their psyche as an ideal streetscape because of the popular cavernous and cozy space the tree's canopy creates in the student-frequented academic oval.

*A. saman* to this day also remains as the most recognized tree species growing around the Diliman campus not only to design students but to the whole U.P. Diliman community. On the other hand, not many native trees are known to most U.P. Diliman students and even teachers based on the author's observation since the author has been conducting educational tree tours around the UP Diliman campus for students and university employees for the past five years and this has been the general consensus among participants.

If concerned university units are to follow what the 2009 memorandum states, specimens of the non-native *A. saman* should no longer be allowed to be planted within the U.P. Diliman campus. The question then stands - What suitable species can be used to replace the already fallen acacia trees? What native species can be used as substitute to recreate the space quality *A. saman* are intended for in future campus landscape undertakings?

## C. Significance of the Study

There is a surge of environmental and ecological advocacies in the past few years. The formulation of the U.P. memorandum on native tree species is a direct result of this movement as the importance of environmental enrichment should be spearheaded by the institution that shapes the country's bright minds.

This wave of advocacy also led to an influx of books and other literature on the use of native trees and Philippine flora in general in urban spaces such as *Philippine Native Plants 101* (Hortica Filipina Foundation and Green Convergence 2012) and *Shades of Majesty* (Malabrigo and La Frankie 2013). There is the intent to share information about the existence of the numerous species, but so far limited to none tackles the design application in visual assessment of trees.

Apart from habitat and the probability of the trees surviving in a designed environment, aesthetics and form play a vital role in the selection of particular trees in space and landscape planning. It is therefore advantageous to

present to future designers the aesthetic profile of a tree species for them to know its landscape design potential and how they would fare in space conceptualization.

The exotic acacia tree or *A. saman* is a vital landscape material in the local scene. Since it is a widely used tree in landscape projects, visual assessment of the acacia tree's aesthetics could be a good start to compare to probable native species replacements. The acacia's distinct wide canopy might be hard to approximate, but with 3500 Philippine native species to choose from, there surely will be several species to approximate the acacia's importance in landscape design.

#### **D. Goals and Objectives**

The research goal is to come up with possible replacement candidates for *A. saman* in U.P. academic oval landscape design. In the process the study will optimistically achieve the following objectives:

1. To visually and quantitatively assess the aesthetics of *Albizia saman* as a landscape material in terms of its form and pertinent dimensions.
2. To assess the space created by the acacia tree's form in the academic oval landscape design
3. To assess how the line and form of the acacia tree affect the landscape design space in the academic oval streetscape.
4. To assess suitable native tree species already existing in the U.P. Diliman campus landscape as candidate to replace the *Albizia saman*.
5. To assess if the said native species could approximate the acacias aesthetic pertinence in the academic oval streetscape.

#### **E. Scope and Limitations**

The research will only focus on the *Albizia saman*'s aesthetic role in the U.P. Diliman academic oval streetscape. Although there are new species already planted in the academic oval, the landscape is still dominated by the acacia tree in terms of number.

The study will only assess specimens growing along the main avenues defining the academic oval. The trees growing outside the academic oval ring will not be included.

The streetscape space created by the acacia tree in the academic oval landscape is the focus of this assessment. Other landscapes around campus using the acacia tree will not be included.

To limit the number of native species for assessment, only trees visually comparable in size and shape to the acacia tree are considered as possible candidates.

The study will not focus on growing conditions success. To omit the factor of habitat and survival, only existing native trees successfully growing around the U.P. Diliman Campus are to be assessed. This will greatly limit the possible array of candidates but would allow the study to focus on landscape design aesthetics. Behavior also will not be discussed. The study will only touch on each tree's line and form.

As prequalification, fourteen species of native trees were chosen from an existing native tree list (Sotalbo 2001). Only the existing specimens of these listed trees present in the U.P. Diliman Campus are the ones that will be assessed for this study.

Since aesthetics is the one qualified, the method to be employed is graphic. Space to be qualified in this study will be reliant on the streetscape section created by the acacia tree.

#### **F. Assumptions**

It is design aesthetics that is the primary criterion in the study though it will touch on the functional and cultural areas dictated by the form of the individual tree species. Even if functional and cultural character are mentioned in the research, it will be relegated to aspects of it created by the tree in the academic oval landscape. The study will not attempt to assess or qualify the functional and cultural implications of the use of *A. saman* and the native tree species.

