

SPRAWLING GROWTH AND THE ENVIRONMENT: A CASE OF JOHOR, MALAYSIA

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Abstract: Urban growth is inevitable in nature and remains a challenge to the quality of both built and natural environments. It remains the main concern of planners in the 21st century, due to problems such as sprawl. Sprawl, a common feature in rapidly growing urban areas is associated with inefficient consumption of resources and unnecessary changes in land use. This reduces the quality of the built environment and lowers environmental performance. The paper examines the linkages between growth of urban centers, population growth, land use change and evolution of sprawl in Johor Bahru conurbation. Documentary research and site visit were used to generate the findings reported in this paper. Findings reveal that, low-density sprawl is evident in Johor Bahru, especially along some of the transportation networks and sub-urban fringes. The study indicated that the rate at which activities are decentralized from the city center to the neighbouring local authorities can in near future result to the decay of the inner city. The outward expansion of the conurbation of Johor Bahru increases tendencies of sprawl. The paper discusses the challenges faced due to land use change and how it leads to sprawling growth, where natural landscapes and green spaces impacts are mainly due with changes in land uses and land cover. The study area witnessed dramatic increase in population and pressure for development with the vision of developing Iskandar Malaysia. Iskandar Malaysia is the development corridor located in Johor, categorized into five flagship zones and under the control of the Iskandar Regional Development Authority. These developments extend beyond its boundary, thereby encroaching Malay settlements. This threatens the surrounding rural landscapes and local communities; as some of the communities await conversion from low density development to high density. Such can be a great challenge towards realizing the vision of developing Johor Bahru as “a strong, sustainable conurbation of international standing”. The paper finally discusses ways to achieve sustainable urban development.

Keywords: Urban growth, Sprawl, Planning, Environmental Sustainability.

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1 INTRODUCTION

The growth of urban centers is a global phenomenon and one of the most distressing problems in the 21st century. Built-up areas of most cities have witnessed significant changes in both land use and expansion in size due to urbanization, rapid population growth and increasing need for economic growth. Urban areas become more densely populated and suburban sprawl have dramatically increased the extent of urban boundaries [1]; and their expansion into country side has not only displaced agricultural and forest lands, but also mixing with rural lands [2]. High population density in many urban areas exceeds the threshold for defining urban settlements [3]. Simultaneously, “*as cities become wealthier, their environmental impacts shift in nature from localized and immediate health issues to globalized and delayed threats to ecosystems* [4]”. The dynamic impacts of urban growth shift from local to regional and global scales. This have manifested in different ways such as urban heat-islands, irreversible damage or depletion of natural resources, increasing green-house gases [5], thereby, increasing urban environmental problems such as flooding and sprawl. These have been the major concern of both national and international bodies as it reduces environmental performance and threatens the well-being of humans.

Planning is a means to remedy development failures engineered by rapid rate of urbanization and population growth using development plans. In many countries, a development plan is a legal document containing set of policies and regulations guiding future growth and development of a given location. Its implementation aims at avoiding worst negative effects of urbanization under moderate growth pressure [6]. However, improper implementation of development plans may result in non-conformity between plans and actual development, which among others, contributes to urban sprawl. According to [7] non-conforming development is an indicator of sprawling growth pattern, and this usually occurs in urban areas experiencing intense population growth. Non-conforming development is influenced by high population growth rate, economic situations and pressure for development. Non-conforming developments also explain the reason for non-implementation of certain plans or policies of a plan [8].

Johor is fast developing. To give Johor Bahru a new image, mangroves forests and rural settlements popularly known as kampongs were transformed into new urban uses. There exists documented evidence that the rapid urbanization in Johor has resulted to the expansion of the city center to its periphery [9]. However, public/private authorities, investors, developers as well as stakeholders lay more emphasis on the need for economic development,

and less emphasis on urban and environmental problems. Therefore, this paper aims to highlight the impact of urban growth, specifically preoccupation of rural communities to be integral part of urban areas, conversion of agricultural/rural landscapes to urban uses and evolution of sprawl.

