



Japan International Cooperation Agency (JICA)  
Yangon City Development Committee (YCDC)

The Republic of the Union of Myanmar  
**A Strategic Urban Development Plan  
of Greater Yangon**

The Project for the Strategic Urban Development Plan of the Greater Yangon

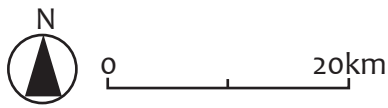
FINAL REPORT I

**Part-I: The Current Conditions**

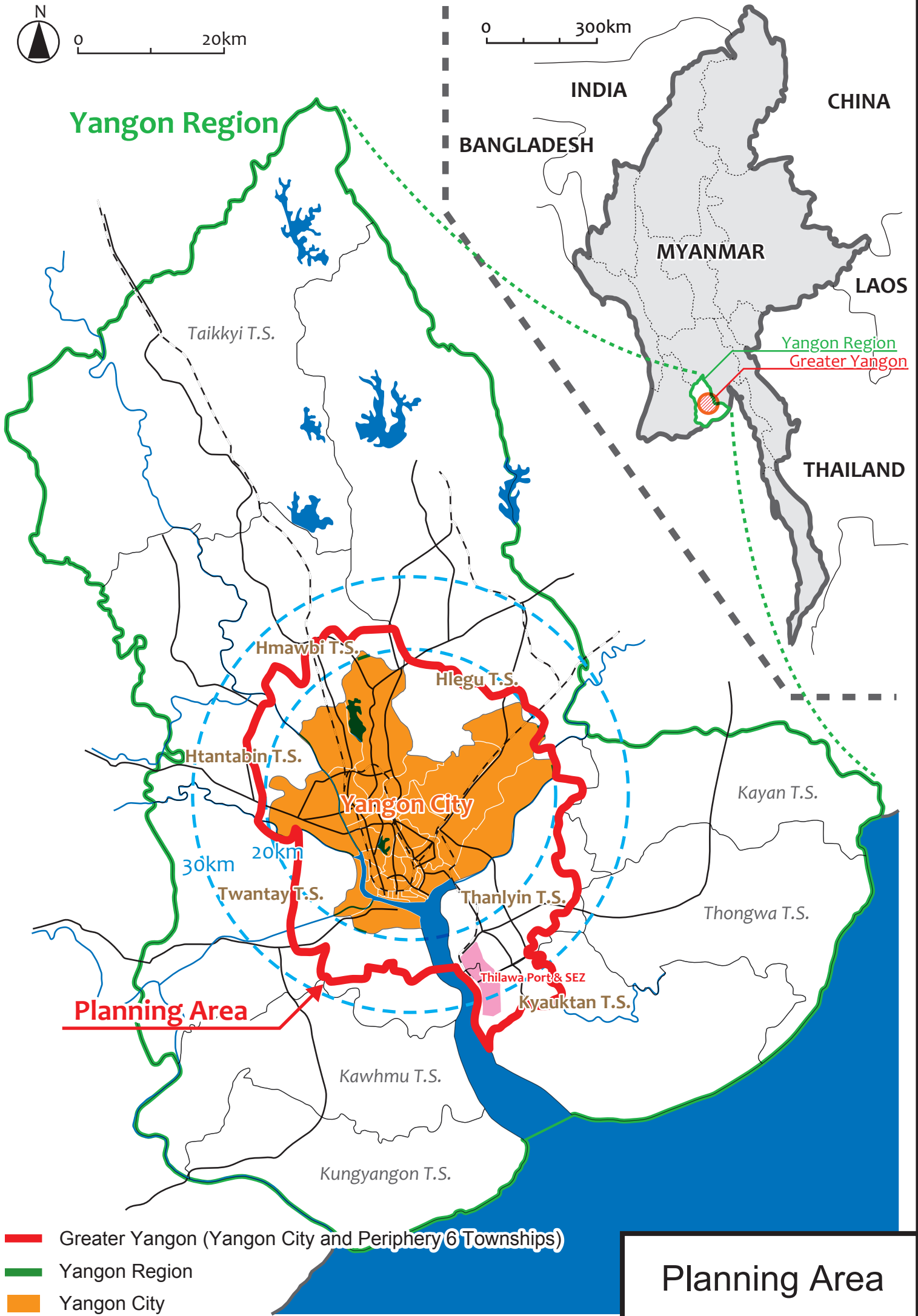
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Asia Air Survey Co., Ltd.  
ALMEC Corporation





# Yangon Region



- Greater Yangon (Yangon City and Periphery 6 Townships)
- Yangon Region
- Yangon City

Planning Area

# The Project for The Strategic Urban Development Plan of the Greater Yangon

## Final Report I

### < Part-I: The Current Conditions >

The Final Report I consists of three parts as shown below, and this is Part-I.

1. Part-I: The Current Conditions
2. Part-II: The Master Plan
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**LIST OF ABBREVIATIONS**

AADMER	ASEAN Agreement on Disaster Management and Emergency Response
ASEAN	Association of Southeast Asian Nations
ADB	Asia Development Bank
ADPC	Asian Disaster Preparedness Center
ADRC	Asian Disaster Reduction Center
ATCS	Area Traffic Control System
AWPT	Asia World Port Terminal
BAW	Bo Aung Kyaw Wharf
BES	Business Establishment Survey
BOT	Build-Operate-Transfer
CBD	Central Business District
CBDRR	Community Based Disaster Risk Reduction
CBM	Compressed Bio Methane
CIDA	Canadian International Development Agency
CNG	Compressed Natural Gas
DCA	Department of Civil Aviation
DDA	Department of Development Affairs
DEP	Department of Electric Power
DHSHD	Department of Human Settlement and Housing Development
DMH	Department of Meteorology and Hydrology, Ministry of Transport
DPMC	Disaster Preparedness Management Committees
DSW	Department of Social Welfare under the Ministry of Social Welfare
DWT	Dead Weight Tonnage
ECFA	Engineering Firms Association
EIA	Environmental Impact Assessment
FDS	Final Disposal Site
FSD	Fire Services Department
FY	Fiscal Year
GDP	Gross Domestic Products
GIS	Geographic Information System
GMS	Greater Mekong Subregion
GPS	Global Positioning System
GRDP	Gross Regional Domestic Product
HDPE	High Density Polyethylene
HHWL	Highest High Water Level

HIS	Household Interview Survey
ICD	Inland Container Depot
ID	Irrigation Department, Ministry of Agriculture and Irrigation
IPP	Independent Power Producer
ITS	Intelligent Transport Systems
ITU	International Telecommunication Union
IWT	Inland Waterway Transport
JETRO	Japan External Trade Organization
JICA	Japan International Cooperation Agency
JPY	Japanese Yen
LRT	Light Rail Transit
MAPDRR	Myanmar Action Plan on Disaster Risk Reduction
MCPT	Ministry of Communication, Posts and Telegraphs
MDPA	Myanmar Disaster Preparedness Agency
MEC	Myanmar Economic Corporation
MEPE	Myanmar Electric Power Enterprise
MES	Myanmar Engineering Society
METI	Ministry of Economy, Trade and Industry of Japan
MIP	Myanmar Industrial Port
MIPL	Myanmar Integrated Port Limited
MITT	Myanmar International Terminals Thilawa
MKRC	Mobile Knowledge Resource Centre
MLIT	Ministry of Land, Infrastructure, Transport and Tourism
MMK	Myanmar Kyat
MNPED	Ministry of National Planning and Economic Development
MOAI	Ministry of Agriculture and Irrigation
MOC	Ministry of Construction
MOE	Ministry of Education (in section 2.1.4)
MOE	Ministry of Energy (in section 2.3.7 and 4.7)
MOECF	Ministry of Environmental Conservation and Forestry
MOEP	Ministry of Electric Power
MOFA	Ministry of Foreign Affairs
MOH	Ministry of Health
MORT	Ministry of Rail Transportation
MOT	Ministry of Transport
MPA	Myanmar Port Authority
MPT	Myanmar Posts and Telecommunications

MR	Myanmar Railways
MRT	Mass Rapid Transit
MS	Myanmar Shipyards
MSPL	MPA-SMD Port Limited
MSWRR	Ministry of Social Welfare, Relief and Resettlement
MWL	Mean Water Level
MPA	Myanmar Port Authority
NDML	Natural Disaster Management Law
NGO	Non-Governmental Organization
NMV	Non-Motorized Vehicle
ODA	Official Development Assistance
PCCD	Pollution Control and Cleansing Department
PPP	Public Private Partnership
PS	Pumping Station
PTD	Post and Telecommunication Department
PwD	Persons with Disability
RET	Rangoon Electric Tramway and Supply Company
RHC	Rural Health Center
ROB	Road Flyover
RRD	Relief and Resettlement Department
R.S.	Railway Station
RTAD	Yangon Region Road Transport Administration Department
RTC	Road Transport Corporation
RTK	Real Time Kinematic
SEA	Strategic Environmental Assessment
SEZ	Special Economic Zone
SHM	Stakeholder Meeting
SLORC	the State Law and Order Restriction Council
SPW	Sule Pagoda Wharf
SRHC	Sub-Rural Health Center
SWM	Solid Waste Management
TOD	Transit Oriented Development
UFW	Un-accounted For Water
UMEHL	Union of Myanmar Economic Holding Limited
UMRT	Urban Mass Rapid Transit
UN	United Nations
UNDP	United Nations Development Programme

UNESCO	United Nations Educational, Scientific and Cultural Organization
UNOSAT	UNITAR's Operational Satellite Applications Programme
UPD	Urban Planning Division
US\$	US Dollar
USDA	Union Solidarity and Development Association
WHO	World Health Organization
WKRC	Water Knowledge Resource Centre
WTE	Waste to Energy plants
WTP	Water Treatment Plant
WV	World Vision
WWTP	Wastewater Treatment Plant
YESB	Yangon city Electricity Supply Board
YCDC	Yangon City Development Committee
YDDPMWC	Yangon Division Disaster Preparedness Management Working Committee

**CONVERSION RATE (AT MARCH 2013)**

1 MMK = 0.108 JPY, 1 JPY = 9.26 MMK
1 US\$ = 91.84 JPY, 1 JPY = 0.01089 US\$

Source: JICA HP

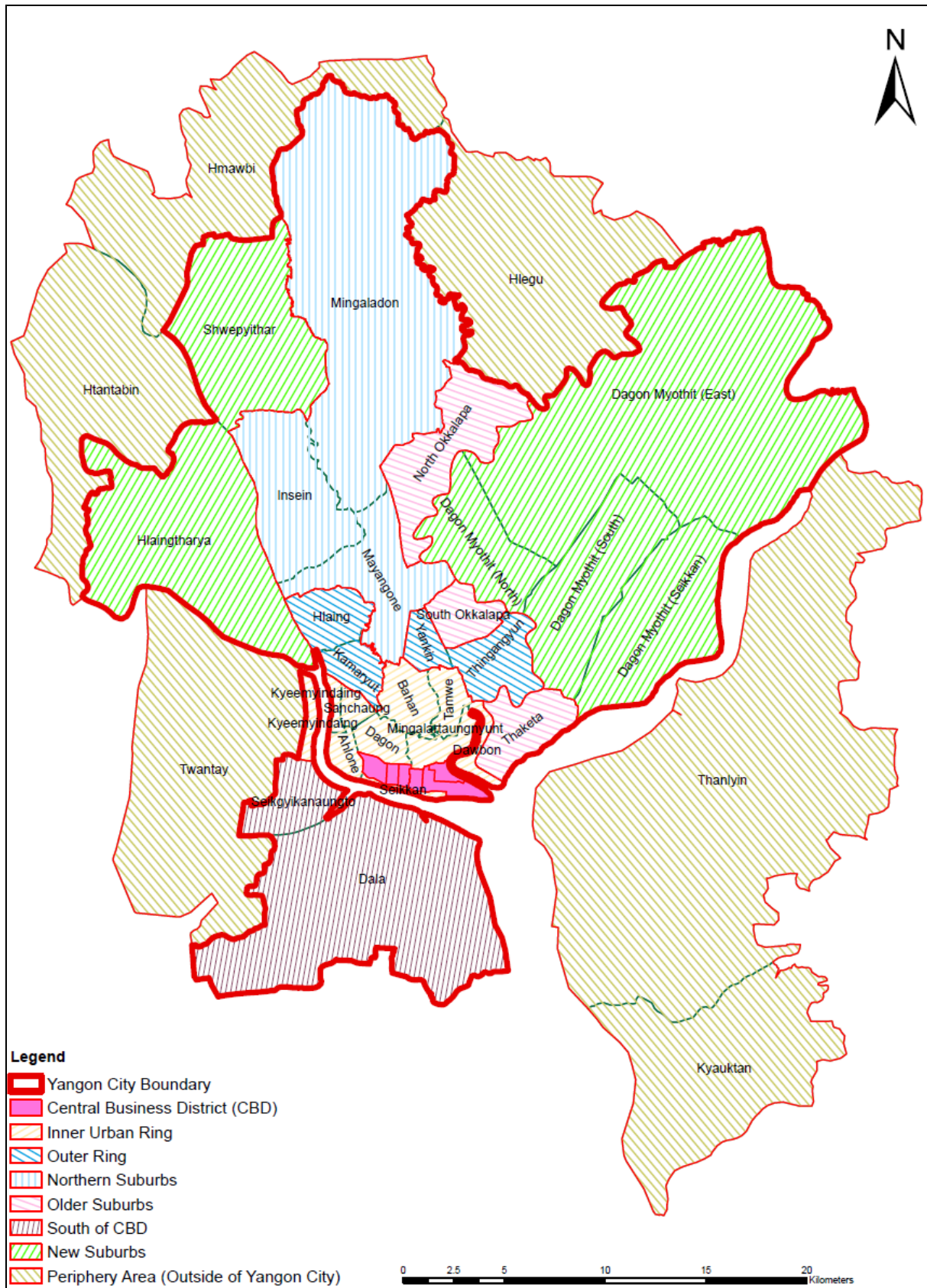
**DEFINITION OF THE STUDY AREA AND YANGON REGION**

Administrative Boundary		Township Group	Township Name	Definition	
Yangon Region	Yangon City	CBD	Latha	Whole area of those townships belongs to the target area	The Greater Yangon (Target Area) Total 1,535 km <sup>2</sup>
			Lanmadaw		
			Pabedan		
			Kyauktada		
			Botahtaung		
			Pazundaung		
		Inner Urban Ring	Ahlone		
			Kyee Myin Daing		
			Sanchaung		
			Dagon		
			Bahan		
			Tarmwe		
			Mingalar Taung Nyunt		
			Seikkan		
		Outer Ring	Dawbon		
			Kamaryut		
			Hlaing		
			Yankin		
		Northern Suburbs	Thingangyun		
			Mayangone		
			Insein		
		Older Suburbs	Mingalardon		
			North Okkalapa		
			South Okkalapa		
		South of CBD	Thaketa		
			Dala		
		New Suburbs	Seikgyikhanaungto		
	Shwe Pyi Thar				
	Hlaing Tharyar				
	North Dagon				
	South Dagon				
	East Dagon				
	Periphery Area (Outside of Yangon City)	Dagon Seikkan	Partial areas of each township belong to the target area		
Kyauktan					
Thanlyin					
Hlegu					
Hmawbi					
Htantabin		(Outside of the Target Area)			
Twantay					
Taikkyi					
Kawhmu					
Kungyangon					
Kayan					
Thongwa					

Source: JICA Study Team



**DEFINITION OF THE STUDY AREA AND YANGON REGION**



Source: JICA Study Team

**THE STUDY IN PICTURES**



Steering Committee (1<sup>st</sup>)  
(14<sup>th</sup> Aug 2012)



Technology Transfer Workshop (6<sup>th</sup>)  
(12<sup>th</sup> October 2012)



Kick-Off Seminar  
(14<sup>th</sup> Nov 2012)



Steering Committee (3<sup>rd</sup>)  
(9<sup>th</sup> Jan 2013)



Stakeholder Meeting (1<sup>st</sup>)  
(18<sup>th</sup> Jan 2013)



Seminar in Tokyo, Japan  
(21<sup>st</sup> March 2013)

Source: JICA Study Team

# ***CHAPTER 1***

***Introduction***

***< Part-I: The Current Conditions >***

## **CHAPTER 1: INTRODUCTION**

### **1.1 Background**

Yangon City, the largest economic center of Myanmar, has about 5.14 million population (2011) and is experiencing rapid urbanization and accelerated development as the nation moves toward democracy. The current rapid urbanization is putting more pressure on the existing old infrastructures in Yangon City and concerns for the deterioration of its urban environment are growing.

The Yangon City Development Committee (YCDC) is the agency responsible for controlling and managing the city's development. However, insufficient data and lack of an integrated future plan limit its ability to respond to various urban issues. At the same time, improvement of the present capacity of YCDC is necessary in providing better public services for the citizens of Yangon City.

The Japan International Cooperation Agency (JICA) conducted a fact-finding survey in March 2012 and reviewed the present condition of Yangon City and its surrounding areas. The survey confirmed the need of a strategic urban development plan for Greater Yangon, which covers not just Yangon City but also the adjoining townships being influenced by the urbanization of Yangon, to realize sound and sustainable development (hereinafter referred to as the Study).

Under such circumstances, Yangon regional government and JICA agreed to start the Study to prepare a well-thought future vision and strategic urban development plan. Accordingly, it will achieve balanced, inclusive, and sustainable growth, and cater to a better supply of urban infrastructure and services for the urban inhabitants of Greater Yangon.

The Study is in accordance with the Japanese government's cooperation policy towards the government of the Republic of the Union of Myanmar, which emphasizes the promotion of economic and regional development. It also concurs with JICA's cooperation program, which focuses on promoting the economic development of Myanmar, since the Study will contribute to the improvement of the living conditions as well as economic activities and logistics in Greater Yangon.

### **1.2 Objectives**

The primary objectives of the Study are as follows:

- 1) To present comprehensive development visions of Greater Yangon, targeting the year 2040;
- 2) To formulate an urban development plan of Greater Yangon for the realization of the development visions;
- 3) To formulate a strategy for promoting development of urban infrastructure sectors; and
- 4) To present a strategy for promoting institutional improvement and administrative capacity development in the field of urban development and management.

### 1.3 Study Period

The Study started from the beginning of August 2012 and is to be completed in December 2013. The Study is divided into two phases as follows;

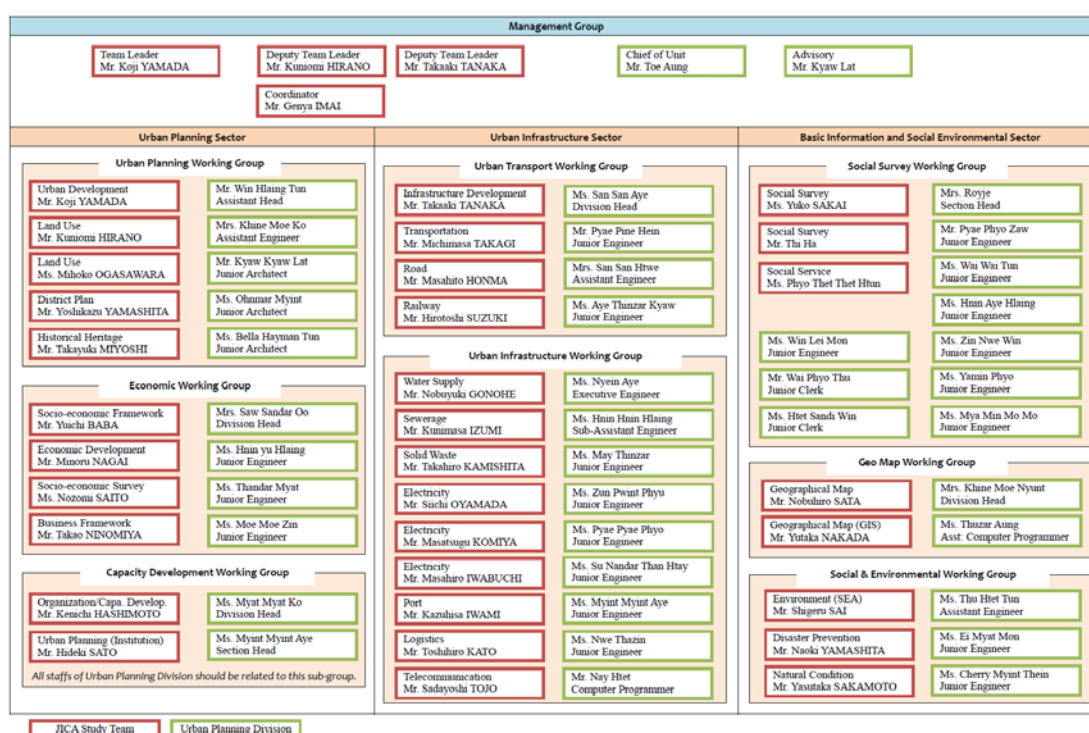
**Table 1.3.1: Phased Work Plan**

Phase	Study Period	Main Contents
1st Phase (Final Report I)	August 2012 – March 2013	<ul style="list-style-type: none"> <li>● Making Urban Basic Information Data</li> <li>● Formulation of Development Visions and a Structure Plan</li> <li>● Formulation of Social Infrastructure Development Strategy</li> <li>● Formulation of an Urban Development Master Plan</li> </ul>
2nd Phase (Final Report II)	April 2013 – December 2013	<ul style="list-style-type: none"> <li>● Conducting a Case Study and Formulation of Capacity Development Plan</li> </ul>

Source: JICA Study Team

### 1.4 Organizational Structure

The counterparts of this Study are the Yangon Regional Government and the Yangon City Development Committee (YCDC), in particular the Urban Planning Division of YCDC as main counterpart. The JICA Study Team and Urban Planning Division organized three sectors with eight subgroups, hereinafter referred to as “Working Group” which aims at conducting the Study smoothly and efficiently as shown in Figure 1.4.1.



Source: JICA Study Team

**Figure 1.4.1: Organized Sectors and Working Groups**

### 1.5 Formulation Methodology

#### (1) Steering Committee

A steering committee was established in order to share present information and perceptions, and oversee the formulation of an urban development master plan to be proposed in this study. The

steering committee will hold six meetings in all. The outline of the past meetings is as shown in Table 1.5.1. The chairman is mayor of Yangon City, who is a minister of development affairs, Yangon Region Government at the same time. The meetings are attended by representatives from different organizations such as YCDC (Department of Administration, Pollution Control and Cleansing, Roads and Bridges, Water and Sanitation, Construction, etc.), Yangon Region Governmental Organizations (Yangon City Electricity Supply Board, Myanmar Railways), etc.

**Table 1.5.1: Outline of the Steering Committees in Past**

No.	Date	Main Topics	Chair Person	The Number of Myanmar Attendees
1	14 <sup>th</sup> Aug 2012	Inception Report	Mr. Hla Myint (Mayor of Yangon City)	16
2	2 <sup>nd</sup> Nov 2012	Interim Report I	Mr. Hla Myint (Mayor of Yangon City)	29
3	9 <sup>th</sup> Jan 2013	Interim Report II	Mr. Hla Myint (Mayor of Yangon City)	29
4	6 <sup>th</sup> Mar 2013	Final Report I	Mr. Hla Myint (Mayor of Yangon City)	31

Source: JICA Study Team

## (2) Stakeholder’s Meeting (SHM) and Seminar

SHMs will be held two times in all. The first SHM was held on 18<sup>th</sup> January 2013 in order to share information related to the process of establishing Development Visions of Greater Yangon for 2040 and exchange opinions on the prepared structure plans based on the development visions and alternatives of structure plans. The meeting was attended by total 169 people from YCDC, Yangon Region Governmental Organizations, and Medias, etc. YCDC explained the “Strategic Environmental Assessment (SEA) for Development Visions and the Structure Plans for Greater Yangon” in Interim Report II of the Study.

Seminars are to be held at each Tokyo, Yangon and Nay Pyi Taw. On 21<sup>st</sup> March 2013, a seminar was held at Tokyo in order to announce JICA studies in Yangon for Japanese companies and relative organizations. In June 2013, the seminars at Yangon and Nay Pyi Taw will be held for each public people and administrative agencies in Myanmar.

## 1.6 Target Area of the Plan

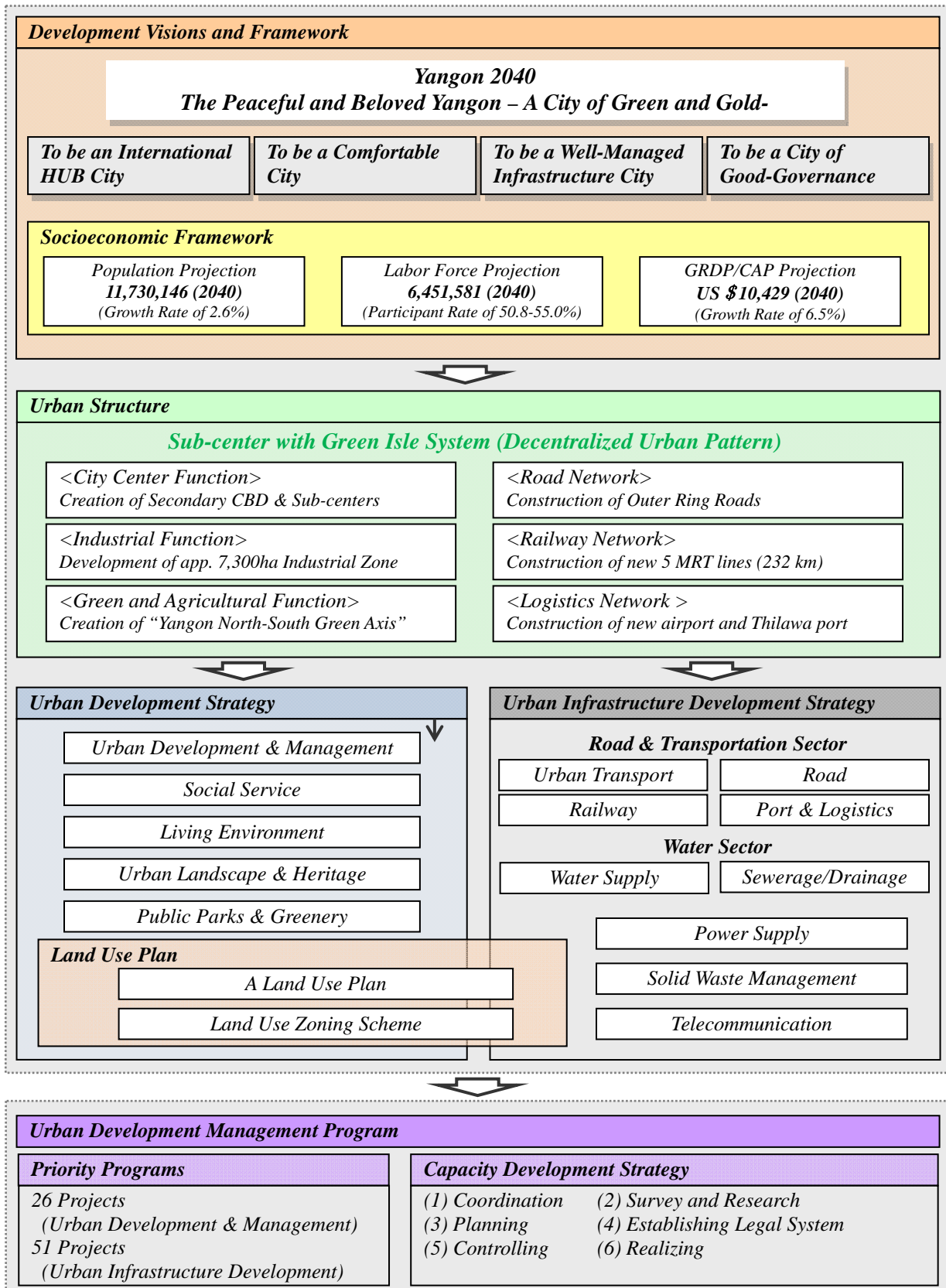
The planning area is the Greater Yangon, including Yangon City (784 km<sup>2</sup>) and parts of the six neighboring townships of Kyauktan, Thanlyin, Hlegu, Hmawbi, Htantabin, and Twantay (hereinafter referred to as the Planning Area), which has a total area of approximately 1500 km<sup>2</sup> as shown in the location map.

## 1.7 Target Year of the Plan

The target year of the plan is the year 2040 when the development visions of the Greater Yangon are set. Based on the development visions, benchmarks of the plan are set as follows;

- Short-term: the year 2018
- Middle-term: the year 2025
- Long-term: the year 2035

## 1.8 A Framework of the Plan



Source: JICA Study Team

Figure 1.8.1: A Framework of the Plan



# ***CHAPTER 2***

***Review and Analysis of the Current Conditions  
and Regulatory Framework***

***< Part-I: The Current Conditions >***



## CHAPTER 2: REVIEW AND ANALYSIS OF THE CURRENT CONDITIONS AND REGULATORY FRAMEWORK

### 2.1 Review of the Current Environmental and Socioeconomic Conditions

#### 2.1.1 Environmental Conditions

(1) Topographic Conditions

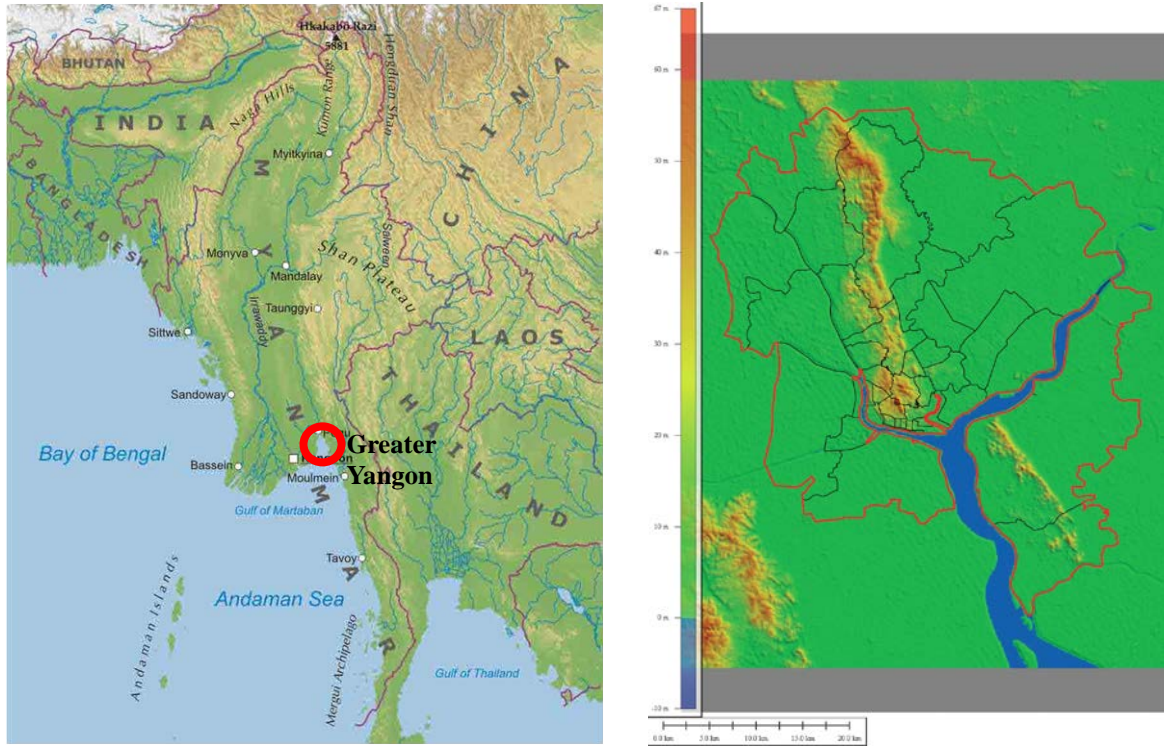
1) Topographic Features of Myanmar and Greater Yangon

Myanmar, with a total area of 678,500km<sup>2</sup>, generally slopes downward from the north to the south. Mt. Hkakabo Razi, located in Kachin State is the highest mountain in Myanmar with an elevation of 5881m. The Ayeyarwaddy River, which originates from Mt. Hkakabo Razi and flows southward to Andaman Sea, is the longest river in Myanmar with the total length of approximately 2170km. The river has an approximately 255,081km<sup>2</sup> of river basin.

The Greater Yangon lies along the Yangon River between around 17°06' and 16°35'N latitude and between 95°58' and 96°24' longitude, east of the Ayeyarwaddy River delta. Yangon City is located 34km upstream from the mouth of Yangon River. As shown in Figure 2.1.1. Yangon City has low hills which are long and narrow spur of Pegu Yomas hill range in the central area running in the N-S direction with an average height of 30m and degenerates gradually into delta plains in eastwards and westwards.

2) River System in and around Greater Yangon

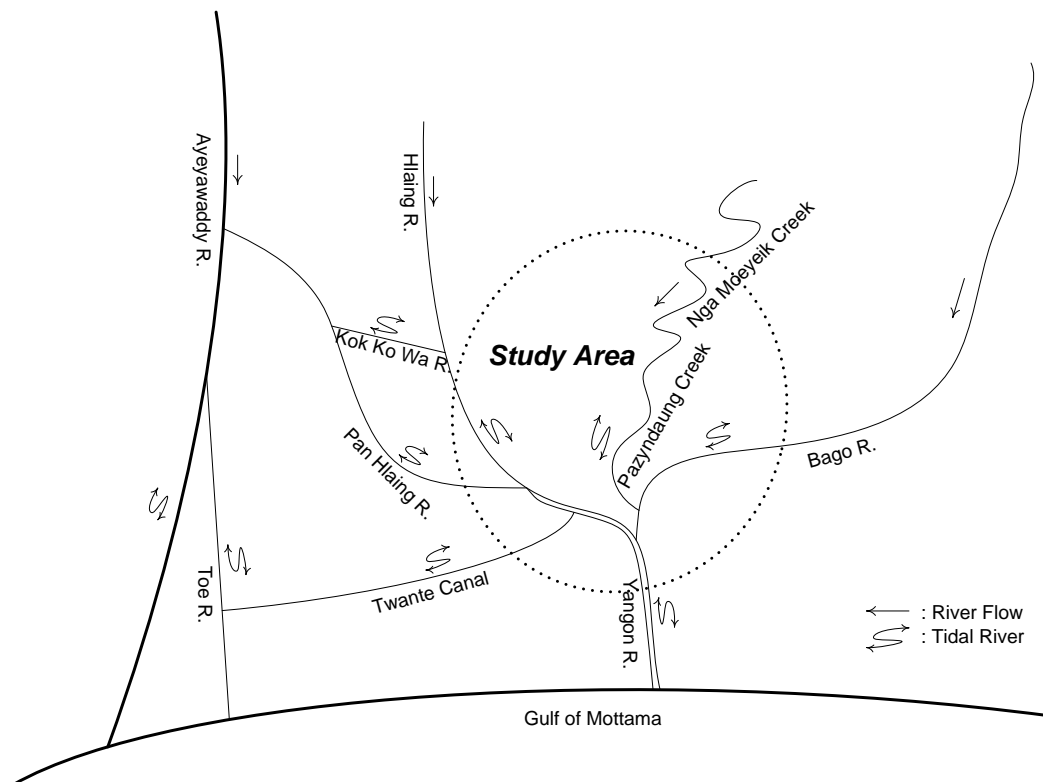
The river system in and around Greater Yangon is schematically shown in Figure 2.1.2. Yangon City is bounded on the south, southeast and southwest by the Yangon, Hlaing, and Bago rivers. The Nga Moeyeik Creek flows into the centre of Yangon City and changes its name to Pazyndaung Creek and penetrates the centre of the city to the Bago River. The river system of the western side of Greater Yangon is more complicated. A few of tidal rivers, namely, the Kok Ko Wa River, the Pan Hlaing River, and the Twante Canal flow into the Yangon River. Significant sedimentation can be observed at the junction of the Pan Hlaing River and Kok Ko Wa River. Recently, main stream of the Upper Pan Hlaing River has been shifted to flow directly to the Kok Ko Wa River instead to the Lower Pan Hlaing River.



a) Physical Map of the Republic of the Union of Myanmar  
Source: JICA Study Team based on the information of a) <http://www.turkey-visit.com> and b) Shuttle Radar Topography Mission (SRTM)

b) Topographic Map of the Greater Yangon

**Figure 2.1.1: Topographic Map of the Planning Area**



Source: JICA Study Team based on the information from several maps

**Figure 2.1.2: River System In and Around Greater Yangon**

3) Water Body in Greater Yangon

The largest water body is the Yangon River, which accounts for 27.80% of the total area, and is managed by the Myanmar Port Authority (MPA). The second largest water body is the Bago River in Thanlyin Township with 13.82% of the total area. Both of the water bodies have saline water. In regard to inland waters, the Mingalardon Township, comprising Hlaw Ga Lake (the major source of water supply for Greater Yangon), accounts for 8.16% of the total area. Botahtaung, Dagon, and Pazundaung townships have 1.0-2.0 ha of water body within each township. Botahtaung and Pazundaung townships are suffering from accumulated rainwater. One of the major causes identified might be the absence of or limited water body area. Table 2.1.1 shows the water body areas such as lakes, ponds, rivers and canals by township within Greater Yangon.

**Table 2.1.1: Water Body Area in Greater Yangon**

Township	Lake/Pond		River/Canal		Total	
	Area (Km <sup>2</sup> )	Weight (%)	Area (Km <sup>2</sup> )	Weight (%)	Area (Km <sup>2</sup> )	Weight (%)
Botahtaung	0.00	0.00	0.01	0.01	0.01	0.01
Pazundaung	0.00	0.00	0.01	0.01	0.01	0.01
Ahlonge	0.04	0.03	0.02	0.01	0.06	0.04
Kyee Myin Daing	0.01	0.01	0.05	0.04	0.06	0.05
Dagon	0.02	0.01	0.00	0.00	0.02	0.01
Bahan	0.54	0.40	0.00	0.00	0.54	0.40
Tamwe	0.01	0.01	0.04	0.03	0.05	0.04
Mingalar Taung Nyunt	0.04	0.03	0.08	0.06	0.13	0.09
Seikkan	0.00	0.00	0.35	0.25	0.35	0.25
Dawbon	0.04	0.03	0.12	0.09	0.16	0.12
Kamaryut	0.09	0.06	0.01	0.00	0.09	0.07
Hlaing	0.09	0.07	0.52	0.38	0.61	0.45
Thingangyun	0.02	0.01	0.96	0.70	0.98	0.72
Mayangone	2.79	2.03	0.24	0.18	3.03	2.21
Insein	0.81	0.59	1.71	1.25	2.52	1.84
Mingaladon	11.20	8.16	0.00	0.00	11.20	8.16
North Okkalapa	0.15	0.11	0.99	0.72	1.14	0.83
South Okkalapa	0.03	0.02	0.25	0.18	0.28	0.20
Thaketa	0.28	0.21	4.29	3.12	4.57	3.33
Dala	0.81	0.59	0.32	0.23	1.13	0.82
Seikgyikanaungto	0.13	0.10	1.56	1.14	1.70	1.24
Shwe Pyi Thar	0.54	0.40	1.56	1.13	2.10	1.53
Hlaing Tharyar	0.76	0.55	5.68	4.14	6.43	4.69
Dagon Myothit (North)	0.14	0.10	0.92	0.67	1.06	0.77
Dagon Myothit (South)	0.40	0.29	0.41	0.30	0.81	0.59
Dagon Myothit (East)	1.16	0.84	5.07	3.69	6.22	4.54
Dagon Myothit (Seikkan)	0.02	0.02	9.44	6.88	9.47	6.90
Kyauktan	3.62	2.64	2.69	1.96	6.31	4.60
Thanlyin	3.55	2.59	18.96	13.82	22.51	16.41
Hlegu	1.19	0.86	1.19	0.87	2.37	1.73
Hmawbi	0.93	0.68	2.68	1.96	3.61	2.63
Htantabin	0.14	0.11	5.79	4.22	5.93	4.33
Twantay	0.05	0.03	3.51	2.56	3.56	2.59
Area Managed by MPA	0.00	0.00	38.13	27.80	38.13	27.80
Total	29.62	21.59	107.56	78.41	137.18	100.00

Source: JICA Study Team based on the information from Shuttle Radar Topography Mission (SRTM)

#### 4) Geology

##### (1) *Tectonics*

There is the Andaman Trench in Bengal Bay, west of Myanmar, in which the Indian Plate is moving northward and subducting underneath the Burma Plate from west to east. Sagaing Fault, boundary between Burma Plate and Sunda Plate, is located eastern of Myanmar which tends to cause large scale earthquakes in Greater Yangon (Section 2.1.5 Disasters (2) Disaster conditions 2) Earthquake disasters are described in more details).

##### (2) *Geomorphological and Soil Conditions*

Most of Greater Yangon area consists of fluvial flood plain which is associated with the area lies in the delta of the Ayeyawaddy River and along Yangon, Hlaing and Bago rivers and Nga Moeyeik Creek. The rivers transfer and deposit sediments, and form soils which can be classified and described below. Figure 2.1.3 presents the soil distribution in Yangon.

###### ● *Meadow Soils and Meadow Alluvial Soils*

The meadow soils which occur near the river plains with occasional tidal floods are non-carbonate. This kind of soil usually contain large amount of salts. Meadow alluvial soils can be found in the flood plains. This type of soil has the texture of silty clay loam and has neutral soil reaction and richly available in plant nutrients.

###### ● *Lateritic Soils*

These soils occur mostly in the lower Myanmar in the lower slopes of the hills of Pegu Yoma, Rakhine Yoma, and Donna hill range. These soils are found on well-drained low uplands and at the foot of low hills. These usually occur at the elevation not higher than 90 m above sea level. These are formed under the influence of the tropical forests under the conditions of wet tropical monsoon climate with 2000-5000 mm of rainfall. Morphologically, yellow or yellow brown and reddish brown colors characterize these soils. The yellow and red colors of the soils are due to the presence of iron with oxidation and reduction processes. In some places the horizons of pisolithic laterite are found at the depth of 457-508 mm, whereas, in other places these soils are not found even at the depth below 1.2-1.5 m. The humus content of these soils in forest area is high, but can be less in the deforested areas. The soil reaction is acidic in the upper horizon and can be more acidic at the lower horizons.

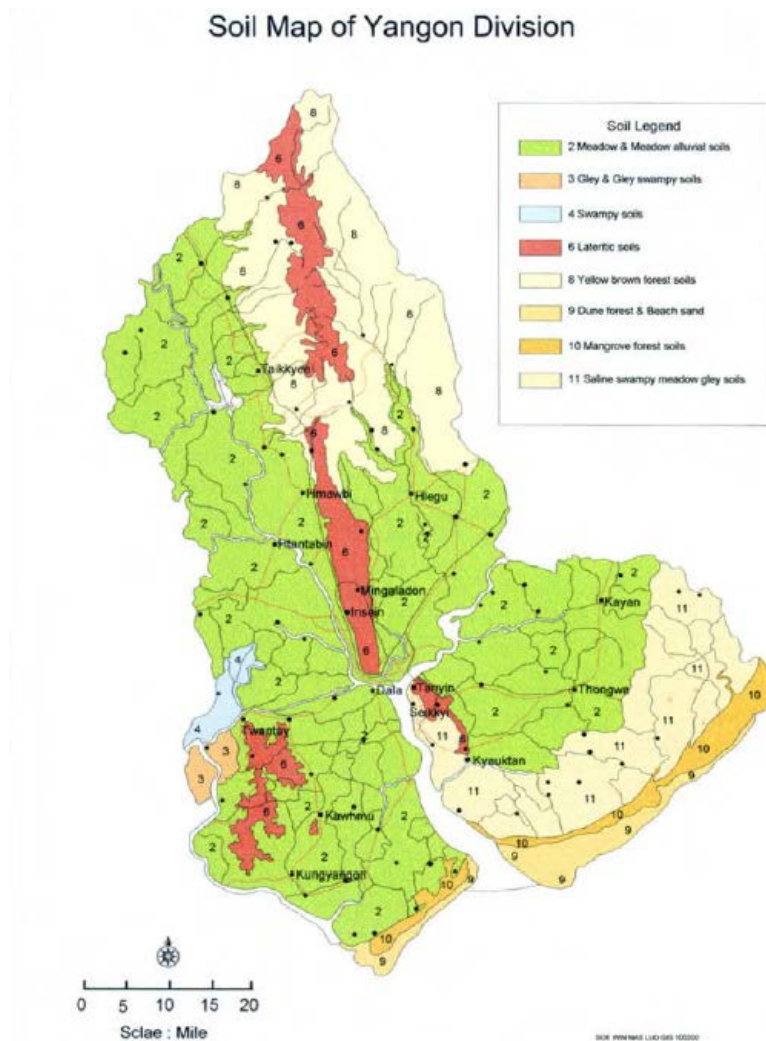
###### ● *Yellow Brown Forest Soils*

The yellow brown forest soils widely exist in Myanmar covering the low hills of Pegu Yoma, foot hills of Tanintharyi Yoma, Rakhine Yoma, and sloping areas at the bottom of northern hilly region up to the approximate latitude of 25°. These soils are closely connected with the red brown forest soils in the soil distribution and usually replacing these soils down the slope. These soils mainly exist in the region of gentle slopes of low hills and foot hills at the elevation of 90-450 m above sea level. These soils are typical for the monsoon or tropical mixed deciduous forests.

These soils contain more percentage of clay and humus than the red brown forest soils. However, in some slope sections, soils are shallow due to presence of pisolithic lateritic layer. According to the land use classification, great majority of these soils are classified as good garden lands.

###### ● *Saline Swampy Meadow Gley*

These soils occur in the Ayeyarwady Delta and along the river bands of the Gulf of Motama and the marine flat lowlands influenced by the tidal sea water, which is always salty.



Source: Ministry of Agriculture and Irrigation (MOAI)

**Figure 2.1.3: Soil Map of Yangon Area**

## (2) Climate

Greater Yangon is located in tropical monsoon climate, characterized by three distinct seasons, namely, summer (March to middle of May), rainy (Middle of May to middle of October), and cool (Middle of October to February) seasons.

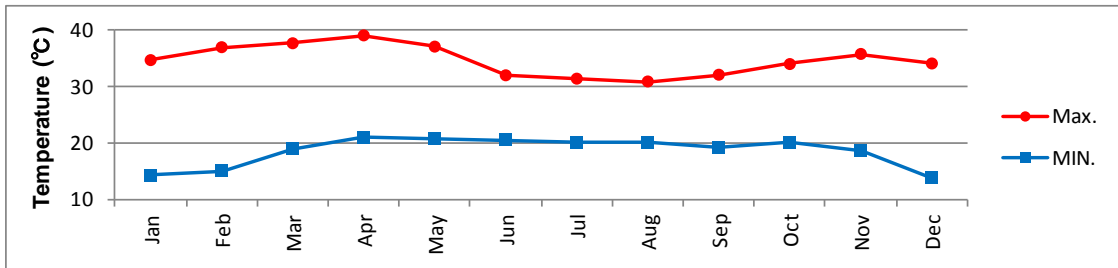
The Kaba-aye Meteorological Station, managed by the Department of Meteorology and Hydrology, Ministry of Transport (DMH, MOT), has been observing meteorological conditions of Greater Yangon since 1968 at the location of 16° 54' latitude, 96° 10' longitude, and +20.0 m in elevation. Six parameters are observed daily which are: 1) temperature, 2) humidity, 3) wind speed and its direction, 4) evaporation, 5) sunshine hours, and 6) rainfall.

The meteorological data at the Kaba-aye Station as representative of Greater Yangon.

### 1) Temperature

Generally, temperature in April is high, the maximum monthly temperature recorded in April 2001 was 39.1 °C. Minimum monthly temperature recorded in December 2004 was 13.8 °C. The difference between the monthly maximum and monthly minimum temperature is more

than 20 °C from December to February and around 10 °C from June to August, which is the peak season of monsoon rainfall.

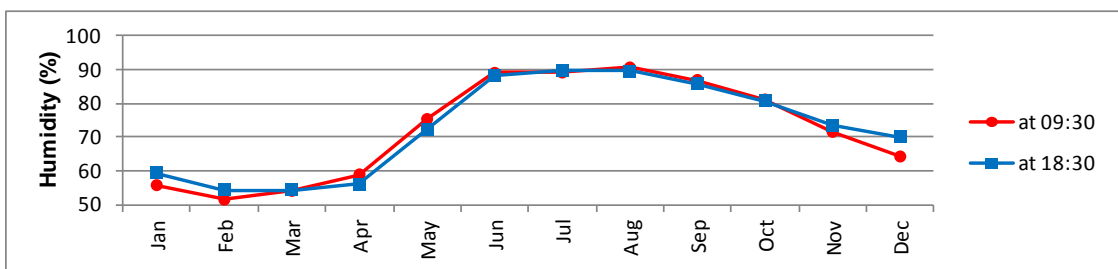


Source: JICA Study Team based on the data from DMH, MOT

**Figure 2.1.4: Mean Maximum and Minimum Temperature at Kaba-aye (1991-2008)**

## 2) Relative Humidity

Relative humidity have been recorded twice a day; at 9:30 and at 18:30. As shown in Figure 2.1.5, humidity difference between the morning and evening is quite small. The annual mean relative humidity at 9:30 and at 18:30 is 72.3% and 72.8%, respectively. The maximum mean monthly relative humidity is 90.6% in August, while the minimum mean monthly relative humidity is 51.4% in February.



