

MINISTRY OF HOUSING, UTILITIES
& URBAN DEVELOPMENT (MOHUUD)
GENERAL ORGANIZATION FOR
PHYSICAL PLANNING (GOPP)

JAPAN INTERNATIONAL
COOPERATION AGENCY (JICA)

THE STRATEGIC URBAN DEVELOPMENT MASTER PLAN STUDY
FOR A SUSTAINABLE DEVELOPMENT
OF THE GREATER CAIRO REGION
IN THE ARAB REPUBLIC OF EGYPT

FINAL REPORT

VOLUME 1: SUMMARY

(STRATEGIC URBAN DEVELOPMENT MASTER PLAN)

AUGUST 2008

NIPPON KOEI CO., LTD.
KATAHIRA & ENGINEERS INTERNATIONAL

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PREFACE

In response to a request from the Government of Arab Republic of Egypt, the Government of Japan decided to conduct “The Strategic Urban Development Master Plan Study for a Sustainable Development of the Greater Cairo Region in the Arab Republic of Egypt”, and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA dispatched a study team headed by Mr. YAMADA Koji of Nippon Koei Co., Ltd. to Egypt between February 2007 and June 2008 and consisting of Nippon Koei Co., Ltd. and Katahira & Engineers International.

In collaboration with the Government of Egypt, the JICA study team conducted field surveys and formulated the Strategic Urban Development Master Plan for the Greater Cairo Region. The JICA study team held discussions with concerned officials of the Government of Egypt and carried out the Pre-feasibility Study for the Western Development Corridor. Upon returning to Japan, the JICA study team conducted further studies and prepared this final report.

I hope that this report will contribute to the sustainable development of the Greater Cairo Region and to the enhancement of the friendly relationship between our two countries.

Finally, I wish to express my sincere appreciation to the concerned officials of the Government of Egypt for their close cooperation and assistance extended to the study team.

August 2008

HASHIMOTO Eiji

Vice President

Japan International Cooperation Agency

August 2008

Mr. HASHIMOTO Eiji
Vice President
Japan International Cooperation Agency
Tokyo, Japan

Subject: Letter of Transmittal

Dear Sir,

We are pleased to submit herewith the Final Report of “The Strategic Urban Development Master Plan Study for a Sustainable Development of the Greater Cairo Region in the Arab Republic of Egypt”. This study was conducted by Nippon Koei Co., Ltd. in association with Katahira & Engineers International, under a contract to JICA during the period from February 2007 to June 2008. The report comprises a Summary (Volume 1) and Main Report (Volume 2) for the Strategic Urban Development Master Plan for the Greater Cairo Region, plus a Summary (Volume 3) and Main Report (Volume 4) for the Pre-feasibility Study for the Western Development Corridor.

The report sets out recommendations for policies to improve the living environment in the Greater Cairo Region. These recommendations reflect the results of the Strategic Urban Development Master Plan and the Pre-feasibility Study for the Western Development Corridor.

We would like to take this opportunity to express our sincere gratitude to your Agency and the Ministry of Foreign Affairs. We are also most grateful for the cooperation and assistance from the concerned officials in Egypt, the JICA Egypt Office, and the Embassy of Japan in Egypt. The Final Report is the fruit of excellent collaboration between all participants in this study.

Yours faithfully,

YAMADA Koji

Team Leader, JICA Study Team

The Strategic Urban Development Master Plan
Study for a Sustainable Development of the
Greater Cairo Region in the Arab Republic of
Egypt

Preface

Letter of Transmittal

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ABBREVIATIONS

AUC	American University in Cairo	ENR	Egyptian National Railway
ADT	Average Daily Traffic	EU	European Union
ATC	Automatic Train Control System	F/R	Final Report
BC	Before Christ	F/S	Feasibility Study
BOD	Biological Oxygen Demand	FDI	Foreign Direct Investment
BOT	Build, Operate and Transfer	FIRR	Financial Internal Rate of Return
BOOT	Build, Own, Operate and Transfer	GAFI	General Authority for Investment and Free Zones
CAPMAS	Central Agency for Public Mobilization and Statistics	GARBLT	General Authority for Roads, Bridges and Land Transport
CAPWO	Organization for Execution of Greater Cairo and Alexandria Portable Water and Wastewater Project	GAID	General Authority for Industrial Development
CBD	Central Business District	GCBC	Greater Cairo Bus Company
CCTV	Closed Circuit Television	GCR	Greater Cairo Region
CDC	Cairo Demographic Center	GCSDC	Greater Cairo Sanitary Drainage Company
CEPC	Cairo Electricity Production Company	GCWSC	Greater Cairo Water Supply Company
CMO	Cairo Metro Organization	GCRUPC	Greater Cairo Region Urban Planning Center
COD	Chemical Oxygen Demand	GDP	Gross Domestic Product
CREATS	Transportation Master Plan and Feasibility Study of Urban Transport Projects in Greater Cairo Region	GEM	Grand Egyptian Museum
CSC	Centralized Substation Control	GIS	Geographical Information System
CTA	Cairo Transport Authority	GOE	Government of Egypt
CTC	Centralized Train Control System	GOJ	Government of Japan
DB	Design Build	GOPP	General Organization for Physical Planning
DBO	Design Build and Operate	GRDP	Gross Regional Domestic Product
DBFO	Design Build Finance and Operate	GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit
DC	Direct Current	GWWC	Giza Water and Wastewater Company
DF/R	Draft Final Report	HCWW	The Holding Company for Water and Wastewater
EDHC	Egypt Demographic and Health Survey	HFO	Heavy Fuel Oil
EEA	Egyptian Electricity Authority	HH	Household
EEAA	Egyptian Environmental Affairs Agency	HIS	Household Interview Survey
EEHC	Egyptian Electricity Holding Company	IBRD	International Bank for Reconstruction and Development (World Bank)
EETC	Egyptian Electricity Transmission Company	IC/R	Inception Report
EIA	Environmental Impact Assessment	ICT	Information Communication Technology
EIRR	Economic Internal Rate of Return	IDA	Industrial Development Authority
ENIT	Egyptian National Institute of Transport		

IDSC	Information and Decision Support Center	PC	Pre-stressed Concrete
IEE	Initial Environmental Examination	PCU	Passenger Car Unit
IPP	Independent Power Producer	pphpd	Passengers per hour per direction
IT	Information Technology	PPP	Public Private Partnership
IT/R	Interim Report	PSU	Primary Sampling Units
JBIC	Japan Bank for International Cooperation	PTPS	Public Transport Passenger Survey
JETRO	Japan External Trade Organization	R&D	Research and Development
JICA	Japan International Cooperation Agency	ROW	Right of Way
ktoe	kilo ton oil equivalent	S/W	Scope of Work
LFO	Light Fuel Oil	SDMP	Strategic Urban Development Master Plan Study (This Study)
LIM	Linear Introduction Motor	SDMP	The Strategic Urban Development Master Plan Study
LRT	Light Rail Transit	SOx	Sulfur Oxides
MENA	Middle East and North Africa	STRASYA	Standard Urban Railway System for Asia
M/M	Minutes of Meeting	SWM	Solid Waste Management
MOF	Ministry of Finance	TOR	Terms of Reference
MOHP	Ministry of Health and Population	UCA	Urban Control Area
MOHUUD	Ministry of Housing, Utilities and Urban Development	UDA	Urban Development Area
MOI	Ministry of Investment	UGB	Urban Growth Boundary
MOIC	Ministry of International Cooperation	UNDP	United Nations Development Program
MOLD	Ministry of Local Development	UNESCO	United Nations Educational, Scientific and Cultural Organization
MOT	Ministry of Transport	UPA	Urban Planning Area
MOTI	Ministry of Trade and Industry	USAID	United States Agency for International Development
MSEA	Ministry of State for Environment Affairs	WHO	World Health Organization
MSLD	Ministry of State for Local Development	WPP	Water Purification Plant
MSW	Municipal Solid Waste	WWPT	Wastewater Treatment Plant
MSWM	Municipal Solid Waste Management		
MWRI	Ministry of Water Resources and Irrigation		
NAT	National Authority for Tunnels		
NOx	Nitrous Oxides		
NUC	New Urban Community		
NUCA	New Urban Community Agency		
OD	Origin and Destination		
OCC	Operating Control Center		
OECD	Organisation for Economic Co-operation and Development		

MEASUREMENT

Length

mm	=	millimeter
cm	=	centimeter
m	=	meter
km	=	kilometer

GW	=	gigawatt
kWh	=	kilowatt hour
MWh	=	megawatt hour
GWh	=	gigawatt hour
ktoe	=	kiloton oil equivalent

Area

cm ²	=	square centimeter
m ²	=	square meter
ha	=	hectare
km ²	=	square kilometer

Other Measures

%	=	percent
HP	=	horsepower
°C	=	Celsius degree

Volume

cm ³	=	cubic centimeter
m ³	=	cubic meter
l	=	litter

Currency

USD	=	US Dollar
LE	=	Egyptian Pound
JPY	=	Japanese Yen

Weight

mg	=	milligram
g	=	gram
kg	=	kilogram
t	=	ton
mg/l	=	milligram per liter

Time

s	=	second
min	=	minute
hr	=	hour
d	=	day
yr	=	year

Electrical Measurement

V	=	volt
kV	=	kilovolt
A	=	ampere
VA	=	voltampere
MVA	=	megavoltampere
kW	=	kilowatt
MW	=	megawatt

Exchange Rate
(As of 15 February, 2008)

US\$1 = JPY 110.0= L.E. 5.5

BACKGROUND OF THE STUDY

i In response to a request from the Government of the Arab Republic of Egypt (hereinafter referred to as “the GOE”), the Government of Japan (hereinafter referred to as “the GOJ”) decided to implement the Study on the Strategic Urban Development Master Plan for a Sustainable Development of the Greater Cairo Region in Arab Republic of Egypt (hereinafter referred to as “the study”). Accordingly, the Japan International Cooperation Agency (hereinafter referred to as “JICA”), the official agency for technical cooperation programs, decided to undertake the Study, and dispatched a JICA Study Team.

ii General Organization for Physical Planning (GOPP) under Ministry of Housing, Utilities and Urban Development (MOHUUD) was appointed as the counterpart agency, and coordinated with the other relevant organizations for the smooth implementation of the Study. The Study is being done in close cooperation with concerned GOE authorities, particularly the Greater Cairo Region Urban Planning Center (GCRUPC).

iii The objectives of the study consist of: (i) to formulate a strategic development master plan for the Study Area in the target year of 2027 to achieve the sustainable socio-economic development through well-balanced urban planning and development; (ii) to formulate an implementation scheme for priority development corridor(s), considering the effective urban development being integrated with transportation development; and (iii) to exchange experience related to urban planning and urban development.

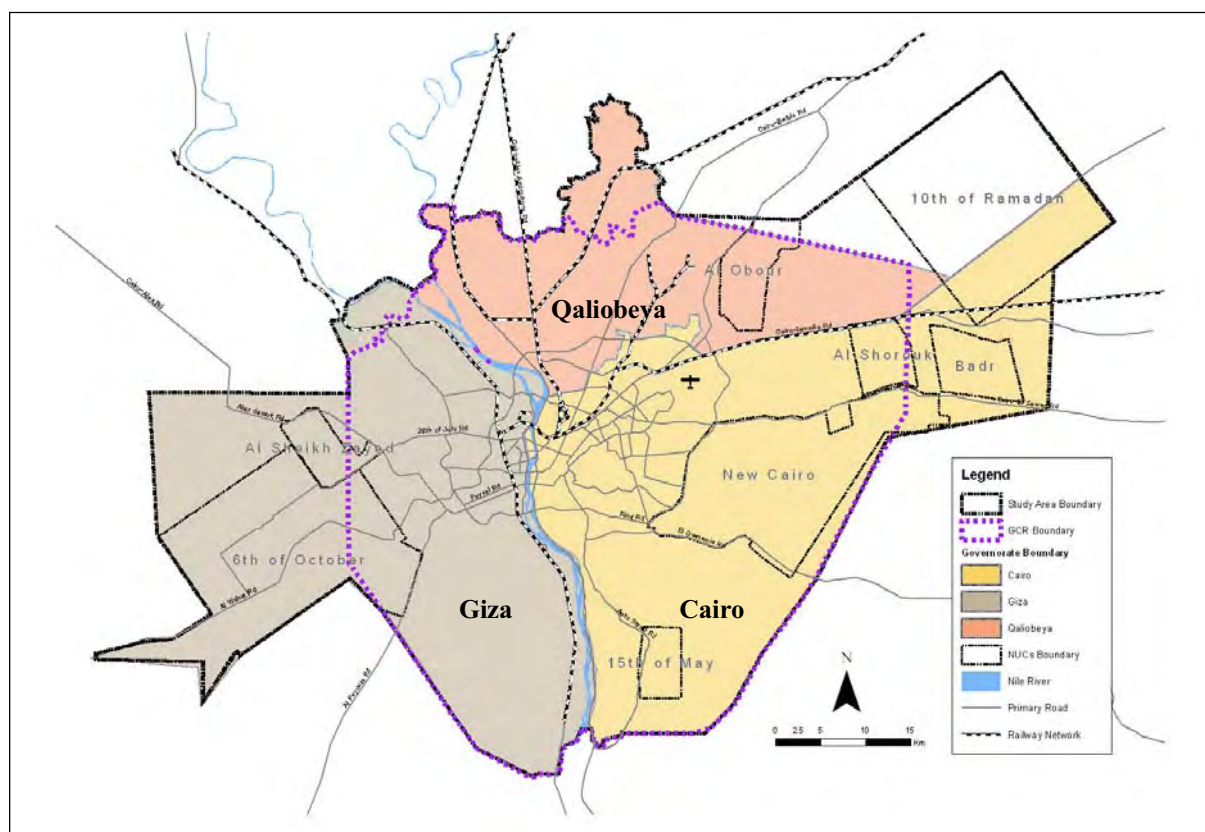
iv The Study Area¹ includes the whole of Cairo governorate, part of Giza and Qaliobeya governorates, and 10th of Ramadan new urban community (NUC). It consists of 544 administrative units, and covers the area of 4,367 km², as shown in Table 1. The list of administrative units, such as shiakha (the minimum sub-division of the administrative unit) and qism, within the Study Area is presented in Annex I of the main report (Volume 2).

