Current Trends of Urban Development in Yangon City and Its Implications on The Environment

San San Moe

Abstract— *Yangon, the former capital city of Myanmar and its main gate-way to the world, has been considered as the most suitable location for the majority of non-agricultural activities in Myanmar in the last decade. In the past few years, Yangon has through a phase of rapid constructional development. This development has resulted in the growth of Yangon over its previous administrative boundaries, and in tremendous changes of land use. The land use changes led to more and more environmental problems and to shortages in the provision with infrastructure. As the negative effects of spontaneous land use pattern such as insufficient land use and damage of the natural resources along with the urban environmental problems of the mega-size urban area hardly can be overcome after arising, they are thus to be minimized in advance by a for sighted concept of efficient framework for land utilization pattern of future urban expansion in the Yangon City. This city has higher population density due to more accessible and positive economic situations than other areas. Due to the increase in population and urban-expansion policy of the government, there were significant environmental changes, especially in land use during the period from 1988 to 2005.*

Keywords— **Environmental problems, land use changes, population growth, urban development, Yangon.**

1. INTRODUCTION

On a global average, urban areas generate 60 percent of a nation's gross national product. If properly managed, urban settlement can develop a country's capacity to sustain productivity, improve the living conditions of residents and manage natural resources in a sustainable way [1].

Compared to many other countries in the region, Myanmar still has a predominantly rural population of around 73 % and 27 % of the total population of 52 million lives in urban areas [2]. Yangon population is around 4 million in 2004. This means 30 % of total Myanmar's urban population and Yangon is population wise about 4 times larger than Mandalay, second largest city of Myanmar. The population of all other urban centers of states and divisions in Myanmar range from twenty thousand to three hundred thousand [3].

Yangon city served 8 % of the total union population. With the present population growth rate of 3.4%, Yangon populations will reach around 10 millions in year 2030 [4].

Yangon provides the location for half the industrial capacity, for the largest financial and marketing center, and is the largest provider of important services in education, health, culture, tourism, research and development. Although the legislation of border trade and liberalization of the economy are generating rapid growth in other centers, Yangon remains as the pole of national economy. It is thus crucial for the economic development of the country, and any pattern of economic growth is likely to see the disproportionate growth of the population of the metropolis.

Over-all objective of this research is to investigate on the urban development of Yangon in different phases and to find out the changing trends of urban development in Yangon. This paper highlights the points that any form of physical and cultural change should take into consideration the social, cultural continuity and identity of Yangon inhabitants. The methodological approach is based on the both of qualitative and quantitative method. This paper presents current urban developments carried out in different phases, 1989-1993, 1994-1998 and 1999-2002.

It highlights the housing reforms initiated by Department of Human Settlement and Housing Development (DHSHD). Private sector participation is elaborated and it is highlights that are recent achievements in carrying out Huts to Apartment Project. It also presents the implications caused by population growth in Yangon and recent urban developments. Issues such as solid waste management, water supply and sanitation and transportation become major problem areas. It concludes by stating the needs for structure plan, planning legislation, institutional framework and capacity building.

Yangon City is the former capital of Myanmar, East longitude 96° 13' and north latitude 16° 45' run through on Yangon City. It is located at the confluence of Yangon and Bago rivers. It is situated on a flat low lying land at the southern end of Bago mountain range. The topography is a somewhat higher in the north and lower in the south, rivers such as Hlaing River are found on the west, Ngamoeyeik Creek on the east, Yangon River on the south and Pazundaung Creek on the south-east.

The presence of these rivers and the nearness to the sea pose a challenge in keeping the city free of flooding. There are also lakes such as Hlawga Lake, Inya Lake and Kan Daw Gyi Lake.

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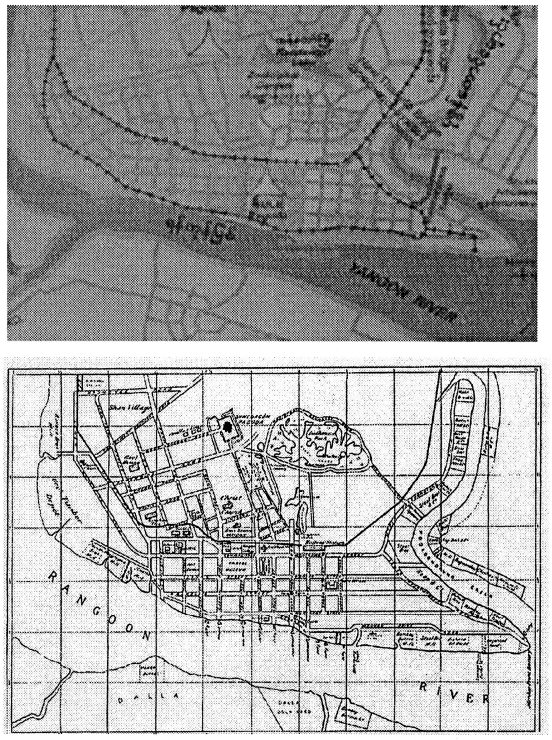