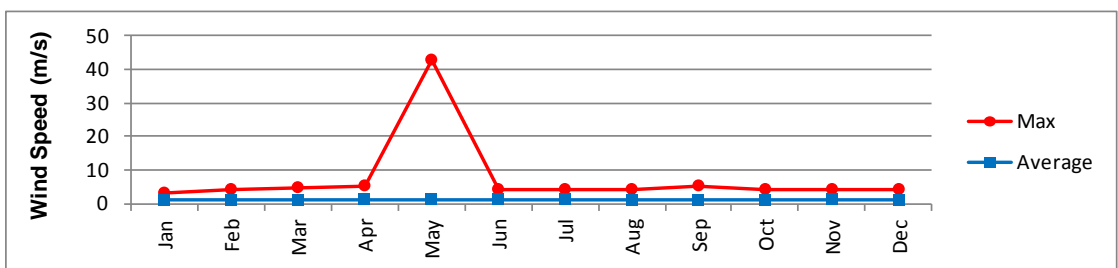
Source: JICA Study Team based on the data from DMH, MOT

**Figure 2.1.5: Mean Monthly Relative Humidity at Kaba-aye (1991-2000)**

## 3) Wind Speed and Direction

Annual mean wind speed at the Kaba-aye Station is 1.1 m/s. Maximum wind speed was 42.9 m/s recorded in May 2008 at the time of Cyclone Nargis. Cyclones come to the country in April, May, and October but as shown in Figure 2.1.6, Greater Yangon seldom experiences such cyclone wind.

Wind directions are generally in the SW during summer (March to middle of May) and rainy (Middle of May to middle of October) seasons, and NE in the cool season (Middle of October to February).

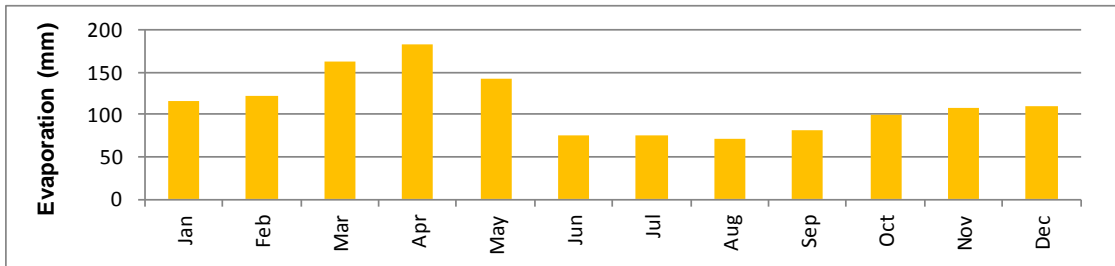


Source: JICA Study Team based on the data from DMH, MOT

**Figure 2.1.6: Maximum Wind Speed and Mean Monthly Wind Speed at Kaba-aye (1991-2008)**

4) Evaporation

Annual mean evaporation is 1,348.6 mm. Evaporation in the summer of March to middle of May is higher than that in rainy season of middle of May to middle of October. Maximum mean monthly evaporation is 183.6 mm in April.



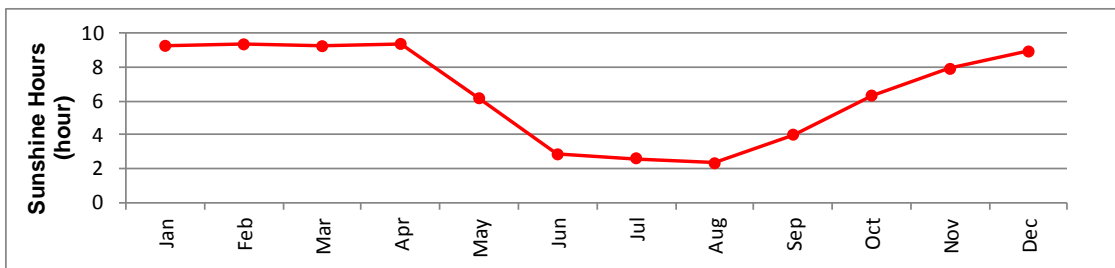
Note: 1984 is not available

Source: JICA Study Team based on the data from DMH, MOT

**Figure 2.1.7: Mean Monthly Evaporation at Kaba-aye (1981-2000)**

5) Sunshine Hours

Sunshine hours during December to April are approximately 8-10 hours a day, while that during June to August are approximately 2-3 hours a day due to monsoon rainy weather.



Source: JICA Study Team based on the data from DMH, MOT

**Figure 2.1.8: Mean Monthly Sunshine Hours at Kaba-aye (1977-2000)**

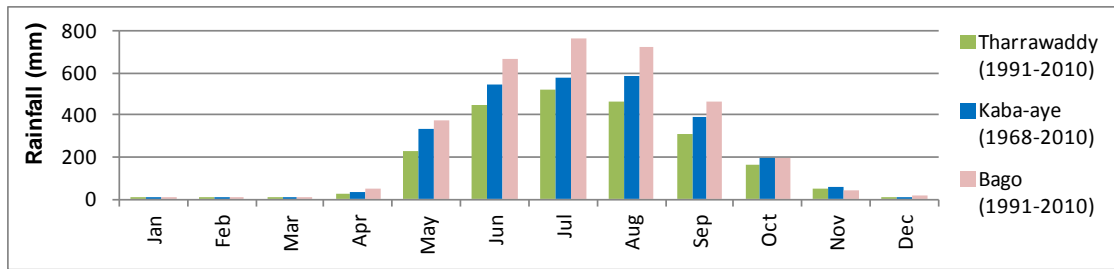
(3) Hydrology

1) Rainfall

(1) *Monthly Rainfall in and around the Greater Yangon*

The rainfall in Greater Yangon is observed at the Kaba-aye Meteorological Station, and rainfall data of other stations in and around the Planning Area are available from a few other sources including Irrigation Department, Ministry of Agriculture and Irrigation (ID, MOAI). In reference to these data, rainfall characteristics of the three stations; Kaba-aye, Bago, and Tharrawaddy were studied. The Bago Rainfall Station is located in Bago City, the Bago River basin and the Tharrawaddy Rainfall Station is located upstream of Hlain River, respectively. As shown in Figure 2.1.9, the mean monthly rainfall increases as it goes eastward.

At Kaba-aye Meteorological Station, mean annual rainfall is 2749 mm and maximum mean monthly rainfall is 591 mm in August and minimum mean monthly rainfall is 3 mm in January and February. Maximum annual rainfall was recorded as 3592 mm in 2007. Maximum monthly rainfall was 868 mm in August 1968 and minimum monthly rainfall was zero in the past several months. Mean annual rainfall in Bago is 3305 mm while that in Tharrawaddy is 2220 mm.



Source: JICA Study Team based on the data from Kaba-aye, Bago and Tharrawaddy stations

**Figure 2.1.9: Mean Monthly Rainfall in and around Greater Yangon**

(2) *Short Intensity Rainfall*

Table 2.1.2 shows probable rainfalls at Kaba-aye Meteorological Station which is derived from the rainfall intensity-duration-frequency relationships prepared by ID, MOAI. As shown in the table, rainfall in Greater Yangon is short in duration and intensity. Remarkably, 50-year probable 60-minute rainfall intensity exceeds 100 mm/hour. Such a high intensity of rainfall is a major cause of inundation problems in downtown Yangon.

**Table 2.1.2: Probable Rainfall Intensities at Kaba-aye Station**

Return Period Rainfall Intensity	5-yr	10-yr	20-yr	50-yr
60 minutes rainfall	63.5	71.1	78.7	104.6
75 minutes rainfall	52.1	63.9	69.9	77.5
2 hours rainfall	40.6	45.7	49.5	55.9

Source: Study on Drainage System of Mingalar Taung Nyunt Area, Nov. 2002, Fukken Co., Ltd.

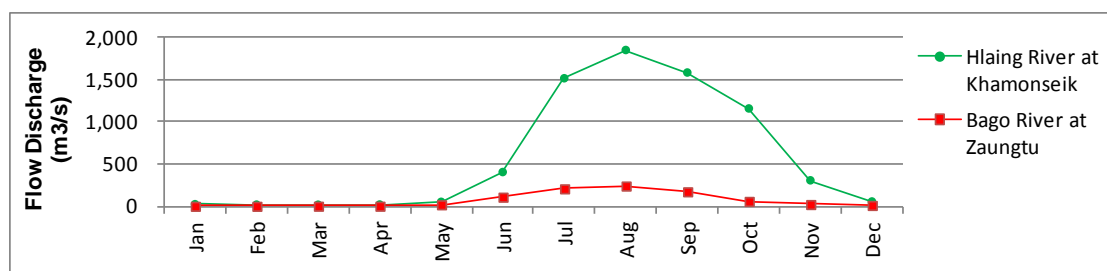
2) *River Flow Discharge*

River flow discharge is measured far upstream from Greater Yangon to avoid tidal effects. Tidal phenomenon makes it difficult to carry out precise discharge observations. Figure 2.1.10 shows mean monthly flow discharge of the Hlaing River at the Khamonseik Station and the Bago River at the Zaungtu Station, both of which are measured by DMH. Both Khamonseik and Zaungtu stations are located far upstream from the junction of the Yangon and Bago rivers, with the distance of approximately 300 km and approximately 200 km, respectively.

The Hlaing River flow discharge in Khamonseik is 1851 m<sup>3</sup>/s in August and 17 m<sup>3</sup>/s in March with a difference of about hundred times. The Bago River flow discharge in Zaungtu is 242 m<sup>3</sup>/s in August and 2 m<sup>3</sup>/s in January and February with a large difference. The maximum daily flow discharges in Khamonseik and in Zaungtu were recorded as 2752 m<sup>3</sup>/s in October 1997 and 1237 m<sup>3</sup>/s in July 1994, respectively.

Flow discharge at Nga Moeyeik Sluice Gate in Nga Moeyeik Creek was measured by ID, MOAI in 15<sup>th</sup> August 2012. This measurement point is located in East Dagon Township. Discharge measurements ranges from 200.8 m<sup>3</sup>/s and 225.8 m<sup>3</sup>/s. ID, MOAI conducted flow discharge measurement of the Kok Ko Wa River in late November 2012 based on a request from the JICA Study Team working on “The Project for the Improvement of Water Supply, Sewerage and Drainage System in Yangon City”. The result indicated that flow discharge of the Kok Ko Wa River was 1,941.4 m<sup>3</sup>/s at 11:00 in 24<sup>th</sup> November 2012. Comparing with the monthly discharge in November of the Hlaing River (834 m<sup>3</sup>/s in maximum, 49 m<sup>3</sup>/s in minimum and 306 m<sup>3</sup>/s in average), it can be said that flow discharge from the Kok Ko Wa River represent majority of flow discharge of the Yangon River. Flow discharge data of Pan Hlaing River and Twante Canal are not available according to ID, MOAI.





Source: JICA Study Team based on the data from DMH, MOT

**Figure 2.1.10: Mean Monthly Flow Discharge of the Hlaing and Bago Rivers (1987-2000)**

### 3) Tidal Conditions

Tidal information is available from the MPA although the tidal observations have not been carried out several years ago. Thus, the available information is based on past observation records at Yangon Port (Sule Pagoda Wharf, 16° 46' latitude and 96° 10' longitude) and the river mouth of Yangon River (Elephant point, 16° 30' latitude and 96° 18' longitude). As shown in Table 2.1.3, the highest high water level (HHWL) is +6.74 m and mean water level (MWL) is +3.121 m and ground elevation is normally indicated from MWL. Hence, it can be said that HHWL around Yangon Port is approximately +3.619 m on ground elevation basis.

Myanmar International Terminal Thilawa, a private firm operating the terminal, has observed tidal condition at the Thilawa Terminal for more than 16 years. According to their information, maximum water level was recorded during a storm in 2007 at +4.14 m, and Cyclone Nargis in May 2008 caused approximately 0.5 m higher than this, although the water level was not recorded. Reliability of the information cannot be confirmed. Reliable and continuous observation of tidal condition should be re-carried out by the MPA.

**Table 2.1.3: Tidal Features of Yangon Port (Sule Pagoda Wharf)**

Items	Tidal Height (m)	Observed Date
Highest High Water Level (HHWL)	+6.74	Sep. 1899
Mean Water Level (MWL)	+3.121	Up to 1936
Lowest Low Water Level at Bo Aung Kyaw Street Wharf	-0.24	Dec. 1902
Indian Spring Low Water Mark	+0.338	-

Source: MPA

### (4) Environmental Conditions

#### 1) Water Quality

Water quality standards in Myanmar are shown in Table 2.1.4.

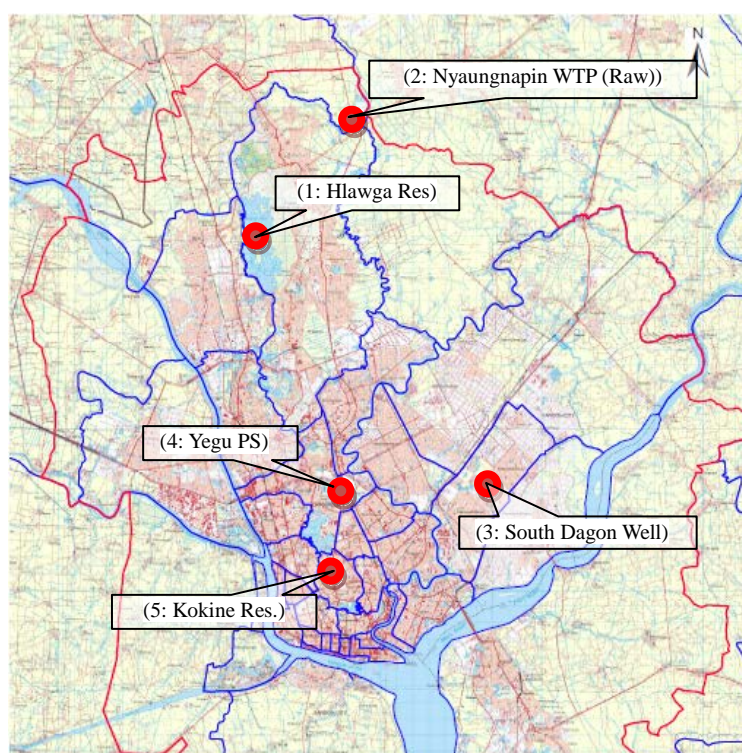
With regard to the water standard of Myanmar, the guidelines proposed in the workshops in 1990 and 2011(Draft), and the World Health Organization (WHO) Guideline were compared in the following table. Compared with 1990, the values for 2011 tended to be closer to the WHO Guideline. However, for copper and iron, the values are less strict than in the WHO Guideline.

**Table 2.1.4: Water Quality Standard in Myanmar**

No.	Parameters	Unit	Myanmar Standard		WHO Guideline
			1990	2011(Draft)	
1	pH	-	6.5-9.2	6.5-8.5	Preferably < 8.0
2	Turbidity	NTU	20	5	5
3	Colour	Pt-unit	6.5-9.2	15	15
4	Aluminum (Al)	mg/l	0.2	0.2	0.2
5	Arsenic (As)	mg/l	0.05	0.05	0.01
6	Calcium (Ca)	mg/l	75-200	100	-
7	Chloride (Cl)	mg/l	200-600	250	250
8	Copper (Cu)	mg/l	1.0	2.0	1.0
9	Cyanide (CN <sub>2</sub> )	mg/l	0.05	0.07	0.07
10	Hardness	mg/l	500	500	-
11	Iron (Fe)	mg/l	0.5-1.5	1	0.3
12	Manganese (Mn)	mg/l	0.3	0.3(0.1)	0.1
13	Lead (Pb)	mg/l	0.05	0.01	0.01
14	Magnesium (Mg)	mg/l	30-150	500	-
15	Nitrate (NO <sub>3</sub> )	mg/l	10 ( as N )	50	-
16	Sulfate	mg/l	400	250	250
17	Total dissolved solids	mg/l	1000	1000	1000
18	Zinc (Zn)	mg/l	5-15	3	3
19	Total Coliform	No/100ml	0	0	0
20	E. Coli	No/100ml	0	0	0

Source: The Study on the Improvement of Water Supply and Wastewater Treatment in Yangon (2012, METI, Japan)

In The Study on the Improvement of Water Supply and Wastewater Treatment in Yangon (2012, METI, Japan), the water quality survey was performed to determine the water quality condition. There are five sampling sites, as shown in Figure 2.1.11. The water quality result is shown in Table 2.1.5. Compared to WHO Guideline, although turbidity and total coliform show higher values, the other parameters were mostly lower.



Source: JICA Study Team based on The Study on the Improvement of Water Supply and Wastewater Treatment in Yangon (2012, METI, Japan)

**Figure 2.1.11: Locations Where Water Quality Samples were Taken**

**Table 2.1.5: Water Quality Results**

No.	Parameters	Unit	1	2	3	4	5	WHO Guideline
			Hlawge Res.	Nyaungnapin WTP (Raw)	South Dagon Well	Yegu PS	Kokine Res.	
1	pH		7.35	7.37	8.1	7.08	7.52	Preferably < 8.0
2	Turbidity	NTU	5	45	5	7.5	7.5	5
3	Colour	Pt-unit	<5.00	<5.00	<5.00	<5.00	<5.00	15
4	Aluminum (Al)	mg/l	<0.10	1	<0.10	1	<0.10	0.2
5	Arsenic (As)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	0.01
6	Calcium (Ca)	mg/l	5.2	7.2	16	6.8	5.6	-
7	Chloride (Cl)	mg/l	4.32	7.57	54.1	8.66	3.24	250
8	Copper (Cu)	mg/l	<1.00	<1.00	<1.00	<1.00	<1.00	1.0
9	Cyanide (CN <sub>2</sub> )	mg/l	-	-	-	-	-	0.07
10	Hardness	mg/l	33	52	84	38	38	-
11	Iron (Fe)	mg/l	0.01	0.5	0.4	0.1	0.1	0.3
12	Manganese (Mn)	mg/l	<0.10	<0.10	<0.10	<0.10	<0.10	0.1
13	Lead (Pb)	mg/l	<0.01	<0.01	<0.10	<0.01	<0.01	0.01
14	Magnesium (Mg)	mg/l	4.86	8.26	10.69	5.1	5.83	-
15	Nitrate (NO <sub>3</sub> )	mg/l	<0.10	<0.10	<0.10	<0.10	<0.10	-
16	Sulfate	mg/l	22.22	9.67	23.66	8.43	22.83	250
17	Total dissolved solids	mg/l	113.5	122.3	404.3	110	125.2	1000
18	Zinc (Zn)	mg/l	<1.00	<1.00	<1.00	<1.00	<1.00	3
19	Total Coliform	No/100ml	>16	>16	2.2	>16	>16	0
20	E. Coli	No/100ml	Isolated	Not isolated	Not isolated	Not isolated	Not isolated	0

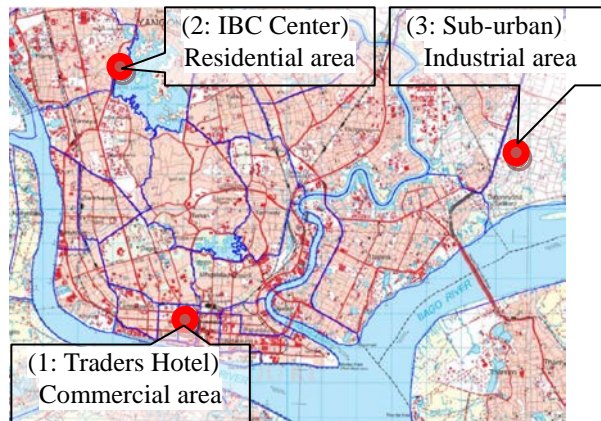
Source: The Study on the Improvement of Water Supply and Wastewater Treatment in Yangon (2012, METI, Japan)

## 2) Air Quality

In respect to ambient air quality, there is no air quality standard established in Myanmar for its own used. Therefore, relevant international guidelines (WHO Guideline, etc) and standards are used to compare the findings.

Ambient air quality measurements were conducted in relevant areas, i.e., commercial areas, residential areas, and nearby industrial zones in Yangon City in 2007-2008 and sub-urban areas located in the east of the city (in Dagon Myo Thit - South) in 2010-2011. The measured air quality data are comprehensive and the monitoring results showed air quality variations over a period of time.

Air quality monitoring was conducted in November 2008 in three selected sites in Yangon, i.e., commercial area, residential area, and an area near the industrial zone (Figure 2.1.12). The residential area does not generate much traffic and is located 1.8 km away from a traffic junction. The commercial area is located near some restaurants and traffic area. The area near the industrial zone does not generate much traffic, and is located 2.0 km away from the industrial zone. These air quality monitoring activities were the first initiative conducted in Myanmar. The 24-hour average concentrations of NO<sub>2</sub> and SO<sub>2</sub> levels in three selected sites are well below the WHO Guideline. The total suspended particulate matter (TSPM) and the particulate matter (PM<sub>10</sub>) at the three sites are higher than the WHO Guidelines. The 24-hour average concentration of TSPM and PM<sub>10</sub> in the industrial area showed a high value of about  $188.66 \pm 26.00 \mu\text{g}/\text{m}^3$  and  $136.92 \pm 24.90 \mu\text{g}/\text{m}^3$ , respectively. The main reason for a high dust level is due to fugitive dust mainly coming from local activities.



Source: JICA Study Team based on the data from the Environmental and Social Information Collection Survey, conducted for the Project for the Strategic Urban Development Plan of the Greater Yangon

**Figure 2.1.12: Locations Where Air Quality Samples were Taken**

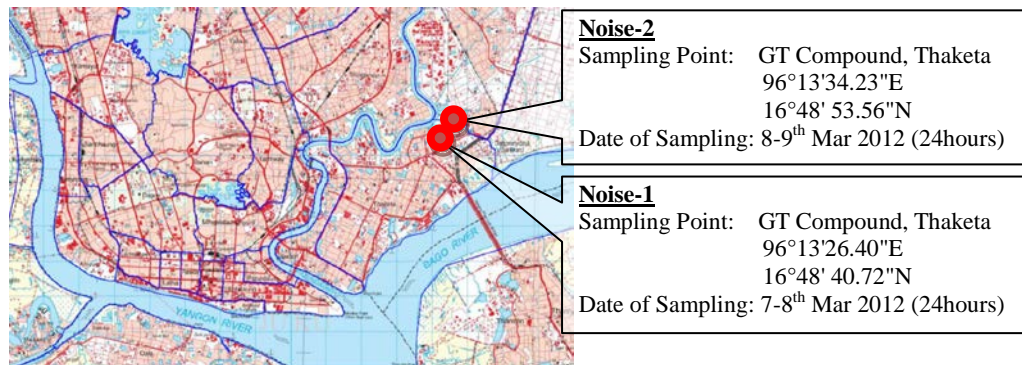
**Table 2.1.6: Air Quality Results**

Pollutant	Averaging Period	1. ( $\mu\text{g}/\text{m}^3$ )	2. ( $\mu\text{g}/\text{m}^3$ )	3. ( $\mu\text{g}/\text{m}^3$ )	Limit/Guideline Value/Standards ( $\mu\text{g}/\text{m}^3$ ) (24hr mean)
		(Commercial area)	(Residential area)	(Industrial area)	WHO (2005 updated)
NO <sub>2</sub>	24-hour	$22.23 \pm 1.54^a$ 23.53 <sup>b</sup> (19.16-24.00) <sup>c</sup>	$22.65 \pm 0.61^a$ 22.28 <sup>b</sup> (21.82-23.84) <sup>c</sup>	$22.88 \pm 3.17^a$ 25.42 <sup>b</sup> (16.58- 26.65) <sup>c</sup>	40 ( annual)
SO <sub>2</sub>	24-hour	$0.88 \pm 0.26^a$ 0.95 <sup>b</sup> (0.39-1.30) <sup>c</sup>	$1.21 \pm 0.32^a$ 1.24 <sup>b</sup> (1.14-1.25) <sup>c</sup>	$0.19 \pm 0.1^a$ 0.25 <sup>b</sup> (0-0.3) <sup>c</sup>	20
TSPM	24-hour	$143.21 \pm 27.37^a$ 152.32 <sup>b</sup> (91.91 -185.40) <sup>c</sup>	$118.70 \pm 11.06^a$ 111.1 <sup>b</sup> (104.51-140.5) <sup>c</sup>	$188.66 \pm 26.00^a$ 178.73 <sup>b</sup> (149.42 -237.82) <sup>c</sup>	100
PM <sub>10</sub>	24-hour	$71.75 \pm 12.64^a$ 73.66 <sup>b</sup> (48.97-92.62) <sup>c</sup>	$65.30 \pm 9.88^a$ 57.21 <sup>b</sup> (53.72-84.96) <sup>c</sup>	$136.92 \pm 24.9^a$ 118.01 <sup>b</sup> (106.48-186.26) <sup>c</sup>	50

A: Mean  $\pm$ Standard Error b: Median c: (Minimum- Maximum) Date of Sampling: November 2012  
Source: JICA Study Team based on the data from the Environmental and Social Information Collection Survey, conducted for the Project for the Strategic Urban Development Plan of the Greater Yangon

### 3) Noise

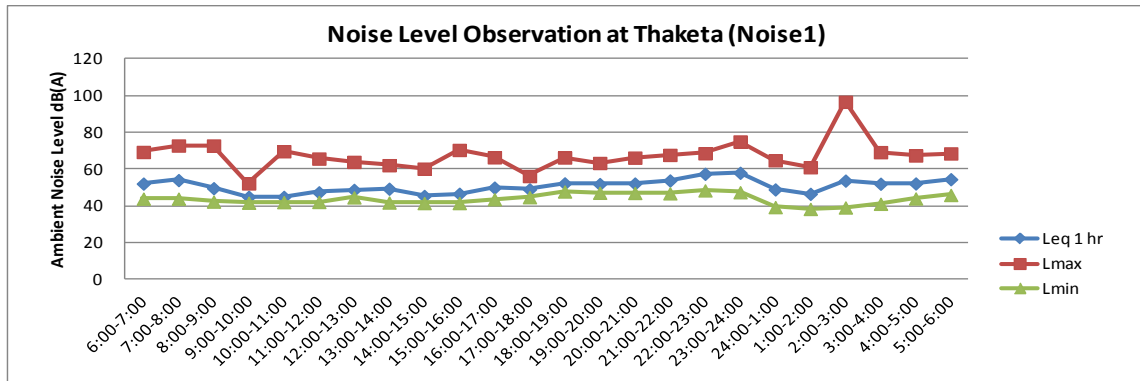
Noise levels were measured at the two points in eastern area of Yangon City in March 2012 (Figure 2.1.13). The survey area is located in a residential area, and there is limited traffic. The noise levels were recorded for 24 hours.



Source: JICA Study Team based on the data from the Environmental and Social Information Collection Survey, conducted for the Project for the Strategic Urban Development Plan of the Greater Yangon

**Figure 2.1.13: Locations Where Noise Level Samples were Measured**

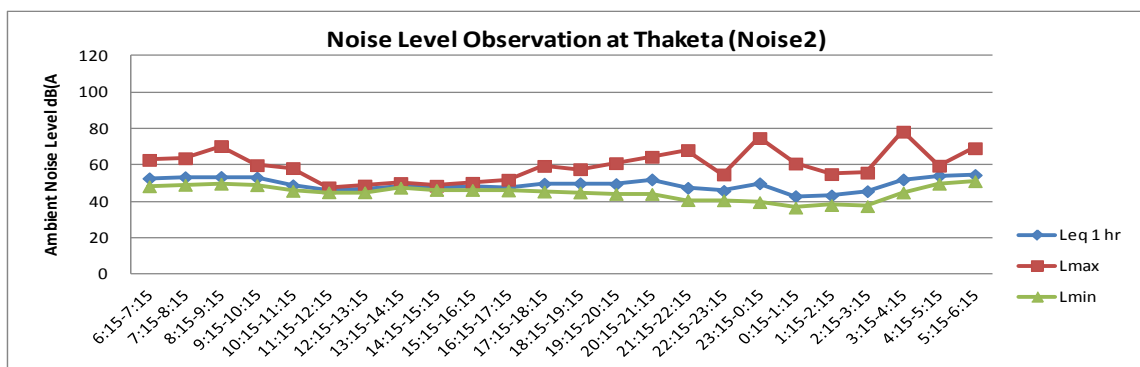
Figure 2.1.14 and 2.1.15 show the result of noise level observation at sampling point Noise 1 and Noise 2 respectively. The  $L_{eq}1hr$  values varied 45.06-58.16dB and 42.88-54.53 dB at Noise 1 and Noise 2 respectively. The  $L_{eq}24hr$  values were 50.81dB and 49.25dB respectively. As there is no available noise level standard established in Myanmar yet, referring to the WHO guideline value which is opened to the public (Table 2.1.7), the  $L_{eq}24hr$  values at the two locations didn't have much difference from the values of WHO guideline on residential area (outdoors), 50 (or 55) dB.



Date of Sampling: 7-8<sup>th</sup> Mar 2012

Source: JICA Study Team based on the data from the Environmental and Social Information Collection Survey, conducted for the Project on the Strategic Urban Development Plan of the Greater Yangon

**Figure 2.1.14: Noise Level Observation in Thaketa (Noise1)**



Date of Sampling: 8-9<sup>th</sup> Mar 2012

Source: JICA Study Team based on the data from Environmental and Social Information Collection Survey, conducted for the Project on the Strategic Urban Development Plan of the Greater Yangon

**Figure 2.1.15: Noise Level Observation in Thaketa (Noise2)**

**Table 2.1.7: Noise Guideline Value of WHO**

Environment Condition	Health Effects	LAeq (dB)	(hours)
Residential area (outdoors)	highly disamenity	55	16
	small disamenity (daytime, evening)	50	16
Residential area (indoor)	Conversation Interference (daytime, evening)	35	16
Commercial aria, Industrial area, roadside (indoor, outdoors)	Auditory Disorder	70	24

Source: JICA Study Team based on data from WHO

4) Ecosystem

● *Endangered species*

Myanmar has rich biological resources. Although the biodiversity inventory has not yet been completed in Myanmar, it is officially stated that there are 350 mammal species, 300 reptile species, 350 freshwater fish species, 800 butterfly species, 1035 bird species, and 9600 plant species in Myanmar. Among them, endangered species are recorded and reported to be 153 species (Table 2.1.8). In avifauna, five species in Myanmar are listed as critically endangered species, seven species are endangered species, and 37 species are vulnerable species. There are 38 plant species in Myanmar recorded as globally threatened. The major threat to globally threatened plant species in Myanmar is the degradation and/or loss of forest.






**Table 2.1.8: Threatened Species listed under IUCN Red List 2011**

Taxonomic Group	Critically Endangered	Endangered	Vulnerable	Total
Mammal	4	10	26	40
Bird	5	7	37	49
Reptile	6	13	6	25
Invertebrate	0	0	1	1
Plant	13	12	13	38
Total	28	42	83	153

Source: JICA Study Team based on the data from Environmental and Social Information Collection Survey, conducted for the Project on the Strategic Urban Development Plan of the Greater Yangon

Greater Yangon is recorded to have three threatened animal species and two threatened plant species as shown in Table 2.1.9. All these threatened species are also protected by the Forest Law in Myanmar.

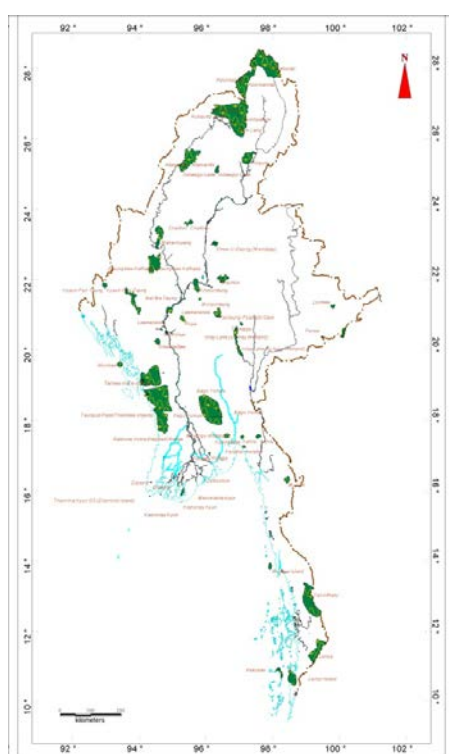
**Table 2.1.9: Animal and Flora Species Recorded as Threatened**

No.	Scientific name	Common name	Family	IUCN, 2011
1	<i>Lissemys punctata</i> 	Indian flap shell turtle	Trionychidae	Endangered
2	<i>Indotestudo elongate</i> 	Yellow tortoise	Testudinidae	Endangered
3	<i>Python molurus bivittatus</i> 	Burmese Python	Boidae	Endangered
4	<i>Dipterocarpus alatus</i> 	Kanyin-phyu	Dipterocarpaceae	Endangered
5	<i>Hopea odorata</i> 	Thin-gan	Dipterocarpaceae	Vulnerable

Source: JICA Study Team based on the data from Environmental and Social Information Collection Survey, conducted for the Project on the Strategic Urban Development Plan of the Greater Yangon

Picture: WIKIPEDIA The Free Encyclopedia

● Protected areas



In Myanmar the Protection of Wildlife, Wild Plants and Conservation of Natural Area Law was enacted in 1994. A target has been set to increase the protected area up to 5% in the short term, and 10% in the long term. There are at present 40 protected areas in Myanmar including wildlife and bird sanctuaries, national parks, and nature reserves (Figure 2.1.16, Table 2.1.10). Myanmar is also a Party to the Convention on International Trade in Endangered Species of Wild Fauna and Flora, and Ramsar Convention.

Source: JICA Study Team based on the data from the Environmental and Social Information Collection Survey conducted for the Project on the Strategic Urban Development Plan of the Greater Yangon

Figure 2.1.16: Protected Area (Wildlife Sanctuaries and National Parks) in Myanmar

Table 2.1.10: Protected Areas and Locations in Myanmar

No.	Name	General Location
1.	Pidaung Wildlife Sanctuary	Kachin State
2.	Shwe-U-Daung Wildlife Sanctuary	Mandalay Region
	Shwe-U-Daung Wildlife Sanctuary	Shan State
3.	Pyin-O-Lwin Bird Sanctuary	Mandalay Region
4.	Moscós Islands Wildlife Sanctuary	Taninthayi Region
5.	Kahilu Wildlife Sanctuary	Karen State
6.	Taunggyi Bird Sanctuary	Shan State
7.	Mulayit Wildlife Sanctuary	Karen State
8.	Wethtikan Bird Sanctuary	Magwe Region
9.	Shwesettaw Wildlife Sanctuary	Magwe Region
10.	Chatthin Wildlife Sanctuary	Sagaing Region
11.	Kelatha Wildlife Sanctuary	Mon State
12.	Thamihla Kyun Wildlife Sanctuary	Ayeyar-wady Region
13.	Htamanthi Wildlife Sanctuary	Sagaing Region
14.	Minwuntaung Wildlife Sanctuary	Sagaing Region
15.	Hlawga Park	Yangon Region
16.	Inlay Wetland Bird Sanctuary	Shan State
17.	Moeyongyi Wetland Bird Sanctuary	Bago Region
18.	Alaungdaw Kathapa National Park	Sagaing Region
19.	Popa Mountain Park	Mandalay Region
20.	Meinmahla Kyun Wildlife Sanctuary	Ayeyarwady Region
21.	Lampi Island Marine N. Park	Taninthary Region
22.	Hkakaborazi National Park	Kachin State
23.	Loimwe Protected Area	Shan State
24.	Parsar Protected Area	Shan State
25.	Natmataung National Park	Chin State
26.	Lawkananda Wildlife Sanctuary	Mandalay Region
27.	Indawgyi Wetland Wildlife Sanctuary	Kachin State

No.	Name	General Location
28.	Kyaikhtiyoe Wildlife Sanctuary	Mon State
29.	Minsontaung Wildlife Sanctuary	Mandalay Region
30.	Hukaung Valley Wildlife Sanctuary	Kachin State
31.	Kyauk Pan Taung Wildlife Sanctuary	Chin State
32.	Hponkanrazi Wildlife Sanctuary	Kachin State
33.	Rakhine Yoma Elephant Range	Rakhine State
34.	Panlaung-pyadalin Cave Wildlife Sanctuary	Shan State
35.	Maharmyaing Wildlife Sanctuary	Sagaing Region
36.	Lenya National Park	Taninthary Region
37.	Taninthary National Park	Taninthary Region
38.	Bumhpabum Wildlife Sanctuary	Kachin State
39.	Hukaung Valley Wildlife Sanctuary (extension)	Kachin State
40.	Taninthayi Nature Reserve	Taninthayi Region

Source: JICA Study Team based on the data from the Environmental and Social Information Collection Survey, conducted for the Project on the Strategic Urban Development Plan of the Greater Yangon



Source: JICA Study Team

**Figure 2.1.17: Hlawga Park in Greater Yangon Area**

The Hlawga Park (No.15 in Table 2.1.10) in Greater Yangon has an area of 2342 ha which is managed strictly as Watershed Protection Forest. Not everyone can enter the park without permission. Teaks and other trees are planted in the Hlawage Park every year.

The Hlawga Park has the objectives of providing environmental education facilities and protecting the forest and plant cover in the catchment area of the Hlawga Lake. It is situated in Mingaladon Township of the Yangon Region. The southern part of the park is the Hlawga Forest Reserve. According to a scientific report (Myanmar Protected Areas -Context, Current Status and Challenges), the site conserves three types of habitat, i.e., evergreen forests, mixed deciduous forests, and swamp forests. In all, there are 108 tree species identified. Barking deer, hog deer, and wild boar are the most common of the 12 mammal species.

#### (5) Legal Framework for Natural Environment

The Legal Framework for Natural Environment has been established in Myanmar. The Environmental Conservation Law has been enacted by the Union Hluttaw on 30<sup>th</sup> March 2012, and promulgated on 1<sup>st</sup> April 2012. The following table lists the contents of the Environmental Conservation Law. YCDC does not have particular provisions or ordinances for the environmental conservation.

**Table 2.1.11: Environmental Conservation Law (Promulgated by Union Hluttaw )**

Chapter	The Outline (Excerpt)
1: Title and Interpretation	This Law shall refer to as the Environmental Conservation Law.
2: Objectives	For implementation of Myanmar's National Environment Policy.
3: Organizing the Environment Conservation Committee	The Union government shall organize an Environment Conservation Committee, Republic of the Union of Myanmar, assigning the Union Minister of the Ministry of Environment as the Chairman and shall constitute appropriate members. In organizing the committee, the Vice-chairman, Secretary, and Joint-Secretary shall be assigned and designated to serve the task.
4: Obligations and authoritative right of the Ministry on Environment Conservation	In order for the Ministry of Environment to implement environment conservation effectively, the State, at the expense of budget fund under the head income of other sources, shall allocate fund in the State account on Environment Conservation in accordance with the Financial Rules and Regulations.



Chapter	The Outline (Excerpt)
5: Emergency Condition on Environment	The Committee, upon notice of an emergency condition that is occurring or may possibly occur across the nation or in certain region or state or in certain territory shall notify the occurrence and submit the matter immediately to the Union government.
6: Environment Quality and Specifications	The ministry under the agreement of the Union government and the committee, for the benefit of the public in accordance with the development of science and technology, or with the requirement of work may make amendments on the environment quality specifications in compliance with time and place.
7: Environmental Conservation	Under this item the following issues on environmental conservation were discussed: a) Using chemicals which may vividly jeopardize environment; b) Transporting polluted materials, hazardous materials, keeping under storage, application, processing and discarding at the industries; c) Discarding materials produced from metals, industrial mineral ores, raw materials, gem extraction, and processing; d) Discarding filthy, dirty, and wastage matters. e) Cleansing and processing; f) Implementation of development and construction; and g) Implementation of other required environmental pollution.
8: City Locality Environment Management	In taking up measures for City Locality Environment Management in accordance with the instructions and guidelines given by the committee, the ministry shall confer to government departments concerned, government organizations, private organizations, and private individuals on the matters requiring advice
9: Conservation of Natural Resources and Cultural Heritage	Under the existing law, the ministry shall cooperate with government departments concerned and government organizations on matters relating with prescribed cultural heritage; regions existing such heritage; cultural/monumental buildings and perpetuation of natural land and territories.
10: Advance Permit Issue	The ministry with the approval of the Union government may prescribe works requiring advance permit application that may jeopardize or endanger the environment quality, or worksites or factories and workshops.
11: Insurance	Party holding advance permit shall have to provide an insurance in accordance with the nature of work, worksite, factory or workshop under existing law to cover any accident jeopardizing the environment.
12: Restrictions	No party shall enter and execute the worksites, factory or workshops which require to apply advance permit in accordance with this law. No party shall violate any restriction provided under the Rules Notification, Orders, Directives, Board, Transport of Sales on certain products or materials which may jeopardize the environment and prohibited by the ministry.
13: Penalties and Punishments	If any party is find convicted of committing violation of Rules, Notifications, Orders, Directives or any restrictions provided in the procedures, corresponding punishment of imprisonment not more than one year or an appropriate fine or both may be imposed.
14: General	Government department concerned and government organization having the right to issue license, permit, or registration on those works, worksite, factory, or workshop, shall issue permit to those works holding advance permit.

Source: JICA Study Team based on the data from Environmental Conservation Law

## (6) Key Findings and Main Issues to be Addressed for Environmental Conditions

### 1) Topographic Features of Greater Yangon

Greater Yangon lies along the Yangon River, east of the Ayeyarwaddy River delta. Yangon City is located 34 km upstream from the river mouth of Yangon River, and has low hills in the central area running in a N-S direction with an average height of 30 m.

### 2) River System in and around the Greater Yangon

Yangon City is surrounded in the south, southeast and southwest by the Yangon, Hlaing and Bago rivers. The Nga Moeyeik Creek flows into the centre of Yangon City and changes its name to Pazyndaung Creek and penetrates the centre of the city to the Bago River. The river system of the western side of Greater Yangon is more complicated. A few tidal rivers, namely, the Kok Ko Wa River, the Pan Hlaing River and the Twante Canal flow into the Yangon River. Significant sedimentation can be observed at the junction of the Pan Hlaing River and Kok Ko

Wa River. Recently, main stream of the Upper Pan Hlaing River has been shifted directly to the Kok Ko Wa River instead to the Lower Pan Hlaing River.

3) Water Body in Greater Yangon

The largest water body is the Yangon River, which accounts for 27.80% of the total area, and is being managed by the Myanmar Port Authority (MPA). The second largest water body is the Bago River in Thanlyin Township with 13.82% of the total area. Both water bodies have saline water. In regard to inland waters, the Mingalardon Township, comprising Hlaw Ga Lake (the major source of water supply for Greater Yangon), accounts for 8.16% of the total area. Botahtaung, Dagon, and Pazundaung townships have 1.0-2.0 ha water body within each township. Botahtaung and Pazundaung townships are suffering from accumulated rainwater. One major cause of the problem might be the unavailability of water bodies such as lakes, rivers, etc., available in the area.

4) Climate

Generally, temperature in April is high, with a recorded maximum monthly temperature of 39.1°C in April 2001. Minimum monthly temperature was 13.8°C recorded in December 2004. The difference between the monthly maximum and monthly minimum temperature is more than 20°C from December through February and around 10°C from June through August, the peak season of monsoon rainfall.

5) Rainfall

The rainfall characteristics at the three stations, i.e., Kaba-aye, Bago, and Tharrawaddy were studied. The Bago Rainfall Station is located in Bago City. The Bago River basin and the Tharrawaddy Rainfall Station is located upstream of Hlain River. The mean monthly rainfall increases as it goes eastward. At Kaba-aye Meteorological Station, mean annual rainfall is 2749 mm and maximum mean monthly rainfall is 591 mm in August and minimum mean monthly rainfall is 3 mm in January and February. Maximum annual rainfall was recorded as 3592 mm in 2007. Maximum monthly rainfall was 868 mm in August 1968 and minimum monthly rainfall was zero in the past several months. Mean annual rainfall in Bago is 3305 mm and in Tharrawaddy is 2220 mm. The rainfall in Greater Yangon is short in duration and intensity. Remarkably, a 50-year probable 60-minute rainfall intensity exceeds 100 mm/hour. Such high intensity of rainfall is a major cause of inundation problems in downtown Yangon.

6) River Flow Discharge

The Hlaing River flow discharge in Khamonseik is 1851m<sup>3</sup>/s in August and 17m<sup>3</sup>/s in March with a difference of about hundreds times. The Bago River flow discharge in Zaungtu is 242m<sup>3</sup>/s in August and 2m<sup>3</sup>/s in January and February with a large difference. The maximum daily flow discharge in Khamonseik and Zaungtu were recorded as 2752m<sup>3</sup>/s in October 1997 and 1237m<sup>3</sup>/s in July 1994, respectively.

7) Tidal Conditions

The HHWL is +6.74m and MWL is +3.121m and ground elevation is normally indicated from MWL. Hence, it can be said that HHWL around Yangon Port is approximately +3.619m on ground elevation basis.

8) Water Quality

With regard to the water standard of Myanmar, the guidelines proposed in workshops held in 1990 and 2011(Draft) and the WHO Guideline were used for comparison. Compared with 1990, the value for 2011 tended to be closer to the WHO Guideline. The water quality survey (2012) was performed to determine the water quality condition. Compared to WHO Guideline, although turbidity and total coliform show higher values, the other parameters were mostly lower.

9) Air Quality

In respect to ambient air quality, there is no available air quality standard established in Myanmar for its own used. Therefore relevant international guidelines and standards were used to compare the findings. Air quality monitoring was conducted in November 2008 in three selected sites in Yangon commercial, residential, and near to industrial zone areas. These air quality monitoring activities were the first initiative conducted in Myanmar. The 24 hours average concentrations of NO<sub>2</sub> and SO<sub>2</sub> levels in three selected sites are well below the WHO Guideline. The TSPM and the PM<sub>10</sub> at the three sites are higher than the WHO Guidelines. The main reason for high dust level is due to fugitive dust mainly coming from local activities.

10) Noise

In respect to ambient noise levels, there is no such standard established in Myanmar yet . According to noise levels measured at two locations in eastern area of Yangon City in March 2012, the values didn't have much difference from the values of WHO guideline.

11) Ecosystem

There were 153 endangered species recorded and reported. Greater Yangon is recorded to have three threatened animal species and two threatened plant species. All these threatened species are also protected by the Forest Law in Myanmar. In Myanmar the Protection of Wildlife, Wild Plants and Conservation of Natural Area Law was enacted in 1994. At present, there are 40 protected areas in Myanmar including wildlife and bird sanctuaries, national parks, and nature reserves. The Hlawga Park in Greater Yangon has an area of 2342 ha which is managed strictly as watershed protection forest.

12) Legal Framework for Natural Environment

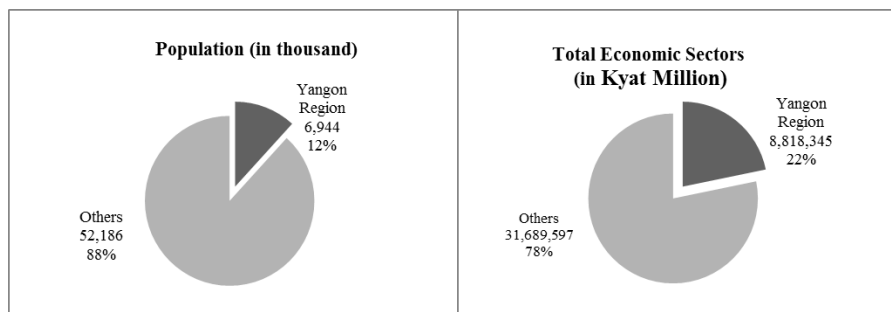
The Legal Framework for Natural Environment has been established in Myanmar. The Environmental Conservation Law that is declared publicly, has been enacted by the Union Hluttaw on 30<sup>th</sup> March 2012 and promulgated on 1<sup>st</sup> April 2012. Yangon City does not have particular provisions or ordinances for environmental conservation.

## 2.1.2 Socio-economy

The socioeconomic situation was reviewed to formulate the development vision and basic development policy of Greater Yangon. Quantitative analysis of the economic sectors in Myanmar and Yangon Region expressed numerically the contribution of the Yangon Region to the national economy. As a result, it is reasonable for Yangon to be referred to as “*Commercial and Industrial City*” instead of the popularly known image as “*Commercial City*”.

### (1) Socioeconomic Scale of Yangon Region

The Yangon Region had a population of 6,944,000 at the end of 2010-2011. It represented approximately 12% of the national population as shown in Figure 2.1.18. As for the economic scale, the net production value of the Yangon Region was MMK 8,818,345 million in 2010-2011, accounting for approximately 22% of the country’s gross domestic product (GDP). For this reason, Yangon is referred to as “*the Economic Center of Myanmar*”.



Source: JICA Study Team based on the data obtained from the Planning Department, Ministry of National Planning and Economic Development (MNPED) (2010-2011)

**Figure 2.1.18: Economic Scale of the Yangon Region**

### (2) Population

In particular, the Yangon City Development Committee (YCDC) has experienced rapid population growth in the past decade. The average growth rate of population in Yangon City between 1998 and 2011 is 2.58% annually.

In addition, the Planning Area, named, *the Greater Yangon*, is composed of Yangon City plus the ‘Periphery Area’ consisting of some areas of six townships in its outskirts, e.g., Kyauktan, Thanlyin, Hlegu, Hmawbi, Htantabin, and Twantay.

