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URBANIZATION AND THE CHANGING HABITAT: THE CASE OF THE MALAY HOUSING COMPOUND IN MALAYSIA

(Pembandaran dan Perubahan Habitat: Kes Halaman Rumah Orang Melayu di Malaysia

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ABSTRACT

The process of urbanization has changed the land utilization and the function of many rural lands in the fringe areas. The rural agricultural areas have rapidly disappeared to make way for residential, industrial and commercial uses. Habitats of the originally rural population are under constant pressure from the growing urbanization and its process can be observed easily through the house's compound. In rural Malaysia, the compound of each house is an integral part of a home garden. This study discusses the impact of metropolitan growth on the habitat of people in its surrounding areas. The Malay housing compounds in Mukim Dengkil, Selangor have been used to illustrate the change. Compounds of a total of 149 houses from 10 Malay villages in the mukim were chosen systematically. The result shows that in the more urbanized villages, ornamental plants mainly flowers and other species of shrubs occupied most of the housing compounds and other parts of the home garden for decorative and landscaping purposes. Fruit and shade trees as well as vegetables and aromatic plants were still widely planted in the gardens. There were clear indications to suggest that the habitat of Malay housing compounds and home gardens have undergone rapid transformation. The finding also exhibits that the processes of urbanization and industrialization in the region have inevitably changed the farming habits of the households. Modern plant species were preferred by the households for their housing compound. The modernizing habitat of the Malays indicates that the ecosystem and the way of life of the people in the region were actively changing. This undoubtedly will have some implications on the land use and socio-cultural systems of the region in the future that requires appropriate policies to address the issue.

Keywords: Habitat, metropolitan growth, housing compound, plant species, and land use transformation

ABSTRAK

Proses pembandaran dan perkembangan metropolitan yang pesat telah mengubah status dan fungsi guna tanah luar bandar di kawasan pinggir wilayah berkenaan. Kawasan pertanian luar bandar ini telah semakin berkurangan dengan kadar yang pesat untuk memberi laluan bagi guna tanah perumahan, perindustrian dan perdagangan. Habitat kawasan yang asalnya dihuni oleh penduduk luar bandar ini mengalami tekanan yang berterusan akibat perkembangan metropolitan. Bukti tentang keadaan ini dapat diperhatikan melalui halaman rumah kediaman yang terdapat di kawasan tersebut. Di Malaysia sebuah halaman rumah adalah bahagian yang tidak dapat dipisahkan daripada kebun di keliling sebuah rumah kediaman. Kajian ini bertujuan membincangkan impak perkembangan metropolitan ke atas habitat penduduk yang tinggal di sekitar bandar raya metropolitan. Halaman rumah orang Melayu di mukim Dengkil, Selangor telah dipilih untuk menunjukkan perubahan tersebut. Halaman 149 buah rumah kediaman orang Melayu di 10 buah kampung yang dipilh secara sistematik telah diperiksa dengan teliti. Hasilnya, didapati bahawa halaman rumah yang lebih terbandar tanaman perhiasan terutamannya bunga dan pokok spesies renek yang lain telah memenuhi hampir kebanyakan bahagian halaman dan kawasan sekitar rumah yang lain untuk tujuan perhiasan dan pelandskapan. Buah-buahan dan pokok penaung, juga sayur-sayuran dan species pokok yang menghasilkan bau-bauan yang harum dan perasa juga turut ditanam dengan meluas di halaman rumah. Terdapat penunjuk yang jelas yang membuktikan bahawa halaman rumah kediaman dan persekitaran rumah keseluruhannya sedang mengalami transformasi yang pesat. Proses pembandaran dan perindustrian di walayah tersebut telah secara langsung mengubah perlakuan dan habit bercucuk-

tanam di kalangan isi rumah tersebut. Spesies tumbuhan moden lebih digemari oleh isi rumah bagi menghiasi halam rumah mereka. Pemodenan habitat kediaman orang Melayu menunjukkan bahawa ekosistem dan cara hidup penduduk di wilayah tersebut sedang secara aktifnya berubah. Ini sudah pasti akan mempunyai kesan terhadap guna tanah dan sistem sosiobudaya penduduk kawasan tersebut pada masa hadapan yang memerlukan suatu dasar dan strategi yang sesuai untuk menanganinya.

Kata kunci: Habitat, perkembangan metropolitan, halaman rumah, spesies tumbuh-tumbuhan, dan transforamsi guna tanah.