Fig. 1. Yangon between 1920s and 1980s.

Yangon is a port city, also has the Yangon International Airport and the central business area. Most of government organizations, private firms, universities and industries are concentrated in the Yangon City. It is organized by central business district (CBD), inner urban ring (IUR), outer ring (OR), south of CBD (SCBD), older suburb (OSU), northern suburb (NSU), and new suburb (NS).

It has 33 townships including CBD, which is formed with 7 townships and located along the Yangon River. International port and harbors are located in CBD area.

2. RESEARCH METHODOLOGY

There are two data sources, primary and secondary data. Primary data were collected by observation method (field visits) and secondary data were collected from Yangon City Development committee (YCDC) and Department of Human Settlement and Housing Development. Additional data were collected from published and unpublished reports, research studies and articles by different researchers, line agencies and non-governmental organizations.

Collected information using primary and secondary data collection methods were used in order to analyze qualitatively and quantitatively. Information regarding land use changes and existing urban expansion were analyzed by using charts: such as excels package, tables, maps and photographs.

The research is divided into four sections. The first section presents the current situation of land-use planning in Yangon City practicing in real recent development plan of Yangon district. The second section investigates possible high and low priority of central place function in Yangon city. The third section evaluates population growth, population distribution and projected population in Year 2020. Lastly, the fourth section covers some appropriate trends of urban development and its future prospect to improve the current situation by suggesting and producing the gridlines for strategic Master Plan.

3. YANGON CITY AREA DEVELOPMENT

Yangon City was founded in 1755 by Myanmar king Alaungphaya and replanned as the capital city of lower Myanmar in 1852 by the British colonial for 50,000 inhabitants. The area of the city at that time was about 25.9 square kilometer. In 1940, the city covered an area of 98.5 square kilometer with a population of 450,000. Since then the city has grown to 3.5 million populations with 593 square kilometer in 1997.

Due to the development of new satellite towns since 1987, the northwards sprawl of the city has changed to a cross pattern having an east-west axis and a north -south axis. The average population density of the city at present is 30 persons per hector, which is very low compared to other neighboring countries' capital city [5].

Large-scale urban development activities have been carried out in Yangon since 1989. Mixed-use developments have come to be undertaken in the central business district and in the areas vacated by large-scale squatter relocations. Isolated developments of great bulk are beginning to appear in the city. There are office buildings, hotels and housing. These three elements generally form the skyline of the intensively built up city.

The city is divided into 33 townships, which may be grouped into three areas with different socio-economic settings as follows.

(1) The Central Business District (CBD) with most of commercial and administrative activities;

(2) The Sub-urban townships with commercial and industry establishments

(3) New towns which are mostly residential and industry establishments

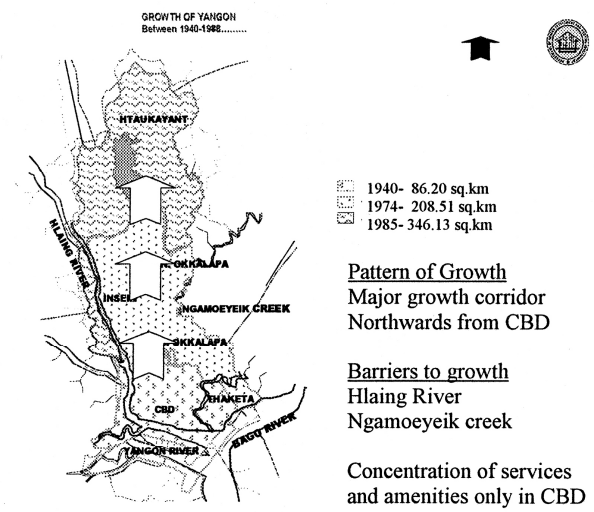

Fig. 2. Planned Urban Expansion after 1988.

