Research Paper

Nature Connectedness and Ecosystem Services Towards Urban Planning for Residents' Health in the Metropolitan Lagos, Nigeria

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Abstract

In the urban context, nature is not entirely devoid of human influence or inaccessible to man, rather, nature exists in urban areas and does not only survive the influence of man but also depends on it. An individual's subjective sense of their relationship with the places of nature within a city explains the concept of nature- connectedness. In the wake of rapid urbanization around the world, spaces of natural features in urban areas have been constantly overtaken by the developments and activities of man. There is a link between the number of ecosystem services provided by the mapped natural features and residents' nature connectedness in the Lagos Metropolis. To understand this, spaces of natural features in the Lagos metropolis have to be examined with focus on how it is environmentally safe, how it improves human health and also the level of its accessibility to the residents. To improve health and well-being, there is need to strengthen the evidence of how nature affects health and promote preventative health contribution made by protected areas and elements of urban nature.

Keywords

Nature-Connectedness, Ecosystem Services, Urban Planning, Residents' Health

1.0 INTRODUCTION

Over the last few decades, the intimate relationship between human and nature have been on a fast decline due to rapid urbanization all around the world (Hung, 2018). This decline is particularly prevalent in cities around the world where human imprints on the natural environment is massive, hence spaces that are totally natural (that is, undisturbed and not altered by man) are not found in urban environments (Grimm & Schindler, 2018). However, spaces with elements of nature co-existing with non-natural features still abound in cities. These spaces with elements of nature have been conceived in literature as blue and green spaces (Abegunde 2011; Finlay et al., 2015; Haeffner et al., 2017).

Green and blue spaces, sometimes referred to as blue-green infrastructure are important parts of the urban landscape that demands the attention of urban planners (Brown & Mijic, 2019). These spaces are integral parts of the city, particularly coastal cities around the world and as such requires spatial ordering for the purpose of creating a functionally efficient and aesthetically pleasing environment for living, working, circulation and recreation as captured in the definition of urban and regional planning (Olaitan, 2019). Unfortunately, the actions and activities of man towards nature in the city are becoming increasingly unsustainable despite various campaigns on sustainability (Paul et al., 2015).

The benefits derivable from nature by the society have been termed ecosystem services in literature (Daily 1997). These benefits include the provisioning of food, wood and medicinal resources, and services that contribute to climate stability, control of agricultural pests, and purification of air and water. Ecosystem services are broadly classified in four different categories: provisioning, regulating, cultural, and supporting (MA 2005). Provisioning ecosystem services include the contribution of essential goods such as food, fiber, and medicinal. Regulating ecosystem services include carbon sequestration, prevention of soil erosion, and natural flood control. Cultural ecosystem services include intellectual, inspirational, and recreational activities. The fourth category is supporting ecosystem services, which include services that are dependent on ecological processes such as primary production and nutrient cycling and that are intimately related to biological diversity (Osvaldo et al., 2017). In order for man to utilize the benefits of nature, man is expected to interact with its elements using more of their senses to experience the physical and psychological benefits (Franco et al., 2017), hence, the concept of nature- connectedness.

Nature - connectedness is an emerging psychological construct for a sustainable future. This construct has been described as an individual's trait level of feeling emotionally connected to the natural world (Richardson et al., 2019) or an individual's subjective sense of their relationship with the natural world. Various scales of measuring the subjective relationship of people with nature have been established in literature. These scales of measuring nature - connectedness include the connection to nature scale (Mayer and Frantz, 2004), nature - relatedness scale (Nisbet et al., 2009), inclusion of nature with self (Schultz, 2002), environmental identity (Clayton, 2003) and the connection to nature index (Cheng & Munroe, 2012). All these scales of measuring nature connectedness highlight the varying levels of relationships with nature that different individuals and groups possess.

The contribution of nature to the state of human health is one of the benefits of the human-nature relationship. The two main components of health status, that is, physical and mental health have been linked to nature connectedness (Lumber, 2016; Kuo et al., 2018; Richardson et al., 2019). Researchers around the world have strongly asserted that individuals who often visit natural spaces and feel psychologically connected to them report better physical and mental health (Officha et al., 2012; Alabi, 2020). In addition, individuals with psychological connections to nature are more likely to contribute to public health by behaving in ways that contribute to environmental health through conservation activities and environmental protection (University of Plymouth, 2020). In spite of these established relationships between nature and health, empirical data linking nature with physical and mental health are still limited, particularly in urban areas of developing countries like Nigeria.