The following table gives the data of Yangon City’s population by township in 1998 and 2011 provided by the YCDC, and the population data of Periphery Area by township in 2011. These data were estimated by the JICA Study Team based on the population data obtained from the YCDC. Furthermore, the population data of Yangon City and Periphery Area are defined as a baseline through this study. The baseline data may preclude some unregistered population.

There are a total of 33 townships in Yangon City, and there are seven township groups, e.g., the Central Business District (CBD), Inner Urban Ring, South of CBD, Older Suburbs Zone, Outer Ring Zone, Northern Suburbs, and New Suburbs Zone. The annual average growth rate in Yangon City was 2.58% from 1998 to 2011. The yearly population growth rate of ‘Northern Suburbs Zone’ alone is 2.36%. Other’s population growth rate varies due to different factors, e.g., land price, density, infrastructure development, and so on.

The JICA Study Team estimated the population of the Periphery Area to be 430,144. The population scale of the Periphery Area is less than 10% of Yangon City, which has 5.14 million population. Meanwhile, the land area of the 'Periphery Area' is almost the same as Yangon City. The population of Greater Yangon (the planning area) is 5.57 million in 2011, and Kyauktan Township occupies more than 40% of the total population of the Periphery Area.

**Table 2.1.12: Population by Township**

	Township	Population		Av. Annual Growth (%) 1998-2011	Area (km <sup>2</sup> )
		1998	2011		
1	Latha	32,535	34,125	0.37%	0.60
2	Lanmadaw	40,597	43,137	0.47%	1.31
3	Pabedan	47,461	37,551	-1.79%	0.62
4	Kyauktada	44,076	34,797	-1.80%	0.70
5	Botahtaung	52,653	49,134	-0.53%	2.60
6	Pazundaung	38,363	53,648	2.61%	1.07
CBD		255,685	252,391	-0.10%	6.91
7	Ahlone	43,569	65,510	3.19%	3.38
8	Kyee Myin Daing	87,491	115,841	2.18%	4.46
9	Sanchaung	78,788	105,208	2.25%	2.40
10	Dagon	39,967	24,492	-3.70%	4.89
11	Bahan	95,114	100,695	0.44%	8.47
12	Tarmwe	128,455	191,114	3.10%	4.99
13	Mingalar Taung Nyunt	109,796	155,767	2.73%	4.94
14	Seikkan	1,379	2,241	3.81%	1.17
15	Dawbon	79,582	87,284	0.71%	3.11
Inner Urban Ring		689,081	778,156	0.94%	49.42
16	Kamaryut	82,943	87,881	0.45%	6.47
17	Hlaing	167,881	151,014	-0.81%	9.82
18	Yankin	107,195	125,909	1.25%	4.79
19	Thingangyun	240,417	231,621	-0.29%	13.12
Outer Ring		598,436	596,426	-0.03%	34.20
20	Mayangone	183,024	205,403	0.89%	25.83
21	Insein	240,704	311,200	2.00%	31.40
22	Mingalardon	170,950	288,858	4.12%	127.96
Northern Suburbs		102,822	219,512	6.01%	110.51
23	North Okkalapa	189,068	333,484	4.46%	27.76
24	South Okkalapa	220,214	191,388	-1.07%	8.22
25	Thaketa	279,799	253,284	-0.76%	13.45
Older Suburbs		664,141	848,153	1.90%	37.83
26	Dala	77,236	181,087	6.77%	98.41
27	Seikyikhanaungto	25,586	38,425	3.18%	12.10
South of CBD		594,678	805,461	2.36%	185.19
28	Shwe Pyi Thar	172,377	295,993	4.25%	52.69
29	Hlaing Tharyar	199,190	488,768	7.15%	77.61
30	North Dagon	101,673	221,200	6.16%	24.18
31	South Dagon	140,387	370,403	7.75%	37.51
32	East Dagon	55,192	145,505	7.74%	170.87
33	Dagon Seikkan	18,279	120,161	15.59%	42.04
New Suburbs		687,098	1,642,030	6.93%	404.90
Yangon City Total		3,691,941	5,142,128	2.58%	828.96
34	Some parts of Kyauktan	-	48,473	-	76.12
35	Some parts of Thanlyin	-	181,959	-	254.85
36	Some parts of Hlegu	-	50,793	-	101.00
37	Some parts of Hmawbi	-	83,719	-	84.23
38	Some parts of Htantabin	-	40,234	-	81.77
39	Some parts of Twantay	-	24,936	-	107.86
Periphery Area		-	430,114	-	706.83
Greater Yangon Total		-	5,572,242	-	1,534.89

Source: JICA Study Team estimates are based on the population and area data from YCDC

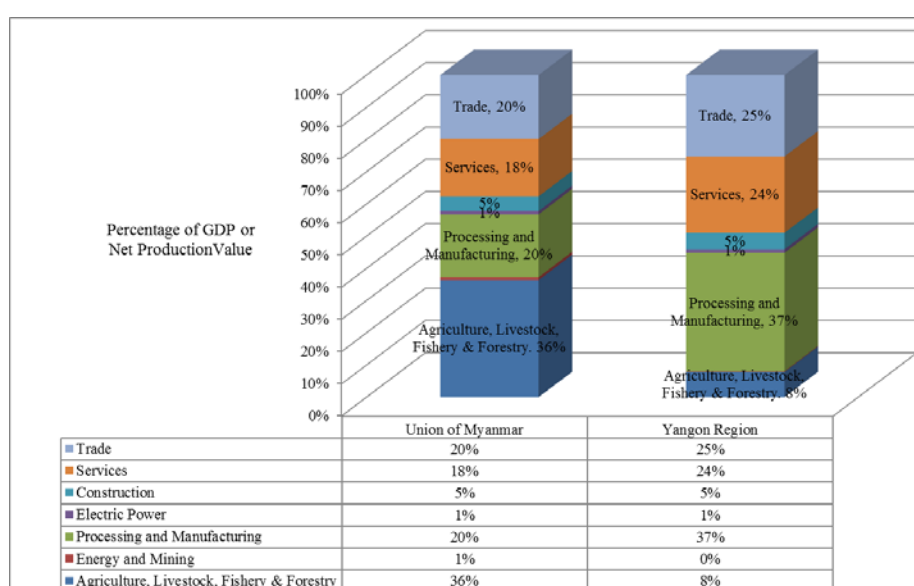
### (3) Industrial Structure in Yangon Region

Figure 2.1.19 compares the industrial structure in the Yangon Region with that of Myanmar on the basis of GDP in 2010-2011.

The industrial structure in Myanmar comprised the agriculture, livestock, fishery, and forestry sectors (36%); trade sector (20%); process and manufacturing sector (20%); and services sector (18%). Meanwhile, the industrial structure in Yangon Region composed of the processing and manufacturing sector (37%); trade sector (25%); and services sector (24%). The agriculture, livestock, fishery, and forestry sector accounted only 8% of the total production value.

Yangon heavily leans towards manufacturing industries. It is quite different from Myanmar's industrial structure that is concentrated on agriculture, livestock, fishery, and forestry.

It is thus reasonable to refer Yangon as the "Commercial and Industrial City" rather than a "Commercial City", judging from the present industrial structure.



Source: JICA Study Team based on the data from the Planning Department, MNPED (2010-2011)

**Figure 2.1.19: Industrial Structure in Myanmar and Yangon Region**

### (4) Labor Force

The JICA Study Team obtained labor force data by township, as well as population data by township. However, both data differ as regards to the total amount of YCDC population, hence the labor force data need to be adjusted. The following table indicates the adjusted data of the labor force by township and township group.

**Table 2.1.13: Labor Force by Township Group**

Township	Population	Primary Industry	Secondary Industry	Tertiary Industry	Extempore	Total Workers	Non-Worker
CBD	252,391	0	8,042	97,637	12,618	118,297	134,094
	-	0.0%	3.2%	38.7%	5.0%	46.9%	53.1%
Inner Urban Ring	848,153	915	11,258	490,709	128,323	631,205	216,948
	-	0.1%	1.3%	57.9%	15.1%	74.4%	25.6%
Outer Ring	596,426	6,369	1,853	232,902	24,340	265,464	330,962
	-	1.1%	0.3%	39.0%	4.1%	44.5%	55.5%
Northern Suburbs	805,461	1,003	18,191	252,291	104,341	375,826	429,635
	-	0.1%	2.3%	31.3%	13.0%	46.7%	53.3%

Township	Population	Primary Industry	Secondary Industry	Tertiary Industry	Extempore	Total Workers	Non-Worker
Older Suburbs	778,156	388	52,996	373,188	133,229	559,800	218,356
	-	0.0%	6.8%	48.0%	17.1%	71.9%	28.1%
South of CBD	219,512	0	2,557	25,103	57,989	85,649	133,863
	-	0.0%	1.2%	11.4%	26.4%	39.0%	61.0%
New Suburbs	1,642,030	33,999	95,165	306,467	140,105	575,735	1,066,295
	-	2.1%	5.8%	18.7%	8.5%	35.1%	64.9%
Total	5,142,128	42,674	190,062	1,778,298	600,944	2,611,977	2,530,152
	-	0.8%	3.7%	34.6%	11.7%	50.8%	49.2%

Note: 'Non worker' consists of infant, pregnant woman, aged people, student, jobless worker, etc.

Source: JICA Study Team estimates are based on the labor force data obtained from the General Administration Department of Yangon Region Parliament

**Table 2.1.14: Labor Force by Township**

Township	Population	Primary Industry	Secondary Industry	Tertiary Industry	Extempore	Total Workers	Working ratio	Non-worker	
1	Latha	34,125	0	293	8,449	533	9,275	27.2%	24,850
2	Lanmadaw	43,137	0	3,737	29,300	1,495	34,532	80.1%	8,605
3	Pabedan	37,551	0	256	2,119	1,714	4,089	10.9%	33,462
4	Kyauktada	34,797	0	1,281	15,555	3,046	19,882	57.1%	14,915
5	Bothtaung	49,134	0	569	21,504	2,918	24,992	50.9%	24,142
6	Pazundaung	53,648	0	2,264	21,749	2,789	26,803	50.0%	26,845
CBD		252,391	0	8,042	97,637	12,618	118,297	46.9%	134,094
7	Ahlone	65,510	0	2,065	37,440	2,065	41,569	63.5%	23,941
8	Kyee Myin Daing	115,841	520	1,516	66,613	19,090	87,739	75.7%	28,102
9	Sanchaung	105,208	0	1,003	95,169	1,245	97,417	92.6%	7,791
10	Dagon	24,492	102	518	15,308	381	16,308	66.6%	8,184
11	Bahan	100,695	0	3,687	35,030	22,493	61,210	60.8%	39,485
12	Tarmwe	191,114	0	4,508	112,711	54,209	171,428	89.7%	19,686
13	Mingalar Taung Nyunt	155,767	0	2,158	87,997	23,892	114,047	73.2%	41,720
14	Seikkan	2,241	41	10	1,755	248	2,055	91.7%	186
15	Dawbon	87,284	126	1,894	32,302	27,469	61,792	70.8%	25,492
Inner Urban Ring		778,156	388	52,996	373,188	133,229	559,800	71.9%	218,356
16	Kamaryut	87,881	0	85	68,387	2,832	71,304	81.1%	16,577
17	Hlaing	151,014	39	380	18,681	2,090	21,190	14.0%	129,824
18	Yankin	125,909	0	0	48,278	4,943	53,221	42.3%	72,688
19	Thingangyun	231,621	5,674	1,213	103,600	14,270	124,757	53.9%	106,864
Outer Ring		596,426	6,369	1,853	232,902	24,340	265,464	44.5%	330,962
20	Mayangone	205,403	213	146	51,146	51,196	102,702	50.0%	102,702
21	Insein	311,200	117	1,876	156,816	11,165	169,974	54.6%	141,226
22	Mingalardon	288,858	680	16,020	40,867	45,122	102,690	35.6%	186,168
Northern Suburbs		219,512	0	2,557	25,103	57,989	85,649	39.0%	133,863
23	North Okkalapa	333,484	482	418	250,926	48,795	300,621	90.1%	32,863
24	South Okkalapa	191,388	0	436	73,303	5,329	79,067	41.3%	112,321
25	Thaketa	253,284	56	40,916	92,423	74,159	207,553	81.9%	45,731
Older Suburbs		848,153	915	11,258	490,709	128,323	631,205	74.4%	216,948
26	Dala	181,087	238	1,858	21,085	43,759	66,941	37.0%	114,146
27	Seikgyikhanaungto	38,425	148	697	3,969	14,177	18,991	49.4%	19,434
South of CBD		805,461	1,003	18,191	252,291	104,341	375,826	46.7%	429,635
28	Shwe Pyi Thar	295,993	5,382	944	68,066	50,189	124,582	42.1%	171,411
29	Hlaing Tharyar	488,768	10,451	66,406	19,510	4,414	100,781	20.6%	387,987
30	North Dagon	221,200	61	2,826	61,211	5,633	69,731	31.5%	151,469
31	South Dagon	370,403	11,335	20,111	88,570	65,129	185,145	50.0%	185,258
32	East Dagon	145,505	3,549	3,317	46,675	9,264	62,805	43.2%	82,700
33	Dagon Seikkan	120,161	5,659	0	31,416	16,905	53,980	44.9%	66,181
New Suburbs		1,642,030	33,999	95,165	306,467	140,105	575,735	35.1%	1,066,295
Total		5,142,128	42,674	190,062	1,778,298	600,944	2,611,977	50.8%	2,530,152

Source: JICA Study Team estimates are based on the labor force data obtained from the General Administration Department of Yangon Region Parliament.

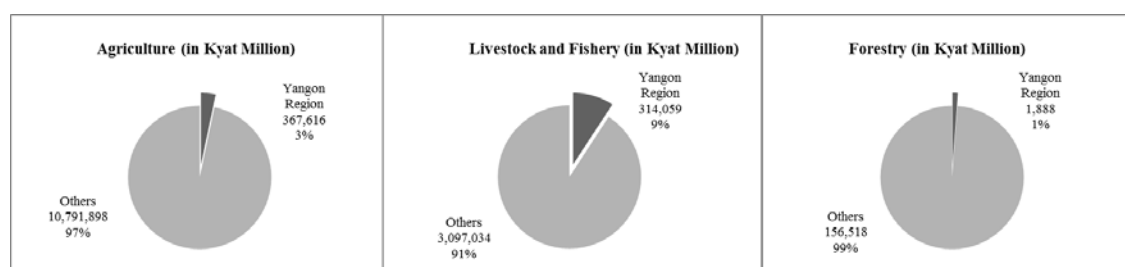
(5) Present Condition of the Economic Sectors

1) Agriculture, Fishery and Forestry Sectors

As described above, the agriculture, fishery and forestry sectors contribute largely to the country, representing 36% of the national economy in 2010-2011.

Figure 2.1.20 shows the contribution ratio of the Yangon Region to the national net production values of the agriculture, livestock, fishery and forestry sectors based on the data in 2010-2011.

The contribution ratio of the Yangon Region is very small in these sectors, e.g., 3% in the agriculture sector, 9% in the livestock and fishery sector, and 1% in the forestry sector.



Source: JICA Study Team based on the data from the Planning Department, MNPED (2010-2011)

**Figure 2.1.20: Contribution Ratios of the Yangon Region in the Agriculture, Livestock, Fishery, and Forestry Sectors**

In fact, agriculture production is not so extensive in the Yangon Region. Table 2.1.15 shows the ranking in the sowing acreage of paddy, medical plants, coconut, fruits, and vegetable in 2009-2010, which were produced in the Yangon Region in relatively large degree.

As for paddy cultivation in terms of sowing acreage, the largest is Ayeyarwady (25% of the country), followed by Bago (18%), and Sagaing (11%). The Yangon Region was ranked fifth (7% of the country).

On the other hand, there are little or no sowing acreage of wheat, maize, pulses, oilseeds, tobacco, tea, coffee, and cotton in the Yangon Region.

In the Yangon Region, a total land area of more than 5600 km<sup>2</sup> was used for sowing paddy; and a total land area of about 880 km<sup>2</sup> was used for sowing other crops such as fruits, vegetables, rubber, oilseeds, coconut, sugarcane, pulses, and medicinal plants in 2009-2010 according to statistical data from the Settlement and Land Records Department at the Ministry of Agriculture and Irrigation.

**Table 2.1.15: State/Region Ranking in Sowing Acreage of Crops (2009-2010)**

Crop	1 <sup>st</sup> Ranking	2 <sup>nd</sup> Ranking	3 <sup>rd</sup> Ranking	Yangon Region
Paddy	Ayeyarwady (25%)	Bago (18%)	Sagaing (11%)	5 <sup>th</sup> Ranking (7%)
Medicinal plants	Mandalay (38%)	Yangon (21%)	Sagaing (13%)	2 <sup>nd</sup> Ranking (21%)
Coconut	Ayeyarwady (47%)	Rakhine (10%)	Tanintharyi (10%)	5 <sup>th</sup> Ranking (7%)
Fruits	Tanintharyi (18%)	Ayeyarwady (16%)	Bago (14%)	7 <sup>th</sup> Ranking (6%)
Vegetables	Sagaing (16%)	Shan (16%)	Bago (10%)	9 <sup>th</sup> Ranking (4%)

Note: Percentage in ( ) is the distribution rate for each state or region.

Source: YCDC and JICA Study Team based on the data from Settlement and Land Records Department, MOAI

As shown in Table 2.1.16, Yangon Region was ranked third for fish and prawns production, accounted for 9% in 2009-2010.



**Table 2.1.16: State/Region Ranking in Fish and Prawns Production (2009-2010)**

1 <sup>st</sup> Ranking	2 <sup>nd</sup> Ranking	3 <sup>rd</sup> Ranking
Ayeyarwady (37%)	Tanintharyi (28%)	Yangon (9%)

Note: Percentage in ( ) is the distribution rate for each state or region.

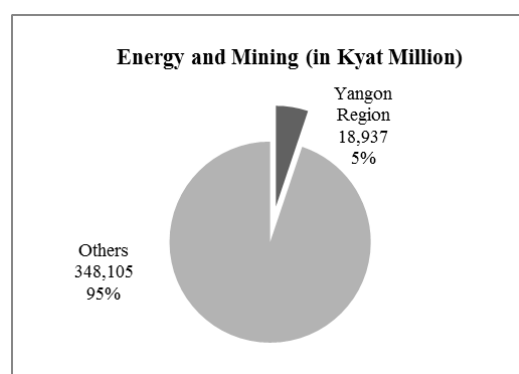
Source: YCDC and JICA Study Team based on the data from Department of Fisheries

Myanmar is filled with forest, but the Yangon Region has a quite low profile in forest resource. Teak and hardwood logs are export articles. These logs were extracted mainly from Sagaing (31% of the country), Bago (21%), and Shan (13%) in 2009-2010, according to the statistical data of Myanmar Timber Enterprise.

## 2) Energy and Mining Sector

As described above, the energy and mining sector has only 1% contribution in the national economy in 2010-2011.

Figure 2.1.21 shows the contribution ratio of the Yangon Region to the national net production values of the energy and mining sector based on the statistical data in 2010-2011. The contribution ratio of the Yangon Region was only 5% in this sector.



Source: JICA Study Team based on the data from the Planning Department, MNPED (2010-2011)

**Figure 2.1.21: Contribution Ratio of the Yangon Region in the Energy and Mining Sector**

Myanmar is richly endowed with natural gas resource. Natural gas is produced mainly at Yadana and Yetagun gas fields in the Gulf of Martaban or in the sea area of Tanintharyi at present. It is exported to Thailand in large volumes. Besides, 15% of the natural gas produced at Yadana gas field is supplied to domestic users through a pipeline. Main natural gas users in the Yangon Region are four gas-fired power stations located in Hlawagar, Yawma, Ahlone, and Thaketa; and CNG<sup>1</sup> fuel-based city buses and taxis. Due to the shortage of domestic natural gas supply, gas-fired power stations are obliged to operate at low utilization rates.

One of the four Myanmar's oil refineries is located in Thanlyin Township of the Yangon Region. It is operated at low utilization rate, due to shortage of crude oil supply. About half of demanded petroleum products relied on imports from foreign countries.

Myanmar has produced and exported mineral resources such as copper, lead, silver, zinc concentrate, tin, tin concentrate, tin/tungsten concentrate, and coal. Besides, it has gold, iron ore, limestone, industrial minerals, and barite, which are produced and consumed in the country. Jade and gems including ruby and sapphire are also important export articles. Mines

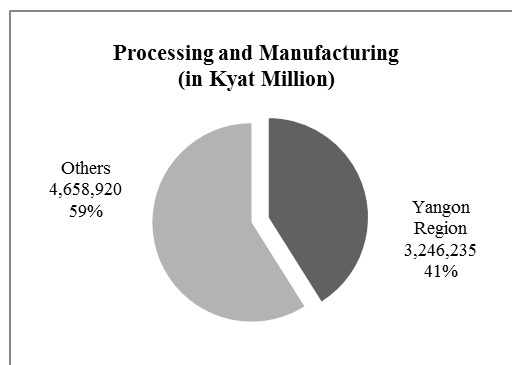
<sup>1</sup> CNG means Compressed Natural Gas. Up to June 2008, there were 39 CNG filling stations in Yangon Region out of 44 stations in the country.

of these mineral resources are distributed in Kachin, Kayah, Kayin, Mon, Shan, Sagaing, Tanintharyi, Bago, Magwe and Mandalay; however, not in the Yangon Region.

3) Processing and Manufacturing Sector

The processing and manufacturing sector accounted for 20% of the national economy in 2010-2011, as described above.

Figure 2.1.22 shows the contribution ratio of the Yangon Region to the national net production values of the processing and manufacturing sector based on the data in 2010-2011. The Yangon Region largely contributed to the processing and manufacturing sector in the country by 41% which is the largest in all economic sectors.



Source: JICA Study Team based on the data from the Planning Department, MNPED (2010-2011)

**Figure 2.1.22: Contribution Ratio of the Yangon Region in the Processing and Manufacturing Sector**

According to the data from Yangon Regional Office of the Planning Department, Ministry of National Planning and Economic Development (MNPED), there are a total of 15,089 factories or workshops in Yangon Region in 2010-2011, composed of 111 state-owned, 66 cooperative-owned, and 14,912 private-owned.

In the 39 townships, where the Planning Area is included, there are 13,582 factories or workshops. These are categorized into eight zones and 39 townships as shown in Table 2.1.17. As for the six townships outside Yangon City, only a part of the township area is in the Planning Area. Therefore, the number of factories/workshops in the Planning Area must be less than those in the 39 townships. By zone, New Suburbs Zone is the most industrialized zone with 3685 factories or workshops (27% of the 39 townships), followed by Northern Suburbs Zone with 1428 factories or workshops (11%), Older Suburbs Zone with 1749 factories or workshops (13%), and Outside Yangon City with 1697 factories or workshops (12%)<sup>2</sup>. Besides, Inner Urban Ring Zone has 2543 factories or workshops (19%).

<sup>2</sup> Only a part of these factories/workshops are included in the Planning Area.

**Table 2.1.17: Distribution of Industrial Zone and Factory/Workshop in the 39 Townships (2011-2012)**

No.	Township	Factory & Workshop	No.	Township	Factory & Workshop
1	Latha	128	23	North Okkalapa	686
2	Lanmadaw	129	24	South Okkalapa	707
3	Pabedan	301	25	Thaketa	356
4	Kyauktada	216	Older Suburbs		1,749
5	Botahtaung	125	26	Dala	232
6	Pazundaung	203	27	Seikgyikhanaungto	65
CBD		1,102	South of CBD		297
7	Ahlone	173	28	Shwe Pyi Thar	299
8	Kyee Myin Daing	296	29	Hlaing Tharyar	868
9	Sanchaung	376	30	North Dagon	328
10	Dagon	244	31	South Dagon	1,423
11	Bahan	142	32	East Dagon	416
12	Tarmwe	852	33	Dagon Seikkan	351
13	Mingalar Taung Nyunt	340	New Suburbs Zone		3,685
14	Seikkan	3	34	Kyauktan	271
15	Dawbon	117	35	Thanlyin	278
Inner Urban Ring		2,543	36	Hlegu	344
16	Kamaryut	99	37	Hmawbi	221
17	Hlaing	470	38	Htantabin	192
18	Yankin	120	39	Twantay	391
19	Thingangyun	392	Periphery Area		1,697
Outer Ring		1,081	Grand Total		13,582
20	Mayangone	548			
21	Insein	421			
22	Mingalardon				
Northern Suburbs		1,428			

Source: JICA Study Team based on the data from the Yangon Regional Office of Planning Department, MNPED

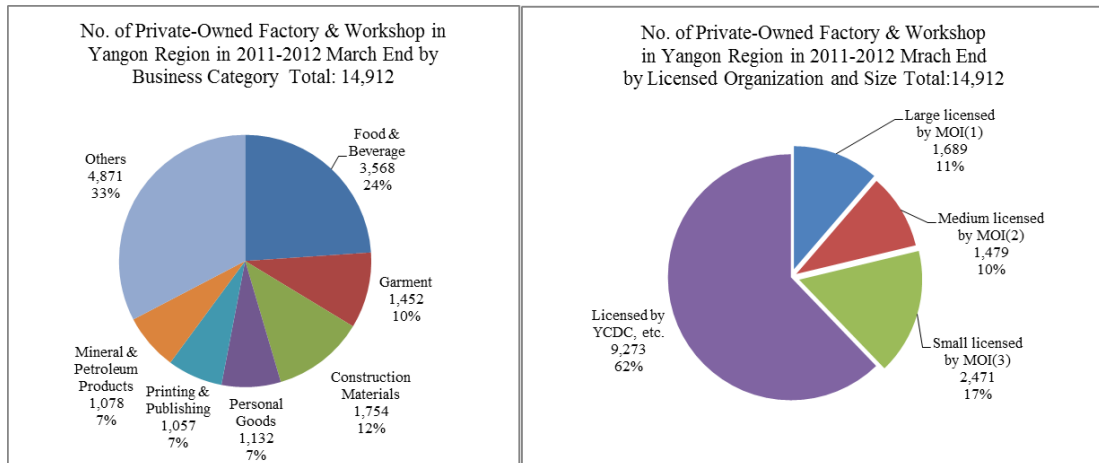
Figure 2.1.23 shows the 14,912 private-owned factories or workshops in the Yangon Region (as of the end of 2011-2012) by business category and by size.

By business category, the food and beverage is the largest category accounted for 24%, followed by construction materials (12%), and garment (10%).

Out of 14,912 private-owned factories or workshops in the Yangon Region, 5639 are supervised by the Directorate of Industrial Supervision and Inspection, Ministry of Industry (1) These factories are categorized into large-sized (1689), medium-sized (1479), and small-sized (2471)<sup>3</sup>. The remaining 9273 factories or workshops are mostly supervised by the YCDC.

Since the YCDC supervises only small businesses in Yangon City, the factories or workshops supervised by the YCDC are added to small-sized category. As a result, the large-, medium-, and small-sized factories or workshops are ,689 (11%), 1479 (10%), and 11,754 (79%), respectively.

<sup>3</sup> Definition of large- medium- and small-sized factories is being checked.



Source: JICA Study Team based on the data from the Planning Department, MNPED (2010-2011)

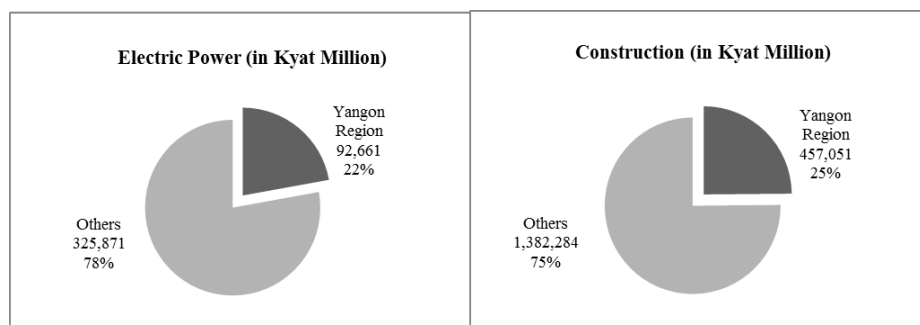
**Figure 2.1.23: Private-owned Factory and Workshop in the Yangon Region by Business Category and Size**

#### 4) Electric Power and Construction Sectors

The electric power and construction sectors accounted for 1% and 5% of the national economy, respectively in 2010-2011.

Figure 2.1.24 shows the contribution ratio of the Yangon Region to the national net production values of the electric power and construction sectors based on the statistical data in 2010-2011.

The contribution ratio of Yangon Region was 22% in the electric power sector, and 25% in the construction sector.



Source: JICA Study Team based on the data from the Planning Department, MNPED (2010-2011)

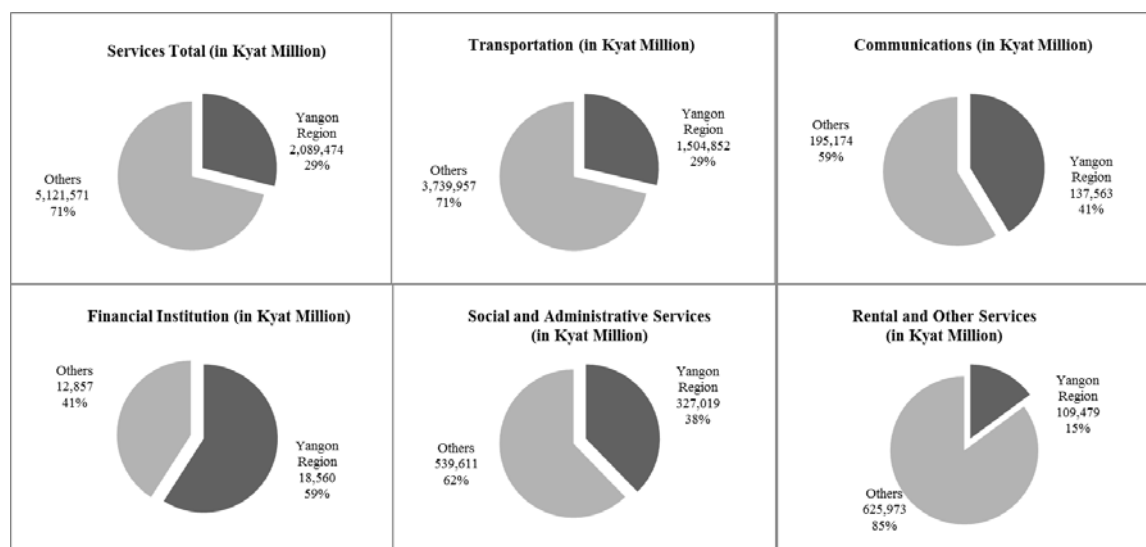
**Figure 2.1.24: Contribution Ratio of the Yangon Region in the Electric Power and Construction Sectors**

#### 5) Service Sector

As described above, the service sector accounted for 17.8% of the national economy in 2010-2011, composed of transportation (12.9%); communications (0.8%); financial institution (0.1%); social and administrative services (2.1%); and rental and other services (1.8%).

Figure 2.1.25 shows the contribution ratio of the Yangon Region to the national net production values of the total service sector, transportation sector, communications sector, financial institution sector, social and administrative services sector, and the rental and other services sector based on the data in 2010-2011.

The contribution ratio of the Yangon Region was 29% in the total service sectors; 29% in the transportation sector; 41% in the communications sector; 59% in the financial institution sector; 38% in the social and administrative services sector; and 15% in the rental and other services sector.



Source: JICA Study Team based on the data from the Planning Department, MNPED (2010-2011)

**Figure 2.1.25: Contribution Ratio of the Yangon Region in the Services Sectors**

Judging from this analysis, it is obvious that Yangon Region can be referred to as the *financial center of Myanmar* where nearly 60% of financial institutions are gathered. In fact, there are 73 branches of state-owned banks and 86 branches of private banks in the Yangon Region as Table 2.1.18 shows. In addition, Yangon Stock Exchange is being established through the support of the Japanese securities company.

**Table 2.1.18: List of Banks in the Yangon Region (2012-2013)**

Name of Bank	No. of Branch
<b>State-owned Banks</b>	<b>73</b>
1. Myanmar Economic Bank	30
2. Myanmar Insurance	2
3. Myanmar Small & Medium Enterprise	26
4. Myanmar Agriculture Development Bank	13
5. Myanmar Foreign Trade Bank	1
6. Myanmar Investment & Trading Bank	1
<b>Private Banks</b>	<b>86</b>
1. Asia Yangon Bank	2
2. Yangon City Bank	2
3. Myawaddy Bank	4
4. Thu Foundation Bank	3
5. Myanmar Citizen Bank	2
6. Industrial Development Bank	2
7. Myanmar Oriental Bank	8
8. Livestock & Fisheries Development Bank	12
9. First Private Bank	4
10. Kanbawza Bank	16
11. Yoma Bank	16
12. Ayeyarwaddy Bank	5
13. United Amara Bank	3
14. CB Bank	7
<b>Grand Total</b>	<b>159</b>

Source: Planning Department Yangon Regional Office of MNPED

There were 172 hotels, motels, or inns in Yangon Region, accounted for 26% of the Myanmar's total number of hotel/motel establishments in 2009-2010 as shown in Table 2.1.19.

In terms of number of rooms, there were 7305 rooms in the Yangon Region, accounted for 33% of the total number of rooms in Myanmar.

Since 2011, a rapid increase in number of foreign guests has raised the level of room per international standards in Yangon City.

**Table 2.1.19: State/Region Ranking of Hotels, Motels & Inns (2009-2010)**

	Myanmar Total	Ranking of State/Region		
		1 <sup>st</sup> ranking	2 <sup>nd</sup> ranking	3 <sup>rd</sup> ranking
Number of hotels, motels and inns	659 100%	Mandalay 190 29%	Yangon 172 26%	Shan 131 20%
Number of rooms	21,925 100%	Yangon 7,305 33%	Mandalay 6,083 28%	Shan 3,480 16%

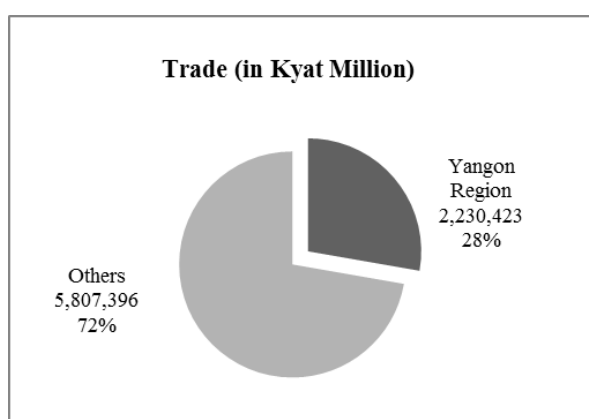
Note: Total number of state-owned and private-owned.

Source: YCDC and JICA Study Team based on the data from the Directorate of Hotels and Tourism

#### 6) Trade Sector

As mentioned above, the trade sector accounted for 20% of the national economy in 2010-2011.

Figure 2.1.26 shows the contribution ratio of the Yangon Region to the national net production values of the trade sector based on the statistical data in 2010-2011. The Yangon Region's trade sector contributed 28% to the national economy.



Source: JICA Study Team based on the data from Planning Department, MNPED (2010-2011)

**Figure 2.1.26: Contribution Ratio of the Yangon Region in Trade Sector**

Generally speaking, in Myanmar, goods are retailed at the traditional markets, street stores or family-run small stores. In Yangon City, modern shops have been built since the early 1980s as shown in Table 2.1.21.; and shopping style is gradually changing.

On the other hand, foreign direct investment for setting up a large commercial facility may render a large impact on the existing traditional markets, street stores, or family-run small stores. Accordingly, the Myanmar government is observing cautious process in approving foreign direct investment for setting up a large commercial facility under the Foreign Investment Law, although such investment itself is not prohibited by the law.

**Table 2.1.20: Traditional Markets in Yangon City**

Traditional Market by Class	No. of Traditional Markets in Yangon City
Market Class-A (Largest)	21
Market Class-B (2 <sup>nd</sup> largest)	49
Market Class-C (3 <sup>rd</sup> largest)	60
Market Class-D (4 <sup>th</sup> largest)	28
Tax Free Markets (Smallest)	11
Total	169

Source: Business Establishment Survey

**Table 2.1.21: Modern Retail Shops in Yangon City**

Company	Set Up	Chain Store	Type	No. of Store in Yangon
Super One International	1982	Super One	Shopping Complex	3
		Victoria	Supermarket	3
Sein Kaung Trading Co., Ltd.	1984	Sein Gay Har. Supermarket	Shopping Complex	7
Shwe Taung Development Co., Ltd.	1990	Junction	Shopping Complex	4
Creation (Myanmar) Co., Ltd.	1994	Orange	Supermarket	6
		Brazon	Shopping Complex	2
Ga Mone Pwint Co., Ltd.	1994	Ga Mone Pwint	Shopping Complex	4
City Mart Holding Co., Ltd.	1996	City Mart	Supermarket	13
		Ocean	Shopping Complex	2
		108	Convenience Store	11
Junior Diamond Star Co. Ltd.	2008	Capital	Shopping Complex	1
Total				56

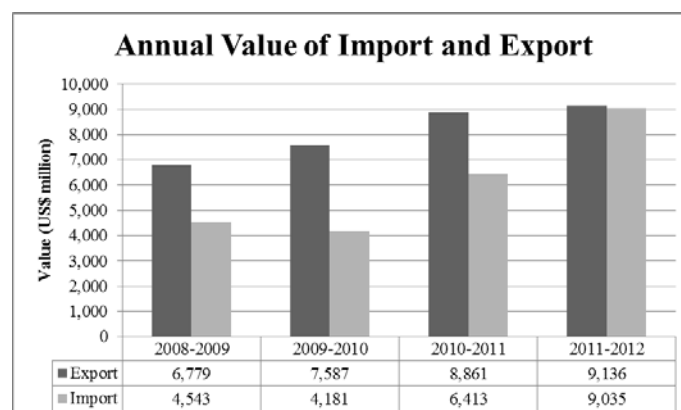
Source: Japan External Trade Organization (JETRO) Sensor, July 2012 Issue

(6) Present Export and Import Conditions

1) Trade Balance

Figure 2.1.27 shows the annual value of export and import from 2008-2009 to 2011-2012.

The Myanmar government employs a foreign trade policy called “*Export First Policy*” under which import is permitted within a foreign currency acquired by export. In the fiscal year 2011-2012, export was US\$9,136 million and import was US\$9,035 million. Trade surplus was US\$101 million in the same year.

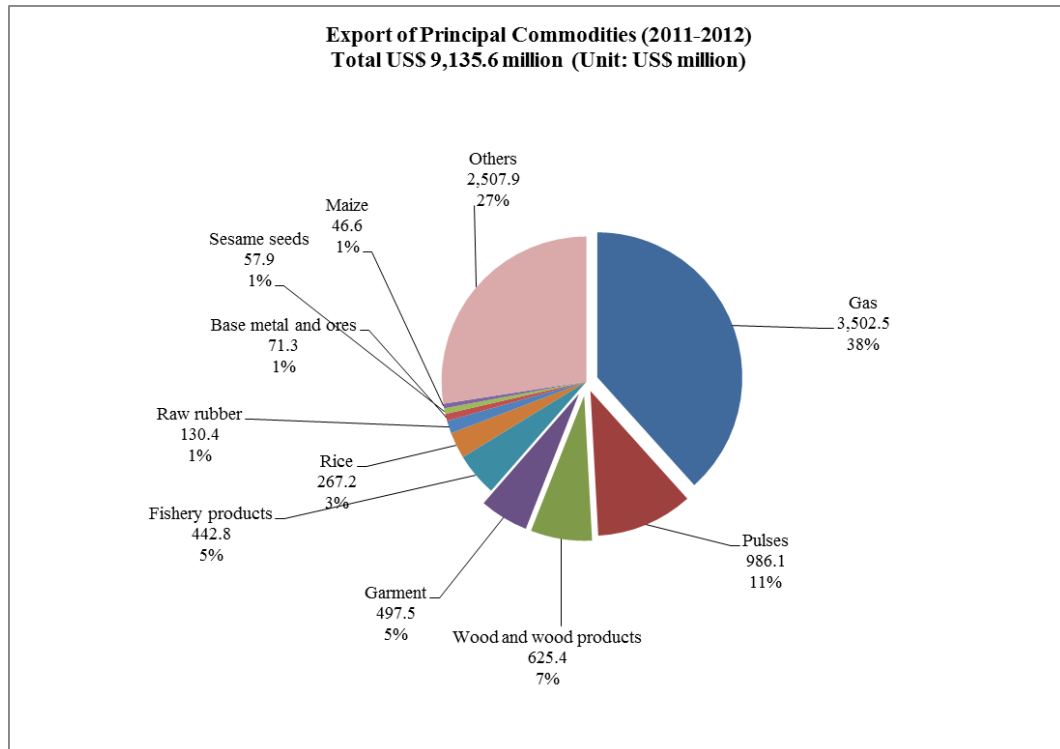


Source: JICA Study Team based on the data from the Selected Monthly Economic Indicators, May 2012

**Figure 2.1.27: Change in Foreign Trade of Myanmar**

2) Export

Figure 2.1.28 shows export of principal commodities in the fiscal year 2011-2012. Natural gas was the largest export commodity accounted for 38% of total export, followed by pulses (11%), wood and wood products (7%), and garments (5%).



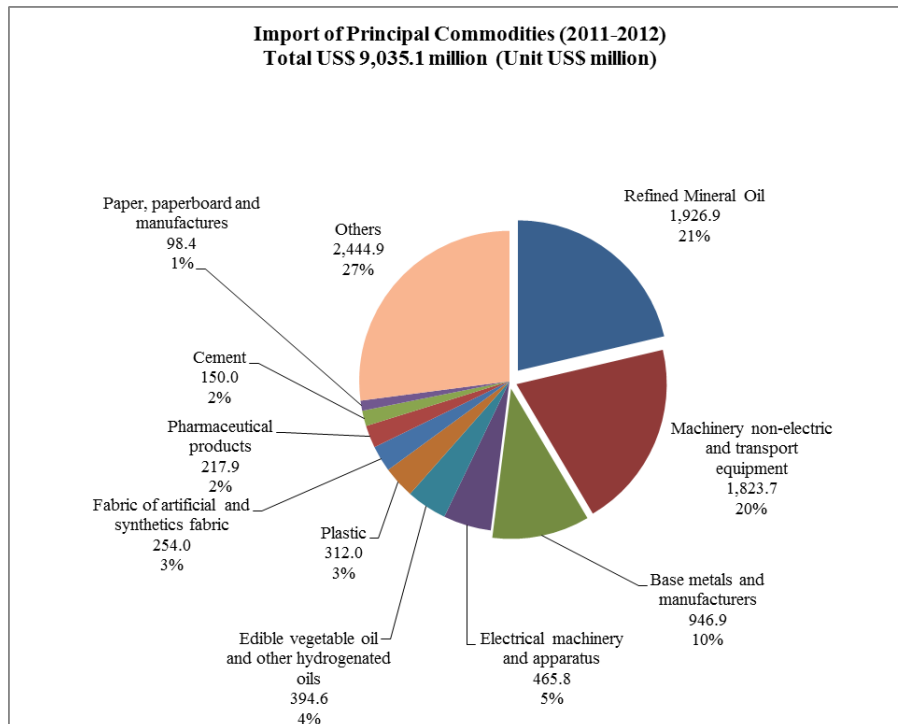
Source: JICA Study Team based on the data from Selected Monthly Economic Indicators, May 2012

**Figure 2.1.28: Export of Principal Commodities (2011-2012)**

3) Import

Figure 2.1.29 shows the import of principal commodities in the fiscal year 2011-2012. Refined mineral oil was the largest import commodity accounted for 21% of total import, followed by non-electric machinery and transport equipment (20%), and base metals and manufactures (10%).





Source: JICA Study Team based on the data from Selected Monthly Economic Indicators, May 2012

**Figure 2.1.29: Import of Principal Commodities (2011-2012)**

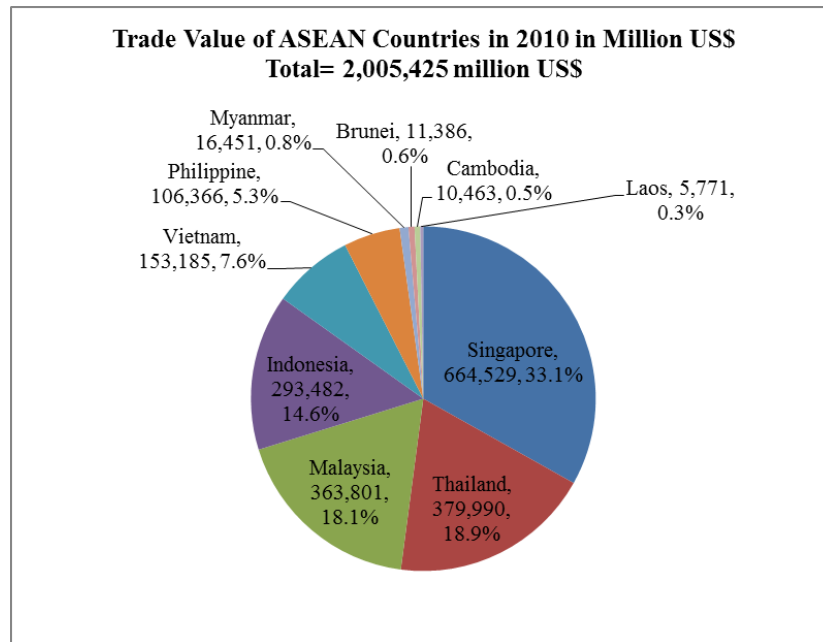
#### 4) Trade via Yangon Port

Following two facts described in the section 2.3.4 (Port and Logistics) proves that Yangon Port is the most important port in Myanmar in terms of international trade.

- Yangon Port consisting of Yangon Main Port and Thilawa Area Port handles about 90% of total national cargo volume in Myanmar.
- Total cargo throughput by ports in Myanmar was 25.7 million tons in 2011. Among this, 14.2 million tons was for import and 9.1 million tons was for export. Cargo throughput of international trade was 23.3 million tons, i.e. over 90% of the total cargo throughput, meanwhile that for coastal shipping was less than 10%.

#### 5) Comparison with other ASEAN Countries

Total trade values of ASEAN countries was over US\$ 2 trillion in 2010. Among ASEAN countries, Myanmar accounts for only 0.8% of the total as shown by Figure 2.1.30. There are great differences between trade value of Myanmar and advanced ASEAN countries such as Singapore, Thailand, Malaysia, and Indonesia.



Source: JICA Study Team based on the data from ASEAN-JAPAN CENTRE, 2011

**Figure 2.1.30: Trade Value of ASEAN Countries**

(7) Present Investment Conditions

1) Current State of Foreign Investment

In Myanmar, foreign investments of 488 permitted enterprises have amounted to US\$41,091 million as of 31<sup>st</sup> August 2012 as Table 2.1.22 shows. Among them, 261 enterprises with a total investment of US\$8,963 million have already concluded and 227 enterprises with a total investment of US\$31,061 million existed at present.

By sector, the resource sectors composed of the oil and gas, power and mining sectors made up a vast majority of 93% to the total permitted investment amounts by the existing enterprises. Greater Yangon does not have foreign investment potential for resource sectors since it has no oil and gas resources, as well as no potential location for hydropower generation and mines as previously described, with an exception of the thermal power plant projects using coal-fired, gas, or petroleum.

Foreign investment in the non-resource sectors, which include agriculture, livestock and fisheries, manufacturing, construction, transport and communication, hotel and tourism, real estate, industrial estate, and other services sectors, are relatively small in terms of investment amount compared with the resource sector.

It should be noted that foreign investment in the non-resource sectors would provide great benefits to Myanmar's economy through creating employment opportunities, transferring industrial technologies, enhancing the convenience of the nation, obtaining foreign currency, and so forth. Therefore, it is crucial to expand foreign investment in the non-resource sectors.

