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FALLEN TREE PROBLEMS IN THE FIELD OF LANDSCAPE ARCHITECTURE IN MALAYSIA

Ahmad Zamil Bin Zakaria
Faculty of Architecture, Planning and Surveying, Universiti Teknologi MARA (Perak), Malaysia
zamil227@perak.uitm.edu.my

Abstract
A study of fallen trees and their impact on the field of landscape architecture is carried out based on media reports in Malaysia. This incident is very worrying fallen tree population in this country, whether located in urban areas or rural areas. The public now want the best solution to reduce the threat of fallen trees that may occur unexpectedly. The situation experienced by Malaysians today is likely due to the lack of concern in the choice of appropriate plant species and a lack of maintenance knowledge. Threats of fallen tree also happen if the correct method is not practiced and not in accordance with planting guidelines that have been provided. Many of us are involved in the maintenance of landscape areas such as urban forests, recreation, maintenance of roads and private residences. All these require of expert advice and professional opinion to identify the needs in managing trees, which if neglected appear to be dangerous to the public. Today, the issue of safe tree planting should be practiced in order to prevent incidents of fallen trees in future. A complete and proper documentation must be implemented so that it there will be accurate and reliable reference to address the issues of this predicament.

Keywords: Fallen Tree , Lanscape Architecture, Safe Tree Planting, Selection Factors

1. Introduction

Nowadays, disasters fallen trees in Malaysia is worrying people, especially city dwellers. It is caused by factors that may not be identifiable, which covers natural disasters and physical and ecological processes of the tree surroundings. The most basic thing in interpreting how a large tree is collapsed, trees planted do not have tap roots, stems or branches of the tree was attacked by the termites and the factors of soil erosion due to heavy rains and storms. More than 20 cases have been reported to local authorities in respect of fallen trees. The effect are the death of residents and road users as well as causing traffic jam to remove a fallen tree in the middle of the road. Landscape architects must play an important role in the selection of suitable trees and safe, not only for the short term, but selected trees in the landscape design is also necessary for long-term use. Planting trees along the way is also seen very well, even then the trees must be in good maintenance and if it is not maintained, adverse incident will occur. Therefore, the responsibility of a landscape architect at the time is now so heavy, because its work is not just the greening of the earth, but the safety of everyone who is close to the tree planting areas. Contributing factors to the occurrence of fallen trees is due to the failure of local authorities to enforce the tree preservation order, as enacted in Act 172 - Town and Country Planning Act 1976. In this case the maintenance factor of each tree and, also work to detect the tree problem is not done by the party responsible. When we point fingers at each other related to each profession will result in dumping cases like this in the future. In this study the reader will be brought more to these issues, planted trees at the edge of the road, because currently most of the cases reported in the media are related to the occurrence of a large fallen tree across the road.

2. Definition

The Definition of Trees

1. Referring to The American Heritage - Dictionary of the English Language, Fourth Edition (2000) tree is a perennial woody plant having a main trunk and usually a distinct crown.

2. Encyclopedia Britannica (2012), tree is a woody plant that regularly renews its growth (perennial). Most plants classified as trees have a single self-supporting trunk containing woody tissues, and in most species the trunk produces secondary limbs, called branches.

The Definition Of Fallen / Fall / Collapse

1. Referring to The American Heritage - Dictionary of the English Language, Fourth Edition (2000) fall can be describe as to drop or come down freely under the influence of gravity.
2. Fallen is having dropped or come down from a higher place, from an upright position, or from a higher level, degree, amount, quality, value, number, etc.(Dictionary.com, 2012).

Definition Of Landscape

According to the National Landscape Department (2008), the definition of landscape in general is, a view of the Earth's surface resulting from natural conditions, or the result of construction. However, the definition of landscape architecture is slightly different from that, where landscape architecture is a blend between science and art in the production of a creative design through two main components of soft landscaping (softscape) and the hard landscape (hardscape).

Definition Of Landscape Design

According to Motloch, J.L. (1991), landscape design is the conscious process of managing, planning and physically changing the landscape. It involves the physical management of the landscape and the design of places.

Definition Of Landscape Architecture

Landscape architecture is a profession whose primary societal role is the synergism of art and science for the management, planning and design of the entire physical and cultural landscape, including its vestal wilderness and its growing urbaneness (Motlocth, 1991). According to Arno Sighart Schmid – Leonberg (2000) in The International Federation of Landscape Architects (IFLA) website; today, on the threshold of a new Millennium, humankind stands at a decisive point on its way into the future, with grave challenges and risks relating to our natural environment and its carrying capacity. Our profession of landscape architecture is called upon to contribute towards safeguarding the viability of the natural environment and towards developing and maintaining a humane built environment in cities, towns and villages.