4. YANGON CITY CHARACTERISTICS

Yangon City, the former capital and premier city of Myanmar with a current population of 4.35 million and an area of 795 sq-km is administrative by the Yangon City Development Committee (YCDC). The primacy of Yangon is expected to remain as it is presently the most dominant city, accounting for more than 52.74 percent of the total urban population in the Union. Mandalay, the second largest city is only a quarter of its size (1057600 people) [3].

The primacy of Yangon city is an important aspect in the overall planning of its future growth. The impact of a strong and sustained growth and structural changes will be strong on the city, since the dynamics of such growth is bound to enhance its primacy. For purpose of analysis, the Central Business District (CBD) will include the seven townships which are located in the downtown area and have high development intensity. These include (7) townships of Botataung, Kyauktada, Lanmadaw, Latha, Pabedan, Pazaungdaung, and Seikkan with land area of about 8 sq-km. The population of CBD was 245,530 in 1983 and increased to 321,922 in 2003.

Within the Yangon City (YCDC area) the 33 townships also demonstrate varying primacy index (PI) over the past years and is expected to improve during the planned period from 0.40 to 0.21 (1983-2020) with more balanced and equitable growth in the city region. This could be partly attributed to the resettlement programme of relocating squatters to the suburban areas and the new towns developed by government. The projected population of the CBD is expected to increase slightly to 311,751 (2010) and 357,709 (2020). The Primary Index (PI) of the CBD however, is expected to fall further from 0.29 to 0.21 indicating that future population growth will be directed to the suburban areas as a result of the CBD being develop for commercial and office uses.

Table 1. Primacy Index for Yangon City (1983-2020)

Sr. No.	Year	Primacy Index
1	1983	0.40
2	1993	0.37
3	2003	0.32
4	2010	0.29
5	2020	0.21

The present town ship character can be categorised in to Central Business District, Outer, Older Suburbs, Suburbs, New Towns and countryside. Central Place Function (CPF) of these townships have also been analysed based on their economic activities, social services and facilities, transport and communication services and facilities, recreational activities, community organization, protective services, infrastructure and maintenance facilities and personal services. (See table - 2)

Table (2) shows the benefits of central place functions based on the survey in the categorized zonal area of Yangon. In terms of the priority by benefits of CPF, Inner Urban Ring and Central Business District obtained high level benefits while other zonal areas are at moderate level in Yangon. Only one zone of South of CBD area is low benefit from CPF. But these townships are located at very near CBD.

Table 2. Central Place Function by Zone

Area	Central Place Functions by %								Priority
	I	II	III	IV	V	VI	VII	VIII	
CBD	26.0	22.8	26.6	14.5	36.0	19.6	21.2	27.5	H
IUR	23.5	25.5	22.0	29.0	22.9	23.3	28.0	24.0	H
OR	11.5	12.4	12.0	15.7	8.0	13.7	14.0	16.0	M
SCBD	2.0	4.8	4.1	4.3	1.7	2.6	2.7	1.8	VL
OSU	10.5	9.3	9.1	12.6	9.9	9.7	11.2	7.7	M
NSU	9.5	8.6	9.9	10.4	8.3	12	8.9	8.3	M
NS	17.0	16.6	16.3	13.5	13.2	19	14	14.7	M
Total	100	100	100	100	100	100	100	100	M

Note: CBD=Central Business District, IUR=Inner Urban Ring
OR=Outer Ring, SCBD=South of CBD, OSU=Older Suburb
NSU=Northern Suburb, NS=New Suburbs
VH=Very High, H=High, M=Moderate, L=Low, VL = Very Low
I=Economic Activities, II=Social Services and Facilities
III=Transport and Communications Services and Facilities
IV=Recreational Activities, V=Community Organization
VI=Protective Services, VII=Infrastructure and Maintenance Facilities, VIII=Personal Services

5. POPULATION GROWTH AND DISTRIBUTION OF YANGON CITY

The total population of Yangon City is estimated to be about 4.35 million in 2005, with an average growth rate of 2.5 percent during 1983-2005 periods. The rate of population growth increased from 2.11 percent during the 1983-1993 periods to 2.87 percent during 1993-2005 periods (Table-3).

The population growth of Yangon City was higher that Yangon Division is 2.2 percent and Union of Myanmar is 2.0 percent. The higher growth of Yangon City population was attributed to migration from rural areas of Yangon Division (Outside City) and from other states.