In this research, when a candidate tree has at least two specimens growing within the U.P. Diliman Campus and has reached pertinent size, it is deemed successful to grow in the U.P. Diliman landscape thus qualified to be included in the landscape design assessment.

Maintenance is used as a fixed variable. Since the trees assessed were already existing in the U.P. Diliman campus landscape and almost all of the trees were located near roadside, it is assumed that they were subjected to the same maintenance parameters as what were applied on the *Albizia saman* specimens.

#### **G. Review of Related Literature**

In 2001, Emiliano Sotalbo prepared a documentation of major vascular plants in the Diliman Campus entitled *Trees, Palms and Bamboos of the University of the Philippines Diliman*. It listed approximately 200 species of trees growing around the 500-hectare university property. Out of the 200 species listed, only 40 to 45 percent are native from the Philippines and they number much less in specimen quantity. It lists down *A. saman* as a major tree used in the landscape of the campus and a dominant tree cover in the academic oval.

When U.P. Memorandum was passed in 2009, an accompanying document prepared by U.P. Los Baños personnel was circulated to the different concerned units. *Species List and Planting Guidelines for the Native Trees Policy for U.P. Campuses for the Next Century – Committee Report* presented native landscape species that could be used for campus landscaping. It gave a list of available native species grown in university nursery facilities and suggested a few others with ornamental or aesthetic value. But the suggested species were not assessed based on their landscape use.

In 2010, the author of this research submitted and defended his graduate thesis entitled *Evaluation of Selected Philippine Native Trees and Shrubs for Landscape Design Use*. It discussed 75 Philippine native trees and shrubs in terms of their aesthetic properties. Drawings were made of the evaluated species and each were subjected to qualitative



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assessment based on line, form, color and texture. The assessment method for this will be a major basis in terms of visual assessment for this undertaking. The visual approach will also be replicated in assessing the trees and the space they create.

In 2012, Hortica Filipina Foundation and Green Convergence listed more than 100 Philippine native tree species in *Philippine Native Trees 101: Up Close and Personal* for urban greening. The species were presented via anecdotal stories and image collage. Their landscape value was not explored in detail. Though there were measurements and vital information included in the book it was presented in table and prose form.

In 2012 (Malabrigo and La Frankie) and 2013 (Ramon Aboitiz Foundation, Inc.), two Aboitiz Group of Companies subsidiaries came out with two native tree books, Wide Angle Media's *Shades of Majesty* and the Ramon Aboitiz Foundation's *Manual on Native Trees in the Visayas*. Both books came up with very good photo-documentations and detailed descriptions of the plants. But the plants' landscape aesthetic value was not explored.

**II. Methodology**

**Table 1.** The Research Framework showing the different steps, activities and phasing.

STEP	WORK DESCRIPTION	PHASING
1	Visual assessment of the acacia tree's form	Phase 1 : Field work and data collection
2	Assessment of the streetscape space created by the acacia tree, ocular of streetscape space and measuring pertinent data	
3	Ocular and selection of native tree species to evaluate	
4	Visual assessment of the selected native trees, ocular of specimens, measuring pertinent data	
5	Translating all data into graphical representations/ digital drawings	Phase 2 : Computer work and computer aided drawing/ drafting
6	Comparison of acacia tree and native tree candidate and superimposition of graphic sections and evaluation of space overlaps	Phase 3 : Computer superimposition, graphic juxtaposition and assessment
7	Assessment of results	

The research is qualitative in approach. The visual assessment would be carried out in three phases.

Phase 1 starts with field work or data collection, when *A. saman* and the candidate native trees are qualified. The concerned specimens are visited, physically inspected and measured. After the fieldwork, Phase 2 commences when the tree measurements and data collected are processed and converted into the graphic representations/digital drawings. Phase 3 will be reliant on these digital images of the trees, comparing the arborescent species' profiles to that of the acacia.

Aesthetics is generally descriptive and qualitative but the study will attempt to include a small quantitative aspect in measuring comparison variables. In the graphic part, the differences in the superimposition of tree profiles as well as the streetscape section will be measured visually but will be connotative of areas.

