FINDING LINKS BETWEEN URBAN BIODIVERSITY AND HUMAN HEALTH AND WELL-BEING

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ABSTRACT: The literature concerned with current trends of sustainable urban development and the role of urban green space in delivering such development is reviewed. Creating sustainable cities is seen as a way to improve human quality of life while mitigating or avoiding adverse environmental, social and economic impacts of urbanization. Urban green space can make important contributions to social, environmental and economic policy agendas and consequently to human quality of life. In particular urban green space can contribute in a variety of ways to human physical health and psychological well-being. However, current research has treated green space in generic terms and has not addressed the various health and well-being contributions of different urban habitats. This study will be relevant to urban conservationists, public health officers, environmental psychologists, urban planners and urban geographers.

Keywords – healthy environments, human well-being, sustainable cities, urban biodiversity, urban green space

1. INTRODUCTION.

Within a global context of increasing urbanization sustainable human environments are seen as fundamental in improving urban quality of life. The sustainable human environment agenda recognises that urban green space can have significant contributions to various social, economic and environmental policies, thus contributing in a variety of ways to human quality of life. Within this context there is a renewed interest in documenting the physical health and psychological well-being benefits of urban green space. This paper will review the literature concerned with the contributions of urban green space to human health and well-being.

Current urbanization trends can have significant adverse effects of natural systems and on the health and well-being of urban communities (UN-Habitat, 2001; 1996). Sustainable human environments are seen as a way to mitigate, and where possible reverse, the adverse effects of urbanization on the health of both humans and the environment (ODPM, 2003; EC, 1998; UN-Habitat, 1996). It is therefore, important that future urbanization patterns become more sustainable. This paper reviews international and national urban policy for sustainable urbanization with the aim of identifying the role of urban green space in delivering sustainable human settlements.

What is the role of urban open space in improving the quality of cities and contributing to people's quality of life? What are the main theories and research addressing this question? This literature review will provide an overview of these questions. A number of authors (Whyte, 1988; Appleyard, 1981; Lynch, 1981 and 1960; Alexander, 1977) suggest that the quality of urban open space has a direct affect on the liveability of the city. High quality open space can facilitate more social interaction, healthy activity, personal satisfaction, and opportunity for personal development, and can attract people, business and wildlife. Poor quality open spaces are associated with poor social conditions, economic and environmental deterioration. Consequently, it becomes important that good quality open

space is provided. A significant part of urban open space is made of urban green space. Urban green space is comprised of parks, amenity green spaces, green corridors, semi-natural urban green spaces, allotments and gardens and outdoor sports facilities. The particular importance of urban green space is that it can provide opportunities for urbanites to come in contact with nature. Could this contact with nature bring about extra health and well-being benefits?

Urban green space enhances the amenity and liveability of urban fabric (DTLR, 2002). It contributes to people's recreational, and leisure needs (Urban Parks Forum, 2001) and to the social (Kuo, 2003; Westphal, 2003), environmental (EA, 2002) and economic (Wolf, 2003) vitality of urban communities. These studies suggest that urban green space can have positive affects on external determinants of health and well-being of the community and individuals. Thus, urban green space becomes fundamental to the liveability and health of urban settlements. But do all kinds of urban green space contribute in the same way to the health and well-being of the community?

Urban habitats can have significant nature conservation value (Lofvenhaft, *et al*, 2002; Barker, 2000; Barker and Box, 1998). Furthermore, urban green space habitats also have significant physical health (Handy, *et al*, 2002; O'Sullivan, 2001; Payne, *et al*, 1998) and psychological well-being (Seymour, 2003; Rohde and Kendle, 1994; Kaplan, 1983; Ulrich, 1983 and 1979) benefits. The literature review reveals a need for more empirical evidence to link urban biodiversity and human health and well-being.

The following section of the paper explains the method that was followed during the literature review. Subsequently the review is organised in two sections. The first looks at current urbanization and sustainable human environments policy and the role of urban green space in delivering them. The second focuses on research evidence for the health and well-being benefits of urban green space.

2. LITERATURE REVIEW METHOD.

The literature review covered both policy documents and research articles. The questions that were raised for each set of literature were different. The policy documents were reviewed with the following aims: a) to identify the current trends of urbanization and its socio-economic, environmental and health and well-being impacts, b) to identify the role of sustainable urban development in response to urbanization pressures and c) to identify the role of urban green space in delivering sustainable urban environments and quality of life. The research articles were reviewed aiming to a) identifying the various social, economic, environmental contributions of urban green space and b) identifying in particular its health and well-being contributions.

The review of policy documents drew from United Nations, European Union and UK policy relating to urban development from the last decade. The research articles that were reviewed came from a variety of disciplines including nature conservation, environmental psychology, urban planning, public health, and urban geography.