INTRODUCTION

Housing compound is a parcel of land adjacent to any dwelling unit. The land is normally left open with some greens or planted with certain types of plants. The planted part of the compound forms a home garden. The size of a housing compound varies from one place to another depending on the location. In urban areas where land availability is limited, the size of a home garden tends to be very small, usually less than 10^2 meter. In traditional rural inland areas where lands are abundant, the size of the garden is relatively large. In many cases the garden is also an orchard where fruit tress such as rambutans *(Nephelium lappaceum)* and durians (*Durino zibethinus murr*) are the common crops widely planted. Food crops are also grown to provide supplementary diets for the family. However in the urbanized villages, modern plants particularly flower, vegetables, fruits and trees for shade are widely planted.

Theoretically, a rural housing compound is actually part of a larger system which is commonly known as home garden. Home gardens have long been viewed by many researchers as a system of agro forestry, a system that combines elements of forestry with agriculture. In the tropical region, agro forestry is actually a much more complex system. The system is normally associated with small scale, mainly subsistence farming activities. In a subsistence traditional farming system, the land surrounding farmers' house is normally cultivated unsystematically with variety of crops for shade and supplement food plants. The systems are a mixture of trees, shrubs, herbs, and other agricultural plants within the house boundary and under the family labor and management (Fernades & Nair 1986). Home gardens are therefore not just a land use system. They also incorporate economic and socio-cultural elements which are constantly changing over time. Most of home gardens in developing countries fall under subsistence agro forestry systems (Nair 1990). The systems are common in Southeast Asian countries particularly Thailand, Indonesia and Malaysia.

In the past, the importance of home garden systems, particularly the part that forms a house compound, to the social and economic aspects of rural population in Southeast Asia is reflected in the farming systems which include type of crops grown and the arrangement of land use around the villagers' house. Generally, the traditional home garden systems in this region can be classified into two distinct types of field. The inner field represents house compound and the outer lowland or highland fields which are used for farming. The housing compound is used mainly for planting domestically required plants such as herbs for medicine, coconut for milk which is useful for preparing traditional cakes and other cooking, fruits such as banana and jackfruit for vitamins and minerals, or sometime trees and palms for shade (Yaacob & Subhadrabandhu 1995). In traditional villages, food crops such as rice are grown on the lowland fields, normally outside the house's courtyard, to provide staple food, while yam, tapioca, nut, sweet potato and corn are also cultivated in the home gardens to supplement foods for the family. On the upland fields, tree crops like rubber and palm are grown on small holdings to provide income. There is sometime a pond that fish is reared.

Other livestock such as chicken, goats and cows are also raised for additional income or foot supplement. Traditionally the system is managed by member of the family.

In the present day, home gardening is widely practiced in villages located in the inland where agricultural lands are plenty. However, due to shortage of labor, as a result of rapid rural urbanization and industrialization which have drawn rural young labor to work in assembly lines and other service activities in large cities or the nearby towns, many home gardens were left unattended. These have significantly changed the traditional pattern of home gardening. In the modern and rapidly urbanizing villages particularly those located near large cities where land is scare, home gardening activities are practiced only on housing compound. The practice and role of home garden in these villages have also changed significantly from providing additional foods, herbs and medicine for household needs to more of decorative and ornamental purposes (Mock 2004). Modernization processes through urbanization have influenced the pattern of home gardening activities among these are periphery-urban dwellers. In relation to the above outline, the article attempts to provide some insights into the patterns of home garden system in an urbanizing region, with special reference to the Malay housing compound in Mukim Dengkil, Selangor.

AGRO FORESTRY, HOME GARDEN SYSTEMS AND HOUSING COMPOUND IN SOUTHEAST ASIA

Agro forestry is a sustainable management system for land that increases total production, combines agricultural crops, tree crops and forest plants and or animals simultaneously or sequentially, and applies management practices that are compatible with the cultural patterns of the local population. According to Budowski (1983), the great variation in the practice of the system has resulted in the variety of definition. The most common meaning of agro forestry is a farming system that incorporates trees with other agricultural crops including animals to provide the basic needs of food, wood products for energy and building materials. The system also is practiced to help conserve farmer's limited resources (Nair 1983; Gliessman 1990). Nair (1990) in his later work classifies agro forestry in three systems: *agrisilvicultural*, *silvopastoral,* and *agrosilvopastoral*. MacDicken and Vergara (1990) concluded that agro forestry is a distinct land-use combination including agricultural, forestry (shrubs or trees) horticultural, and animal husbandry subsystem and practices. The system integrates trees with crops and/or animals with the main objectives of reducing risk and increasing total productivity. In their ideal forms, agro forestry systems are both stable and sustainable because of the integration of trees into agricultural system may result in more efficient use of sunlight, moisture, and plant nutrient. These agro forestry ecosystems together with their management system are broadly used to define home gardens. However, for areas located near large urban centers, the agro forestry system has developed into urban forest with it main function is to provide recreational space for urban dwellers (Konijnendijk et. al. 2004; Wolf 2004).