Table 1 Administrative Units, Land Area, and Population in the Study Area

Governorate	No. of Administrative Units (units)	Land Area (km ²)	Population in 2006 (1,000)
Cairo	325	1,636	7,787
Giza	95	1,550	5,131
Qaliobeya	122	788	3,059
10 th of Ramadan NUC (Sharqia)	2	393	124
Total	544	4,367	16,101

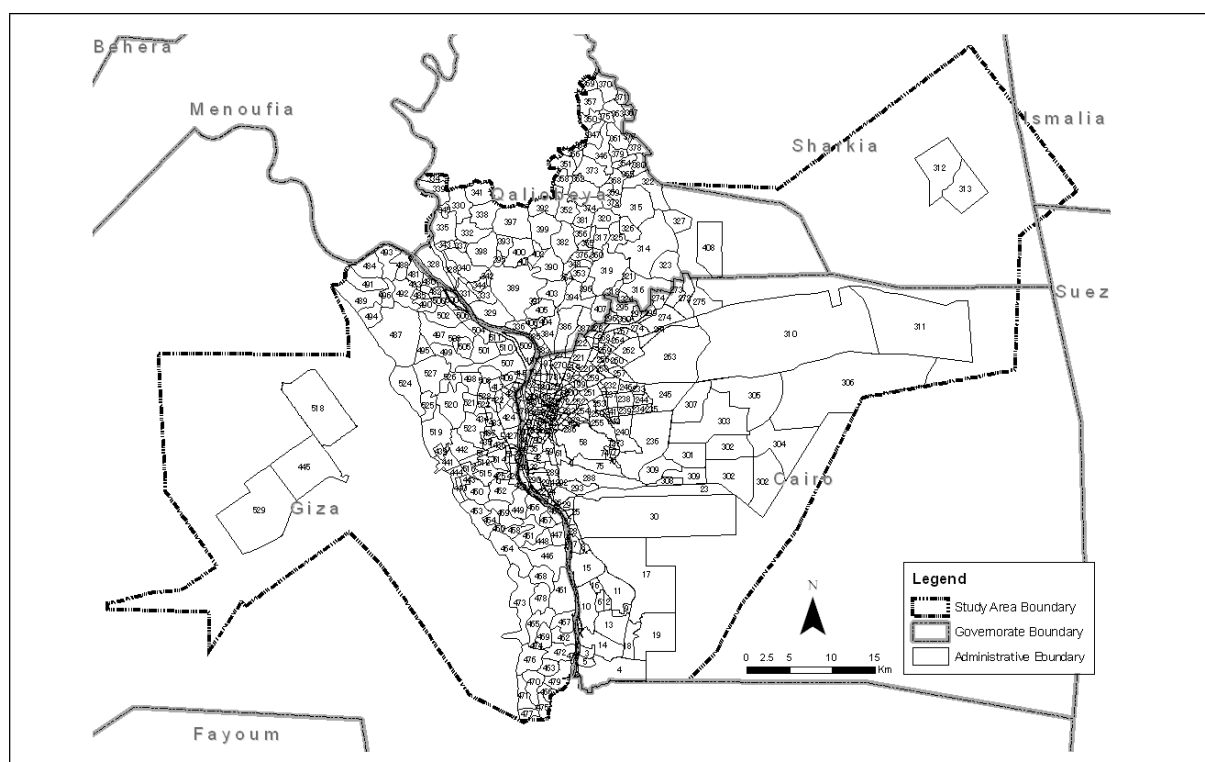
Source: Census, CAPMAS, 2006

¹ In April, 2008 after the completion of the final draft report for the strategic development master plan, Cairo governorate was divided into Cairo and Helwan governorates. In addition, Giza governorate was divided into Giza and 6th of October governorates. (Presidential Decree No. 124, 2008)



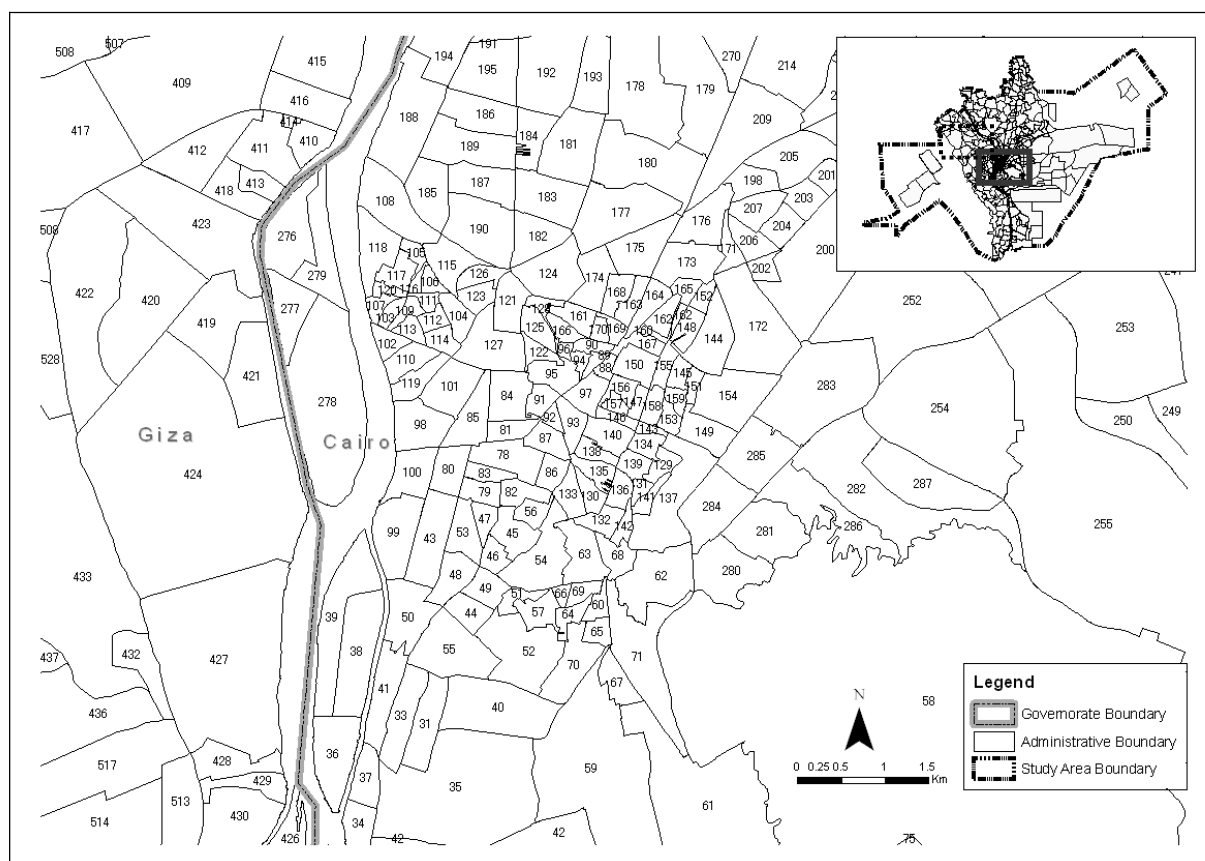
Source: Census, CAPMAS, 2006

Figure 1 Location Map of the Study Area



Source: Census, CAPMAS, 2006

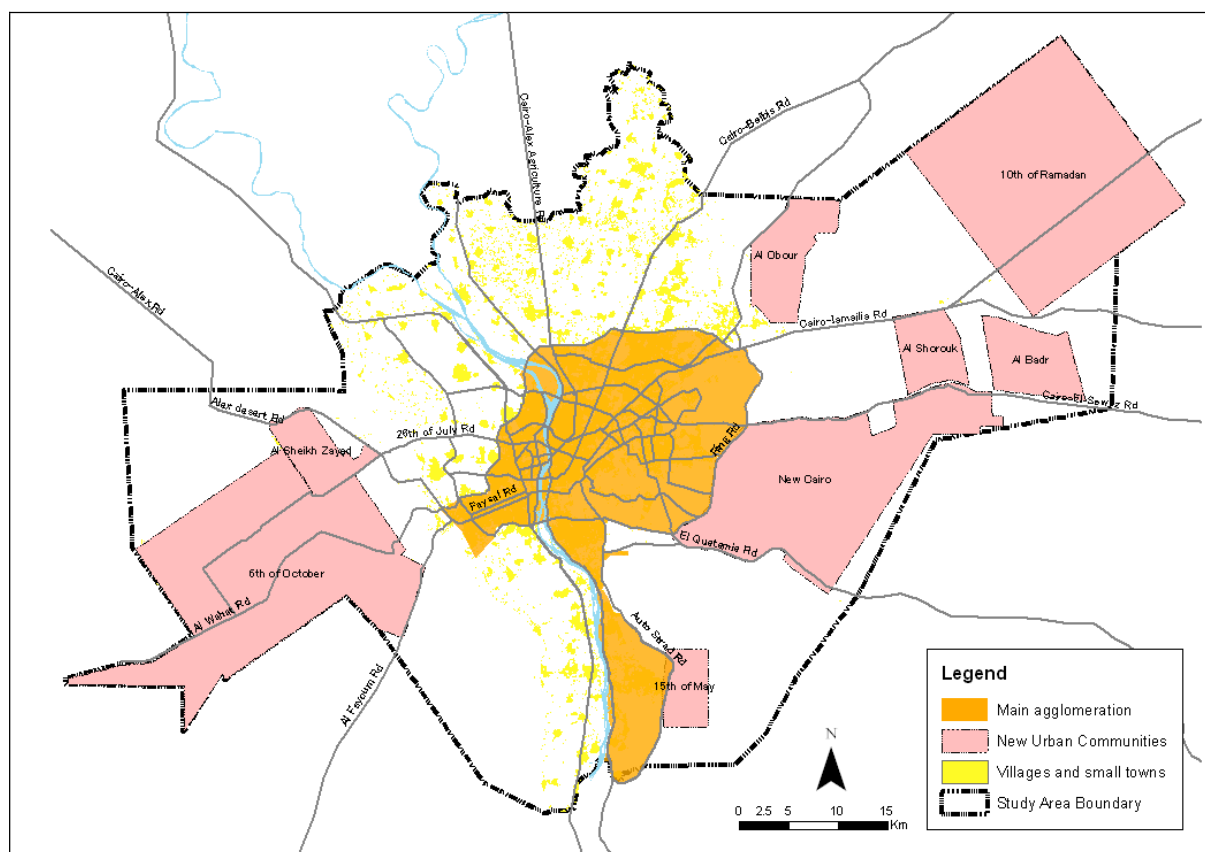
Figure 2 Administrative Settings of the Study Area



Source: Census, CAPMAS, 2006

Figure 3 Administrative Settings in the Central Part of the Study Area (Enlarged)

v In the study, the existing built-up areas (called the urban agglomeration) have been classified into three types and defined as: (i) main agglomeration comprising the built-up areas within the ring road and south of the ring road along the Nile inside the Autostrad Road; (ii) villages and small towns mostly in agricultural areas outside the main agglomeration; and (iii) new urban communities (NUCs).



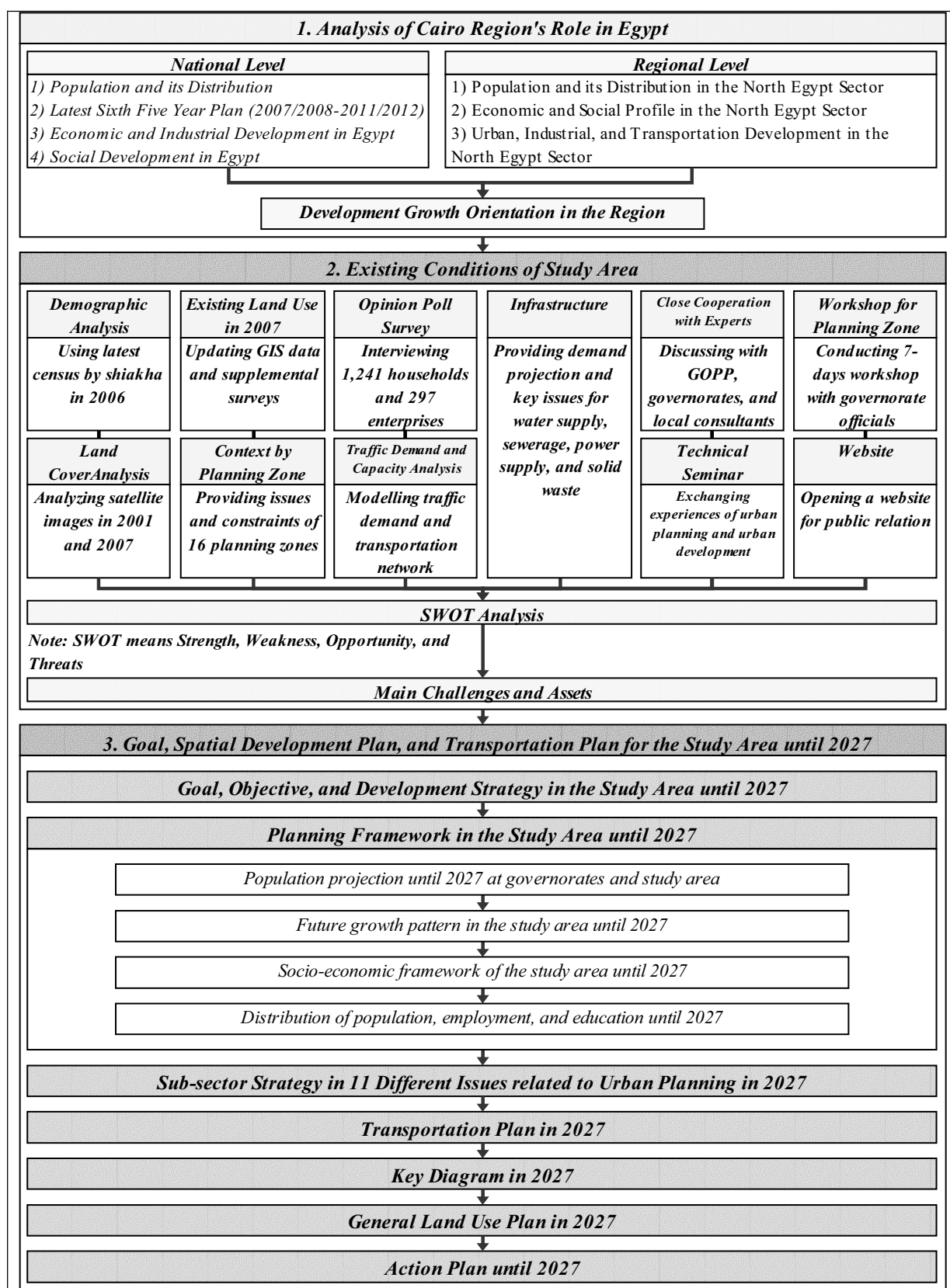
Source: JICA Study Team

Figure 4 Classification of Built-up Area in the Study Area

vi. In the study, three different areas were defined to analyze the existing conditions of the Study Area at the national and regional levels. These areas are: (i) the North Egypt Sector; (ii) the Cairo Region; and (iii) the Greater Cairo Region. The North Egypt Sector covers two regions of Cairo and the Delta and their neighboring governorates. The Cairo Region covers the whole three governorates of Cairo, Giza, and Qaliobeya. The Greater Cairo Region covers the main agglomeration and its surrounding areas within the Study Area.

vii. Figure 5 shows the work flow of the study for preparing the master plan. It consists of three stages: (i) to analyze the role of the Cairo Region² at national and regional levels; (ii) to analyze existing conditions of the Study Area; and (iii) to formulate goals, spatial development plans, and transportation plans of the Study Area for the target year of 2027. In the second stage, the Study Team carried out various activities in strong cooperation with GCRUPC. This consisted of: (i) demographic analysis; (ii) land cover analysis utilizing the remote sensing analysis based on the satellite image in 2007; (iii) analysis of existing land use; (iv) analysis of context and characteristics of 16 planning zones at the district level in the Study Area; (v) opinion poll survey of 1,241 households and 397 enterprises; (vi) traffic demand and capacity analysis; (vii) analysis of existing infrastructure; and (viii) discussions with related authorities and governorates including daily discussions, technical seminars, and workshops.

² Cairo Region covers the whole three governorates of Cairo, Giza, and Qaliobeya, while the Greater Cairo Region covers the main agglomeration and its surrounding areas within the Study Area.

