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Green space use and management in Malaysia

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Nor Akmar Abdul Aziz

KØBENHAVNS UNIVERSITET

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ABSTRACT

This PhD-study focuses on the importance and use of green space in Malaysia. In industrialising and urbanising countries such as Malaysia, urban green spaces such as parks play an increasingly important role in contributing to the quality of urban life and environment. The main objectives of this study have been: 1) to obtain a better understanding of residents' use and preferences regarding urban green spaces in major Malaysian cities, 2) to gain insight into the relationship between the distance to green space from the residence and green space use, 3) to provide insight into the relationships between green space use and self-reported health, and 4) to gain an overview of green space planning and management in Malaysia through the case of the highly urbanised areas in Klang Valley.

The study applied a socio-ecological model as a framework for analysing the use of urban green spaces. This theoretical perspective stresses that individual factors (e.g. gender, age, education, ethnicity and marital status), perceived environment (e.g. safety, attractiveness, accessibility and comfort) and physical environment (e.g. distance to green space, the area's features and character) jointly define the behaviour or use of green space (such as time spent, frequency of visits, and whether visiting alone or not).

In order to meet the study's aims, a combination of methods was applied, including a study of literature and policy documents, interviews with green space managers, and a survey among residents living within 2 km of five selected parks in Kuala Lumpur and Kuching. A total of 16,205 eight-page questionnaires were posted to the respective residential areas. In the end, only 1,692 (10.44%) respondents returned the questionnaires. The study probably holds considerable bias due to the low response rate, even though this should be seen in the light of the large sample population (which included most of the people in the target area). All ethnic groups, for example, were well represented amongst the respondents, with 45% Chinese, 38.5%, Malays (38.5%), 13.4% other ethnic groups, and 3.0% Indians.

Findings from the study of use of the parks in Kuala Lumpur and Kuching showed that distance to green space from the residence is an important factor that explains the frequency of green space use, with the large majority of the people who live within a 2 km radius of a park also visit it. In terms of park use, ethnicity was found to be among the important socio-demographic factors in explaining differences. Regarding the impacts of use of green space on self-reported health, the results do not include any convincing evidence about the positive impacts of the use of green space (and of living close to parks). Despite this, some evidence of the positive impacts of green spaces on health was found, especially among frequent park users, with frequency being more important than length of stay, for example. Posi-

tive feelings such as feeling energetic, joyful and relaxed were also found to increase with park use. Visiting a nearby park ranked high among suggestions made to friends or family members if they felt stressed. The results of the study also indicate that green spaces are receiving increasing attention in Malaysia, but that planning and management are still not optimal. Research on six cities in the rapidly developing Klang Valley indicated a lack of comprehensive policies and legislation.

The study resulted in interesting findings on the recreational and health aspects of urban green spaces that show similarities, but also important differences between Malaysia and the Western world, where most green space research has been conducted so far. More research will be required to better support green space planning, design and management.

Key words**:** Cultural diversity; Environmental governance; Green infrastructure; Greenspace policies; Green structure; Human health; Outdoor recreation; Public users; Recreation; Self-reported health; Socio-ecological model; Urban parks; Urban greening; Urban greenspace; Urban parks; Wellbeing.

RESUMÉ

Denne ph.d.-afhandling fokuserer på betydningen og brugen af grønne områder i Malaysia. Grønne områder i industrialiserede og urbaniserede lande som Malaysia spiller en afgørende rolle i forhold til kvaliteten af bylivet og bymiljøet. Hovedformålet med ph.d.-studiet har været 1) at skabe en bedre forståelse for beboernes brug og præferencer hvad angår grønne områder i de største malaysiske byer, 2) at få viden om sammenhængen mellem afstand til et grønt område og brugen af dette, 3) at tilvejebringe viden om sammenhængen mellem brug af grønne områder og oplevelsen af den enkeltes sundhedstilstand og 4) at skabe et overblik over planlægning og drift af grønne områder i Malaysia gennem et studie af byudviklingsområder i Klang Valley.

I undersøgelsen er der anvendt en socio-økologisk model som ramme for analysen af brugen af grønne områder i bymæssig sammenhæng. Dette teoretiske perspektiv understreger, at forskellige individuelle faktorer (som f.eks. køn, alder, uddannelse, etnisk baggrund og civilstatus) sammen med det fysiske miljø (som f.eks. afstanden til et grønt område, et områdes tilbud og egenskaber) afgør brugen af et grønt område (som f.eks. længden af et ophold, hyppigheden af besøg og om man kommer alene eller sammen med andre).

Der er anvendt forskellige metoder for at imødekomme undersøgelsens målsætninger. Det gælder litteraturstudier, gennemgang af strategiplaner, interviews med parkforvaltere og en undersøgelse, der omfattede beboere inden for en radius på 2 km ved fem udvalgte parker i Kuala Lumpur og Kuching. Der blev udsendt i alt 16.205 spørgeskemaer til beboelsesområder i de nævnte områder. I alt 1.692 responderede på spørgeskemaet – en svarprocent på 10,44 %. Resultatet er derfor omfattet af en vis usikkerhed på grund af den lave svarprocent. Det skal dog nævnes, at alle de forskellige etniske grupper i området er godt repræsenteret blandt de indkomne svar med 45 % kinesere, 38,5 malaysiske, 13,5 % andre etniske grupper og 3 % indere.

Resultatet fra undersøgelsen af brugen af parker i Kuala Lumpur og Kuching viser, at afstanden til et grønt område er en afgørende faktor i forhold til, hvor ofte det grønne område bruges. Størstedelen af de folk, der bor inden for en radius på 2 km, bruger også området. Med hensyn til brugen af parken er etnicitet blandt de vigtige socio-demografiske faktorer til at forklare forskellene i brugen.

Når det gælder sammenhængen mellem brugen af grønne områder og opfattelsen af egen sundhedstilstand, giver undersøgelsen ikke noget overbevisende bevis for denne sammenhæng (og i forhold til at bo tæt ved parkerne). Undersøgelsen viser dog, at der findes nogen sammenhæng mellem brugen af de grønne områder og opfattelsen af sundhedstilstanden, hos de som bru-

ger parkerne ofte – frem for ophold af længere varighed. Herudover viste undersøgelsen, at positive følelser som ”at få mere energi”, ”glæde” og ”afslappet” stiger i takt med brugen af parker. ”At besøge en nærliggende park” lå også højt på listen over anbefalinger til stressede venner eller familiemedlemmer. Resultatet af undersøgelsen tyder også på, at grønne områder får mere og mere opmærksomhed i Malaysia, men at planlægning og forvaltning af disse ikke er optimal. En undersøgelse af seks byer i det hurtigt voksende område Klang Valley antyder også en mangel på sammenhængende politikker og lovgivning på området.

Ph.d.-studiet er nået frem til nogle interessante ligheder – men også forskelle – mellem Malaysia og den vestlige del af verden, når det gælder grønne områder, rekreation og sundhed. Størstedelen af den forskning, der findes på dette område, er lavet i den vestlige del af verden, og der er brug for mere forskning for at kunne støtte planlægning, design og forvaltning af grønne områder.

ABSTRAK

Kajian PhD ini memberi tumpuan kepada kepentingan dan penggunaan ruang hijau di Malaysia. Di negara-negara perindustrian dan pesat membangun seperti Malaysia, kawasan hijau bandar seperti taman-taman memainkan peranan yang penting dalam menyumbang kepada kualiti bandar dan persekitaran. Objektif utama kajian ini adalah 1) untuk memahami penggunaan dan kehendak pengguna terhadap kawasan hijau di bandar-bandar utama Malaysia, 2) untuk mendapatkan perkaitan antara jarak kawasan hijau dari kediaman dan penggunaan kawasan hijau, 3) untuk memberi gambaran tentang hubungan antara penggunaan kawasan hijau dan laporan kesihatan diri, dan 4) untuk mendapatkan gambaran keseluruhan perancangan dan pengurusan kawasan hijau yang pesat membangun di Malaysia seperti di Lembah Kelang.

Kajian ini menggunakan model sosio-ekologi sebagai rangka kerja bagi menganalisis penggunaan ruang kawasan bandar hijau. Perspektif teori ini menekankan bahawa faktor individu (seperti, jantina, umur, pendidikan, etnik dan status perkahwinan), anggapan persekitaran (seperti, keselamatan, daya tarikan, akses dan keselesaan) dan persekitaran fizikal (seperti jarak ruang hijau, ciri-ciri di kawasan ini dan ciri-ciri) yang di mana kombinasi faktor-faktor ini akan mempengaruhi tingkah laku penggunaan kawasan hijau (seperti masa yang diperuntukan, kekerapan lawatan, dan samada melawat bersendirian atau tidak).

Dalam usaha untuk memenuhi matlamat kajian, berbagai kaedah telah digunakan, termasuk pengumpulan maklumat dan dokumen, temu bual dengan pengurus kawasan hijau, dan menghantar borang soal-selidik kepada penduduk yang tinggal dalam lingkungan 2 km daripada lima taman terpilih di Kuala Lumpur dan Kuching. Sejumlah 16,205 borang soal selidik (8 muka surat) diedarkan kepada kawasan-kawasan kediaman terbabit. Kajian ini mungkin berat sebelah disebabkan oleh kadar responden yang rendah. Namun begitu, ianya harus dilihat pada sampel penduduk yang besar (kebanyakan kawasan penduduk menjadi sasaran). Keputusan menunjukkan semua kumpulan etnik memberikan responden, contoh, kaum Cina (45%), Melayu (38.5%), etnik lain (13.4%) dan India 3.0%.

Penemuan dari kajian penggunaan taman di Kuala Lumpur dan Kuching menunjukkan bahawa jarak kawasan hijau dari kediaman pengguna adalah faktor penting untuk menjelaskan kekerapan penggunaan kawasan hijau, dengan majoriti penduduk dalam 2 km radius dari taman yang datang melawat. Dari segi penggunaan kawasan hijau, kaum etnik didapati menjadi antara faktor sosio-demografi penting untuk menjelaskan perbezaan penggunaan. Mengenai impak penggunaan ruang hijau terhadap kesihatan yang dilaporkan sendiri, keputusan tidak memberikan bukti yang

meyakinkan tentang kesan-kesan positif penggunaan kawasan hijau (atau hidup berhampiran dengan kawasan hijau). Namun begitu, beberapa bukti kesan positif kawasan hijau terhadap kesihatan telah dijumpai, terutama di kalangan pengguna taman yang kerap, berbanding dengan pengguna yang memperuntukan masa yang lebih di kawasan hijau. Perasaan positif seperti rasa bertenaga, riang dan santai juga didapati meningkat dengan penggunaan kawasan hijau yang kerap. Melawat taman berhampiran adalah cadangan yang tertinggi disarankan kepada rakan-rakan atau ahli keluarga jika mereka berasa tertekan.

Kajian ini telah menghasilkan penemuan menarik yang menunjukkan persamaan dan juga perbezaan penting di dalam penggunaan kawasan hijau dan pengurusan di antara Malaysia dan negara-negara lain di dunia, di mana penyelidikan kawasan hijau telah banyak dijalankan. Lebih banayak penyelidikan diperlukan untuk menyokong perancangan, reka bentuk dan pengurusan kawasan hijau yang lebih baik.