Attaining healthy cities and healthy urban dwellers remains a fundamental goal of urban and regional planning (Olaitan, 2019). The significance of health among other goals of urban planning cannot be overemphasized as health impacts economic performance and stability, social exclusion, and the implementation of local and national goals for sustainable development (Boyce and Brown, 2019). The relationships between health and other national sectors are bi-directional (Onisanwa, 2014) as failure in one sector such as the natural environment can lead to the outbreak of diseases and pandemic. For instance, man's dysfunctional relationship with the natural environment and/or urban ecosystem has been linked to the increasing emergence of diseases such as COVID 19, Ebola and Lyme diseases (Bloomfield et al., 2020). This is because nature provides buffers between humans and diseases; hence, a decline in natural features increases vulnerability to diseases (Quinney, 2020). This paper adopts an exploratory approach to examine

the connections between the human health and the natural environment in an urban area from the purview of urban planning.

2.0 SPACES OF URBAN NATURE AND ECOSYSTEM SERVICES IN LAGOS

Human imprints on the natural environment are massive in cities, hence spaces that are totally natural cannot be found in cities around the world (Grimm & Schindler, 2018). Spaces with elements of nature have been conceived in literature as blue and green spaces (Abegunde 2011; Haeffner et al., 2017). Green spaces in the city includes open fields, woodlands, gardens (for urban agriculture & horticulture), sport grounds, green corridors (landscaped transport routes and streets with vegetated walls), and nature parks. Blue spaces on the other hand include wetlands, waterways, waterfronts and beaches. The general structure of land use distribution in Lagos shows that only 520 hectares (2.8%) of the total land area are open spaces (Abegunde, 2011). This includes all urban land for recreation, parks and gardens, urban agricultural land, commercial and individual horticultural garden, and unused spaces (Oduwaye, 2006). This is far below the 8-10% of land area expected to be available for green space in an urban setting (Abegunde, 2011).

Figure 1: Map of Nigeria showing Lagos state. Source: Ministry of Physical Planning

In recent times, Lagos state, one of the fastest growing cities in the world witnessed a massive landscaping and beautification that has changed the face of the megacity for the better (Ajewole et al., 2019).). In spite of these efforts to promote greenery within Lagos State, the deficit and abuse of open spaces still abound within the state across the twenty local government areas of the state.

Figure 2: Map of Lagos state showing the Various Local Government Areas. Source: Ministry of Physical Planning and Urban Development

Prominent among the urban blue spaces within Lagos is the Lagos Lagoon. In addition to this, there are various strata of waterways existing in Lagos as shown in Figure 3 and they include: Coastal shoreline, nine lagoons namely; Yewa, Ologe, Badagry, Iyagbe, Lagos, Kuramo, Epe, Lekki and Marhin (Lawson et al., 2011). Lagoon covers a total area of about 426.0 km² with a coastline and inland waterways. On the west of the lagoon (south-west of the harbour) there are several creeks; these are the Lighthouse creek, Ologe lagoon, the Badagry creek, the main waterway leading to Badagry (Port Novo and Cotonou). Another creek joining the southern part of the main Lagos Lagoon to the Atlantic through Victoria Island is called Five Cowries creek. The North East of lagoon is bounded with Ikorodu local port that leads to Epe. Also at that region, there are several inlets from Ogun River, Majidun River and Agboyi creek. A sub-lagoon of the Lagos lagoon lies to the east of the harbour bound, and the bar beach between the Atlantic Ocean and the lagoon is called the Kuram (Adejare et. al, 2011).

Figure 3: Lagos lagoon and waterfronts in Lagos state. Source: Lawson et al., 2011

Urban nature within metropolitan Lagos have been depleting increasingly over time due to rapid urbanization and population growth within the city (Azare et al., 2018). Coupled with this increasing rate of urbanization, the densification of land uses and development practices adopted by the residents poses constant threats to elements of nature within the urban area (Aluko, 2015). These practices include the encroachment of developments into reserved green spaces provided as setbacks to roads, open spaces, buffer zones along power lines and pipelines (Olapecu, 2015). In addition to these, sand-mining dredging and sand-filling activities at waterfronts, lagoons and other blue spaces (Adebayo, 2017). Some of these practices have not only affected these natural elements within the city adversely, but also stand as threats to human-nature connections among the residents.

