IDENTIFICATION AND CHARACTERIZATION OF PTEROPLINTHITE MANGROVE FORESTS

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ABSTRACT
Mangroves are highly beneficial as they have many environmental and social functions. This paper is aimed at identifying the unique characteristics of Pteroplinthite Mangrove Forest which is one of the mangrove types in Peninsular which has never been documented so far. This kind of mangrove can support numerous residents and non-residents species. It is important to find out the abiotic and biotic factors affecting how they perceive with their surroundings. The study is also expected to explore the most intrinsic value of Pteroplinthite Mangrove Forests that can be integrated as a landscape design element. These intrinsic values of this mangrove forest are being manipulated to be integrated into the urban landscape design setting. The data collection involved the observation, site inventory, determination of physicochemical contents of seawater, and collected sample plants and soil that is conducted in two selected areas, namely Pasir Panjang, Port Dickson and Kuala Linggi, Melaka. The main finding shows the analysis of abiotic and biotic factors of pteroplinthite mangrove that have their own potential and there have eight of intrinsic characters that had been highlighted in ~~the~~ both selected areas of this mangrove forest. It is hoped that this paper may provide significant information on the characteristics of pteroplinthite mangrove forests towards understanding the ecological or functional values of Pteroplinthite mangrove forest habitat as potential approach to be integrated in landscape ecology to restore their habitats and plant species from becoming threatened or extinct.

Keywords: Mangroves, Pteroplinthite Mangrove Forests, Abiotic factors, Biotic factors, Intrinsic value or characters.

INTRODUCTION
There is a various definition that related to the mangrove. According to Michael Mastaller (1997), the origin of the English word "mangrove" is uncertain and it has etymological evolution. The word mangrove may derive from the old Malay *"manggi–manggi",* which used to mark a specific family of mangrove trees. Thus, in Arabic, members of this genus were named as *el gurm* or *el q'urum* and it is suggested that the word "mangrove" has derived from the term *mang-gurm,* which is a combination from the old Malay and Arabic names (Saenger, 2002). Other theories related to the term is a simple derivation by the English word "grove" used to mark a dense stand of tropical trees during colonial times. Besides, the term "mangrove" can be used to mark an individual plant in the mangrove community or the whole community itself which consisting of biotic components, their interaction and its environmental functioning. However, the term "mangrove" can be used to describe and identify any plant community that occurs in area periodic fresh and salt-water inundation.

Mangrove forests are unique ecosystem which they are able to survive in a harsh environment where the water is poor in oxygen content. Mangrove is fast growing trees that only take a few years to reach up to 25 meters when they are fully matured. According to the National Agriculture Research Institute, there are seven types of mangroves in this world, and three are most dominant, which are the red mangroves, black mangroves and white mangrove types.