PREFACE

This PhD study started in August 2008 when I was awarded a scholarship from the Ministry of Higher Education and an approval for study leave from University Putra Malaysia for three years. Why Denmark? I insisted on studying in Denmark, because Forest & Landscape at the University of Copenhagen is a national centre for research, education and consultancy services within landscape management, urban planning and design, landscape architecture as well as forest and forest products. The centre hosts many experts on these topics and covers areas of my particular interest, such as urban forestry and urban greening. In addition, the beautiful scenery in Denmark was an additional motivation for choosing this country.

Initially, my supervisor was Prof. Thomas Randrup, but this only lasted for four months as Thomas left the university. Dr. Kjell Nilsson took over the job as my main supervisor and was assisted by Prof. Dr. Cecil C. Konijnendijk as my project supervisor. By the end of June 2010, Prof. Dr. Cecil C. Konijnendijk had officially become my main supervisor, while Dr. Kjell Nilsson remained in the project as assistant supervisor. To enhance the Malaysian link of this project, Dr. Noor Azlin Yahya from Forest Research Institute Malaysia (FRIM) agreed to act as co-supervisor. She was especially able to support me during my time in Malaysia.

I made full use of the opportunity of living away from my home country. During my stay in Denmark, I have had the chance to diversify and expand my research, not least through collaboration with other inspiring colleagues. These included Jasper Schipperijn (2010) who conducted a similar study, which inspired my own work. Being here also provided me the opportunity to compare findings in the Nordic countries and Malaysia on several aspects. I soon realised, for example, that Malaysia provides a special case of green space use, due to its multicultural character. The structural (although sometimes minor) differences in green space use and preference between different ethnic groups in Malaysia were quite surprising to me. I believe that findings from my study will assist park managers and landscape designers in Malaysia.

The interlinkages between how individual, social and environmental factors interplay to result in diverse green space use and preferences has been a fascinating topic. The work of Jasper, but also, for example, of Dr. Ulrika Stigsdotter on the relationship between urban green spaces and people's health also guided my work. This topic is quite new to me and to Malaysia in general. I hope that the findings from this study can help raise awareness in Malaysia on the important role green spaces can play in the promotion of public health and wellbeing.

During the period of my studies in Denmark, which included enrolment in courses such as the theme course in Urban Forestry and Urban Greening, I had the opportunity to obtain very useful and new knowledge in the field of parks and landscaping in general, including interesting theories and methods. The 'eight experience characteristics' (Grahn and Stigsdotter, 2003), for example, which have developed into eight perceived sensory dimensions (Stigsdotter and Grahn, 2011) have offered particular inspiration.

In addition, experience gained from attending several seminars and conferences on the international stage gave me the opportunity to meet with many academics, practitioners, officers and students within the wider field of green space management. I used this opportunity to exchange ideas and discuss the issues and the future of urban green spaces.

Finally, after three years and three months in this country with its popular Little Mermaid statue, I completed my study. I hope the knowledge and experience I have obtained during this study will be beneficial to Malaysia, and perhaps also add something to the wider research field of green space management and urban forestry. I know this PhD-study is only a beginning for me, as I still wish to gain more knowledge and experience in the field.

Several people have helped me succeed in my journey. I would like to express my gratitude to my dedicated supervisor Prof. Dr. Cecil C. Konijnendijk in making my doctorate journey into a success and a reality. Your encouraging words and guidance have always been much appreciated. Next, I would like to extend my thanks to Dr. Kjell Nilsson and Dr. Noor Azlin for their invaluable support throughout the project.

My deepest thanks go to my loving husband, Hariz Raymond; your sacrifice, passion, under-standing and endless love are highly appreciated. My adorable sons, Hadif Syahmi and Haziq Luqman; your kittenish and mischievous behaviour always makes my heart smile, also when pressure has been significant. Not to be forgotten, I am grateful to my dear family; especially my mother (Chek Yan), siblings (Lina, Azmi & Lia) and other family members - your spirit and prayers gave me strength.

Last but not least, the gorgeous ladies in my office, Shureen, Anne, Victoria, Karin and Maja, thank you for sharing the happy and gloomy moments, and thanks also for sharing your ideas and support in completing this task. To all my friends in the Parks, People and Policies research group, colleagues and staff members at Forest & Landscape LIFE, University of Copenhagen: thank you for all of your support and assistance.

Frederiksberg, November 2011.

Nor Akmar Abdul Aziz.

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1.0 INTRODUCTION

Rapid population growth and urbanisation across the globe have led to pressures on the natural landscape. Natural and open spaces have been lost due to the development of housing areas, infra-structure, commercial and industrial areas. With the loss of natural areas, ecosystem services such as providing better air and water quality and recreational opportunities have come under threat (Kim and Pauleit, 2007).

The importance of urban green spaces has been known for centuries, but during recent decades, more comprehensive knowledge has become available on the wide range of benefits they provide (e.g. Bedimo-Rung et al., 2005). Good quality parks and green spaces contribute to individual wellbeing, and through their social, economic and environmental values contribute to more liveable and attractive towns and cities (CABE Space, 2004; Maas et al., 2006; Hartig, 2007; Maas et al., 2008; Bell et al., 2008; de Vries, 2010).

Malaysia, as a rapidly industrialising country, is facing high pressure on its urban green spaces. On the other hand, the benefits of these green spaces are increasingly recognised. Ways have to be found to maintain and develop a multifunctional and sustainable green infrastructure in Malaysian cities. This is difficult when green spaces are susceptible to land use changes and the degradation of their environmental and social qualities. In major cities like Kuala Lumpur and its surroundings, the last decades have witnessed dramatic land use changes due to, e.g. the establishment of commercial areas, and an overall conversion of forests and green space to built-up areas (Teh, 1989). Furthermore, increasing infill and density have also contributed to problems related to the loss of green areas, pollution, and general challenges to quality of life (KL City Plan 2020, 2009). In addition, existing green spaces in cities like Kuala Lumpur are often endangered by encroachment (KL City Plan 2020, 2009).

A well-distributed green infrastructure can enhance the quality of life and environment in a congested urban area (National Urbanisation Policy, 2006). Initial studies from Malaysia have indicated the importance of urban green spaces for people's health and wellbeing. A study in a small town in Malaysia, for example, stated that experiencing green spaces leads to positive effects in terms of community cohesion, as well as physical and mental wellbeing (Mansor et al., 2009). It is interesting to note, in this respect, that a recent international study found that Malaysian women rank 16th on the list of the most stressed in the world (Nielsen Report, 2011).

In spite of the recognised benefits of urban green spaces, according to the Malaysia Quality of Life (2002) report, the frequency of park use amongst Malaysian is still low. Only 20.2% of Malaysian families engage in recrea-

tion activities once a week and about less than half of the families do so once a month.

Most Malaysian cities and towns lack a well-functioning green infrastructure while, for example, poor accessibility can be an issue (National Urbanisation Policy, 2006). For example, according to a study by Sreetheran and Adnan (2004), Kuala Lumpur does not have a proper green network that links all the existing open spaces. This is problematic, as accessibility and connectivity are important preconditions for green space functionality (Natural England, 2011).

1.1 Aim and objectives of study

In the light of the issues described above, the overall aim of this study is to generate more comprehensive knowledge on the social use and importance of green spaces in Malaysian cities, in order to provide a better knowledge base for green space planning and management.

In order to meet this aim, the following research objectives were formulated, all of which were covered in one or more of three papers included in this PhD-thesis:

1) Gain an overview of green space planning and management in Malaysia through the case of the highly urbanised Klang Valley (Paper I)
2) Obtain a better understanding of residents' use and preferences regarding urban green spaces in major Malaysian cities (Papers II and III).
3) Gain insight into the relationship between distance to green space from the residence and green space use (Paper II).
4) Provide insight into the relationship between green space use and self-reported health (Paper III).

1.2 Research questions

The specific research questions dealt with in the three articles are as follows:

Paper I - Greenspace Planning and Management in the Klang Valley, Peninsular Malaysia.

i) Analyzes the status of urban greenspace policy, planning and management in Malaysia such as
   a. Who is responsible for handling legislation, policy and management in urban green spaces in selected cities in the Klang Valley?
   b. Which actors and stakeholders are involved in the green space planning and management in each city?
   c. What are the cities' plans and management aimed at maintaining and developing its urban green spaces?

d. How do municipal green space officers assess the present status of the green spaces and their planning and management?

Paper II - Recreational use of urban green space in Malaysian cities- according to socio-demographic characteristics.

i) What are the socio-demographic factors that influence the use of city green spaces in Kuala Lumpur and Kuching?
ii) What are the differences in terms of the use of urban green spaces according to socio-demographic and economic factors, as well as distance to the nearest park from the residence?

Paper III: Malaysian case studies on the relation between use of green space and health promotion.

i) Is there are any relationship between socio-demographic and economic characteristics of users of green space, and their self-reported health and feelings?
ii) Do distance to the park, park use and frequency of use effect people's self-reported health and feelings?
iii) How does green space use rank among recommendations respondents would give to their close friends or family members if they are experiencing stress or anxiety?

Fig. 1 below shows how the three articles are linked to one another. The figure explains how the authorities ensure opportunities for recreational and other use of urban green spaces through planning and management (Paper I). However, planning and management need to be supported by relevant and up-to-date knowledge on people's green space use and preferences (Paper II). Here it is important to recognise people's different needs according to varying socio-demographic, cultural and economic factors. It is also important to recognise the specific benefits of green spaces, for example in terms of promoting public health (Paper III), and to reflect these benefits in planning and management. If the use of green spaces promotes people's health, then it is important to make sure that people also use these areas. The interaction between green space resource and their functions, different users and their preferences, and planning and management are all in focus in this thesis.