Figure 4: Lekki Urban Forest and Animal Sanctuary Initiative, (LUFASI, Lekki)

Figure 5: The Lagos State Parks and Garden Agency, Ikeja

Figure 6: Freedom park, Lagos Island

Figure 7: Lakowe lakes and golf resort, Ibeju Lekki

Figure 8: University of Lagos Lagoon front

3.0 HUMAN-NATURE RELATIONSHIPS AND NATURE CONNECTEDNESS IN URBAN AREAS

Human-nature relationships have been considered in literature under various concepts such as the biophilia hypothesis (Gullone, 2000), human-nature interactions (Hung, 2018) and human nature connections (Guisti, 2019). Human-nature connections shed light on the complementary dimensions of human-nature relationships. The first dimension (psychological) emerges from studies that consider human-nature relationships as an attribute of the mind, examining the psychological connection to an abstract form of nature, by measuring people's connection with nature using quantitative methods (Schultz, 2000). The second dimension (experiential) is often used in qualitative research to describe human-nature relationships as experiences of being in nature, that is, people's interaction with local nature (Consquer et al., 2012). The last dimension (contextual) emerges from the studies on 'sense of place' and it investigates human-nature relationships as the sense of belonging that people develop through time with geographical areas (Lewicka, 2011).

In a related context, the concept of nature- connectedness was first introduced by Schultz who designed a measure to examine the extent that people viewed themselves as part of the natural environment (Schultz, 2000, 2001). Nature-connectedness is the sensation that an individual is part of a larger natural community (Mayer et al., 2009) leading to nature and the self-becoming one (Schulz, 2001) through personal and social influences as part of an environmental identity (Clayton, 2003). This connection is comprised of cognitive (Schultz, 2001), affective (Mayer & Frantz, 2004), learnt, experiential (Nisbet, et al., 2009) and personality (Kals et al., 1999) factors that together create an individual, subjective relationship with nature.

In spite of this importance of human relationships with nature, major cities in Sub-Saharan Africa are becoming increasingly dense, thereby subjecting its residents to little or no contact with nature in their daily lives and routine. Cities like Lagos have development patterns and structures with limited places of outdoor natural environment accessible to the residents to promote their health status. Consequently, most outdoor experiences for city dwellers are times of rush, struggle, demanding activities among others that does not encourage active living, physical activities and relaxation for mental stress reduction. Considering the rate at which physical development activities of the residents are encroaching into natural spaces in Lagos metropolis as a result of the disregard for development and space standards, natural spaces such as parks, green spaces and waterfronts will be accessible to only selected few in the metropolis. Unarguably, this will present a lot of challenges to the residents particularly in relation to physical and mental health.

4.0 IMPLICATIONS OF NATURE CONNECTEDNESS TO HUMAN HEALTH

The rapid and continuous shift towards densely developed urban areas with little provisions given to nature and nature connectedness will have major implications for the health of the residents. Chronic and non-communicable conditions that presents major health implications are disproportionately common in urban centres. These conditions include obesity, cardiovascular diseases and high blood pressure (Shanahan et al., 2015). However, urban nature presents the city with inexpensive interventions to assist in addressing a significant number of these health issues. Over 30 years of research has shown that urban nature is a promising tool for enhancing the physical, psychological, and social well-being of the world's growing urban population (Shanahan et al., 2015). The nature-health link is a vital aspect of the city life that should be researched into for sustainable development and overall wellness or health of city dwellers.

Numerous studies have linked exposure to nature with increased physical health. One study examined a

representative sample of adults and found higher rates of physical health and well-being in those who have more direct contact with the natural world (Tauber, 2012). Interestingly, sometimes simply having a view of nature has an effect on health. Moore (1981) discovered that prison inmates with views of the outdoors area beyond the prison are sick less than those with views of an interior courtyard (Moore, 1981), while Tauber (2012) found that patients with views of nature from hospitals rooms recover faster than those with views of a wall. In addition, hospital administrators have long understood that the presence of green and blue spaces with plants and gardens increases rates of healing among their patients, and participation in wilderness programs often results in improvements in physical health (Frumkin, 2001).