**Step 1: Visual assessment of the acacia tree**

The first step involves inspecting several acacia trees growing in the U.P. Academic Oval. Selected healthy specimens were visually assessed by the proponent of this research. Sampling was done by selecting five sites along the oval to do ocular, photo-documentation and physical measuring of the *A. saman* specimens. Documentation and physical measuring was performed with the help of two to three research assistants.

The five chosen sites for sampling were visited in the course of three weeks. In each site, six (6) acacia tree specimens were chosen based on health and robustness. A total of 30 acacia trees were documented as samples and measured. Photo documentation was performed to double-check the measurements and to use as reference basis for drawing part of the research.



**Figure 5.** Sampling, measuring of pertinent data and photo-documentation of the acacia trees were performed. Height dimensions were approximated using a two-meter measuring stick.

The measurements taken included the following data: tree height was measured by approximation using a two-meter measuring stick held by a research assistant standing near the base of the tree while observer stands more than 100 meters distance from the tree specimen, canopy width (based on tree radius), breast height trunk diameter and circumference were obtained using a 15-meter long retractable meter and a flexible measuring tape.

**Step 2: Assessment of the streetscape space created by the acacia tree**

Space created by the acacia tree was assessed by recreating a cross section of the streetscape flanked by two acacia trees standing on opposite sides of the academic oval road. Streetscapes at the five chosen sites were inspected, documented and measured. Data were recorded.

Photo documentation of the streetscape was performed to check the measurements and to use as reference for drawing. The following were measured:

1. Width of the road;
2. Width of vehicular carriage way;
2. Width of bicycle and jogging lane;
3. Width of sidewalk; and
4. Distance of acacia trees from the edge of sidewalk.

**Step 3: Selection of native tree species to assess**

Native tree species candidates are the ones considered as possible replacement candidates for this research. The native nominees were determined using Sotalbo's book: *Trees, Palms and Bamboos of the University of the Philippines Diliman*. Using size and the tree descriptions indicated in the book as selection parameters, 14 species were included as possible native tree species candidates.

Sotalbo's book also has a map of the tree locations within the U.P. Diliman campus landscape. These specimens were located within campus and inspected. The 14 native trees' identities were personally confirmed with Mr. Sotalbo himself. Common names, botanic names and location of the sampled full grown specimens were tabulated below.

**Step 4: Visual assessment and documentation of the selected native trees**

After locating the specimens of the qualified native tree species, each was further observed and photo-documented. Again documentation was performed with the aid of three research assistants.

The largest and most robust specimens of each species were determined and subjected to visual assessment. Vital measurements were taken and recorded.

Photo documentation was performed to confirm the measurements and to use as reference for the computer drawings to be generated later on.



**Figure 6.** Several native trees were located and measured around the university campus, including this *Kalumpang* tree or *Sterculia foetida*.

**Table 2.** The pre-qualified existing Philippine native tree species growing within the U.P. Diliman campus and their specimen count and location.

<i>Kalumpang</i> or <i>Sterculia foetida</i>	Two specimens located at a parking lot behind Palma Hall
<i>Dao</i> or <i>Dracontomelon dao</i>	Full grown specimen located beside the Main Library
<i>Siar</i> or <i>Peltophorum pterocarpum</i>	Full grown specimen located beside the Main Library
<i>Kalumpit</i> or <i>Terminalia microcarpa</i>	Largest specimen located at the Sunken Garden
<i>Kupang</i> or <i>Parkia timoriana</i>	Three large specimens located at roadside near the National Engineering Center
<i>Bitao</i> or <i>Calophyllum inophyllum</i>	Two large specimens located each at the Yakal Residence Hall and the College of Law (Malcolm Hall)
<i>Molave</i> or <i>Vitex parviflora</i>	Several specimens located at Ylanan Road
<i>Amugis</i> or <i>Koordersiodendron pinnatum</i>	Specimen located behind Bahay ng Alumni
<i>Supa</i> or <i>Sindora supa</i>	Specimen located behind Bahay ng Alumni
<i>Narra</i> or <i>Pterocarpus indicus</i>	Several specimens located at the track and field oval
<i>Lamio</i> or <i>Dracontomelon edule</i>	Two specimens located at the Church of the Risen Lord Complex
<i>Balitbitan</i> or <i>Cynometra ramiflora</i>	several specimens located near the Check Point Area at University Avenue
<i>Pili</i> or <i>Canarium ovatum</i>	several specimens flanking University Avenue
<i>Talisay</i> or <i>Terminalia catappa</i>	several specimens flanking University Avenue





**Figure 7.** Some trees were disqualified because they are obviously not comparable to the acacia tree in size and form. Like this *balitbitan* or *Cynometra ramiflora* which obviously has a low trunk height.