Meaning Of Falling Tree By Researcher

The problem of fallen trees, according to the meaning of the researcher is, trees that have problems remain to be the place of origin. This problem occurs because of the age of the trees, the way of maintenance, environmental quality and selection of appropriate planting to an area. With the problems faced by the tree, this has led to it can not last long, due to local weather and climate factors. Among the incidents of fallen trees ever recorded was such as, a tree falling due to storms and floods, landslides, large branch fell on public transport, as well as a large branch fell on the main road. Trees can be dying due to disease, insect infestation, drought, the roots are exposed, and the failure to stem the effects of weather or a combination of strong winds contributing factors acting in concert. Some trees die and then fall after the stems or branches decompose, and some trees suffered skin cracking due to the availability of weak adhesion on the stem and branches, although the trees appeared to be very lush. This is because the structure can no longer meet the existing burden or no wind resistance and because of the weak structure in the tree.

3. Why There Are Many Cases of Falling Tree Incident In Malaysia?

Contributing factors to the occurrence of this incident fallen trees are as follows:

1. Large trees in the street in particular, it should be noted that much because, if it broke and fell across the road will cause accidents.
2. Current weather conditions are often accompanied by rain and wind is also very dangerous.
3. Tree branches that hang on the tree in the side streets and lush tree branches and covered the signboard also is the cause of undesirable accidents.
4. Lack of maintenance activities such as pruning or cutting down dead trees, or trees that may bring a risk to the public.
5. There is a dead tree in any place anywhere, even in the area of maintenance of local authorities. Dead trees is a feature that clearly shows that, the tree has failed or has lost its function. Such trees can be categorized as a tree with the highest risk and may at any time, fall or collapsed without encouragement from outside.

6. Currently, our country still lacks skilled manpower in the tree pruning work. The method of pruning or topping, for example, performed by unskilled workers on the tree will only damage the original structure of the tree.
7. Lack of coordination of work between the Forest Department and Local Authorities on the trees planted along roads throughout Malaysia. This has caused expertise in the government department is not utilized as best as possible.
8. Lack of budget to maintain the trees after planting has become one of the reasons why at present there are many trees that are not healthy, whether in urban or rural areas. Thus a comprehensive study on the maintenance of the trees after planting, it is necessary to help provide tree management budget more transparent, based on actual information gathering.

4. Do All Trees Have Legal Protection?

Referring to the 172 - Local authorities are not encouraged to make a preservation order on the trees of the following types:
1. Commercial crops
2. Fruit trees
3. Trees which are dying or dead; and may prevent or interfere with the installation, maintenance or other work related to the utility or a source that can threaten life and property.
4. The importance of preserving trees is to make a significant contribution to the quality of the environment and the additional elements that can beautify the environment.

Subsection 35A (3) of Act 172, allows one to cut down trees that are subject to a tree preservation order:
1. For trees which are dying or dead
2. To prevent the danger that is about to occur
3. If it is to comply with any written law

5. Factors That Influence The Selection Of Trees In Landscape Architecture.

Act 172 - Town and country Planning Act (1976)
Section 21, Act 172 requires the developer to meet when submitting the proposed landscape aspects of development applications. The conditions specified are as follows:
Steps to protect and beautify the environment in the project area.
1. Steps to protect the natural topography.
2. Steps for the improvement of the landscape.
3. Steps to preserve and plant trees.
4. Location and type of tree with a girth exceeding 0.8 meters and other plants on the development of the project area.
5. The provision of open space.

National Landscape Guidelines
Tree selections criteria refer to the National Landscape Guidelines are as follows:
The main street area, and the protocol road, and the main focus of the public, should be planted with flowering trees heavy key, to show the beauty and highlight the area's identity.
1. The main plant of the type that is straight and upright stems, and fast growth rate. Branches less than 3 meters from ground level must be cut to create public safety.
2. One type of trees to both sides of the road reserve. Planting different types can be made for specific purposes, such as intersection indicator.
3. The selections of the type of crops that can withstand pollution, branches are not easily broken and brittle and have a low rate of leaf fall.
4. Crops that are selected from species that have tap roots, and easily maintained species.
5. To reduce noise, the selection of plants that have a dense texture and the main tree of medium size category are recommended.
6. Planting of shrubs at the bottom of the main tree are encouraged to avoid the glare of street lights.
7. Selection of plant species intended for the stabilization, conservation and preservation of the slope should be selected from types that have roots grip. Recommended plants selected were from families 'Leguminosae' (beans).
8. To indicate when there is a cross-road or intersection, planting different tree species is encouraged at the intersection.