**Table 2.1.22: Foreign Investment of Permitted Enterprises as of 31<sup>st</sup> August 2012**

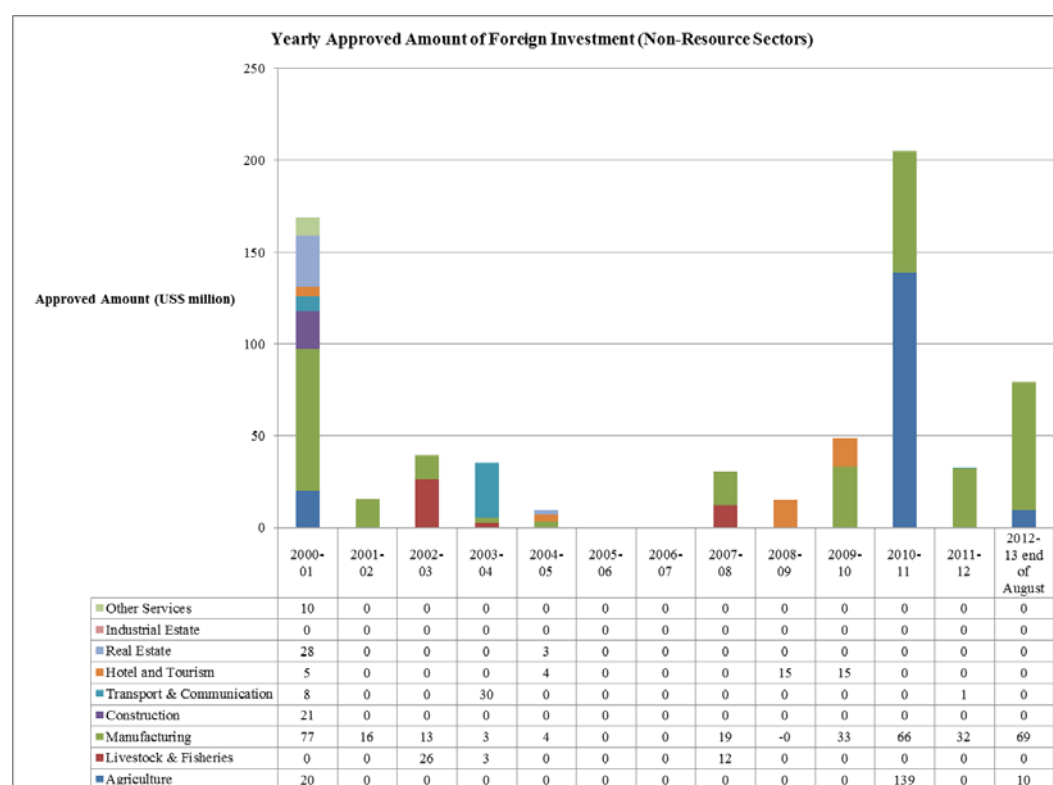
US\$ million

Sector	Total Permitted Enterprises		Existing Enterprises		Terminated Enterprises	
	No.	Approved Amount	No.	Approved Amount	No.	Terminated Amount
Agriculture	9	182.751	6	154.070	3	28.681
Livestock & Fisheries	25	324.358	7	64.946	18	21.227
Mining	66	2,814.360	8	2,289.162	58	208.933
Manufacturing	179	1,830.131	90	627.720	89	834.574
Power	5	19,067.498	4	13,037.498	1	6,030.000
Oil and Gas	113	14,181.972	62	13,474.728	51	901.875
Construction	2	37.767			2	37.767
Transport & Communication	16	313.906	7	137.676	9	113.230
Hotel and Tourism	45	1,064.811	30	814.475	15	169.274
Real Estate	19	1,056.453	7	275.000	12	586.603
Industrial Estate	3	193.113	2	179.113	1	14.000
Other Services	6	23.686	4	7.061	2	16.625
<b>Total</b>	<b>488</b>	<b>41,090.806</b>	<b>227</b>	<b>31,061.449</b>	<b>261</b>	<b>8,962.789</b>

Source: Directorate of Investment and Company Administration, MNPED

Figure 2.1.31 shows the annual permitted investment amount in the non-resource sectors for 12 years from 2000-2001 to 2011-2012 and five months from April to August in 2012.

Annual permitted foreign investment in the manufacturing industry was US\$77 million in 2000-2001; however, since then it had been at a low level up to 2008-2009. After 2009-2010, it has been on the track to recovery, since it has already amounted to US\$69 million during the first five months of 2012-2013. It is evident that the annual permitted investment in the manufacturing industry exceeds US\$100 million in 2012-2013 for the first time after 2000-2001.



Source: JICA Study Team based on the data from the Directorate of Investment and Company Administration, MNPED

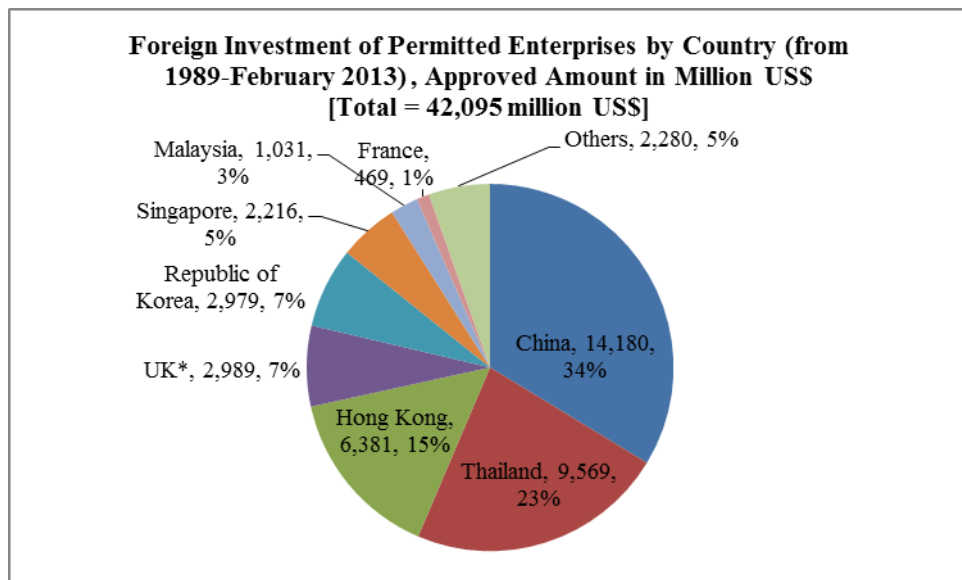
**Figure 2.1.31: Yearly Approved Amount of Foreign Investment in Non-resource Sectors**

Meanwhile, annual permitted foreign investment in the manufacturing sector was US\$5,801 million in Thailand<sup>4</sup> and US\$5,979 million in Vietnam<sup>5</sup>, in 2010. As compared with Thailand and Vietnam, the annual permitted investment in the manufacturing industry is infinitely small in Myanmar at present.

According to the World Investment Report<sup>6</sup>, however, the total foreign direct investment inflow was only US\$189 million in 1980 in Thailand; and it was only US\$180 million in 1990 in Vietnam.

Despite the current large differences in the foreign investment permitted amount from Thailand and Vietnam, a lot of foreign investors are laying their hopes on Myanmar as a destination of investment in the manufacturing industry, because of Myanmar's large potential. It is crucial to improve the investment climate in Myanmar to catch up with Thailand and/or Vietnam in terms of foreign direct investment in the manufacturing industry in the future.

Figure 2.1.32 illustrates foreign investment of permitted enterprises by country. Over 70% of approved foreign investments were from China, Thailand and Hong Kong. Approved investment from Japan was US\$270 million accounting for 0.64% of the total approved foreign investments. Japan was the 11th-largest investing country.



Note: \* Inclusive of enterprises incorporated in British Virgin Islands, Bermuda Islands and Cayman Islands

Source: JICA Study Team based on Directorate of Investment and Company Administration (DICA), MNPED, (<http://www.dica.gov.mm/>) accessed in April 2013

**Figure 2.1.32: Foreign Investment of Permitted Enterprises by Country**

## 2) Amendment of the Foreign Investment Law

Myanmar is opening up to and attracting foreign investors. To attract foreign investments, Myanmar revised related laws, relaxing the rules and regulations, and speeding up the incorporation process. Amendment to the Foreign Investment Law was issued on 2<sup>nd</sup> November 2012.

<sup>4</sup> Source: Website of the Board of Investment (BOI), Thailand

<sup>5</sup> Source: Foreign Investment Agency (FIA), Ministry of Planning and Investment, Vietnam

<sup>6</sup> Source: Website of United Nations Conference on Trade and Development

3) Thilawa SEZ Development

Most of foreign manufacturing industry requires special economic zones or industrial estates with high quality infrastructure before investing in Myanmar. However, Myanmar has none of these areas especially designed for foreign investments. To facilitate economic development, Dawei Special Economic Zone (SEZ) is being implemented in the Tanintharyi Region. Thilawa SEZ and Kyaukpyu SEZ would be developed in the Yangon Region and Rakhaing State, respectively.

Thilawa SEZ project is a mega project aiming to develop a special economic zone composed of areas for manufacturing, residential, commercial, logistic, and so forth in Thanlyin and Kyauktan townships in the Yangon Region. Its location is near Thilawa Port and conveniently located for transportation of raw materials as well as products. The total development area is approximately 2400 ha.

To accelerate the Thilawa SEZ project, the MNPED, and the Ministry of Foreign Affairs (MOFA) and the Ministry of Economy, Trade and Industry (METI) of Japan concluded a Memorandum of Intent (MOI) to prepare the basic master plan and to conduct a feasibility study in April 2012.

JICA is supporting the Thilawa SEZ project by conducting the following related studies: a study on Thilawa SEZ infrastructure development; a study on the expansion project of Yangon Port in the Thilawa area; a study on water resource in Thilawa SEZ and surrounding area; and legal advisory services for SEZ development.

### 2.1.3 Industrial Activity

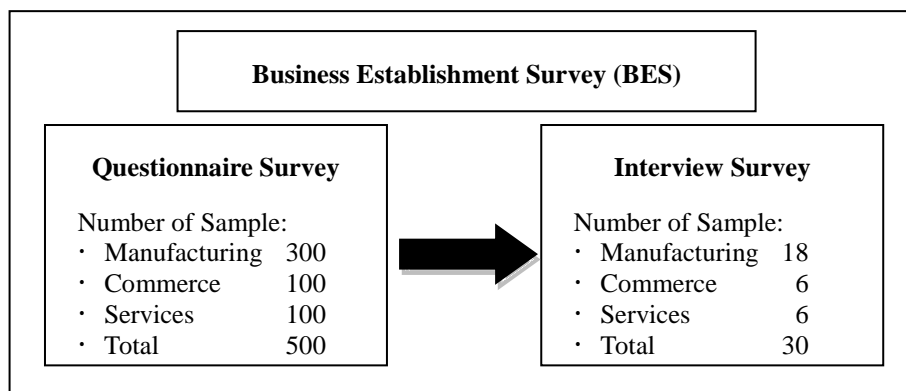
The socioeconomic situation was reviewed in Section 2.1.2 mainly based on statistical data. It was revealed that Yangon’s key industries were the manufacturing, commerce, and services industries.

In this subsection, the present situation and problems of industrial activity are analyzed based on the interim results of the Business Establishment Survey that was conducted for the manufacturing, commerce, and services industries. Also, the present situation and problems of the industrial zones were analyzed as these are important factors for the land use plan in Greater Yangon.

#### (1) Present Situation and Problems of Industrial Activity

##### 1) Method of Business Establishment Survey (BES)

BES was conducted to find out the situation, problems, and future visions of the existing business establishments in the manufacturing, commerce, and services sectors in Greater Yangon. BES consists of a questionnaire survey for 500 business establishments and an interview survey for 30 business establishments as shown in Figure 2.1.33. The questionnaire survey has already been completed. Present situation and problems of industrial activities were analyzed based on the report of the questionnaire survey.



Source: JICA Study Team based on contract of BES

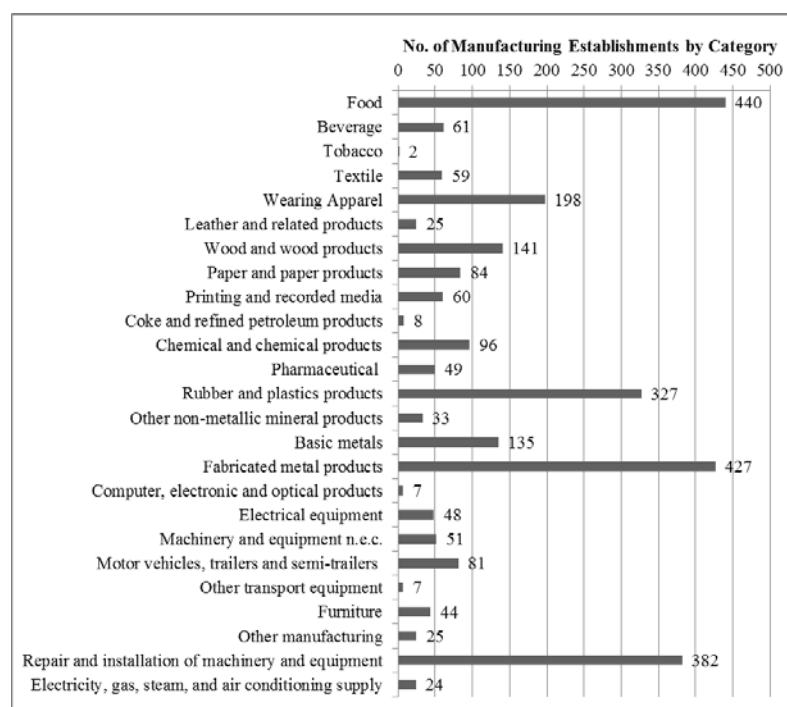
**Figure 2.1.33: Process of Business Establishment Survey**

#### 2) Brief Overview of the Business Establishments

##### 1) *Manufacturing Sector*

There are about 3100 private-owned factories and large- or medium-sized workshops in the Yangon Region as described in Section 2.1.2. BES of the manufacturing sector is directed to manufacturing establishments in the industrial zones, since private-owned factories and workshops of large or medium-sized are supposed to be concentrated in the industrial zones.

About 2814 manufacturing establishments are operating in the industrial zones of Yangon City, according to the prepared list of currently operating manufacturing establishments based from the data coming from 17 industrial zone management committees. Figure 2.1.34 illustrates a breakdown by industrial category based on International Standard Industry Classification (ISIC) Revision 4. Major industrial categories are food, fabricated metal products, repair and installation of machinery and equipment, rubber and plastics products, wearing apparel, wood and wood products, basic metal, and so forth.



Source: JICA Study Team based on BES Report

**Figure 2.1.34: Number of Manufacturing Establishment in the Industrial Zones by Industrial Category**

## 2) Commerce Sector

Commerce sector includes traditional markets, modern commercial establishments such as shopping complexes, supermarkets, and convenience stores, and numbers of family-run small stores or street stores.

The traditional market means public market, for example, Bayintnaung Wholesales Market that is the largest wholesale center in Myanmar and located in Yangon City. Commodities being sold at Bayintnaung Wholesales Market are rice, oil and oil seeds, pulses and beans, other culinary items, snack food, other food items, plastic and jute bags, mats, tarpaulin and plastic, and a number of food stuff.

BES of the commerce sector is directed toward traditional market and modern commercial establishments, since these are assumed to be cooperative in the questionnaire survey. Number of traditional markets (public markets) and modern commerce establishments are shown in Table 2.1.23.

**Table 2.1.23: Number of Traditional Markets and Modern Commercial Establishments**

Sub-sector	Number of Commercial Establishments		Remarks
Traditional Market (Public Market)	Total	169 establishments in Yangon City	
	Grade-A	21	Refer to Table 2.1.20
	Grade-B	49	
	Grade-C	60	
	Grade-D	28	
	Tax free market	11	
Total	169		
Modern Commercial Establishments	Total	56 establishments in Yangon City	
	Shopping Complex	23	Refer to Table 2.1.21
	Supermarket	22	
	Convenience Store	11	
Total	56		

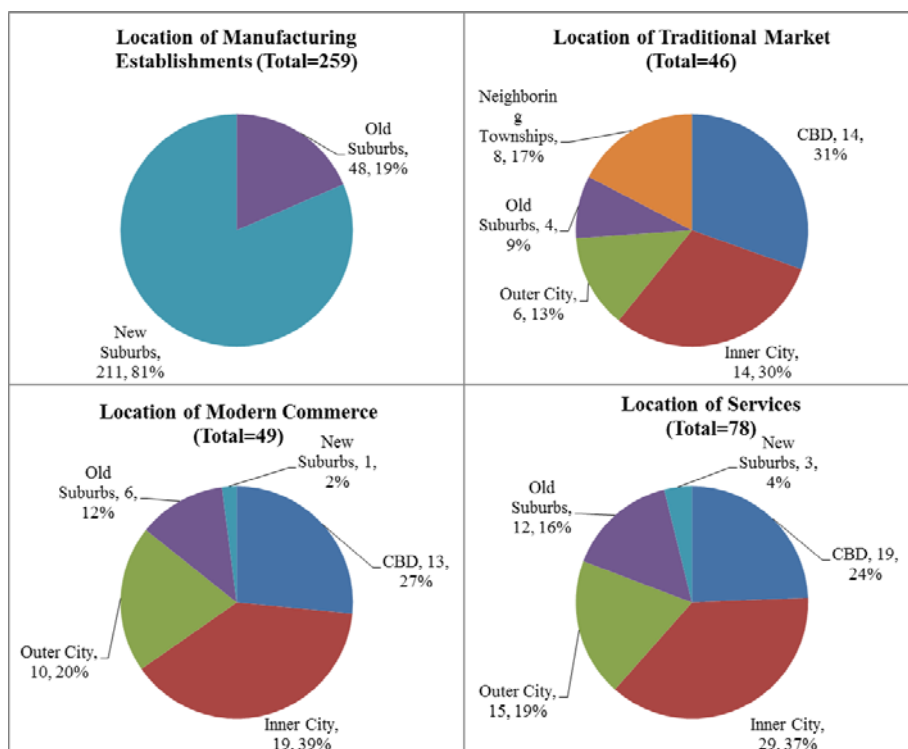
Source: JICA Study Team based on BES Report





Manufacturing establishments are concentrated in new suburbs and old suburbs with shares of 81% and 19%, respectively. This geographical distribution may be attributed to the government’s plan of industrial zone development.

Over 60% of the commerce and services establishments are located in the CBD and the inner city, and thinning down outwards to the periphery.



Source: JICA Study Team based on BES Final Report Part-1

**Figure 2.1.35: Geographical Distribution of Business Establishments**

#### 5) Period of Foundation

Less than 10% of the existing establishments were founded before 1990, except for traditional markets, where about 30% of the total were founded before 1990, as shown in Table 2.1.27.

About 20% of the existing establishments were founded after 2010 for the manufacturing and services sectors. And 37% of garment factories were founded after 2010.

Establishments founded after 2010 are quite different in traditional markets and modern commerce. Only 6.7% of the existing establishments were founded for traditional markets, while over 40% of the existing establishments were founded for modern commerce after 2010.

**Table 2.1.27: Period of Foundation**

Period of Foundation	Manufacturing	Traditional Market	Modern Commerce	Services
No. of establishments	259	46	49	78
Before 1979	3.1%	15.0%	-	3.2%
1980-1989	5.0%	15.6%	6.1%	3.6%
1990-1999	26.6%	47.1%	26.5%	28.5%
2000-2009	46.7%	15.6%	26.5%	43.4%
After 2010	18.5%	6.7%	40.8%	21.4%
Total	100.0%	100.0%	100.0%	100.0%

Source: JICA Study Team based on BES Final Report Part-1

6) Reasons for Selecting the Current Site

For the manufacturing sector, more than half of the establishments responded that there was no reason for selecting the current site. Over 30% of establishments selected 1) good for recruitment of employees, 2) good for customer’s access, 3) easy land acquisition, and 4) government directive. However, other comments, accounting less than 30% of the manufacturing establishments, stated that the industrial park should normally have: “better power supply” (21.6%), “better water supply” (4.2%), “existence of well-development road” (23.6%), “sufficient facilities of wastewater treatment” (3.5%), “firm ground” (2.3%), and “relatively low risk from natural disaster” (4.2%).

For the commerce and services sectors, the common and dominant site selection factors were 1) good for customer’s access, 2) good urban facilities near the site, 3) good road near the site which received more than 50% of the respondents in each case. For traditional markets, nearly 80% of respondents selected “government directive”.

**Table 2.1.28: Ranking on Reasoning for Selecting the Current Site (Responses of over 30% of establishments)**

(Multiple answers up to three selections)

	Manufacturing	Traditional Market	Modern Commerce	Services
No. of establishments	259	46	49	78
First ranking	Good for recruitment of employees 46.3%	Government directive 77.7%	Good for customer’s access 95.9%	Good for customer’s access 62.9%
Second ranking	Good for customer’s access 45.6%	Good for customer’s access 56.4%	Existence of substantial urban facilities near the site 69.4%	Existence of well-developed road near the site 62.1%
Third ranking	Easy land acquisition 39.0%	Existence of well-developed road near the site 56.7%	Existence of well-developed road near the site 55.1%	Existence of substantial urban facilities near the site 57.1%
Fourth ranking	Government directive 34.0%	Existence of substantial urban facilities near the site 53.8%	- -	- -

Source: JICA Study Team based on BES Final Report Part-1

7) Number of Employees

Table 2.1.29 shows that smaller establishments with less than 50 employees dominate the manufacturing sector (78.0%), traditional markets (97.8%), and services sector (71.3%). On the other hand, 13 manufacturing industries (5.0%) have larger establishments with more than 500 employees. Among these, nine establishments are garment factories.

Modern commerce sector appears to take the lead in generating high level of employment, though, the notably high percentage of non-responses in the survey (about a quarter of the number of establishments) makes it rather uncertain.

**Table 2.1.29: Number of Employees**

Number of Employees	Manufacturing	Traditional Market	Modern Commerce	Services
No. of establishments	259	46	49	78
Less than 10	51.4%	69.1%	22.4%	24.8%
10-49	26.6%	28.7%	8.2%	46.5%
50-99	8.1%	-	20.4%	16.8%
100-499	8.9%	2.2%	22.4%	9.1%
500-999	2.7%	-	2.0%	2.7%
1000 or more	2.3%	-	-	-
Not reported	-	-	24.5%	-
Total	100.0%	100.0%	100.0%	100.0%

Source: JICA Study Team based on BES Final Report Part-1

#### 8) Employees' Origin

Table 2.1.30 indicates that close to half of the establishments in the manufacturing sector responded that most of their employees are living near the establishment. For commerce sector, dominant employees' origin was that half of their employees live near the establishment and the other half live from distant places. For services sector, close to half of the establishments responded that half of their employees live near the establishment and the other half from distant places.

**Table 2.1.30: Employees' Origin**

Employees' Origin	Manufacturing	Traditional Market	Modern Commerce	Services
No. of establishments	259	46	49	78
Mostly near the establishments	44.4%	27.4%	14.3%	16.6%
Mostly from distant places	23.9%	17.5%	18.4%	34.4%
Fifty-fifty of those from near the establishment and from distant places	31.3%	55.1%	67.3%	48.9%
Total	100.0%	100.0%	100.0%	100.0%

Source: JICA Study Team based on BES Final Report Part-1

#### 9) Employees' Living Arrangement

Table 2.1.31 shows that more than 40% of establishments have their own dormitories, except for the traditional markets.

**Table 2.1.31: Employees' Living Arrangement**

(Multiple answers up to two selections)

Living Arrangement	Manufacturing	Traditional Market	Modern Commerce	Services
No. of establishments	259	46	49	78
Parent's house	44.4%	51.3%	75.5%	40.6%
Own house with family	53.3%	78.3%	10.2%	43.8%
Live alone at rented apartment	3.9%	2.2%	-	4.3%
Sharing rented apartment with friends/co-workers	11.2%	6.7%	36.7%	23.6%
Live alone at company's dormitory	8.5%	6.7%	-	11.3%
Sharing company's dormitory with other employees	40.2%	29.3%	63.3%	43.8%

Source: JICA Study Team based on BES Final Report Part-1

10) Mode of Commuting to Work

Table 2.1.32 indicates that public buses are used by more than 60% of the commerce and services establishments' employees in commuting to work. Buses arranged by modern commerce establishment are used by more than 40% of their employees.

Establishments in the manufacturing sector that responded using public buses in commuting are substantially less than those in the commerce and service sectors. Manufacturing establishments that responded using bicycle in commuting are more than those in other sectors. Use of bicycle is restricted in CBD during daytime hours as described in the section 2.3.1 Urban Transport. Employees of manufacturing establishments commonly use bicycles in commuting, since the manufacturing establishments are located in the new suburbs or old suburbs. Meanwhile, bicycle commuting is much less common for employees of the commerce and services establishments, since over 60% of those establishments are located in the CBD and the inner city adjacent to CBD.

**Table 2.1.32: Mode of Commuting to Work**

(Multiple answers up to two selections)

	Manufacturing	Traditional Market	Modern Commerce	Services
No. of establishments	259	46	49	78
On foot	57.5%	40.4%	34.7%	55.4%
Bicycle	55.6%	14.3%	4.1%	8.9%
Motorcycle	0.4%	1.9%	-	-
Public bus	33.6%	71.0%	100.0%	63.3%
Railway	2.3%	17.8%	4.1%	3.2%
Bus arranged by establishment	14.7%	6.7%	42.9%	23.4%

Source: JICA Study Team based on BES Final Report Part-1

11) Employee Training

Table 2.1.33 shows that more than 70% of the establishments use their own training program for their employees. Furthermore, close to half of the establishments provide on-the-job training by their own trainers, except for traditional market that have a passive stance for employee's training. On the other hand, close to half of the establishments in the modern commerce sector utilize vocational training schools.

**Table 2.1.33: Employee's Training**

(Multiple answers up to two selections)

	Manufacturing	Traditional Market	Modern Commerce	Services
No. of establishments	259	46	49	78
Employ persons trained by vocational training school	1.9%	6.7%	14.3%	17.7%
Ask vocational training school for employees training	1.2%	2.2%	30.6%	5.2%
Train by own training program in the establishment	74.5%	58.9%	85.7%	78.5%
On-the-job training by own trainers	48.3%	35.7%	51.0%	54.2%
Training is necessary, but not done now	3.1%	11.1%	2.0%	2.6%
Training is not necessary	8.9%	25.5%	-	4.9%

Source: JICA Study Team based on BES Final Report Part-1

12) Land Area

Table 2.1.34 shows that nearly 60% of the establishments have land smaller than 1000 m<sup>2</sup>; while in the modern commerce sector, less than 40% of the establishments have the same range of land space.

More than 10% of the establishments in the manufacturing services sectors have land larger than 10,000 m<sup>2</sup>, while 20% or more establishments in traditional and modern commerce sectors have land larger than 10,000 m<sup>2</sup>.

**Table 2.1.34: Land Area**

Land Area (m <sup>2</sup> )	Manufacturing	Traditional Market	Modern Commerce	Services
No. of establishments	259	46	49	78
Less than 1,000	59.1%	58.9%	38.8%	59.6%
1,000-4,999	18.9%	8.6%	20.4%	22.1%
5,000-9,999	10.0%	13.1%	8.2%	0.9%
10,000-19,999	7.7%	6.4%	6.1%	7.8%
20,000-49,999	4.2%	4.1%	8.2%	1.6%
50,000 or more	-	8.9%	6.1%	1.7%
Not reported	-	-	12.2%	6.3%
Total	100.0%	100.0%	100.0%	100.0%

Source: JICA Study Team based on BES Final Report Part-1

13) Duration of Power Cut in Electricity Supply and Backup Generator

Table 2.1.35 shows that more than 80% of the establishments suffer inconvenience from electricity supply failure for longer than 10 minutes/day, while in traditional markets only 45% of establishments suffer the same.

Table 2.1.36 shows that more than 80% of the establishments and only 20% of traditional markets responded that they have power generators for backup use.

**Table 2.1.35: Duration of Electricity Supply Failure**

Duration of Power Failure per day	Manufacturing	Traditional Market	Modern Commerce	Services
No. of establishments	259	46	49	78
Less than 10 minutes	6.9%	42.4%	16.3%	16.4%
10-59 minutes	56.0%	40.4%	36.7%	59.6%
1-less than 5 hours	34.0%	4.5%	46.9%	18.4%
5-less than 10 hours	1.2%	-	-	2.0%
10 hours or more	0.4%	-	-	-
Not reported	1.5%	12.7%	-	3.5%
Total	100.0%	100.0%	100.0%	100.0%

Source: JICA Study Team based on BES Final Report Part-1

**Table 2.1.36: Generator for Backup**

Backup Generator	Manufacturing	Traditional Market	Modern Commerce	Services
No. of establishments	259	46	49	78
Have backup generator	84.2%	20.1%	100.0%	92.4%
Not have backup generator	15.4%	79.9%	-	6.8%
Not reported	0.4%	-	-	0.9%
Total	100.0%	100.0%	100.0%	100.0%

Source: JICA Study Team based on BES Final Report Part-1

14) Water Source

Table 2.1.37 shows that more than half of the establishments in traditional markets and services responded that they use YCDC water. Only 17% of the establishments in the manufacturing sector used YCDC water.

Half of the establishments in the modern commerce sector seem to use YCDC water, though, the notably high percentage of non-responses in this survey (about 30%) makes it rather uncertain.

**Table 2.1.37: Water Source**

Water Source	Manufacturing	Traditional Market	Modern Commerce	Services
No. of establishments	259	46	49	78
YCDC water	17.0%	55.1%	34.7%	53.7%
Tube well	74.9%	29.9%	34.7%	44.8%
Other	7.3%	2.2%	-	-
Not applicable/Not reported	0.8%	12.7%	30.6%	1.6%
Total	100.0%	100.0%	100.0%	100.0%

Source: JICA Study Team based on BES Final Report Part-1

15) Problems Faced by the Establishments

For the manufacturing sector, the problem that got the first rank is the frequent power stoppage that is caused by insufficient infrastructure. It is noted that other problems faced by the establishments in all sectors are not related to infrastructure, but to issues such as skilled labor, business competition, technology acquisition, market, capital, costs of transportation, and fuel.

**Table 2.1.38: Ranking of Problems Faced by the Establishments (Responses of over 20% of the Establishments)**

(Multiple answers up to three (3) selections)

	Manufacturing	Traditional Market	Modern Commerce	Services
No. of establishments	259	46	49	78
First rank	Frequent power stoppage 44.4%	Keen business competition 45.9%	Lack of skilled labor 65.3%	Lack of skilled labor 43.2%
Second rank	Keen business competition 38.2%	Risk from natural disaster 33.1%	Keen business competition 53.1%	Keen business competition 41.8%
Third rank	Capital shortage 23.6%	High transportation cost 24.2%	Difficulty in technology acquisition 30.6%	
Fourth rank	Lack of skilled labor 22.4%		High fuel cost for generator 26.5%	
Fifth rank	Insufficient market 20.1%			
No problems	5.8%	14.6%	-	7.4%

Source: JICA Study Team based on BES Final Report Part-1

16) Business Expansion Plan

Surprisingly, almost all the establishments in the modern commerce sector responded that they have plans of business expansion; and nearly 60% responded to expand within one year.

About 70% of the establishments in the services sector responded to have plans of business expansion. Close to half of the establishments in the manufacturing sector responded to have business expansion plans as well. Among them more than 60% of garment factories responded that they have plans of business expansion.

**Table 2.1.39: Business Expansion Plan**

Business Expansion Plan	Manufacturing	Traditional Market	Modern Commerce	Services
No. of establishments	259	46	49	78
Have plan of business expansion within 1 year	13.1%	2.2%	57.1%	26.4%
Have plan of business expansion within 2-3 years	12.0%	4.5%	38.8%	18.9%
Have plan of business expansion in later than 3 years or not yet determined	20.5%	20.1%	-	25.6%
No plan for business expansion	54.4%	73.2%	4.1%	27.2%
Not reported	-	-	-	1.8%
Total	100.0%	100.0%	100.0%	100.0%

Source: JICA Study Team based on BES Final Report Part-1

The detailed results of the interview survey in BES are given in Appendix 3.

#### 17) Interview Survey

Table 2.1.40 summarized the results of interview survey.

**Table 2.1.40: Interview Survey Results**

Sector		Major Opinions of Business Establishment
Manufacturing		<ul style="list-style-type: none"> <li>Management committees of many industrial zones require the Government to improve infrastructures in the existing industrial zones. In particular, half of industrial zones require YCDC to add or improve the water system. 8 out of 18 industrial zones need to upgrade the power system for the realization of stable supply. Many industrial zones require improving the maintenance of roads and drainage.</li> <li>Industrial zone management committees need fund for zone improvement.</li> <li>Mingalardon Industrial Park for foreign investors needs to set up One-Stop service.</li> <li>6 out of 18 industrial zones have troubles of bad smell.</li> <li>5 out of 18 industrial zones are not quite satisfied with solid waste collection and disposal system.</li> </ul>
Commerce	Traditional Market	<ul style="list-style-type: none"> <li>Bayint Naung Market in Mayangone Township has problems of traffic congestion along the main access roads, roads inside the market unsuitable for container trucks, serious traffic congestion inside the market, and delays in transportation of commodities due to traffic problems.</li> <li>Thanlyin market has to resolve problem between temporary sellers and permanent shopkeeper.</li> </ul>
	Modern Commerce	<ul style="list-style-type: none"> <li>Supermarket having 4 shops in Yangon City has traffic problems including traffic jam and not enough space for customer's car parking. Besides, it has problem of high expenditure for backup power generator fuel.</li> <li>Convenience store having 15 shops in Yangon City has problem of high expenditure for backup power generator fuel, flood during heavy rainfalls and high turnover of workers after getting training and experience. It has difficulties in applying license for foreign liquor, backup generators, and 24 hour operation.</li> </ul>
Service	Bank	<ul style="list-style-type: none"> <li>Awareness of using banks is very low.</li> <li>Banks have to compete with each other to get market share.</li> <li>Banks need more capital to increase branches.</li> <li>Financial sector laws need to be amended to suit with the current situation.</li> <li>Number of staffs who have knowledge and skill is not sufficient for introducing new financial products.</li> </ul>
	Restaurant	<ul style="list-style-type: none"> <li>Traffic jam takes away usual customers.</li> </ul>

Sector		Major Opinions of Business Establishment
		<ul style="list-style-type: none"> <li>• Raw material price becomes higher.</li> <li>• There are many competitions.</li> </ul>
	Hotel	<ul style="list-style-type: none"> <li>• There is no problem of the market, due to increasing tourists.</li> <li>• Five-star hotel interviewed has differentiating strategy by upgrading service. The hotel cultivates employees by using own training center and training in the hotel.</li> </ul>
	Game Center	<ul style="list-style-type: none"> <li>• A game center in CBD area has about 200 game machines mostly secondhand Japanese machines. Sometimes, there are troublesome customers including drunkards.</li> </ul>
	Private Hospital	<ul style="list-style-type: none"> <li>• The visited hospital needs more private rooms for patients. It has future visions for achieving more patients' satisfaction. It is planned to upgrade services, patient room facilities and ultra sound services using 3D system.</li> <li>• Car parking space is not sufficient.</li> </ul>

Source: JICA Study Team based on BES Final Report

## (2) Present Situation and Problems of the Industrial Zone Development

### 1) Present Situation of Industrial Zone Development

Table 2.1.41 shows the industrial zones at various status of development with a total land area about 6700 ha. Figure 2.1.36 shows the location of industrial zones.

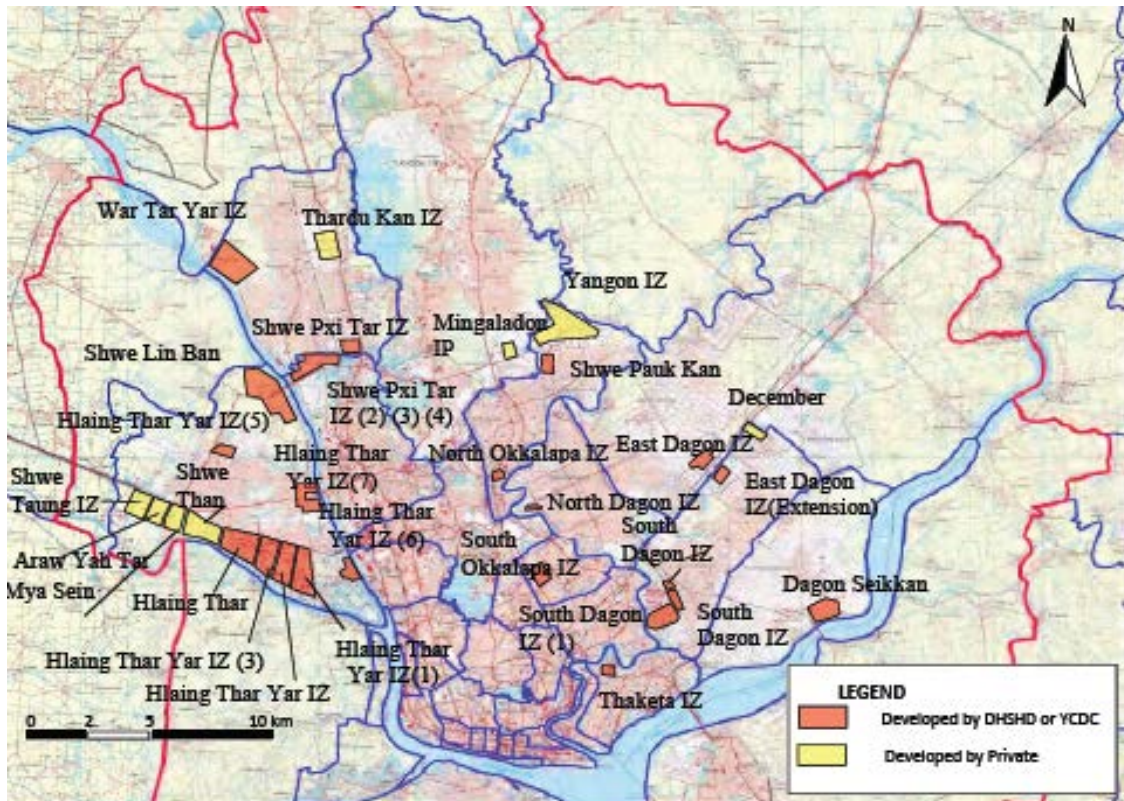
**Table 2.1.41: Industrial Zones**

	Name of Industrial Zone	Developer	Status of Development	Land Area (ha)
1	Hlaing Tharyar IZ (1-7)	DHSHD	Completed in 1994-1997	780
2	Shwe Thann Lyin IZ	Shwe Thann Lyin Co.	Under Development	168
3	Mya Sein Yaung IZ	War War Win Co.	Under Development	118
4	Anaw Yah Tar IZ and Shwe Taung IZ	Mahar Shwe Taung Co.	Under Development	315
5	Shwe Lin Ban IZ	DHSHD	Completed in 2002	445
6	Shwe Pyi Thar IZ (1)	DHSHD	Completed in 1989	136
7	Shwe Pyi Thar IZ (2,3,4)	DHSHD	Completed in 1998-2000	400
8	War Ta Yar IZ	DHSHD	Completed in 2004	445
9	Thardu Kan IZ	TOSTA High Rise	Completed in 2002	195
10	Mingalardon IP	Mingalardon Industrial Park Co.	Completed in 1998	89
11	Yangon IP	Zaykabar Co.	Completed in 2000	400
12	Shwe Paukkan IZ	DHSHD	Completed in 1992-1993	38
13	North Okkalapa IZ	DHSHD	Completed in 1998	45
14	South Okkalapa IZ	DHSHD	Completed in 2001	15
15	North Dagon	YCDC	Completed	10
16	East Dagon IZ	DHSHD	Completed in 2000	202
17	East Dagon IZ (extension)	DHSHD	Completed	115
18	South Dagon IZ (1)	DHSHD	Completed in 1992	192
19	South Dagon IZ (2)	DHSHD	Completed in 1992	87
20	South Dagon IZ (3)	DHSHD	Completed in 1992	22
21	December IZ	December Co.	Under Development	142
22	Dagon Seikkan IZ	DHSHD	Completed in 1998-1999	490
23	Tharketa IZ	DHSHD	Completed in 1999	81
24	Thilawa IZ	DHSHD	Completed	175
25	Thilawa SEZ	Japanese Co. (expected)	Under Planning	1,560
	<b>Total</b>			<b>6,665</b>

Note: DHSHD: Department of Human Settlement and Housing Development in the Ministry of Construction

Source: JICA Study Team based on data obtained from DHSHD and others





Source: JICA Study Team based on the data from YCDC map

**Figure 2.1.36: Location of Industrial Zones**

2) Problems in the Industrial Zone Development and Infrastructure

Field inspection of the industrial zones revealed the following problems:

- There are large unused land spaces in several industrial zones that have already been developed. In December 2011, the government instructed persons or companies who hold the land-use right but have not yet constructed factories to make a fence and then build a factory, otherwise the government would buy back the land at their original price.
- Tenants have to reclaim the land before building their factories in the industrial zones, except for Mingalardon Industrial Park and Yangon Industrial Park, where developers have completed the land reclamation.
- In the industrial zones which are being operated by the tenants, Management Committees have the responsibility of operation and maintenance, and of additional investment for internal infrastructure. Management Committees have been collecting management fees and social contribution fees from tenants to use for maintenance.
- Tenants have to dig tube wells in a number of industrial zones, because water supply is not available there. Groundwater quality is bad at some locations. Use of large amount of groundwater would cause the problem of land subsidence.
- Electricity stoppage frequently occurs during the dry season. It is the first ranked problem faced by factories in the industrial zones according to the business establishment survey.
- Management Committee needs to repair the damaged roads inside the industrial zone. However, they sometimes do not have the technology and workforce for repairing roads.

- Some manufacturing establishments are complaining about the high toll rates of bridges in Hlaing Tharyar Township. The transportation vehicles to/from factories in Hlaing Tharyar Township are forced to go a long way because vehicles that weigh more than 3 tonnes are prohibited to pass through the Bayint Naung Bridge.
- Foreign investors are short of industrial land supply. Government has allowed foreign investors to rent land from private companies by the issuance of the Presidential Decree No.39 dated 30<sup>th</sup> September 2011 and the Revised Foreign Investment Law dated 2<sup>nd</sup> November 2012. Land rental fee appears to be unreasonably high in some industrial zone.

3) Chances and risk for local industries

- As the economic sanction is relaxed or gradually lifted, the manufacturing industry in Myanmar may reach a turning point. Some companies may have a chance to go into a new business, but some other companies may face keener competition than before.
- Companies may become free to import raw materials from any foreign countries. They may also be able to export to foreign countries, if they are competitive. However, some other companies may not be able to compete with imported products coming from foreign countries in price and quality.
- Increasing foreign assembly industry in Greater Yangon may create business opportunities for local suppliers of motorcycle parts, car parts, electric household appliances, cellular phone, personal computer, etc. Some of the Myanmar companies may have a chance to have a good foreign partner.

#### **2.1.4 Social Services**

This section is an attempt to comprehensively review the current social services and issues in Yangon with an emphasis on the following six areas: Education, Health, Urban poor community, Gender, Disability, and Social welfare services in the communities.

##### (1) Education System in Myanmar

###### 1) Brief Historical Background of the Myanmar Education System

The education system in Myanmar is based on the United Kingdom's system due to nearly a century of British presence in the country. The first public high school was founded by the British colonial administration in 1874. Two years later, this public high school was upgraded and became the University College, Rangoon. It was affiliated to the University of Calcutta. In 1920, the two colleges namely, the University College, Rangoon and Judson College were combined to form the University of Rangoon. The University of Rangoon was shut down during the Second World War, and after regaining independence, the university was reopened and the two colleges were abolished in place for a unitary system. In 1964, this unitary system ceased to exist, and in its place, numerous professional institutes, arts and science universities, degree colleges and colleges were set up. The University of Yangon and University of Mandalay became arts and science universities, and most of their faculties became professional institutes. This system is still in force with substantial modifications (Han Tin, 2004).

The structure of the education system and the fundamentals of the education policy in Myanmar are laid down in the Basic Education Law (1973) which was promulgated in 1973 and amended in 1989. The University Education Law was enacted in 1973 and amended in 1998. The Technical, Agricultural and Vocational Education Law was promulgated in 1974 and amended in 1989 (UNESCO-IBE, 2010/11).

###### 2) National Education Development Plans

In order to promote greater access to and improve the quality of education, the 30-Year Long-Term Education Development Plan (FY 2001-02 to FY 2030-31) was commenced in 2001. There are ten programs in the plan for basic education and 36 programs for higher education. The programs for basic education are as follows:

- Emergence of an education system for modernization and development;
- Completion of basic education by all citizens;
- Improvement of the quality of basic education;
- Opportunity for pre-vocational and vocational education at all levels of basic education;
- Provision of facilities for e-Education and ICT;
- Producing well-rounded citizens;
- Capacity-building for educational management;
- Broader participation of the community in basic educational activities;

- Expansion of non-formal education; and
- Development of educational research.

For higher education, there are six core areas of focus for the 36 programmes. These are:

- Development of human resources;
- Utilization of technology;
- Expansion of research;
- Development of a lifelong learning society;
- Promotion of the quality of education; and
- Preservation of national identity and national values.

In line with the 30-Year Long-Term Basic Education Development Plan, the Myanmar Education for All-National Action Plan from 2003-2015 (EFA-NAP) was also formulated with the following six goals:

- Making basic education more accessible to children;
- Improving the quality of education in all aspects: teachers, education personnel, and curriculum;
- Increasing retention and completion rates in schools;
- Enhancing literacy and continuing education through non-formal education;
- Expanding and improving comprehensive Early Childhood Care and Education (ECCE); and
- Strengthening the Education Management Information System – EMIS.

### 3) National Education Administration

The Ministry of Education (MOE) is the central government agency responsible for the education sector from basic education to higher education. Under MOE, there are ten departments which are distributed between two deputy ministers. The Deputy Minister for Basic Education administers the following departments:

- Department of Basic Education (1), which is responsible for Lower Myanmar;
- Department of Basic Education (2), which is responsible for Upper Myanmar;
- Department of Basic Education (3), which is responsible for Yangon Region;
- Department of Education Planning and Training, which is primarily responsible for short- and long-term planning and training for primary and middle school teachers;
- Myanmar Board of Examinations; and
- Myanmar Education Research Bureau.

The functions of the departments under basic education are coordinated by the Basic Education Council, which includes the Basic Education Curriculum, Syllabus, and Textbook Committee, and Teacher Education Supervisory Committee.

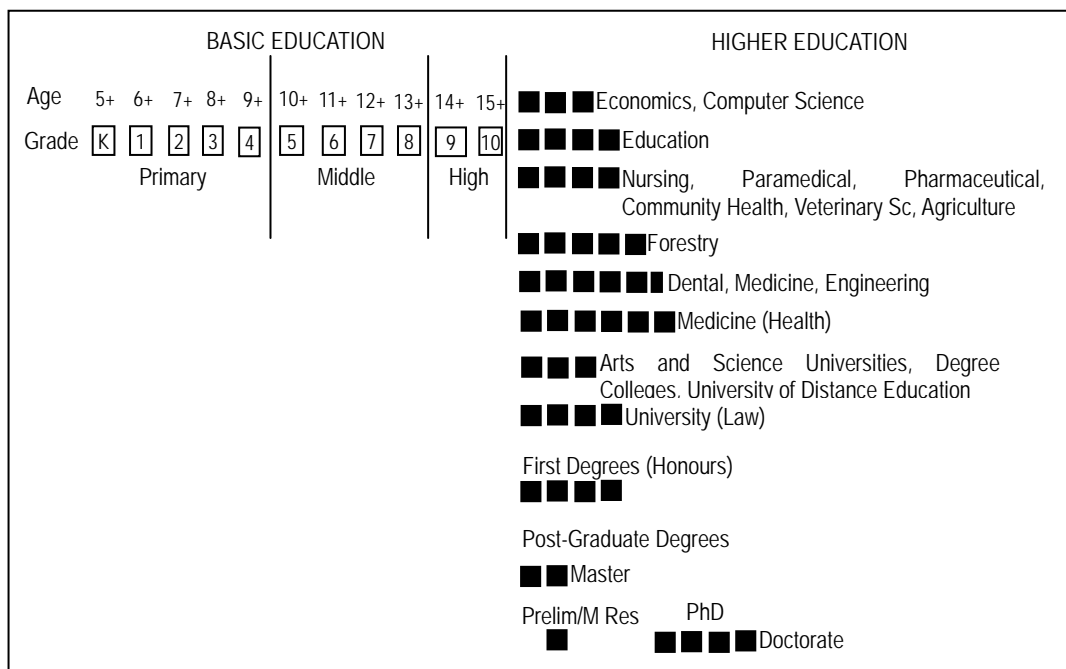
The Deputy Minister for Higher Education administers the following departments:

- Department of Higher Education (For Lower Myanmar);
- Department of Higher Education (For Upper Myanmar);
- Department of Myanmar Language Commission; and
- Universities Historical Research Center.

The functions of the departments under higher education are coordinated by the Universities Central Council, which is responsible for broad policy and coordination of the work of higher education institutions and the Council of Universities Academic Bodies, which is responsible for the adoption of academic regulations and the coordination of academic work.

Besides the MOE, the Ministry of Progress of Border Areas and National Races is responsible for education and social services in the border and ceasefire areas. The Ministry of Religious Affairs runs a parallel system of monastic schools which cater primarily to poor children in the communities, including orphans and those from remote areas.

#### 4) Structure and Organization of the Education System



K : Kindergarten  
Source: UNESCO-IBE, 2010/11

**Figure 2.1.37: Structure of the Myanmar Education System (2007)**

##### 1) Basic Education

At present, the structure of basic education is 5-4-2, that has five years of primary school education, four years of middle school education, and two years of high school education. One feature of this structure is that kindergarten is taken to be part of the primary education cycle and, in fact, it constitutes the first year of the primary school. In effect, a child receives 11 years of schooling (kindergarten and Grades I-X) before entering higher education. The 11 years of basic education culminate in the matriculation examination, which is conducted annually in the middle of March on a nationwide scale and administered by the Myanmar

Board of Examinations. Students who do pass the matriculation examination are eligible to enter any university and institute according to their choices and total examination scores. A Myanmar child starts his or her schooling at the age of five and takes his or her matriculation examination at the age of 16. The school year at the basic education level consists of 36 school weeks and is divided into two semesters.