Table 3. Population of Yangon City and Yangon Division, 1983-2005

Area	Population (in million)			AAGR (%)	
	1983	1993	2005	1983-1993	1993-2005
I	2. 513	3. 097	4. 350	2.11	2.87
II	1. 452	1. 870	2. 108	2.56	1.00
III	3. 966	4. 967	6. 459	2.28	2.21
IV	35. 308	43. 116	54. 681	2.02	2.00

Note : AAGR = Average Annual Growth Rate

I = Yangon City, II= Outside City, III= Yangon Division, IV= Myanmar

Source: Adapted from unpublished statistics,

Department of Population, Union of Myanmar

The distribution of Yangon City population according to townships is shown in appendix. Population was largely concentrated in several townships such as Insein, Thingangyun, Tharkayta, North Okklapa, South Okklapa, Hlaing, Mayangone and Mingalardon. (See table-4).

Population growth of the townships varies. The growth of Inner City Area has low growth rate less than 1 percent per annum. On the other hand the townships located at the fringes towards north-west and eastern part of Yangon City has experienced rapid increased in population with growth rate of more than four percent. These are the areas where future direction of growth shall be expected. (See table-4)

The population is projected to rise to about 6.8 million by 2020, with an average growth rate of 3 percent. The increase is largely due to net in-migration to the city of about 140,000 per annum. The rate of increase due to birth is about 22,000 per annum.

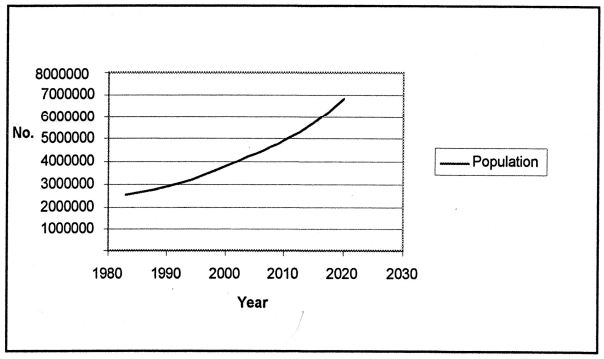

Fig. 3. Projected population of Yangon, 2010-2020.

The population of the townships located at the eastern and western fringes of the cities is expected to grow more than four percent per annum while the population of older townships located in and around the inner city is projected to increase much slower (less than 2.0 percent). These inner city townships have limited area for future expansion and the density is already high.

6. CURRENT TRENDS OF URBAN DEVELOPMENT IN YANGON

Two main bodies, YCDC and DHSHD manage urban land. YCDC is responsible for administering private land whereas DHSHD caters to the need of government land. The committee charged by the Prime Minister decides all change of use of urban land in Yangon City.

The Housing Delivery System in Yangon can mainly be divided into Two Main Sectors of Private and Public sector. The Housing Delivery System in Myanmar is predominantly private. The DHSHD provides rental housing for government employees in several major administrative towns. As Yangon population accounts to 30% of total urban population, the housing delivery system of Yangon represents a significant portion of the urban housing delivery system in Myanmar.

Initially, a policy and program response of the government to the deficiency of urban shelter is focused on the public housing schemes and slum clearance.

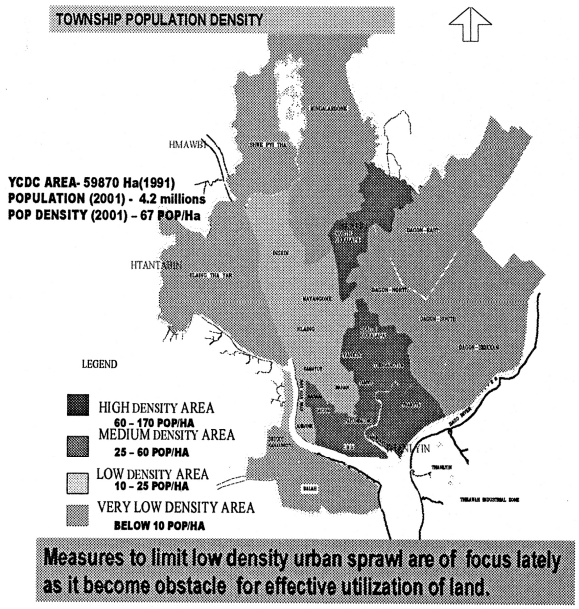

Fig. 4. Township Population Density.