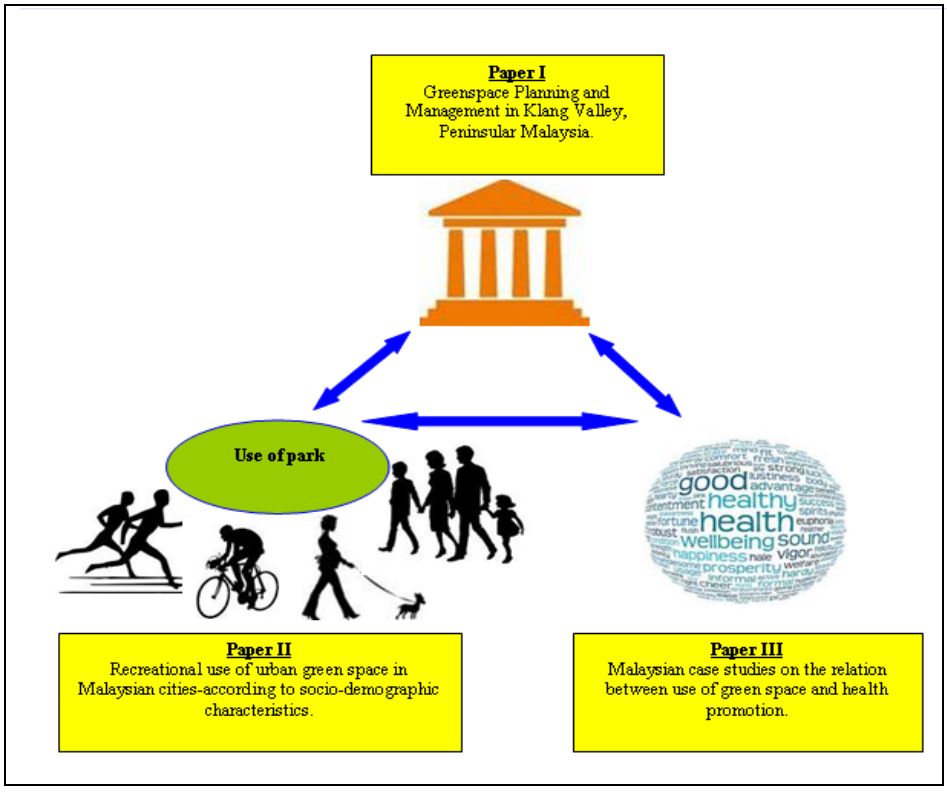

Figure 1: *Visual representation of the three articles and their links.*

In the remainder of this text, firstly the background of the study is described and the theoretical framework is introduced. This is followed by a brief description of the methodology applied. Then, the main results from each scientific paper are briefly presented, followed by an overall discussion of the study findings. Finally, conclusions are drawn and some recommendations are provided for future research as well as for the planning and management of urban green spaces in Malaysia, with the primary objective of enhancing their use.

2.0 BACKGROUND: INTRODUCTION TO MALAYSIA

This section offers a brief introduction to Malaysia in terms of its location, history, culture and people. In addition, the field of green spaces in Malaysia will be introduced, including the related policy framework.

2.1 Malaysia: Location, History and Population

Situated in Southeast Asia, Malaysia, with an area of 329,750 sq km, consists of two regions: Peninsular Malaysia, on the Asian mainland, and the states of Sarawak and Sabah, known together as East Malaysia, on the island of Borneo. Peninsular Malaysia is separated from the states of Sabah and Sarawak by the South China Sea. To the north of Peninsular Malaysia is Thailand, while its southern neighbour is Singapore. Sabah and Sarawak share a common border with Indonesia, while Sarawak also shares a border with Brunei (Dorai, 2007).

The country consists of 14 states including the three Federal Territories of Kuala Lumpur, Putrajaya and Labuan. Malaysia has a warm and humid climate. The humidity is about 80% all year round and temperatures range from 21°C to 32°C. Malaysia was established in 1963 through the merging of Malaya (independent in 1957) and the former British Singapore, both of which formed West Malaysia, and Sabah and Sarawak in north Borneo, which composed East Malaysia (Dorai, 2007).

The Malaysian population comprises 28.3 million people in 2010 (Department of Statistics Malaysia, 2011). A multiracial country with a diverse mix of religion and culture, the main races in Malaysia are Malays (53.3%), Chinese (26.0%) and Indians (7.7%), with large regional differences. The composition of the population in East Malaysia (Borneo), for example, is the most diverse in all of Malaysia. In Sarawak, the Dayak and Iban races make up most of the population, followed by the Bidayuh (land Dayak) and Melanau. There are also a number of other smaller tribal communities, which are collectively known as Orang Ulu (‘interior people’). Some tribes considered as Orang Ulu are Penan, Punan, Kajang, Kelabit, Lun Bawang and Bisaya tribes. The largest ethnic groups in Sabah are the Kadazan and Dusun tribes, followed by the Murut, Bajau and Rungus (Tourism Malaysia, 2011).

Islam is the official religion, but other religions are practiced freely. Bahasa Melayu (Malay) is the national language. While English is widely spoken in Malaysia, the locals are more comfortable with Bahasa. The ethnic groups also speak various languages and dialects including Cantonese, Hokkien, Mandarin, Tamil and Hindi (Dorai, 2007).

2.2 Urban green space and challenges

Malaysia is currently developing into an urbanised nation, with an expected urban population of 78% by 2030 (United Nation Habitat, 2011). According to Gairola and Noresah (2010), many green areas are affected by population increases in the cities. Malaysia's severe loss and degradation of urban green spaces could adversely affect important ecosystem services as well as have detrimental effects on the quality of human life (Ghazali, 1999). Kuala Lumpur, as an example, only provides 0.4 hectare of open space for every 1,000 inhabitants, far less than many European cities which provide 2 to 3 hectares for every 1,000 dwellers (Nordin, 1997). According to Salleh and Ishak (2002), air and noise pollution affect Malaysian cities as well. To deal with these challenges, Malaysia's local and federal authorities need approaches and tools for planning and monitoring of urban growth (Samat, 2006).

Lack of accessibility to green spaces is another problem in Malaysia. For example, Kuala Lumpur does not have a proper green network that links all the existing open spaces (Sreetheran et al., 2004). According to the Kuala Lumpur Landscape Master Plan (2002), the green network which comprises road reserves, river reserves, rail reserves and utility reserves, shows no relationship to each other and there is no green continuity throughout the network.

2.3 Policies and governance background

2.3.1 PENINSULAR MALAYSIA

Generally, land use planning in Peninsular Malaysia is undertaken wholly within the provisions of the Town and Country Planning Act of 1976 (Act 172) and its amendments in 1995 (Act A933) and in 2001 (Act A1129). The Town and Country Planning Act indeed recognises and protects the importance of public open spaces as one of the special infrastructures that is required in a development area.

The role of planning is to allocate land uses in a compatible and sustainable way across many components in the development process, including the provision of open spaces, green spaces and spaces for recreational use. According to the Town and Country Planning Act A933, "open space" means *any land whether enclosed or not which is laid out or reserved for laying out wholly or partly as a public garden, park, sports and recreation ground, pleasure ground, walk or as a public place.*

There are three levels of governance in Peninsular Malaysia: the federal, state and local level. From a planning perspective, municipal plans need to be assessed by the state level before the plan is sub-mitted to the federal level. At the federal level, three important bodies examine the plan: the National Physical Planning Council, the Town and Country Planning Depart-

ment and the Regional Planning Committee. Through this planning set-up, the government trusts that land use will be duly arranged for all private, municipal and other public areas, with consideration of environmental, social and econo-mic interests (Halimaton, 2007).

The National Physical Planning Council is an advisory council at the federal level which is chaired by the Prime Minister. Given the fact that under the Federal Constitution, land is a state matter, and town planning is a concurrent matter between the federal government and the state government, town planning in Malaysia is still very much a state stronghold notwithstanding the presence of this federal level council. Thus, each state has a State Planning Committee which advises the State Authority on matters relating to the regulation and coordination of all development activities in the state. Under the State Planning Committee are the various local planning authorities for each local authority area in the State.

The National Urbanization Policy (NUP) embodies an attempt by the Federal Town and Country Planning Department to guide growth as outlined in the 9th Malaysia Plan and the National Vision. The NUP was formulated to increase the effectiveness and quality of urban services for the creation of safer, modern and attractive towns. One of its six 'pillars' concerns the creation of liveable urban environments with a clear identity, with an emphasis on environmental conservation and the quality of urban life (National Urbanisation Policy, 2006).

Another important policy actor is the National Landscape Department (NLD), which was established in 1996 under the Ministry of Housing and Local Government. It was entrusted with the responsibility for landscaping and greening the country, based on the approval by Economic Planning Unit (EPU). The National Landscape Department (NLD), for example, prepared a National Landscape Policy and initiated the formulation of the Landscape Master Plan for all cities in the country (Kuala Lumpur Landscape Master Plan, 2002). These plans should be referred to together with the Structure Plan and Local Plan in any proposed development in the city.

2.3.2 SARAWAK

Sarawak policies and governance are different from those of Peninsular Malaysia. In Sarawak, various legislations, directly or indirectly, affect planning and the development of the built and natural environment. Planning-related laws and regulations have existed for a long time in Sarawak. The first known planning law, The Town and Country Planning Ordinance was enacted in 1952. However, it was never invoked by the State as the provisions were considered impractical by the State. The Land Code (1958) forms the legal structure on which the Land and Survey Department administers all land matters in the State. However, it has limited usage in the urban planning process because it only contains provisions which and provides for the sub-

division of land outside the scheduled ‘Development Areas’ (Nasser and Hamid, 2011).

Historically, it was under the ‘Land (Control of Subdivision) Ordinance 1954’ that the planning function of development control was carried out. The Ordinance was defined as “an Ordinance to regulate the development of land by sub-division and to make consequential provision for the reservation of land for roads, access-ways and reserves whenever land is developed and to provide for all matters incidental there to.” It has served as a comprehensive framework for the development control practice in the State for many years until it was repealed by the 1997 amendment to the Land Code (Land and Survey Department, 2011).

Other laws also help to shape the physical built environment in Sarawak, such as the Strata Titles Ordinance, 1995 and the Buildings (Amendment) Ordinance of 1997. The former, implemented by the Land and Survey Department, enables the issuance of subsidiary titles for different ownership in each level of multi-storey buildings. In effect, this facilitates the building of higher and more complex types of buildings, and in the process, changing the skyline and character of the cities. This is unavoidable as the country progresses and development increases in tandem with economic advancement (Nasser and Hamid, 2011).

The Buildings (Amendment) Ordinance 1997 incorporates all the building by-laws and is implemented by the local authorities. However, in the ordinance, relevant town planning matters require the approval of the Planning Authority, namely the Land and Survey Department. The enforcement of this Ordinance involves both the Department and the Local Authority, although the latter are the primary implementers of the legislation. The Ordinance also helps to control our built environment, ensuring adequate minimum living standards and safety in all buildings (Nasser and Hamid, 2011).

3.0 THE IMPORTANCE OF URBAN GREEN SPACE

3.1 The benefits of urban green space

Urban green space as used here refers to municipally owned green space, although elements of privately owned green space will be touched upon. Awareness about the importance of urban green space has been increasing worldwide. As mentioned earlier, green spaces contribute to the quality of life and environment through a wide range of benefits. Urban parks and green spaces provide numerous direct and indirect contributions to people's prosperity, wellbeing, social relations, and daily life experience. In this chapter, the current findings on the benefits to people of green spaces will be presented (Fig. 2), based on an adapted version of the conceptual model presented by Bedimo-Rung et al. (2005).

Schipperijn (2010) adapted the original model by changing the word 'park' to 'urban green space' (UGS in brief), a suggestion which is followed in this thesis as it deals with all types of urban green spaces. According to Bedimo-Rung et al. (2005), visits to, or the use of, UGS (as well as non-visits or non-use) are influenced by the UGS and user characteristics. UGS's characteristics include features and amenities, size, accessibility, aesthetics, condition, and safety. Meanwhile, user characteristics include age, gender, ethnicity, education and disability. Scotland's Annual Report (2007) identified that having a disability or health problem or not are important factors influencing green space use among specific groups of people. Perception of use derives from the attitudes and perceptions of users, which depend on the UGS's characteristics. Attitudes and perceptions are important factors which determine visits to and the use of UGS. Definition of perception is generally a gathering information through our senses, which are seeing, hearing, touching, tasting, smelling and sensing which these stimuli are selected, organized and interpreted; and prepared for action by the brain (Stávková et al., 2008). Meanwhile, definition of attitude is conceptualized in many ways from it being a state of readiness for mental and physical activity, to the inclination for an individual to evaluate objects or aspects in a favorable or unfavorable manner (Dawes, 1972). The right column of the model presents the benefits of UGS in terms of physical and psychological (mental) health, as well as the social, environmental and economic benefits (Schipperijn, 2010).