**Table 2.1.42: Primary School Entrance Age and Duration of Schooling by Level**

Primary School Entrance Age	Duration of Schooling (Years)		
	Primary School (Kindergarten and Grade I-IV)	Middle School (Grade V-VIII)	High School (Grade IX-X)
5	5	4	2
Official commencement date for schools: Every 1 <sup>st</sup> of June			

Source: JICA Study Team, based on the "Seminar on Education in Myanmar" that was held at the Australian National University, Centre for UNESCO, presented by Professor Han Tin on March 31, 2004.

All schools in Myanmar are government-operated. The existing Private Tuition Law of 1984 does not allow a private school to operate without following the basic education curriculum (Education and Vocational Training Issues and Strategies, Myanmar, 2011). However, recently, there has been an increase in privately-funded schools (which specialize in English) such as ILBC, Nelson, Summit, Horizon, and others with their own curriculum, not following the national curriculum. Students who attend these private schools are neither eligible to sit for the matriculation examination, nor allowed to enroll in any university. Generally, enrolment and monthly fees in these private schools are very expensive, and mostly, have to be paid in foreign currency. Even though the certificates of these private education institutions are not recognized by the government, wealthy people prefer to send their children there instead of sending them to a government school.

## 2) Higher Education

The higher education system is entirely state-run, and its universities and colleges are organized along their fields of studies. While the majority of educational institutions are under the jurisdiction of the Ministry of Education, the responsibility for higher education is shared among 13 other ministries and the Public Service Selection and Training Board. There are a total of 156 higher education institutions in Myanmar in 2008 as shown in Table 2.1.43.

**Table 2.1.43: Number of Higher-Education Institutions in Myanmar (2008)**

Ministry		Number
1	Education	64
2	Health	14
3	Science and Technology	56
4	Defense	5
5	Culture	2
6	Forestry	1
7	Agriculture and Irrigation	1
8	Livestock, breeding and fisheries	1
9	Cooperatives	5
10	Public Service Selection and Training Board	1
11	Religious Affairs	2
12	Progress of Border Areas and National Races	1
13	Transport	3
Total		156

Source: Han Tin, 2008

5) Basic Education Profile of Yangon Region

1) *Education Statistics by Level*

The basic education statistics by level of education is shown below.

**Table 2.1.44: Schools, Teachers, and Students in Yangon Region**

	2007-2008			2008-2009			2009-2010		
	Schools	Teachers	Students	Schools	Teachers	Students	Schools	Teachers	Students
Primary Schools	2,256	18,475	545,109	2,256	18,975	562,406	2,261	17,389	557,325
Middle Schools	249	10,237	305,682	249	9,971	302,738	251	11,191	309,927
High Schools	164	3,767	129,199	165	3,735	128,625	166	4,384	126,862

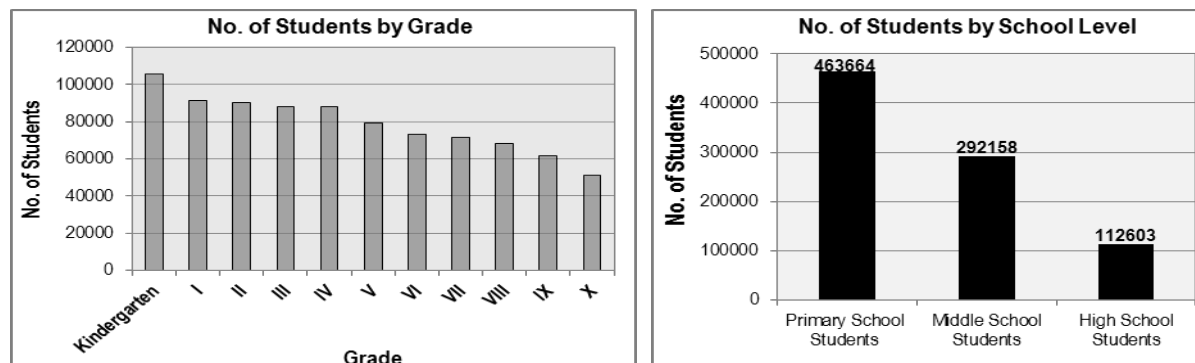
Remarks: Years refer to academic year (June to March)

Source: Myanmar Statistical Yearbook, 2010

2) *Student Enrolment Rate and Number of Schools*

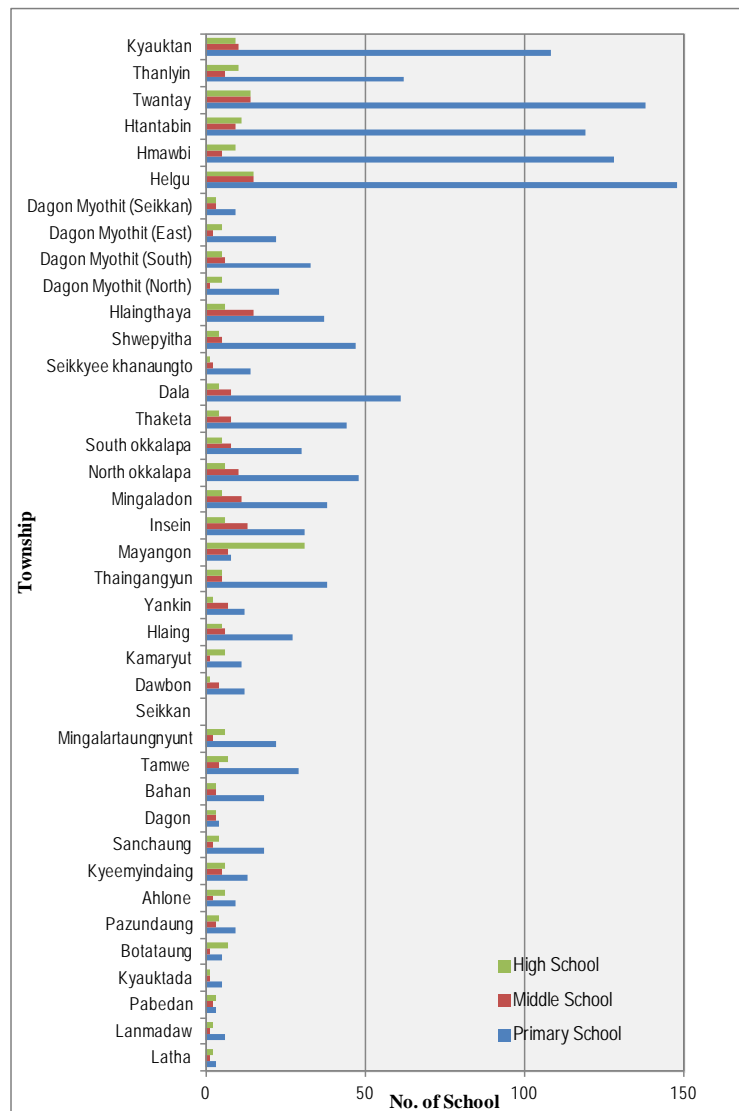
The student enrolment rate in Yangon Region for AY2012-2013 can be seen in Figure 2.1.38. Furthermore, Figure 2.1.39 represents the number of primary schools, middle schools, and high schools in each township of Yangon Region.

It can be observed that there is a difference in the number of students enrolled at primary schools (463,664) and the number of students enrolled at middle schools (292,158). This is further highlighted by the disparity between the total number of primary schools (1392) and total number of middle schools (211). These are indicators of a fairly large dropout rate after the completion of the primary education cycle.



Source: Data from the Department of Basic Education (3), 2012

**Figure 2.1.38: Basic Education Enrolment (AY 2012-2013)**



Source: Data from the Department of Basic Education (3), 2012

**Figure 2.1.39: Schools by Township (2012)**

### 3) Post-Primary Schools and Branch Schools

In most poor and rural areas, there are only primary schools but no middle and high schools located in their communities. In accordance with the 30-Year Long-Term Basic Education Development Plan, aiming at providing opportunities for students who have completed primary education to pursue middle school education conveniently, and increasing the transition rate from primary to middle school, some suitable government primary schools have been upgraded to post-primary schools, which means that these schools now offer education up to Grade VIII as well.

Branch schools are essentially part of the main school but located closer to the homes of children living far away from the main school. This is a great benefit for primary/middle school graduates to continue their studies.

Currently, there are 141 post-primary schools, 38 branch high schools, and 26 branch middle schools in Yangon Region. The number of schools by township is shown in Table 2.1.45.



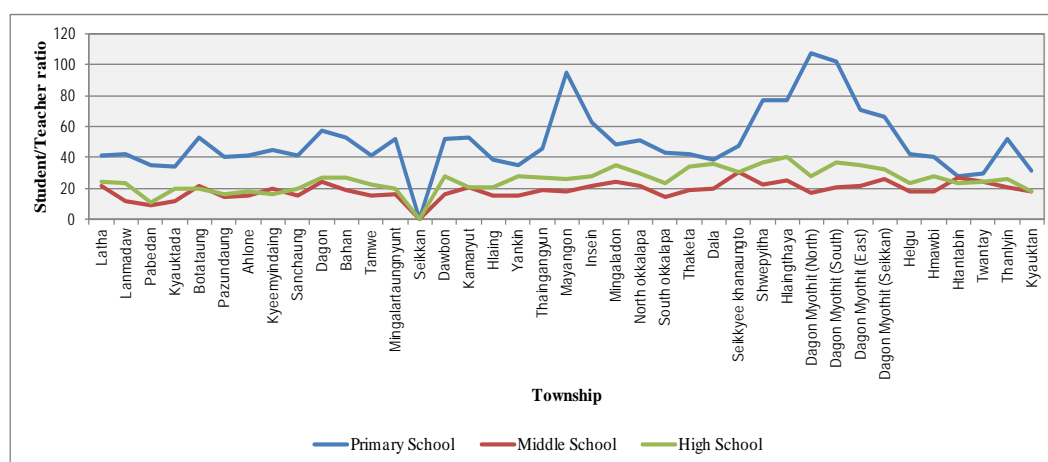
**Table 2.1.45: Post-Primary, Branch, and Affiliated Schools (AY 2011-2012)**

Township	Number of Schools	Number of Students	Number of Teachers
(a) Post-Primary Schools			
Mingalar Taung Nyunt	6	3,217	97
Thingangyun	4	1,989	62
Mingalardon	12	7,753	216
North Okkalapa	1	799	26
Thaketa	1	694	20
Seikgyikhanaungto	4	1,114	32
Shwe Pyi Thar	9	6,368	167
South Dagon	15	16,013	385
East Dagon	7	4,822	109
Hlegu	29	9,428	287
Hmawbi	31	10,806	339
Htantabin	22	4,765	151
(b) Branch Middle School			
Yankin	1	258	12
Mingalardon	1	579	15
North Okkalapa	2	3,090	63
Shwe Pyi Thar	3	3,362	86
South Dagon	3	6,147	136
Hlegu	10	4,369	134
Htantabin	6	2,062	67
(c) Branch High School			
North Okkalapa	1	1,390	53
Thaketa	1	1,562	48
Shwe Pyi Thar	1	2,555	69
North Dagon	2	3,602	100
South Dagon	2	5,401	121
East Dagon	3	4,701	121
Dagon Seikkan	1	1,498	32
Hlegu	10	9,469	321
Hmawbi	7	7,766	247
Htantabin	10	6,939	207

Source: Data from the General Administrative Department, Ministry of Home Affairs, 2011

#### 4) Service Delivery

To measure the workload and availability of teachers to their students, the students to teacher ratio is calculated for each level of education. Figure 2.1.40 represents students to teacher ratios for different levels of education (i.e., primary, middle, and high) in each of the townships of Yangon Region.



Source: Data from the Department of Basic Education (3), 2012

**Figure 2.1.40: Student-Teacher Ratio for Primary, Middle, and High Schools in Each Township of Yangon Region (AY 2012-2013)**

The highest student to teacher ratio in primary school is found in North Dagon Township with 107 students per teacher, while the lowest ratio is in Htantabin Township with 28 students per teacher.

The highest student to teacher ratio in middle schools is found in Dagon Seikkan and Htantabin townships with 27 students per teacher, while the lowest ratio is in Pabedan Township with nine students per teacher.

The highest student to teacher ratio in high school is found in Hlaing Thayar Township with 40 students per teacher, while the lowest is in Pabedan Township with 11 students per teacher.

On the average, the student to teacher ratio in primary school is 50:1, which is more than the international norm for the Southeast Asian Region of 26.5 students per teacher (UNESCO Institute for Statistics, 2008). On the other hand, the average student to teacher ratio in the middle school is 18.8 which is less than the international norm for the Southeast Asian Region of 22.8 students per teacher.

In the Myanmar Education for All (EFA) National Action Plan (2003-2015), the targets for the student to teacher ratio of primary school and middle school are 30:1 and 27:1, respectively. Therefore, the current situation for primary schools is still under the target level.

5) *Summary of Basic Education*

**Table 2.1.46: Schools, Teachers and Students per 1000 population**

Township	No. of School/1000 population	No. of Teacher/1000 population	No. of Students/1000 population
Latha	0.18	6	161
Lanmadaw	0.21	4	74
Pabedan	0.21	4	57
Kyauktada	0.20	3	53
Botataung	0.26	10	271
Pazundaung	0.30	4	79
Ahlon	0.26	5	109
Kyee Myin Daing	0.21	4	104
Sanchaung	0.23	4	85
Dagon	0.41	17	563
Bahan	0.24	4	121
Tarmwe	0.21	4	84
Mingalar Taung Nyunt	0.19	3	81
Seikkan	0.00	0	0
Dawbon	0.19	3	99
Kamaryut	0.20	5	134
Hlaing	0.25	4	92
Yankin	0.17	3	68
Thingangyun	0.21	4	117
Mayangone	0.22	4	163
Insein	0.16	4	136
Mingalardon	0.19	4	146
North Okkalapa	0.19	5	146
South Okkalapa	0.22	4	96
Thaketa	0.22	4	116
Dala	0.40	4	127
Seikgyikhanaungto	0.44	5	175
Shwe Pyi Thar	0.19	4	152
Hlaing Tharyar	0.12	4	158
North Dagon	0.13	4	113
South Dagon	0.12	4	143
East Dagon	0.20	4	143
Dagon Seikkan	0.12	3	130
Kyauktan	1.03	8	192
Thanlyin	0.38	5	174

Hlegu	0.83	7	207
Hmawbi	0.74	7	192
Htantabin	1.11	7	191
Twantay	0.78	7	191

Source: JICA Study Team based on Data from Department of Basic Education (3), 2012

6) Higher Educational Profile of Yangon Region

Table 2.1.47 presents the statistics on higher education in Yangon Region. As evident from government official figures of 2012, there are a total of 24 universities (undergraduate and postgraduate) with almost 250,000 students and have students to teacher ratio of 20.83 on average.

Among all the students pursuing higher education, 82.79% are studying arts and sciences, business and laws, while 12.81%, the second largest number of students by field of education, are in engineering and computer sciences.

Furthermore, it is interesting to see that distance learning programs are quite popular. The University of Distance Education, which offers distance learning degree, has the highest number of students among all universities in Yangon Region. Majority of students enroll in the University of Distance Education with the aim of getting a degree without disruption in their jobs.

**Table 2.1.47: Number of Universities, Teachers, and Students (2012)**

Area	Township	University	Affiliation	Number of Teachers	Number of Students
CBD	Latha	University of Public Health	Ministry of Health	16	91
	Lanmadaw	University of Nursing	Ministry of Health	150	748
		Institute of Medicine (1)	Ministry of Health	417	4,312
	Pabedan				
	Kyauktada				
	Botahtaung	National Management College	Ministry of Education	16	689
Inner Urban Ring	Pazundaung				
	Ahlong				
	Kyee Myin Daing				
	Sanchaung				
	Dagon				
	Bahan				
	Tarmwe				
	Mingalar Taung Nyunt				
Outer Ring	Kamaryut	Institute of Economics	Ministry of Education	189	10,196
		Institute of Education	Ministry of Education	134	5,076
		University of Distance Education	Ministry of Education	151	150,681
		University of Foreign Languages	Ministry of Education	168	2,046
		University of Yangon	Ministry of Education	693	2,409
	Hlaing				
	Yankin				
Thingangyun	University of Dental Medicine	Ministry of Health	141	831	
Northern Suburbs	Mayangone				
	Insein	Yangon Technological University	Ministry of Science and Technology	121	637
		University of Medical Technology	Ministry of Health	68	607
	Mingalardon	Institute of Defense Services Medicine	Ministry of Defense	NA	NA
Older Suburbs	North Okkalapa	University of Pharmacy	Ministry of Health	62	622
		University of Medicine (2)	Ministry of Health	386	3,600
	South Okkalapa				

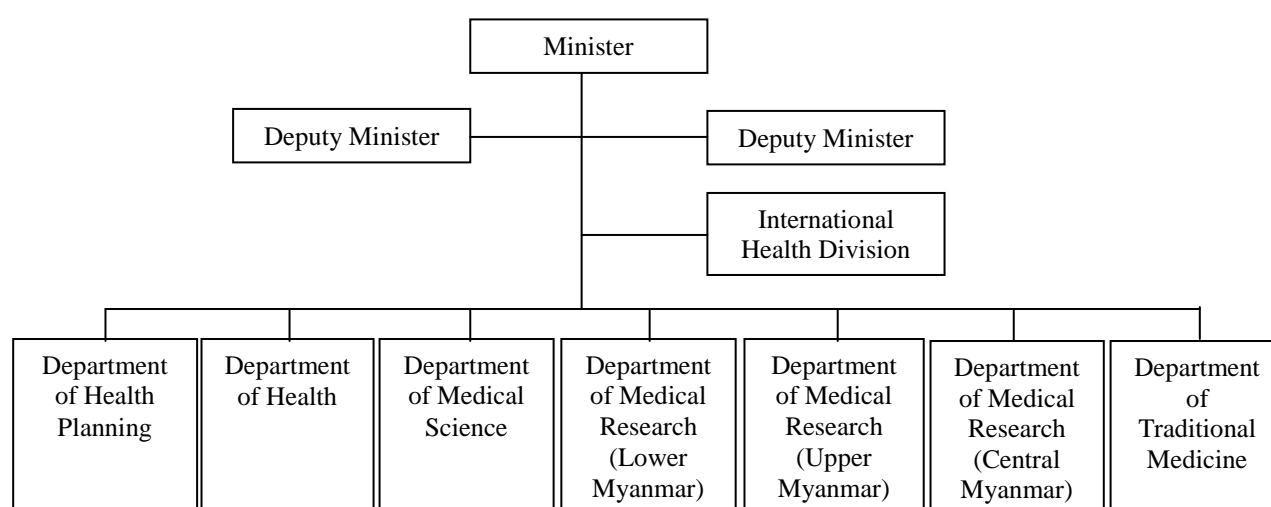
Area	Township	University	Affiliation	Number of Teachers	Number of Students
South of CBD	Thaketa				
	Dala				
	Seikyikhanaungto				
New Suburbs	Shwe Pyi Thar	University of Computer Studies (Yangon)	Ministry of Science and Technology	149	630
	Hlaing Thayar	West Yangon Technological University	Ministry of Science and Technology	175	10,648
	North Dagon				
	South Dagon	University of Culture	Ministry of Culture	NA	NA
	East Dagon	Dagon University	Ministry of Education	1,019	17,618
	Dagon Seikkan				
Periphery Area	Kyauktan				
	Thanlyin	Technological University (Thanlyin)	Ministry of Science and Technology	202	10,219
		University of East Yangon (Tarwa)	Ministry of Education	460	8,677
		Myanmar Maritime University	Ministry of Transport	132	2,244
	Helgu				
	Hmawbi	Technological University (Hmawbi)	Ministry of Science and Technology	181	7,148
Htantabin	University of West Yangon	Ministry of Education	353	6,369	
Twantay					

Source: Ministry of Science and Technology (As of October 2012)  
 Department of Higher Education (Lower Myanmar) (As of 5<sup>th</sup> October 2012)  
 Department of Medical Science, Ministry of Health, Nay Pyi Taw (As of 12<sup>th</sup> October 2012)  
 Myanmar Maritime University (As of 14<sup>th</sup> November 2012)

## (2) Health Services in Myanmar

### 1) National Health Administration

The Ministry of Health (MOH) is a central government organization administering health affairs and health care in Myanmar, which include all the medical schools. MOH is headed by the Union Minister who is assisted by two Union deputy ministers. The ministry has seven functioning departments, and each is headed by a Director-General. All these departments are further divided according to their functions and responsibilities. The administration structure is shown in Figure 2.1.41.



Source: Health in Myanmar 2011, Ministry of Health

**Figure 2.1.41: Organizational Structure of the Ministry of Health (MOH)**

The responsibilities of each department are as follows:

- Department of Health Planning:

The Department of Health Planning is responsible for formulating the National Health Plan and for supervision, monitoring and evaluation of the National Health Plan implementation. The department also compiles health data and disseminates health information.

- Department of Health:

The Department of Health is responsible for providing health care services to the entire population in the country.

- Department of Medical Science:

The department is responsible for the production of all categories of health personnel with the aim to strengthen the development of human resources for health and equip them with advanced technologies to deliver health care to the people.

- Department of Medical Research (Lower, Central, and Upper Myanmar):

The department is responsible to organize research in various fields, promote research capability, and support researchers from health institutes, universities, and other departments under MOH.

- Department of Traditional Medicine:

The department is responsible to provide comprehensive traditional medicine services through existing health care system in line with the National Health Plan. It is also responsible to review and explore means to develop safe and efficacious new therapeutic agents and medicine and to produce competent traditional medicine practitioners.

Some ministries such as those of Defense, Rail Transport, Home Affairs and Labour, are also providing health care, mainly curative, for their employees and their families.

Existing health laws can be categorized as follows; a) health laws for promoting or protecting health of the people, b) health laws concerned with standard, c) quality and safety of care, d) laws relating to social organizations, and e) the law for which focal ministry is Ministry of Home Affairs (Table 2.1.48). Majority of current health laws are related with the public health law promulgated in 1972 although the government has recently enacted some health laws.

**Table 2.1.48: Health Laws in Myanmar**

(a) Health Laws for Promoting or Protecting Health of the People		
Public Health Law	1972	Concerned with the protection of people's health by controlling the quality and cleanliness of food, drugs, environmental sanitation, epidemic diseases, and regulation of private clinics.
National Drug Law	1992	Enacted to ensure the people safe access to efficacious drugs by licensing in relation to manufacturing, storage, distribution, and sale of drugs.
Prevention and Control of Communicable Diseases Law	1995 Revised in 2011	Concerned with functions and responsibilities of health personnel and citizens in relation to prevention and control of communicable diseases
Traditional Drug Law	1996	Concerned with labeling, licensing and advertisement of traditional drugs to promote traditional medicine and drugs as well as to enable public to consume genuine quality, safe, and efficacious drugs.
National Food Law	1997	Enacted to enable the public to consume food of genuine quality, free from danger. And to control and regulate the production, import, export, storage, distribution and sale of food systematically.
Control of Smoking and Consumption of Tobacco Product	2006	Enacted to protect the public by creating tobacco smoke-free environment, and to implement measures in conformity with the

Law		international convention ratified to control smoking and consumption of tobacco product.
<b>(b) Health Laws concerned with Standard, Quality, and Safety of Care</b>		
Dental and Oral Medicine Council Law	1989 Revised in 2011	Concerned with licensing and regulation of dental and oral medicines.
Law relating to the Nurse and Midwife	1990 Revised in 2002	Concerned with the registration, licensing, and regulation of nursing and midwifery practices.
Eye Donation Law	1996	Concerned with the establishment of National Eye Bank Committee and its functions and duties, and measures to be taken in the process of donation and transplantation.
Myanmar Medical Council Law	2000	Describes the formation, duties and powers of Myanmar Medical Council and the rights of the members, registration certificate of medical practitioners and their rights, medical practitioner license, duties and their rights.
Traditional Medical Council Law	2000	Describes the formation, duties and powers of the traditional medical council, registration of the traditional medical practitioners and duties.
Blood and Blood Products Law	2003	Describes measures to be taken in the process of collection and administration of blood
Body Organ Donation Law	2004	Enacted to enable saving the life of the person who is required to undergo body organ transplant. To enable to carry out research relating to body organ transplant and to obtain assistance from government, international organizations, NGOs, and individuals in body organ transplant.
Law relating to Private Health Care Services	2007	Enacted to enable private health care services to be carried out systematically as an integrated part in the national health care system.
<b>(c) Laws relating to Social Organizations</b>		
Myanmar Maternal and Child Welfare Association Law	1990 Revised in 2010	Describes structure, objectives, membership and formation, duties and powers of Central Council and its executive committee
<b>(d) The following law is also related to the health sector through the Ministry of Home Affairs as the focal ministry.</b>		
Narcotic Drugs and Psychotropic Substances Law	1993	Related to control of drug abuse and describes measures to be taken against those who break the law.

Source: Health Policy, Legislation and Plans, MOH, 2011

## 2) National Health Development Plans

Health is one of the priorities in the national agenda. With the national social objective of uplifting the health status of the entire nation, MOH is systematically developing health plans, aiming towards Health for All as its goal. The National Health Policy was developed with the initiative and guidance of the National Health Committee in 1993. The Rural Health Development Plan (2002-2006) seeks to address the disparities in health and health services between urban and rural areas.

The “Myanmar Health Vision 2030” (2001-2002 to 2030-2031) of the 30-year Long-term Health Development Plan has been drawn up to meet present and future health challenges of the country. The plan encompasses a wide gamut of national objectives, i.e., political, economic, and social, of the country. The main components of the plan are:

- Health Policy and Law
- Health Promotion
- Health Service Provision
- Development of Human Resources for Health
- Promotion of Traditional Medicine
- Development of Health Research

- Role of Co-operative, Joint-Ventures, Private Sectors, and NGOs
- Partnership for Health System Development
- International Co-operation

The MOH has formulated the National Health Plan (2006-2011) within the objective frame of the second five-year period of the Myanmar Health Vision 2030. The main components of the plan are:

- Community Health Care
- Disease Control
- Hospital Care
- Environmental Health
- Health System Development
- Human Resources for Health
- Health Research
- Traditional Medicine
- Food and Drug Administration
- Laboratory Service
- Health Promotion
- Health Information System

Furthermore, the National Health Plan (2011-2016), at its third stage for the five-year period of the Myanmar Health Vision 2030, is now in the process of formulation through a series of meetings and workshops.

### 3) Health Service Delivery

Generally, health services in Myanmar are provided by both public and private providers. At present, there are specialist hospitals, general hospitals, teaching hospitals, state/regional hospitals, district hospitals, and township hospitals in urban area of Yangon, Mandalay, and some large cities.

The population residing in rural areas is covered by station hospitals, which are basic medical units with essential curative elements. Rural health centers (RHCs) and sub-rural health centers (SRHCs) are serving at the village level. Basically, RHCs are staffed by a health assistant, public health supervisor, lady health visitor, and a midwife, who are trained mainly in public health and primary health care. Each SRHC provide health care services to a cluster of five to ten villages, in which there are usually volunteer health workers with no remuneration.

At the township level, both curative and preventive health services are provided by the township health departments, which are staffed by health assistants of Grade (I) and township health nurses. In addition, township hospitals are providing health care services including laboratory, dental, and also major surgical procedures and acting as the first referral health institutions for those who require better care. More advanced secondary and tertiary health

care services are provided at the state/regional hospitals, as well as at the central and teaching hospitals which are usually equipped with modern diagnostic and therapeutic facilities.

Most of the RHCs and SRHCs are not open to in-patients. On the other hand, public specialized hospitals, township hospitals and station hospitals are usually open to in-patients and to out-patients most of the time.

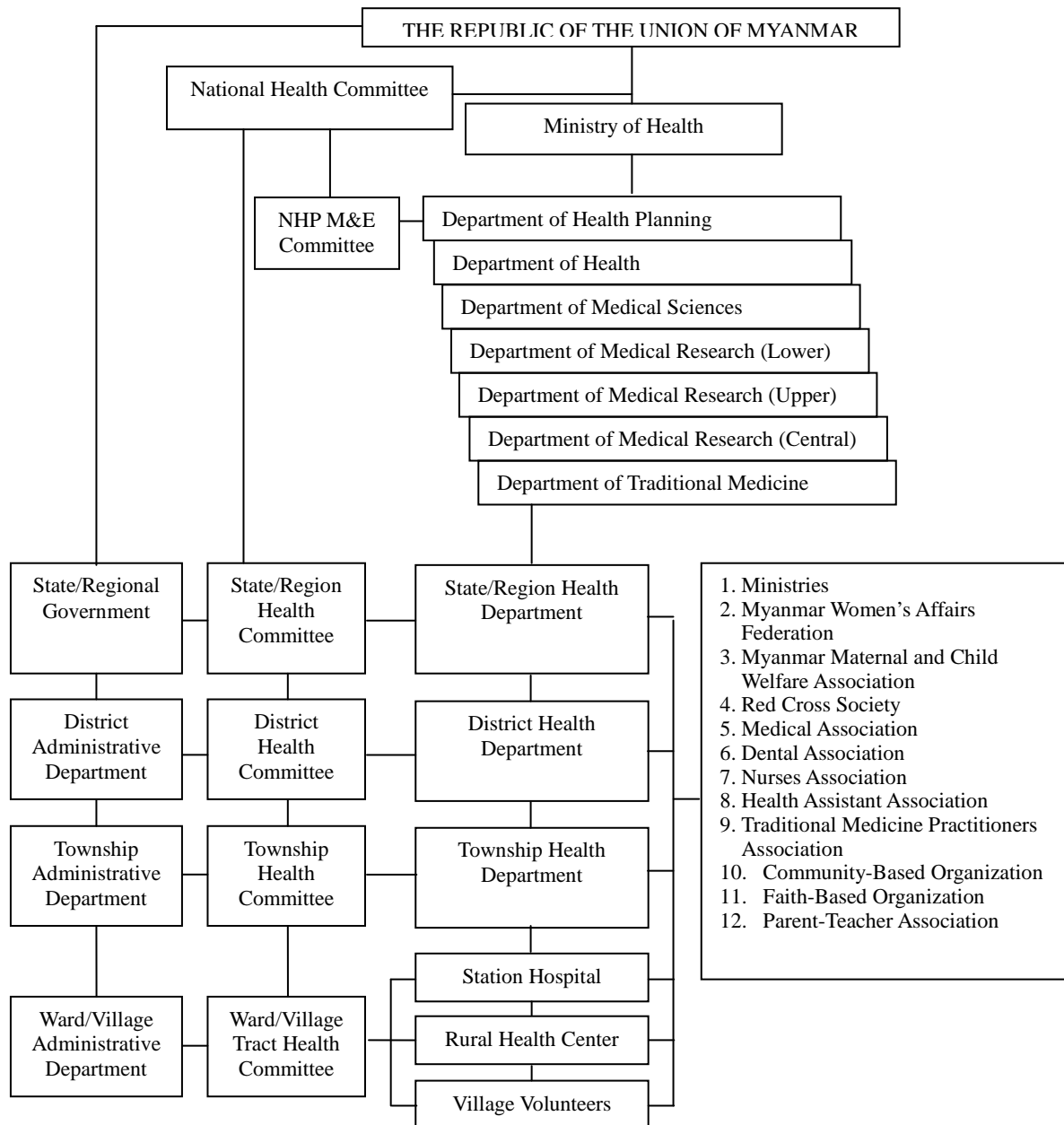
Private hospital and private health care services have been legally allowed to be registered during 2010 according to the Law relating to Private Health Care Services adopted in 2007. In line with the National Health Policy, some non-governmental organizations (NGOs) are also taking important roles in health service provision. MOH has signed memorandums of understanding with 30 international NGOs and 14 local NGOs on collaboration in health development as shown in Table 2.1.49. Furthermore, traditional medicine also plays an important role in the public health system. The government accords high importance and provides considerable support to traditional medicine. The organization of health service delivery in Myanmar is described in the following Figure 2.1.42.

**Table 2.1.49: NGOs Working in Myanmar**

International Non-Governmental Organizations	Local Non-Governmental Organizations
Association of Medical Doctors of Asia (AMDA)	Myanmar Maternity and Child Welfare Associations (MMCWA)
Action Contre La faim (ACF)	Myanmar Red Cross Associations
Adventist Development and Relief Agency (ADRA)	Myanmar Women's Affairs Federation (MWAF)
Aide Medicale International (AMI)	Myanmar Academy of Medical Science
Association of Francois-Xavier Bagnoud (AFXB)	Myanmar Medical Association (MMA)
Artsen Zonder Genzen (AZG) MSF-Holland	Myanmar Medical Council
Asian Harm Reduction Network (AHRN)	Myanmar Traditional Medicine Council
Alliance International HIV/AIDS	Myanmar Traditional Medicine Practitioners Association
Burnet Institute Australia	Myanmar Dental Association (MDA)
CARE Myanmar	Myanmar Dental Council
Cooperation and Svilu – ppo onlus (CESVI)	Myanmar Nurses Association (MNA)
Humanitarian Services International (HIS)	Myanmar Nurses Council
International Organization Migration (IOM)	Myanmar Health Assistant Association
International Union against TB and Lung Diseases (IUATLD)	Myanmar Anti-narcotic Association
Latter Day Saint Charities, USA	
Malteser (Germany)	
Marie Stops International (MSI)	
Medecines du Monde (MDM)	
Medecins Sans Frontieres – Switzerland (MSF-CH)	
Merlin	
Pact Myanmar	
Partners International Solidarity Organization	
Population Services International (PSI)	
Progetto Continenti	
Save the Children (UK)	
Save the Children (US)	
Save the Children (Japan)	
Terre des homes (TDH)	
World Concern (WC)	
World Vision International	

Source: Health Statistics, Ministry of Health, 2012





Source: Myanmar Health Care System, Ministry of Health, 2011

**Figure 2.1.42: Organization of Health Service Delivery**

#### 4) Resources and Support Systems

##### 1) Health Financing

The major sources of finance for health care services are the government, private households, social security system, community contributions, and external aids. Government has increased health spending on both current and capital expenditure yearly. Total government health expenditure increased from MMK 464.1 million in 1988-1989 to MMK 86,547 million by the end of 2010-2011.

**Table 2.1.50: Government Health Expenditures**

	1988-89	2007-08	2008-09	2009-10	2010-11 (End of March)
Health Expenditure (MMK Million )					
(a) Current	347.1	38,368.1	41,362.7	47,275	60,096
(b) Capital	117.0	10,379.2	10,080.7	16,521	26,451
Total	464.1	48,747.3	51,443.4	63,796	86,547
Per Capita Health Expenditure (MMK)	11.8	847.8	881.2	1,078.9	1,447.7

Source: Health Statistics, Ministry of Health, 2012

Social security scheme was implemented in accordance with the 1954 Social Security Act by the Ministry of Labour. According to the Law on Factories, state-owned/private/foreign/joint venture workshops and enterprises which have over five employees must provide the employees with social security coverage. The contribution is tri-partite with 2.5% by the employer, 1.5% by the employee of the designated rate while the government contribution is in the form of capital investment. Insured workers under the scheme are provided free medical treatment, cash benefits, and occupational injury benefit. To implement the scheme effectively, branch offices, workers' hospitals, dispensaries and mobile medical units have been established nationwide (Health in Myanmar 2012, MOH).

## 2) Health Workforce

Under the leadership of MOH, the Department of Medical Science is responsible for training and production of all categories of human resources for health care services. Health-related universities in Myanmar include four medical universities, two dental universities, two nursing universities, two universities of medical technology, two universities of pharmacy, one university of public health, one university of community health, 46 nursing and midwifery training schools all over the country (Health in Myanmar 2012, MOH).

The types of health personnel produced are doctors, dental surgeons, nurses (including specialty nurses), radiographers, medical lab technicians, physiotherapists, pharmacists, dental technicians, and basic health workers such as health assistants, public health supervisors Grades I and II, lady health visitors, and midwives who are the cornerstones for the implementation of rural health development programme.

## 5) Health Profile in Yangon Region

### 1) Trend of Health Facilities in Yangon Region

Table 2.1.51 outlines the development of health facilities in Yangon Region from 2005 to 2010. Furthermore, the availability and utilization of hospital services in the region are described in Table 2.1.52.

**Table 2.1.51: Development of Health Facilities in Yangon Region (2005~2010)**

Year (April- March)	Specialist Hospital		General Hospital						Total		Dispensaries
			With Specialist Services		Other		Station				
	No.	Scheduled bed	No.	Scheduled bed	No.	Scheduled bed	No.	Scheduled bed	No.	Scheduled bed	
2005 -2006	10	3,900	8	3,220	29	1,187	26	416	73	8,723	63
2006 -2007	11	4,050	8	3,720	28	1,105	26	416	73	9,291	60
2007 -2008	12	4,100	8	3,720	31	1,171	24	384	75	9,375	60
2008 -2009	12	4,100	8	3,720	31	1,180	26	416	77	9,416	63
2009 -2010	11	4,050	8	3,720	32	1,130	27	432	78	9,332	58

Source: Myanmar Statistical Yearbook 2010

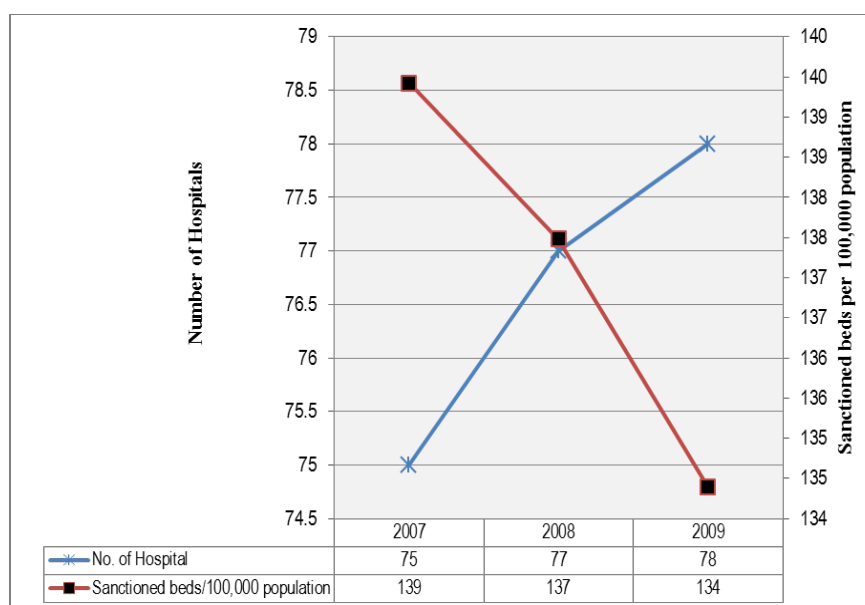
**Table 2.1.52: Availability and Utilization of Hospital Services (2007-2011)**

Hospital Service Indicators	2007	2008	2009	2010	2011
Number of population (,000)	6,724	6,849	6,944	NA	6,214
Number of hospitals	75	77	78	NA	NA
Number of sanctioned beds	9,375	9,416	9,332	NA	NA
Total Number of out- patients	NA	188,734	186,534	288,811	300,387
Total Number of in- patients	NA	52,876	66,921	71,899	81,540
Total Number of discharges	NA	48,982	61,093	66,227	64,363
Total Number of abortions	NA	2,637	3,259	3,272	5,997
Total Number of deaths	NA	1,011	1,277	1,329	1,128
Total Number of delivery	NA	10,129	15,209	16,057	31,633
Average Number of in-patient per day	NA	652	809	873	766
Average Number of out-patient per day	NA	813	815	1,165	1,127
Average duration of stay	NA	5	5	5	4
Bed occupancy rate (Sanctioned Beds)	NA	40.94	44.73	44.2	39

Source: Myanmar Statistical Yearbook, 2010

Health Profile, Yangon Region Department of Health, 2012

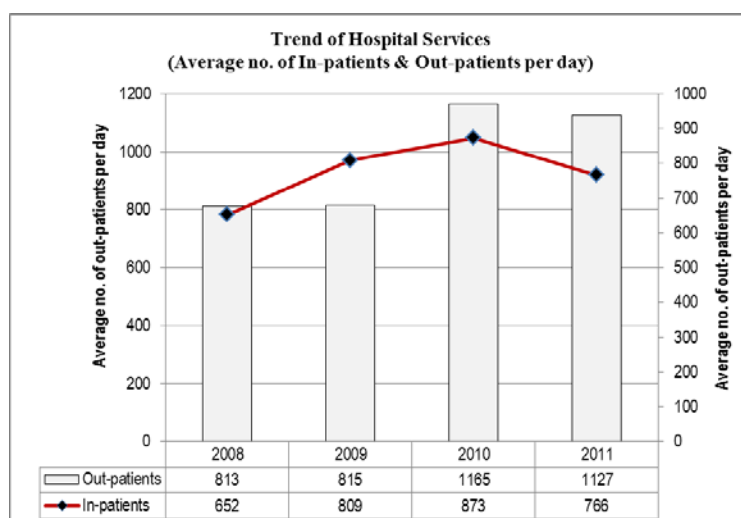
Figure 2.1.43 shows the trend in the number of hospitals and sanctioned beds per 100,000 population. Although the number of hospitals is at an increasing trend, the number of sanctioned beds does not coincide with the said trend in terms of per 100,000 population.



Source: Data from Health Profile, Yangon Region Department of Health, 2012 and Myanmar Statistical Yearbook 2010

**Figure 2.1.43: Number of Hospitals and Sanctioned Beds per/100,000 Population**

The trend of hospital services on the average number of in-patients and out-patients per day from 2008 to 2011 is described in Figure 2.1.44. The average number of in-patients per day increased after the year 2008 in public hospitals up to 2010. Similarly, the out-patient visits also gradually increased from 2008 onwards.



Source: Data from Health Profile, Yangon Region Department of Health, 2012

**Figure 2.1.44: Trend of Hospital Services (Average Number of In-patients and Out-patients per Day)**

2) *Health Service Indicators by Yangon Region*

Table 2.1.53 outlines the distribution of health facilities by type in Yangon Region. In addition, Table 2.1.54 describes the various types of hospitals in accordance with the sanctioned and available beds.

**Table 2.1.53: Distribution of Health Facilities by Type (2012)**

Type of Health Facilities	Number
Specialist Hospitals	9
General Hospitals	15
District Hospital	1
Township Hospitals	20
Station Hospitals	28
Primary Urban Health Centers	28
Secondary Urban Health Centers	22
Rural Health Centers (Main)	77
Rural Health Centers (Sub)	402
Maternity and Child Health Centers	15
School Health Centers	12
Community Nutrition Centers	25
Indigenous Medicine Centers	43
Diseases Campaigns	4
Private Clinics and Hospitals	2,887

Source: Health Profile, Yangon Region, Department of Health, 2012

**Table 2.1.54: Hospital Service Indicators (2012)**

Hospital Category	Name of Hospital	Level	Sanctioned Beds	Available Beds	% of Bed Occupancy based on Sanctioned Beds (2008)
Specialist Hospitals	Aung San Tuberculosis Hospital	Central Level	300	250	14
	Central Women's Hospital	Central Level (Teaching Hospital)	800	850	32
	Ear, Nose and Throat Hospital	Central Level (Teaching Hospital)	150	150	32
	Eye Hospital	Central Level	150	150	38
	Infectious Diseases Hospital (Waibargi Specialist Hospital)	Central Level	200	250	33
	Mingalardon Specialist Hospital	Central Level	50	50	82
	Mental Health Hospital (Psychiatric Hospital)	Central Level (Teaching Hospital)	1,200	700	69
	National Rehabilitation Hospital	Central Level	50	50	81
	Orthopaedic Hospital	Central Level (Teaching Hospital)	400	242	48
	South Okkalapa Women and Children Hospital	Regional Level	150	200	37
	T.B Hospital (Htantabin) (**)	District Level	100	100	5
	Yangon Children's Hospital	Central Level (Teaching Hospital)	550	604	115
General Hospitals with Specialist Services	East Yangon General Hospital	Regional Level (Teaching Hospital)	200	280	70
	Insein General Hospital	Central Level	300	360	93
	New Yangon General Hospital	Central Level (Teaching Hospital)	220	220	75
	North Okkalapa General Hospital	Central Level	800	800	54
	Thingangyun San Pya Hospital	Central Level	300	430	113
	West Yangon General Hospital	Regional Level (Teaching Hospital)	200	264	70
	Workers' Hospital(**)	Central Level (Teaching Hospital)	200	244	39
	Yangon General Hospital	Central Level (Teaching Hospital)	1,500	1,392	67
150-Bedded Hospitals	Thanlyin People's Hospital	District Level	150	170	31
100-Bedded Hospitals	Yangon University Hospital	Regional Level	100	100	1
50-Bedded Hospitals	Bahan Women's Hospital	Regional Level	50	50	NA
	Buddha Sanga Hospital	Regional Level	50	50	1
	C.P.S.I. Phaunggyi (**)	NA	50	50	10
	Dagon University Hospital	Regional Level	50	50	NA
	Hmawbi People's Hospital	Township Level	50	57	98
	Hlegu People's Hospital	Township Level	50	60	42
	Insein Jail Hospital (**)	NA	50	50	701
	Insein Railway Hospital (**)	NA	NA	NA	NA
25-Bedded Hospitals	North Dagon People's Hospital	Township Level	25	40	113
	South Dagon People's Hospital	Township Level	25	40	36
	Dala People's Hospital	Township Level	25	31	49
	Hlaing Tharyar People's Hospital	Township Level	25	45	120
	Htantabin People's Hospital	Township Level	25	30	33
	Kyauktan People's Hospital	Township Level	25	68	67
	Seikgyikhanaungto People's Hospital	Township Level	25	25	44
	Shwe Pyi Thar Hospital	Township Level	25	36	100
	Thaketa Hospital	Regional Level	25	30	11
	Twantay People's Hospital	Township Level	25	50	40

Hospital Category	Name of Hospital	Level	Sanctioned Beds	Available Beds	% of Bed Occupancy based on Sanctioned Beds (2008)
16-Bedded Hospital	East Dagon People's Hospital	Township Level	16	18	23
	Dagon Seikkan People's Hospital	Township Level	16	16	12
Station Hospitals	Bawlai (Htantabin)	Station Level	16	16	NA
	Dabein (Hlegu)	Station Level	16	16	7
	Dayzat (Thanlyin)	Station Level	16	16	26
	Hleseik (Htantabin)	Station Level	16	16	11
	Hnethamain (Htantabin)	Station Level	16	16	12
	Hpoogyi (Hmawbi)	Station Level	16	18	18
	Kayinchaung (Twantay)*	Station Level	16	16	NA
	Khatiya (Twantay)	Station Level	16	16	41
	Lay daunt kan (South Dagon)	Station Level	16	16	11
	Mayan chaung (Hlegu)	Station Level	16	16	3
	Mee pya (Kyauktan)	Station Level	16	16	1
	Nyaung Hnapin (Hmawbi)	Station Level	16	16	NA
	Phaunggyi (Hlegu)	Station Level	16	20	17
	Pyawbwegyi (Dala)	Station Level	16	16	29
	Wanetchaung (Hmawbi)	Station Level	16	16	18
Tadar (Kyauktan)	Station Level	16	16	21	
Yakhainggyaung (Dala)	Station Level	16	16	8	

Remark: (\*) Newly establish hospital; (\*\*) Under other ministries  
(\*\*\*) Teaching hospitals: For clinical training of undergraduate as well as post graduate students, 10 hospitals in Yangon are designated as affiliated teaching hospitals.

Source: Department of Health, Ministry of Health, as of October 17, 2012  
Health Profile, Yangon Region Department of Health, 2012  
Annual Hospital Statistics Report 2008

From the above Table 2.1.54, it can be seen that among the specialist hospitals, Yangon Children's Hospital has bed occupancy of over 100%. In case of general hospitals with specialist services, Thingangyun San Pya Hospital has bed occupancy rate of over 100%. Other hospitals also attained more than 50% bed occupancy rate except for Workers' Hospital.