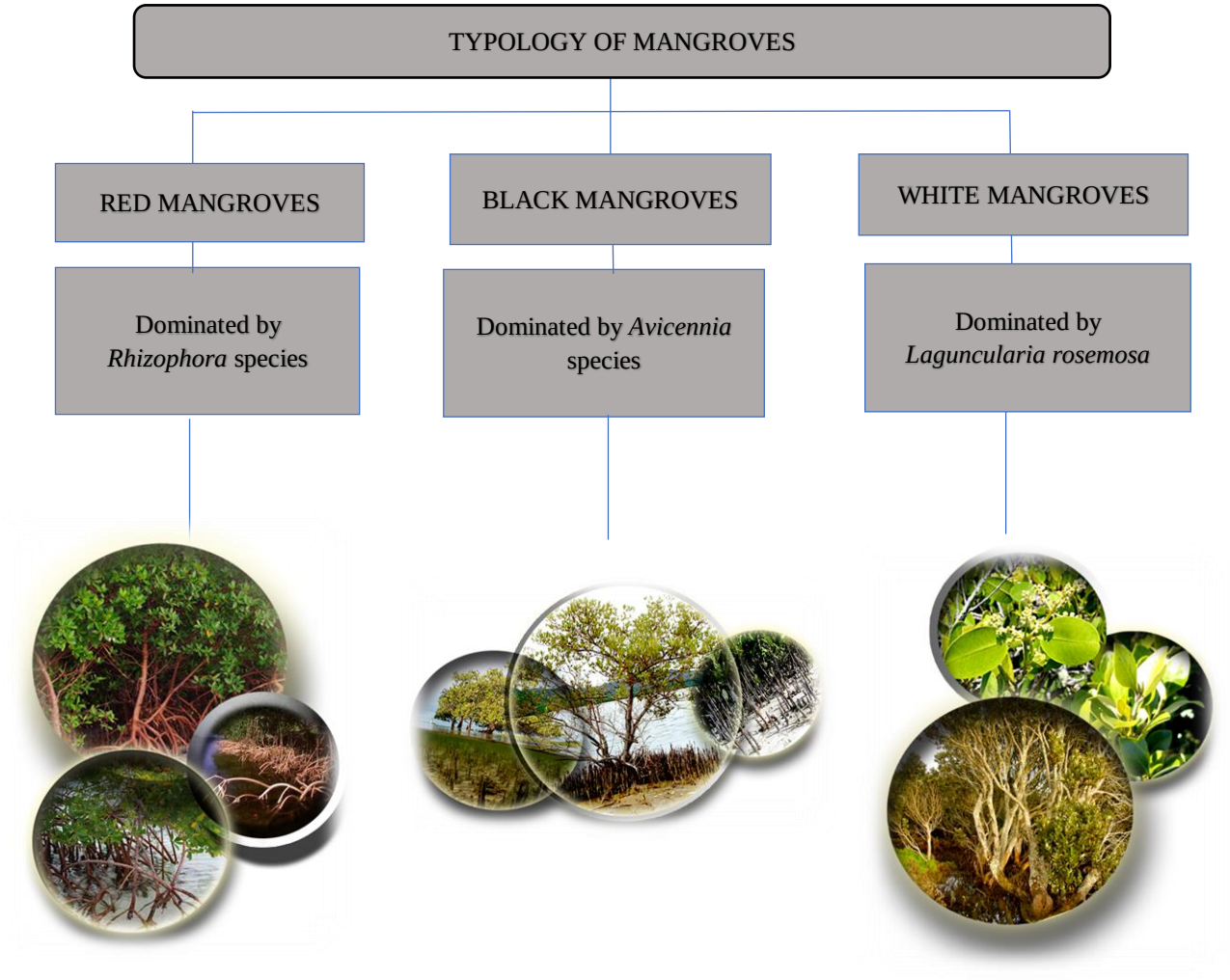

Fig. 1: Typologies of mangroves
Sources: National Agriculture Research and Ecosystem Institute, published on 27 April 2014 – Type of mangroves

MANGROVE FORESTS IN PENINSULAR MALAYSIA

Mangrove forests are important coastal ecosystem and are among the world's most productive ecosystem. According to Mazlan et al (2005), mangrove forest is the dominant coastal vegetation community in tropical Asia, with the Malay-Indonesian region as its center of the distribution. Reported by Forestry Department, there are about 675,000 ha of mangrove forests in Malaysia and only 105,537 ha of mangrove areas were gazetted as forest reserve where Perak has the largest area, followed by Selangor, Johor, Kedah and others. According to Abdul Latiff (2005), mangrove forest reserves has been estimated at 77.8% that considered as productive. About 90% of these, occur on the more sheltered west coast of Peninsular Malaysia and only 4% occur on the more exposed east coast of Peninsular Malaysia. Table 1 showed the detail information of mangrove forest reserve in Peninsular Malaysia.

Table 1: The extent of the mangrove forest reserves in Peninsular Malaysia
Sources: Kamaruzzaman, A. B., Lim, K. L., Suhaili, R., Jalil, M. S. and Latiff, A. Forest Biodiversity Series 4: Sustainable Management of Matang Mangroves: 100 Years and Beyond. Forestry Department Peninsular Malaysia.