To the present day, there is no clear cut definition for agro forestry. Budowski (1985), Ninez (1987), Grahn and Stigsdotter (2003) used the term home garden for describing a piece of land with definite boundaries, usually near a house, occupying an area generally between 0.5 and 2.0 hectares. Home garden system is a common practice and part of people's way of life in many tropical regions like Southeast Asia. In this region, traditional home gardening is widely being practiced as part of a complex and diverse agro forestry system (Marten 1986). Products of the gardens have long play an important role in the diet of the people in the region (Terra 1954). Home gardens are normally found in a concentrated area around the dwelling of most farming systems throughout the region. The home garden is an integrated

ecosystem of humans, plants, animals, soils, and water, with trees playing key roles in both the ecology and management of the system (Gliessman 1990). Home gardens also have contributed to economic sustainability of traditional farmers in the region. Gajaseni and Gajaseni (1999) reported that paddy rice and home gardens have been the foundation of the permanent settlers of Thai society. Their home gardens are imitations of natural tropical forest ecosystems to serve for daily subsistence with paddy rice as the major staple food. In densely populated areas such as Java, Bali and Madura of Indonesia home gardening is often practiced on the *perkarangan* or courtyard. Paddy rice provides carbohydrates for energy, is cultivated on the fields outside their house compound. Other foods such as fruits, vegetables, herbs, and other crops as well as fish from the pond or livestock raised on the backyard of their dwelling that provide dietary needs of their family, are also obtained from their home garden. Although productivity is low, home garden production system in the region sustains subsistence economy for some poor farmers as well as maintains ecological stability.

In Malaysia home gardens are predominant landscape of a village. The system is also known among the locals as ***dusun*** or ***kebun*** (Yaacob & Subhadrabandhu 1995). A ***dusun*** is normally planted with mixed crops mainly fruit trees, coconut palms, shrubs and in wetter areas paddy rice is also planted. In a smaller scale, fruit trees, coconut palms and other crops are also planted in the housing compound. However, detailed information on this is very much lacking. Attention been given to fruit crops. For instance, Chan, ***et al*** (1981) noted that small-scale fruit growers could be found elsewhere scattered in most kampongs in the country. They argued that unlike Java in Indonesia, Malaysia does not encounter any serious population pressure. Therefore, the importance of home garden systems in providing supplementary foods to farmers is less evident. Similar is found in the Philippines with respect to home gardening.

Recently, the more organized and systematic form of home gardening prevails in villages located near urban areas particularly in Indonesia, Philippines, Thailand and Malaysia. In those areas, orchard and vegetable farming have become popular among the new generation farmers. They developed their home gardens into commercial orchard and vegetable plots. Such practices have produced a landscape distinct from the traditional villages (Webb 1999). In newly developed periphery-urban areas, forest tress are cultivated for green belt with its main function is to provide recreational space for urban dwellers.

In Malaysia, while the home garden systems are mainly practiced by the indigenous people, small commercial fruit and vegetable productions have been a popular venture of the Chinese farmers (Yaacob & Subhadrabandhu 1995). The Chinese farmers who live on the highlands and urban peripheries as well as in some inland kampongs are known for their successful fruit and vegetable productions. Home gardening is also practiced in a smaller scale. Urbanization processes have taken much of agricultural land around major cities. In this region, agricultural lands have widely been subdivided for residential purposes. In many cases the practice is carried out without proper permission from the local authorities. In these urbanizing rural regions, a small housing compound would provide an ideal plot for home gardening activities. Example of this practice can be observed in Mukim Dengkil, Selangor.

STUDY AREA AND METHODOLOGY

Mukim Dengkil is one the three subdivisions of Sepang District in Selangor. Located in the southern corridor of the State of Selangor, the mukim has been mostly affected by the recently completed mega projects, namely the construction of Kuala Lumpur International Airport (KLIA) at Sepang, the development of Putrajaya as a new administrative centre for Malaysia, and the completion of Cyberjaya a multimedia city, all are located in the mukim of

Dengkil. The mukim covers an area of 29,488 hectares which is about 50 percent of the total district. In 1991 only 31,026 people lived in the mukim. The figure rose to 72, 462 people in 2000 with average annual increase of 9.4 percent. This phenomenal increase is mainly attributed to immigration. The level of urbanization is considerably low. In 1991, only 12.2 percent of the mukim's inhabitants lived in settlements with a population of more than 1,000 people. By 2000 the urbanization rate increased to 23.7 percent. A total of 17,168 people lived in small urban areas particularly in Putrajaya. Cyberjaya (now Putrajaya and Cyberjaya become a Federal Territory) and Dengkil. Outside Putrajaya and Cyberjaya, Dengkil with present population of 3,785 is the only town in the mukim. The remaining settlements are in transition from predominantly rural to urban. They are urbanizing traditional Malay villages.