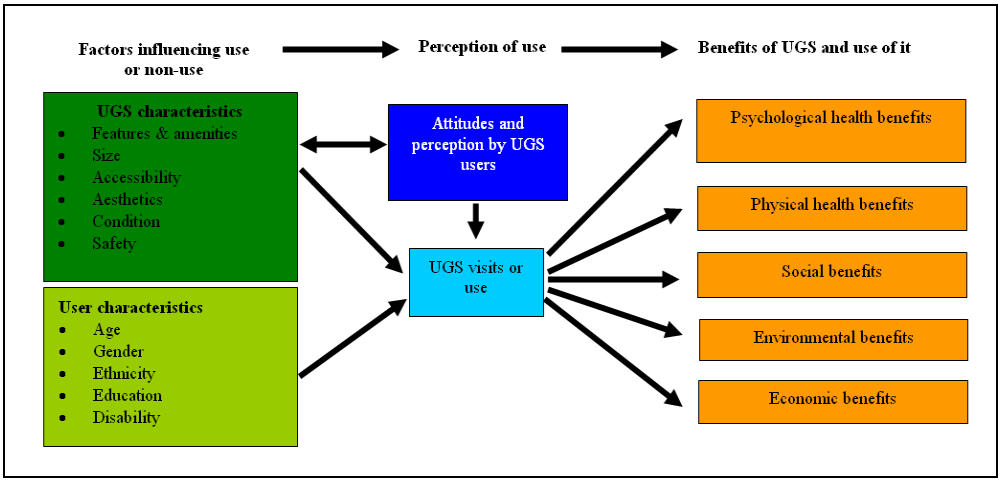

Figure 2: *A conceptual model of the benefits of urban green spaces (adapted from Bedimo-Rung et al., 2005).*

3.1.1 PSYCHOLOGICAL HEALTH BENEFITS

Green spaces contribute to mental health and well-being. Research has shown, for example, that green spaces help to relieve mental fatigue (Kuo, 2001), increase cognitive functions, improve work capacity (Grahn and Stigsdotter, 2010) and reduce stress (Kuo and Sullivan, 2001). Viewing and engaging with nature also result in feelings of pleasure, enjoyment, relaxation, comfort and calmness (Korpela, 2002; de Vries et al., 2003; Lohr et al., 2004). A study by van den Berg et al. (2007) proves that passive contact with green space affects the psychological restorative system, reducing blood pressure and stress levels. Moreover, getting in touch with natural settings can improve the attention of functional and emotional gains as well as reduce blood pressure (Hartig et al., 2003). A recent study shows that engaging in physical activity in a green space area leads to greater feelings of re-vitalisation, and at the same time, decreases tension, confusion, anger and depression (Thompson Coon et al., 2011). Moreover, frequent visits to green spaces have been found to help reduce stress (Grahn and Stigsdotter, 2003). Some studies have pointed at a relationship at hospitals as well as workplaces between people´s health and their access to green spaces. The view of a natural environment within the hospital area promotes recovery from illness (Diette et al. 2003), while direct contact with nature at the workplace reduces pressure and enhances job satisfaction (Hine et al., 2007; Maller et al., 2006). Evidence also shows that green spaces have a positive effect on children's mental health (Ward Thompson et al., 2004) and decrease stress levels (Wells and Evan, 2003). In addition, recently, in a doctoral study on nature and public health, Annerstedt (2011) provided an over-

view of the literature as well as of leading theories. This work shows that the evidence base concerning positive effects of natural environments on public health is still rather weak, especially as many past studies have lacked stringency in their design

3.1.2 PHYSICAL HEALTH BENEFITS

An increasing number of studies have identified positive relationships between green spaces and public health (e.g. Takano et al., 2002, de Vries et al., 2003; Maas et al., 2006; Mitchell and Popham, 2007; Nielsen and Hansen, 2007; Annerstedt and Währborg, 2011). These studies relate both to psychological and physical health. Research across the Western world has shown that access or close proximity to green space, as well as green space size, have an impact on levels of physical activity (Cohen et al., 2007; Giles-Corti et al., 2005; Hillsdon et al., 2006; Kaczynski et al., 2008). A study in the Netherlands shows that people who live in areas with a lot of green space are healthier than people who live in less green areas (de Vries et al., 2003; Maas et al., 2006). Studies in Japan have indicated that close proximity to green spaces motivates people to walk and positively influences the longevity of older people in urban areas (Takano et al., 2002), while also reducing mortality rates (Fukuda et al., 2004). In Denmark, close proximity to and resulting use of green space was found to help young people overcome obesity problems (Nielsen and Hansen, 2007). Furthermore, a study by Biddle et al. (2004) supports the assertion that people who regularly participate in exercise in green spaces are less prone to obesity and have better bone condition, thereby reducing the risk of developing osteoporosis.

3.1.3 SOCIAL BENEFITS

Green space offers settings for enhanced community interaction and social activities (Tzoulas et al., 2007; Bell et al., 2008; Peters et al., 2010). A study by Sullivan et al. (2004) found that people are more inclined to engage in social activities in green spaces than indoor ones. Cohen et al. (2008) have also found positive relationships between green spaces in the neighbourhood area and the residents in terms of social interaction. According to Sallis and Owen (1999), people are more likely to participate in social activities if they have the support and encouragement of families, friends and co-workers. Peters et al. (2010) found that urban green spaces offer opportunities for different ethnic groups to relax and enjoy outdoor life. In addition, green areas may contribute to social cohesion in the culturally diverse cities and towns of modern society.

3.1.4 ENVIRONMENTAL BENEFITS

Green space provides a wide range of environmental services. Research has shown that green space helps to maintain a healthy urban environment by

providing clean air, improving the urban climate, preserving the natural balance of the city and even providing clean water and fertile soil (Baycan-Levent and Nijkamp, 2009; Nowak et al., 2006). Specific studies have looked at, e.g. the role of green spaces in improving air quality (Zhang, 1999), reducing noise pollution from traffic and in controlling temperature (Salleh et al., 1990; Yang et al., 2005). Akbari (2002) has studied the effect of green spaces on soil pollution and erosion, as well as in terms of providing shade. In addition, green areas provide habitats for birds and other wildlife (Zhang and Wang, 2006). In tropical cities, green spaces are especially important for shading and cooling, and for mitigating the urban heat island effect and its impact in terms of, e.g. air pollution (Sani and Ahmad Badri, 1988; Mikami and Kubo, 2001; Takano et al., 2002; Thaiutsa et al., 2008).

3.1.5 ECONOMIC BENEFITS

There is an important link between the value of a property and its proximity to parks, greenbelts and other green spaces. According to Crompton (2001), green space can increase the value of a property. Studies have reported that greenways or trail development can have a positive influence on property values (Nicholls and Crompton, 2005). A range of studies conducted in Europe, Asia and the US have evaluated the effect of environmental factors, such as green space provision, (e.g. Tyrväinen, 1997; Tyrväinen and Miettinen, 2000; Tajima, 2003; Jim and Chen 2006), proximity to parks (Bolitzer and Netusil, 2000; Poudyal et al. 2009) and views of green space and water (Luttik, 2000; Jim and Chen, 2006) on house prices. A study in Hong Kong, for example, demonstrated that a view of green spaces and close proximity to water bodies raised house values by 7.1% and 13.2% respectively (Jim and Chen, 2006). Work in Finland showed that accessible green spaces near homes can raise house values by 5-6 % (Tyrväinen and Miettinen, 2000; Tajima, 2003). In Dallas, Texas, USA, a study by Miller (2001) found that houses which overlooked 1 of 14 parks located in an area were worth 22 % more than homes situated just a mile from the park. In Malaysia, according to Tan (2011), residential neighbourhoods with landscaped compounds had residential property values which were 18.1 % higher than neighbourhoods without landscape elements.

3.2 Research on the recreational use of urban green space

3.2.1 RECREATIONAL USE OF GREEN SPACE

Many of the mentioned benefits of green space, such as their health and social values, are closely linked with green space use. Studies on the use of urban green spaces have been carried out for quite some time with, e.g. many studies being conducted in Europe (Chiesura, 2004; Arnberger, 2006; Sanesi and Chiarello, 2006; Schipperijn et al., 2010a). However, work has

also been conducted in Asia (Jim and Chen, 2006; Wong, 2009; Lo and Jim, 2010; Mahdieh and Mustafa Kamal, 2010). Across the globe, studies have looked at frequency, types and patterns of use (Arnberger, 2006; Jim and Chen, 2006; Saniya and Faria, 2009), as well as the purposes of use (Chiesura, 2004; Jim and Chen, 2006; Sanesi and Chiarello, 2006; Schipperijn et al., 2010b). Some research has specifically looked at differences in green space use amongst immigrants and between various ethnic groups or immigrants in Western countries (Fraser and Kenney, 2000; Gobster, 2002; Johnston and Shimada, 2004; Jay and Schraml, 2009; Peters et al., 2010).

Studies have applied various methods of investigation. Both potential and actual users have been involved through interviews, postal or telephone surveys, both selectively and randomly, in order to obtain information about the use and non-use of urban green space (e.g. Grahn and Stigsdotter, 2003; Neuvonen et al., 2007; Tyrväinen et al., 2007; Schipperijn et al., 2010b).

Study results show differences and similarities in terms of preferred activities, experiences and attributes of green space. The most popular reasons for visiting green spaces include finding peace and quiet, relaxation and enjoying nature and fresh air (Chiesura, 2004; Jim and Chen, 2006; Sanesi and Chiarello, 2006; Schipperijn et al., 2010a).

Typical visiting times show variation. Studies from urban forests in Vienna to public parks in Guangzhou show that the weekend is typically the most popular time for day visits compared to weekdays (Arnberger, 2006; Jim and Chen, 2006). However, the urban and peri-urban forests in Vienna are used on all days of the week and at most times of the day (Arnberger, 2006). In warmer climates, such as Malaysia, visiting times are affected by variations in temperature. Most people in subtropical Guangzhou, China and Dhaka, Bangladesh visit green spaces during the early morning (Jim and Chen, 2006; Saniya and Faria, 2009). Moreover, some researchers have found that most users prefer walking to nearby green space (Arnberger, 2006; Sanesi and Chiarello, 2006; Wong, 2009; Schipperijn et al., 2010a).

Previous research has looked at the use of green space according to cultural diversity. Results indicate that in North America, for example, Chinese people rarely spend time in green spaces, except for the elders who like to socialise and get involved in healthier activities such as *Tai-chi* (Devier, 2010). African-Americans, however, go to parks to socialise and relax rather than to engage in sporting activities (Baas et al., 1993).