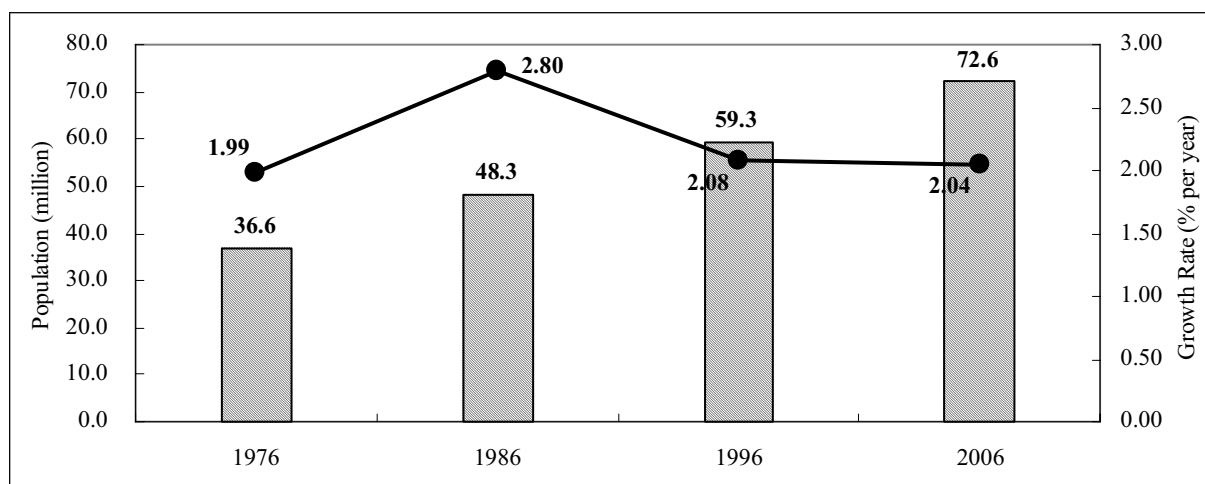


Source: JICA Study Team

Figure 5 Work Flow for Formulation of Master Plan

1 Cairo's Role in the Country and the Region

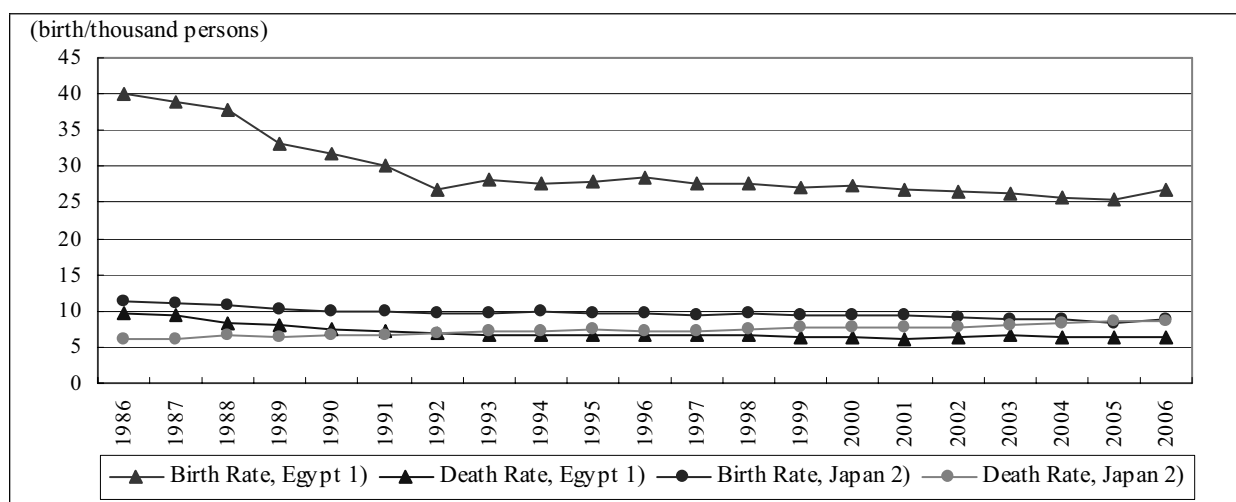
1.1 Approximately seventy-three million people resided in Egypt in 2006. Between 1976 and 1986, Egypt's annual population growth rate increased rapidly from 1.99% in 1976 to 2.80% in 1986. However, over the next 10 years, the growth rate fell markedly to just 2.08% in 1996. In the following 10 years, the population growth rate slowly declined to 2.04% in 2006 (Figure 1.1). The growth rate between 1996 and 2006 remained at a level that is slightly higher than the "high" scenario of 2.02% per year proposed by the Cairo Demographic Center (CDC). The birth rate decreased substantially from 40 to 27 births/thousand persons in 1986-2006, while the death rate steadily decreased from 10 to 6 deaths/thousand persons. In the future, the descending trend of natural growth will be more gradual than in the past (Figure 1.2).



Source: Census, CAPMAS, 2006

Note: Population of Egypt in 1996 and 2006 does not include residents outside the country.

Figure 1.1 Total Population and Annual Growth Rate of Egypt in 1976-2006

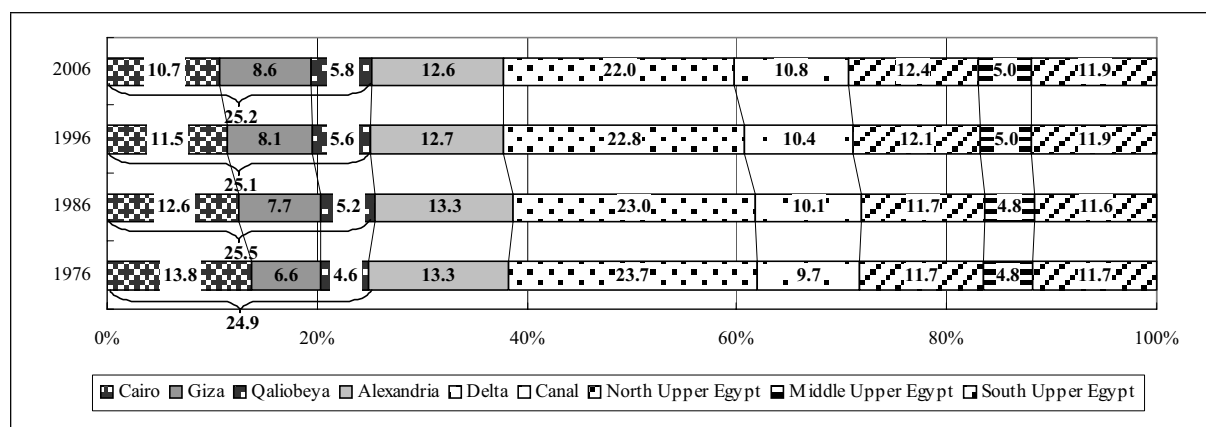


Source 1) Statistical Yearbook 2005, CAPMAS and Sixth Five-Year Plan, MOP, 2007

Source 2) Ministry of Health, Labor, and Welfare, Japan, 2006

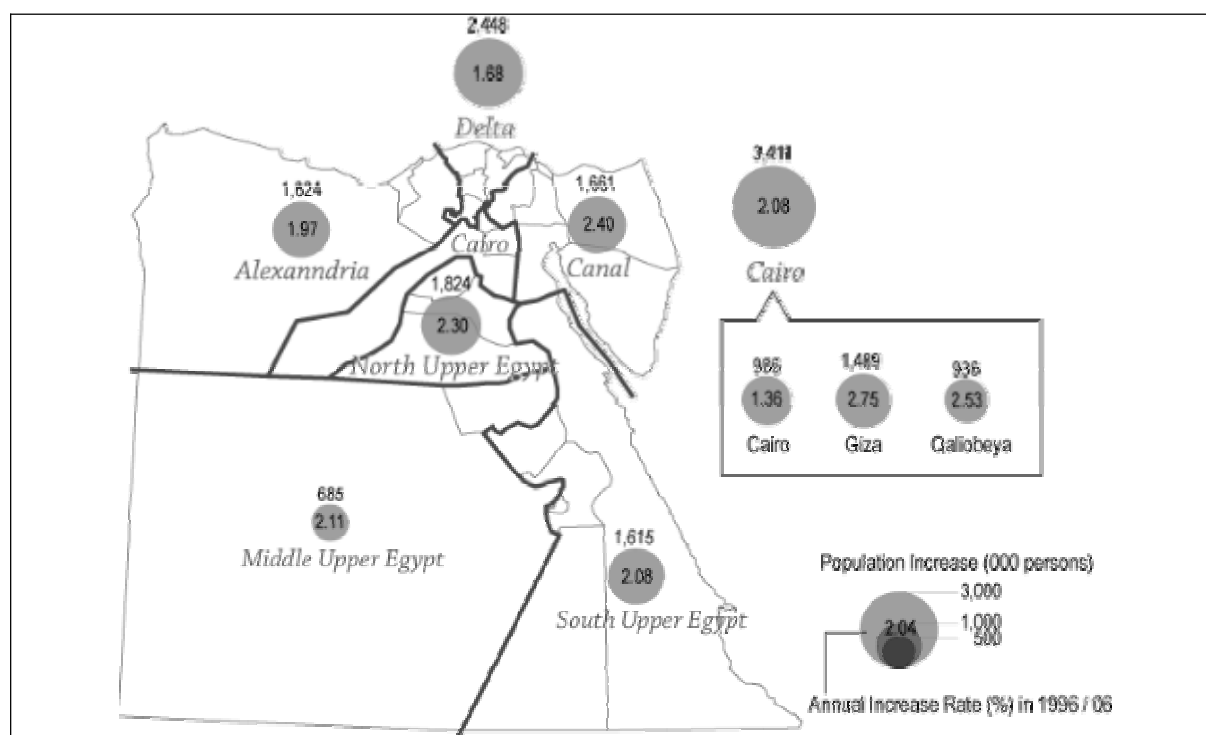
Figure 1.2 Birth, Death, and Fertility Rates of Egypt and Japan in 1986-2006

1.2 The Cairo region, including Cairo, Giza, and Qaliobeya governorates, has a relatively stable share of Egypt's total population (approximately 25%), although this increased slightly between 1996-2006. In contrast, the size of Cairo governorate's share decreased from 13.8% in 1976 to 10.7% in 2006, and the balance shifted to neighboring governorates within the Cairo region (Figure 1.3). The strong attraction of the Cairo region resulted in the largest incremental population of 3.4 million people among all the regions between 1996-2006 (Figure 1.4).



Source: Census, CAPMAS, 2006

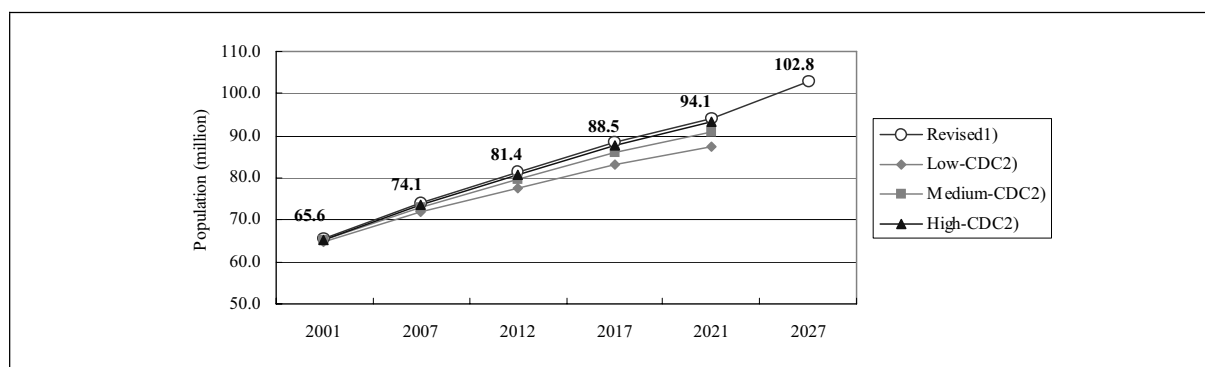
Figure 1.3 Population Distribution by Region in Egypt in 1976-2006



Source: Census, CAPMAS, 2006

Figure 1.4 Incremental Population by Region in 1996-2006

1.3 The total population of Egypt was projected at 103 million in 2027 by maintaining the “high” scenario growth rate proposed in the CDC’s population projection (Figure 1.5).

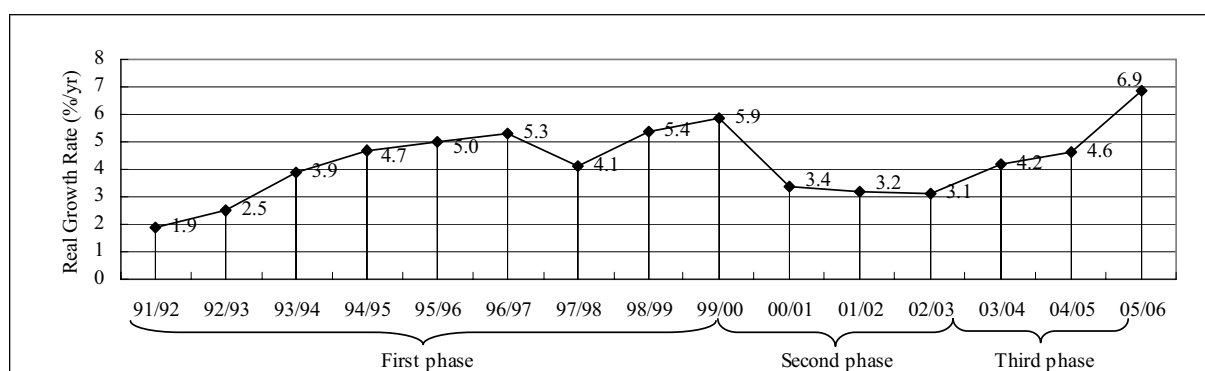


Source 1) JICA Study Team

Source 2) Cairo Demographic Center, 2001

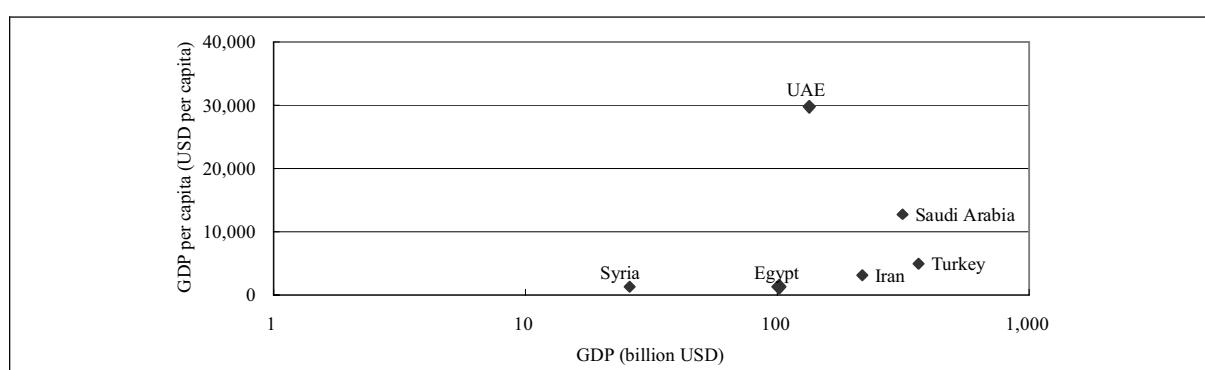
Figure 1.5 Revised Population Projection until 2027

1.4 The national GDP has fluctuated over time. However, since 2002/03 (Third Phase), the GDP has constantly increased (Figure 1.6). The level of Egypt's GDP is comparable to the GDP of neighboring countries. However, Egypt's GDP per capita is relatively low (Figure 1.7). The sixth five-year plan targets an 8% GDP growth rate.