The findings from the literature review were grouped into similar categories of benefits associated with urban green space. Then, the various quality of life benefits of urban green space were drawn together and from these the specific health and well-being benefits were gathered. The research and policy documents were also reviewed in terms of research gaps they indicated.

3. URBANIZATION & SUSTAINABLE HUMAN SETTLEMENTS.

3.1 Urbanization.

Urbanization is defined as the process by which an increasing proportion of a country's population lives in urban areas (Waugh, 1990). However it is more than a simple demographic change, it involves many qualitative and quantitative social, economic and environmental changes. Such changes include cultural transformation, economic development, political idiosyncrasies and distinctive urban lifestyles, urban expansion and regeneration (Downs, *et al*, 1999). As such, urbanization becomes a fundamental part of development (Waugh, 1990). However, urban development can have adverse impacts on the environment and socio-economic fabric of cities, and consequently on the health and well-being of urban communities (UN-Habitat, 1996). World urbanization trends are increasing (UN-Habitat, 2001). Therefore, if the current urbanization patterns are followed it is likely that they will cause significant adverse environmental and social effects.

What is the affect of urbanization on natural systems? Urban centers impact on the environment by their need for energy, transport, water, food and raw material supplies. Furthermore urban centers generate large quantities of waste that need to be disposed of. These needs are currently provided by unsustainable patterns of production, distribution and consumption (UN-Habitat, 2001; UN-Habitat, 1996). Ecosystem functions are disrupted and more often than not natural resources are used faster than they can be replenished. These exploitative and unequal trends of urbanizations cannot be sustained over the long term. Consequently, future plans for urbanization ought to provide for ways to meet social and economic needs, while minimizing or avoiding adverse environmental impacts.

Urbanization affects the health and well-being of communities in two main ways. Firstly, indirectly by providing the socio-economic, cultural and environmental determinants of health (Figure 1). Some studies (Bartley, *et al*, 1997; Bruner, 1997; Davey-Smith, *et al*, 1997) have linked socio-economic position and health. This is significant in the field of public health because it provides some empirical evidence of important external, socio-economic determinants of health. The consequence of this is that health can only be promoted by health supporting social and economic environments. The second way by which urbanization affects human health is a direct one. This involves the direct health effects of poor urban environmental quality, air pollution, inadequate waste management, excessive noise, toxic effects of chemicals and heavy metals (e.g. lead, mercury) (UN-Habitat, 1996). Furthermore, it is also recognized that the design and visual quality of urban environments can also affect people's behavior and psychological well-being (Whyte, 1988; Appleyard, 1981; Lynch, 1981; Alexander, 1977). Thus, current patterns of urbanization can be detrimental to the natural and social environments, and to the health and well-being of urban communities. It follows, that alternative models to urbanization, which mitigate or try to avoid adverse environmental and social impacts while creating environments that meet people's aspirations and enhance their quality of life, health and well-being, are needed for future urbanization.

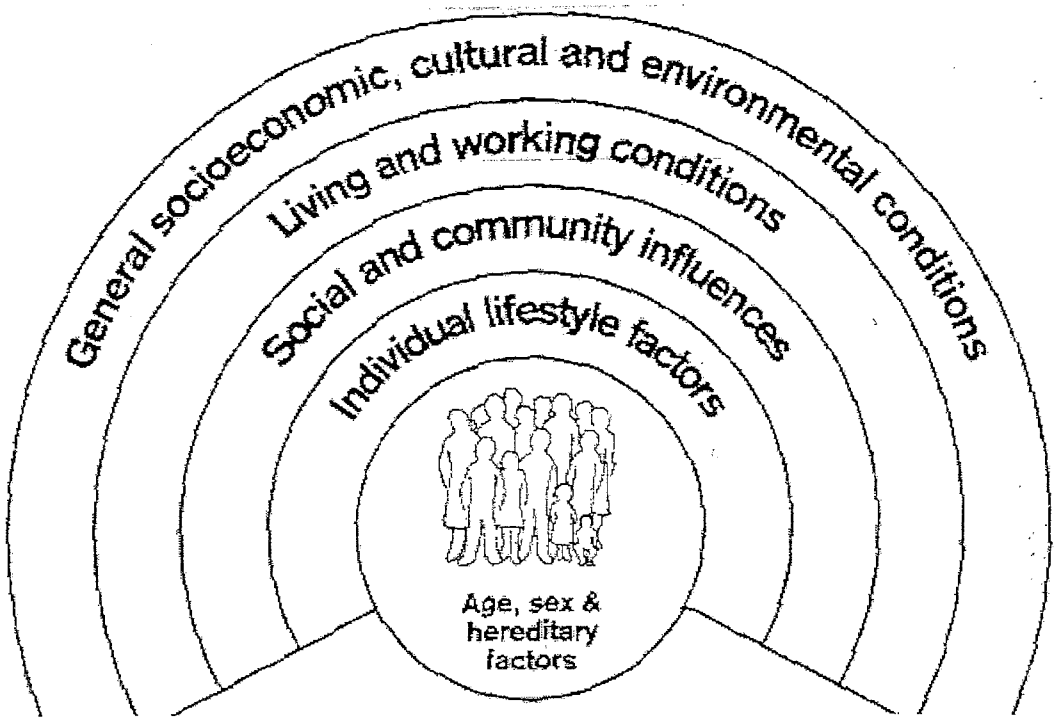

Figure 1: The Arch of Health. (Source: WHO, 1997).