3.2.2 FACTORS INFLUENCING THE RECREATIONAL USE OF URBAN GREEN SPACE

Distance to a green space is the most important factor influencing its use (Takano et al., 2002; Owen et al., 2004; Lee and Moudon, 2008). Various studies have found that urban dwellers prefer to visit nearby green spaces and that the frequency of use declines as the distance from the residence

increases (Grahn and Stigsdotter, 2003; Kaczynski and Henderson, 2007; Neuvonen et al., 2007; Nielsen and Hansen, 2007). A distance of 300 m has been mentioned as a 'threshold' for the most intensive use by a resident. However, a study conducted by Schipperijn (2010) in Denmark found that distance is not a limiting factor on park use for the majority of people, but it can depend on, e.g. mobility, available alternatives and the quality of green spaces. In Kuala Lumpur, green spaces are difficult to reach by foot due to poor green networks that link all existing open spaces (Sreetheran and Adnan, 2004). This could hamper green space use.

Some studies have shown that green space use is closely connected with the physical characteristics of these areas (Bedimo-Rung et al., 2005; Kemperman and Timmerman, 2008; Shores and West, 2008). Size and the level of facilities are factors that influence use (Crawford et al., 2007; Kaczynski et al., 2008). McCormack et al. (2006) found that the opportunities provided for different recreational activities influence how far people travel to use green spaces.

Use of green areas also differs amongst different social and cultural groups (Arnberger, 2006; Neuvonen et al., 2007; Schipperijn et al., 2010b; Gentin, 2011). Factors such as age, gender, education and income level result in differences in recreational use patterns and preferences (Oguz, 2000; Sanesi and Chiarello, 2006; Neuvonen et al., 2007; Schipperijn et al., 2010b).

4.0 THEORETHICAL BACKGROUND: UNDERSTANDING THE USE OF URBAN GREEN SPACE

4.1 A socio-ecological model

Social–ecological (SE) models are becoming more widely used in health behaviour research (e.g. Gregory et al., 2011), leisure research (e.g. Raymore, 2002), active living research (e.g. Sallis et al., 2006), physical activity research (e.g. Owen et al., 2004), as well as in studies on the use of urban green space (Schipperijn, 2010). This study has applied this theoretical approach as a framework for analysing and understanding the behavioural use of green space. Behaviour in this thesis is broadly defined as any sort of visit to an urban green space, mode of transport, length of stay, frequency of use and timing of visits.

The SE model approach was selected as it not only involves human behaviour, but also the nature of people's interaction with their environment; and the environment may also influence whether or not people participate in UGS or use the UGS.

The so-called socio-ecological approach combines these issues with a wider social context, as well as with the effect of people's environment. Thus, it distinguishes between various levels of influence on a person's behaviour, which can be divided into, 1) individual factors such as age and education, as well as social aspects such as links to family and friends, and 2) environmental factors such as the physical and cultural environment (Giles-Corti et al., 2005). As explained by Schipperijn (2010), who applied the socio-ecological approach in his doctoral study on green space use in Denmark, the behaviour 'use of green space' can be seen as the result of individual factors, the perceived environ-ment, the physical environment (i.e. the characteristics of the green space itself) and various interactions.

Inspired by Giles-Corti et al. (2005); Sallis et al. (2006); Hutzler (2007) and Schipperijn (2010), the following, specific socio-ecological model was developed for this study, as a framework for understanding the use of urban green space (see Figure 3).

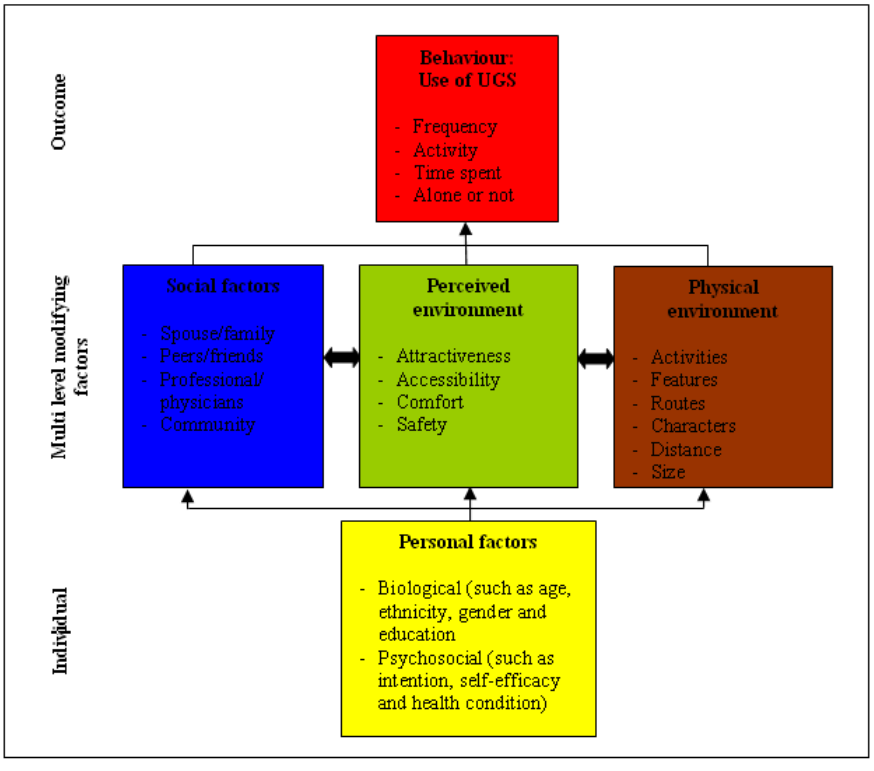

Figure 3. *A socio-ecological model of the use of urban green space. Inspired by Giles-Corti et al. (2005), Sallis et al. (2006), Hutzler (2007), and Schipperijn (2010).*

The model in Fig. 3 shows the interaction between the individual and multi-level modifying factors that can affect the behaviour 'use of UGS'. The determinant factors can be seen as socio-demographic/individual factors, social factors, perceived environment and physical environment.

4.1.1 PERSONAL FACTORS

According to Yi Pan et al. (2009), personal factors can be divided into biological (e.g. age, gender and health status) and psycho-social (e.g. intention, self-efficacy and health beliefs). Furthermore, individual factors such as age, education, gender and ethnicity also influence people's use of green space (Giles-Corti et al., 2005; Gobster, 2002).

4.1.2 SOCIAL FACTORS

Social support and social networks such as companionship, encouragement, assistance from friends/ family members, advice and information from pro-

fessionals has an effect on participation in physical activity (McNeill et al., 2006; Yi Pan et al., 2009). People are more likely to be active when they have the social support and encouragement from families, friends, co-workers and others (Sallis and Owen, 1999).

4.1.3 PHYSICAL ENVIRONMENT FACTORS

Humpel et al. (2002) mentioned that the environment influences the use of green space; and that environmental characteristics include features, condition and distance (Owen et al., 2004). However, as mentioned, research identifies distance as being the main influencing factor on the use of green space (van Herzele and Wiedemann, 2003; Giles-Corti et al., 2005).

4.1.4 PERCEIVED ENVIRONMENT FACTORS

In this model, perceived environment is defined as the perceived characteristics of the physical context in which people live, work and engage in recreation in line with Davidson and Lawson (2006). This includes aspects of safety, traffic density, attractiveness and accessibility. Previous studies have emphasised the perceived access to green spaces (Sugiyama et al., 2008; Foster et al., 2009) and perceived quality of open spaces (Sugiyama and Ward Thompson, 2008) as important factors that influence actual physical activity.

4.1.5 INTERACTION BETWEEN FACTORS

Physical activity behaviour is influenced by personal and environmental factors in conjunction (Brownson et al., 2001; King et al., 2002). A study conducted by Giles-Corti and Donovan (2002) in Australia shows that the direct influence of the physical environment on the level of physical activity was secondary to individual and social environmental factors. In previous research, physical environment factors, personal attitudes and peer support appear to be equally important in encouraging walking (Giles-Corti and Donovan, 2003; Ball et al., 2007). Booth et al. (2000) attempted to identify whether social and perceived environment influences are associated with physical activity in older adults. Moreover, Carnegie et al. (2002) discovered that physical activity behaviour is associated with the physical environment. For example, the aesthetics and features of the physical environment influenced time spent walking.

5.0 METHODOLOGY

Different approaches have been applied in the three papers to meet the four main objectives of the study. As Malaysia is the setting for the research, not only UGS use in Malaysian cities was of interest, but also finding out more about how Malaysian green space use compares with other countries. Besides this, Malaysia is a multi-ethnic country, and studying the use and preferences of different ethnic groups can provide a more in-depth understanding of similarities and differences between user groups.

Figure 4. Map of Malaysia, with case studies indicated

5.1 Postal survey

In order to meet the first, second and third research objectives, 16,205 questionnaires were sent out randomly to addresses in a residential area within a 2 kilometres radius of five selected parks in the cities of Kuala Lumpur and Kuching. The selected parks located in Kuala Lumpur were Titiwangsa Lake Park, Permaisuri Lake Park and Kepong Metropolitan Park, while the parks in Kuching, Sarawak were Kuching Park and Friendship Park. A distance of 2 kilometres was chosen based on early research that suggests most park visitors to live nearby, while still allowing for a differentiation between people living at different distances from the park. The data from this survey were used to provide an overview of the use of UGS in Kuala Lumpur and in Kuching, Sarawak. The questionnaires were constructed in two languages, namely English (international language and widely spoken in Malaysia) and Bahasa Malaysia (local language), so as to cater for the variety of ethnic groups in Malaysia and their respective language preferences. The respon-

dents were asked to answer the questionnaire within three weeks of receiving it.

The questionnaire was inspired by studies undertaken by Schipperijn (2010) on the use of UGS, while for health-related aspects and experience of UGS issues, inspiration was drawn from the work of Grahn and Stigsdotter (2003) and from a Danish report on nature and health by Randrup et al. (2008). The main focuses of this survey were the use of UGS, the effect of distance to the nearest green space, user preferences, as well as linkages between green space use and health. In the part on use of UGS, respondents were asked about the distance from their home to the park and whether they had visited the park for recreational purposes. In the health part, respondents were asked about whether they had ever visited the nearby (named) park for recreational purposes (yes or no), about the number of visits to the park during the past three months (if any), and also to provide a self-estimated distance to the park. Also, respondents were asked to report their own general health condition (self-reported health) within the past four weeks, including how they scored a range of feelings, e.g. feeling energetic and full of life, sad, relaxed and at ease, worn out, happy and satisfied, and tired. Moreover, the questionnaire asked whether the respondent had recommended close friends or family members to use a park if they felt worried or stressed. Respondents were also asked about their demographic profile including gender, age, ethnicity, marital status, number of children, level of education and monthly income.

In this survey, n=1,692 respondents returned the questionnaires (response rate: 10.44%). SPSS version 18.0 was used to analyse the data, and descriptive statistics (frequencies and cross-tabs) and regression analyses were carried out.