Source: Egyptian Central Bank

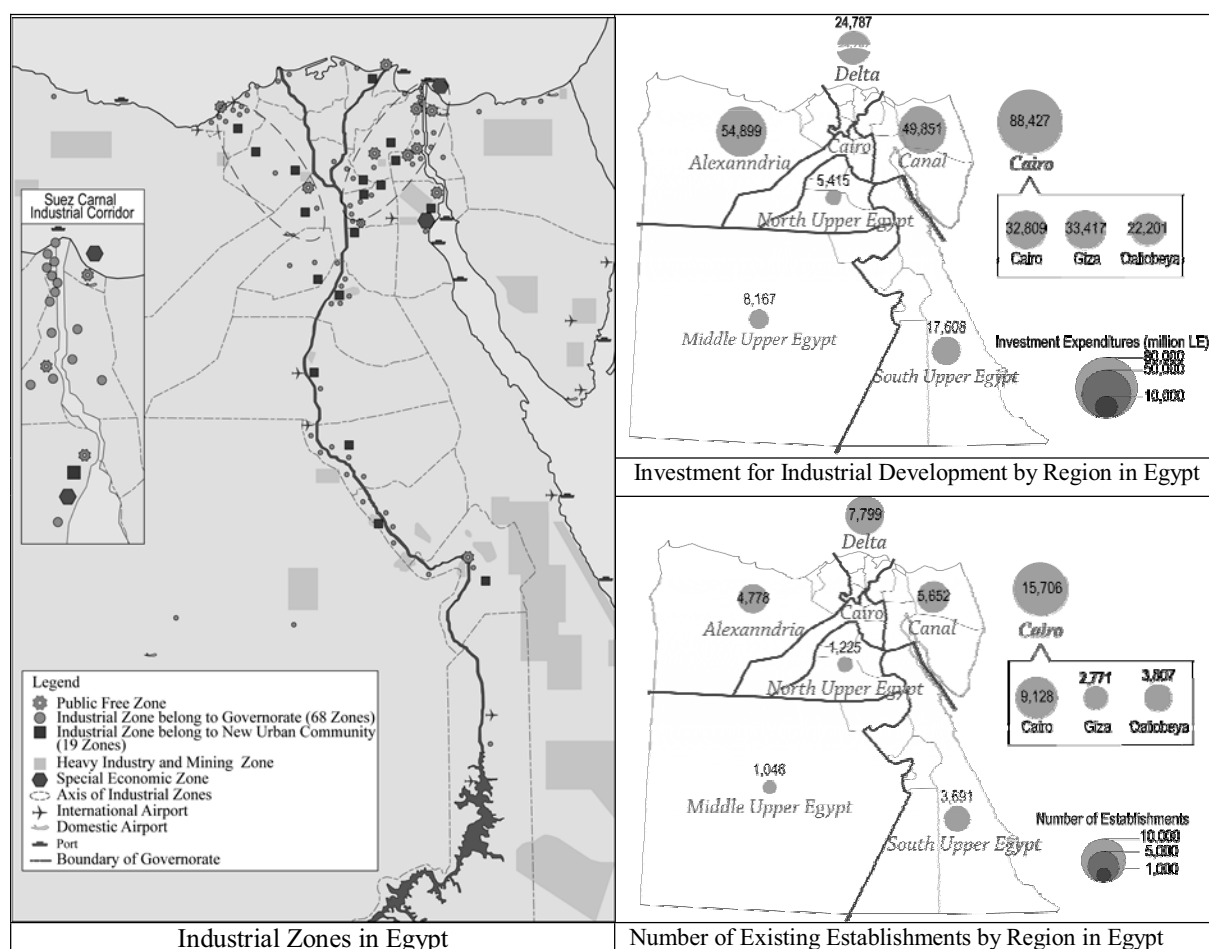
Figure 1.6 Real GDP Growth Rates in Egypt in 1991/1992-2005/2006



Source: United Nations, 2007

Figure 1.7 GDP and GDP per Capita of Egypt, Middle East Countries, and Japan in 2006

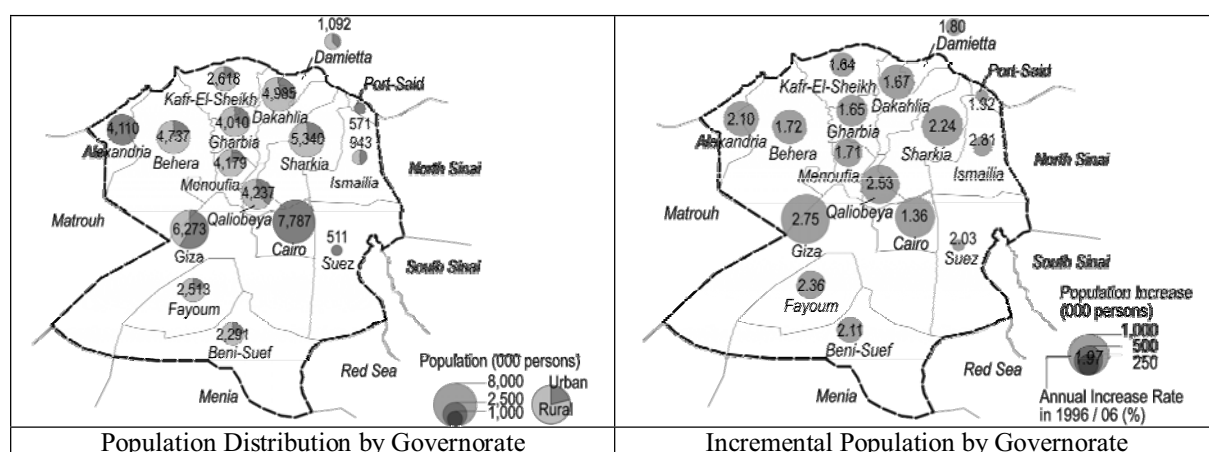
1.5 In Egypt there are 68 industrial zones in governorates, 19 industrial zones in NUCs, ten public free zones, and two special economic zones (Figure 1.8). A number of these designated industrial areas are located in the Cairo, Alexandria, and Canal regions.



Source: Distribution map of industrial zones, Ministry of Foreign Trade and Industry, 2007

Figure 1.8 Industrial Zones in Egypt

1.6 The North Egypt³ sector had a total population of 55 million, or 76% of Egypt's total population in 2006. The Cairo region accounted for the dominant share (33%) in the region. This share slightly increased between 1996-2006.

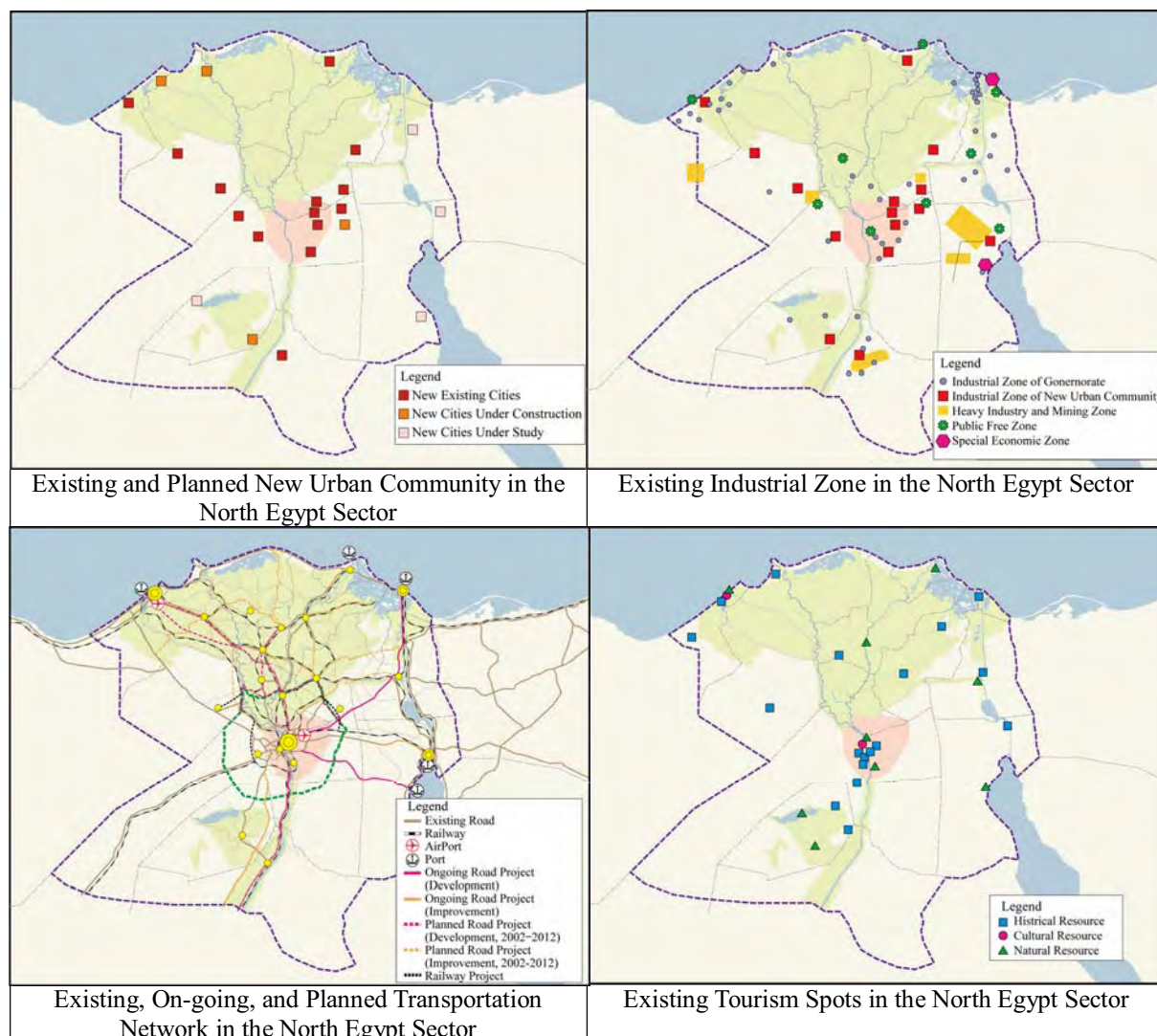


Source: Census, CAPMAS, 2006

Figure 1.9 Population Distribution and Incremental Population in the North Egypt Sector in 1996-2006

³ The North Egypt Sector includes the Cairo Region (Cairo, Giza, and Qaliobeya) and its neighboring governorates.

1.7 The Cairo region is a focal point for urban development in the North Egypt sector, primarily due to its inter-regional transportation networks. Both urban and industrial development have progressed along the Alexandria Desert and Ismailia roads, which are accessible from the Cairo region. Tourism points are also located in the Cairo region.



Source: Distribution map of NUCs, NUCA, 2006

Source: Distribution map of industrial zones, Ministry of Foreign Trade and Industry, 2007

Source: JICA Study Team

Source: Ministry of Tourism

Figure 1.10 Urban Development Projects in the North Egypt Sector

1.8 The Sixth Five Year Plan gave the highest priority to development of the Upper Egypt regions. Continuous efforts will be made by GOE to accelerate development in those regions. The Cairo region is expected to remain dominant in terms of population distribution and economic activities in the short-medium terms because the Cairo region accounts for the largest share of the population, economic activity, and industry and human resources in Egypt. This will have a positive effect on neighboring regions. However, it will take some time to encourage development in the Upper Egypt regions to a level that surpasses the Cairo region. In the regional context, Cairo will play the roles depicted in Figure 1.11.

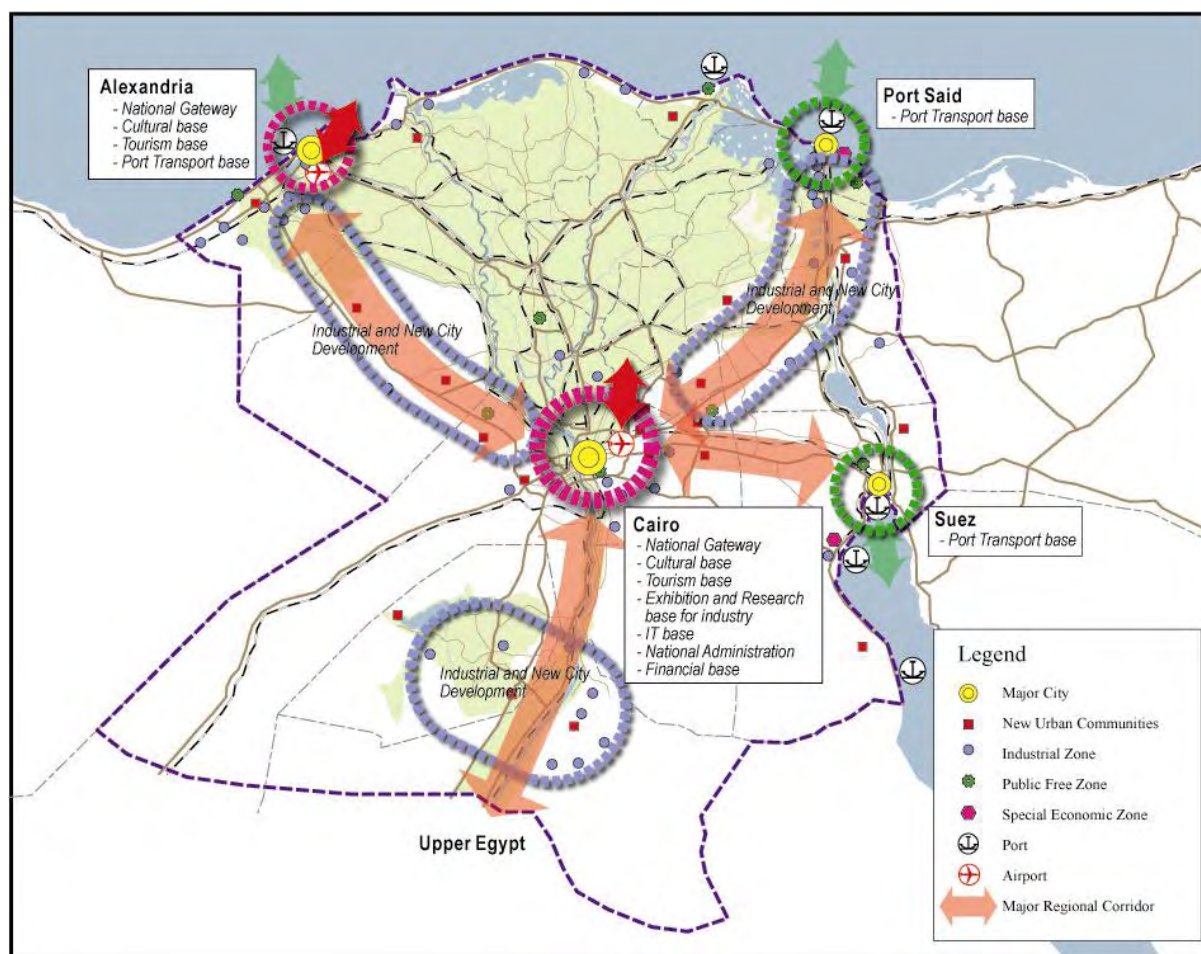
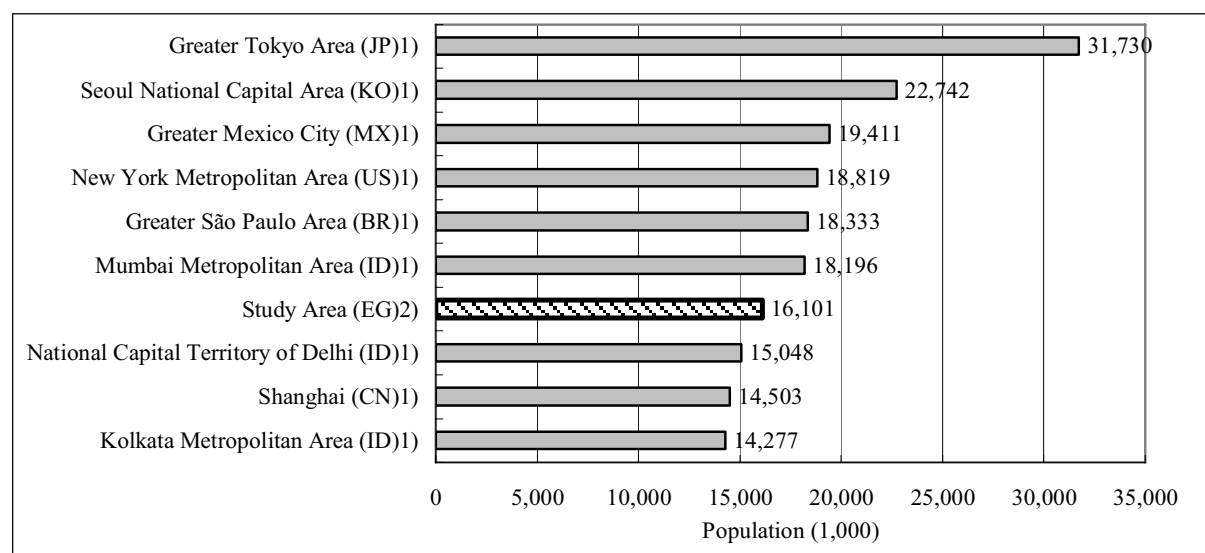


Figure 1.11 Development Growth Orientation in the North Egypt Sector

2 Existing Conditions, Context, and Issues of the Study Area

2.1 In 2006, the population in the Study Area was 16 million, which accounted for 22% of the total population of Egypt. This makes the Study Area the 7th largest urban agglomeration in the world and the largest in the Middle East and Africa.