Array of studies in literature also catalogs the positive effects of exposure to nature for one's mental health. Nature may have a rejuvenating effect: spending time in nature could serve to increase tolerance of stressful situations, improves concentration, and increase productivity (Nisbet & Zelenski, 2011). Herzog & Strevey, (2008) examined nature and the health of university students using cross-sectional survey data. The study reported that those who self-report more contact with the natural world as measured by time spent in a natural environment report higher levels of effective functioning and personal development, peacefulness as measured by the Positive and Negative Affect Scale, and lower levels of stress as measured by the Perceived Stress Scale.

There have even been significant findings detailing nature's restorative effect on emotions. A "natural" stimulus, ocean waves, was specifically selected by the authors of one study to elicit contentment. It was found that the ocean wave sound significantly reduced the cardiovascular stress and sympathetic nervous system arousal elicited by a fearful stimulus (Fredrickson et al., 2000). Multiple additional studies have also demonstrated the stress-reducing (Rader, 2009), restorative effects (Herzog et al., 2003), well-being enhancement (Kaplan, 2001), and mood-improving aspects (Rader, 2009) of exposure to nature and nature-related stimuli. Unfortunately, these claims lie solely on theoretical grounds without much empirical support, especially in African cities.

5.0 URBAN PLANNING FOR BETTER NATURE CONNECTEDNESS AND HEALTH

Research has shown that the urban environment in which people live, work and play affects their health. Characteristics of a healthy and sustainable environment include: a clean and safe environment; sufficient green and blue space, nature and water; healthy and sustainable homes; attractive and varied public spaces; wide range of public services (housing, schools, shopping, culture, business, sports, health). Lagos like many

coastal cities around the world are prone to many environmental and health challenges such as increasing flood risk, urban heat, pollution of various kind among others. These challenges are consequences of climate change, including rising sea levels, increased river discharge and extreme precipitation. In addition, these are also the results of land use changes such as the increase of sealed surfaces and buildings. These challenges as well as the accompanying damages are a threat to a healthy and vital urban environment. This may lead to health problems in cities since these areas face higher temperatures than the rural surroundings (urban heat islands). Associated health risks are heat stress and an increase in mortality among the elderly and people with cardiovascular disease.

Well-planned and designed green infrastructure, including water and soil, can contribute to climate change adaptation and at the same time promote and support healthy urban living. Effective application requires design principles that address the direct relationship between green and/or blue infrastructure and impacts of climate change is important (flood risks, flood, heat, water supply and drought), but also the quality of the ecosystem (water, soil and air quality) and its relationship with health (increased mortality and morbidity by unhealthy air and heat stress, spread of pathogens, drug residues and hormones, sanitation, green and blue infrastructure contribution to environmental quality).

Historically, health has often been the driver for investment in urban infrastructure. Around the turn of the 20th century public health was decisive for urban planning. The loss of open space, traffic congestion, noise and poor air quality are still the factors that determine the quality of life in the city. However there are In the case of air quality there is epidemiological evidence highlighting the adverse effects of air quality on human health still exist. It is therefore important to identify how urban planning and design for natural spaces affect the health of residents in the city. Wang (2018) identified four salient principles that are important for the design and planning of spaces in the city based on the nature environment. These principles include the respect for nature, reflecting on regional environmental characteristics, renewable energy and the revitalization and restoration of nature.

6.0 CONCLUSION

Green and blue spaces within Lagos State have been greatly affected by increasing urbanization and various land conversion activities of the residents due to the state's peculiarities as a coastal city and business hub in the country. The understanding of the interaction between human and the natural environment can help in formulating a more compelling urban development goal that keeps both human and nature intact, while at

the same time appealing to and accepted by a wider range of audience. To date, efforts to protect the natural environment in the country are mainly focused on large areas with less human presence, bio-diverse, and relatively untouched. As a result, much more challenges are been encountered in conserving the spaces of nature within highly urbanized areas where lands have been a scarce resource for absorbing further development pressure. Besides, the pressure to excise land from its protected or conserved status for development mounts as soon as the land is found to have economic value.

This paper therefore suggests that the planning and designing of cities should give more attention to the changes occurring around spaces of natural features by understanding the ecological, health and social implications of converting natural environments to highly urbanized settlements. This could be achieved by obtaining the residents' perception and attitudes towards the roles and function these spaces of nature as it impact their health, lifestyle and their day-to-day living in general. Hence, Urban Planners and other relevant stakeholders regulating the development of cities should not prioritize the economic implications of development plans, policies and programs over their environmental, health ecological and social consequences.

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