Since 1991, the Malay settlement in mukim Dengkil has undergone a rapid process of transformation. Urbanization and modernization processes took place resulting in land use changes, employment shifts among the households and population concentration in key villages. Mukim Dengkil was formerly agricultural area. Tin mining activities were also carried out in many places. However, presently agricultural and mining are no longer the economic mainstay of the area. Many agricultural and mining lands have been converted into other purposes particularly residential, industrial and commercial uses. In 2000, about 52 percent of a total 29,487 hectares of land in the mukim were utilised for urban uses such as residential, industrial and commercial. The remainders were mixed uses including kampungs, mostly traditional Malay villages (Table 1).

Table 1: Land use of Mukim Dengkil (2000)

Land use	Area (ha)	%
Mixed crops and kampongs	11,932.0	40.4
Mega Development Projects (urban)	7592.50	26.0
Residential	4,571.0	15.5
Institutional	2,097.0	7.1
Plantation (rubber or oil palm)	1,764.4	5.9
Industrial	409.82	1.4
Tourism/recreation	652.45	2.2
Commercial	468.47	1.5
Total	29,487.64	100.0

Source : Jabatan Pemetaan Daerah Sepang 2001

Employments in manufacturing and services available in and around Dengkil are not only attracting the local households but also people from other regions. By 2000 labour force employed in these modern urban based activities have already reached 90 per cent compare to less than four per cent in agricultural and mining (Table 2). Households living in Mukim Kajang travelled as far as 20 kilometres to work in factories, public and private institutions as well as commercial and business firms located in Shah Alam, Petaling Jaya, Puchong, Bandar Baru Bangi, KLIA Sepang apart from Putrajaya, Cyberjaya and Dengkil. Most of the households migrated from other regions outside the mukim. The migrants mostly rented or bought a house in the area due to the price of a house in the the mukim is relatively cheaper than in other mukims.

Demand for houses increased steadily during the 2000's. Residential land use expanded and many houses were constructed in the mukim. In 1991, there were only about 7,230 houses in the mukim. In less than ten years the figure rose to 17,383, an increase of about 140.4 percent (Statistic Departmet of Malaysia 2001). Of the total, only 4,684 (26.9

percent) were found in the urban areas (Putrajaya, Cyberjaya and Dengkil). The rest were built outside the local authority areas. This indicates that houses in the mukim are mainly constructed outside the local authority areas mainly on agricultural lands without proper planning. This spatial pattern has some significant bearing on the ecosystem of the settlement. Pertinent to this is the pattern of home gardens. The following discussion provides some insight on the issue.

Table 2: Employment changes of household in Mukim Dengkil 1991-2000

Economic sector	1991		2000	
	Labour force	%	Labour force	%
Agriculture & mining	2,702	22.8	11,89	3.7
Manufacturing	3,528	29.5	10,106	31.4
Construction	377	3.1	3,514	11.0
Services	2,665	22.5	7,949	24.7
Business & commerce	755	6.3	2,509	8.0
Transport & comunication	389	3.2	4,334	13.4
Finance & insurance	424	3.5	832	2.6
Other activities	1,073	8.8	795	2.5
Total	11,913	100.0	31,228	100.0

Source: 1. Malaysia. 1991. Laporan Banci Penduduk dan Perumahan: Negeri Selangor.
2. Statistic Department. 2001. Emplyment by Mukim (Unpublished). Putrajaya.

In order to examine the pattern of home garden particularly to the Malay housing compound in Mukim Dengkil, the study is focused on 10 traditional Malay villages. The villages are Kampung Dengkil, Kampung Semarang, Kampung Sungai Merab, Kampung Limau Manis, Desa Putra, Kampung Sungai Buah, Jenderam Hilir, Jenderam Hulu, Kampung Dato' Abu Bakar Baginda and Pulau Meranti. For the purpose of the study, a total of 149 houses have been visited and closely examined. Using a checklist method, a systematic field counting and recording was conducted to gather required information. Each kampung is represented by samples ranging between 10 to 21 houses, depending upon the size of the village. The samples were systematically picked on the ground.