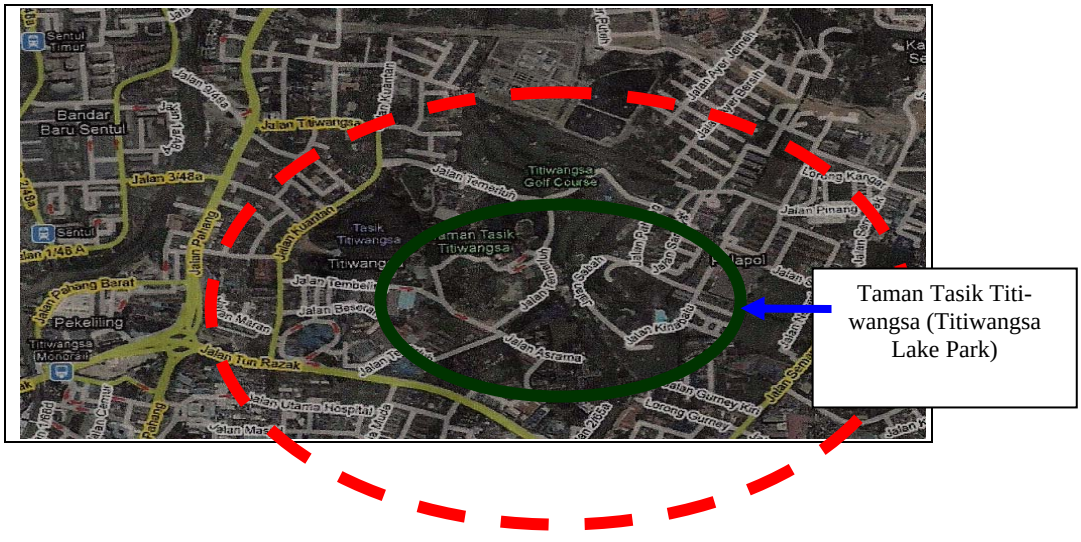

***Figure 5**. Example of a study area (Titiwanga Lake Park), with the red line (at a 2 km radius from the park boundaries) indicating the 'catchment area' for residents surveyed.*

5.2 Document analysis, literature review and interviews

In order to obtain a better understanding of urban green space planning and management in Malaysia and to answer my first objective, documentation was collected and analysed on planning and management such as green space policies and plans. The study specifically looked at six city/municipal councils in the Klang Valley region as the most urbanised part of Malaysia. The six selected cities were Kuala Lumpur, Putrajaya, Petaling Jaya, Subang Jaya, Shah Alam and Klang, all of which are developing rapidly and their population is increasing. In addition, expert interviews were conducted with public green space managers in every municipality or city council in order to update their city and green spaces information. In this paper, elements of the Policy Arrangement Model (PAM) are applied as a framework for analysis. The focus in the paper is primarily on actors and discourses and to some extent the rules of the game in terms of regulations and rule acceptance. The PAM provides a structured approach for analysing and understanding policy arrangements as the temporary stabilisation of the substance and organisation of the particular policy domain. The list of questions for the interviews with municipal green space officers involved city and green space information (the total municipal area, population, percentage of green space and meters squared of green space per inhabitant in each city), the main functions and benefits of green spaces in each city, any actors involved and the

most important Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis regarding the city's green spaces and their planning and management.

6.0 SUMMARY OF RESULTS

This chapter shows the main results of the three papers, while the reader is referred to the individual papers for more detailed findings.

6.1 Green space planning and management in Klang Valley, Peninsular Malaysia.

Background knowledge was compiled on the planning and management of urban green spaces in six selected cities in the rapidly urbanising Klang Valley of Peninsular Malaysia. Information was compiled through interviews with municipal green space managers, through the study of planning and other documents, and by using analytical tools such as SWOT analysis. The results clearly indicate that green space planning and management in Malaysian cities is recognised as important, although there is still considerable room for improvement.

In terms of the planning set-up, most of the selected cities fall under the national Town and Country Planning Act 1976 and the Local Government Act 1976. Kuala Lumpur and Putrajaya have a special status as Federal Territories, which implies that they need to submit their planning and management reports or proposals to the Ministry of the Federal Territories for review. These federal territories have their own extraordinary policies and legislation, such as The Federal Territory (Planning) Act 1982, in the case of Kuala Lumpur. Apart from implementing national policies, the cities have also adopted their own municipal policies and bylaws, something which is of relevance to green space planning and management.

The development of public parks in Malaysia started at the end of the 19th century, during the colonial era. Green spaces such as Kuala Lumpur's Lake Garden Park (from 1888) were primarily meant to cater for the needs of British colonial society. The green space discourse changed when Malaysia gained independence in 1957. The new government started to focus on urban greening and beautification as an instrument for nation building. The changing green space discourse was reflected in the work of, e.g. the National Landscape Department, within which the greening of cities and the development of public parks and recreational areas featured as important elements of the National Landscape Policy (Kuala Lumpur Landscape Master Plan 2002). The notion of green infrastructure is clearly present in the plan, e.g. the establishment of greenway linkages is stressed.

When considering prioritised green space function and benefits, all cities emphasise environmental services such as cooling the air, water regulation, and pollution reduction. Biodiversity and the provision of habitats for flora and fauna are also considered important. The social services offered by

green spaces, such as providing opportunities for recreation, relaxation and sports, are also emphasised by all cities.

Different municipal organisations are responsible for green space planning and management in the cities. Urban green space governance (i.e. strategic decision making) and management involve a wider range of actors than just municipal departments and units. National-level actors, such as the National Landscape Department, and a series of knowledge institutions (universities and research centres) also play an important role, e.g. as advisors to city councils on planning, management and design issues. The Institute of Landscape Architects Malaysia and private landscaping firms have also contributed to knowledge generation and transfer.

In terms of green space plans and activities, the six cities studied have plans and activities in place for the planning and management of urban green spaces, but these vary widely in terms of their scope and ambition. For example, Kuala Lumpur has a rather ambitious vision to become a Tropical Garden City by the year 2020, while Petaling Jaya is in the process of connecting its 440 open spaces under the Petaling Jaya Action Plan Green Corridor Network 2009. Putrajaya's green structure has been an important part of its development and a comprehensive set of policies and bylaws is in place for green space planning and management.

The SWOT-analysis completed by the respondents showed, for example, that the current focus on greening as part of an overall city development strategy was mentioned as a strength by three cities. In fact, this strength could also be seen as an opportunity for realising the full potential of urban greening as a part of city development. Other strengths mentioned for specific cities were, among others, the extensive existing green cover (Putrajaya), the existence of a tree inventory (Petaling Jaya), and the historically strong links between humans and nature (Klang). The respondents agreed on the main weaknesses of present green space planning and management, with lack of funding being mentioned most frequently. Other weaknesses mentioned included a lack of legal protection and land ownership (many of the open spaces in Klang are privately owned). Regarding opportunities for green space planning and management, the visions, policies, and ambitions of cities to become more competitive and sustainable were mentioned. Listed threats included the current financial crisis and a lack of public awareness, as well as confrontations with land management administrations regarding the alternative use of green space areas.

6.2 Use of green space in selected Malaysian cities

The studied parks were rather popular among local residents. About 88.5% of the respondents in the two cities stated that they had visited the nearby park, and 72.1% had visited the park during the past three months. The ma-

jority of the respondents visited the nearby park in the weekend, although the results for the five different parks varied. In terms of the timing of the visit, most of respondents mentioned the afternoon. About 80% of all respondents spent an hour or less in the park.

When looking at how people get to the parks, most respondents travelled by car (61.2 %), with only 26.6 % walking to the park.

In terms of the social aspect of park use, the majority of the respondents visited the park with their family (54.0%), while only a small share (9.7%) used the nearby park alone.

When considering the relationship between the frequency of park use and the distance from the residence, the number of people who had visited the park more than 20 times during the past three months increased as the distance from the residence decreased. Moreover, the group of 'non users' increased as the distance to the park increased.

Findings were not always consistent across the five parks or the two cities. In a comparison of the results for the two cities by means of logistic regression, for example, some differences were noted. People in Kuching were most likely to go to the parks during the weekdays, while weekend use was more popular in Kuala Lumpur.

Logistic regression modelling also indicated differences in the probabilities of using parks in terms of the day visited and the timing of the visits between ethnic groups, age groups, genders and people with different educational levels. For example, Indian and people aged 33-40 had the lowest odds for visiting the parks, while people aged 60 years or older were most likely to use the green spaces. Malays and Chinese generally preferred to go to the park in the morning, with Malays stating to avoid going to the park in the late afternoon and evening.

Park use in terms of bringing along family and friends, can be explained by interaction between the variables ethnicity and age. Respondents aged 41 to 60 were most likely to visit the parks with their family, while the frequency of use among people aged 17-25 was very low except for the Chinese group. Chinese showed significant differences with other ethnic groups as they generally were less inclined to bring their family to parks, with the exception of younger age groups. Malays, Indians and other ethnic groups continuously had the same pattern until the age of 60 and above, which brought about a decrease in bringing friends and family to the park, except for the Indian group which was also similarly inclined to bring their friends at that age.

The variables ethnicity and age show a significant difference regarding day of use (specifically using the park during both weekdays and weekends), while 'city' was a significant variable for more frequent weekday visits, and educational level showed significance only for weekend visits. When looking at gender, men were more likely to visit the park than women during

weekdays. In contrast, women's odds of visiting parks during the weekends were higher than for men.

Education had an impact on both day and time of visit. Individuals with a certificate level of education had the highest odds of reporting using the park during weekdays, while those with primary school education level had higher odds of using the park in the weekends than individuals with a university education. Individuals with primary education level had the highest odds visiting the park in the morning, and had lowest odds for visiting during the afternoon. Individuals with a certificate level of education had a higher tendency to visit during the afternoon than higher educated individuals. Moreover, individuals who were university graduates had the highest odd to use the park in the late afternoon and evening.

Through Principal Component Analysis, the following 4 different dimensions were identified out of 20 reasons or purposes for going to the park among ethnic groups; 1) restorative, 2) social, 3) education, and 4) fitness. Malays were found to visit parks more frequently for restorative and educational reasons, as well as for fitness. Meanwhile, Chinese people tended to visit parks for broader reasons, scoring almost equally on the 4 dimensions. Like Malays, Indians scored high on the restorative dimension, while they scored lowest for fitness. Other ethnic groups scored highest on the social dimension, but lowest on the restorative.

6.3 Use of green space and health promotion

Self-reported health for people living within 2 km of the five parks was first of all compared between the cities of Kuala Lumpur and Kuching, and revealed significantly lower scores for the population in Kuching. Several socio-demographic and economic factors were also found to have a significant effect on self-reported health, as well as on respondent feelings. Differences in self-reported health were significant for all socio-demographic characteristics, apart from educational level ($p=0.11$). Highly educated men and all ethnic groups except Chinese were over-represented in the group reporting good/excellent health. When looking at respondents' feelings, ethnicity was an important factor in explaining differences, while for age, all positive feelings were found to increase from teenagers (starting from 17 years old) to older people.