3.2 Sustainable human settlements and urban open space.

Sustainable human settlements can be described by a variety of political, economic, social and environmental characteristics. The main political aspects of sustainable cities include horizontal (across sectors) and vertical (across spatial scales) socio-economic and environmental policy integration, public involvement in political life, decentralised governance, co-operation and partnerships. In economic terms sustainable cities are characterised by thriving local economies based on natural resource management, efficiency and corporate social and environmental responsibility. The social characteristics of sustainable cities include community capacity building, no poverty, welfare, population management, employment and opportunities for social development, leisure and recreation and links to cultural heritage. Sustainable cities try to minimise their ecological footprint by natural resource management (air, water, soil, flora and fauna), waste management and appropriate spatial planning. Overall sustainable cities are characterised by an integration of environmental concerns in all their social and economic policies and a vision for creating better environments for quality of life.

Based on the DTLR (2002) typology, urban open space comprises all civic and green spaces (Table 1). Urban open space is a significant part of the built environment. It allows for transport, reserves land for future urban development creates wildlife habitats and is a major urban amenity. The quality of the built environment is reflected in the quality of its urban open spaces as well as in the quality of the built fabric. Normative, deterministic theories (Whyte, 1988; Appleyard, 1981; Lynch, 1981 and 1960; Alexander, 1977) suggest that the quality of the built environment can affect the quality of life and health and well-being of urban communities. Thus, a good quality urban open space will enhance the amenity of the city and consequently the quality of life of its residents.

Table 1. Urban Open & Green Space Typology. (Adopted from DTLR 2002).

Urban open spaces	**Urban green spaces**	*Parks and gardens.*	Urban parks, country parks, formal gardens.
		Provision for children and teenagers.	Play areas, skateboard parks, hanging out areas.
		Amenity green spaces.	Informal recreational spaces, housing green spaces, domestic gardens, village green s and other incidental green spaces.
		Outdoors sports facilities.	Sports pitches (including artificial surfaces), golf courses, athletic tracks, schools, institutional playing areas and other sports areas.
		Allotments.	Allotments, urban farms, community gardens.
		Churchyards.	Churchyards, cemeteries, crematoria.
		Natural and semi-natural green spaces.	Woodland, urban forestry, grassland, heath or moor, wetlands, open and running water, wastelands, bare rock habitats.
		Green corridors.	River and canal banks, road and rail corridors, cycling routes, pedestrian paths, rights of way & permissive paths.
	Civic spaces.	*See fronts and promenades*	
		Civic squares and plazas.	
		Market squares	
		Pedestrian streets.	
		Other hard surfaced pedestrian areas.	

At international and national levels of urban policy it is increasingly recognized that urban green space can contribute to creating sustainable human environments (ODPM, 2003;DETR, 2000; DEFRA, 2002; ODPM, 2002; DTLR, 2002; WHO, 2002; WHO-Regional Office for Europe, 2001, EC, 1998; WHO, 1997; UN-Habitat, 1996). Urban green space has a wide range of social, environmental and economic benefits (Taylor and Coalter, 2001; Stephen, *et al*, 1995; Barker and Graf, 1989). Social benefits of urban green space include opportunity for community development, social inclusion, contact with nature, recreation and healthy opportunities. Environmental benefits of urban green space include the sustenance of ecosystem functions, amelioration of pollution, noise and local climate, efficient use of land and providing wildlife refuges (EA, 2002). Economic benefits of urban green space include potential for cropping (such as wood or food) rise in housing values, creation of employment, environmental improvements and attraction of investment (DTLR, 2002). These, benefits collectively improve the socio-economic conditions of urban communities and also improve the quality of their physical surroundings. Therefore, urban green space is increasingly recognized as an important factor in meeting the needs of a healthy, sustainable urban society. However, there is a need for better understanding of the interactions between the various urban policy strands for their integration (ODPM, 2003; DETR, 2000; EC, 1998; Breuer, 1999; WHO, 1997). In particular this research will address the interactions between health and well-being, and green space in urban areas. The literature concerned with the contributions of urban green space to human health and well-being will be discussed in the following section.