RESULTS AND DISUSSION

(a)Patterns of Home Gardens in the Malay Housing Compound

In the present study, kampung is basically a rural settlement or a village. In Mukim Dengkil the villages are mainly traditional Malay settlements. By virtue of their location in the Klang-Langat Valley, these settlements are under the extensive influence by the metropolitan cities particularly Kuala Lumpur, Petaling Jaya and Shah Alam. Physical and cultural landscapes of the kampungs are generally homogeneous. Ecology of the villages also tends to be uniform. In most kampungs, a courtyard where home gardening activities are carried out, is an important section of their housing compound where crops such as fruit trees and herbs as well as flowers are normally cultivated for economic, social and cultural purposes. Traditionally, besides fruits, the crops grown in the courtyard are source of medicines, spices and materials or ingredients used in many ritual and cultural practices. They also provide shade and ornamental for the kampungs. It is such a unique relationship between physical, economic and cultural environments that the ecosystem of the Malay kampungs develops. Example of this relationship may be found in crops such as coconut tree (*Cocos nucifera*), *pandan wangi* (*Pandanus amaryllifolius*) and banana (*Musa*). Other dominant crops are fruit trees such as *rambutan* (*Nephelium lappaceum*), Jackfruits (Artocarpus heterophyllus) and durians (*Durino zibethinus murr*). Herb plants such *as pandan wangi* (*P. Amaryllifolius*) and

betle vine (*Piper betle*) are often grown for medicines and cultural purposes. In addition, spices particularly hot pepper or *cili* (*Capsicum annuum*), tumeric (*Curcuma longa*) and ginger (*Zingiber officinale*) are also commonly grown in the traditional Malay kampungs. Other plants such as various types of flower are also planted mainly for ornamental purposes. Each type of the crop normally occupies different corners of the housing compound. In some areas, the crops are grown interspersed with wild plants particularly grasses and bush.

In addition to plants, traditionally animal such as chicken, goats, cows or water buffaloes are also raised in home garden. In the past, these animals are sold for extra incomes or to be slaughtered for religious or cultural purposes. In some areas, ponds are also dug to breed fish for protein. However all these practices are no longer present in Mukim Dengkil. Transformation of their economic way of life has left such activities behind through the process of modernization. Instead raising for incomes or protein, households breed chicken, fish and other pets animals for hobby as well.

(b) The Plant Species

Southeast Asia including Malaysia has long been associated with the centre of diversity, a region of origin and dispersal of cultivated plants. All domesticated plant variations from the cultivated type to a wild species including banana, coconut, sugarcane, clove, rice, nutmeg, black pepper, mangosteen are to be found in this region (Hutton & Cassio 1998; Wiart 2000). This opinion is also supported by Kochhar (1981) who suggests that at least 55 cultivated plants in the world are originated from this region. These plants provide most of the basic necessities, particularly for foods, shelter and medicine, that support life for human being. The role of plants in relation to mankind is so dynamic. It changes over time and also differs from one community to another. Some of these differences may be observed by examining plants cultivated in the surrounding of traditional Malay house that form a home garden. Table 3 shows some of these variations. In general, there are several common species of plants grown in the home gardens. Among the most common and ubiquitously found are fruit trees (widely regarded as agro forestry crops) including *rambutan* (*Nephelium lappaceum*), banana (*Musa*), coconut (*Cocos Nucifera),*jackfruit or *nangka* and c*empedak (Artocarpus heterophyllus).* Rambutan, cempedak and jack fruit trees flourish on the uplands but they also tolerate the deep fairly heavy and moist soils on a lowland environment such as in Mukim Dengkil. The crops require minimum inputs. Banana is a tree-like perennial herb up to 9.0 meter high with herbaceous stems. The banana requires a hot moist climate and the fruit is in season throughout the year.

Table 3: Dominant plant species cultivated in the Malay housing compound

Village	Plant species				
	Tree	Shrub	Herb	Liana	Total
Sungai Buah	14	15	3	3	35
Desa Putra	14	11	3	-	28
Jenderam Hilir	13	12	3	2	30
Limau Manis	10	11	1	-	22
Semarang	12	11	1	1	25
DatukA.Bakar Baginda	12	14	3	1	30
Dengkil	13	12	3	3	31
Jenderam Hulu	14	15	3	1	33
Sungai Merab	9	13	3	2	27
Pulau Meranti	9	12	2	-	23
Total	120	126	25	13	294

Source : Fieldwork 2003

Urbanization processes have some bearing on the ecosystem of the villages. The more urbanized villages tend to have a distinct ecological pattern. More modern plants are cultivated in the settlements. *Bougainvillea (*double colour*), Cyrtostachys lakka* (*pinang raja*), *Chrysalidocarpus lutescens* (cane palm), *acalyha* (*ati-ati*), c*attleya, Vanda Dendrobium* (orchids) and ferns are among popular plant species present in the villages. The plant species are cultivated mainly for ornamental purposes. Limited courtyard space compels the households to cultivate bigger plant species. Furthermore urbanized households do not use home garden to provide supplementary foods. Even fruit trees like rambutan *(Nephelium lappaceum)* and mangosteen *(Garcinia mangostana)* are mainly cultivated for shade rather than for fruits. This indicates that only selected plants, particularly shrubs, lianas and herbs are cultivated in the more urbanized villages for landscape beautification and enhancement purposes. Palms and ferns which do not require large space are also cultivated in the compound for the same purposes.