2 URBAN GROWTH AND ENVIRONMENTAL ISSUES

There exists symbiotic relationship between built and natural environment. The transition zone is the area in-between an urban and rural area, mainly forest, vegetation or open space serve. It is an important zone for leisure and recreation for both rural and urban dwellers [10], [11], [12], [13], [14], [15], [16]. However, as cities grow to their apex to meet economic and social goals of their region, environmental degradation worsens. Studies have shown that, urban growth are mostly driven by the need to attain economic development [17], [18]; thereby resulting to fragmentation of natural and or rural landscapes in the rural areas surrounding the urban core. Urban growth has staged threats to environmental resources, agricultural lands and water bodies, and is the brain behind ecosystem destruction [19], [20], [21]. Urban development results to depletion of natural resources and farmland [22], [21], habitat fragmentation and biodiversity extinction [23], [24], and increased pattern of land consumption [25]. Similarly, [23], [26] attribute biodiversity and ecosystem fragmentation to change in land use and land cover. Pattern of urban growth is influenced by high population growth and rapid rate of urbanization, where agricultural and green landscapes are converted to urban and related use. The magnitude of the impacts due to change in land use varies with location and intensity of change. This is due to unsustainable patterns of resource consumption and heavy dependence on natural/environmental resources by the cities and their inhabitants. The impact of urban growth extends beyond immediate urban boundary to regional and global scales. Sub-urban fringes remain potential areas to accommodate growing urban areas. Urban fringes continue to grow in different format [27]; dominated by isolated estates of low-density residential areas around urban area or sub-urban fringes [28] and it is evident that, quick transformation of sub-urban fringes exerts more pressure on natural and rural landscapes [29]. In Johor, low density sprawl has extended in to rural lands by 2217km² [9]. This left a big dilemma of whether the growth of urban areas is sustainable or not? Attempts to attain sustainable development remain rhetoric as practical implementation is always a difficult task. Rapid rate of urban development is a potential threat to environmental sustainability. The association that exists between ecosystems and urban environments is complex and multidimensional in nature [30], therefore, it is crucial to understand pattern of

change to overcome environmental challenges through the use of suitable approaches in regulating urbanization [31]. Greenery challenges and reduced environmental performance are attributed to rapid rate of urban development and economic growth, which subsequently results to sprawl.

3 PLANNING AND SPRAWLING GROWTH

Panning in rapidly urbanizing environments remains a great challenge to planners and environmentalists. This is despite the role of planning in controlling and managing urban growth. Among the major challenges is sprawl. Sprawl is a universal problem and is one of the primary challenges facing Johor Bahru conurbation. Sprawl is defined as the growth of urban area that results to the emergence of leap-frog development of low-density residential areas along transportation networks or in sub-urban fringes mainly on agricultural lands [32], [33]. It is a common phenomenon in rapid growing urban areas in both developed and developing world, where frequency of occurrence and extent of impact varies. The emergence of sprawl is an indication that, there is little planning control on urban development and expansion [33]. [34] associated sprawl to social and economic situations. It may also be attributed to land value, because land value decreases with increasing distance from the city center, and areas away from cities are potential areas for emergence of sprawl. [35] in their study of sprawl in 78 urban areas also reveals that, the tendency of sprawl increases with increased distance from the city center. [25] classify sprawl into four categories viz: suburban growth, strip, scattered/discontinuous and leapfrogged development. Intensity of human activities, level of pressure for development and rate of urbanization and economic development determines the type of sprawl exhibited by an urban area. It poses a serious threat to sustainability, since it is associated with consumption of land resources and degradation of both the natural and built environment.