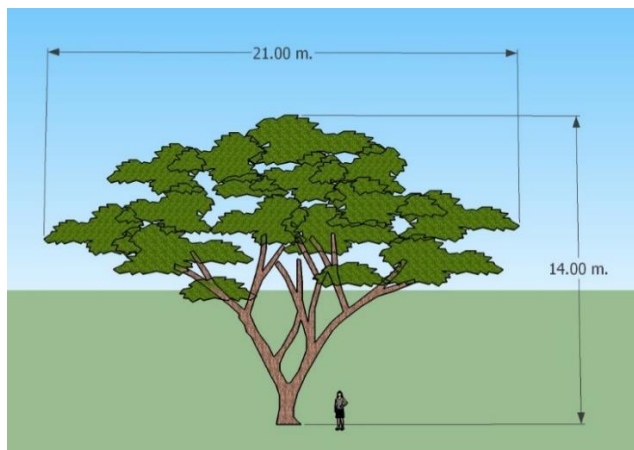
Measurements were taken of each sample specimen of the candidate trees.

The tree height was measured by graphic approximation using a measuring stick held by a research assistant standing near the base of the tree while observer stands more than 100 meters distance from the tree specimen. Canopy width (based on tree radius), breast height trunk diameter and circumference were obtained using a 15-meter long retractable meter and a flexible measuring tape.

### Step 5: Translating collected data into graphical representation/ digital drawings

#### Graphic translation of *Albizia saman* data

The data recorded for *A. saman* were averaged. Using these and the collected images (photographs as reference) of the acacia tree samples, a typical digital tree profile was approximately recreated (based on the measurements taken in the fieldwork) using a computer-aided program. Drawing was prepared by the proponent, with the help of a couple of Landscape Architecture students, using a digital software (Trimble Sketch-Up-Make non-commercial version 2014).



**Figure 8.** Based on the gathered measurements in the sampling, a digital model was generated showing the tree profile.

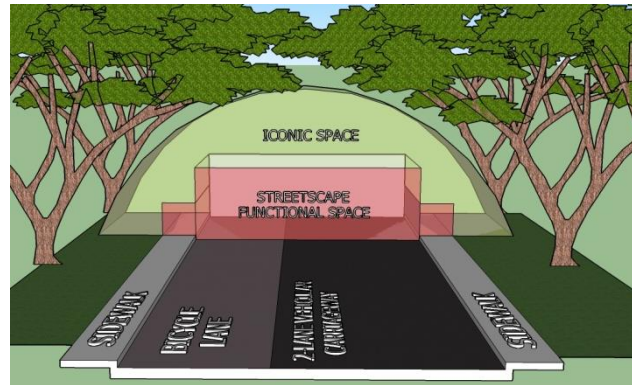
#### Graphic translation of measured streetscape space created by *Albizia saman*

Using the measurements taken at the five chosen sites, a typical road space section was also digitally generated using the same computer graphics program. The digital tree profile of the acacia tree previously created was added and scaled into the section drawings of the streetscape space.



**Figure 9.** Averaged dimensions were used to recreate the streetscape section created by the acacia trees.

A functional streetscape space field was assigned based on anthropometrical (human static and dynamic dimensions) and vehicular dimensions of the streetscape. For the digital drawing, this space was assigned using a red-colored field. A cultural iconic space was also allotted based on the cavernous area created by the acacia tree arbor and this was graphically represented using a yellow colored field.



**Figure 10.** The red-colored field represents the functional space used by people and vehicles while the yellow-colored field represents the yellow space that connotes the iconic cavernous character the acacia tree canopy creates.

#### Graphic translation of data for native tree species candidates

During the ocular inspection, the trees were qualified based on size and form. The data collected for the inspected native tree species were compared to the data collected for *A. saman*.

Based on what was physically measured in steps 1 to 3, the native tree data were juxtaposed with the acacia tree, comparing radius (based on actual dimensions measured) and form (based on the images of the tree superimposed with the two-meter measuring stick – approximating the height and overall form of the tree). The comparison was tabulated, presented in Table 3.