Several varieties of ornamental climbing shrubs with flowers widely known as Bougainvillea (*Bougainvillea*) are also popular among the households. The most common flowers are in purple, pink, white, brick-red, sometime double in colors. Other examples of commonly cultivated crop are ginger (*Zingiber officinale*) and lemmon grass *(Cymbopogon citratus)* a well known stimulus herbs. The crop does not require a large plot of land to cultivate thus suitable for small urbanizing housing compounds like those in kampung Dengkil, Desa Putra and Abu Bakar Baginda. Other examples of such plants are shown in Table 4.

Table 4: Most common plants cultivated in the Malay housing compound

Type of plants	% housing compound with plants
Nephelium lappaceum (*rambutan*)	85 – 100
Musa (banana)	68 – 84
Bougainvillea (Bougainvillea) and *Cymbopogon citratus* (lemon grass)	51-67
Mangifera indica (mango), *Artocarpus heterophyllus* (Jackfruit), *Durino zibethinusmurr* (durian), *Carica papaya* (papaya), *Syzygium aqueum Alston* (water/wax apple), *Pandanus amaryllifolius* (*pandan*) and *Cocos nucifera* (coconut)	34-50
Hibiscus rosa sinensis (Hisbiscus), *Zingiber officinale* (ginger), *Saccharum officinarum* (sugarcane), *Curcuma domestica/ longa* (tumeric), Capsium annum (hot pepper/chilis), *Colocasia esculenta* (taro) *Manihot esculenta* (topioca/casava), *Murraya koenigii* (curry leaf) and Napalea cochenillifera (cactus)	17-33
Cyrtostachys lakka (*pinang raja*), *Codiaeum variegatum* (*puding*), *Acalyha* (*ati-ati*), *Lansium domesticum* (*langsat*), *Garcinia mangostana* (mangosteen), *Citrus* - variety (citrus fruits), *Chrysalidoc-arpus lutescens* (cane palm), *Aloe vera* (aloe vera), *Ananas comosus* (pineaple), *Psidium guajava* (guava), *Cattleya, Vanda Dendrobium* (orchids) etc.	0-16

Source : Fieldwork 2003

(c) Plant Utility and Function

Plants are planted for different purposes. In the traditional Malay society, crops such as yam, corn and tapioca are grown to supplement family food needs. However, such home gardening activities are no longer practiced in the more modern and urbanized rural areas. Urbanization has changed the dietary patterns and needs of the household. Many household have permanent incomes which they earn from employment in manufacturing and service activities. Such income is enough to fulfill their needs, thus planting of food crops is no longer necessary. Although many food crops such as yam, corn, taro and tapioca have gradually vanished from the Malay home garden, crops like banana and fruit trees are still widely planted to provide additional fruits and shade (Table 5).

Table 5: Functions of plant species cultivated in the Malay housing compound by villages

Kampung	Functions of plant (frequency of plant species)						
	Supplime-tary foods	Orna-mental	Shade	Aroma (in food)	Cultural	Medi-cinal	Add. Income
Sg. Buah	98	28	54	30	9	3	2
Desa Putra	69	26	39	8	4	0	0
Jend. Hilir	46	28	34	13	0	5	0
Limau Manis	30	15	20	5	4	0	0
Semarang	52	10	32	1	4	0	2
Kg. A Bakar B.	46	30	37	13	9	1	1
Kg. Dengkil	75	63	37	30	9	8	1
Jend. Hulu	81	36	45	21	9	1	1
Sungai Merab	24	43	21	28	2	5	0
Pulau Meranti	43	26	21	20	5	0	0