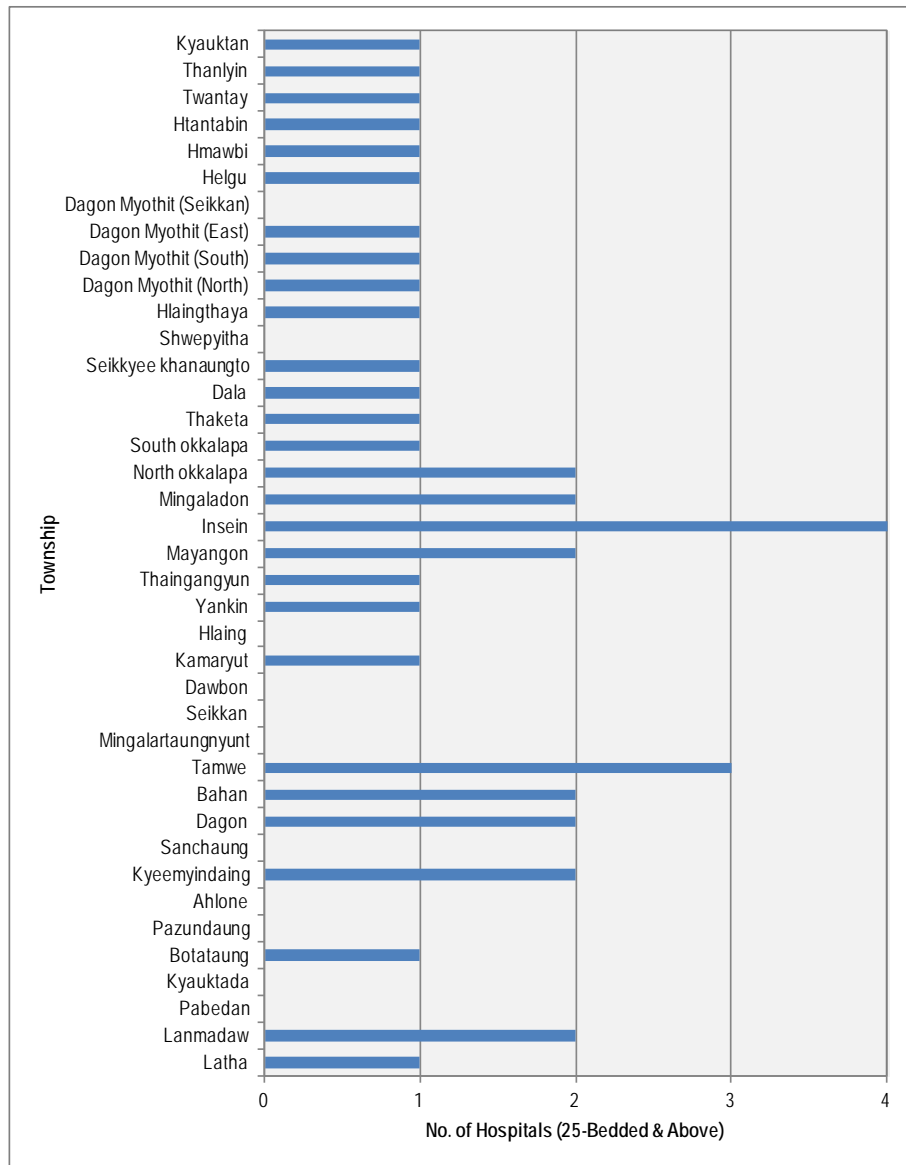
### 3) *Health Service Indicators by Township*

The health facilities in each township within Yangon Region are summarized in Table 2.1.55. In addition, the distribution of 25-bedded and above hospitals by township is illustrated in Figure 2.1.45.

**Table 2.1.55: Distribution of Health Facilities by Type by Township (2012)**

Area	Township	Central Level Hospital	200-Beded Hospitals	150-Beded Hospitals	100-Beded Hospitals	50-Beded Hospitals	25-Beded Hospitals	Sub-Township Hospital	Station Hospital	Rural Health Center (Main)	Rural Health Center (Sub)	School Health Center	Maternity and Child Health Centers	TOTAL
CBD	Latha	1												1
	Lanmadaw	1												1
	Pabedan													
	Kyauktada													
	Botahtaung		1									1		2
	Pazundaung													
Inner Urban Ring	Ahlonge	1												1
	Kyee Myin Daing	1	1							1	4			7
	Sanchaung													
	Dagon	1												1
	Bahan					1								1
	Tarmwe	2										1		3
	Mingalar Taung Nyunt											1		1
	Seikkan													
Outer Ring	Dawbon										1			1
	Kamaryut				1							1		2
	Hlaing													
	Yankin											1		1
Northern Suburbs	Thaingangyun													
	Mayangon	1				1								2
	Insein	2									2	1	1	6
Older Suburbs	Mingalardon				1		1			2	17	1		22
	North Okkalapa	2										1		3
	South Okkalapa			1										1
South of CBD	Thaketa					1								1
	Dala						1		2	3	17		1	24
New Suburbs	Seikgyikhanaungto						1				2			3
	Shwe Pyi Thar						1			1	8			10
	Hlaing Tharyar						1		1	1	5			8
	North Dagon						1							1
	South Dagon						1		1	2	9			13
	East Dagon	1				1	1			1	4			8
Periphery Area	Dagon Seikkan						1				3			4
	Kyauktan						1	1	1	9	36		1	52
	Thanlyin			1					1	4	22	1	2	37
	Helgu					1			3	8	38	1	1	41
	Hmawbi					1			3	5	27		1	44
	Htantabin						1		3	6	30		1	31
	Twantay						1		2	6	33	1	1	49

Source: Department of Health, Ministry of Health, 2012



Source: Data from General Administrative Department, Ministry of Home Affairs, 2011

**Figure 2.1.45: Distribution of (25-Bedded and Above) Hospitals by Townships (2011)**

4) *Private Health Care Services by Township*

At present, 40 private hospitals (34 general hospitals and six specialist hospitals), 2,816 general clinics, and 192 special clinics have been licensed to provide health services to the community. The detailed statistics by each township is presented in the following Table 2.1.56.



**Table 2.1.56: Private Health Care Services (2012)**

Area	Township	General Clinics	Specialist Clinics	General Hospitals	Specialist Hospitals	TOTAL
CBD	Latha	20	11	-	-	31
	Lanmadaw	45	15	2	1	63
	Pabedan	44	33	-	1	78
	Kyauktada	31	5	1	-	37
	Bothtaung	26	7	1	-	34
	Pazundaung	44	1	-	-	45
Inner Urban Ring	Ahlonge	39	7	1	-	47
	Kyee Myin Daing	65	6	-	-	71
	Sanchaung	81	8	3	1	93
	Dagon	11	2	-	-	13
	Bahan	67	7	5	-	79
	Tarmwe	123	8	1	-	132
	Mingalar Taung Nyunt	79	8	-	-	87
	Seikkan	-	-	-	-	0
Outer Ring	Dawbon	51	-	1	-	52
	Kamaryut	60	11	3	3	77
	Hlaing	86	7	-	-	93
	Yankin	62	5	-	-	67
Northern Suburbs	Thingangyun	102	6	1	-	109
	Mayangon	96	11	2	-	109
	Insein	121	11	3	-	135
Older Suburbs	Mingalardon	71	2	-	-	73
	North Okkalapa	171	9	2	-	182
	South Okkalapa	94	3	2	-	99
South of CBD	Thaketa	152	4	-	-	156
	Dala	31	-	-	-	31
New Suburbs	Seikgyikhanaungto	4	-	-	-	4
	Shwe Pyi Thar	57	-	-	-	57
	Hlaing Tharyar	119	1	2	-	122
	North Dagon	107	2	3	-	112
	South Dagon	91	1	-	-	92
	East Dagon	29	-	-	-	29
Periphery Area	Dagon Seikkan	20	-	-	-	20
	Kyauktan	23	1	-	-	24
	Thanlyin	39	-	1	-	40
	Hlegu	14	-	-	-	14
	Hmawbi	23	-	-	-	23
	Htantabin	-	-	-	-	0
	Twantay	18	-	-	-	18

Source: Department of Health, Ministry of Health, 2012

5) Summary of Health Services Facilities

**Table 2.1.57: Health Services Facilities (Public & Private) (2012)**

Area	Township	Public	Private	TOTAL	Health Service Facilities/1000 population
CBD Area	Latha	1	31	32	0.94
	Lanmadaw	1	63	64	1.48
	Pabedan		78	78	2.08
	Kyauktada		37	37	1.06
	Botataung	2	34	36	0.73
	Pazundaung		45	45	0.84
Inner City	Ahlon	1	47	48	0.73
	Kyeemyindaing	7	71	78	0.67
	Sanchaung		93	93	0.88
	Dagon	1	13	14	0.57
	Bahan	1	79	80	0.79
	Tarmwe	3	132	135	0.71
	Mingalartaungnyunt	1	87	88	0.56
	Seikkan		0	0	0.00
Outer City	Dawbon	1	52	53	0.61
	Kamaryut	2	77	79	0.90
	Hlaing		93	93	0.62
	Yankin	1	67	68	0.54
Old Suburbs	Thaingangyun		109	109	0.47
	Mayangon	2	109	111	0.54
	Insein	6	135	141	0.45
	Mingaladon	22	73	95	0.33
	North okkalapa	3	182	185	0.55
	South okkalapa	1	99	100	0.52
	Thaketa	1	156	157	0.62
	Dala	24	31	55	0.30
New Suburbs	Seikkyee khanaungto	3	4	7	0.18
	Shwepyitha	10	57	67	0.23
	Hlaingthaya	8	122	130	0.27
	Dagon Myothit (North)	1	112	113	0.51
	Dagon Myothit (South)	13	92	105	0.28
	Dagon Myothit (East)	8	29	37	0.25
Periphery Area	Dagon Myothit (Seikkan)	4	20	24	0.20
	Kyauktan	49	24	73	0.59
	Thanlyin	31	40	71	0.35
	Hlegu	52	14	66	0.31
	Hmawbi	37	23	60	0.31
	Htantabin	41	0	41	0.33
Twantay	44	18	62	0.29	

Source: JICA Study Team based on Data from Department of Health, Ministry of Health, 2012

6) Health Workforce in Yangon Region

Human resources in the health sector are the most important facet in delivering quality health services to the community. In this section, therefore, the current health workforce in Yangon Region is examined. The following Table 2.1.58 describes the overall health manpower, while Table 2.1.59 represents the health manpower in various types of hospitals in Yangon Region.

The largest number of doctors can be seen in general hospitals with specialist services, followed by specialist hospitals in Yangon Region. Station hospitals have an average of one doctor.

**Table 2.1.58: Health Workforce in Yangon Region (2012)**

Name of Designation	Sanctions	Appointed	Vacancies
<b>(a) Doctors</b>			
Divisional Health Director	1	1	
Deputy Divisional Health Directors	4	4	
Maternity and Children, School Officer	1	1	
Epidemiologist	1	1	
Specialist	83	61	22
Dental Specialist	5	4	1
Medical Superintendent	9	7	2
District Medical Officers	1	1	
Senior Medical Officers	4	4	
Township Medical Officers	40	36	4
Station Medical Officers	54	22	32
Township Health Officer	6	6	
Rural Health Doctors	4	2	2
Assistant Surgeons	393	272	121
Dental Surgeons	62	57	5
<b>(b) Basic Health Staff</b>			
Township Health Assistant	5	4	1
Health Assistant (1)	44	39	5
Health Assistant	94	84	10
Public Health Supervisors (1)	51	50	1
Nurses	1360	823	537
Lady Health Visitors	208	195	13
Midwives	750	635	115
Public Health Supervisors (2)	264	135	129
Vaccinators	67	2	65

Source: Health Profile, Yangon Region Department of Health, 2012

**Table 2.1.59: Health Manpower by Hospital (2012)**

Hospital Category	Name of Hospital	Health Manpower						
		Professor	Associate Professor	Consultant Specialists	Specialist Assistant Surgeon	Assistant Surgeon	Nurse	Others
Specialist Hospitals	Aung San Tuberculosis Hospital	0	0	1	0	6	35	65
	Central Women's Hospital	4	11	12	25	43	144	257
	Ear, Nose, and Throat Hospital	1	3	2	14		71	54
	Eye Hospital	1	9	5	19	1	41	58
	Infectious Diseases Hospital (Waibargi Specialist Hospital)	0	1	2	3	7	45	58
	Mingalardon Specialist Hospital	0	0	4	2	13	35	7
	Mental Health Hospital (Psychiatric Hospital)	NA	NA	NA	NA	NA	NA	NA
	National Rehabilitation Hospital	0	1	1	2	2	9	65
Orthopaedic Hospital	1	4	5	10	9	80	115	

Hospital Category	Name of Hospital	Health Manpower						
		Professor	Associate Professor	Consultant Specialists	Specialist Assistant Surgeon	Assistant Surgeon	Nurse	Others
	South Okkalapa Women and Children Hospital	0	2	1	3	10	40	56
	T.B Hospital (Htantabin) (**)	NA	NA	NA	NA	NA	NA	NA
	Yangon Children's Hospital	4	12	14	40	28	179	222
General Hospitals with Specialist Services	East Yangon General Hospital	0	15	16	11	40	129	115
	Insein General Hospital	1	11	11	13	36	18	0
	New Yangon General Hospital	1	2	11	15	36	142	146
	North Okkalapa General Hospital	32	28	33	56	79	214	237
	Thingangyun San Pya Hospital	1	13	17	20	53	138	89
	West Yangon General Hospital	0	12	12	13	54	155	79
	Workers' Hospital(**)	NA	NA	NA	NA	NA	NA	NA
	Yangon General Hospital	21	30	25	89	91	403	123
150-Bedded Hospitals	Thanlyin People's Hospital	0	0	7	4	9	18	41
100-Bedded Hospitals	Yangon University Hospital	0	0	0	0	5	5	23
50-Bedded Hospitals	Bahan Women's Hospital	0	0	0	0	2	16	11
	Buddha Sanga Hospital	0	0	0	0	2	3	13
	C.P.S.I. Phaunggyi (**)	NA	NA	NA	NA	NA	NA	NA
	Dagon University Hospital	0	0	0	0	5	9	13
	Hmawbi People's Hospital	0	0	0	0	6	6	18
	Hlegu People's Hospital	0	0	0	0	5	12	17
	Insein Jail Hospital (**)	NA	NA	NA	NA	NA	NA	NA
	Insein Railway Hospital (**)	NA	NA	NA	NA	NA	NA	NA
25-Bedded Hospitals	North Dagon North People's Hospital	0	0	0	0	4	8	22
	South Dagon People's Hospital	0	0	0	0	4	9	17
	Dala People's Hospital	0	0	0	0	3	13	8
	Hlaingtharyar People's Hospital	0	0	0	0	4	8	20
	Htantabin People's Hospital	0	0	0	0	4	8	13
	Kyauktan People's Hospital	0	0	0	0	5	4	21
	Seikgyikhanaungto People's Hospital	0	0	0	0	4	4	7
	Shwe Pyi Thar Hospital	0	0	0	0	5	8	17
	Thaketa Hospital	0	0	0	0	4	6	15
	Twantay People's Hospital	0	0	0	0	5	5	14
16-Bedded Hospital	East Dagon People's Hospital	0	0	0	0	2	8	14
	Dagon Seikkan People's Hospital	0	0	0	0	4	8	9
Station Hospitals	Bawlai (Htantabin)	0	0	0	0	0	2	4
	Dabein (Hlegu)	0	0	0	0	1	3	0
	Dayzat (Thanlyin)	0	0	0	0	1	3	3
	Hleseik (Htantabin)	0	0	0	0	0	2	4
	Hnethamain (Htantabin)	0	0	0	0	0	2	3
	Hpoogyi (Hmawbi)	0	0	0	0	2	2	7
	Kayinchaung (Twantay)*	0	0	0	0	2	4	0
	Khatiya (Twantay)	0	0	0	0	1	3	1
	Lay daunt kan (South Dagon)	0	0	0	0	1	1	7
	Mayan chaung (Hlegu)	0	0	0	0	0	2	3
	Mee pya (Kyauktan)	0	0	0	0	1	4	1
	Nyaung Hnapin (Hmawbi)	0	0	0	0	1	4	2
	Phaunggyi (Hlegu)	0	0	0	0	2	1	3
	Pyawbwegyi (Dala)	0	0	0	0	0	2	8
Wanetchaung (Hmawbi)	0	0	0	0	1	1	4	
Tadar (Kyauktan)	0	0	0	0	1	6	7	
	Yakhainggyaung (Dala)	0	0	0	0	0	4	11

Source: Department of Health, Ministry of Health (As of October 17, 2012)

(3) Urban Poor Community

1) Distribution of Urban Poor

Yangon is growing fast. In-bound migration to the city has increased dramatically in the past ten years. Consequently, Yangon has a large portion of impoverished population. Table 2.1.60 presents data on poverty levels in Yangon Region.

**Table 2.1.60: Poverty Levels (Yangon Region, 2010)**

Poverty Incidence ( $P_0$ )	National Poverty Share (%)	Poverty Intensity ( $P_1$ )	National Poverty Share (%)	Poverty Severity ( $P_2$ )	National Poverty Share (%)
0.161	8.1	0.023	7.1	0.0052	6.6

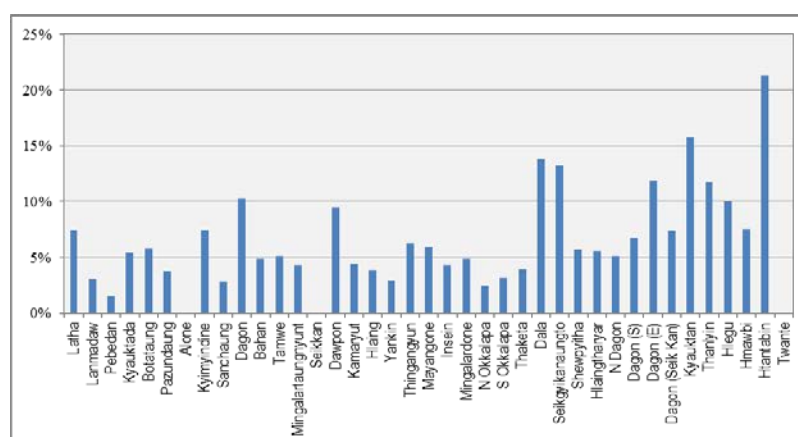
$P_0$ : percentage of the population who are poor

$P_1$ : average shortfall from the poverty line

$P_2$ : combined indicator of the extent of poverty and inequality among the poor

Source: Integrated Household Living Conditions Survey in Myanmar (2009-2010), UNDP

In this study, the poverty line used to identify poor against non-poor was defined as an earning of US\$3 per day (equivalent with MMK 75,000 per month; 6.3% of total population). This amount is for minimum subsistence food plus non-food consumption based on a UNDP project entitled “Integrated Household Living Conditions Survey in Myanmar (2009-2010)”. Based on the household interview survey (HIS) of this study, distribution of households below poverty line by township is described in the following Figure 2.1.46.



Note: Data for Seikkan Township and Twantay Township are not available.

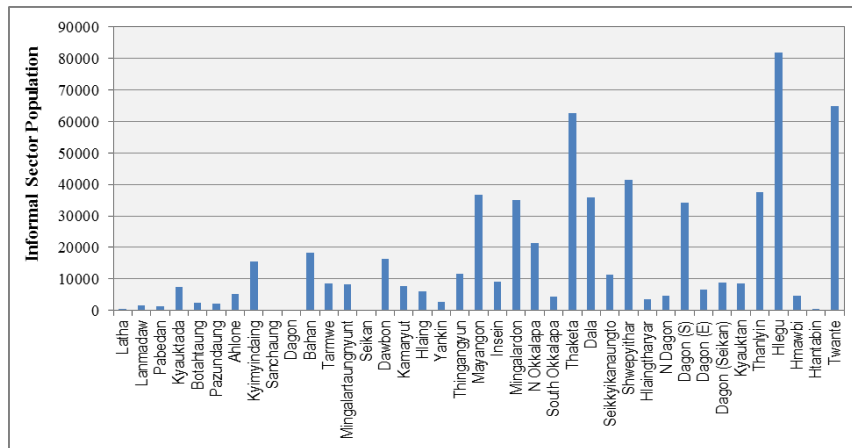
Source: Household Interview Survey, JICA Study Team (2012)

**Figure 2.1.46: Distribution of Households below Poverty Line by Township**

The above figure provides specific information about the level of poverty in each township. The number of households which fall below the poverty line are highest in Htantabin Township (21.3%), followed by Kyauktan Township (15.7%) whereas the lowest percentage (0%) are encountered in Ahlone Township.

2) Informal Sector

Most of the urban poor earn their living as day-laborers in the informal sector like street vending, construction workers, garbage collectors, field-hands, or factory workers working in occasional shift. Some children also work at ubiquitous teashops or selling cashew nuts/flower garlands at Yangon’s crowded bus stops or intersection points. The number of day-laborers by township is shown in Figure 2.1.47.



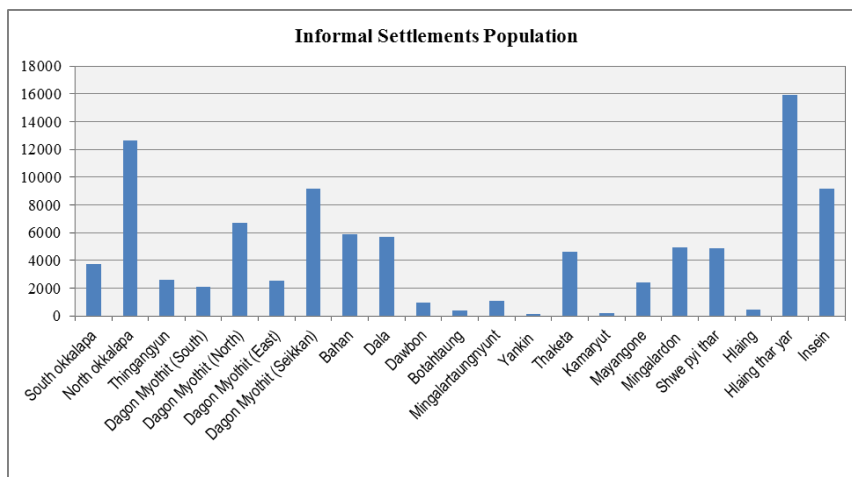
Source: Data from the General Administrative Department, Ministry of Home Affairs, 2011

**Figure 2.1.47: Informal Sector Population by Township**

The highest number of informal sector population is found in Hlegu Township, followed by Twantay Township and Thaketa Township.

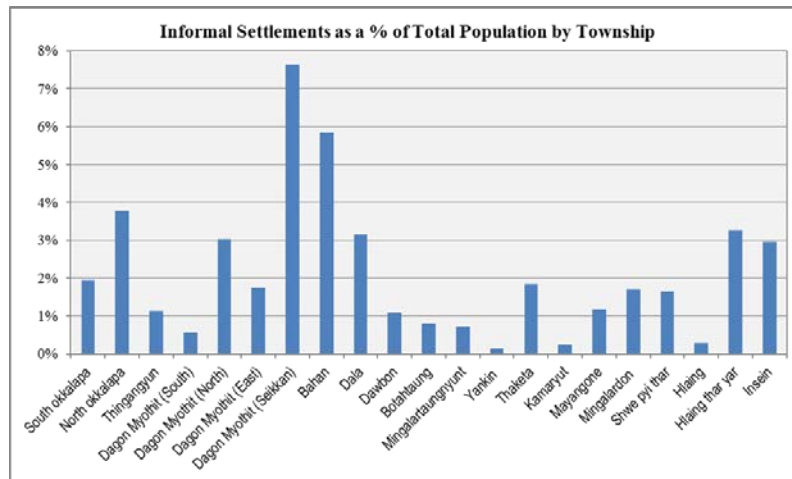
### 3) Informal Settlement

Most of the poor migrants end up living as informal settlers or living in temporary accommodations in Yangon’s urban sprawl area in its suburbs. Some informal settlers in the downtown of Yangon extend their living quarters along the railway track and others extend along river banks. These informal settlements are widely distributed within Greater Yangon. In most cases, residents of these settlements do not have any access to basic urban services and amenities. In addition, their locations are not recognized by the authorities. The distribution of informal settlers’ population among townships is described in Figure 2.1.48 and Figure 2.1.49.



Source: Data from YCDC, 2012

**Figure 2.1.48: Informal Settlements Population by Township**



Source: Data from YCDC, 2012

**Figure 2.1.49: Informal Settlements as Percentage of the Total Population of Each Township**

The number of informal settlers are maximum in Hlaing Tharyar Township and by the share to the total population, Dagon Seikkan has the highest, comprising 7.6% of the total population living as informal settlers. Yankin Township, Kamaryut Township and Hlaing Township have lower proportions of informal settlers, having less than 0.3% of the total population.

#### 4) Housing Conditions and Household Assets

A typical urban poor family of 4-7 persons live in a house with an area of about 4-5 m<sup>2</sup> made of wood and galvanized iron roof. Some use bamboo as the main construction material, instead of wood. The floor of the hut is elevated from the ground by about 1 m, supported by wooden columns. A ladder is used to enter the house. Houses are tiny, flimsy, and often prone to flooding.

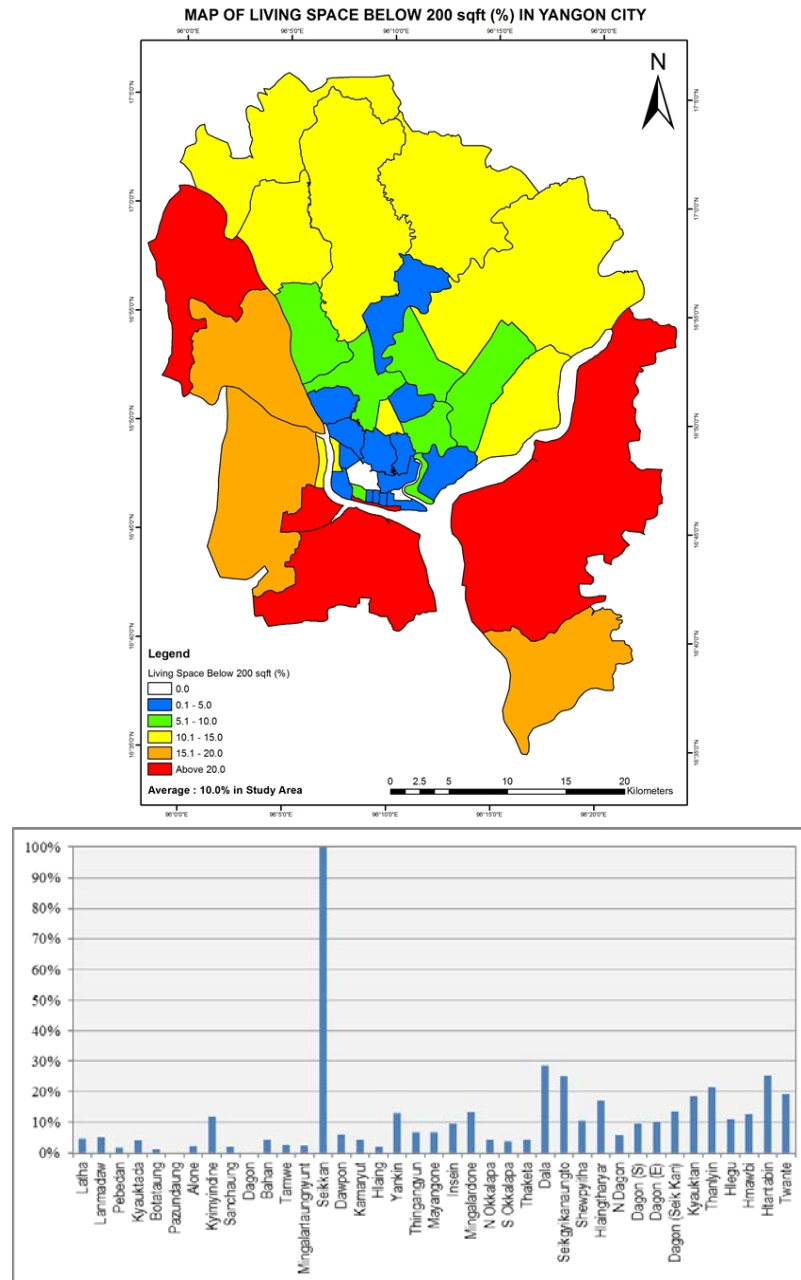


Source: JICA Study Team

**Figure 2.1.50: A House in Dala Township**

The type of material of the house can also provide information on the living conditions and poverty status of the household. The following figures are extracted from the HIS of this study.

1) Living Space



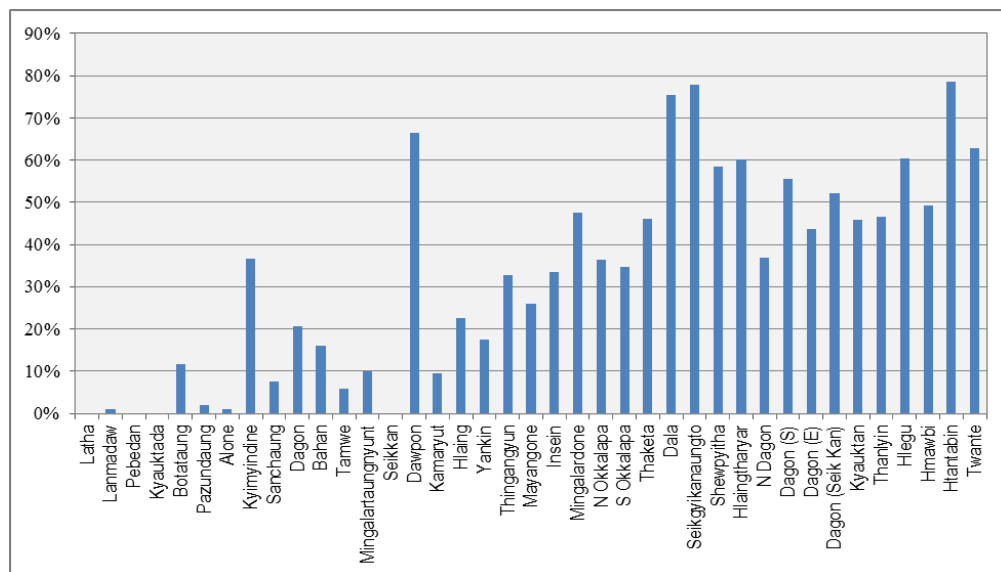
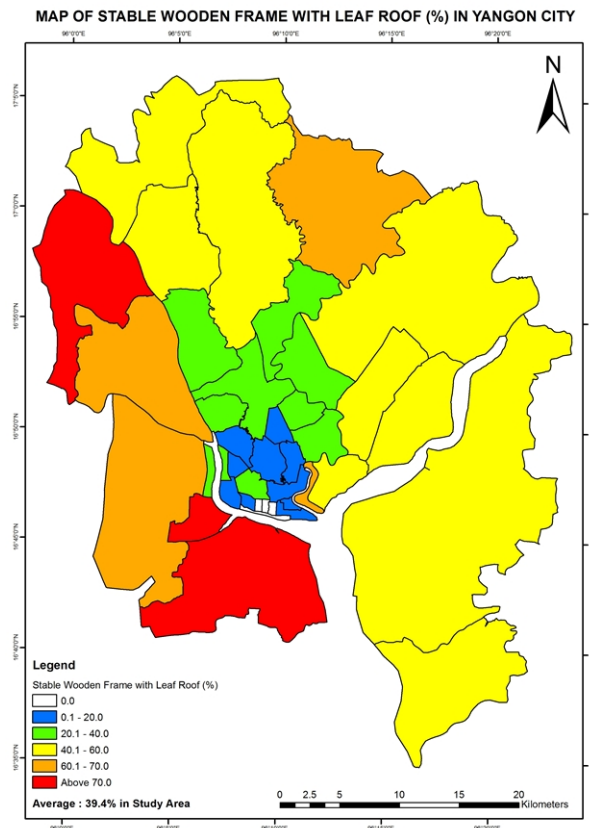
Note: Only five samples are taken from Seikkan township.  
Source: Household Interview Survey, JICA Study Team, 2012

**Figure 2.1.51: Distribution of Houses with Living Space below 200 sq. ft by Township**

Houses with living space below 200 sq.ft accounted for 9.7% on. There are large disparities between townships. All of the houses in Seikkan Township have living space below 200 sq.ft. More than 20% of houses in Dala, Htantabin, Seikgyikhanaungto, and Thanlyin townships have living spaces below 200 sq.ft. It is also interesting to observe that Pazundaung and Dagon townships do not have any house with living space below 200 sq.ft.



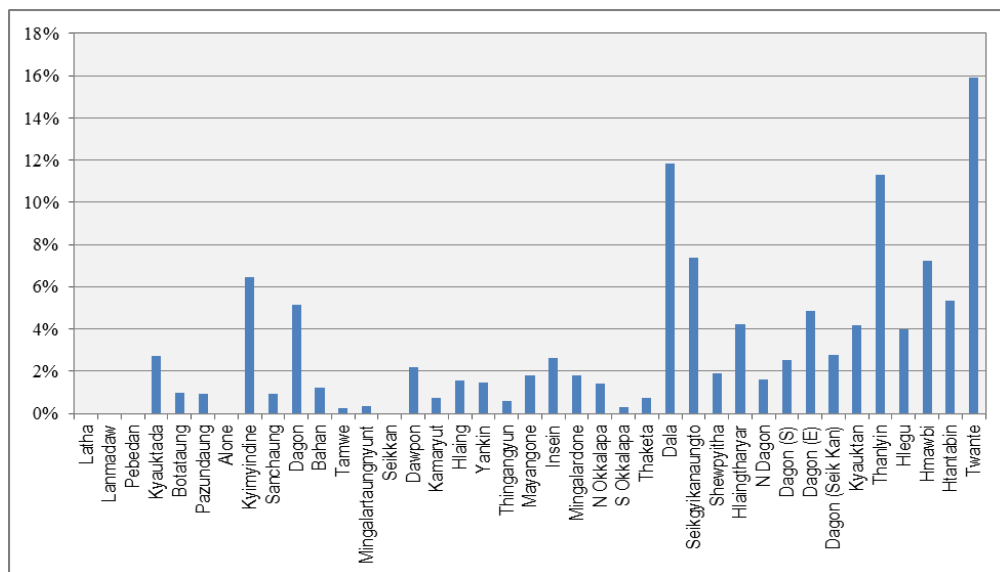
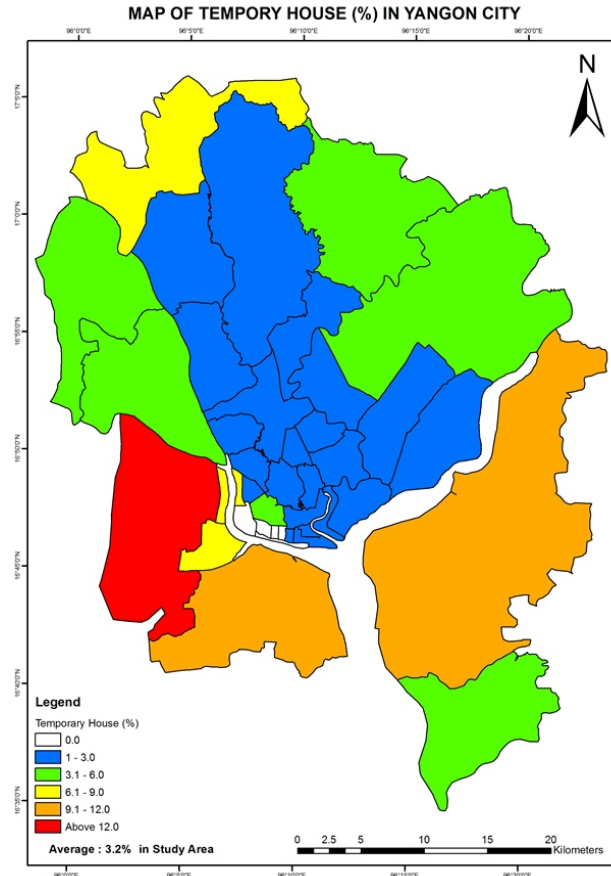
2) Structure of House



Source: Household Interview Survey, JICA Study Team, 2012

**Figure 2.1.52: Distribution of Stable Wooden Frame with Leaf Roof House Type by Township**

Stable wooden frame with leaf roof house type accounted for 39.8% in Greater Yangon. This type of house is seen highest in Htantabin Township (79%), Seikgyikhanaungto Township (78%), Dala Township (75%), followed by Dawbon Township (66%) and Twantay Township (63%). Meanwhile, in Latha, Pabedan, Kyauktada, and Seikkan townships, there are no houses of this type.



Source: Household Interview Survey, JICA Study Team, 2012

**Figure 2.1.53: Distribution of Temporary House Type by Township**

Temporary house type accounted for only 3.4% in Greater Yangon. The percentage share of temporary house type is highest in Twantay Township (16%), followed by Dala Township (12%) and Thanlyin Township (12%). However, in Latha, Lanmadaw, Pabedan, Ahlone, and Seikkan townships, there are not any temporary houses.

3) Household Assets

In Greater Yangon, 25.9% of households own landline telephone equipment and the proportion of population owning mobile phone is 53.4%. Very few households (only 9.0%) have access to internet. (See Table 2.1.61)

**Table 2.1.61: Ownership of Household Assets in the Planning Area**

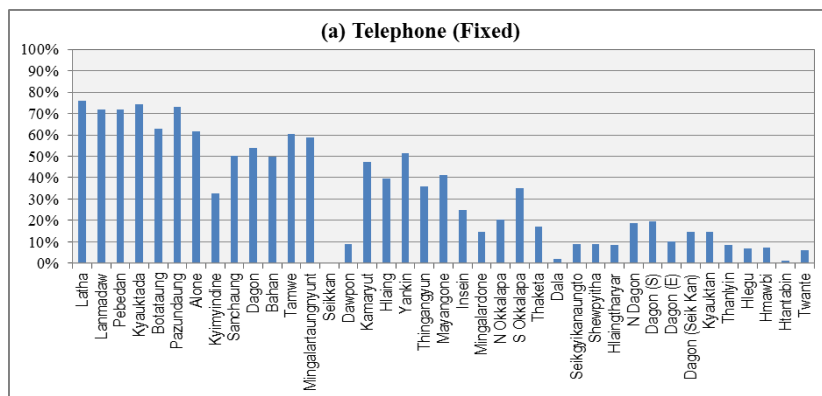
Household Assets	Percentage
Telephone (Fixed)	25.9
Mobile Phone	53.4
Internet	9.0

Source: Household Interview Survey, JICA Study Team, 2012

The highest access to landline telephone is in Latha Township with 76.1% of households owning telephone line equipment. There is no landline telephone access in Seikkan Township. (See Figure 2.1.54)

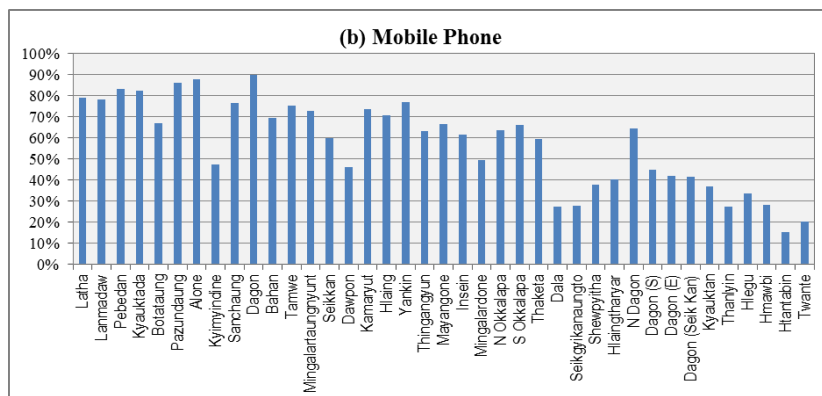
Dagon Township has the highest number of households (89.7%) which have mobile phone services. The lowest mobile phone ownership is seen in Htantabin Township which is only 15.5%. Interestingly, all townships in Yangon have coverage of mobile phone services, however, the percentage of mobile phone ownership is low, which may probably be due to high tariff. (See Figure 2.1.55)

The households in Kyauktada Township have the highest access to internet which is 32.4%. However, in areas like Seikkan, Dala, Seikgyikhanaungto, Htantabin and Twantay townships, there is no internet service at all. (See Figure 2.1.56)



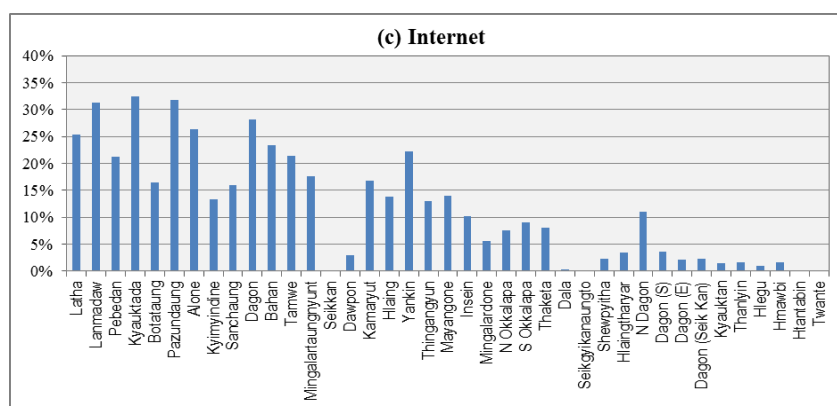
Source: Household Interview Survey, JICA Study Team, 2012

**Figure 2.1.54: Landline Telephone Ownership by Township**



Source: Household Interview Survey, JICA Study Team, 2012

**Figure 2.1.55: Mobile Phone Ownership by Township**



Source: Household Interview Survey, JICA Study Team, 2012

**Figure 2.1.56: Internet Access by Township**

#### 4) Access to Urban Services

The indicator in Table 2.1.62 is defined as the proportion of households with access to urban services.

**Table 2.1.62: Access to Urban Services in the Planning Area**

Urban Services	Percentage
Electricity	87.7
Piped Water Supply	40.0
Sewerage	44.3
Sludge Removal Service	49.0
Solid Waste Collection	72.4
Toilet Facility	99.4
Black Water Treatment	52.5
Gray Water Treatment	40.4

Source: Household Interview Survey, JICA Study Team, 2012

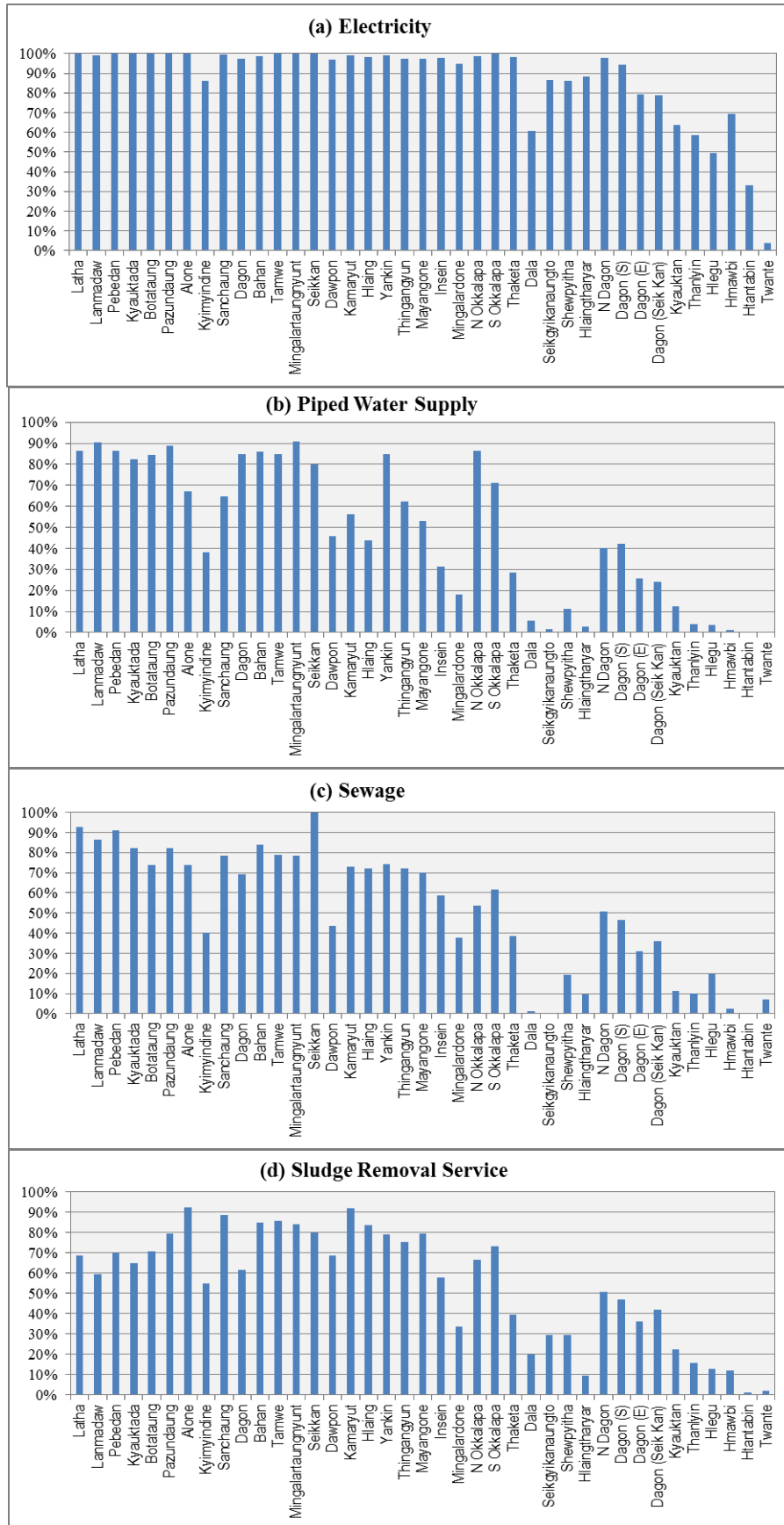
It is observed that access to piped water supply, sewerage, sludge removal service, and gray water treatment system are less than 50% in Yangon.

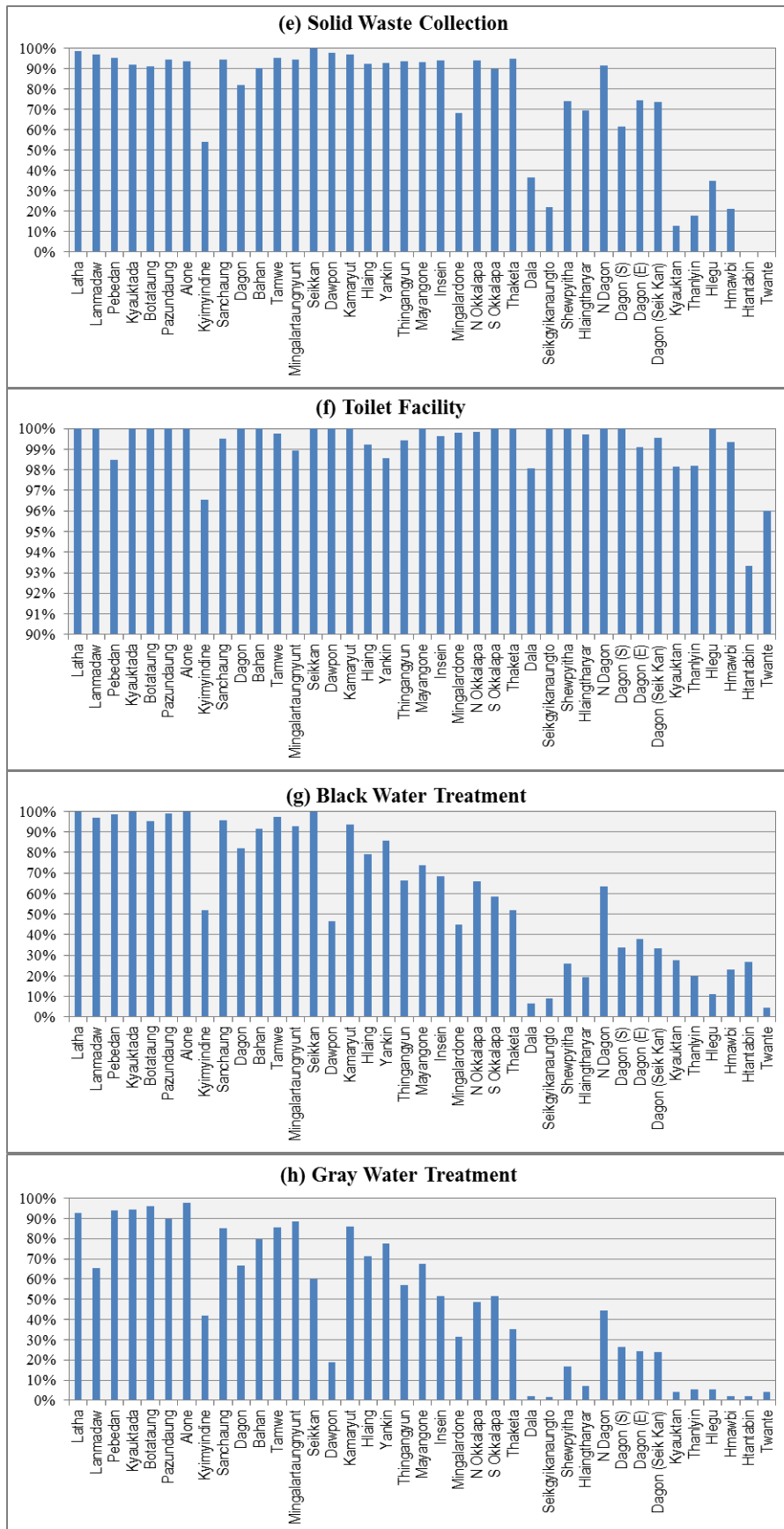
Figure 2.1.57 illustrates township-wise proportion of households which have access to urban services. It can be seen that among the urban services, most households have access to toilet facility. The townships with households having less than 10% access to urban services are summarized in Table 2.1.63 below.

**Table 2.1.63: Townships with Households Having Less than 10% Access to Urban Services**

Urban Services	Township Name
Electricity	Twantay
Piped Water Supply	Dala, Seikgyikhanaungto, Hlaing Tharyar, Thanlyin, Hlegu, Hmawbi, Htantabin, Twantay
Sewerage	Dala, Seikgyikhanaungto, Hmawbi, Htantabin, Twantay
Sludge Removal Service	Hlaing Tharyar, Htantabin, Twante
Solid Waste Collection	Htantabin, Twante
Black Water Treatment	Htantabin, Twante
Gray Water Treatment	Dala, Seikgyikhanaungto, Thanlyin, Kyauktan, Hlaingtharyar, Hlegu, Hmawbi, Htantabin, Twantay

Source: Household Interview Survey, JICA Study Team, 2012





Source: Household Interview Survey, JICA Study Team, 2012

**Figure 2.1.57: Township-Wise Proportion of Households with Access to Urban Services**

5) Education of Urban Poor Community

According to an integrated household living conditions assessment survey in 2009-2010 of the UNDP, the net school enrolment rate for children from poor households is 86.4%, which is lower than that of non-poor households at 95.0%. Financial constraints often discourage many poor parents from sending some or all of their children to school.