4 THEORETICAL UNDERPINNINGS

Theory of International Trade and Friedmann's Core-Periphery Model were used to guide the analysis of spatial growth of urban areas, economic development, environmental issues and environmental problems in Johor. The development of Johor region is engineered by the need to make the region attractive for both domestic and foreign investors, especially taking into consideration its proximity to Singapore. Using the International Trade Theory to explain this phenomenon, Johor, located in Malaysia have a comparative advantage in production of certain goods and services that are needed by its neighbor 'Singapore'. The theory which was first put forward by Eli Heckscher and Bertil Ohlin in early 1900s predicts that, higher

incomes will increase to the nations with greatest advantage. In this situation, Malaysia's Johor has advantage because of the following reasons: (i) its location in the Economic Growth Triangle (Indonesia - Malaysia - Singapore Growth Triangle), (ii) Singapore uses Singapore Dollar which is stronger than the Malaysia Ringgit; (iii) goods and services are cheaper in Malaysia's Johor when compared to Singapore; (iv) distance between Johor Bahru and Singapore is just 1km which is relatively close for the residents in Singapore; (v) free movement of Singaporeans and Malaysians across the international boarder. These factors tend to attract more investment to Johor region, attracts Singaporeans for shopping, accommodation medical and leisure activities, thereby exerting more pressure for development. [36] states that, there is large scale movement of Singaporeans to Johor in Malaysia primarily to enjoy "high purchasing power" and leisure/entertainment in Johor due to currency value of Singapore's Dollar over Malaysia's Ringgit.

The Friedmann's Core-Periphery Model which was first put forward by Friedmann (1966) was used to explain the development process in the Johor region. The development of the Johor region is in accordance with the Friedmann's Model, where the region at the initial stage consisted of independent settlements with no hierarchy; later, Johor Bahru emerge as a strong core/center bounded by periphery with entrepreneur and labour force. Johor Bahru which is the core subsequently transform into multi-nuclei, where periphery eventually develops. Finally, the emergence of a functionally inter-dependent systems of cities, with Johor Bahru as the City Center as well as the Central Business District. Nusajaya is the new state administrative center at the same time the Edu City. The Western Gate Development is the Free Trade Zone and Conservation Area. Pasir Gudang is the Eastern Gate Development comprising of the sea port. Senai and Skudai are the Airport City and the gate-way to the region. The developments have brought about the complete absorption of the metropolitan's peripheries.

5 STUDY AREA AND METHODOLOGY

The study area is Johor, which is located on $1^{\circ} 29'14''\text{N}$ $103^{\circ}46'52''\text{E}$. It is bounded by Pahang to the North; Malacca and Negeri Sembilan to the Northwest; and Straits of Johor that separates Johor and the Republic of Singapore to the South. The state is ranked fifth in terms of landmass, with a total landmass of $19,210 \text{ km}^2$ and second most populated state in Malaysia. It has a population of 3,233,434 based on the 2000 population census.

Johor Bahru conurbation is the second largest urban area in Malaysia. It is a commercially oriented area and contributes significantly to the economy of the region and the nation in

general through commercial activities and tax/revenue to the government. Johor Bahru is the capital of Johor State in the Southern part of Malaysia (refer with Fig. 1). It is located on latitude $1^{\circ}28'0^{11}N$ and $103^{\circ}45'0^{11}E$, with a total population of 1.4 million in 2009, and a total land mass of $185KM^2$ [37].