Source 1) World Urbanization Prospects Report, United Nations, 2005

Source 2) Census, CAPMAS, 2006

Note: BR: Brazil, CN: China, EG: Egypt, ID: India, JP: Japan, KO: Korea, MX: Mexico, and US: United States

Figure 2.1 Population of Largest Metropolitan Areas in the World

Table 2.1 Existing Population in the Study Area in 1996-2006

Governorate	Population (1,000)		Growth Rate (% per year)
	1996	2006	1996-2006
Cairo (% within S.A.)	6,801 (100.0)	7,787 (100.0)	1.36
Giza (% within S.A.)	3,876 (81.0)	5,131 (81.8)	2.85
Qaliobeya (% within S.A.)	2,207 (66.9)	3,059 (72.2)	3.32
Sub-total (% within S.A.)	12,884 (86.5)	15,977 (87.3)	2.18
10th of Ramadan	48	124	10.00
Total	13,045	16,101	2.22

Source: Census, CAPMAS, 2006

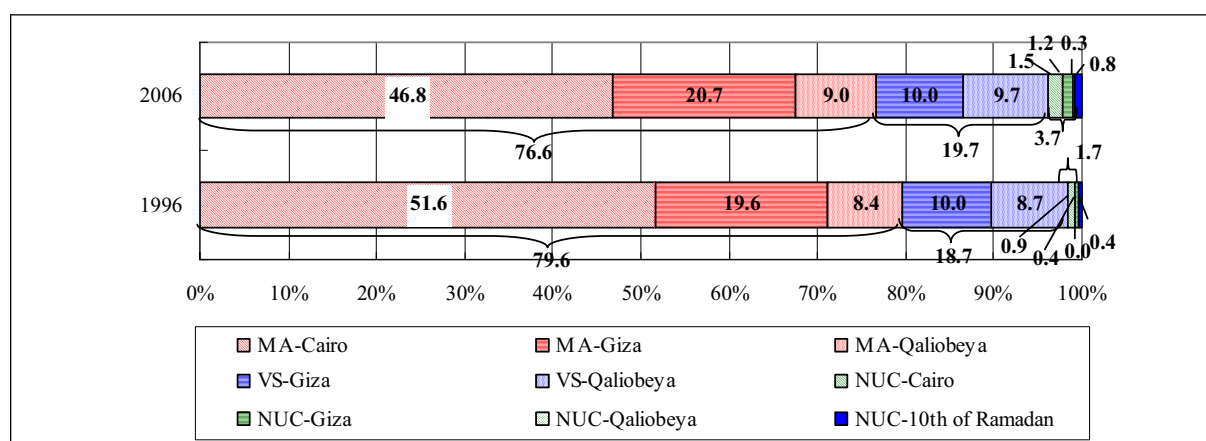
2.2 NUCs experienced a higher growth rate of 10.7% per year between 1996-2006. The villages and small towns had a growth rate of 2.0%, which was slightly higher than that of the main agglomeration (1.7%). The population shifted from the central part of the main agglomeration to its outskirts, villages and small towns, and NUCs, as shown in Table 2.2. Even though NUCs recorded the highest growth rate and tripled their population, the main agglomeration retained the largest share of the total population at 77% (Figure 2.2). Villages and small towns shared 20% to the total population, and NUCs are limited to less than 4%.

2.3 More than 75% of the total population of the Study Area live within a 20 km radius from the central part of the main agglomeration.

Table 2.2 Population Distribution by Built-up Area in the Study Area in 1996 and 2006 (1,000)

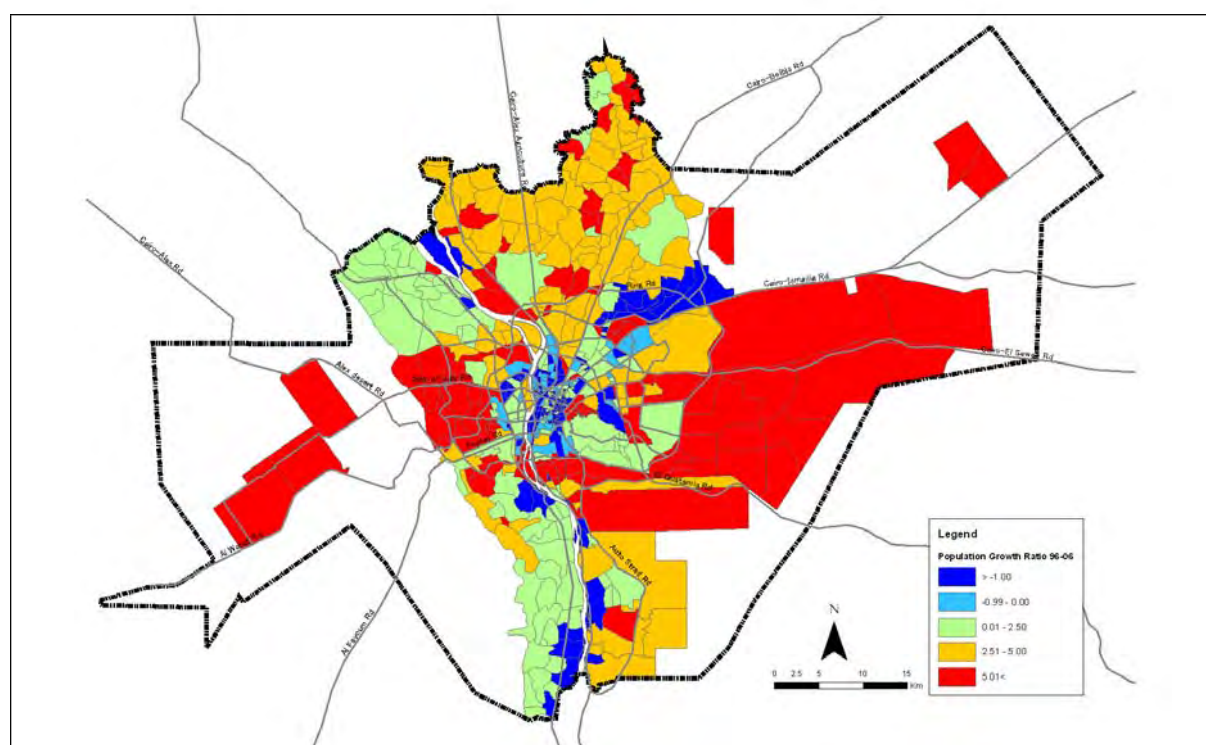
Governorate	Population (1,000)						Growth Rate in 1996-2006 (% per year)		
	Main Agglomeration		Villages & Small Towns		NUCs		Main Agglo.	V&S	NUCs
	1996	2006	1996	2006	1996	2006			
Cairo	6,678	7,540	0	0	123	246	1.2	-	7.2
Giza	2,531	3,237	1,301	1,559	47	187	2.5	1.8	14.8
Qaliobeya	1,145	1,455	1,255	1,560	1	44	2.4	2.2	46.0
10th of Ramadan	0	0	0	0	48	124	-	-	10.0
Total	10,355	12,232	2,556	3,119	218	601	1.7	2.0	10.7

Source: Census, CAPMAS, 2006



Source: Census, CAPMAS, 2006

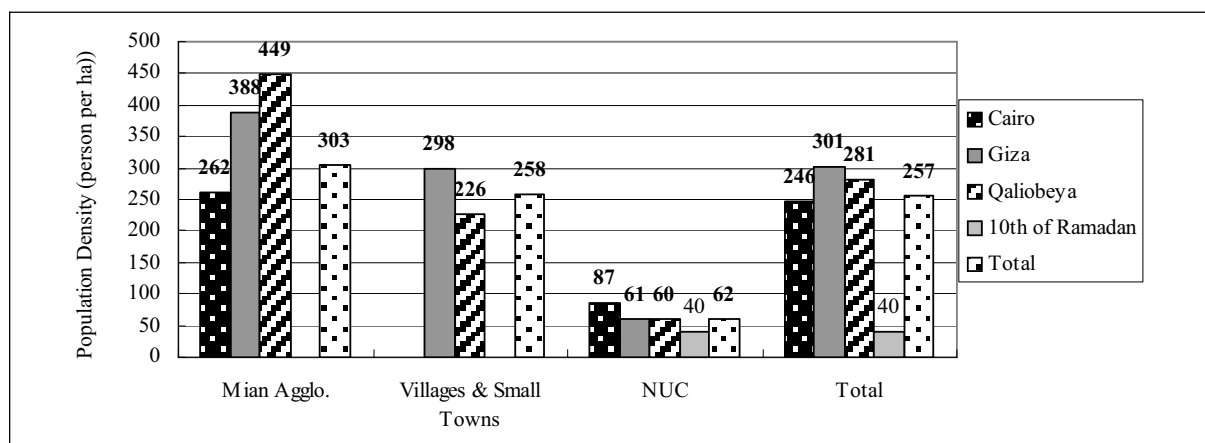
Figure 2.2 Population Distribution by Built-up Area in 1996 and 2006



Source: Census, CAPMAS, 2006

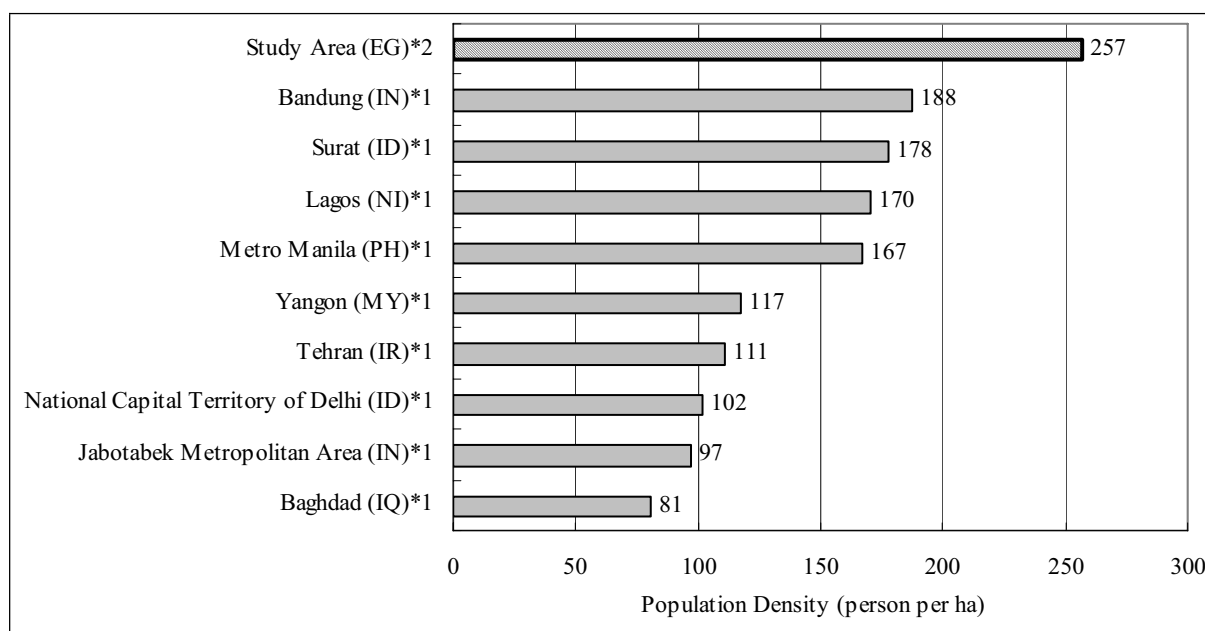
Figure 2.3 Population Growth Rate by Shiakha in the Study Area in 1996-2006

2.4 The Study Area had a relatively high population density⁴ at 257 persons per ha in 2006 (Figure 2.4 and Figure 2.5). The main agglomeration had a population density of 397 persons per ha, which was one of the highest for a metropolitan area in the world. In particular, the main agglomeration in Qaliobeya had a very high density at 449 persons per ha. Villages and small towns had a population density of 258 persons per ha, while NUCs had a low population density of only 62 persons per ha.



Source: Census, CAPMAS, 2006

Figure 2.4 Population Density by Built-up Area in the Study Area in 2006



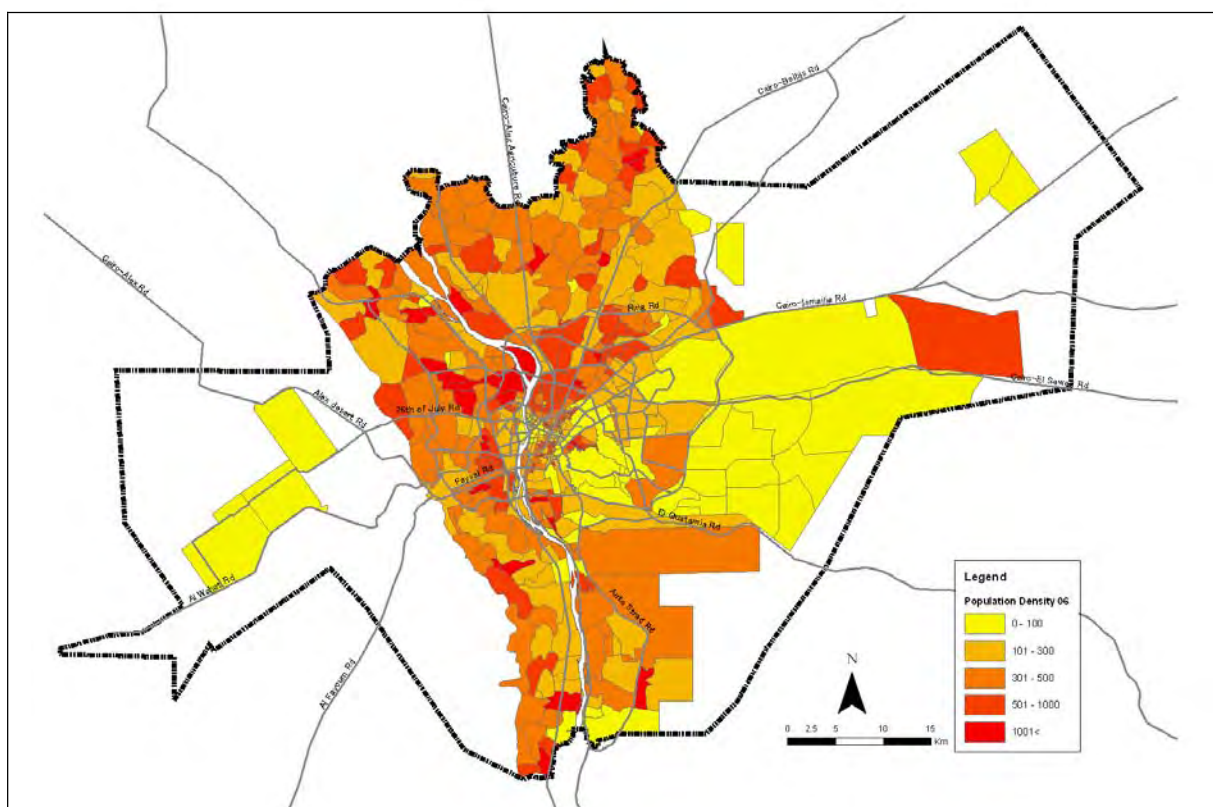
Source*1: World Urbanization Prospects Report, United Nations, 2005

Source*2: Census, CAPMAS, 2006

Note: EG: Egypt, ID: India, IN: Indonesia, IQ: Iraq, IR: Iran, MY: Myanmar, NI: Nigeria, and PH: Philippines

Figure 2.5 Highest Population Density of Metropolitan Areas in the World

⁴ Population density was estimated based on the population by *shiakha* of the census in 2006 and the existing built-up areas estimated from the satellite imagery in 2007.