The main housing delivery systems undertaken by the successive governments are:

a) Public and Rental Housing;
b) Government's Joint Housing;
c) programs for Individual Housing;
d) Sites and Services Schemes;
e) Slum and Squatter Upgrading (Hut to Apartment Scheme);
f) Urban Redevelopment Projects;
g) Area Development Projects;
h) Low Cost Housing.
i) Industrial Zone Development and
j) Provision of social Infrastructure

Significantly large sites and services schemes have been implemented after 1989. Approximately 160,000 plots for round about 400,000 persons have been developed in three new settlements to the east, west and north of Yangon. About 200,000 populations of squatter settlement dwellers have been provided with land lease on plots with basic infrastructure [4].

Out of 253050 plots developed from 1990 to-2000, 88180 plots (28%) were allocated to senior government employees. However, due to the high vacancy rates of plots (20%) in new towns, the trend on housing emphasis changed to slum upgrading, hut to apartment projects and low cost housing projects in suburban areas [4].

By mobilizing private sector participation in slum and squatter upgrading schemes, the role of the State has changed from provider to facilitator. Prior to 1988, there was no dedicated industrial zone in Yangon. The private industrial enterprise law promulgated in November 1990 has allowed the promotion of private sector development and the direct foreign investment.

During 1997 to 2000 there are 46 schools facilitated and constructed by DHSHD in Yangon city and its environs. The DHSHD and private developers have

contributed total development cost of 855.2 million Kyats.

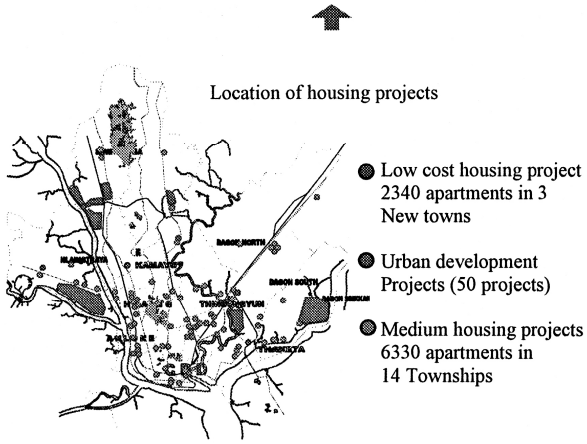

Fig. 5. Urban Densification (1993 onwards).

At present, Yangon is the most dominant city and may be described as a primate city accounting for more than 52.74 percent of total urban population. The present (2005) estimated population of Yangon City is almost four times bigger than Mandalay, the second city.

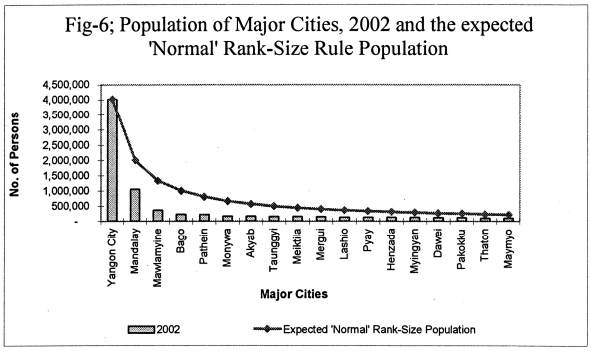

Fig. 6. Population of majot cities, 2002 and the exected "Normal" rank-size rule population.

The urban hierarchy of Myanmar deviates considerably from the 'normal' rank that follows the rank-size rule which states that the 'normal pattern' is one in which the second city is about half the size of the first city, the third city is about one third of the largest and so on. (See-fig-6)

It appears that in an open and free enterprise economy, the main factors i.e. size of city, its income level and accessibility seem to be the major influence on its growth rate.

7. URBAN INFRASTRUCTURE DEVELOPMENT

7.1 Water Supply System

Yangon obtains its water from sources such as rivers and lakes. Most of water bodies are located outside the Yangon City boundary. Water is also tapped from the ground for the daily needs.

At present only 46 percent of Yangon's population of 4.3 million is serviced with piped water supply. There is still a large proportion of the city's population being denied of clean water supply.

In recent years, demand for water supply is based on two sources; they are surface water and ground water resources. Daily demand for Yangon City is about 439,440 m^3/day and supply from three reservoirs, their daily capacity is just 393, 550 m^3/day. The rest of 45,890 m^3/day was supplied from the tube wells.