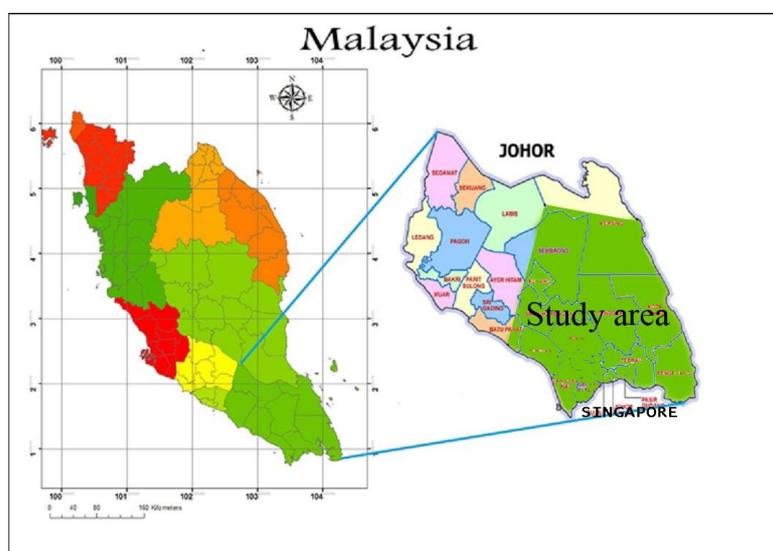


Fig. 1: Map of Malaysia showing Study Area

Source: Adapted from [21]

Its proximity to Singapore (separated by 1km Sea Strait) allows large scale movement of people between both nations thereby boosting economic trade. The conurbation witnessed rapid rate of urbanization in recent years, where the built-up areas increased from 231 km² in 1988 to 416 km² in 2005 and non-built up areas decreased from 836 KM² in 1988 to 651 KM² in 2005 [38]. The establishment of the Regional Development Authority which was later renamed 'Iskandar Malaysia' is to sustainably develop the region both physically and economically, and make Johor Bahru "a strong, sustainable conurbation of international standing" in the Southern Malaysia. The development is based on nation building, growth and value creation, equitable and fair distribution of development. This is with the aim of attracting both domestic and foreign investors, to boost economic growth and development. The research is based on documentary sources and site visit. The main sources of data are Comprehensive Development Plan for South Johor Economic Region 2006-2025 and the Iskandar Malaysia Integrated Land Use Plan.

6 FINDINGS AND DISCUSSION

Johor Bahru conurbation is an industrial and commercial hotspot of the South Johor Economic Region (SJER) [36]. The dynamic nature of Johor Bahru conurbation and its continuous response to emerging economic needs and social desires is with the view to

achieve the target of Iskandar Malaysia. Iskandar Malaysia is a development corridor in the Southern part of Malaysia covering Johor. The development corridor is similar to the Multimedia Super Corridor in the central part of the country, with the aim of striking a balanced development. The development of Iskandar Malaysia is categorized into five flagship zones namely: Zone 'A' is Johor Bahru City Center, constituting the Central Business District, Conservation and Heritage Zones and Danga Bay. Zone 'B' is Nusajaya, comprising of Johor State administrative center, international destination resort, Edu City and Medini. Zone 'C' is the Western Gate Development, comprising of Tanjung Pelepas Port, Free Trade Zone, Second Tuas link and RAMSAR World Heritage Park. Zone 'D' is the East Gate Development, made up of Tg Langsat Industrial Park and Pasir Gudang Port. Zone 'E' is Senai and Skudai, which is referred to as the Airport City, and the gate-way to the region. This has changed the morphology of the conurbation and the region at large. The development of the conurbation is guided by a Comprehensive Development Plan to realize the vision of Iskandar Malaysia, which is developing Johor Bahru as "a strong, sustainable conurbation of international standing". The Comprehensive Development Plan consist of policies that are aimed at promoting all the three dimensions of sustainability, however, the implementation of the policies is not comprehensive. Despite the adoption of planning approaches such as Transit Oriented Development (TOD), Compact Growth and the integration of sustainable development principles, the conurbation suffers from urban and environmental ills, thereby demonstrating characteristics of sprawling growth. This can be attributed to external factors such as population growth, pressure for economic and physical development. Influx of both legal and illegal migrants to the region remains the greatest challenge to the urban morphology. This subsequently manifests in form of squatter and sprawling growth.