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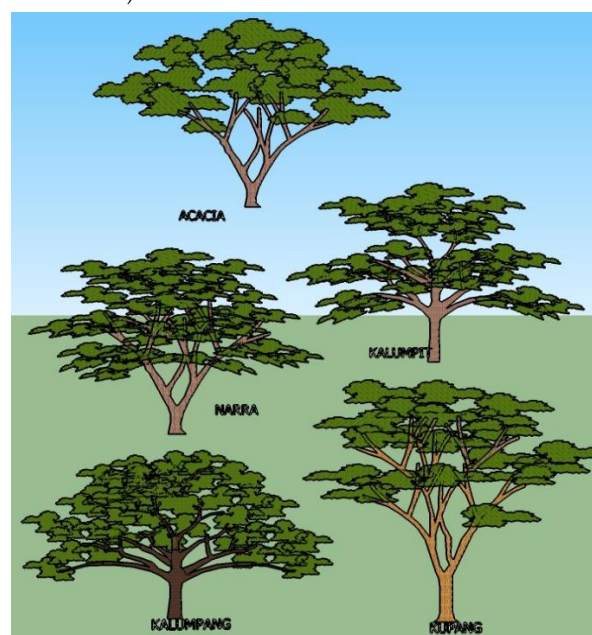
**Table 3.** Native tree species qualified and inspected around the U.P Diliman Academic Oval and surrounding areas. The species deemed comparable in size to *A. saman* are shortlisted to be included in the succeeding steps of the study are highlighted in yellow.

Tree	Size	Form
<i>Kalumpang</i> or <i>Sterculia foetida</i>	Radius 11.5 m.	Ok – Comparable to acacia
<i>Dao</i> or <i>Dracontomelon dao</i>	Radius 4.0 m. Too small	Not - More tall than wide
Siar or <i>Peltophorum pterocarpum</i>	Radius 11.0 m.	Specimen damaged by typhoon, not conclusive
<i>Kalumpit</i> or <i>Terminalia microcarpa</i>	Radius 13.6 m.	Ok – Comparable to acacia
<i>Kupang</i> or <i>Parkia timoriana</i>	Radius 14.9 m.	Ok – Comparable to acacia
<i>Bitao</i> or <i>Calophyllum inophyllum</i>	Radius 12.2 m.	Trunk height is too low. Branches cantilever a few meters above road level
<i>Molave</i> or <i>Vitex parviflora</i>	Radius 6.0 m.	Specimens are young too evaluate
<i>Amugis</i> or <i>Koordersiodendron pinnatum</i>	Radius 8.0 m.	Specimens are young too evaluate
<i>Supa</i> or <i>Sindora supa</i>	Radius 8.0 m.	Tree is tall rather than wide. Trunk height is too low. Branches cantilever a few meters above road level
<i>Narra</i> or <i>Pterocarpus indicus</i>	Radius 13.2 m.	Ok – Comparable to acacia
<i>Lamio</i> or <i>Dracontomelon edule</i>	Radius 8.7 m. Radius is quite limited.	Ok – Comparable to acacia
<i>Balitbitan</i> or <i>Cynometra ramiflora</i>	Radius 7.2 m.	Trunk height is too low. There is not enough space below the tree crown
<i>Pili</i> or <i>Canarium ovatum</i>	Radius 7.6 m.	Tree is tall rather than wide. Trunk height is too low. Branches cantilever a few meters above road level
<i>Talisay</i> or <i>Terminalia catappa</i>	Radius 8.4 m.	Tree is tall rather than wide. Trunk height is too low. Branches cantilever a few meters above road level

In some cases, the specimen located had inconclusive variables, such that they are too small or damaged to be documented and compared for the research. Some trees were not considered because they are obviously not comparable to the acacia tree in size and form.

Based on the above-mentioned parameters, the prepared tabulation indicates the species highlighted in yellow as the suitable native species. Four native species are superimposed into the streetscape section and will be compared to streetscape space of the acacia tree.

Using the data and the collected image of the native tree samples, a typical tree profile drawing was prepared for the four (4) qualified candidates. The same digital software (Trimble Sketch-Up-Make non-commercial version 2014) was used.



**Figure 11.** Digital images of the qualified trees were prepared using Trimble Sketch-Up-Make non-commercial version 2014.