According To The National Landscape Guidelines (2008), There Are Eight Functions Of Tree Planting:
1. Protection of micro-climates.
2. Protection of the environment.
3. Markers and directions.
4. Barriers.
5. Ecological and biological diversity.
6. Aesthetic.
7. Improved quality of life and economic status.
8. Research and education.

In this fallen trees study, the researchers want to relate some of the functions of planting, as stated by the National Landscape Guidelines, include:

1) *Protection of micro-climates*
   a) Protection and shade - canopies and shade trees to provide consumer protection from the rain.
   b) Lowering the temperature in urban areas - planting trees reduce the micro climate of a city.
   c) However, the climate and the weather have played a big role in the incidence of fallen trees in Malaysia.
2) *Barriers*
   a) Reduce the glare of the sun - helping road users receive direct light.
   b) To control glare from vehicle control vehicle opposite direction - the planting of the road divider.
   c) Blocking the view is not interesting - planting closely serves as a barrier, a view of the area as squatters, garbage disposal and out of reach.
   d) Most commercial plantings are used as barrier plants is less interesting, but its functions and effects are very good for cover the bad views.
3) *Aesthetic*
   a) An interesting feature on the plants, giving effect to the views of aesthetics as a whole, particularly in urban areas.
   b) Designers will tend to use the beautiful trees and shady in landscape design, has a negative effect, because sometimes a landscape architect forgets about the morphology of a tree.

Referring to the National Landscape Guidelines (2008), generally the main tree should be given priority for a significant shading effect, and the planting of palm is encouraged in a narrow space. The selection of shade trees should be compatible with the size and space which is reserved for landscaping.

Crown Density

There are three types of tree crown density has been identified according to National Landscape Guidelines, namely:

1) Compact - a branch of natural systems is a lot of care and quantity of leaves and thick. For example tree is *Mimusops elengi.*
2) Medium - a natural system of branches and leaves moderate quantities. *Cassia fistula* tree for example.
3) Open - a branch of natural systems are open, the quantity of small leaves and branching forms that do not flow well. For example tree is *Gliricidia seplum*.

Branching

The main branching of trees will determine whether the trees used in landscape design, can last long or contribute to the risk category of fallen trees. According to the National Landscape Guidelines, branches of trees can be divided into five types, namely:

1. Vertical - the main branching less than 45 degrees from the main stem.
2. Ascendant - the main branching of approximately 45 degrees from the main stem.
3. Horizontal - the main branching of about 90 degrees from the main stem.
4. Bending - the main branching about 45 degrees at the base and bent at the tip.
5. Descending - the main branch and the subsequent more than 90 degrees from the main stem and bend down at the end.

6. Case Study of Fallen Tree in Malaysia

Most incidences of fallen trees were reported occurred in the side of the road. Among the trees that are always reported as fallen trees was such as, *Khaya senegalensis* (Khaya), *Samanea saman* (Hujan-hujan) and also the most is *Pterocarpus indicus* (Angsana). According to Ismail Saidin (a botanist), Angsana trees were planted

around many towns and cities in Malaysia. However Angsana tree planting is not done properly and not be treated with care. This has resulted in a tree is easy to fall, and the branches break easily in the event of high winds, thus destroying property and even death.

Case Study 1:
Report by the Utusan Malaysia newspaper dated 21/12/2009. Title of the article "Falling Tree: Senior Citizens Injured Crushed By The Branches". In this article a senior citizen was crushed by the Angsana tree, after he was out of the car. Angsana trees are as high as 15 meters was subsequently cut by the Trees Cutting Unit of Kuala Lumpur City Hall (DBKL) to do the cleaning work.

Case Study 2:
Report by the Utusan Malaysia newspaper dated 19/06/2010. Title of the article "Fear Of Crushed Trees". Review by Utusan Malaysia at that time found that about nearly 20 large trees that are old, was in the car park, children's playground and there is also near the home neighborhood. According to a resident, the problem of broken branches or fallen trees during heavy rain has several times experienced by residents in the area.