4. URBAN GREEN SPACE AND HUMAN HEALTH AND WELL-BEING.

4.1 Urban green space contributions to health and well-being.

What is the association between different urban green space habitats and human health and well-being? The contributions of urban green space to community health and well-being can be through improvements in ambient environmental quality, more opportunity for healthy lifestyles, and opportunities to come in contact with nature (Kuo, 2003; EA, 2002; Takano, *et al*, 2002). Urban green space can ameliorate urban pollution, absorb solar radiation, improve microclimate, absorb pollutants, reduce noise levels and improve the visual urban landscape (EA, 2002), thus reducing health and well-being risks from these determinants. Urban green space can also promote social interaction between people and thus improve the social determinants of health (Kuo, 2003). Furthermore, it can promote more opportunities for further physical activity and increase longevity (Takano, *et al*, 2002). This evidence adds to western public health and epidemiological theories that realize the importance of environmental and social determinants of health. Therefore, urban green space becomes more than just an amenity: it plays a fundamental role in achieving societal, community and public health goals.

A number of studies (Handy, *et al*, 2002, O'Sullivan, 2001; Payne, *et al*, 1998) have explored the effects of urban green space on respiratory, cardiovascular, circulatory disease and stress, overall health and longevity. These studies are significant in making explicit links between urban green space and physical health. Other studies (Seymour, 2003; Rohde and Kendle, 1994; Kaplan, 1983; Ulrich, 1983 and 1979) have explored the emotional, social, cognitive, behavioral, developmental, anxiety, stress, confidence, stamina and well-being benefits from contact with nature. Kellert and Wilson (1993) with the Biophilia hypothesis, suggest that humans have an innate need to be in contact with nature for their psychological well-being. These studies make a significant contribution to the understanding of the psychological benefits of contact with nature. It follows that urban green space has significant potential for improving the health and well-being of urbanites.

4.2 Further research.

Mainly because for the larger part of the 20th century the health and well-being benefits of parks were unstudied, the restorative potential of natural settings is probably under appreciated (Herzog, *et al*, 2002) and still, the built environment is largely unexplored for improving human health (Jackson, 2003). Also, it has been realized that further studies are needed to assess how aesthetic features could affect walking and cycling behavior, and to develop appropriate qualitative methods in measuring such variables (Handy, *et al*, 2002). It is acknowledged that more research should be undertaken to better document the relationship between local park use and health and well-being (Payne, *et al*, 1998). Furthermore, much research refers to green space in general and does not discuss landscape alternatives (Jackson, 2003). Also it is recognized that what perhaps is needed most is a framework linking people and urban biodiversity (Wong, 2002). This literature review provides a context for a descriptive, associational and comparative study to explore links between urban biodiversity and human health and well-being.

Does an area of urban forestry have the same health and well-being contributions, as does amenity grassland? Does the urban built environment afford more opportunity for healthy activity or the urban green space? What is the role of urban habitats structural

diversity in the contributions of green space to human health and well-being? The research that is proposed will focus on the hypothesis that more structurally diverse urban landscapes are associated with more diverse healthy activity and that the difference between the amounts of activity in urban areas is due to the effects of structural diversity of urban habitats. Urban structural diversity will be the surrogate measure for urban biodiversity. Healthy activity, including passive and active, will be the surrogate measure for community health and well-being. A mix of ethnological and ecological methods is proposed for the investigation of these hypotheses.

5. CONCLUSIONS.

It has been shown that current patterns of urbanization can be detrimental to the natural and social environments, and to the health and well-being of urban communities. Therefore, alternative models to urbanization, which mitigate or try to avoid adverse environmental and social impacts while creating environments that meet people's aspirations and enhance their quality of life, health and well-being, are needed for future urbanization. The agenda for creating sustainable cities is concerned with such alternative urbanization models.

Current research in the field of urban open space recognises that good quality urban open space will enhance the amenity of the city and consequently the quality of life of its residents. Furthermore, there is a renewed research interest in the economic, social, environmental and health and well-being benefits of urban green space in particular. Urban green space has been recognized as an important factor in meeting the needs of a healthy, sustainable urban society. However, despite the increasing number of studies documenting the health benefits of urban green space, the built environment still remains largely unexplored for improving human health (Jackson, 2003). Furthermore, much research refers to health and well-being benefits of green space in general and does not discuss landscape alternatives (Jackson, 2003).

This research will focus on the hypothesis that more structurally diverse urban landscape alternatives are associated with more diverse healthy activity and that the difference between the amounts of activity in urban areas is due to the effects of structural diversity of urban habitats.

If indeed the amounts of healthy activity can be predicted by the structural diversity of urban habitats, then urban green space becomes an important determinant of public health. Thus future urban development will ought to incorporate more biodiversity rich urban habitats in order to promote more healthy lifestyles.

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