**Step 6: Comparison of acacia tree and native tree candidate**

*Comparison of the created tree profiles sizes*

The digitally drawn tree profiles were juxtaposed with the digital acacia tree profile. Qualified trees were superimposed into the academic oval streetscape sections. The images created for both acacia tree and native tree species candidate were generated and compared.

*Superimposition of the streetscape sections and comparison*

The digitally drawn images of the four native tree candidates were superimposed into the graphic sections of the streetscape. The native tree streetscape sections are compared to the acacia tree streetscape sections by visual assessment. Differences are determined and analyzed qualitatively.

**Step 7: Tabulation and Assessment**


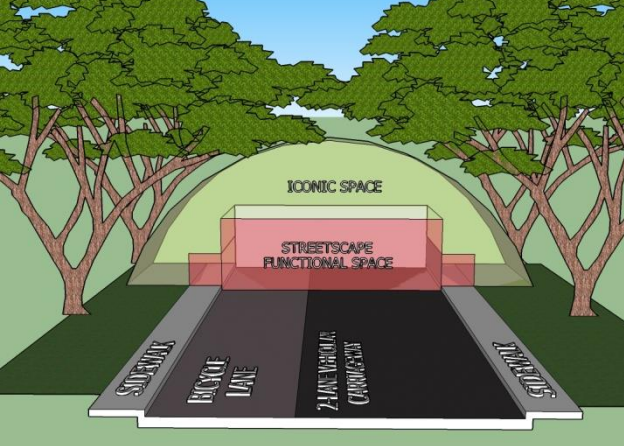
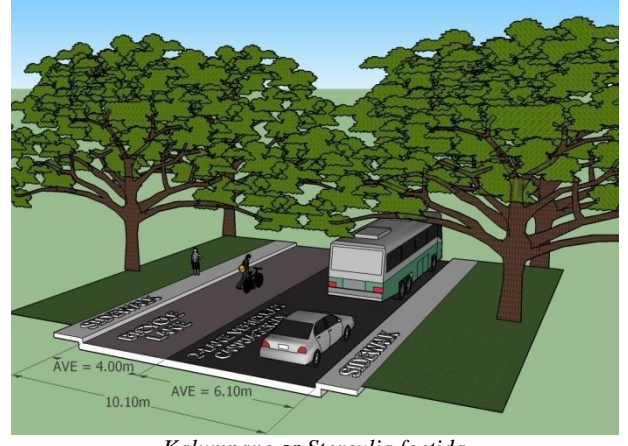
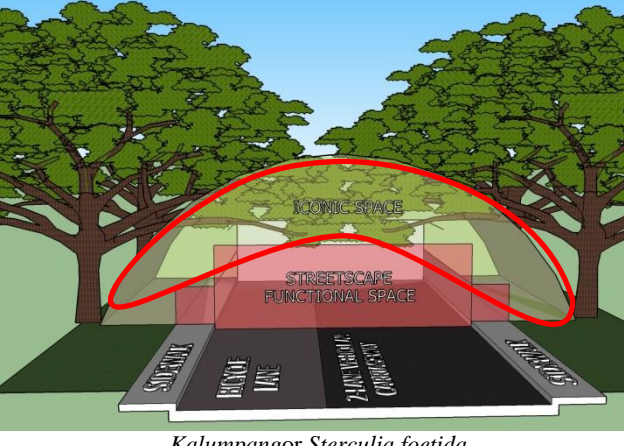

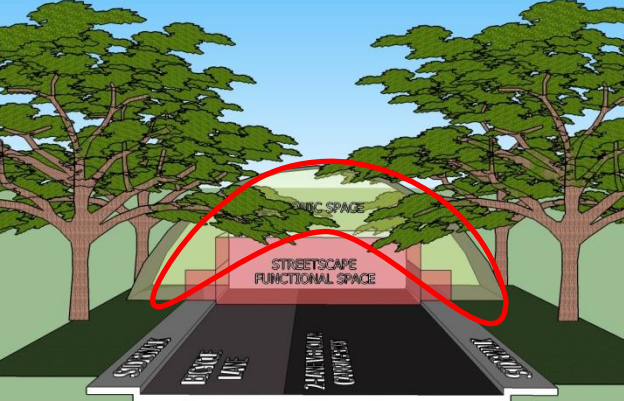
The generated drawings were organized and presented as Table 4 for easier comparison.