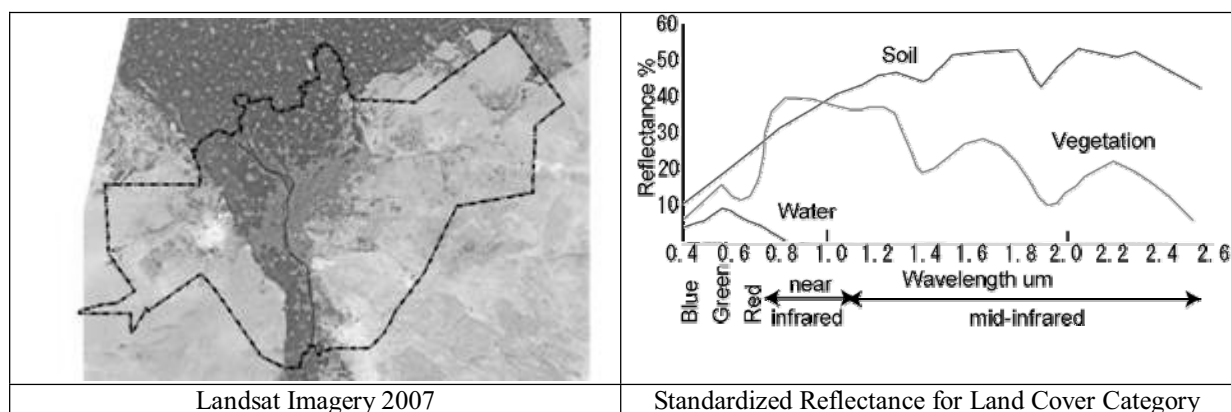


Source: Census, CAPMAS, 2006

Figure 2.6 Population Density by *Shiakha* in the Study Area in 2006

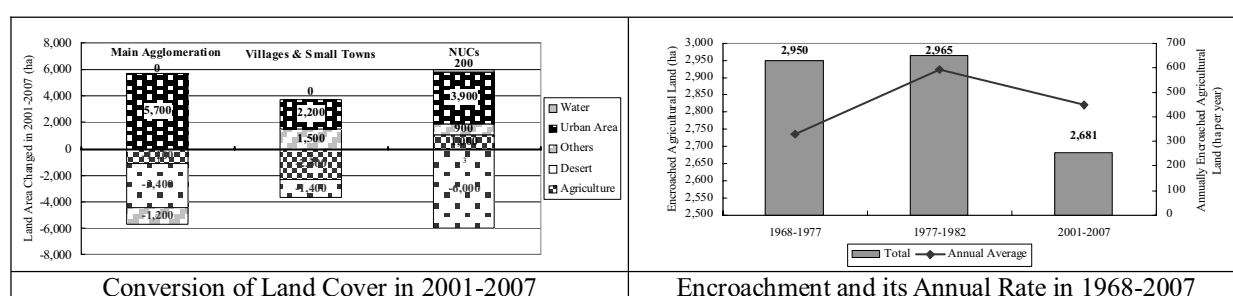
2.5 The Study Area made a sizable economic contribution to the nation as the economic engine of Egypt. Its share of GRDP for the national economy (GDP) was 31% in 2006. The unemployment rate in the Study Area was estimated at 7%, which was 2 percent less than the national average of 9% in 2006.

2.6 The basic data source for the changes in urbanized land within the Study Area was Landsat imagery from 2001 and 2007, supplemented by IKONOS (2002) and QuickBird (2006) for reference. The methodology adopted for this analysis was the commonly practiced remote sensing technique of automated land cover classification, which utilizes spectral characteristics (color) to determine the land cover type (Figure 2.7). As for the changes in land cover, urbanization encroached on the scarce agricultural lands between 2001-2007. The loss of agricultural land was estimated at 2,400 ha, with an average loss of 400 ha per year. However, the average transformation rate from agricultural land to urban areas slowed down between 2001 and 2007, compared to 593 ha in 1977-1982 (2,965 ha in total), as shown in Figure 2.8.



Source: JICA Study Team

Figure 2.7 Landsat Imagery and Standardized Reflection for Land Cover Analysis

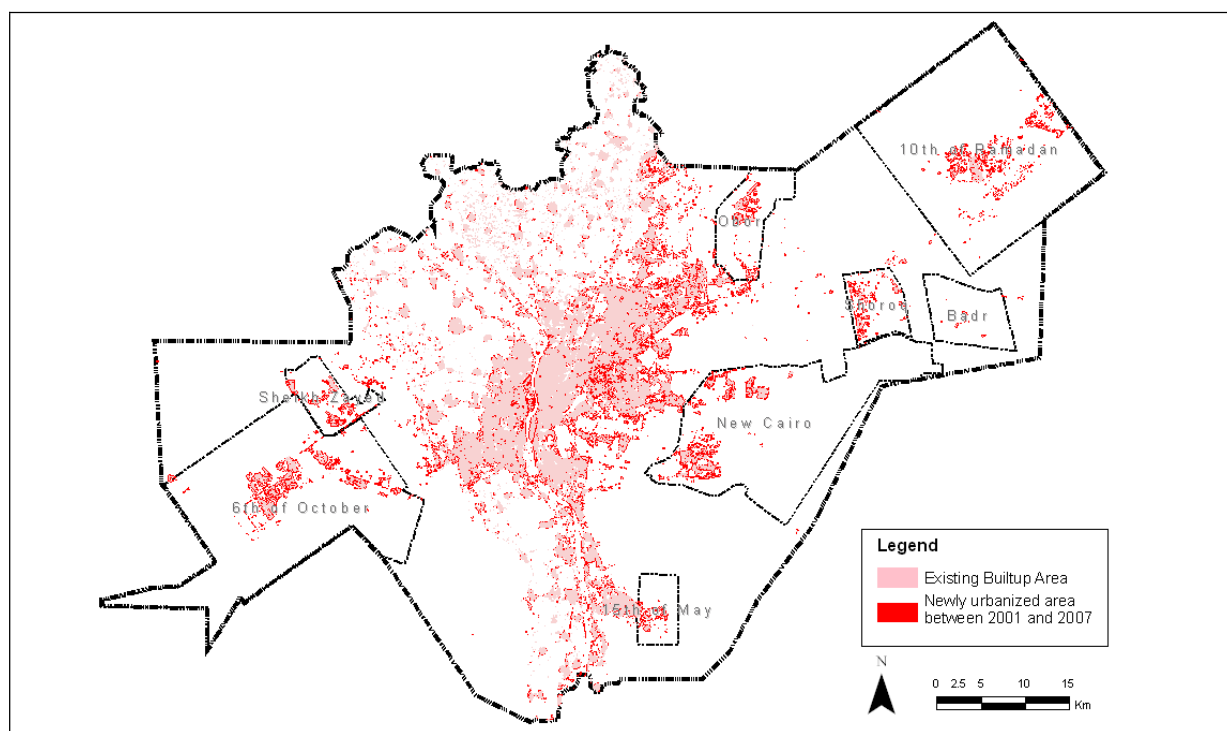


Source 1) GOPP for 1968-1977 and 1977-1982

Source 2) Remote sensing analysis of Landsat images for 2001-2007

Figure 2.8 Encroachment on Agricultural Land in 1968-2007

2.7 New urbanization during 2001-2007 has occurred actively on the fringe of the main agglomeration, within a radius of about 20 km, or in NUCs. However, some of these new areas are outside the 20 km radius. New urbanization took place even in agricultural areas with a lesser degree, particularly on the fringe of existing small towns and villages, as shown in Figure 2.9.



Source: Land cover analysis based on Landsat satellite images from 2001 and 2007.

Figure 2.9 Urban Area Change between 2001 and 2007

2.8 Existing land use in the Study Area was based on the land cover analysis, and additional data and information including building use by CAPMAS, field surveys, as well as discussions with governorate officials, as shown in Figure 2.10.

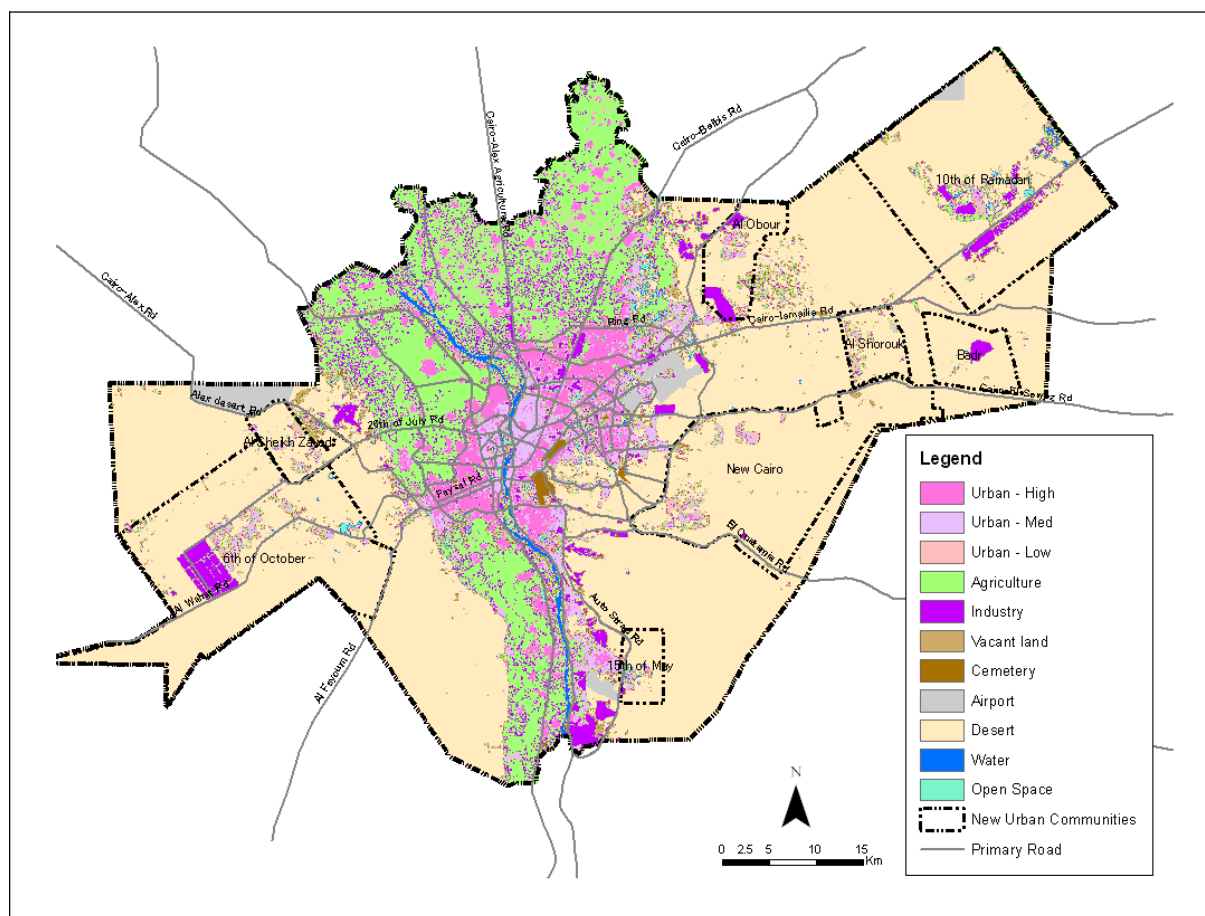
2.9 Factories and industrial zones occupy 10% or 2,400 ha of the total land area in the main agglomeration; some of these are the source of environmental pollution. The Ministry of Trade and Industry has identified 21 large environmentally unfavorable factories that are to be relocated from the main agglomeration. Similar factories, in addition to the 21 nominated by MOTI, need to be relocated away from the main agglomeration so as to improve the land use efficiency and rejuvenate the living environment.

2.10 Existing cemeteries occupy an area of 879 ha within the main agglomeration. These cemeteries are located on the fringes of the built-up areas. To enhance the efficient use of limited land resources, the development of new cemeteries needs to be promoted in areas outside the main agglomeration, while expansion of the existing ones need to be regulated within the main agglomeration.

2.11 There are substantial areas of land set aside for transportation, such as large railway freight stations and bus terminals. Due to changing demands and roles for transport, some of these facilities may have lesser functions today, as compared with the previous times. Relocation or redevelopment of such facility may be considered when restructuring the main agglomeration.

2.12 The area of public parks and green areas is very limited in the main agglomeration. The green area per capita is 3.2 m² in the Study Area, and only 1.5 m² in the main agglomeration. This is a very low level compared with other metropolitan areas, such as

London (27 m² in 1997) and Paris (12 m² in 1997). In addition, a substantial part of the green area is not open to public because it comprises private facilities that have a closed membership. More green space should be allocated throughout the main agglomeration.

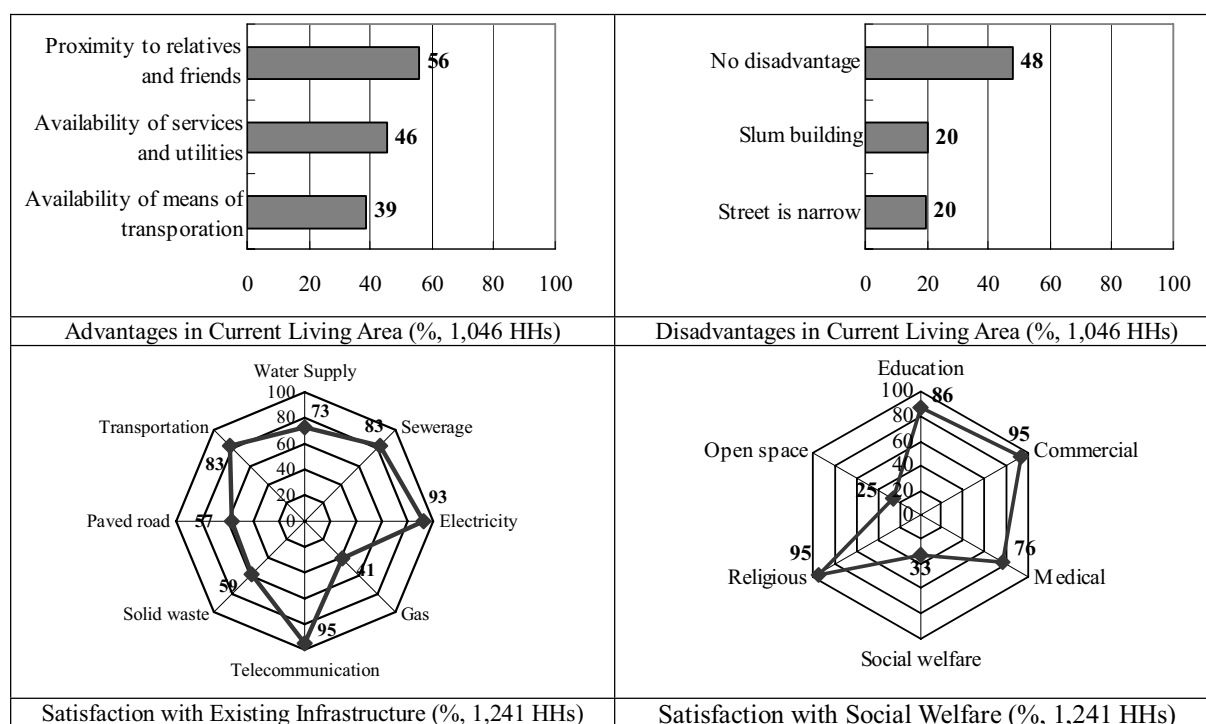


Source: JICA Study Team

Figure 2.10 Existing Land Use in the Study Area in 2007

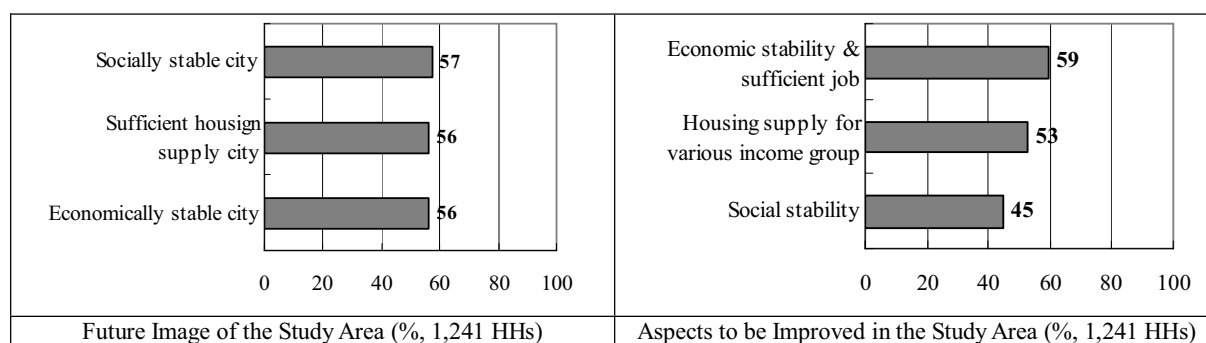
2.13 An opinion poll survey revealed the people's perceptions of their current living environment, future image of the Study Area, and intention to move to NUCs (Figure 2.11). A total of 84% of respondents said they were satisfied with the current living area, saying that the advantages are: (i) proximity to relatives and friends; (ii) services and utilities; and (iii) means of transport. The disadvantages are: (i) slum buildings and (ii) narrow streets. More than half of the respondents said they were satisfied with existing infrastructure, other than gas supply. With regard to social welfare, more than 75% of respondents were satisfied with education, commercial, religious, and medical facilities, while only 25% of respondents were satisfied with existing parks and open space.