Rapidly increase of population and city area, more industrial zones, residents, commercial activities and emerging of he new satellite tows call for more water demand for the future. Estimation of demand for Yangon City is about 61, 3642 m3 per day for the future. YCDC plans a long term and short term projects for regular water supply. After these projects will be completed, 78% of whole city's water demand will be covered and amount of consumption will be 182 lpcd (40 gal per capital per day).

7.2 Sewerage System

Existing sewerage system was established in 1888 and consists of gravity sewer lines, 39 Ejectors, air distribution lines and two sewer force main to the river. The collected sewerage is distributed to the Yangon River without any treatment. The central sewer system in CBD covers an area of approximately 1.7 square miles. It was installed about a century ago to serve about 40,000 people. It is now over loaded and untreated raw sewerage was discharged through two outlets into the Yangon River.

The present sewerage and sanitation practices in Yangon have been categorized into four different types, such as conventional sewerage system (central sewerage system), septic tank system, and pour flush system, fly proof (chute type) latrines.

7.3 Road Network System

Yangon City's road network is still ground network system. Urban express way or elevated ways are not yet implemented and urban rail-way system also occupied a small portion of over all transportation networks. There are 2960 kilometers of the road networks (assorted lanes measurement) in Yangon City. Road networks have already expanded to northeastwards from the CBD. In the CBD the trunk road and streets followed a grid pattern and in the urban area (outer CBD) is a mesh-style road networks.

Travelers and commuters from national wide can access to Yangon City by using six national high way Roads conveniently. And then, inhabitants who live in urban fringe, especially in satellite towns and expansion areas can easily access to downtown (CBD area) by using arterial roads and collector roads.

7.4 Solid Waste Management System

As it is happening in most major cities, the waste management problem has already become severe in Yangon City. The problem is compounded by the rapidly increasing amounts of wastes of complex nature and composition, which result from the growth in the city's

population and the changes in the consumption patterns.

Solid waste generation in the city in 1999 was at about 3,000 tons per day. Due to rapid increase in urbanization area of Yangon City becomes wider and Pollution Control and Cleansing Department has to collect the solid waste in large extent across the area of city. However, gradual increase in population cause the generation rate in regular order and the amount of waste in each year is stated as follow:

Year	Amount of waste generator
1990	0.40 kg / cap / day
1995	0.48 kg / cap / day
2000	0.52 kg / cap / day
2005	0.62 kg / cap / day

The features of solid waste management in Yangon city are basically labor-intensive and uncontrolled. It is reported that the waste collection ratio in Yangon City is only 50– 60%. In the area of urban expansion, solid waste collection system does not properly operate like as main city Yangon. Residents commonly dispose of their solid waste into the alleys, streets, BDS (Back drainage space) rivers, channels, and drains/ditches indiscriminately.

8. CHALLENGES OF DEVELOPMENT

Some of the key issues and challenges identified in this study and are as follows:

- Up to now only sector planning approaches are existed. There is high demand for integrated planning based on a city wide land use planning.
- Legal framework regarding land use planning is missing completely.
- Citizen within a land development process have no rights. The process and compensation are not transparent.
- The level of population growth and migration are the main demographic issues related to the planning of Yangon City. The level of population growth is affected by economic condition of the city, demographic factors such as migration and natural increase, the capacity of infrastructure and facilities to support the population growth.
- Given the geographical position of Yangon City as a gateway linking Myanmar to the outside world, the effect of growth resulting from international trading will be received by the region within and around Yangon City. Under a more liberal economic scenario, the growth of Yangon City population is expected to be higher. In order to address and amend the strategic plan to accommodate any major changes to level of growth.
- Migration is major component of population growth of Yangon city. The domination of Yangon city in the hierarchy of urban settlement in Myanmar and disparity of living condition between Yangon City and the rest of the union may encourage people to move to Yangon city in the hope of earning better future. This will end up in massive unemployment or underemployment, slum and related social problems in the city.
- Need to prepare a detailed city plan and an overall infrastructure plan.
- Need for a comprehensive City Planning Act and related rules and guidelines.
- Application of GIS in city planning and land administration.