Source : Fieldwork 2003

In Mukim Dengkil, compound of the Malay houses has undergone a rapid transformation. The courtyard is no longer the source of additional carbohydrate and protein for the households. In the past, crops such as yam, tapioca and taro were known to be the source of carbohydrate apart from rice, sago and corn. In the present day such crops have lost their important to breads and various other manufactured foods products which become widely available in the market. The crops are rarely planted. Only selected fruit trees such as rambutan, jackfruit, papaya, mango, banana, water apple and to a lesser extent durian are found in the area. These plants are planted for their fruits and shade. In the past animal like chicken and goats were also raised to provide additional protein and income for the rural families. These animal species which used to be among the essential components of biodiversity in the traditional home garden now have vanished from the system. Only a few households raise pet animals such as birds and fish for hobby. Modern plant species and some of them are of foreign origin such as various type of ***bougainvillea, hisbiscus, acalypha, cordiaeum, napales***, orchids and palms have gradually taken over the more traditional one. In the more urbanized courtyards most of these ornamental plants are cultivated in the pot mainly to enhance the landscape of the compounds. However, certain traditional plants such as pandanus, lemon grass, capsium (chilli), tumeric and ginger are still cultivated for cultural, medicinal and aroma for food. Many of these species are native to Malaysia but some species originated from foreign lands. Plant species like wing bean and ***ulam raja*** are traditional consumed as salads by the Malays. Various functions of plants in the Malay housing compound in the villages of Mukim Dengkil are shown in Table 6.

Generally, at this point it can be said that the process of urbanization changes the landscape and function of the Malay housing compound. Employment changes and the increase of permanent incomes have enabled the Malay households in the mukim to buy foods and other necessities. Therefore home garden systems are no longer their source of foods. Furthermore, most urbanized villages tend to have a small courtyard which provides no space for farming activities. Modern lifestyle whereby most of the day time of the households are spent at workplace literally give them very little time to attend their garden, even if they have land for gardening. This compels the Malay households to cultivate modern and exotic plant species particularly flower which normally require minimum attention or labor and manure inputs. This practice has resulted in the emergence of modern ecosystems in the Malay housing compounds indicative of ecological urbanization in the rural area.

Table 6: Functions of major plant species cultivated in the Malay housing compound

Function	Example of plant species
Ornamental	*Hibiscus rosa sinensis* & *Napalea cochenillifera* (cactus), *Cyrtostachys lakka* (*pinang raja*), *Codiaeum variegatum* (*puding*), *acalyha* (*ati-ati*), c*attleya*, *Vanda Dendrobium* (orchids), ferns &*Caladium, Bougainvillea*
Aroma, food enhancer and spices or salads	*Zingiber officinale* (ginger), *Curcuma domestica/ longa* (tumeric), Capsium annum (hot pepper), *Murraya koenigii* (curry leaf), *Pandanus amaryllifolius* (*pandan*), *Cymbopogon citratus* (lemon grass) and *Belimbing (Averrhoa bilimbi),*
Shade	*Chrysalidoc-arpus lutescens* (cane palm), *Nephelium lappaceum* (*rambutan*), *Garcinia mangostana* (mangosteen), *Pinang*/Areca (*Areca catechu*) & Sapodilla(*Manilkara zapota*).
Medicinal	*Saccharum officinarum* (black sugarcane), *Cymbopogon citratus* (lemon grass), *Aloe vera* (aloe vera), *Zingiber officinale* (ginger), & *Curcuma domestica/ longa* (tumeric).
Additional income	Oil Palm (*Elaris Guineensis)*, Cocoa (*Theobroma cacao)*and *Durino zibethinusmurr* (durian).
Cultural	*Pandanus amaryllifolius* (*pandan*), *Cocos nucifera* (coconut), Betel Vine (Betel-leaf), *Citrus* - variety (citrus fruits)
Supplementary foods and fruits	*Colocasia esculenta* (taro), *Manihot esculenta* (topioca), *Mangifera indica* (mango), *Artocarpus heterophyllus* (Jackfruit), *Durino zibethinusmurr* (durian), *Carica papaya*, *Syzygium aqueum Alston* (water/wax apple), *Garcinia mangostana* (mangosteen), *Ananas comosus* (pineaple), *Psidium guajava* (guava), *Nephelium lappaceum* (*rambutan*).

HOUSING COMPOUND ECOSYSTEM AS AN INDICATOR OF URBANIZATION

The Malay villages in Mukim Dengkil are in transition from predominantly rural to urban. Characteristics of traditional village have gradually been taken over by modern urban traits. Modern houses mainly of concrete structure, tiled roof and floor replace traditional simple wooden houses. Shop-lots and factories are thriving in many places. Tarred roads, telecommunication lines, electricity, piped water and social amenities are also provided. These infrastructural developments bring about modern living to the people in the mukim. Rural land use is under pressure from a rapid growth of industrialization and metropolitan

expansion resulting in the changing patterns of the village's ecosystem. The traces of these urbanization and modernization processes are observable in the ecosystem of the Malays housing compound in the mukim.