Monthly expenses for a student in the government-run school can range from MMK 10,000 to MMK 50,000, covering fees for school registration, books and stationary, school uniforms, exam fees, sports, library and a school fund. The school registration fee and contribution to the school fund are one-time payments, but the amount can vary depending on the school. Book fees, exam fees, and contributions to learning equipment are required on a monthly basis and when needed. There are still other miscellaneous expenses such as closing school ceremony, school festivals, etc.

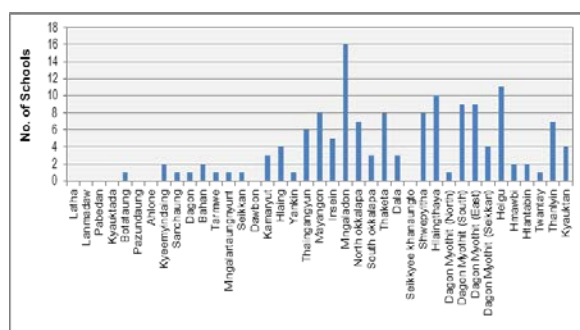
Therefore, majority of poor families could not afford to send their children to government-run schools. As a result, many of the children from these needy families and some orphans are sent to attend monastic schools where they can receive free education, free books, and free school registration. The monastic education system in Myanmar is an old one with a long history, dating back to the colonial era. Their role virtually dissipated around the 1980s, but reemerged in the 1990s and since then has filled an important educational need for urban poor communities. As there are demands from parents who want their children to receive education, the number of monastic schools has grown since 2000.

The monastic schools are registered under the Ministry of Religious Affairs and required to cooperate closely with township education authorities to be officially recognized. The schools generally follow the national curriculum, but receive no financial support from the government. Instead, they rely heavily on donations and collaboration from the local communities or, in some cases, international donors and friends. Mostly with the help of international donor organizations, some monastic schools have also managed to establish libraries with a relatively good collection of books. Teachers working at the monastic schools are voluntarily contributing their services, rather than making money. Since the schools are recognized by the government, students can either take their final exams at a government school or at their respective monastic school to acquire an officially recognized graduation certificate.

The monastic schools play an important role in terms of access to education, especially for the children coming from needy families and orphans by filling a significant gap within Myanmar's education system.

According to official government figures, monastic schools in the Yangon Region for 2011-2012 academic year, there are 51 monastic schools in 12 townships of the Eastern District, 22 monastic schools in eight townships of the Western District, 38 monastic schools in eight townships of the Southern District, and 55 monastic schools in eight townships of the Northern District (Figure 2.1.58).

Furthermore, the Child Law (1993) of Myanmar establishes the responsibility for Early Childhood Development (ECD) of children aged 0-5. The Department of Social Welfare (DSW) under the Ministry of Social



Source: General Administration Department, Ministry of Home Affairs, 2011

**Figure 2.1.58: Number of Monastic Schools (AY 2011-2012)**

Welfare (DSW) under the Ministry of Social

Welfare, Relief and Resettlement takes responsibility for ECD, through a multi-sectorial framework, which includes Early Childhood Care and Education (ECCE). The priority of the welfare policy is to provide opportunities for vulnerable groups such as poor children, children from remote, border and mountainous areas, children with disabilities, and orphans. The DSW provides assistance to orphans, abandoned children, and poor children younger than five years old in six residential nurseries in Yangon Region.

The MOE is also one of several implementing agencies in ECCE through the provision of pre-schooling for children aged 3-5 years old. UNESCO provides a conceptual framework for ECCE which includes provision of health care, immunization, feeding and nutrition, supporting new parents through information and parenting education, creating a safe environment for young children to play and socialize with their peers, compensating for disadvantage and fostering the resilience of vulnerable children and promoting school readiness and preparation of primary school.

NGOs also participate in the implementation of ECCE programs. These facilities provide help to children who cannot attend the government preschools as well as to parents by providing a venue for income generation, parenting education, awareness raising, and child health care and nutrition assistance.

#### 6) Health Services to Urban Poor Community

Generally, the healthcare system in Myanmar is funded through the government, private sectors, social security system, community contributions, and external aids. Mechanisms for protection of the poor have been recognised through the establishment of trust funds in all hospitals over the country. Interests earned from these funds are used for supporting the poor in accessing needed medical supplies and diagnostic services where user charges are practiced.

According to religious and social customs, Myanmar people are eager to provide assistance for social works. Local community and private donors contribute to curative health services in terms of cash or fulfillment for hospital needs including medical equipment especially for the poor and the aged.

In addition to the support coming from the well-wishers in the community, mobile specialist health teams take care of people in remote areas, especially the poor and the old free of charge. The costs for this service are borne by NGOs and other individual donors.

The Public Health Division under the Department of Health is responsible for primary health care and basic health services, nutrition promotion and research, environmental sanitation, maternal and child health services, and school health services. Basic health care services provided by basic health staff play a vital role in community health development. The basic health staffs down to the grassroot level are providing promotive, preventive, curative, and rehabilitative services through primary health care approach. Infrastructure for service delivery is based upon RHC and SRHC where midwives, lady health visitor, and health assistant are assigned to provide primary health care services to the rural community.

In line with the National Health Policy, NGOs such as the Myanmar Maternal and Child Welfare Association and Myanmar Red Cross Society are also taking some share in health service provision. Furthermore, some international NGOs are also taking important roles in health service provision, particularly in the areas of maternal and child health, primary health care, environmental sanitation, control of communicable diseases, rehabilitation of the disabled and border health (Table 2.1.64). The contribution of NGOs to the health development of the country is also remarkable.



The United Nations also plays a major role in contributing to health activities. The main contributors include the World Health Organization (WHO), the United Nations Children's Fund (UNICEF), the United Nations Development Program (UNDP), the United Nations Population Fund (UNFPA), and the Food and Agriculture Organization (FAO) of the United Nations.

**Table 2.1.64: International Non-Government Organizations Working in Myanmar**

Names of Organizations	Activities
Marie Stopes International (MSI)	HIV Prevention, Treatment Care and Support, MCH Service, Mobile Clinic and Drop-in RH Centers
Malteser (Germany)	Environmental Health and Safe Drinking Water, Health Centers Construction and Maintaining, Fly-root Latrine
Aide Medicale International (AMI)	HIV Prevention, Treatment Care and Support, Water and Sanitation, Health Education for MCH and RH Service
Terre des homes (TDH)	Water and Sanitation, Hygiene Promotion, Health Education and Nutrition Promotion, Reconstruction for Primary Basic Education Schools and HE for Deserter Management
Alliance International HIV/AIDS	HIV Prevention, Treatment Care and Support, Child Development Programme
Artsen Zonder Genzen (AZG) MSF-Holland	STD and HIV Prevention Treatment Care and Support, MCH and Nutrition Promotion, Supported for TB and MDR TB
Population Services International (PSI)	Sun Quality and Primary Network in 36 townships, RH, Malaria, TB, STI and HIV/AIDS Prevention, Pneumonia and Diarrhoea Control for 5-year Age Group
Partner's Myanmar	Water and Sanitation, Hygiene Promotion
Association of Freancosis-Xavier Bagnoud (AFXB)	HIV Prevention, Comprehensive Care Treatment and Supported Project
World Vision International	MCH Service, Nutrition, Water and Santitation, Immunization GE and DHF, HIV/TB Prevention and Control Measures, HE, Drugs Support for Poor Patients, Emergency Care, Promotion for Family Income
Save the Children (US, UK, Japan)	Child Health Development, External Education, PMCT, ECCD, Education Funds
Medicines du Monde (MDM)	STI and HIV Prevention
Burnet Institute Australia	HIV/AIDS Prevention, Safe Water Sanitation, Elderly Health, Environmental Health

Source: Health Profile, Yangon Region Department of Health, 2012

Indeed, reliable information about the health of the urban poor is not easily available. The nationwide Integrated Household Living Conditions Assessment in Myanmar was completed in 2009-2010 by the Ministry of National Planning and Economic Development and UNDP. Inequalities in health status and access to health services between the poor and non-poor groups for Yangon Region data are extracted from this survey (Table 2.1.65).

**Table 2.1.65: Health Status in Yangon Region (2010 Data)**

	Indicators (%)	Definition	Poverty Status		Strata		Findings
			Poor	Non-poor	Urban	Rural	
Immunization coverage	Proportion of 1-year old fully immunized against measles	-	74.0	96.3	97.6	72.2	Considerable differences in coverage between the poor and non-poor and differences between rural and urban dwellers
Maternal health	Antenatal care coverage, at least one visit	Proportion of women having given birth in the past five years who used skilled health personnel <sup>1)</sup> for antenatal care at least once during their last pregnancy	81.2	97.4	96.7	88.4	Moderate differences in access between the poor and non-poor and slight differences between rural and urban dwellers
	Births attended by skilled personnel	Proportion of births attended by skilled health personnel <sup>1)</sup>	76.6	95.3	96.6	80.4	Considerable differences between the poor and non-poor and _____ differences between rural and urban dwellers
Morbidity	Self-reported morbidity incidence	Population percentage who declared having been hospitalized, staying in bed all day, or reducing their activities because of illness or injury in the 30 days preceding the survey	5.1	4.9	5.0	5.0	Data do not reveal significant differences between the poor and non-poor, urban and rural areas
Access to health care	Physical access to health care (population %)	Those living within one hour walking distance to the hospital <sup>2)</sup> or health center <sup>3)</sup>	85.6	95.5	96.2	86.0	Slight differences in access between the poor and non-poor and moderate differences between rural and urban dwellers
Expenditure on health	Health expenditures in 2009 in MMK (Share %)	Includes insurance, in-patient stays in public or private hospitals, out-patient care in public or private facilities, home visits, dental care, care from traditional healers and other related expenses	3.8	6.4	6.6	4.8	Shares of the poor are considerably lower than non-poor as is the case with shares of rural and urban dwellers Non-poor pay close to three times the amount of the poor on health

1) Skilled health personnel include doctor, nurse, midwife, lady health visitor, and auxiliary midwife and exclude traditional birth attendants and voluntary health workers.

2) Hospital includes township hospitals, public specialized hospitals, and station hospitals.

3) Health center includes rural health centers, sub-rural health centers, and maternal and child health centers.

Source: Integrated Household Living Conditions Survey in Myanmar (2009-2010), UNDP

(4) Gender

According to cultural and traditional practices and beliefs, the communities in Myanmar are said to be male-dominated and designed to keep men in power and control. The cultural “Myanmar Word – *Phon*” which means power and glory of men creates gender hierarchy, and women are oppressed especially in social and religious spheres.

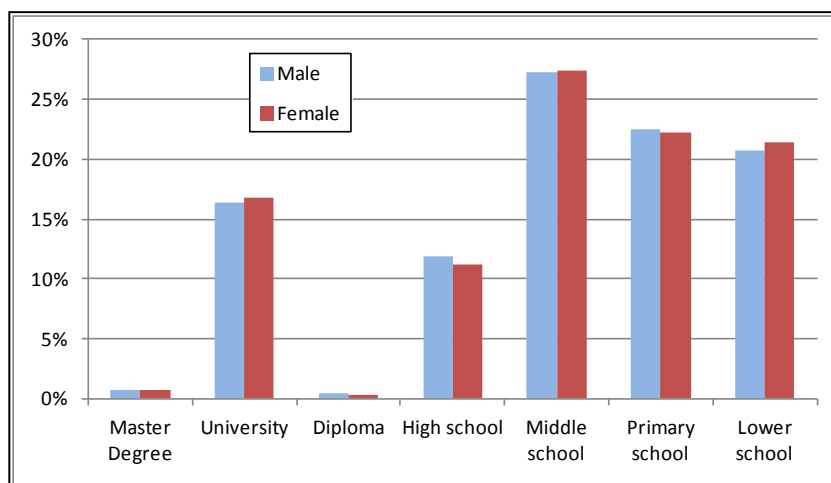
In the legal system of Myanmar, the rights of women in Myanmar are stated in the following laws;

- Marriage is governed under Myanmar Buddhist Woman Special Marriage and Succession Act 1954.
- Polygamy is permitted under Myanmar Customary Law.
- Rape is prohibited under the Penal Code.
- Abortion is punishable of up to three years imprisonment and/or payment of a fine under the Penal Code of Myanmar.
- Married Women’s Property Act protects the rights of women on property.
- Sexual harassment is not addressed in any law.

(Source: OECD Development Center)

In the 2012 Social Institutions and Gender Index, Myanmar is ranked 44 among 86 countries. The country was ranked 41 among the 102 countries in the 2009 Social Institutions and Gender Index (Source: OECD GID-DB). In 2011, the Human Development Index for Myanmar was 0.483, placing the country at 149 among 187 countries. Under the Gender Inequality Index, the country’s score is 0.492 (ranked 96 among 146 countries).

With regards to education, the UNDP project entitled “Integrated Household Living Conditions Survey in Myanmar (2009-2010) (IHLCS)” indicated that the primary school net enrolment rate in Yangon Region for male and female are 94.3% and 92.5%, respectively. The literacy rate of 15-24 years old for male is 98.4% and female is 95.5%. The educational attainment by gender obtained from Household Interview Survey (HIS) of this study is described in Figure 2.1.59. Based on these data, it is observed that there is no significant gender discrimination in the Myanmar Education System.



Source: Household Interview Survey, JICA Study Team, 2012

**Figure 2.1.59: Education Attainment by Gender (2012)**

However, the data on labor force survey given in Table 2.1.66 below indicates that there exists a gender gap in the labor market and employment opportunities in Yangon Region. The results from IHLCs also show the gender gap in the labor force participation rate (Table 2.1.67). In addition, the results from Household Interview Survey (HIS) of this study show the gender gap in the labor force participation rate (Table 2.1.68).

**Table 2.1.66: Economically Active Population by Sex (Labor Force Survey, 1990)  
(Yangon Region)**

(Unit: in thousands)

Urban			Rural			Total		
Male	Female	Both Sex	Male	Female	Both Sex	Male	Female	Both Sex
828	325	1153	313	142	455	1141	467	1608

Source: Myanmar Statistical Yearbook, 2010

**Table 2.1.67: Participation in the Labor Market**

Indicators	Male	Female
Labor force participation rate of population aged 10 years and over	66.8	34.8
Labor force participation rate of population aged 15 years and over	73.9	38

Source: Integrated Household Living Conditions Survey in Myanmar (2007), UNDP

**Table 2.1.68: Participation in the Labor Market (2012)**

Indicators	Male	Female
Labor force participation rate of the population aged 10 years and over	66.4	43.1
Labor force participation rate of the population aged 15 years and over	74.6	47.0

Source: Household Interview Survey, JICA Study Team, 2012

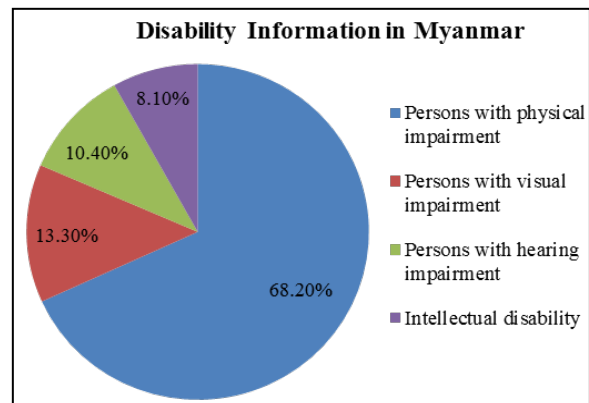
Consequently, poverty and lack of employment opportunities are driving women and young girls to migrate to neighboring countries to find jobs and earn money for their own and their family's survival. With lack of information and knowledge about the laws, customs or working conditions in their destinations, these females are vulnerable to trafficking and exploitation when they leave home.

In addition, another issue of violence faced by women and girls in Myanmar is sexual harassment. Women regularly experience sexual harassment on crowded city buses in Yangon, however, they usually keep silent because they think that it is shameful to reveal such matters to other people and also afraid that people will look down on them and gossip about them.

In a campaign to reduce domestic violence against women and sexual harassment, 150 volunteers distributed pamphlets at eight major bus stops in Yangon in February 2012 with the support of Myanmar National Human Rights Commission. The government, in collaboration with the UN agencies, local and international NGOs, and the community are also addressing the issues and implementing the Eradication of Female Trafficking Plan. The "Myanmar Women's Affairs Federation (MWAFF)" was established in 2003 to carry out the security of women and to enhance cooperation with local and international NGOs. The "Myanmar National Plan of Action for Advancement of Women (2011-2015)" has been developed to improve the circumstances of all women and girls in the public sphere: workplace, home, and the community.

(5) Disability

Majority of citizens in Myanmar are Buddhists and according to their traditional beliefs, persons with disabilities (PwDs) have been born disabled as punishment for their bad deeds in previous lives, and viewed as abnormal and were looked down upon. Most PwDs face discrimination and/or exclusion, but the degree and severity often depend on the nature of their impairment and their varying personal situations. Disabled children and women are particularly vulnerable.



Source: salai Vanni Bawi, 2012

**Figure 2.1.60: Type of Disability in Myanmar**

Compared with other developed countries, PwDs in Myanmar have little access to a range of support services. There is no effective law to encourage employment of PwDs at present, although there is an outdated Law on Rehabilitation and Employment of PwDs which was enacted in 1958. Consequently, employment for a PwD is unlikely to occur. Due to this reason, PwDs often resort to begging. Especially for women and children, their security may be vulnerable as beggars on the streets.

Disability and development in Myanmar is greatly under research. The First Myanmar National Disability Survey was conducted by the Department of Social Welfare (DSW) and The Leprosy Mission International Myanmar (TLMI-Myanmar) between 2008 and 2009. According to this survey, Myanmar has a disability prevalence of 2.32%, translating to approximately 1.2 million people living with disability, or one person with a disability in every ten households. The types of disability in Myanmar are shown in Figure 2.1.60. The socioeconomic status of PwDs is considerably lower than the national average, only 15% reported their current livelihood, with less than 10% attending high school or having access to health care (Source: UNDP, Myanmar). The proportion of PwDs in Yangon Region is recorded at 175,571 (2.75%) (Source: DSW and TLMI, 2010).

The DSW together with the cooperation of the ministries concerned, local and international NGOs are striving to improve the services for PwDs and their empowerment to have equal rights and full participation in the community. The DSW established training schools, special schools, and community-based rehabilitation (CBR) programs with the aim of protecting the rights and promoting development of PwDs (See Table 2.1.69). In parallel with this, special schools provide education for visually impaired children up to the end of primary school level. The Myanmar Child Law was also enacted in 1993 for “Ensuring Education and Protection for All Children with Disabilities”.

**Table 2.1.69: Social Welfare Establishment**

Particulars	1990-91	1995-96	2000-01	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
School for the Blind										
(1) Number of Schools	1	1	1	2	2	2	2	2	2	2
(2) Inmates	26	51	84	140	145	176	179	171	167	177
School for Disabled Children										
(1) Number of Schools	1	1	1	1	1	1	1	1	1	1
(2) Inmates	39	29	73	114	142	160	160	150	150	175
Vocational Training School for Adult Disabled										
(1) Number of Schools	1	1	1	1	1	1	1	1	1	1
(2) Trainees	17	43	52	137	150	130	131	116	110	141
Social Welfare Training School										
(1) Number of Schools	1	1	1	1	1	1	1	1	1	1
(2) Trainees	132	177	223	392	461	313	312	421	290	267

Source: Myanmar Statistical Yearbook, 2010

**Table 2.1.70: List of Disability-related Training Institutes**

Name	Activities
The Social Welfare Training School, Department of Social Welfare	Training for care providers from GOs, NGOs
Department of Psychology, Yangon University, Ministry of Education	Diploma in Social Work Course for one year
National Rehabilitation Hospital	Training of nurses, physiotherapists, assistive-device technicians, and so on

Source: JICA Study Team based on the "Country Profile on Disability, JICA, 2002"

The names of disability-related governmental organizations, local NGOs as well as international NGOs and their activities are listed in Table 2.1.71-73.

**Table 2.1.71: List of Disability-related Government Organizations**

Name	Activities
Department of Social Welfare, Ministry of Social Welfare, Relief and Resettlement	Social rehabilitation, Education, Vocational training, Training for care providers for PWDs, and Establishment of disability-related laws.
National Rehabilitation Hospital, Ministry of Health	Medical treatment and rehabilitation, Orthopedic and plastic surgery, Training for care providers, and Provides assistive devices for mobility impairment.
Eyes, Ears, Nose and Throat Hospital, Ministry of Health	Medical treatment and rehabilitation of hearing impairments.
Myanmar Maternal and Child Welfare Association	Prevention, identification, early detection, and intervention.
Myanmar Disabled Sports Federation	Organizing sports for PWDs, Training and selecting athletes for international sports events for PWDs.
School for Disabled Children	Special education, A.D.L training in days school
School for the Blind	Special education, Vocational training, Setting up a library and making available Braille books for the blind, Organizing sports activities and literary talks.
Vocational Training School for Adult Disabled	Vocational training, Recreation activities and study trips.

Source: JICA Study Team based on "Country Profile on Disability, JICA, 2002"

**Table 2.1.72: List of Disability-related Local NGOs**

Number	Name	Description of Activities											Remarks		
		Type of Activities				Field Activities									
		Project Implementation	Financial Support	Advocacy	Capacity Development	CBR	Medical	Educational	Vocational Training and Employment Promotion	Assistive Devices	Communication Tools	Art and Sport		Barrier-free	Counseling
1.	Eden Center for Disabled Children (ECDC)					O	O	O	O					O	Physically and intellectually disable children irrespective of race, religion, or nationality
2.	Mary Chapman School for the Deaf							O	O						Deaf children
3.	Myanmar Christian Fellowship of the Blind				O			O	O		O				Blind with no other disability irrespective of race and religion, both sexes, 5-25 age group
4.	Myanmar Council of Churches								O						
5.	Myanmar Independent Living Initiative			O	O							O	O		PWDs (priority to women, children and persons with severe disabilities)
6.	Myanmar National Association of the Blind (Myanmar-ILI)				O										Visually impaired persons
7.	Myanmar Physically Handicapped Association							O							
8.	Shwe Min Thar Foundation (Myanmar)					O	O	O	O				O		

Source: JICA Study Team based on "Local NGO Directory, 2012"

**Table 2.1.73: List of Disability-related International NGOs**

Number	Name	Description of Activity											Remarks			
		Type of Activities				Field Activities										
		Project Implementation	Financial Support	Advocacy	Capacity Development	CBR	Medical	Educational	Vocational Training and Employment Promotion	Assistive Devices	Communication Tools	Art and Sport		Barrier-free	Counseling	
1.	Association for Aid and Relief (Japan)	O	O	O		O			O							a) Vocational training center in collaboration with DSW b) Activities at Shwe pyi thar and Dala townships a) Promotion of employment: Income generation b) Promotion of schooling: Inclusive education c) Advocacy
2.	International Committee of the		O			O										a) Support for prosthetic/orthotic workshops run by the Ministry of

	Red Cross																		Health. b) Training courses for prosthetic and orthotic technicians.	
3.	International Medical Volunteers-Japan Heart																		O O	Project Location: Mayangone Township, Yangon Region Target Beneficiaries: The visual impaired persons Funded by Ministry of Foreign Affairs in Japan and Japan Heart
4.	JICA																		O O O O	a) Training opportunities in Japan b) Renovation of the National Rehabilitation Hospital to be barrier-free c) Implementing the “Project on Strengthening of Rehabilitation in Myanmar” at the hospital since March 2008 in cooperation with the Department of Health d) Promotion of the Social Participation of the Deaf Community – To develop sign language teaching materials
5.	Save the Children (UK)																		O	Training program for disabled persons co-sponsored by the DSW
6.	The Leprosy Mission International TLMI (Myanmar)																		O	Disability Resource Centers at Hlaingtharyar, Shwe pyi thar, Dala, Thanlyin, and Kunchankone
7.	World Vision International																		O O O	CBR co-sponsored by the DOH training. Programs for deaf children co-sponsored by the DSW.

Source: JICA Study Team based on the “Directory of International NGOs in Myanmar, 2012” and [www.aarjapan.gr.jp](http://www.aarjapan.gr.jp)

#### (6) Social Welfare Services in the Communities

The Ministry of Social Welfare, Relief and Resettlement was established in 1952 and since then, social welfare activities have been expanded in close collaboration with NGOs. The ministry is also responsible for rendering relief and resettlement services to victims of natural disasters such as earthquakes, cyclones, floods, and fire disasters.

The Department of Social Welfare (DSW) under the Ministry of Social Welfare, Relief and Resettlement is in charge of implementing social welfare services for vulnerable group such as children, women, persons with disabilities, and the elderly through preventive, protective and rehabilitative measures. The objectives of the DSW are:

- To contribute towards the social objective of “uplifting the health fitness and education standards of the entire nation”;
- To contribute towards the development of human resources;
- To assist those who are facing social problems;
- To take preventive measures to control occurrence of social problems;
- To increase the number of volunteer social workers; and
- To give assistance to the State in some ways by implementing social development tasks and giving social assistance.



The DSW has implemented eight different types of social services and social assistance to vulnerable groups with the collaboration of relevant government organizations, local NGOs (LNGOs), and international NGOs (INGOs). The main categories of social services are as follows:

- Early Childhood Care and Development Services
- Children and Youth Welfare Services
- Women Welfare Services
- Care of the Aged
- Rehabilitation of the Disabled
- Rehabilitation of Ex-drug Addicts
- Grants in Aid to Voluntary Organizations
- Public Welfare Services

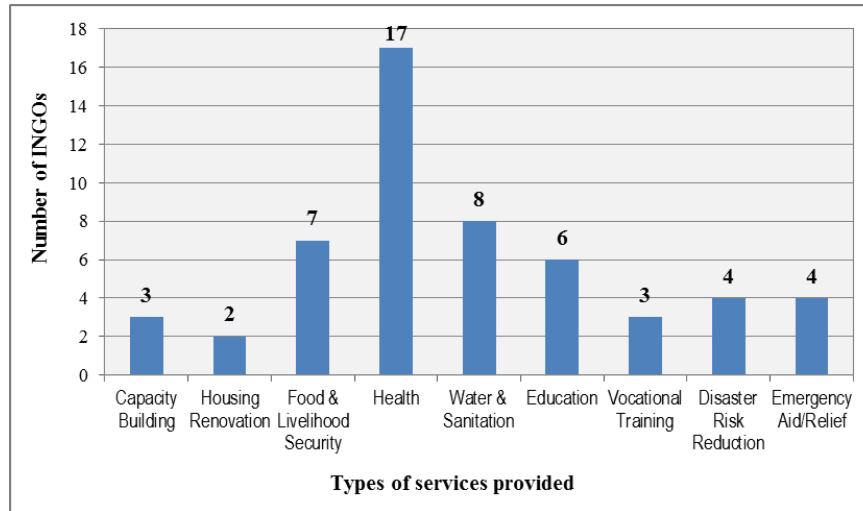
In order to implement social services effectively, the following laws and regulations are promulgated.

- The Child Law (1993)
- Rules related to Child Law (2001)
- Kattima Adoption Act (1941)
- Anti-Trafficking of Persons Law (2005)
- Regulations on Voluntary Institutions
- Regulations on Voluntary Day-Care Centers and Pre-Primary School
- Regulations on the Establishment of Voluntary Primary Night School
- Regulations on Youth Centers

Source: Myanmar Country Report, 2010

Social welfare services are being carried out not only by the DSW, but also by voluntary social organizations. The main international NGOs which are currently supporting social needs for vulnerable groups especially in Yangon Region are listed in the following Table 2.1.74.

The abstract of information is shown in Table 2.1.74. A graphical representation about the number of INGOs and types of services provided is given in Figure 2.1.61.



Source: JICA Study Team based on the “Directory of International NGOs in Myanmar, 2012”

**Figure 2.1.61: Number of INGOs and Types of Services Provided in Yangon Region**

The above figure indicates that the priority type of service provision identified among the INGOs is in health services, which are given by 81% of service providers. The second type of service provision identified is for water and sanitation services, offered by 38% of service providers. The third type of service provision identified is food and livelihood programs, made available by 33% of service providers. Education service is supplied by 29% of service providers.

**Table 2.1.74: Social Welfare Services-related INGOs and Activities**

Name	Started in the Country	Number of Staff	Sector of Work									Project Location	Time and Duration	Target Beneficiaries	Main Sources of Funding	Remarks	
			Capacity Building	Housing Renovation	Food and Livelihood Security	Health	Water and Sanitation	Education	Vocational Training	Disaster Risk Reduction	Emergency Aid/Relief						
1. Agency for Technical Cooperation and Development (ACTED)	2008	National (10); International (2)			0							0	Yangon Region, Dry Zone-Mandalay Region	Varying	Vulnerable communities	French Cooperation, CdC, EU, FAO, LIFT, ASEAN, DFID, OFDA, UNFPA	Supporting communities in emergencies and in the development process
2. CWS-Asia/Pacific	2005	National (2); International (1)	0		0	0						0	Yangon Region, Delta, Bago	Ongoing	School teachers, school children, villagers	Various	Disaster risk reduction
3. Good Neighbors International	2009	National (53); International (1)		0		0	0	0	0				Mingalardon Township, Yangon Region	2010-Current	Children, community members in the targeted areas	Personal and private company's donation	Mingalardon Community Development Project
4. HelpAge International Myanmar	2004	National (50); International (2)			0	0						0	Yangon Region, Patheingyi, Kyailat, Kangyidauk, Pyinpoolwin, Ayartaw, Mandalay	Current strategic plan to 2015	Older women and men and other vulnerable households	KOICA, AgeUK, European Union and LIFT multi-donor trust fund	
5. IDE Proximity Designs	2004	National (30); International (6)			0								6,500 village tracts in 125 townships in Yangon, Ayeyarwaddy, Bago West, Mandalay, Sagaing, Magway, Rakhine, Shan, Mon, Karen	-	Poor and vulnerable rural families	Royal Norwegian government, OXFAM Novib, LIFT, Skoll Foundation, Private foundations, Mennonite Central Committee	

Name	Started in the Country	Number of Staff	Sector of Work									Project Location	Time and Duration	Target Beneficiaries	Main Sources of Funding	Remarks	
			Capacity Building	Housing Renovation	Food and Livelihood Security	Health	Water and Sanitation	Education	Vocational Training	Disaster Risk Reduction	Emergency Aid/Relief						
6. International HIV/AIDS Alliance	2004	National (28); International (1)				O						Yangon, Mandalay, Mawlamyaing, Lashio, Kyaukpadaung, Pyay, Monywa, Patheingyi, Dawei	2004-Current	People living with HIV/AIDS, men who have sex with men, female sex workers, orphans and vulnerable children	Global Fund, 3D Fund, USAID, European Union		
7. International Medical Volunteers-Japan Heart	2004	National (32); International (11)				O				O		Kungyangone Township, Yangon Region	Unlimited	50 children who lost parents by Cyclone Nargis	Japan Heart and local people in Japan	Social support for basic living, health and education	
						O						Mayangone Township, Yangon Region	3 years (Extendable)	Visual impaired persons	Ministry of Foreign Affairs in Japan and Japan Heart	People with Disabilities	
						O							All Regions and States in Myanmar	Unlimited	Medical, dental, nursing students in Myanmar	Nikura Foundation and Japan Heart	Scholarship for students who could not afford to attend medical, dental, and nursing universities, up to the time they got their degrees
8. Interreligious and International Federation for World Peace	2002	National (170); International (3)		O							O	Hlaingtharyard Shwepyithar Township, Yangon Region				Financial aid to repair the house roofs of the poor	
9. Malteser International	1996	National (305); International (9)				O						O	Dawbon Township, Yangon Region	2004-Current	Population in Dawbon Township	German Federal Ministry for Economic Cooperation and Development, ECHO, Malteser International, Private donations	Water and sanitation in the slums of Dawbon Township
10. Marie Stopes International Myanmar (MSI-M)	1997	National (300); International (0)				O							Yangon, Mandalay, Magwe, Bago, Ayeyarwaddy, Sagaing, Mon, Shan		Men and women of reproductive age		Improving sexual and reproductive health

Name	Started in the Country	Number of Staff	Sector of Work									Project Location	Time and Duration	Target Beneficiaries	Main Sources of Funding	Remarks
			Capacity Building	Housing Renovation	Food and Livelihood Security	Health	Water and Sanitation	Education	Vocational Training	Disaster Risk Reduction	Emergency Aid/Relief					
11. Medecins Du Monde (MDM)	1991	National (216); International (6)				O						Yangon, Kachin State, Pyapon Township	1994– Current	Sex workers, men having sex with men, drug users, community health worker, auxiliary midwife	Europeaid, 3 Disease Fund, Global Fund, MDM private funding	STI/HIV-AIDS prevention, care and support
12. MSF Holland/AZG	1992	National (1128); International (19)				O					O	5 project locations: Northern Rakhine State, Eastern Rakhine State, Northern Shan State, Kachin State, Yangon Region	1992- Current	PHA, TB/MDR-TB, malaria patients, including high risks groups (CSW, IDU, MSM, mining migrants workers) Population in need of health care in vulnerable situation such as women and children <5 years old, victims of emergencies	MSF private fund (65%), ECHO, Global Fund, 3DF, SIDA	
13. Medecins Sans Frontieres - Switzerland (MSF-CH)	2000	National (123); International (8)				O						Yangon, Tanintharyi Region	Started in 2000, open-ended	Vulnerable communities	MSF-CH private fund, Global Fund/ECHO supported projects	
14. MERCY Malaysia	2008	National (2); International (1)				O						Dedaye and Myaungmya Township, Ayeyarwaddy Region; Kungyangone and Kawhmu Township, Yangon Region; Emergency relief	3 years (and beyond, subject to funding)		People of Malaysia	

Name	Started in the Country	Number of Staff	Sector of Work									Project Location	Time and Duration	Target Beneficiaries	Main Sources of Funding	Remarks
			Capacity Building	Housing Renovation	Food and Livelihood Security	Health	Water and Sanitation	Education	Vocational Training	Disaster Risk Reduction	Emergency Aid/Relief					
												nationwide				
15.Partners	1998	National (12); International (1)			O	O	O	O	O			Shwe pyi thar Township; Hmawbi Township; Hlegu Township; Yangon Region; Chauk, Yenanchaung townships in the Dry Zone, Magway Region	2011	15,000 children and around 2,000 vulnerable households	WFP, Australian Embassy, German Embassy, La Guilde, Ligue de l'Enseignement etc.	WASH activities in primary schools; Renovation of schools; Livelihood micro-projects; Food for work (pond renovation, RWCT, soil conservation, tree plantation); Food for training (Hygiene education, soil conservation, tree plantation); Food for education programs with WFP
16.Save the Children	1995	National (671); International (17)			O	O	O	O				Hlaingtharyar Township, Shwepyithar Township, Kungyangone Township, Yangon Region	1-3 years	Children (Primary), mothers, parents, vulnerable families, men who have sex with men	USAID, DFID, AusAID, EU, SIDA, Japanese MOFA, Save the Children Members	
17.Terre des hommes Italia (TDH Italia)	2004	National (73); International (3)			O	O	O	O				Yangon Region	October 2010 - January 2012	22,225 people and 3,450 school children in the Twantay area and 480 children at "Hngat Aww Sann" Training Center in the Kawt Hmu area	TDH Italia and Italian families and donors, Chaîne du Bonheur (Swiss Solidarity), ECHO	
18.The Foundation Terre des homes,	2009	National (8); International (2)				O	O					Yangon Region	2010 onwards	Vulnerable children from institutions and their families	The Foundation Terre des homes, Switzerland	Tdh-L works in partnership with DSW to support the family and community

Name	Started in the Country	Number of Staff	Sector of Work									Project Location	Time and Duration	Target Beneficiaries	Main Sources of Funding	Remarks
			Capacity Building	Housing Renovation	Food and Livelihood Security	Health	Water and Sanitation	Education	Vocational Training	Disaster Risk Reduction	Emergency Aid/Relief					
Lausanne (Tdh-L)																reintegration of children coming from training schools in Yangon Region
19.The Leprosy Mission International TLMI (Myanmar)	2004	National (65); International (1)	O		O							Hlaingtharyar Center; Shwepyithar, Dala, Thanlyin community-based center; Kunchankone home-based center; Yangon Region	since 2004	Adults and children with disability	TLMI	Disability Resource Centers with individuals, enabling community and enabling partners in disability issue across Myanmar
20.Welthunge rhilfe	2002	National (125); International (6)			O	O	O					Htantabin Tsp, Yangon Region; Pauk Tsp., Magway Region; Bogalay Tsp., Ayeyarwaddy Region; Lashio, Namtu, Thenni, Kutkai Tsp., Northern Shan State	Up to March 2013 (To be extended after MoU extension)	Focusing on the most vulnerable population of the rural areas	Welthungerhilfe core funds, German Ministry for Economic Cooperation and Development (BMZ), Europe Aid and ECHO, LIFT, German Happel Foundation and other private donations	
21.World Concern Myanmar	1995	National (177); International (1)	O		O	O	O					Yangon and Ayeyarwaddy Region; Dry Zone and Mandalay Region	14 years in the Netherlands, 8 years in Myanmar	Young researchers, fresh graduates and grassroots people	Private donations, Research grants and consultancy fees	Capacity Building; Institution Building; Research; Advocacy; Water Education; Gender and Water; Networking; Mediation; Consultancy; Climate Change Adaptation

Source: JICA Study Team based on the “Directory of International NGOs in Myanmar, 2012”

(7) Key Findings and Main Issues to be addressed in Social Services

The Myanmar Government has been striving for development for all in terms of the education, health and social welfare services sectors. However, there is still much to be done in social services. The following gives a brief synopsis in the social services sector in Yangon Region.

1) Education System

1) *Students Retention*

There are significant differences among the number of students enrolled at primary school (463,664) and the number of students enrolled at the middle school (292,158), and the number of students enrolled in high school (112,603). These indicate that large numbers of students are unable to continue education beyond the primary school.

The main reason for not attending school is the inability of parents to meet school expenses. Therefore, children are prohibited from learning the skills and qualifications they need to be able to survive later in life. Ultimately, this situation allows them to continue living in the wheels of poverty and will likely never to come out from the poverty cycle. Such a scenario is much true to poorer communities in Yangon Region.

2) *Government Attempt for Post-Primary Schools*

As mentioned above, it is due to poverty that children drop out of school after finishing the primary level, even if there may be a government-run middle school in the immediate vicinity. However, in any case, the post-primary program seems to reflect a somewhat desperate attempt for the government to keep children in school, be it only one or two years more than their primary school attendance.

3) *Role of Monastic Schools*

Monastic schools specifically reach out to the poorest of the poor, who otherwise would not have access to education at all. They deliberately try to make important contributions by bridging some of the gaps in Myanmar's education system by teaching the government curriculum to the children whose parents cannot afford to send them to a government school.

4) *Student-Teacher Ratio*

Student-teacher ratio for primary school is, on the average, 50.1, while it is beyond 100 in some districts. On the other hand, student-teacher ratio on the average for middle and high schools are 18.8 and 25, respectively. The current student-teacher ratio for primary schools is still under the target level of Myanmar EFA National Action Plan.

2) Health Services

1) *Lack of Health Facilities*

From 2005 to 2010, only five new hospitals were added in the health facilities. In addition, there are 11 townships in Greater Yangon where there are no hospitals at all (with more than 25 beds).

In terms of bed occupancy, eight out of twelve specialist hospitals have bed occupancy of less than 50%. There is no station hospitals which achieve 50% and above bed occupancy rate.



2) *Health Workforce*

The largest number of doctors can be seen in public general hospitals with specialist services followed by public specialist hospitals. Station hospitals usually have an average of one doctor. Generally, rural and sub-rural health centers do not have a doctor on their staff.

3) *Urban Poor Community*

The poverty line was defined as an earning of US\$ 3 per day (6.3% of total population). Households below poverty line are located in periphery areas (Kyauktan, Thanlyin, Hlegu, Hmawbi, Htantabin, Twantay) and south of the CBD (Dala, Seikgyikanaungto) with limited access to urban services. Accordingly, the housing conditions in these areas are poor. Majority of houses have a living space below 200 sq.ft and their construction type is either stable wooden frame with leaf roof house or temporary house. Informal sector population is also high in these areas particularly in Hlegu and Twantay townships. The highest number of informal settlers – slum dwellers - is found in Hlaing Tharyar Township.

Many school expenses must be borne by students' families, presenting an insurmountable financial obstacle for many impoverished households.

The indicators for immunization rates and skilled birth attendance are considerably lower for poor households in Yangon Region. This is partly due to the higher proportion of poor households that live in rural areas where access to the health service facilities is lower.

4) *Gender*

There is gender gap in the labor market and in employment opportunities. Also, there is an increase in female's vulnerability to trafficking. Community awareness and understanding of the needs of women is still low.

5) *Disability*

National data on disabilities is quite limited. Special education for PwDs is limited due to the inadequate special education schools and resource persons. Currently, the integration of children with disabilities in compulsory education is very difficult because school buildings are not designed for children with disabilities. There remains a need to open more schools with barrier-free environment to prepare children to be integrated into regular schools.

6) *Social Welfare Services*

Social welfare services are being carried out not only by the government but also voluntary social organizations. There are a total of 21 INGOs who work for socially vulnerable communities, mostly in the field of health.

## 2.1.5 Disasters

### (1) Generals

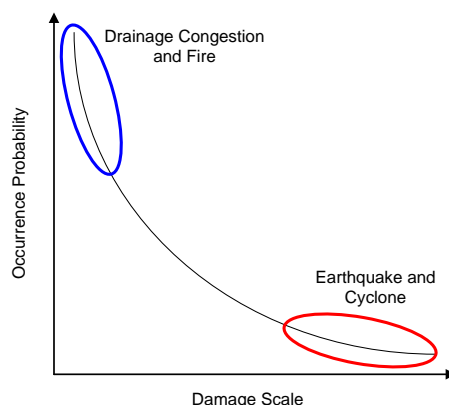
Disasters cause undesirable effects on human life in highly-developed areas including urban and agricultural areas. Without human activities, these so-called disasters are naturally occurring phenomena e.g. wetlands and flood plains accept flood inundations and are contained within their own environment. Human life, which is based on the development of natural resources, comprises disaster risk on their continuous/stable activities because the discontinuous and unstable conditions are one of the many aspects of nature. From the view point of human life, such discontinuous and unstable conditions caused by natural phenomenon are what we call events. Besides, the Earth Sciences Program of United Nations Educational, Scientific and Cultural Organization (UNESCO)<sup>1</sup> distinctly determined i) Natural Hazards and ii) Natural Disasters as follows:

- i) Natural Hazards are naturally-occurring physical phenomena caused either by rapid or slow onset of events having atmospheric, geologic and hydrologic origins on solar, global, regional, national and local scales. They include earthquakes, volcanic eruptions, landslides, tsunamis, floods and drought.
- ii) Natural Disasters are the consequences or effects of natural hazards. They represent a serious breakdown in sustainability and disruption of economic and social progress.

Disaster risk can be generally indicated by the product of 1) damage scale and 2) occurrence probability, as shown below:

$$\text{DisasterRisk} = \text{Occurrence Probability} \times \text{DamageScale}$$

Normally, disasters that cause large damage tend to occur less frequently and disasters with small damage tend to occur more frequently, as shown in Figure 2.1.62. 'Infrequent Disaster with Large Damage' and 'Frequent Disaster with Small Damage' are distinctly treated in disaster management policy. In general, measures for "Infrequent Disaster with Large Damage" are considered to be more important than that for "Frequent Disaster with Small Damage". In Greater Yangon, the earthquakes and cyclones can be categorized as "Infrequent Disasters with Large Damage" and drainage congestion and fire can be categorized as "Frequent Disasters with Small Damage".



Source: JICA Study Team

**Figure 2.1.62: Theory of Disaster Risk**

<sup>1</sup> <http://www.unesco.org/new/en/natural-sciences/environment/earth-sciences/>

This sub-section describes present conditions of disasters and disaster mitigation measures in Greater Yangon based on available data/information and results of the Household Interview Survey (HIS) carried out by the JICA Study Team.

HIS carried out from September to November 2012 shows that people living in Greater Yangon have suffered from natural disasters. Around 70.9% of households (7,119 in 10,045) replied that they experienced natural disasters.

(2) Disaster Conditions

‘Hazard Profile of Myanmar’ prepared by five Government Ministries and Departments in Myanmar and four non-government agencies<sup>2</sup> in July 2009 describes nine types of disasters in Myanmar: 1) Cyclone, 2) Drought/Dry zone, 3) Earthquake, 4) Fire, 5) Floods, 6) Forest Fire, 7) Land slide, 8) Storm, and 9) Tsunami. The following describes the present conditions of disasters in Greater Yangon.

1) Floods

1) *General Status of Floods in Greater Yangon*

‘Hazard Profile of Myanmar’ states that flooding is one of the major hazards in Myanmar, accounting for 11% of all losses caused by disasters. It adversely affects all aspects of human activities not only from a humanitarian aspect but from the regional and national economic aspects. Floods in Myanmar usually occur during two distinct periods: from June to August and from late September to October, with the largest intensity observed in August at the peak of the monsoon season.

Floods in Greater Yangon can be classified into three types:

- i) River floods;
- ii) Localized flood inundations in urban areas due to a combination of such factors as cloudburst, poor infiltration rate, poor drainage infrastructure (possibly due to climate change, heat island phenomenon); and in rural areas due to decrepit dams, dykes and levees;
- iii) Floods due to cyclone and storm surge.

Past major flood events during 1997-2007 are described in “Hazard Profile of Myanmar”, but there are only a few flood events in and around Greater Yangon as shown in Table 2.1.75. However, an interview survey by the JICA Study Team revealed that other areas in Greater Yangon have flood inundations almost every year.