2.14 Respondents expressed their opinions for the future of the Study Area as being a socially and economically stable city with the sufficient housing and job opportunities, as shown in Figure 2.12.



Source: Opinion Poll Survey for Urban Planning in GCR, JICA Study Team, 2007

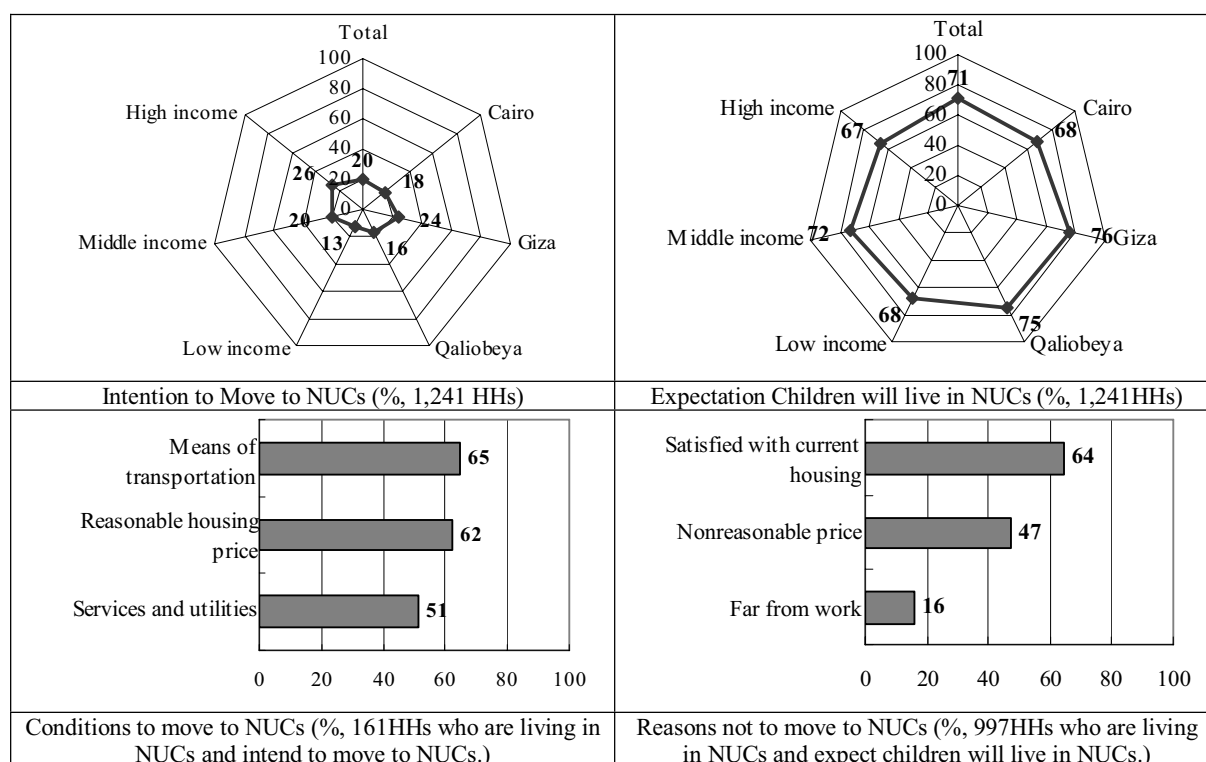
Figure 2.11 People's Perception related to Living Environment in the Current Living Area



Source: Opinion Poll Survey for Urban Planning in GCR, JICA Study Team, 2007

Figure 2.12 People's Perception related to Future Image of the Study Area

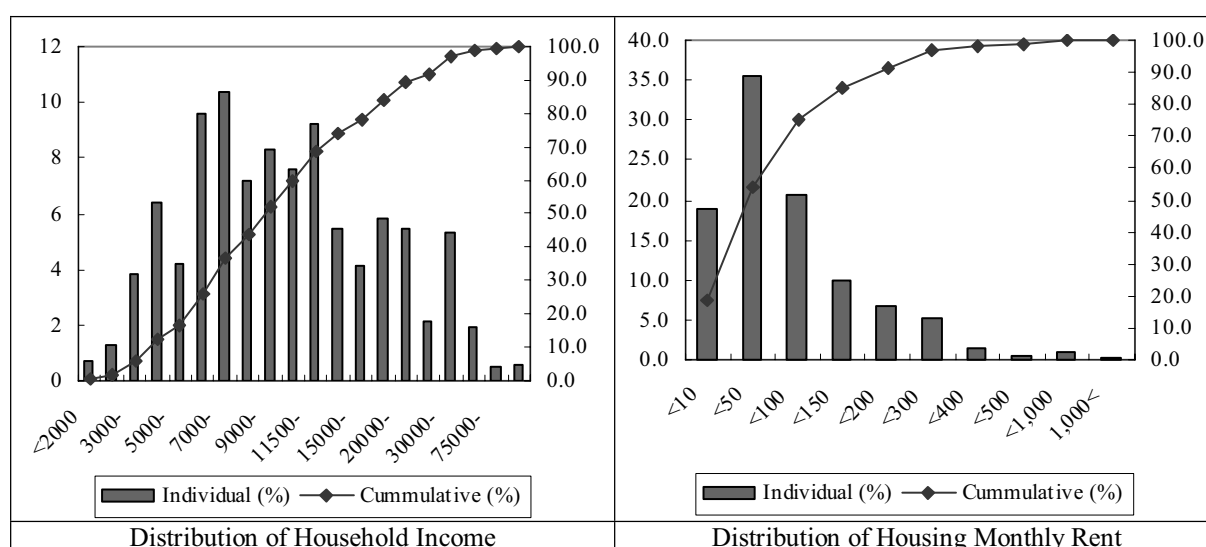
2.15 About 20% of respondents had already moved to NUCs or intended to move to NUCs, while about 80% of respondents had no intention to move to new urban communities (Figure 2.13). However, for their children's residence in future, 79% of respondents preferred the new urban communities. The respondents pointed out the conditions which need to be changed for them to move to NUCs. These include affordable housing with convenient transportation, and well-planned services and utilities.



Source: Opinion Poll Survey for Urban Planning in GCR, JICA Study Team, 2007

Figure 2.13 People's Perception related to Intention to move to NUCs

2.16 Provision of affordable housing finance for low to middle income group needs to be promoted. A housing demand survey by USAID in 2006 shows that housing loans provided by individuals, employees and banks for the purchase of housing units is only 10.9%. More contribution to affordable housing by the private sector will be an efficient use of limited budgets in the construction of housing units, and operation and maintenance of existing housing units. The USAID housing survey revealed that 78% of households have incomes less than 17,000 LE per year and 75% of household paid less than 100 LE for monthly rent.



Source: Housing Demand Survey, USAID, 2006

Figure 2.14 Household Income and Monthly Rent in Cairo, Giza, and Qaliobeya

2.17 With respect to water supply in the Study Area, planned capacity expansions will meet the total demand up to the year 2027. However, several issues have to be raised regarding the water quantity as well as the supply system. Some NUCs will need to receive water from water purification plants in the Governorate of Cairo to cover the predicted future shortage of water supply. In parallel, reduction of unaccounted water usage, including leakage, will be essential for efficient water use. Proper and regular preventive maintenance of the water supply system as well as metering of the water supply to all users will be key measures in rationalizing the water use. For the villages and small towns where groundwater is used for water supply, investigation of the water quality and purification process is strongly recommended to clarify the risk of groundwater contamination.

2.18 The overall wastewater treatment capacity in the Study Area will be sufficient to handle the wastewater generation up to 2027, based on current capacity expansion plans. It is recommended that the extension plan for some NUCs be reviewed in the light of potential future shortages in wastewater treatment capacity. Installation of secondary treatment for the wastewater treatment plant at Abu Rawash is essential and considered as the highest priority project by CAPWO. Providing wastewater systems to the villages and small towns that are currently without any wastewater treatment systems in Giza and Qaliobeya Governorates within the Study Area is highly recommended.

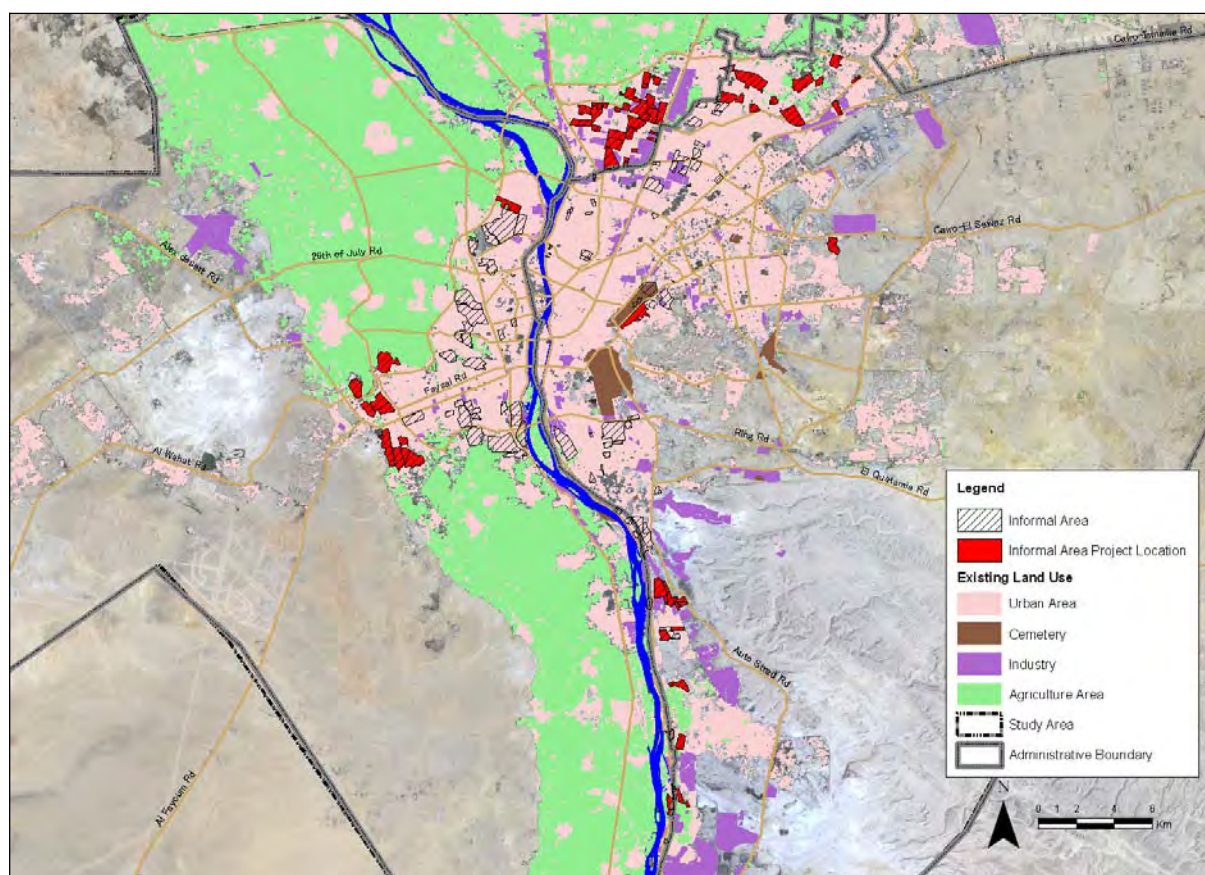
2.19 Disposal of municipal solid waste (MSW) in the Study Area is a burden that causes operational and financial problems. Introduction of proper management will reduce problems with hygiene, and contribute to the beautification of the landscape within and outside the Study Area. In addition, better performance in operation will result in a reduction in the operational cost, which is currently being subsidized by the public sector. The existing landfill sites will be utilized continuously for 10-15 more years. Therefore, no new sites for expansion, other than on-going project sites, are deemed necessary at the moment. A waste disposal system must have the required capacity, structure and location. The future users for the landfill area should be well informed of the situation of each site. A sound structure is needed for any sanitary landfill sites, including stability, leachate control and gas venting, along with proper operation. In addition, post-closure management of the sanitary landfill site must also be taken into consideration.

2.20 As for recycling, material recovery for non-organic recyclables, especially aluminum cans, iron scrap, plastics and paper items, should be promoted to reduce the volume of waste disposed in the landfill areas. Presently, “3R” (Reduce, Reuse, Recycle) has become a world-wide trend for addressing the SWM issue. If recycling activities such as composting organic materials and recycling valuable materials are enhanced, the service life of the existing landfill sites will be extended.

2.21 Electricity generation, transmission and distribution is planned and implemented by the Egyptian Electricity Holding Company and its affiliated companies. Demand forecasts have been prepared up to the year 2021-22 and the capacity expansion plan for generation plants is in due balance. The progress of on-going projects seems to be almost on schedule, and the electricity supply in GCR, including NUC, is also stable and uninterrupted. An important issue is the fuel type used for thermal power stations, and its environmental influence. Natural Gas (NG) is preferred, but Heavy Fuel Oil (*Mazout*) which contains Sulfur is still used in GCR. Switching to NG will provide environmental advantages and will be

promoted. It is recommended that improvements in efficiency be pursued further in both electricity supply and demand sides, as proposed in the main text of the report.