The development taking place in the region is among the factors that facilitates the emergence of sprawl. It has been reported that development in Nusijaya are mostly scattered, except for the new administrative area [36]. Instead of promoting sustainable development of the region, it is doing contrary. The separation of developments is contrary to the concept of compact growth, which is supposed to organize developments together to reduce the need for private transportation and leaving no room for sprawling growth. Similarly, the increasing demand for accommodation by both foreigners and Singaporeans in Johor Bahru and environments has facilitated the emergence of sprawl in the region. It has been estimated that, over 150,000 people cross the Straits of Johor to work in Singapore [39]. The figure is expected to reach 500,000 by [9].

6.1 *Population growth and urban sprawl*

The Comprehensive Development Plan (CDP) for South Johor Economic Region (2006-2025) by the Iskandar Regional Development Authority is prepared and to be implemented in order to achieve the vision of developing the conurbation of Johor Bahru. The Plan showed that the city's population is on the increase, which subsequently increased the city's density. Increased population of the conurbation facilitates unplanned development which manifests in form of sprawl. [40] also states that large number of the city's population live in the suburbs, making those places densely populated. High job opportunities in construction, manufacturing and private sectors as well as economic growth are the determining factors of the dense population, which can subsequently spread out unplanned development in the surroundings in an effort to accommodate the populace. This is a potential threat to low density local/traditional villages in the suburbs as the area is witnessing significant changes in population, and may lead to unnecessary/unplanned development. [37] identify that there is spread of low density development and sprawled suburbanization in and within Johor Bahru conurbation. Reporting a similar view, [38] highlighted that developments are taking place but outside the boundary of the conurbation, demonstrating ribbon type of sprawl. The sprawl occur mostly along transportation networks, undeveloped areas/open spaces. The low density sprawl sometimes portray the population job characteristics. This in the near future can lead to multi-centric cities, which can increase sprawled areas in the region.

Studies on urban sprawl in Malaysia discovered that the conurbation of Johor Bahru is demonstrating sprawling growth [41], [38]. Similarly, a research on the implications of city competitiveness and urban sprawl on socio-economic and cultural life in Malaysia by [40] disclose that, there is evidence that the conurbation has grown beyond its boundary, thereby demonstrating sprawling growth, and suburbs located outside the boundary accommodates great number of built up areas where large percentage of the city's population live in those areas. Low density rural areas are now rezoned for high density developments (refer with Fig. 3). In addition, [37] discover that "developments in Nusajaya are spread widely and the only recognizable semi-complete nucleus is the new administrative centre.... (p6)". This tends to reveal that the Comprehensive Development Plan is deviating from the concept of Compact Growth and Transit Oriented Development.

Another challenge to realizing the vision of developing Johor Bahru as "a strong sustainable conurbation of international standing" is decentralization of activities from the city center to surrounding areas. Decentralization of activities to new locations have been taking place.

This is a threat to the city center because it will pave way for the decay of the inner city. Shifting of administrative and other governmental institutions to Nusiyajaya, movement of Custom, Immigration and Quarantine CIQ complex to its new location and the construction of the 'Second Tuas' link to Singapore are typical examples of such decentralization. As the 'Second Tuas' Link is constructed on the southeast part of Johor Bahru, and Nusiyajaya is to be developed as the administrative and residential area, what busy activity is left in the Johor Bahru City Centre? What other activities can replace and utilize the existing infrastructures provided in the city center to ensure proper functioning of the city? Decentralization can lessen activities in the core city and render the available infrastructural facilities underutilized. Livability of the conurbation can at the same time decrease, thereby contributing to the decay of the inner city.