The study was mainly interested in the possible effect of park use on self-reported health. The frequency of visits was found to have a significant ($p=0.04$) positive effect on self-reported health, while visiting the park in itself was not found to have a significant effect. Perceived distance to the park from the residence did not have an effect either.

Visitors to the park were over-represented among those who stated that they were in good or excellent health, while non-visitors reported that they were

in average health more frequently. In terms of the distance to the park, people who live within 300 metres of the park were over-represented in the groups who reported being in good/excellent health, while those living one kilometre away from the park were more frequently of average health, although these findings are not statistically significant as previously stated. Respondents who used the park more than 20 times reported being in good/excellent health more often (53.8%) than those who used the park 1-20 times (49.4%). Respondents who never visit the park more frequently stated that were of average health.

When looking at the respondents' feelings during the past four weeks, those who used the park more than 20 times felt more energetic and happy, while people who used the park 1–20 times felt more relaxed. Interesting findings related to ethnicity, with Chinese people tended to feel less energetic, more tired and worn-out compared to others. Meanwhile, the Indians indicated to feel more joyful, but less relaxed, while Malay and the other ethnics group scored higher on feeling sad. Differences were also related to age, with older people feeling more energetic, joyful and relaxed compared to e.g. teenagers. Furthermore, teenagers felt less tired and wornout, but generally more sad than the other age groups.

In terms of distance, people who lived further away from the park felt more energetic, happy and relaxed, but these findings were not significant. Meanwhile, people who lived between 301-600m from the park were generally more tired than those who lived within 300m of the park. People who lived within 601m-1km were found to feel more worn out and sad. The respondents' feelings differed between the five parks. For example, people who visited the Friendship Park were more likely to feel energetic compared to those who used other parks, while respondents who visited Permaisuri Lake Park were most happy.

Recommendations for close friends or family members experiencing stress or anxiety to use a park were also studied. The highest scoring recommendations were to go on a vacation (N=1596), to get involved in sport/outdoor activities (N=1549), and to listen to relaxing music (N=1544). To take medicine was mentioned the least often. However, to take a break in a quiet and peaceful park was ranked 5th (N=1476) while to take a walk in the forest was ranked 7th (N=1415). Taking a break in a quiet and peaceful forest in was ranked 12th (N=936) out of 13 options. When the results are broken down according to socio–demographic and economic characteristics, many similarities are found, e.g. between genders, age groups and ethnic groups. However, the oldest age group and Indians ranked nature-based options such as taking a break in a quiet and peaceful park and taking a walk in the forest higher.

7.0 DISCUSSION

In this chapter, research findings are discussed and compared to previous studies. As frame for the discussion, I use the socio-ecological model and the individual factors, social factors, perceived environment factors and physical environment factors that all impact the behaviour of park users.

7.1 Socio-ecological model as a framework for the use of urban green space

In this study, the socio-ecological model used proved itself very useful as a frame for more in-depth understanding of the use of urban green spaces (UGS). A number of factors which influence the use of UGS have been reported in previous studies. Some of them applied the socio-ecological model or a similar approach, and these factors were also identified as important in a Malaysian context. Having said this, some differences were found, although most of these being minor.

7.1.1 INDIVIDUAL FACTORS INFLUENCING THE USE OF URBAN GREEN SPACE

Individual factors such as age, ethnicity and education level showed significant levels of influence on the use of UGS (Paper II). The findings also showed that the distance to an UGS affected individual factors which influenced whether parks are used frequently or not (Paper II). Both of these results can also be found in the work of Schipperijn et al. (2010b) in Denmark.

Moreover, among individual factors, ethnicity turned out to have an important impact on the recreational use of UGS. People from different ethnic groups showed different use patterns, as influenced by culture and beliefs. Ethnicity also explained different motives for using UGS, results which are in line with other studies, such as the work of Gobster (2002) on Hispanic and African Americans in the US. Gobster found, for example, that the ethnic minority groups visit the parks primarily for social activities, while Caucasians use green spaces to appreciate nature.

Another individual factor, perhaps not studied that frequently, also emerged from this study, namely people's (self-reported) health. People who stated to be in good/excellent health were found to be more frequent park users than those who were in poor health (Paper III). The question is, of course, whether more frequent park use is a result of better self-reported health, or rather the other way round.

7.1.2 SOCIAL FACTORS INFLUENCING THE USE OF URBAN GREEN SPACE

In line with the socio-ecological model, the impact of social factors on UGS use was also confirmed. Most respondents in the study preferred to bring other people such as friends, spouses/partners, and/or family members rather than visiting alone, although differences existed between people from different ethnic and age groups (Paper II). Chinese, for example, generally had a lower preference for park use together with others. Social support and encouragement from family and friends has been found to influence people's use of UGS (McNeill et al., 2006), while culture was found to influence people's attitudes and believed in terms of what types of social activities to engage in (Edward and Tsourus, (2006).

7.1.3 PHYSICAL ENVIRONMENTAL FACTORS INFLUENCING THE USE OF URBAN GREEN SPACE

Another multi-level modifying factor which influences the use of parks is the physical environment. An important physical environmental factor influencing the use of UGS in Malaysia is the weather. Due to Malaysia's hot and humid climate, the early morning and late afternoon are the most common times to visit parks. Similar findings were also found in other cities with warm climate (Sanesi and Chiarello, 2006; Jim and Chen, 2006; Lafortezza et al., 2009). Moreover, the different climatic conditions might also contribute to the popularity of driving to the park, in spite of often short distances from the residence, in contrast to findings from from European studies (e.g. Arnberger, 2006; Schipperijn et al., 2010a) Although an Australian study by Humpel et al. (2004) found that the weather impacts walking for exercise, an earlier study by Humpel et al. (2002) stated that the weather had only a minor influence on adults' participation in physical activity.

The present study included the distance and routes to get to the park, although focus was on perceived distance (Paper II), as explained below. In a large number of studies, distance was found to be associated with the frequency of use of UGS (e.g. Grahn and Stigsdotter, 2003; Giles-Corti et al., 2005; Schipperijn et al., 2010a). In the studied cities, there were some indications that distance was not a major issue, at least not within the studied zone of 0-2 km from the park boundaries, as people living 1.1-2 km from the nearest park were still frequent users. This finding is in line with the results from a Danish study by Nielsen and Hansen (2006) which showed that only 3% of respondents considered distance to be a constraint on the use of parks. Of course there could be other factors at play here, such as the lack of alternative options. Another factor is the important role of the car as major means of transportation in Malaysia (see above). When residents tend to travel to the parks by car in any case, distance is less of an issue. and even from other Asian cities (Jim and Chen, 2003).

Park features as specific physical environment factors also influence the use of UGS. Results from Paper II indicate that the age group from 26 to 32 years to had the highest probability of using the park for recreational purposes. According to Sallis et al. (2000), young people tend to spend more time outdoors if there are facilities, parks and programmes of activities. The findings of Paper III show that the different characteristics of the parks can influence people's feelings and have different effects on self-reported health. For example, both Permaisuri Lake Park and Friendship Park make people feel better and reduce their negative feelings. However, both parks are very different in terms of features. Friendship Park in Kuching is designed with Chinese architectural elements, while PLP in Kuala Lumpur has more trees and vegetation.

7.1.4 PERCEIVED ENVIRONMENTAL FACTORS INFLUENCING THE USE OF URBAN GREEN SPACE

In this study, the respondent assessed distance to the nearby green space, which according to Scott et al. (2007) and Schipperijn et al. (2010b) provides a better predictor for the frequency of use of UGS than the objectively measured distance (Paper II and III). Lackey and Kacyzanski (2009) showed that the correlation between the objective and self-estimated distance to the nearest park is rather poor, especially for people who do not use the park regularly. This might be explained by the fact that the distance to well-known, popular or well-used parks is often underestimated. On the other hand, less well-known, less popular, or less used parks are typically assessed to be further away than they are in reality (Scott et al., 2007). Perceived environmental factors could also relate to e.g. safety, natural dangers, attractiveness, and so forth.

7.1.5 BEHAVIOUR AND USE OF URBAN GREEN SPACES

The combination of personal and multi-level modifying factors as discussed above should feed into the behavioural use of UGS. Results of paper II show that the number of people who visited the park more than 20 times during the past three months increased as the distance to the park from the residence decreased. However, according to Schipperijn et al. (2010b), besides close proximity to the UGS, size and personal factors have the least or no effect when predicting frequency of use. According to Van Herzele and Wiedemann (2003), the attractiveness of an UGS for a user is influenced by a combination of different factors, primarily size and quality, and of course the distance from the respondent's home. In terms of the relationship between frequency of use and peoples' feelings, the results indicate that an increase in park use encourages positive feelings including feeling more energetic, happy and relaxed (Paper III). Another study in Malaysia indicated that participating in green space activities gives residents the opportunity to be ac-

tive and energetic, and to feel healthy and happy (Mansor et al., 2009). However, in contrast to results from Scandinavia (e.g. Grahn and Stigsdotter, 2003), park use in Malaysian cities was not found to decrease feelings of being tired, worn-out or sad.

The use of UGS also affects personal health as people who used the nearby park frequently stated higher levels of self-reported health, a finding which was found to be significant (Paper III). As mentioned above, however, the precise relation between self-reported health and park use is unclear. Studies carried out elsewhere have found stronger links between green space use and (self-reported) health. In this study, no significant relationship between distance to green space and self-reported health was found. This contrasts to recent work in Denmark that found that people who live closer to a green space reported being in better health than those living further away (Stigsdotter et al., 2010). This confirmed the results of Nielsen and Hansen (2007) and Grahn and Stigsdotter (2003) who found that people who use green spaces often are more likely to be in better health compared to those who do not use green spaces at all.

7.1.6. NATIONAL AND ORGANISATIONAL INFLUENCES ON THE USE OF URBAN GREEN SPACE

Paper I suggested that the roles of national and local organisations are important in ensuring the successful use of UGS. The involvement of NGOs, local communities, interest groups, clubs and the like in promoting UGS is not yet very high in Malaysia and could be enhanced to attract more people. But public bodies, including the national and local departments planning and managing urban green space, have a leading role to play in facilitating and promoting green space use. Concern for the provision of proper recreational space, and public parks in particular, has led to the adoption of various policies and the establishment of a range of institutions as a major step in this direction. However, in spite of an emerging policy and planning framework, there is still a lack of comprehensive green space policies at the municipal level. In addition, a lack of planning and management expertise and concern over funding and high pressure on urban land, has resulted in difficulties for municipal agencies to maintain and develop a sustainable, multifunctional urban green structure.

There is also evidence that suggests that these municipal agencies have difficulty in interpreting and implementing existing (national) green space policies, something which indicates that the “rules of the game” are not always clear. The respective roles of different (public) actors are not always clear either, and policies at the federal and local levels do not always match. Although municipal authorities take a leading role in green space planning and management in Malaysia and in Europe (Konijnendijk, 2003), the Klang Valley case studies show that there is quite a range of municipal departments

involving, such as Administrative Divisions, Park Divisions, City Cleansing and Control Divisions, and Agriculture and Horticulture Divisions, and that responsibilities for green space are rather fragmented.