Case Study 3:
Report by the Utusan Malaysia newspaper dated 10/07/2010. Title of the article "Kindergarten Broken After Crushed By A Tree". In this article, a 14 meter tall tree had fallen into a kindergarten in Kuantan. A kindergarten teacher has claimed several times to make a complaint to the Kuantan Municipal Council to chop down trees as big as two embraces, was old and almost collapsed. He said, if not mistaken the age of the tree has more than 13 years. However, Kuantan Municipal Council staff who come to the inspection, has given reason not to cut down the tree because it is not dangerous. But the fact is the tree had fallen.

Case Study 4:
The report by Bernama dated 26/11/2010. A total of 20,000 passengers suffered delays when KL Monorail service is interrupted between 6:25 pm to 9:31 pm today, due to the fallen tree on the main rail KL Monorail, in front of the Concorde Hotel, Jalan Sultan Ismail here. Bomba has been called as soon as possible to remove the tree from the monorail track, and during the disturbances, a number of shuttle trains were sent to operate from Hang Tuah station to KL Sentral Station.

Case Study 5:
Report by the Utusan Malaysia newspaper dated 14/10/2010. Title of the article "Local Authority should be sure The Beautiful, Safe and Preserve". It sounds easy, but plays an important role in local institutions (local authorities). Not exempt, they must also monitor various emergencies such as fallen trees to ensure traffic flow and roads in residential areas run smoothly. According to Shafri Suman (Operations Assistant Department of Landscape, Landscaping and Tree Unit, Seremban Municipal Council), usually they received reports of 120 complaints per month.

Case Study 6:
Report by the Utusan Malaysia newspaper dated 06/10/2010. Title of the article "Flood: MPK Started Cutover, Cut Down Trees". As early preparation to face the monsoon season, Kuantan Municipal Council (MPK) taking the initiative pruning and felling trees in the vicinity of this city, to ensure the safety of the people are guaranteed over a month ago. Previously we have received complaints relating to fallen trees have damaged some vehicles and houses, especially when it's windy and rainy day, it was a risk to public safety. They take this very seriously, to facilitate the work of branches and tree pruning, MPK conduct inspections to identify locations of high risk.

7. Type of Trees Suggested In The National Landscape Guidelines

Based on information from the National Landscape Guidelines, plants that usually used for planting along the road are as follows:

1. *Adenantera pavonina* (Saga) - the main tree moderately high, densely leafy, shape, texture and color are interesting, have a fibrous root, the growth rate is slower, can survive in the wetlands, the area in case of flooding and dry land.
2. *Bauhinia purpurea* (Tapak Kuda, Orchid Tree) - The main trees are small, densely leafy, shape, texture and color are interesting, have a clear and attractive flowers, have tap roots, fast growing, can survive in the wetlands, the area in case of flooding and the dry land and contaminated areas, and most importantly is very easy care.

3. *Calophyllum inophyllum* (Penaga Laut) - the main tree of average height, densely leafy, shape, texture and color are interesting, with scattered roots, the growth rate is slower, can survive in dry soil, the area in case of flooding and it has a clear structure of flowers and interesting.
4. *Cananga odorata* (Kenanga Kayu Hutan, Champaca) - The main tree can exceed 15 meters high, densely leafy, with tap root system, the growth rate is slower, can survive in the wetlands, the area in case of flooding and dry land.
5. *Cassia fistula* (Rajah Kayu, Golden Shower) - the main tree moderately high, densely leafy, shape, texture and color is attractive, has a tap roots, the growth rate is slower, can survive if it is dry, however, tree care is difficult.
6. *Casuarina equisetifolia* (Ru Pantai, Common Ru) - main tree with the height of which can exceed 15 meters, leaf fall, has scattered roots, fast growth rates, could survive in the wetlands, the area in case of flooding and dry land, this species of tree care is simple.
7. *Cinnamomum iners* (Medang Teja, Kayu Manis Hutan) - The main tree has a medium height, densely leafy, shape, texture and color are interesting, have tap roots, can survive in wetlands and areas of flooding.
8. *Delonix regia* (Semarak Api, Flame of the forest) - the main tree has a medium height, shape, texture and color is attractive, has a clear flower structure and attractive, have fibrous roots, fast growth rate and can survive in dry areas.
9. *Erythrina glauca* (Coral Tree) - the main tree height is less than 10 meters (low category), but has a dense leaf arrangement, shape, texture and beautiful colors, clear and attractive flowers, tap roots, medium growth rate and affordable survive if planted in dry land areas.
10. *Eucalyptus deglupta* (Minyak Kayu Putih) - the main tree, whose height may exceed 15 meters, compact arrangement of the leaves will drop leaves, shape, texture and colors, tap roots, its growth rate is moderate, able to survive in the wetlands, dry and flooded areas.
11. *Eugenia grandis* (Jambu Laut) - the main tree, whose height may exceed 15 meters, compact arrangement of the leaves will drop leaves, shape, texture and colors, with fibrous roots, rapid growth rate and can survive if planted in dry land areas.
12. *Fagrea fragrans* (Tembusu) - the main tree, whose height may exceed 15 meters, compact arrangement of the leaves will drop leaves, shape, texture and beautiful colors, clear and attractive flowers, tap roots, its growth rate is moderate, can survive in wet and dry soil also at flooded areas.
13. *Filicium decipiens* (Kiara Payung, Fern Tree) - the main tree of average height, dark, compact shape, texture and colors, has a tap cord, a moderate growth rate and can survive if planted in dry land areas.
14. *Gardenia carinata* (Kedah Gardenia, Cempaka Hutan) - The main tree has a height less than 10 meters (low category), leafy compact and drop leaves, flowers clear and interesting, has its tap roots, the growth rate is moderate, able to survive if planted in wet and dry soil also at flooded areas.
15. *Hopea odorata* (Merawan Siput Jantan) - the main tree can reach 15 meters high, densely leafy, tap roots, faster growth rate estimated at 2.5 meters a year, can survive if planted in moist soil, dry and flooded areas.
16. *Jacaranda filicifolia* (Jambu Merak) - the main tree of average height, dropping leaves, shape, texture and colors, has a tap roots, a moderate growth rate, can survive if planted in moist soil, dry and flooded areas.

