Sustainable Sri Lanka through Polycentric Cities.

Urban Sprawl

Rapid Growth of Population and Urbanization are two key factor that leads the Urban Sprawl. In considering various perspectives Urban Sprawl can be defined in many ways. Galster et al. (2001) has stated several definitions urban sprawl is (1) specific land utilization model, (2) land development process, (3) reasons of land utilization behaviors, (4) results of urban land utilization behaviors. Causes for urban sprawl are mainly with the rapid growth of population scattering of urban influence towards rural regions according to the demands of dwellings, industry and business sectors which causing occupation of more and more agricultural land and forests. Mostly these urban growth are uncontrolled and unplanned. Due to this disorganized methods it effects hinder regional sustainable development. Moreover clearing of vegetated land for land acquisition for population residing reduces impervious areas resulting impacts on environmental balance. Further sprawl decreases open areas and amenities, natural living area, water quality and increases cost for public services and living and causes traffic density and flood in urban areas.

Current world population is 7.7 billion and expected to reach 8.6 billion in 2030 and 9.8 billion in 2050. Among this population majority scrawl to the urban areas where as per the records 55% of them resides in urban areas. (A proportion that is expected to increase to 68% in 2050). According to the recent United Data set launched another 2.5 billion of population predicted to be added to the urban population in 2050 where 90% of this increase taking place in Asia and Africa. The significance of this two regions where most countries are developing countries. Between 2018 and 2050 India, Nigeria and China are expected to account for 35% of the growth in the world's urban population. This inevitable expansion of urban forms which currently occupy 3% of global land consuming over 75% of the overall energy consumption and producing over 50% of the global waste gradually creating negative impacts on sustainability development.

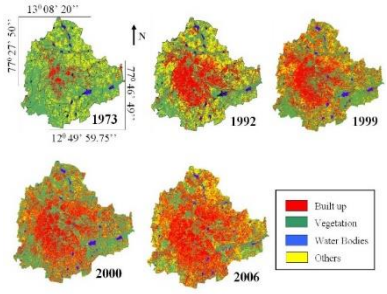

Figure 1 Bangalore's growing urban sprawl

Urbanization in Sri Lanka

Sri Lanka is facing rapid urbanization currently with unplanned and poorly-structured development. UN-Habitat is currently assessing the spatial dynamics in Sri Lankan Urbanization has monitored data analyzing 9 provisional capitals for period of 1995 to 2017. State of Sri Lankan Cities Report 2018 released by them with analyzed results state that Sri Lankan cities has expanded rapidly since 1990 and the trend of urbanization of capital city Colombo shows unprecedented expansion in country's history. Further it state that Colombo build-up area has increased from 41km^2 in 1995 to 281km^2 in 2017 and non-build-up area has been diminished from 125km^2-10km^2. Refer the figure 2 bellow which depicts how the Colombo city has expanded invading the surrounding.

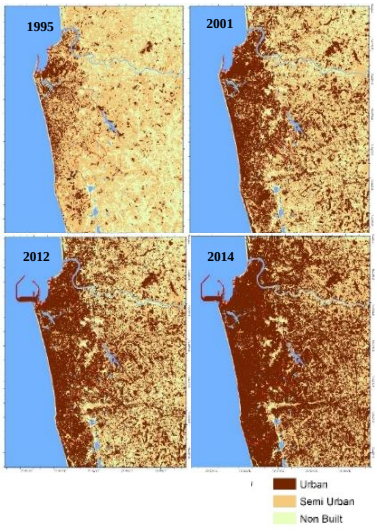

Figure 2 Colombo Urban Expansion 1995-2014 (Source State of Sri Lankan cities Report 2018)

According to their statistics urban area grew by 6.42% per year which is again a remarkably high figure even by global standards. See the following figure 3 which shows annual rates of urban expansion across the globe. Although it records higher values of rapid growth the urban population density seems very low since Sri Lanka ranks as the 5th least urbanized out of 233 countries as per UN's 2014 world urbanization prospects. Only 18% of population in Sri Lanka lives in urban area which is 3.9 million out of country's 21.2 million according to the World Bank.

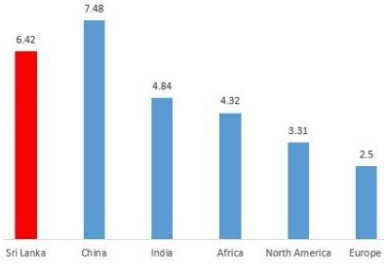

Figure 3 Average annual rate of urban expansion across the globe (Source Sri Lanka SoSLC project, others Seto et.al 2014, SL reference period 1995-2017 for 9 provincial capitals, others 1970-2000)

In conclusion these values depicts that although the population density in urban areas are less than the urban sprawl has affected seriously in invading irrigation lands. Sri Lanka demonstrates a sprawl and ribbon development. Which is the rate of expansion of urban areas has exceeds the population growth. This hidden urbanization reveals that as much as one third of country's entire population are living in areas that possessed urban characteristics but are classified as rural. This is due to the unplanned city development strategies within the country and also trend of population resides around the city center. All the economic activities and working places are congregated in the main city center which is the common nature of Sri Lankan cities. Hence more congestion is created with increasing land prices near to the main center. This results population sprawling slowly outwards by invading the green belts.

City Planning with spatial models

Monocentric City Model.