State	**Total area (ha)**	**Note**
JOHOR	25 619	It is reported that only 16 659 ha are left. Lately, more mangrove has been felled for new development.
KEDAH	9 036	It is reported that only 8 034 ha is left, some at Sg. Merbok has been converted as prawn pond.
PERLIS	Not Available	There are patches of mangrove forest in the area of Kuala Perlis but not economical
NEGERI SEMBILAN	1 269	It is reported that only 879 ha left, much of the mangroves in the vicinity of Port Dickson have been developed for resorts, marinas and housing.
MELAKA	338	There are patches of mangrove forests at estuaries and their river banks.
PAHANG	2 141	The mangrove found in the sheltered estuaries and also along the river such as Sg. Kuantan, Sg. Pahang, Sg. Rompin.
PERAK	40 683	Most especially in Matang are quite intact. This is the most studies mangrove in Peninsular Malaysia.
PULAU PINANG	406	Both the mangroves in Pulau Pinang and Seberang Perai are affected due to water pollution.
SELANGOR	26 381	It is reported that only 15 090 ha left
KELANTAN	Not Available	They have never been documented in any official document of Forestry Department.
TERENGGANU	1 295	There are patches of mangrove forests at estuaries and their river banks.
TOTAL	**105 537**	**It is reported that only 88 731 ha are left and conserved. As some importance has been given to the mangroves after the tsunami 2004, the mangrove has some bright future.**

PTEROPLINTHITE MANGROVES FORESTS

According to the variation in tidal inundation, type of soil and salinity, only 0.7% of the whole mangrove forest in Peninsular Malaysia that could be estimated as Pteroplinthite Mangrove Forest. They have never been documented yet in any official document of Forestry Department. Pteroplinthite Mangrove forest only found in Negeri Sembilan and Melaka. Pteroplinthite mangrove forests are only existing in the area of laterite soil.

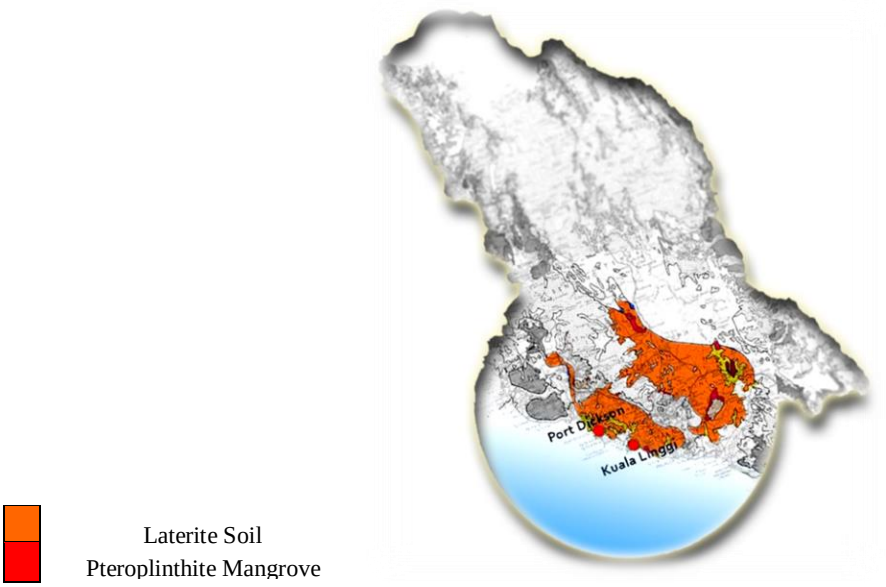

Fig.2: Pteroplinthite Mangrove has been only existing around laterites soils in the area of Negeri Sembilan and Melaka.
Sources: Soil Map of Malaya (1962)

According to the map in Figure 2, the orange color represented the laterite soil that only has on the west coast of Peninsular Malaysia. It cannot be denied the fact that only two areas of Pteroplinthite Mangrove Forest have still left in Peninsular Malaysia. The mangrove forest mostly had paved ways to agriculture, aquaculture, and infrastructural facilities. There is no more hope for recovery. What is lost will be remain lost. However, there were hopes for this type of mangrove forest especially in the area under mangrove reserves forest.

METHODOLOGY

Two sites were selected which are Pasir Panjang and Linggi. The first site is located close to Hutan Lipur Pasir Panjang which about 16 kilometers from Port Dickson. Pasir Panjang has coastal hill forest facing the straits of Melaka. The second site (Linggi, Melaka) is located 36km from Port Dickson. The data collection involved the observation, site inventory, determination of physicochemical contents of seawater, and collected sample plants and soil. Most of this research is done through qualitative research. According to Tracy (2012), qualitative research is about immersing oneself in a scene and trying to make sense of it. Furthermore, collecting sample

mangrove plants and soil also implemented in this research method in order to get further information towards characteristic of pteroplinthite mangrove and its intrinsic value that can be part of an urban landscape design setting. The review of the data collection approach can be referred in Figure 3 below:

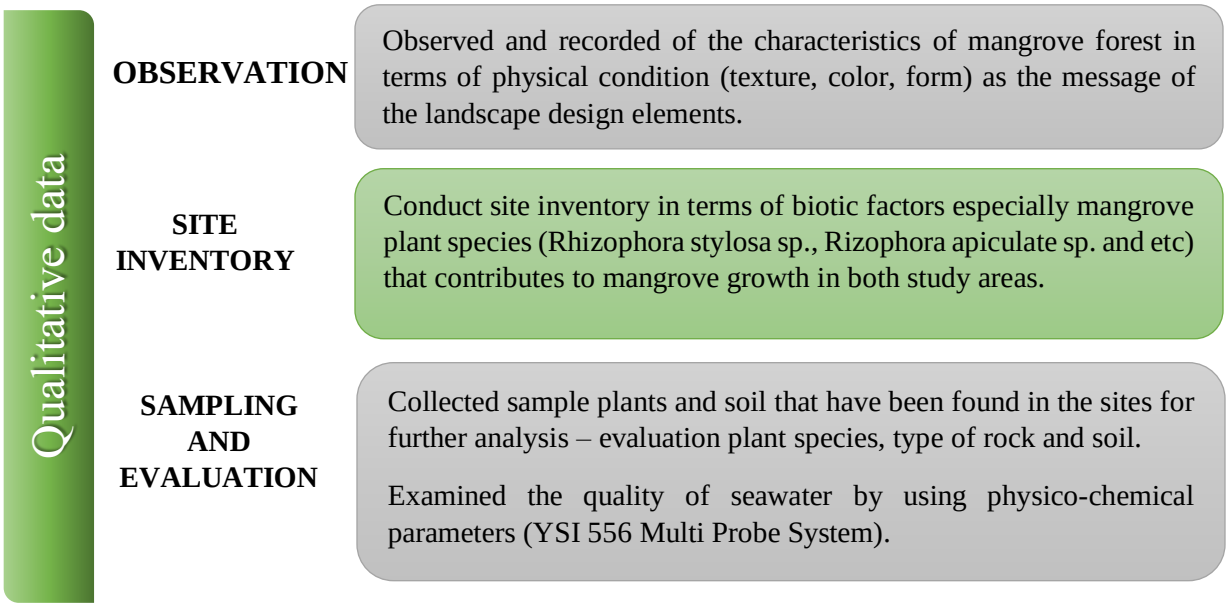

Fig. 3: Shows the data collection approach in both selected areas.

FINDING AND DISCUSSION

Abiotic Factors

Soil type

Due to the observation, both of the selected areas are mainly made up by two-layer type of soil; laterite or pteroplinthite soil act as the upper layer, and the second layer can be classified as acid sulfate soil. The difference of physical attributes soil between both selected areas which; Pasir Panjang was consist of high clay and small gravel. While Kuala Linggi is being rockier and sandy. The similarities between these areas, the color of the soil is reddish brown soil with poor fertility and lower cations exchanges capacity which not encourage for agriculture purpose. Pteroplinthihe mangrove consists of two type of rocks which; laterite rocks and hematite rocks as refers to the figure as below.

Fig. 4: Sample of laterite rock at Pasir Panjang, Port Dickson

Temperature

Temperature is a significant aspect of characterization in water quality index as it is one of the important factor that affects the biochemical and chemical reactions occurring in the water which later on will altering its nature. Temperature for seawater usually does not exceeds 37°C and in both sites the temperature is considered normal as revealed in Table 2 which is 32.7°C.

Dissolved Oxygen (DO)

The amount of oxygen dissolved or available is the most important indicator of a water body health status and its capacity to sustain and support a balanced ecosystem of flora and fauna. Higher BOD values strongly associated with lower DO content. As a result, DO values for both sites environment was detected lower (0.8 and 1.36 mg/L) than 4 mg/L which is the standard criteria for marine water quality index. The DO content less than 1 mg/L may lead to the death of marine organisms.

pH

pH is a measure of the relative acidity or alkalinity of water. The natural marine ecosystem pH value varies from in the range of 6.5 to 8.54. In this case the pH values for all sites are normal which is 7.9.