Levels of urbanization and modernization in the villages of Mukim Dengkil are relatively different from one place to another. Using several indicators such as approximate population density, size of compound, house quality index (mainly base on the type of house as well as construction materials used, house structure and whether plan or unplanned housing area), and distant from the nearest town, the Malay villages in the mukim can be categorized into three major groups namely urbanized, transition and rural. Similarly, using it's utility functions, type of plants species and origin whether local or foreign as the base, the crops planted in the housing compound may be divided into three major categories namely modern, transition and traditional crop species. Table 7 attempts to depict the relationship between levels of urbanization of the villages and modernity of plant species cultivated in the compound.

Table 7: Relationship between the levels of urbanization of village and modernity of plant species cultivated in the compound

Level of urbanization & village	Modernity of plant species and examples
Urbanized: Kg. Dato' Abu Bakar Baginda, Sg. Merab, Pulau Meranti & Dengkil	Modernized: *Bougainvillea (*double colour*) , Cyrtostachys lakka* (*pinang raja*), *Aloe vera* (aloe vera), *Chrysalidocarpus lutescens* (cane palm), *Codiaeum variegatum* (*puding - double*), *acalyha* (*ati-ati*), c*attleya, Vanda Dendrobium* (orchids) & ferns.
Transitional: Jenderam Hilir, Jenderam Hulu & Semarang	Transitional: *Mangifera indica* (Siamese mango), *Carica Papaya* (papaya), *Psidium guajava* (cloned guava) & *Nephelium lappaceum* (*rambutan*),
Rural: Sungai Buah, Desa Putra & Limau Manis	Traditional: *Colocasia esculenta* (taro), *Manihot esculenta* (topioca/casava), *Lansium domesticum* (*langsat*), *Artocarpus heterophyllus* (Jackfruit), *Durino zibethinusmurr* (durian), *Syzygium aqueum Alston* (water/wax apple), *Garcinia mangostana* (mangosteen), *Ananas comosus* (pineaple), *Musa* (banana) and Sapodilla/*Ciku* (*Manilkara zapota*), & *Cocos nucifera* (coconut).

Generally, the more urbanized villages are those located close to planned new townships. Villages such as Kampung Abu Bakar Baginda and Sungai Merab are adjoining Bangi New Town and the newly established township of Putrajaya. Similarly Kampung Dengkil is located near the town of Dengkil, the capital of the mukim and Pulau Meranti is sandwiched by new townships Cyberjaya and Puchong. In these villages, influences of modern housing designs, construction materials and landscapes are markedly observable. In contrast, Kampung Sungai Buah and Limau Manis are located much farther from the new towns. Although modernization processes is rapidly sweeping through the villages, the degree of rural of the settlements is relatively high. Jenderam and Semarang are also less urbanized but urban traits have begun to emerge. More shop houses and planned housing

areas are constructed pushing rural land use further away. The settlements are in transition from highly rural to semi-urban.

In general, plant species can be used as important ecological indicators of urbanization. Certain modern plant species are only widely present in the more urbanized courtyards. Modern plant species such as palms and mango normally provide shade and in smaller compounds flowers are planted for ornamental purposes. Whereas traditional tropical crops particularly trees and shrub species such as banana, jackfruit, durian and also yam, tapioca and taro are grown, mainly to provide fruits and supplementary foods. This pattern of variability in the rural ecosystem is a good indication urbanization level in Malaysia's villages.

CONCLUSION

In general, it can be concluded that home garden of the Malay housing compound are the product of man's interaction with his environment. In the past most traditional rural Malay households practiced subsistence economy whereby foods and other basic needs were produced domestically from their farmlands and home gardens. Fruits, vegetables, spices, medicinal and ornamental herbs and lianas occupied the home garden. Therefore, the garden emerged as the most intensively operated land in the villages. However, industrialization and rural urbanization have slowly changed the practice of home gardening in this country. In the more urbanized rural areas such as those located in Mukim Dengkil, ornamental plants mainly flowers and other species of shrubs occupied most of the home gardens for decorative and landscaping purposes. Although fruit and shade trees, as well as vegetables and aromatic or enhancer plant species were still widely cultivated in the gardens, there were clear indications to suggest that the Malay housing compounds have been undergoing a rapid transformation. The processes of urbanization and industrialization in the region have inevitably changed the farming habits of the households. Modern plant species were preferred by the households for their housing compound. The modernizing ecosystems of the Malay housing compound is therefore can be used as indicators of land use modernization in the region. An appropriate policy and strategy is also required to address this growing issue of land use as well as socio-cultural changes in the region.

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