Table 1: The table below is the names of the other major plants suggested in the National Landscape Guidelines (2008) for the planting of roadside areas.

No.	Botanical Name	Common Name
1	*Casuarina nobile*	Sempilau, Cemara
2	*Cassia grandis*	Horse Cassia
3	*Cassia siamea*	Kassod Tree, Johor
4	*Cassia nodosa*	Cassia Busuk, Beresah, Pink Cassia
5	*Erythrina orientalis*	Dedap
6	*Erythrina variegated*	Dedap Batik
7	*Juniperus chinensis*	Blue Juniper
8	*Khaya senegalensis*	Khaya
9	*Lagerstromea floribunda*	Kedah Bungor, Bungor
10	*Lagerstromea flos-reginae*	Bungor, Rose of India
11	*Melaleuca cajeputi*	Gelam
12	*Melia indica*	Mambu, Nim Tree
13	*Mesua ferrea*	Ironwood Tree, Penaga Lilin
14	*Michelia alba*	Chempaka Putih
15	*Millettia atropurpurea*	Janaris, Purple Millettia
16	*Mimusops elengi*	Tanjung
17	*Pelthophorum pterocarpum*	Batai Laut, Yellow Flame
18	*Pinus spp*	Pine
19	*Pisonia alba*	Kemudu Siam, Lettuce Tree
20	*Pithecellobium dulce*	Madras Thorn

21	*Podocarpus polystachyus*	Kayu China, Jati Laut
22	*Pterocarpus indicus*	Angsana, Sena
23	*Sterculia rubiginosa*	Kelumpang
24	*Swietenia macrophylla*	Big-Leaf Mahogany
25	*Tamarindus indica*	Asam Jawa, Tamarind Tree
26	*Tabebuaia spactabilis*	Tecoma
27	*Tectonia grandis*	Jati
28	*Bucida buceras*	Black Olive
29	*Pongamia pinnata*	Mempari
30	*Pteleocarpa lamponga*	Tembusu Tikus
	Ziziphus mauritiana	Bidara

Source: National Landscape Guidelines (2008), National Landscape Department, Ministry of Housing and Local Government, Malaysia.

8. Conclusion

As a landscape architect in Malaysia, the need to know the concept of "Right Plant, Right Place: The Art and Science of Landscape Design" is a must. This is because the selection of suitable trees can make it a successful and sustainable design. Most cases of fallen trees on the selection displays the wrong tree in the wrong place would endanger the public. Landscape architects can no longer be designing planting of a project, just as the favorite or the identity itself, it should refer to the environmental requirements, functionality and aesthetic values. From the article above can be deduced that the country has good guidelines on tree planting and tree selection and the act, which can be used to enforce the custody of the big trees for purposes of maintaining its history, telling the importance of their presence and most importantly, to educate the people in Malaysia to be more caring for the trees and the environment. Management of trees will ensure the success of fertility, safety, beauty and harmony of the tree components integrated with other components found in the surroundings.

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