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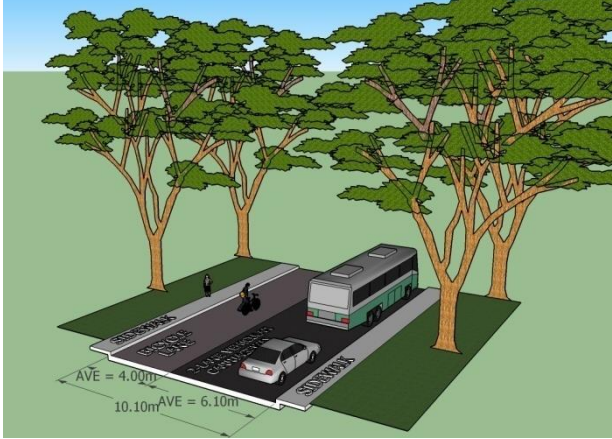
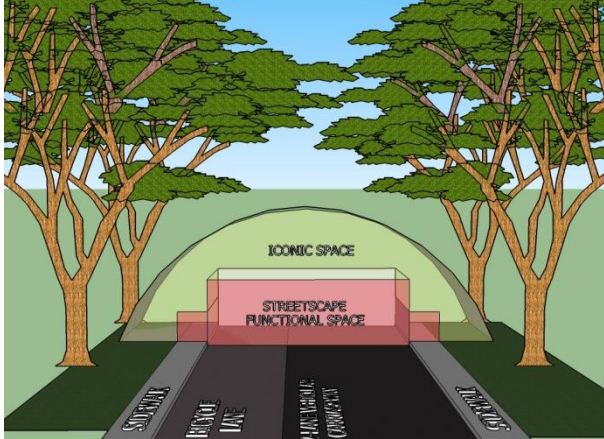

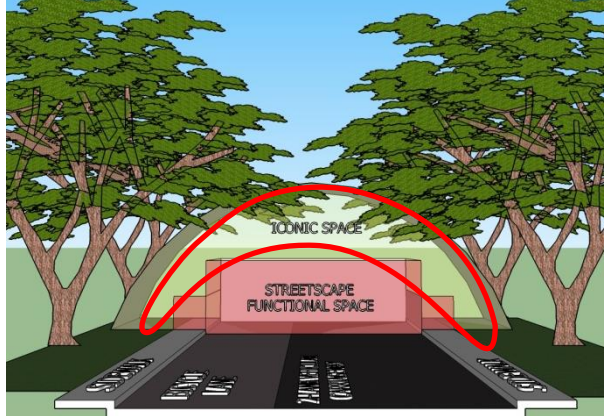
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**Table 4.** Tabulation of visual assessment results.

<p><b>Assessment 1:</b> Digitally generated tree profile superimposed into digitally approximated streetscape</p>	<p><b>Assessment 2:</b> Streetscape Space Visual Assessment and Evaluation of form encroachment into functional spaces</p>
 <p>Acacia or <i>Albizia saman</i></p>	 <p>Acacia or <i>Albizia saman</i> Variable control for comparison</p>
 <p><i>Kalumpang</i> or <i>Sterculia foetida</i> <i>Kalumpang</i> is smaller than acacia and has lower trunk height.</p>	 <p><i>Kalumpang</i> or <i>Sterculia foetida</i> Forms cavernous space. Lower branches encroach into the iconic cavernous space and a bit into the streetscape functional space (encircled in red). Tree will have a more limited space under its canopy. Larger vehicles might hit lower branches.</p>
 <p><i>Kalumpit</i> or <i>Terminalia microcarpa</i> <i>Kalumpit</i> is a large tree almost comparable to acacia size but has lower trunk height.</p>	 <p><i>Kalumpit</i> or <i>Terminalia microcarpa</i> Forms cavernous space. Lower branches encroach into the iconic cavernous space and a bit into the streetscape functional space (encircled in red). Tree will have a more limited space under its canopy. Larger vehicles might hit lower branches.</p>