Many local authorities plan a range of strategic or planning designations for their green spaces such as greenways, green corridors and green links. However, it is perhaps telling that in the study of municipalities of the Klang Valley, the health benefits of green space did not emerge as a priority, illustrating that promotion of this role of parks and other green areas leaves room for improvement in Malaysia.

7.2 Discussion of methodology

Two major research methods were used in this project, namely a postal survey of green space use among residents and a policy analysis (which included interviews and study of literature and documents). The study has indicated the merits of both methods, and both have generated important findings on UGS use and management. However, some weaknesses were encountered during the analysis of the results, both in terms of the methods and the way they have been applied.

7.2.1 POSTAL SURVEY

Based on the findings from other studies, residents who live within a 2 km radius of the nearby park were asked to participate in a postal survey (Paper II and Paper III). It is critically important to select specific locations in order to focus more on the residents, rather than only on park users (Schipperijn, 2010). Thus the method allows for incorporating both a large share of the actual users as well as potential users of each park. However, the 2 km perimeter applied in this study is rather arbitrary. For example, some of the parks had very few residences within the first kilometre. Here perhaps a wider perimeter could have been adopted.

The study's response rate was low. According to PriceWaterHouseCoopers (2002), responses to postal surveys in Malaysia are typically between 10 and 16%. Dillman (1991) has discussed the fact that mail surveys often hold an element of bias due to high-levels of non-response. As it is unlikely that the over 10% that responded also represents the 90% of non-respondents, study findings will be biased. Despite awareness of this setback, it was impossible to make follow up enquiries to the participants due to budgetary constraints. In future studies, it may be a good idea to send a reward offer letter together with the questionnaire to increase the response rate, and to counteract the limitations posed by available resources by more targeted sampling.

7.2.2 QUESTIONNAIRE DESIGN.

In Paper II, the questionnaire design was inspired by a recent study on the use of green spaces in Denmark (Schipperijn et al., 2010a; Schipperijn et al., 2010b). Green space use issues seem to have been addressed appropriately and the questionnaire worked well. The questions on accessibility, use of park, and mode of transportation were asked consecutively, in order to ensure that respondent would have an easy understand of the questions.

However, the research design of the part of the survey reported in Paper III may have been more problematic. The study found an unclear relationship between self-reported health and positive feelings. This might be explained by different relationships between forests and recreational forest use in Scandinavian and Malaysian culture. Fundamentally, the use of a Western research design in a newly industrialised country therefore can be questioned.

There were other differences with studies in Denmark and Sweden that provided the main inspiration for this work (Grahn and Stigsdotter, 2003; Nielsen and Hansen, 2007 and Randrup et al., 2008), such as the smaller population in the Malaysian study. However, all studies investigated similar issues and were based on similar theoretical foundations. In this study, survey questions were structured in a categorical rather than interval form, primarily because of the large number of questions in the survey (which deals with green space use in general) and the need to be able to handle the data. This choice has hampered the analysis of data on green space – health linkages. The work by Stigsdotter et al. (2010) showed that there are several options for statistically analysing interval form replies, e.g. multiple logistic regressions. This could have been integrated better in the design of the present study.

7.2.3 POLICY ARRANGEMENT MODEL (PAM)

The Policy Arrangement Model (PAM) was used as a theoretical frame for the part of the study reported in Paper 1. Although not applied in great depth, it helped structure and analyse the data and provide more in-depth insight in urban green space planning and management at the municipal level.

7.2.4 LITERATURE AND DOCUMENT COLLECTION

A review of the literature and other relevant material was used as a method for Paper I. Material was drawn from a wide range of academic publications and professional local and national policy documents on urban green space. A policy document provides a sound foundation for future planning, thereby helping to determine priorities. However, the study was hampered by the limited number of local council documents available specifically on the topic of urban green spaces. In many cases, comprehensive municipal green space plans and policies were lacking.

7.2.5 INTERVIEWS

The individual interviews with the selected green space officers about the basic city green space information and the SWOT analysis provided important information on the daily realities of green space planning and management in Malaysia. In spite of patterns of similarities, answers varied widely between the six municipalities. Perhaps sometimes questions were not easily understood. Some respondents needed additional time to answer the questions in order to obtain the correct answer or fact from a senior officer. The different locations and timing of the interviews is also considered to be a weakness. It had been the intention to gather the interviewees in one place at the same time to discuss and answer the questions. The follow-up enquiries regarding the interviews using e-mail and/or telephone were difficult due to the time difference between Denmark and Malaysia, but also because the officer in charge had handed the case over to another employee.

8.0 CONCLUSION AND RECOMMENDATIONS

8.1 Users of green areas

Understanding the use of green spaces is complex, as always illustrated by theories such as socio-ecological models. Many factors are in play. In many cases, urban parks are designed based on designers' insight and knowledge, but not always do green spaces meet the needs of users. This results in infrequent green space use, at least by some user groups. Given the recognized benefits of green space use, such as better health and more positive feelings, this can be regarded problematic.

The situation in Malaysia is made even more complex due to the country's ethnic diversity. The study has provided evidence of the differences in use patterns, motivations for green space use, and other aspects between the different groups. It is important to note that the issue of ethnicity is slightly 'sensitive' in Malaysia for political reasons, and therefore there could be some reluctance amongst authorities to differentiate between ethnic groups, for example in terms of providing dedicated park facilities. Public green space provides a 'democratic' space, where all segments of society can meet and where social cohesion can be promoted. However, it is crucial to recognize the needs of different groups of park users, including people from different age groups. Individual and social factors all have an impact on people's behaviour in terms of park use, in terms of e.g. the activities performed; the frequency of visits, the timing of visits (time of day), the length of time spent at the UGS, and the willingness to visit UGS at different distances from the home.

Urban planners and green space managers need to ensure that green spaces meet the demands and preferences of residents. For this purpose, it is important to carry out surveys, interviews, focus group interviews, observational studies and the like, so that more in-depth insight is acquired on people's behaviour, demands and preferences. This study has indicated that this type of knowledge is often still lacking in Malaysia.

8.2 Importance of green space and health

The use of green space has different positive effect on users, as outlined in the literature as well as in this study. However, the present study sketches a less clear picture of positive linkages between park use and public health than emerges from the literature. Fundamentally, frequent use of green space is thought to improve people's health, a finding for which this study provides some evidence. This relates back to the physical environment offered in green space areas, which determines the behaviour use of UGS. Relevant

parties in Malaysia, such as the Ministry of Health, Ministry of Education and Ministry of Environment, should be encouraged to raise awareness about the benefits of recreational use of green space. This could be done, for example, by working with schools and parents to promote daily, high quality physical and health education classes at all levels. A strong collaboration between health professionals and city planners could also raise awareness amongst the public regarding the importance of green areas for health and wellbeing. The mass media and celebrities/champions, on the other hand, also have a role to play.

8.3 Organisational actions

Institutional structures are important for sound green space planning and management. In particular, efficient and well-informed planning and management can help improve green spaces and meet users' needs. However, the local authorities included in this study identified a lack of resources as a major problem for green space planning and management. New sources of funding and better central government advocacy and policy are needed to support green space within cities. For example, developing transport policies can ensure that urban bus routes conveniently connect passengers with green spaces. Moreover, local authorities need to take a broad integrated view of the whole urban green space resource by recognising its vital contributions to the quality of life of urban dwellers. Collaboration with stakeholders is becoming an important aspect of UGS planning and management. More ideas and perspectives can be generated if a wide range of actors and stakeholders become involved, while they can also generate alternative funding opportunities for the enhancement of green space efforts. Community involvement is becoming a mainstream activity in many Western countries. Engaging in dialogue and sharing information about community design and opportunities for physical activity provide public authorities with access to experience, knowledge, opinions and expertise within the community, as well as opportunities to educate the public about issues, priorities and constraints.

8.4 Future research

This study offered the opportunity to explore the relationship between individual and multi-level modifying factors that influence the use of UGS, understood within the framework of a socio-ecological model. After having completed the project, several unanswered questions and ideas for future research are left. A lot remains to be done in industrialising countries like Malaysia, drawing on experiences from for example Europe and North

America, where green space research has become much more comprehendsive.

8.4.1 IDENTIFY HOW CITIZENS AND USERS APPRECIATE AND USE URBAN GREEN SPACES.

A range of individual and multi-level modifying factors can help to explain people's behaviour as regards green space. Differences in usage patterns among different ethnic groups should be a particular focus for future research as it is an important aspect of modern green space planning and management, where societies are becoming more multi-ethnic. Furthermore, similar studies as the present could also be carried out in other cities, and focus on specific target groups such as children, teenagers and elderly people. The selection of parks could be broadened so that the focus is not just on city parks, but also on neighbourhood parks, local parks, district parks or other types UGS.

8.4.2 LINKAGES BETWEEN USE OF URBAN GREEN SPACE AND RESIDENTS' WELL-BEING.

Here it is important not to just rely on self-reported health, as done in this study, but to also study direct health indicators and to more epidemiological approaches. Moreover, very little is known about the mechanisms that can explain why nature and green space have a positive effect on people's health. This information is important to help urban planners and green space managers in countries like Malaysia in developing healthier cities and to promote public health. Studies like this can raise awareness among authorities and professionals about the importance of green spaces for public health. Moreover, the experience should be taken into account and related to residents' wellbeing and feelings. Methods such as the 'eight experience characteristics' can provide a tool for more in-depth understanding of people – green space relations, and the links between green space and public health.

8.4.3 USE OF GEOGRAPHICAL INFORMATION SYSTEMS' DATA FOR URBAN GREEN SPACES

GIS is widely accepted in green space planning as it can provide better understanding on the spatial pattern and changes in land use in an area. Municipal GIS should contain detailed information on all publicly owned UGS; their exact location, size and the different elements in the area. By using GIS, the exact distance to a park and its accessibility can be determined. Furthermore, knowing the exact distance between respondents' homes and UGS could help to distinguish whether the subjective or objective distance is the most accurate. Finally, GIS could be more instrumental in visualising as well as in analysing data on the recreational use of green space.

8.4.4 ATTRACTIVENESS OF URBAN GREEN SPACE

Future research should put more emphasis on size, features and experience characteristics of UGS. When reflecting on park characteristics and elements, consideration should be given to linking these to the duration of visits, frequency of use, ways people get to the park, whether they visit alone or accompanied by others, and the activities performed, all of which can influence people's behaviour in the sense of recreational use of UGS. Some examples of the features to consider include places for children to play, access to UGS, benches, toilets, lighting and equipment for picnics. But the characteristics of different park areas and vegetation, e.g. in terms of the experiences they provide to different groups of users, should be considered here as well.

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PAPER I

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PAPER II

Recreational use of urban green space in Malaysian cities according to socio-demographic characteristics. Nor Akmar, A. A., Konijnendijk, C. C., Nilsson, K. (Revised version submitted to Urban Forestry & Urban Greening).

PAPER III

Malaysian Case Studies on the Relation between Use of Green Space and Health Promotion. Nor Akmar, A. A., Konijnendijk, C. C., Stigsdotter, U.K., Nilsson, K. (Accepted in International Journal on Sustainable Tropical Design Research & Practice).

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