9. TRENDS AND RECOMMENDATIONS

By viewing in urban growth patterns, the city was initially built around the port area covering two sq-km. Based on old official maps, the built up area for the city increased rapidly from 13,244 ha (1970) to 27, 273 ha (1990) and 43, 284 ha (2000) [2]. It is expected that future growth will be mainly directed to the east in the Dagon Myothit Area and across the Bago River to Thanlyin where port activities at there are expected to spur development there. The area to the north in Mingalardon is not expected to see extensive development due to its remoteness from the CBD and other limiting constraints such as water catchments area for city water supply and a wildlife reserve. Further developments to the south of CBD will depend on the provision of road and bridges to these areas.

According to the development densities, Yangon City is 54.73 populations per hectare (compared to 76 pop/ha for Kula Lumpu). Some of the higher densities are found in the Kyauktada Township at 779 pop/ha and Latha township at 471 pop/ha both of which are found in IUR. Densities of outer-ring included townships within 10 km is about 250 pop/ha. The development densities in the New Town Areas (NS) are less than 100 pop/ha which is reflective of suburban densities. There is also noticeable trend towards suburbanization in north east and south-east area of Yangon by fulfilling the public transport and creating jobs.

The city which has been developed to an elongated shaped until 1989 has been changed to a cross shape. In future, that will have positive impact on city transportation and road network. From the cross shape, Hlaing Thayar, Hlaing, Mayangone, and Dagon North have formed the east-west axis and CBD, Bahan, Yankin, Mayangone and Mingalardon have formed the north-south axis. The secondary center should develop in the central place of Hlaing and Mayangone townships.

Before 1988, the land use classification is not systematic and clear in Yangon city. Most of industrial zones are existed in residential area, especially located in Inner Urban Ring (mostly in Hlaing Township). In 1988, these area were moved on to urban fringes like as Hlaing Thayar, western part of Yangon city across the Hlaing River, Shwe Pyithar, northern part and DAGON East and South, eastern of the city. Whole sale and large commercial area existed in CBD only and regional wise trading centre are shifted to the western part of Yangon city. Before this occasion, these are in Downtown (CBD)

and mixed up with residential area. Between 1989 to 2002, government tried to develop urban densification projects by three phases (1989-1993, 1994-1998, 1999-2002). Most of them are area development projects and Huts to apartment projects. The Fig.5 showed the urban densification projects by 1993. Their objective tends to upgrade the slum and squatter area and the people to live in the better living condition.

In my opinion, it is showed that the changes of land use after 1989 by establishing new industrial zones and implementing high rise apartments in northern, eastern, and western part of the city. So, the shape of city changed to an elongated shape to a cross shape. It will be better impact on the city transportation system. In overview the land use of industrial area were be totally changed and its development tends to be a heavy industrial zone. Residential areas are more spread out to the sub-urban area than that of before 1988. Former slum and squatter area were upgraded to the luxury housing projects and shopping center.

In these development projects, it can be seen that there are cultural changes of inhabitants. They are poor and lived together with 3 tiers family in their huts. In these new apartments, they are not enough space to live together, but they really live with together. They don't properly know how to live in it. They destroyed their living environments throwing their garbage and plastic bags and other solid waste disposal around their buildings. So, drainages and back lane are full of plastic bags and floods are caused by the rain season.

So, it is clear that there are not environmental friendly issues. They do their environment degradation. To maintain their status of sustainable city, inhabitants live in newly projects should be awareness of environmental concerns. They should learn more about the public participation and cooperation in environmental issues.

With more than 50% of people belongs to lower income bracket, and effective and efficient housing policy is an urgent necessity in order to provide housing for the majority of the population. It is therefore not recommended to increase the city area but to restructure and densify low-density area of western, eastern and northern areas of the Yangon city.

The city authorities and planners attempting to meet the challenges of growing population and increasing pressure on infrastructure have become conscious of the need to employ innovative approaches in city governance. In the context of maintaining the status of sustainable city, synergic efforts in term of public private partnership has become on essential element.

10. CONCLUSION

Yangon is and will be one of the most important urban centres of Union of Myanmar. The city has grown rapidly in recent years (expected to become a mega city in 2026) and new suburban satellite townships have been developed by the government to accommodate the increasing population and resettle inhabitants from the congested inner CBD area.

To maintain the image of Yangon as a livable and sustainable city, there is an urgent need to establish comprehensive city planning and urban development law. This law should be a comprehensive law covering aspects related to the use, development and conservation of land and building in the city. This law should be cover aspects pertaining to the types of Statutory Development Plans, Urbanization Promotion Areas, Land Readjustment, Land and Building Development Control, Planning Proposal Reports, Environmental Impact Assessment, Social Impact Assessment, Heritage Buildings and Conservation Areas including Environmentally Sensitive Area, public participation, enforcement as well as appeal procedures. In addition to planning laws, it is important to establish rules and guide lines.