6.2 *Land use change and sprawling growth*

Change in land use remains the greatest challenge in fast growing urban areas. Most of the changes in land uses in Johor region are from undeveloped lands such as natural landscapes, forest, and agricultural lands to built-up areas. Such changes are attributed to physical and economic development, thereby resulting to more consumption of land resources, ecosystem degradation and habitat fragmentation due to the vegetative nature of Johor region. Urban growth with these characteristics demonstrates unsustainable growth. The proposed developments have either absorbed or converted rural/agricultural lands and forested areas to urban and related uses. These may result to future urban environmental problems such as flooding. Rapid growth of urban areas is threatening the survival of several rural villages in Johor, as many traditional villages (Kampongs) are absorbed and replaced with high-density developments, while some are vulnerable to relocation [42], [9], [43]. [44] expresses fear over the encroachment of residential communities such as Kampung Mahmoddiah, Kampung Kubur, and Kampung Masjid among others, where rapid urban development extends into the boundaries of these communities (refer with: Fig. 2, and Fig. 3). These communities faces serious threats as some awaits conversion from low density developments to high density developments (refer with Fig. 3), and their surrounding natural/green landscapes will undergo serious modification. [45] consider the changes to natural landscapes as a threat and negative evolution, because they are characterized by loss of biodiversity, and the identity of the existing landscapes. And these natural and traditional landscapes are well known in maintaining eco-balanced society.



Fig. 2. Location of villages encroached

Source: [44]

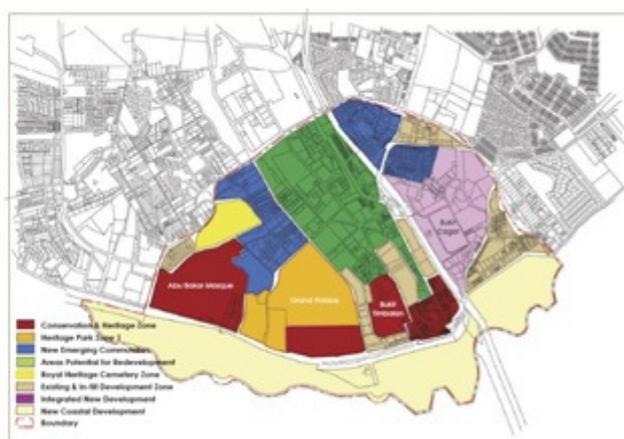


Fig. 3. Newly proposed land uses for Johor Bahru

Source: [44]

7 WAY FORWARD

Evidence of neglect of environmental sensitivity in planning decisions in the region and the nation at large has been highlighted by [36]. Since safeguarding livable and sustainable conurbation is the fundamental target of the Iskandar Malaysia, responsible authorities should re-visit the plan and consider adoption of more planning approaches such as the Urban Growth Boundary and Green Belt concepts so as to achieve sustainable urban development.

Urban Growth Boundary and Green Belt are effective in conserving areas with valuable biodiversity and undeveloped lands, at the same minimizing the tendency of sprawling growth. The Green Belt concept is a green strategy used to control urbanization/urban growth with the aim of protecting pre-urban landscapes [46]. Similarly, [47] view green belt as an indicator for measuring sprawl. This approach has been used in several locations and proved successful [48], [49], [50], [51]. Growth management policies in planning are vital in protecting the environment [52], and its implementation by local planning authorities can mitigate urban sprawl [22].

Similarly, Urban Growth Boundary is another approach that sets boundary for development. It determines the trends of urban growth, zoning and rezoning of land uses in growing urban areas [53]. The approach tends to restrict development along sub-urban fringes and promoting development of nature-oriented cities.

8 CONCLUSION

As urban areas grow to reap economic and social benefits, urban and environmental problems such as sprawl manifest in unsustainable consumption of resources and environmental

degradation. It is a universal problem for most growing urban areas, but the type and intensity depend on rate of population growth and pressure for development. Factors such as high rate of population growth and unnecessary change in land use contribute significantly to sprawl in both the inner city and along sub-urban fringes of Johor Bahru. The conurbation of Johor Bahru is mixing up with its rural hinterlands, and low density rural areas and natural landscapes are captured and converted to high density developments. These can be challenging in achieving sustainable development of Johor region, because it is associated with inefficient consumption of resources which reduces environmental performance. It is therefore pertinent to monitor the nature and pattern of urban growth to enable adoption of better approach in handling issues arising. This can also assist in realizing expected outcome, which is economic and physical development without jeopardizing the environment.

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