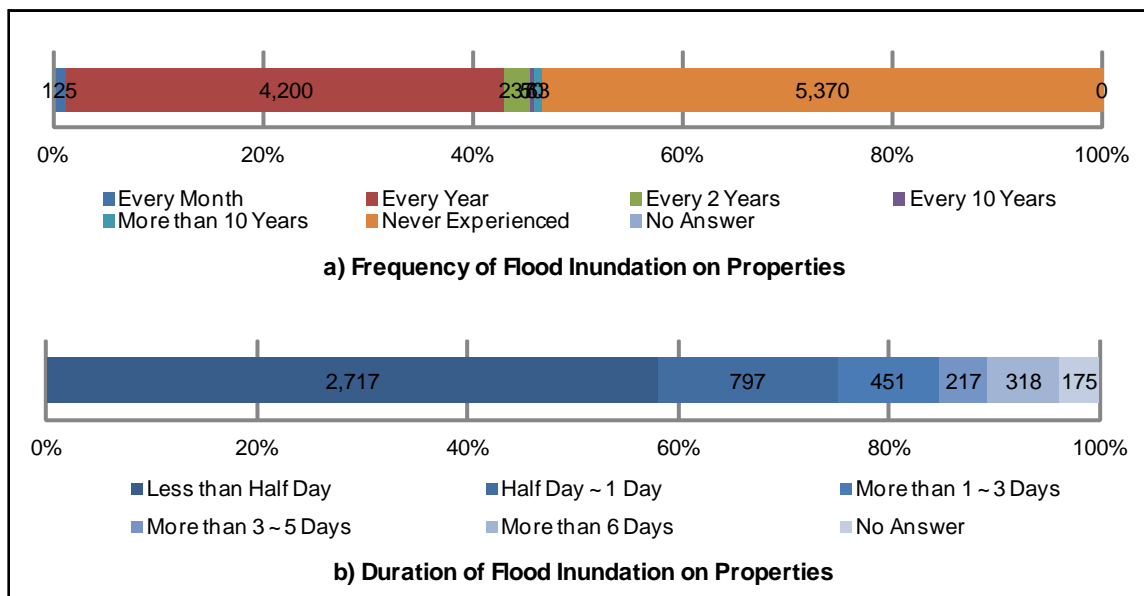
**Table 2.1.75: Past Major Floods in Yangon Region (1997-2007)**

Location	Date	No. of Affected Households	Affected Population	Deaths	Remarks
Kayan Township	7 <sup>th</sup> Jun. 1997	1,189	5,878	0	North part of the region
Hta/16 Ward, Shwe Pyi Thar Township	8 <sup>th</sup> Sep. 2002	886	4,541	0	Along the Hlaing River left bank within Greater Yangon

Source: Hazard Profile of Myanmar, Jul. 2009

<sup>2</sup> Government Ministries and Departments in Myanmar and four no- Government Agencies: Department of Meteorology and Hydrology (DMH), Forest Department, Relief and Resettlement Department (RRD), Irrigation Department (ID), Fire Services Department, Myanmar Engineering Society (MES), Myanmar Geosciences Society (MGS), Myanmar Information Management Unit (MIMU) and Asian Disaster Preparedness Center (ADPC)

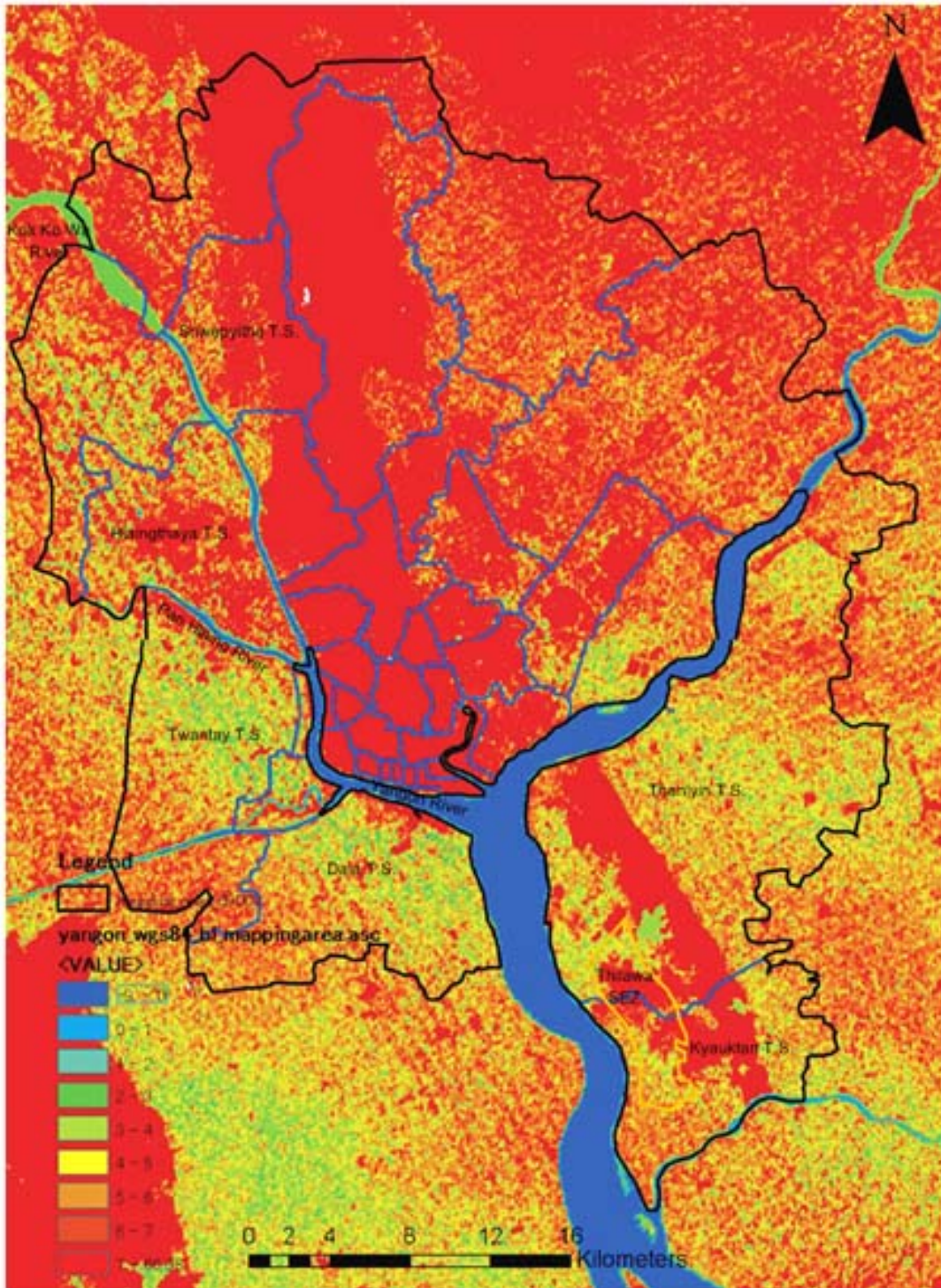
HIS results also indicate frequent flood inundation in Greater Yangon. Figure 2.1.63 a) shows frequency of flood inundation on houses and/or land. There are 5,370 out of 10,045 households (53.5%) who replied that they never experienced flood inundation but 4,200 households (41.8%) have flood inundation every year. The inundation depth at their area is up to the ankles or knees (92.1 %) and inundation duration ranges from less than half day to more than six days as shown in Figure 2.1.63 b).



Source: HIS Results by JICA Study Team

**Figure 2.1.63: HIS Results on Flood Inundation Condition**

Figure 2.1.64 shows digital elevation map focusing on the lowland area. Red colored areas in the map are relatively high elevation; above El. 7.0 m have less disaster risks against river floods and storm surges. Yangon downtown along the Yangon River also has less disaster risks against flooding although the district suffers from drainage congestion during the rainy season. Yellow and green colored areas in the map comprise El. 2.0-5.0 m where there are disaster risks due to flooding and drainage congestion during high tide. Although fringe areas of Greater Yangon have rapid population growth of 3% per year, part of these areas lie in the lowland area colored in yellow and green as shown in Figure 2.1.64.

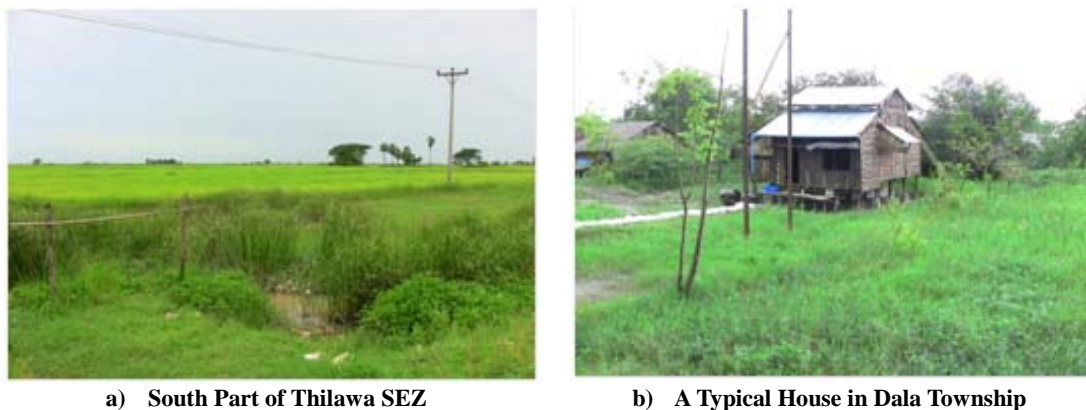


Source: JICA Study Team prepared based on data from Shuttle Radar Topography Mission (SRTM)  
**Figure 2.1.64: Digital Elevation Map Focusing on Lowland Area in Greater Yangon**

2) *Drainage Congestion*

The Yangon River experiences a large water level difference between the low and high tides. Water level of the Yangon River increases to around 2.5-3.0 m during high tide with a full moon. There are several lowland areas below El. 3.0 m in Greater Yangon with rainwater drainage issue. Most of the lowlands are located in the suburbs of Greater Yangon including Thilawa SEZ.

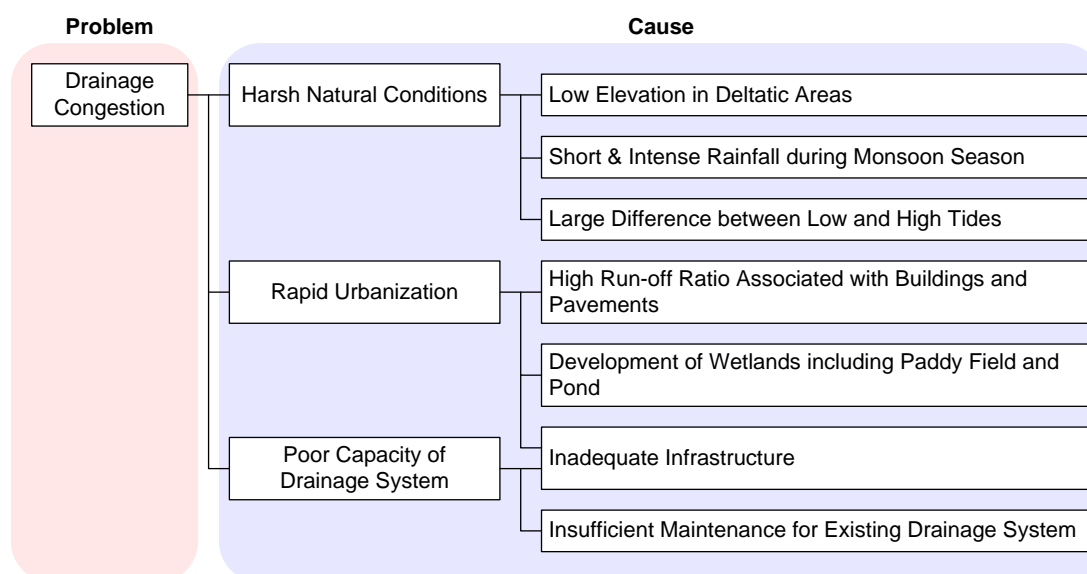
Most areas of Thilawa SEZ are utilized as agricultural land such as paddy fields as shown in the photograph in Figure 2.1.65 a), and some creeks function as drainage canals. According to an interview survey with local people, the whole zone experiences flood inundation twice or three times a year mainly in July and August except for a small area. The inundation depth is approximately 0.5-1.0 m and its duration ranges from several hours to a few days.



Source: JICA Study Team

**Figure 2.1.65: Present Condition of Fringe Areas of Greater Yangon**

Actually, drainage congestion problem in Greater Yangon is complicated. Several conditions, i.e. harsh natural conditions, rapid urbanization and poor capacity of drainage system, cause the problem as shown in Figure 2.1.66.



Source: JICA Study Team

**Figure 2.1.66: Tree Analysis of Drainage Congestion in Greater Yangon**

### 3) Tidal Flood including Storm Surge

Dala Township is located south of Greater Yangon across the Yangon River. The area has good potential for development, but most of the area is lowland between elevation 1.5-3.0 m. Most of the land is utilized as paddy fields. According to an interview survey with local people, they experience inundation at every high tide during full moons all year round. Inundation that occurs almost every month is relatively short and shallow; usually lasting 30 minutes to one hour with 0.5-1.0 m inundation depth. Hence, rice crops can be grown and local people accept

the frequent inundations. As shown in the photograph in Figure 2.1.65 b), local residence is raised up/elevated for periodic tidal inundations and rainwater is collected for domestic uses.

Storm surge refers to an extraordinary rise in sea water level along the sea coast caused by strong waves associated with low pressure and strong winds during a storm event, including cyclones. “Hazard Profile of Myanmar” indicates the distribution of storm surge potential in Yangon Region as shown in Table 2.1.76. Within Yangon Region, Kyauktan Township has a high hazard potential for storm surge.

**Table 2.1.76: Distribution of Storm Surge Potential in Yangon Region**

Unit: %

Township	Hazard Zones			
	Low	Moderate	High	Very High
Dedaye	50	35	15	
Kawhmu	35	30	35	
Kayan	60	18	22	
Kungyangone*	30	156	55	
Kyauktan	15	20	65	
Nyaungdon	100			
Tantabin	100			
Thanlyin	80	20		
Thongwa	20	20	40	
Twantay	45	35	15	
Yangon City	85	15		

Note:\* Reason of exceeding 100% in total is unknown.

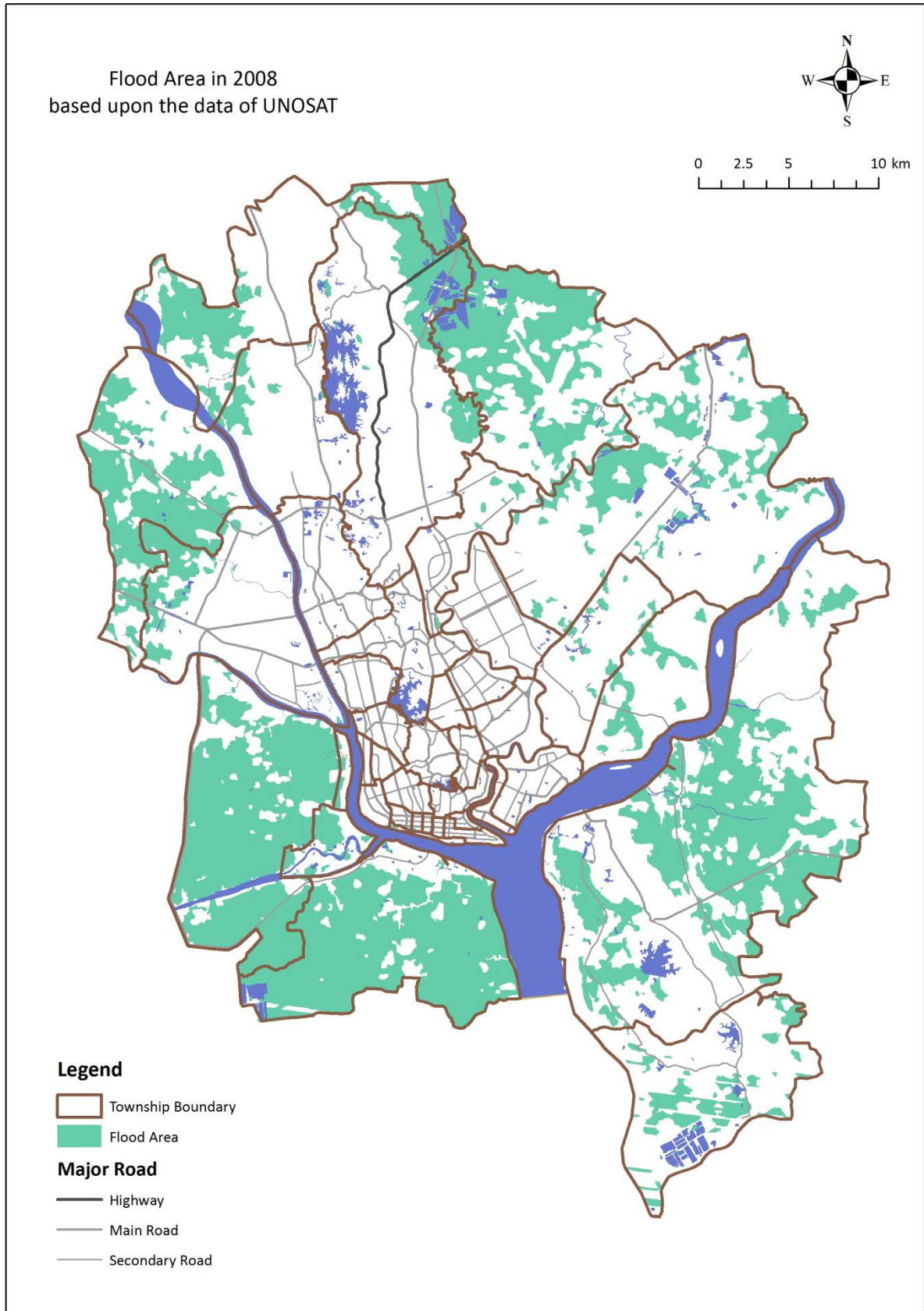
Source: Hazard Profile of Myanmar, Jul. 2009

#### 4) Cyclone

Cyclones that originate in the Bay of Bengal generally move westward heading for India and then turn towards Bangladesh and Myanmar. Severe cyclones tend to occur either during the pre-monsoon season from April to May or post-monsoon season from October to November. Cyclones have three destructive forces, namely: i) storm surge, ii) heavy rainfall and iii) strong winds.

According to ‘Hazard Profile of Myanmar’, 1,248 tropical storms formed in the Bay of Bengal during the period from 1887 to 2005, of which 80 storms (6.4% of the total) hit the Myanmar coast. In all, 12 cyclones caused severe damage in Myanmar mainly due to the accompanying storm surge, and the maximum death or missing toll was 138,373 caused by Cyclone Nargis in May 2008.

Cyclone Nargis also hit Greater Yangon. Figure 2.1.67 shows the flood inundation areas resulting from Cyclone Nargis taken by satellite imagery on 5th May 2008. Flood water spread on a number of Townships around Yangon City. Table 2.1.77 shows estimated flood inundated areas by Cyclone Nargis based upon the satellite image. As shown in the table, 83.37% of the Dala area was inundated; 82.12% in Twantay; 51.86% in Htantabin; and 51.58% in Hlegu. This corresponds to interview results of JICA Study Team.



Source: JICA Study Team based upon satellite image of UNOSAT

**Figure 2.1.67: Flood Inundation Areas by Cyclone Nargis Taken by Satellite Imagery on 5<sup>th</sup> May 2008**

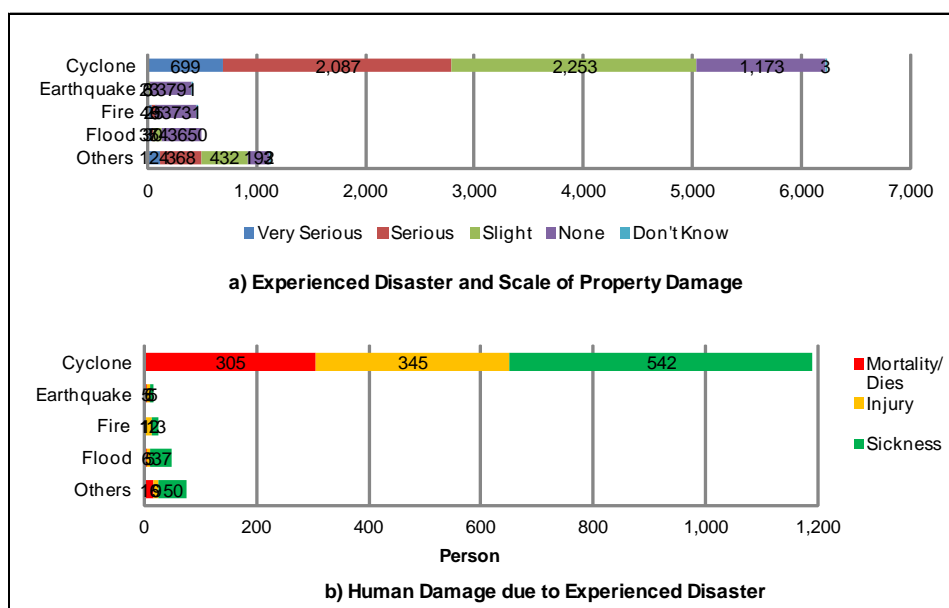


**Table 2.1.77: Flood Inundated Areas by Cyclone Nargis**

Township	Total (km <sup>2</sup> ) (1)	Water Surface (km <sup>2</sup> ) (2)	Inundated Area	
			(km <sup>2</sup> ) (3)	Weight (%) (3)/((1)-(2))
Latha	0.60	0.00	0.04	6.44
Lanmadaw	1.31	0.00	0.03	2.42
Pabedan	0.62	0.00	0.00	0.00
Kyauktada	0.70	0.00	0.00	0.00
Botahtaung	2.60	0.01	0.00	0.00
Pazundaung	1.07	0.01	0.00	0.00
Ahlon	3.38	0.02	0.05	1.48
Kyee Myin Daing	4.57	0.06	0.94	20.90
Sanchaung	2.40	0.00	0.00	0.00
Dagon	4.89	0.02	0.00	0.00
Bahan	8.47	0.54	0.00	0.00
Tarmwe	4.99	0.05	0.00	0.00
Mingalar Taung Nyunt	4.94	0.13	0.00	0.00
Seikkan	1.17	0.35	0.09	11.41
Dawbon	3.11	0.18	0.00	0.00
Kamaryut	6.47	0.09	0.00	0.00
Hlaing	9.82	0.61	0.00	0.00
Yankin	4.79	0.00	0.00	0.00
Thingangyun	13.12	0.98	0.00	0.00
Mayangone	25.83	3.07	0.00	0.00
Insein	31.40	2.66	0.00	0.00
Mingalardon	127.94	11.79	22.78	19.61
North Okkalapa	27.76	1.12	1.34	5.04
South Okkalapa	8.22	0.28	0.00	0.00
Thaketa	13.45	0.94	0.00	0.00
Dala	98.40	2.33	80.10	83.37
Seikgyikhanaungto	12.10	1.78	4.69	45.43
Shwe Pyi Thar	52.71	2.20	4.55	9.00
Hlaing Tharyar	77.61	6.11	11.49	16.07
North Dagon	24.18	1.06	0.04	0.16
South Dagon	37.51	0.93	2.60	7.10
East Dagon	170.87	6.41	34.38	20.91
Dagon Seikkan	42.04	0.53	7.23	17.43
Kyauktan	76.12	7.00	13.44	19.45
Thanlyin	254.85	6.23	93.41	37.57
Hlegu	101.00	3.84	50.12	51.58
Hmawbi	84.23	5.27	27.73	35.11
Htantabin	81.77	6.16	39.21	51.86
Twantay	107.86	3.55	85.67	82.12
<b>Total</b>	<b>1,534.89</b>	<b>76.30</b>	<b>479.93</b>	

Source: JICA Study Team based upon satellite image of UNOSAT

In the HIS, 70.9% of households (7,119 in 10,045) replied that they have suffered from natural disasters as mentioned previously, of which most households pointed to damages caused by cyclone as shown in Figure 2.1.68 a). Physical damages including sickness caused by cyclones are also noteworthy among disasters experienced in Greater Yangon. As shown in Figure 2.1.68 b), 305 people died due to cyclones.



Source: HIS Results by JICA Study Team

**Figure 2.1.68: HIS Results on Experienced Disaster**

## 2) Earthquake

In the Bay of Bengal west of Myanmar, there is the Andaman Trench where the Indian Plate is moving northward and subducting underneath the Burma Plate from west to east; in east Myanmar, there is the Sagaing fault which is the boundary between Burma Plate and Sunda Plate. Hence, magnitude 7.0+ earthquakes occurred more than 16 times and six earthquakes of around magnitude 7.0 hit the main cities along the Sagaing fault such as Yangon, Bago and Mandalay from 1930 to 1956. Significantly, Yangon experienced six huge earthquakes around the 1930's as shown in Table 2.1.78.

**Table 2.1.78: Major Earthquake Records around Greater Yangon**

Date	Location	Magnitude	Remarks
868	Bago	-	Shwemawdaw Pagoda fell down
875	Bago	-	Shwemawdaw Pagoda fell down
13 <sup>th</sup> Sep. 1564	Bago	-	Pagodas including Shwemawdaw and Mahazedi fell down
1567	Bago	-	Kyaikko Pagoda fell down
1582	Bago	-	Umbrella of Mahazedi Pagoda fell down
9 <sup>th</sup> Feb. 1588	Bago	-	Pagodas and other buildings fell down
30 <sup>th</sup> March 1591	Bago	-	The Great Incumbent Buddha destroyed
4 <sup>th</sup> June 1757	Bago	-	Shwemawdaw Pagoda damaged
27 <sup>th</sup> Dec. 1768	Bago	-	Ponnyayadana Pagoda fell down
24 <sup>th</sup> Aug. 1858	Pyay	-	Collapsed houses and tops of pagodas at Pyay, Henzada and Thayetmyo Felt with some damages in Innwa, Sittwe, Kyaukpyu and Yangon
8 <sup>th</sup> Oct. 1888	Bago	-	Mahazedi Pagoda collapsed
10 <sup>th</sup> Sep. 1927	Yangon	-	-
17 <sup>th</sup> Dec. 1927	Yangon	7.0	Impacts extended to Dedaye
5 <sup>th</sup> May 1930	Near Kayan, Yangon and Bago Region	7.3	Collapsed houses and other buildings in Yangon and Bago Regions. Death person in Bago and Yangon Regions were approximately 500 and 50, respectively.
27 <sup>th</sup> Mar. 1931	Yangon	-	-
16 <sup>th</sup> May 1931	Yangon	-	-
21 <sup>st</sup> May 1931	Yangon	-	-

Note: Data from 9<sup>th</sup> century to 19<sup>th</sup> century are quoted from records of Pagoda and such ancient records have no statistical damage data and magnitude of earthquake.

Source: Hazard Profile of Myanmar, (Jul. 2009), Earthquakes in Myanmar and the Work for the Peoples' Safety (2012)

Despite the fact that earthquakes seldom hit Greater Yangon in the immediate past, Greater Yangon apparently faces a potential risk of significant earthquake disaster although it is not easy to predict the time and magnitude of future earthquakes in the area. Myanmar Engineering Society (MES) predicts that a large scale earthquake around Greater Yangon will occur within the next 20 years, based on the result of their analysis. MES already prepared a seismic hazard map of Yangon Region and they will prepare a more detailed hazard map by considering the site conditions.

3) Fire

“Hazard Profile of Myanmar” says that fire is the most frequent disaster in Myanmar and accounts for 71% of the disasters within the country. Most fire disasters in urban areas were associated with human errors except for those associated with earthquakes. Yangon Region is one of the high fire incidence areas in the country. The number of fire cases in Yangon Region during 2000-2007 was 2,431 which accounts for 35% of the total number of fire cases in the country, and its estimated loss is approximately MMK 1.6 billion which accounts for 14% of the estimated loss in the country according to “Hazard Profile of Myanmar”. Significantly, a fire in Hlaing Township in 2005 affected 9,145 people, with losses amounting to approximately MMK 80 million according to the draft “Standing Order for Natural Disaster Management in Myanmar”.

4) Other Disasters

1) *Thunder*

In “Hazard Profile of Myanmar”, lightning is not considered as a kind of disaster, but Relief and Resettlement Department (RRD) indicates that more than 100 people died due to lightning in 2011. Among them, 40 people died in Bago Region. Thus, lightning shall be considered as a serious disaster in the country. People in Myanmar are generally ashamed of dying from lightning attacks because of their religious belief.

2) *Landslide*

“Hazard Profile of Myanmar” reports that Greater Yangon is situated at the southern extremity of a long narrow spur of the Bago Yoma. The most notable feature of the topography is the central ridge known as Shwedagon-Mingladon anticlinal ridge. Therefore, the central part of the area is higher than its limbs. Most types of landslides that occurred in these areas are creeps, earth flow and slumps or block slides. Soil creeps occurred at Shwe-Taung-Kyar, Botahtaung and Hninsigon Bobwa Yeiktha. Earth flow types of landslides are observed at Dhamazedi Road. Slumps or block slides are noted at Inya Myaing, University Avenue Road, and Cantonment, west of Yangon Zoological Garden. From the observation of JICA Study Team, most of the slopes in Yangon City are protected by concrete walls or other artificial structures.

3) *Tsunami*

The tsunami caused by the earthquake in the Indian Ocean off Sumatra in 2004 hit the delta area south of Myanmar; causing the deaths of about 64 people. A large tsunami might cause severe damages along the west coast of Myanmar if a large scale earthquake occurs around the Andaman trench. For Greater Yangon, some researchers including Nippon Koei Central Research Institute assessed the disaster risk of tsunami in Yangon City. They anticipate maximum tsunami height is less than 1.0 m thanks to the topographic conditions of Yangon River and the deltaic area.

4) *River Bank Erosion*

There are some bank erosions along rivers in the Greater Yangon. JICA Study Team confirmed that Aye Ywar village located along Pan Hlain River near the junction of Pan Hlaing River and Yangon River has bank erosion damages due to the complex phenomenon of river flow during the monsoon season around the junction of two tidal rivers. Flood overtops the embankment in Aye Ywar village every monsoon season because the village is located on a low-lying area.

5) *Future Potential for Disasters*

Present conditions of natural disasters in Greater Yangon are depicted in this sub-section. However, with a possible effect of environmental changes, future potential for disasters might include the following:

- i) Flood inundation in and around newly developed areas,
- ii) Ultra rapid/heavy rainfall and drought due to climate change;
- iii) Abnormally high temperature due to heat island phenomenon

Because of limited data and information availability, such potential are not described in detail. Above mentioned problems already appear in Tokyo and other mega cities around the world. Yangon might follow their experience if the city has no appropriate measures.

(3) *Present Measures for Disasters*

1) *Organization for Disaster Management*

In Myanmar, legal and institutional frameworks for disaster management have been enforced since the devastating disaster of Cyclone Nargis in May 2008.

1) *Legal Framework for Disaster Management*

Natural Disaster Management Law (NDML) has been drafted and submitted to the Parliament for approval. It is now being discussed in the upper house but the expected approval date is uncertain according to several information sources. New constitution issued in 2008 has changed Myanmar's political system, which affects the disaster management structure. NDML is expected to clearly define the role and structure of the organizations and the agencies engaged in disaster management.

In spite of the absence of NDML, the draft "Standing Order for Natural Disaster Management in Myanmar" was issued. The Draft Standing Order determines the responsibilities of 23 ministries in Myanmar<sup>3</sup> and City Development Committees. YCDC has responsibilities during, before and after disasters including: i) disseminate an early warning to the public upon reception of information on predictable natural disasters except for earthquakes, ii) carry out maintenance work and reinforce earth embankments along the river banks to prevent river floods.

Disaster management policies and guidelines have been prepared by Myanmar Disaster Preparedness Agency (MDPA), formerly the Central Committee on National Disaster Prevention established in 2005. "Myanmar Action Plan on Disaster Risk Reduction (MAPDRR) 2012" was prepared as a revision of that of 2009-2015. MAPDRR is not yet adopted as a formal document, but it has certain influence on disaster risk reduction projects.

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<sup>3</sup> The Draft Standing Order was prepared in 2009: before some reorganization of ministries under the new constitution.

Due to the absence of policy directives for fund allocation of disaster management, the financial resources seem to be insufficient. Nevertheless, there are some resources, namely: 1) the Ministry of Finance's special fund for rehabilitation works, and 2) the Ministry of Social Welfare, Relief and Resettlement's (MSWRR) budget for relief activities and capacity building on disaster risk reduction. Budget for disaster management is not clearly separated at ministerial as well as local government (State/ Region) level. Apart from "Regional/State Flood Protection Plans", comprehensive disaster management plans and/or action plans do not seem to have been prepared at local level.

The "Myanmar National Building Code, 2012" was drafted up which consists of seven parts . Part 3, Structural Design of the Building Code indicates building structural design under seismic condition which mainly quotes the design standards of American Society of Civil Engineering (ASCE).

### 2) *Institutional Framework for Disaster Management*

MSWRR chairs MDPA under the new institutional framework. The Minister of Defense and the Minister of Home Affairs are co-vice chairs for MDPA. Relief and Resettlement Division (RRD) under MSWRR handles the secretariat role for MDPA. The working committee to supervise the implementation of disaster management activities and several sub-committees for effective implementation of the activities are also instituted.

Chief Minister at the State/Region level is the chair of disaster management at the local level based on the new administrative structure under the new Constitution. Similar structure applies to District, Township and Towns/Wards/Village-tract levels respectively.

International organizations, the International Red Cross and NGOs have provided grass-roots level assistance to the communities affected by Cyclone Nargis in 2008, which made them institutionalize disaster preparedness setup. However, other areas of the country have not developed a comparable setup as external support is limited to those affected areas of the cyclone. MAPDRR includes community-based disaster preparedness and risk reduction programs.

### 3) *Institutional Arrangement for Disaster Management in Yangon Division*

The Yangon Division (Region) Disaster Preparedness Management Working Committee (YDDPMWC) is chaired by the Chairman, Division Peace & Development Council, Yangon. The Mayor of YCDC is assigned as Co-Chairman and Deputy Mayor of YCDC is a member of YDDPMWC. YDDPMWC has 39 members and the roles and responsibilities of YDDPMWC<sup>4</sup> are as follows:

- To perform disaster preparedness activities such as mitigation, preparedness, relief activities during disaster, rehabilitation and reconstruction activities;
- To make arrangements for public education programs on DRR, and public participation programs;
- To make arrangements to establish Forecasting System on disaster and Early Warning System, and to disseminate information at the grass roots level when early warning is received;
- To delegate departments and organizations based on the magnitude (size) of the disaster.

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<sup>4</sup> Quoted from 'Institutional Arrangements for Disaster Management in Myanmar' (2009) RRD, MSWRR and ADPC

- To supervise the activities of working committees, and to coordinate with the working committees.
- To supervise during periods of disaster and on relief and rehabilitation activities.

Under the supervision of YDDPMWC, Disaster Preparedness Management Committees (DPMC) are constituted at district, township and ward/village tract levels. There are four (4) districts in Yangon Division. Table 2.1.79 shows the composition of DPMCs at district, township and ward/village tract levels. In addition to this, ten working committees such as those for Information & Education and Emergency Communications have been constituted under the YDDPMWC. The JICA Study Team visited a township office and met a member of DPMC. A township officer said he holds member positions in township DPMC and Information & Education Working Committee. DPMC holds a meeting once a month to discuss disaster preparedness activities. However, educating the public on disaster for better preparedness, one role of Information & Education Working Committee, is not carried out. The member argued that the township will not be severely damaged by earthquakes. First, capacity development of such committee members are required to implement disaster public awareness.

**Table 2.1.79: DPMCs at District, Township and Ward/Village Tract Levels**

	No. of Member	Chairman
District	16	Chairman, District Peace & Development Council
Township	14	Chairman, Township Peace & Development Council
Ward/Village Tract	6	Chairman, Ward/Village Tract Township Peace & Development Council

Source: JICA Study Team based on 'Institutional Arrangements for Disaster Management in Myanmar'

## 2) Flood Management Structures

### 1) *Drainage*

There are about 50 creeks in Greater Yangon whose width ranges from a few meters to hundreds of meters. They function as drainage canals from urban and agricultural areas. Artificial drainage facilities such as floodways and diversion channels do not exist in Greater Yangon.

### 2) *Embankment*

Some embankments are constructed along the major rivers such as the Yangon and Bago Rivers. Large scale embankments were constructed by ID, MOAI (Figure 2.1.69 a), b)) and small scale local ones mostly by communities (Figure 2.1.69 d)). However, from the view point of construction quality control, either type of embankment is often insufficiently compacted so that they are frequently breached during or after floods. Embankment in Dala Township along the Yangon River was constructed by ID, MOAI around 50 years ago. A storm surge caused by Cyclone Nargis in 2008 breached some parts of the embankment and local farmers repaired those by themselves because the rehabilitation work by the ID, MOAI could not be expected at that time. Land use condition of both sides of the embankment is agricultural (paddy fields). Curiously, some local developers purchased riverside land in early 2012 with an expectation of urban development in the near future. JICA Study Team did not confirm any breaches of embankment but considers that the embankment in Dala Township is not well functional because of the land use condition and land transactions.

### 3) *River Bank Protective Work (Revetment)*

Some riverbank protective works shown in Figure 2.1.69 c) are constructed on a private donation basis which implies a shortage of government budget for construction and maintenance of flood management structures.



Source: JICA Study Team

**Figure 2.1.69: Embankments and Bank Protection Work in Greater Yangon**

#### 4) Dam

There are 15 dam reservoirs upstream and around Greater Yangon which are managed by YCDC and MOAI. Eight dams were newly constructed in Bago River Basin by MOAI. As all the spillways on the dams are ungated, no significant flood control function would be expected, but they still have some effects on flood reduction.

**Table 2.1.80: Major Dam Reservoirs Upstream of Greater Yangon**

River System	Dam Name	Height (m)	Full Storage Capacity (MCM)	Completion Year	Management Agency
Hlaing	Phugyi	-	54.6	-	YCDC
	Gyobyu	-	75.5	-	YCDC
	Tabuhla	-	104.6	-	MOAI
Nga Moeyeik	Mahuyar	30.5	66.6	2004	MOAI
	Paunglin	30.5	147.0	2004	MOAI
	Nga Moeyeik	22.9	222.0	1995	MOAI
	Kalihtaw	19.8	32.1	2003	MOAI
Bago	Kodugwe	27.4	183.2	2012	MOAI
	Shwelaung	28.0	123.4	2012	MOAI
	Salu	26.8	111.0	2012	MOAI
	Mazin	18.3	35.5	2000	MOAI
	Zalathaw	15.2	23.3	1999	MOAI
	Alaingni	15.8	48.1	2004	MOAI
	Shwepyi (3)	10.7	4.6	1997	MOAI
Lagunpyin	18.6	183.5	2002	MOAI	

Source: ID under MOAI and YCDC

3) Disaster Management Assistance by Other Donors and NGOs

Recently, 34 organizations, including ten United Nations (UN) Agencies & Association of Southeast Asian Nations (ASEAN), 22 NGOs and two professional bodies, assist in disaster management in the country. Study Team interviewed some of them to understand the present measures for disasters by other donors and international NGOs.

1) *United Nations Development Programme (UNDP)*

UNDP has carried out activities for disaster risk reduction since the catastrophic disaster of Cyclone Nargis in 2008. They carried out the Multi Hazard Risk Assessment in Rakhine State in 2010. UNDP mainly focuses on rural areas for their activities. Yangon Region does not have any project supported by UNDP although the region has large rural areas.

Recently, UNDP headquarters is preparing new programs for Myanmar which will be completed within the near future according to the UNDP staff in Yangon office. MAPDRR will reflect their new programs. UNDP has initiated a working group of Disaster Risk Reduction (DRR working group).

2) *UN Habitat*

UN Habitat has also carried out activities for disaster risk reduction since the Cyclone Nargis disaster. They focus on education and structural measures; one of their major activities is education for carpenters to build safer houses against strong winds brought about by cyclones (see sample educational material shown in Figure 2.1.70 a)). Construction of cyclone shelters is also their main output.

3) *SEEDS Asia*

SEEDS Asia has carried out disaster management education including raising awareness through schools and curriculum development. Water Knowledge Resource Centre (WKRC) and Mobile Knowledge Resource Centre (MKRC) as well as Myanmar Engineering Society (MES) are utilized for this purpose. Evacuation roads were also constructed by local participation and SEEDS Asia assistance.

Activities of SEEDS Asia related to disaster risk reduction were mainly for earthquake and tsunami, and the activity fields were mainly in the Ayeyarwaddy Delta which experienced damage brought about by Cyclone Nargis and in Mandalay. In addition, they also focus on the Greater Yangon and Bago Region. Recently, they are carrying out education program for the enhancing awareness of fire disaster based on a request from the Fire Services Department (FSD). SEEDS Asia considers that FSD does not contribute to educational disaster preparedness and a system is needed to make FSD participate in such activities. SEEDS Asia educates school teachers in teaching schools. They consider that educating the school teachers is the first step in disaster awareness.

4) *Asian Disaster Preparedness Center (ADPC)*

ADPC has participated in the Urban Earthquake Vulnerability Reduction Program in Mandalay funded by Norwegian Government. MAPDRR plans to have the same program in Yangon Region but the plan for Yangon Region is not yet assured according to ADPC. ADPC has also participated in raising awareness in schools through the school curriculum for disaster risk reduction such as for earthquake.

5) *World Vision (WV)*

WV has participated in the Community Based Disaster Risk Reduction (CBDRR) in three areas including Mandalay which is one of the programs of the ASEAN Agreement on Disaster



Management and Emergency Response (AADMER). They focus on software measures such as education for disaster management (see sample educational material shown in Figure 2.1.70 b)) although they also participate in projects like construction cyclone shelters and evacuation roads. These cyclone shelters were constructed by private contractors and evacuation roads were constructed by participants of beneficiaries.

MAPDRR expects WV to contribute to the integration of Disaster Risk Reduction in school and health facilities. WV constructed or renovated elevated schools and clinics to protect against flood inundation. Earthquake resilience is also a major activity of WV. Bank protection works carried out by WV is quite costly but they have grant aid sourced from donors including CIDA. After the construction of structures, beneficiaries manage the structures and shoulders maintenance cost but their ability is quite variable.



a) Guidance How to Construct Safe House

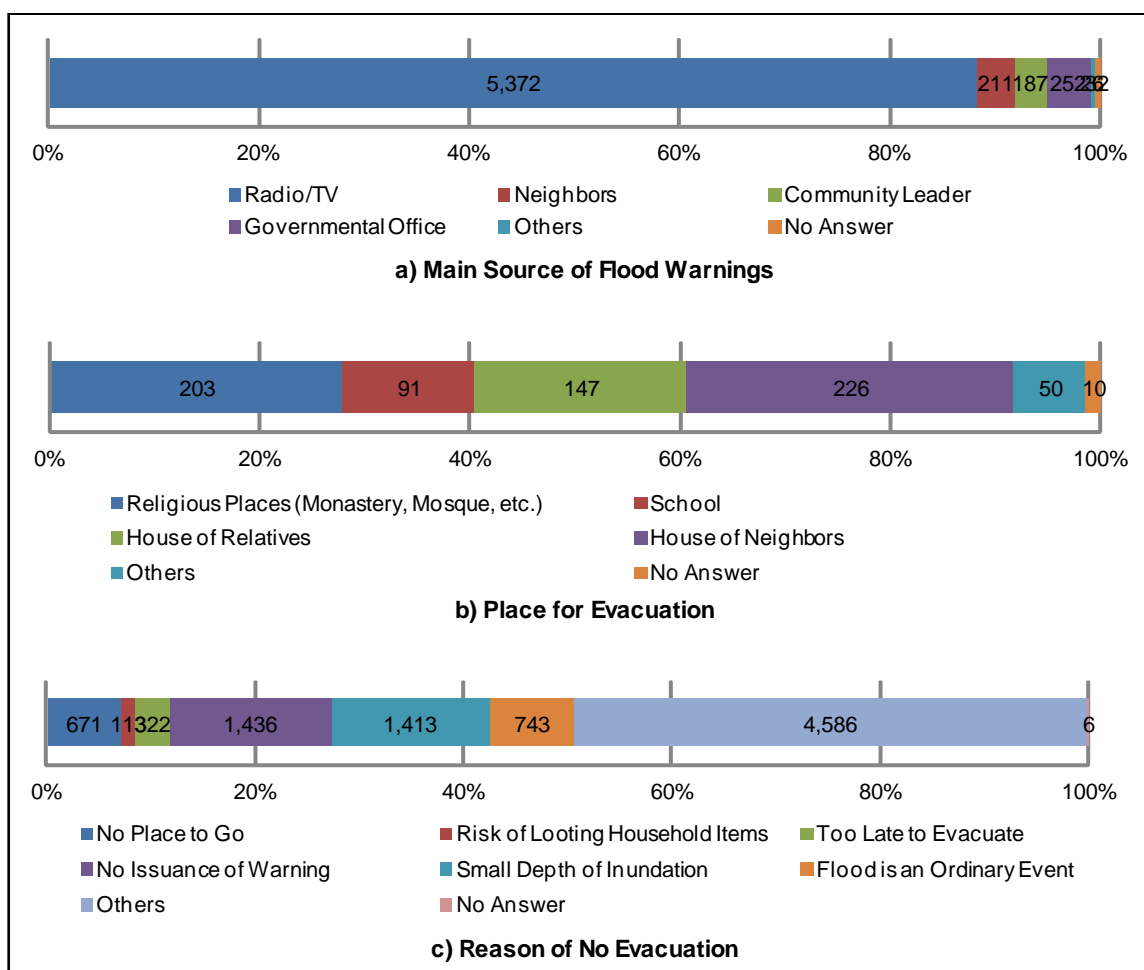
b) Awareness against Flood Inundation for Children

Source: A Guide for Village Carpenters on How to Build a Safer Shelter for a), Disaster Safety Booklet for b)  
**Figure 2.1.70: Samples of Educational Materials for Disaster Management**

4) Disaster Awareness of People Living in Greater Yangon

1) Present Activities on Disaster Forecast/Warning and Evacuation

According to the HIS results, 60.5% of households (6,080 out of 10,045) receive flood warnings in advance. Main source of flood warnings is radio or TV as shown in Figure 2.1.71 a). Some households (727 out of 10,045 or 7.2%) have evacuated due to a disaster. Evacuated people gathered in houses of neighbors and relatives or in religious places such as monasteries and mosques as shown in Figure 2.1.71 b). Households who did not evacuate explained their reasons as shown in Figure 2.1.71 c).



Source: HIS Results by JICA Study Team

**Figure 2.1.71: HIS Results on Flood Forecast/Warning and Evacuation**

2) *Disaster Preparedness by People in Greater Yangon*

According to the HIS results, most people living in Greater Yangon (8,616 out of 10,045 or 85.8%) have been educated in disaster preparedness. However, only a small portion (1,276 out of 10,045 or 12.7%) prepare emergency foods and goods in the event of a disaster. Practical education and a continuous awareness campaign are required against devastating disasters such as earthquakes and cyclones.

(4) Key Findings and Main Issues to be Addressed for Disaster Measures

Measures for “Infrequent Disaster with Large Damage” are important because of their impact on human life. However, “Frequent Disaster with Small Damage” cannot and should not be ignored from the viewpoint of sustainable and efficient economic activities. Disasters in Greater Yangon are categorized and summarized below:

1) Infrequent Disaster with Large Damage

1) *Earthquake*

Magnitude 7.0+ earthquakes occurred more than 16 times and six earthquakes of around magnitude 7.0 hit the main cities along the Sagaing fault such as Yangon, Bago and Mandalay from 1930 to 1956. Significantly, Yangon experienced huge a earthquake six times around the

1930's. Despite the fact that earthquakes seldom hit Greater Yangon in the immediate past, Greater Yangon obviously faces a potential risk of significant earthquake disaster although it is not easy to predict the time and magnitude of future earthquakes in the area.

2) *Cyclone*

Severe cyclones occur during the pre-monsoon season from April to May or post-monsoon season from October to November. Cyclones have three destructive forces, i.e. i) storm surge, ii) heavy rainfall and iii) strong winds. Cyclone Nargis hit the Yangon area in May 2008. Flood inundation area caused by Cyclone Nargis was seen through satellite imagery on 5<sup>th</sup> May 2008. JICA Study Team estimated the flood inundated areas caused by cyclone Nargis based upon the satellite image. In Dala, 83.37% of the area was inundated; in Twantay 82.12%; in Htantabin 51.86%; and in Hlegu 51.58%. This corresponds to interview results of JICA Study Team.

2) Frequent Disaster with Small Damage

1) *General Status of Floods*

An interview survey by the JICA Study Team revealed that some areas in Greater Yangon have flood inundations almost every year. Yangon downtown along the Yangon River has little disaster risks against flooding although the district suffers from drainage congestion during the rainy season. Fringe areas of Greater Yangon with elevation 2.0-5.0 m have disaster risks due to flooding and drainage congestion during high tide. Although fringe areas of Greater Yangon have rapid population growth of 3 % per year, it should be noted that parts of these lie in lowland area. Interim results of HIS also indicate frequent flood inundation in Greater Yangon. About 5,370 out of 10,045 households (53.5%) replied that they have never experienced flood inundation but 4,200 households (41.8%) experience flood inundation every year. Most of the inundation depth at these areas are up to ankles or knees (92.1 %) and inundation duration ranges from less than half day to more than six days.

2) *Drainage Congestion*

The Yangon River experiences large water level difference between the low and high tides. Water levels at the Yangon River exceed elevation 2.5-3.0 m during the high tide with a full moon. There are several lowland areas below elevation 3.0 m in Greater Yangon with rainwater drainage issue. Most of the lowlands are located in the suburbs of Greater Yangon including Thilawa SEZ. The drainage congestion problem in Greater Yangon is complicated. Harsh natural conditions, rapid urbanization and poor capacity of drainage system are the main cause of the problem.

3) *Tidal Flood including Storm Surge*

Dala Township, located south of Greater Yangon across the Yangon River, has potential for development, but most of the area is lowland with elevation 1.5-3.0 m being utilized as paddy fields. They experience inundation at almost every high tide during full moon all year round. Inundation that occurs almost every month is relatively short and shallow; usually lasting 30 minutes to one hour and with 0.5-1.0 m inundation depth. Hence, rice crops can be grown and local people accept the frequent inundations. Within Yangon Region, Kyauktan Township has a high hazard potential for storm surges.

3) Present Measures for Disasters

1) *Organization for Disaster Management*

Since the devastating disaster of cyclone Nargis in May 2008, legal and institutional frameworks for disaster management have been enforced. Natural Disaster Management Law (NDML) has been drafted and submitted to the Parliament for approval. It is now being discussed in the upper house but expected approval date is uncertain according to several information sources. New constitution issued in 2008 has changed Myanmar's political system, which affects the disaster management structure. NDML is expected to clearly define the role and structure of the organizations and the agencies engaged in disaster management. Disaster management policies and guidelines have been prepared by Myanmar Disaster Preparedness Agency (MDPA), formerly the Central Committee on National Disaster Prevention established in 2005. "Myanmar Action Plan on Disaster Risk Reduction (MAPDRR) 2012" was prepared as a revision of that of 2009-2015. MAPDRR is not yet adopted as a formal document, but it has certain influence on disaster risk reduction projects.

2) *Flood Management Structures*

Flood management structures such as drainage, embankment, revetments and dams were constructed by ID, MOAI, other authorities, charitable persons and local communities.

3) *Disaster Management Assistances by Other Donors and NGOs*

Recently, 34 organizations, including ten UN Agencies & ASEAN, 22 NGOs and two professional bodies, assist in disaster management in the country. UNDP has initiated a working group of Disaster Risk Reduction.

4) *Disaster Awareness of People*

According to the HIS results, 60.5% of households (6,080 out of 10,045) receive flood warnings in advance. Main source of flood warning is radio or TV. Some households (727 out of 10,045 or 7.2%) have evacuated due to disaster. Evacuated people gathered in religious places such as monasteries and mosques or in houses of neighbors. Most people living in Greater Yangon (8,616 out of 10,045 or 85.8%) have been educated in disaster preparedness. However, only a small portion (1,276 out of 10,045 or 12.7%) prepare emergency foods and goods in the event of a disaster. Practical education and a continuous awareness campaign are required against devastating disasters such as earthquakes and cyclones.