And also, there is an urgent need to prepare a Detailed City Plan and over all Infrastructures Master Plan to guide, promote and control the development of the city. The plan should include land use zoning and building controls, as well as infrastructure plans covering key aspects of roads and urban transportation, urban drainage, waste water treatment and solid waste disposal. The present strategic plan could be serve as basic for it.

This research work recommends where and how new establishments should be located and what is to be protected in Yangon CBD and Whole Yangon City area.

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NOMENCLATURE

CBD = Central Business District,
IUR = Inner Urban Ring
OR =Outer Ring, SCBD=South of CBD, OSU=Older Suburb
NSU = Northern Suburb, NS=New Suburbs
I = Economic Activities, II=Social Services and Facilities
III = Transport and Communications Services and Facilities
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APPENDIX

Population size and Density by Townships, Yangon City (1993-2005)

Sr. No.	Township	Population			AAGR (%)		Area	Density
		1983	1993	2005	1983-1993	1993 – 2005	Sq.Killo	(pop/ha)
1	Ahlone	51,849	41,292	50,094	-2.25	1.62	2.59	193
2	Bahan	102,112	89,450	109,528	-1.32	1.70	8.81	124
3	Botahtaung	49,168	50,025	60,508	0.17	1.60	2.59	234
4	Dagon	35,541	35,360	46,590	-0.05	2.32	5.18	90
5	Dagon (East)*	0	0	69,902	-	6.66	110.4	6.3
6	Dagon (North)	0	75,035	122,899	-	4.20	118.53	10
7	Dagon (Seikkan)*	0	0	23,154	-	6.67	90.52	3
8	Dagon (South)	0	81,523	178,026	-	6.72	159.92	11
9	Dala	54,167	66,769	90,455	2.11	2.56	10.36	87
10	Dawbon	49,967	61,592	95,286	2.11	3.70	3.63	262
11	Hlaine	171,687	174,494	189,498	0.16	0.69	12.96	146
12	Hlaingtharyar	0	148,878	240,164	-	4.07	67.63	36
13	Insein	221,307	213,435	280,468	-0.36	2.30	19.98	140
14	Kamaryut	75,177	71,969	97,064	-0.44	2.52	6.22	156
15	Kyauktadah	37,634	40,806	50,914	0.81	1.86	0.52	779
16	Kyeemyindaing	69,866	80,823	101,112	1.47	1.88	5.18	195
17	Lamadaw	41,663	41,356	46,009	-0.07	0.89	1.20	354
18	Lathar	31,061	33,456	36,802	0.75	0.80	0.78	471
19	Mayangon	152,616	163,680	212,895	0.70	2.21	25.91	82
20	Mingalar-Taung-Nyunt	110,435	118,077	123,090	0.67	0.35	5.18	238
21	Mingalardon	124,652	145,092	200,941	1.53	2.75	29.02	69
22	North Okklapa	190,905	233,599	343,133	2.04	3.26	12.96	264
23	Pabedan	41,913	45,205	54,515	0.76	1.57	0.52	1048
24	Pazundaung	38,806	36,186	44,150	-0.70	1.67	1.04	424
25	Sanchaung	68,867	69,972	91,773	0.16	2.29	2.54	354
26	Seikkan (Port)	5,285	1,653	1,513	-10.97	-0.73	0.78	19
27	Seikkyi-Khanaungto	15,393	18,974	30,897	2.11	4.15	5.70	54
28	Shwepyithar	0	96,154	220,361	-	7.16	39.12	56
29	South Okklapa	183,264	198,398	255,776	0.80	2.14	10.36	247
30	Tarmwe	119,914	134,819	144,713	1.18	0.59	5.18	279
31	Tharkayta	193,028	225,683	332,255	1.58	3.28	12.96	256
32	Thingangyun	194,100	220,480	278,256	1.28	1.96	11.40	244
33	Yangkin	82,646	83,530	128,172	0.11	3.63	5.18	247
	Total Yangon City	**2,513,023**	**3,097,765**	**4,350,913**	**2.11**	**2.87**	**795**	**54.73**

Source: Adapted from Department of Population, Union of Myanmar

**Growth based on 2002-2005 figures Note: *AAGR = Average Annual Growth Rate*