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<p align="center"><b>Assessment 1:</b> Digitally generated tree profile superimposed into digitally approximated streetscape</p>	<p align="center"><b>Assessment 2:</b> Streetscape Space Visual Assessment and Evaluation of form encroachment into functional spaces</p>
 <p align="center"><i>Kupang or Parkia timoriana</i></p> <p><i>Kupang</i> is a much taller tree compared to the acacia tree but has almost the same canopy width. It has taller trunk height</p>	 <p align="center"><i>Kupang or Parkia timoriana</i></p> <p>Forms a much larger cavernous space. Tree profile does not encroach into both iconic space and functional streetscape space.</p>
 <p align="center"><i>Narra or Pterocarpus indicus</i></p> <p><i>Narra</i> has almost the same structure and form as acacia but slightly smaller</p>	 <p align="center"><i>Narra or Pterocarpus indicus</i></p> <p>Forms cavernous space. Tree profile slightly encroaches into iconic space and but not into functional streetscape space.</p>
<p><b>Assessment 1 Result:</b> In terms of tree profile and aesthetics, the Narra is the closest candidate resembling the aesthetics of the acacia tree.</p>	<p><b>Assessment 2 Result:</b> In terms of streetscape section and space comparison, Kupang is the least that encroaches into the iconic and functional streetscape space, while Narra is second best.</p>

The generated images of the trees and the streetscape spaces were compared with each other and qualified visually.

For assessment 1, the native tree species candidates are compared with the acacia tree in terms of height, size and form. Based on tree profile and aesthetics, the Narra is the closest candidate resembling the aesthetics of the acacia tree.

For assessment 2, the native tree species were evaluated in terms of how some its parts are encroaching into the red (human and vehicular functional space) and yellow (iconic cultural space) fields. In terms of streetscape section and space comparison, Kupang is the least that encroaches into the iconic and functional streetscape space, while Narra is second best option.

### III. Results and Conclusion

Based on initial ocular, tree inventory and qualifications done, fourteen (14) native species were found to have full grown specimens around the Diliman Campus. Because of this they were included to be observed, measured and visually assessed for this research.

For steps 3 and 4 of the methodology, the fourteen species were subjected to further ocular fieldwork, physical measurements and visual qualifications. After comparing the 14 species with the measurements and data collected for *Albizia saman*, only four (4) species were found to be comparable in shape, size and form with the acacia tree. These were Kalumpang (*Sterculia foetida*), Kalumpit (*Terminalia microcarpa*), Narra (*Pterocarpus indicus*) and Kupang (*Parkia timoriana*).

# Visual Assessment of Native Species Replacement Candidates for the Acacia Tree (*Albizia saman*) in the U.P. Diliman Academic Oval Streetscape

Gozon

Only the remaining four native trees were subjected to methodology step 5. Kalumpang (*Sterculia foetida*), Kalumpit (*Terminalia microcarpa*), Narra (*Pterocarpus indicus*) and Kupang (*Parkia timoriana*) were graphically represented, digitally drawn and juxtaposed with the digital drawings of *Albizia saman* and the streetscape space recreated.

Based on the graphic comparison and visual assessment, the best candidate species is Narra or *Pterocarpus indicus* in terms of aesthetics approximation and Kupang or *Parkia timoriana* in terms of streetscape space approximation.

If in the future landscape designs of the U.P. Diliman campus, the aesthetic form of *Albizia saman* is required to be replicated, the research recommends Narra or *Pterocarpus indicus* as the ideal candidate replacement to approximate the aesthetics of the acacia tree.

If the landscape requires that the streetscape space created by the acacia tree is to be the one approximated and recreated, then Kupang or *Parkia timoriana* is the ideal streetscape space replacement candidate.

## IV. Further Recommendations

The probability of using the native species as acacia tree replacements would not be tested fully unless the candidate plants are substituted in the academic oval streetscape. The researcher recommends that some of the acacia tree gaps are to be immediately replaced by specimens of the candidate native trees and examined for their landscape design potential on site. The individual tree's progress could be also documented and assessed in a separate study.

Since 2008, the university's centennial celebrations, two more native tree gardens have been established within the U.P. Campus leading to an introduction of at least 100 new native species into the native tree count. Though theoretically there are certain trees in the new roster that could compare in size and shape to the acacia tree, the specimens growing in these gardens are still far from being mature. Probably after a few years when these specimens have fully developed, they could be subjected to a similar visual assessment.

Furthermore, the remaining 3,000 plus species could also be subjected to landscape aesthetic assessment, exploring the potentials of our untapped Philippine flora. These could be subjects for numerous tropical landscape design researches in the future.

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