Table 2: Pteroplinthite Mangrove Forest physico-chemical analysis

PHYSICO-CHEMICAL CHARACTERS	PARAMETERS	
	Pasir Panjang	**Kuala Linggi**
Water Temperature (^{0}C)	32.7	32.7
Dissolved oxygen mg/l)	0.8	1.36
pH	7.9	7.85

Salinity	32.3	32.04
Conductivity (µS/cm)	57,360	56,174

Salinity
The salt content of seawater is given as parts per thousand (ppt) or in other word the amount of salt (g) dissolved in 1,000 g of water. Common salt (sodium chloride) is the main dissolved solid in seawater, and the average salinity is 35 ppt. The degree of salinity in marine ecosystem can be categorised into 3:
Oligohaline waters of low salinity (0.5-5 ppt)
Mesohaline waters of intermediate salinity (5-18 ppt)
Polyhaline waters of high salinity (18-30 ppt)
Table 2 established that the salinity of both sites seawater was classified as polyhaline or high salinity.

Conductivity
Conductivity is one of the most useful key indicator tool of change in a seawater system. Most bodies of seawater maintain a fairly constant conductivity at 55000 µS/cm that can be used as a baseline of comparison to unhealthy environment or degree of pollution. Measurement of conductivity level at both stations indicated that the seawater quality index slightly higher than the normal range.

Biotic Factors
Biotic factors act as an important component in mangrove ecosystem growth. Many plants and animals that live in association with mangroves have developed sophisticated anatomical and physiological systems to cope with this extreme environment. According to the Giesen et al. (2006), Southeast Asia is renowned for its species of the diverse mangrove ecosystem. Almost 268 species comprising trees, shrubs, palms, climbers, herbs, ferns and grasses that have been recorded in the Southeast Asian mangrove plants. However, Saengar et al. (1983) recorded a world-wide inventory of 60 plant species exclusively found in mangrove habitats. These statistics show a very significant number of mangrove species in this region. The largest plant families recorded in Southeast Asian mangroves are the Leguminosae (22 species), Cyperaceae (17 species) and Rhizophoraceae (12 species). At least 42 of the 52 species occur in Malaysia.

In this paper, plant species observed in this mangrove areas are generally divided into two groups, namely, true or exclusive mangroves species, and associated mangrove species. Basically, true mangrove species grows only in mangrove environment and do not extend into the terrestrial plant community and are morphological, physiological and reproductively adapted to saline, waterlogged and anaerobic condition. These plant materials are being classified into three groups which are trees and shrubs, ferns and palm as referred in table 3.

Table 3: List of Plant Species at Pasir Panjang and Kuala Linggi mangrove areas

NO.	FAMILY	SCIENTIFIC NAMES	COMMON NAMES
		MAJOR SPECIES	
1.	Rhizophoraceae	*Rhizophora stylosa*	Bakau stylosa
2.	Rhizophoraceae	*Rhizophora apiculata*	Bakau minyak, akit
3.	Rhizophoraceae	*Ceriops decandra*	Tengar, Bakau lali, Tengar tikus
4.	Sonneratiaceae	*Sonneratia alba*	Pedada
		ASSOCIATE SPECIES	
5.	Combretaceae	*Terminalia catappa*	Ketapang
6.	Combretaceae	*Lumnitzera littorea*	Pokok teruntum merah
7.	Convolvulaceae	*Ipomoea pes-caprea*	Seri kembang pagi, sea morning glory
8.	Malvaceae	*Hibiscus tiliaceus*	Baru-baru / Baru laut
		MINOR SPECIES	
9.	Palmae	*Calamus erinaceus*	Rotan bakau
10.	Pteridaceae	*Adiantum aleuticum*	Paku sejati
11.	Pandanaceae	*Pandanus odoratissimus*	Pandan laut

CONCLUSION

Pteroplinthite mangrove forest ecosystem are threatened by direct impacts such as cutting and pollution due to agricultural, industrialization and urbanization activities. Pteroplinthite mangrove forests are often regarded as unpleasant environments with little intrinsic value. These habitats are sensitive and in critical stage which requires immediate action for conservation, further investigation and protective measures for preservation. Therefore, introduction of Pteroplinthite mangrove forest species to new natural habitats would appear to be a viable alternative to resolving the problem. On top of that understanding the ecological or functional values of Pteroplinthite mangrove forest habitat as potential approach to be integrated in landscape ecology in order to restore their habitats and plant species from becoming threatened or extinct.

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