Two types are monocentric city model and polycentric city model. The most trend of cities are monocentric cities where concentration of economic activities in central business districts (CBD). Therefore majority of the population attract towards the CBD and forcing people to take daily trips towards the city center. This is due to congregate of economic and commercial activities within the CBD. All working places and business units are located in very close proximity where it makes easy to share risks and form partnerships and also benefit from free exchange of knowledge, ideas and learn from each other. (Shlomo Angel, Alejandro M.Blei, 2015)

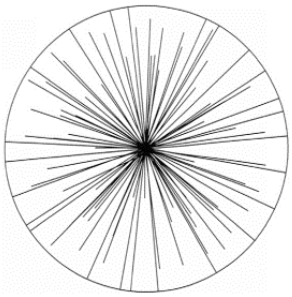

Figure 4 Monocentric city model (Source Shlomo Angel, Alejandro M.Blei, 2015

Hence the negative impact on this is due to having all the jobs congregate in the CBD the population tend to resides circular around the center. But when the city grows the residences sprawl further towards the rural invading the green belts by urban sprawl. Then the distances for daily trips towards the center increases costing more for transportation. These city type systems are not well planned with the growth of population. Due to long distances people have to spend more time on roads to travel to their working places located in the center. Further it creates more traffic congestions since lack of urban planning and results in more carbon emission to the environment. This is the mostly found spatial system in Sri Lanka, hence the central business district (CBD) being Colombo, majority travels to the center for their working places, driving longer distances. Colombo is the commercial city in the country located in the Western province. 5.64% land surface owns for the Western province and 28.8% of Sri Lankan population resides there and 45.1% of country's gross domestic product (GDP) is produced in this region. This reflects the magnitude of economic disparity between the Western Province and the rest of the country.

Figure 5 City Congestion in Colombo

Polycentric City Model.

This is more structured city planning with considered to the monocentric city model. In this model work places are still congregated together by strong attractions but concentrated in a number of dense centers dispersed throughout the metropolitan area, not only in the CBD.

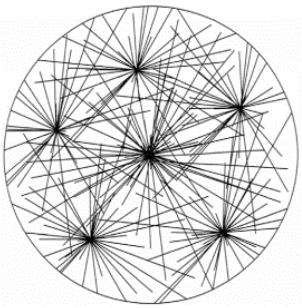

Figure 6 Polycentric city model (Source Shlomo Angel, Alejandro M.Blei, 2015

Shiomo Angel and Alejandro M.Blei 2015 in their paper highlights the features which deviates polycentric city models considering with monocentric city model. The city centers dispersed in several locations within the metropolitan without centrifugal contraction to the city center CBD, reduce the competition for the land and its price compelling firms. And avoid sprawling invading the boundaries, especially clearing the green spaces for the establishment of adequate floor spaces. The second feature is where polycentric city model avoid the competition of land in the city center and congestions for land acquisition and reaching the work destinations. It encourage the firms to locate outside the city center so as to be more accessible to their workers. Moreover due to distribution of commercial city centers the distances from residences to the workplaces are average closer than in monocentric city model where people can walk to the office. Distributed city clusters may also benefit with sharing knowledge, local amenities and pool of workers skilled with various abilities. This model is similar for a concept of "city within a city".

Polycentric cities promoting sustainable development.

This concept model which is polycentric city model of urban designing was not new to the world. New York's Downtown and Midtown city development is the evidence where the city grows it incorporate its neighbor islands such as Bronx, Queens, Brooklyn and Staten during earlier periods. Today also New York and London adopt this concept where developing cities by incorporating urban city clusters within the metropolitan in terms of shifting the density beyond the established center of gravity (Alexandar S.Z). Having city clusters with housing and job balancing with efficiency transport system and not centralizing to a main city is a sustainable development strategy according to Elijah Knaap et.al. (2015). He has insight polycentrism as a sustainable development strategy with empirical analysis from the state of Maryland. Further Chen Zhong et.al (2013) has introduced two parameters which are diversity and density index where city center is detected by combination of both. Polycentrism is not having centrifugal attraction of the density and diversity only toward the CBD but having dispersed nature outwards from the center. That is, every dispersed clusters in polycentric spatial model within the metropolitan region implemented with well-structured cross transits with improved public transportation, mixed use development for work, leisure and nature, promoting diversity will only enhances the density where more people are attracted and

resides around. Chen Zhong et.al (2013) in his paper emphasizes progress of Singapore in reaching sustainable economic growth with polycentric urban form. The concept of decentralization in Singapore was initiated in 1990 and still on process of polycentric urban transformation. The well-structured city planning and infrastructures, skyscrapers with vertical growing green gardens shows the evidence of their approach. The busiest city in the world Beijing has also insight in transforming to polycentric from monocentric, believing more sustainable. Daquan Huang et.al (2015) emphasizes the reasons, people being attracted to the CBD as central city enjoys better infrastructure, having city government departments, schools, hospitals and public facilities. Also the other fact is ring-and-radial road structure and economic activities facilitating the concentration of people to the center. Hence in polycentrism it is essential to disperse these elements to suburban centers with balance job-housing spatial distribution. Implementation of these well planned city models promote sustainable development. Furthermore in the research done by Alexander (1965) stated, polycentric region or a city as a remedy for a suburban sprawl. The dispersed clusters within the metropolitan mostly to be slightly differ with economic features from the CBD. Further these cities within the city to be specialized with unique economic and social characteristics specified to the respective area and with more diversity where it creates ability to attract more density. Then the workers having the jobs inside the specific cluster can reside around that area which reduce city congestion in the center and also trip distances. This will contribute in reducing carbon emission, air pollution and noise pollution. These type cities can be more structured with ample open spaces and converting them to green areas with proposing golden ratio 1:8 of environmentalist Sian and Ang (2016). Which is one person need to be approximately surrounded by atleast $8m^2$ of green area where it makes people feel that they are not far from nature and bringing social wellbeing. CTBUH introduce concept of “A Tall Polycentric” city where clusters having few tall buildings which promotes vertical sprawl, an ideal solution for

Figure 7 Sustainable Cities in Singapore

rapid urban sprawl. Therefore it is true that polycentric city represent a strong sustainability spatial model.

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