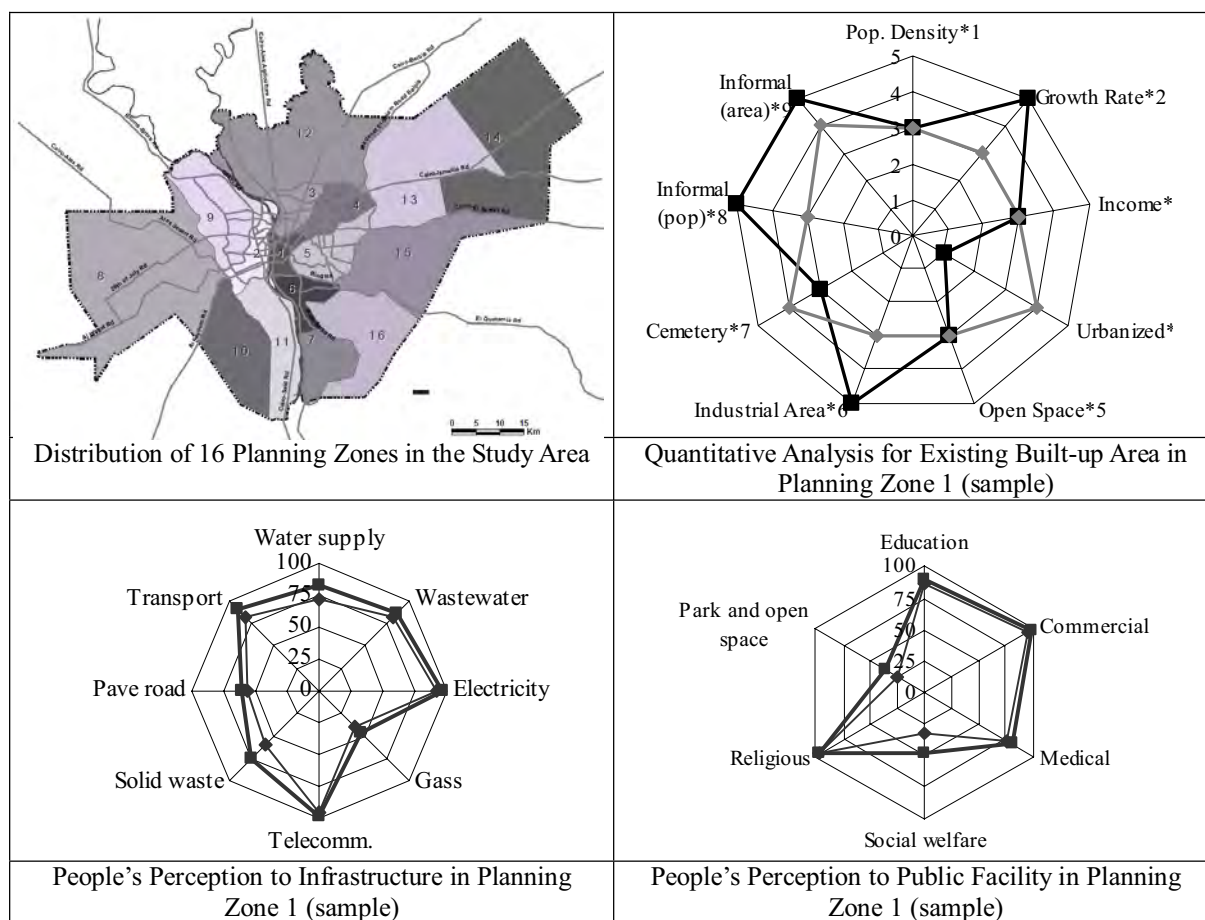
2.22 Informal settlements occupy land in and on the fringe of the main agglomeration, as shown in Figure 2.15. While there are no exact statistics regarding the informal settlements, some statistical information prepared by the Ministry of State for Local Development indicated that there were 81 informal communities in Cairo, 36 informal communities in Giza, and 67 informal communities in Qaliobeya. The total population of the informal communities within these three governorates ranges from 3.4 to 4.5 million for different statistics.



Source: GOPP/GTZ

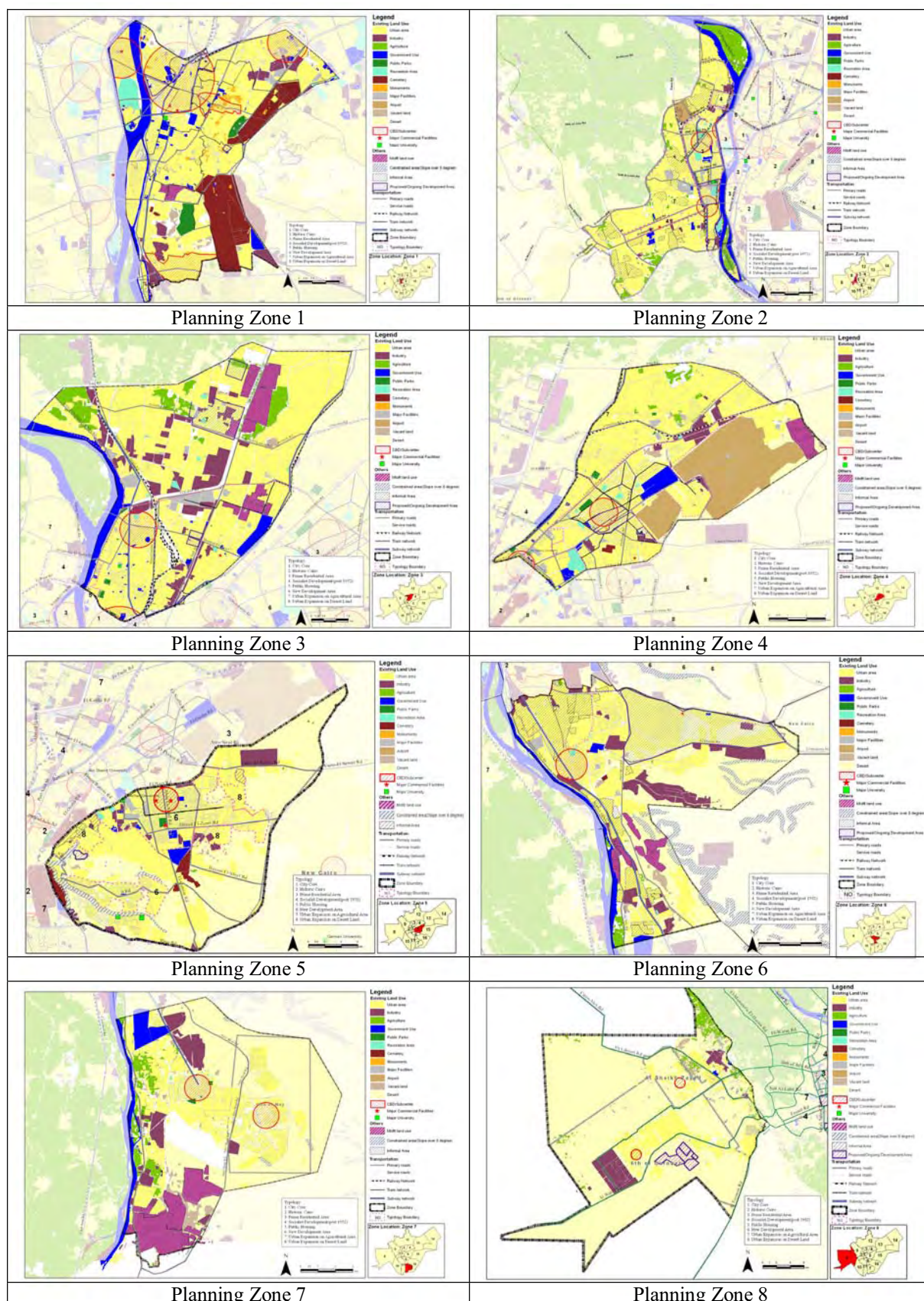
Figure 2.15 Distribution of Informal Area and On-going/Planned Project by GOPP

2.23 The Study Area was classified into 16 planning zones. Each planning zone was analyzed on the basis of the existing land use map, quantitative indicators, and the people's perception of infrastructure and public facilities to identify the issues and constraints. A series of workshops were carried out to update the existing land use maps and help identify the key issues, as shown in Figure 2.16. Existing land use maps for each planning zone are shown in Figure 2.17.



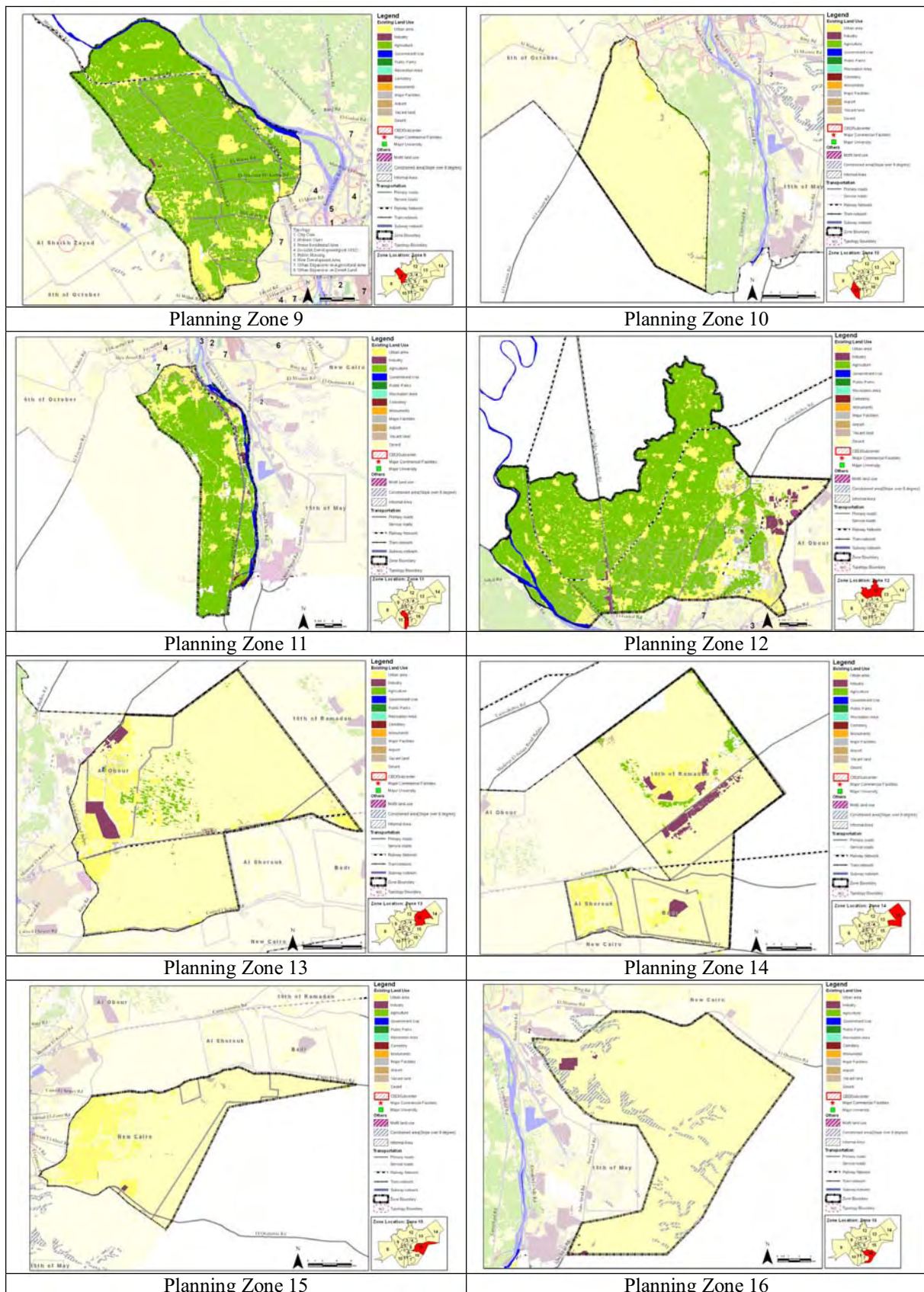
Source: JICA Study Team

Figure 2.16 Distribution of Planning Zone and Quantitative Analysis for Planning Zone



Source: JICA Study Team

Figure 2.17 (1/2) Existing Land Use Map of Planning Zone



Source: JICA Study Team

Figure 2.17 (2/2) Existing Land Use Map of Planning Zone

3 Main Challenges, Assets, and Forces to Change

3.1 *SWOT Analysis*⁵ was carried out to assess existing conditions. This allowed the Study Team to formulate objectives for improving the current situation, such as a favorable environment for living, economic activities, and natural resources in order to sustain an attractive city.

3.2 Figure 3.1 shows the SWOT matrix for the Study Area, as analyzed in the previous sections for population, economic activities, urbanization, land use, and people's perception. The SWOT matrix yielded four major planning tasks, representing the main challenges and assets:

- 1) *Over-concentration in the main agglomeration*: Rectifying population concentrations in the main agglomeration by promoting the growth of new urban communities and efficient land use in all existing built-up areas
- 2) *Insufficient lands for new business activities*: Encouraging provision of competitive lands for new business activities to enhance economic activities, reduce unemployment rate, and improve household income,
- 3) *Improper management of natural and cultural resources*: Encouraging the management of existing resources by controlling urban growth and improving protection of existing natural and cultural assets, and
- 4) *Imperfect living environment*: Improving living environment by dissolving misuses and providing public transportation and offering affordable housing, utilities and facilities for various income groups

⁵ *SWOT Analysis* is a widely practiced planning tool to evaluate the *Strengths*, *Weaknesses*, *Opportunities*, and *Threats* involved in a project or in a planning context. The SWOT analysis technique involves specifying the objectives of the planning process or project and identifying the internal and external factors that are favorable and unfavorable to achieving the objectives.

S		Helpful	
Internal Origin	P-1:	Seventh largest population of the metropolitan areas in the world for labor force and large market	
	P-2:	Incremental population in new urban communities	
	Ec-1:	High GDP growth rate of Egypt and large contribution to the national economy	
	Ec-2:	Concentration of manufacturing industries	
	Ec-3:	Newly growth of IT industries	
	Ec-4:	World class tourism spots	
	Ec-5:	Well-provided economic infrastructure	
	S-1:	Highly educated human resources	
	L-1:	Large amount of housing stock	
	L-2:	Well-provided basic infrastructure and public facilities	
	En-1:	Nile river running through the main agglomeration	
	En-2:	Valuable agricultural lands in suburbs	

W		Harmful	
Internal Origin	P-1:	Highest population density in the metropolitan areas in the world	
	P-2:	Incremental population in agricultural lands	
	Ec-1:	Relatively high unemployment rate at 7%	
	Ec-2:	Relatively low GRDP per capita	
	Ec-3:	Limited production of high-value added industries	
	Ec-4:	Limited lands for new investment	
	Ec-5:	Weak maintenance of valuable historical assets	
	S-1:	Large share of low income household	
	L-1:	Unbalanced housing supply for various income groups	
	L-2:	Relatively limited open and green spaces	
	L-3:	Limited provision of solid waste management	
	L-4:	Misfit land uses of pollution sources and informal areas	
	En-1:	Encroachment on agricultural land	

O		Helpful	
External Origin	P-1:	National policy to encourage the rural regions to release population concentration on Cairo	
	Ec-1:	National policy to improve GDP and GDP per capita	
	Ec-2:	National policy to encourage FDI and high-value added industries	
	Ec-3:	National policy to improve the tourism sector	
	L-1:	National policy to improve the living environment	
	En-1:	National policy to manage the natural resources	

T		Harmful	
External Origin	P-1:	Further population concentration onto study area	
	Ec-1:	Internationally high competitiveness with major cities in the world	
	Ec-2:	Internationally high competitiveness in terms of rapid innovations in technologies	

Legend: P- Population, Ec- Economy, S- Social development, L- Living environment, En- Environment

Main Challenges and Assets	
<p>1: <u>Over-concentration in the main agglomeration</u> : Rectifying population concentrations in the main agglomeration by promoting the growth of new urban communities and efficient land use in all existing built-up areas</p> <p>2: <u>Insufficient lands for new business activities</u> : Encouraging provision of competitive lands for new business activities to enhance economic activities, reduce unemployment rate, and improve household income</p> <p>3: <u>Improper management of natural and cultural resources</u> : Encouraging the management of existing resources by controlling urban growth and improving protection of existing natural and cultural assets</p> <p>4: <u>Imperfect living environment</u> : Improving living environment by dissolving misuses and providing public transportation and offering affordable housing, utilities and facilities for various income groups</p>	

Source: JICA Study Team

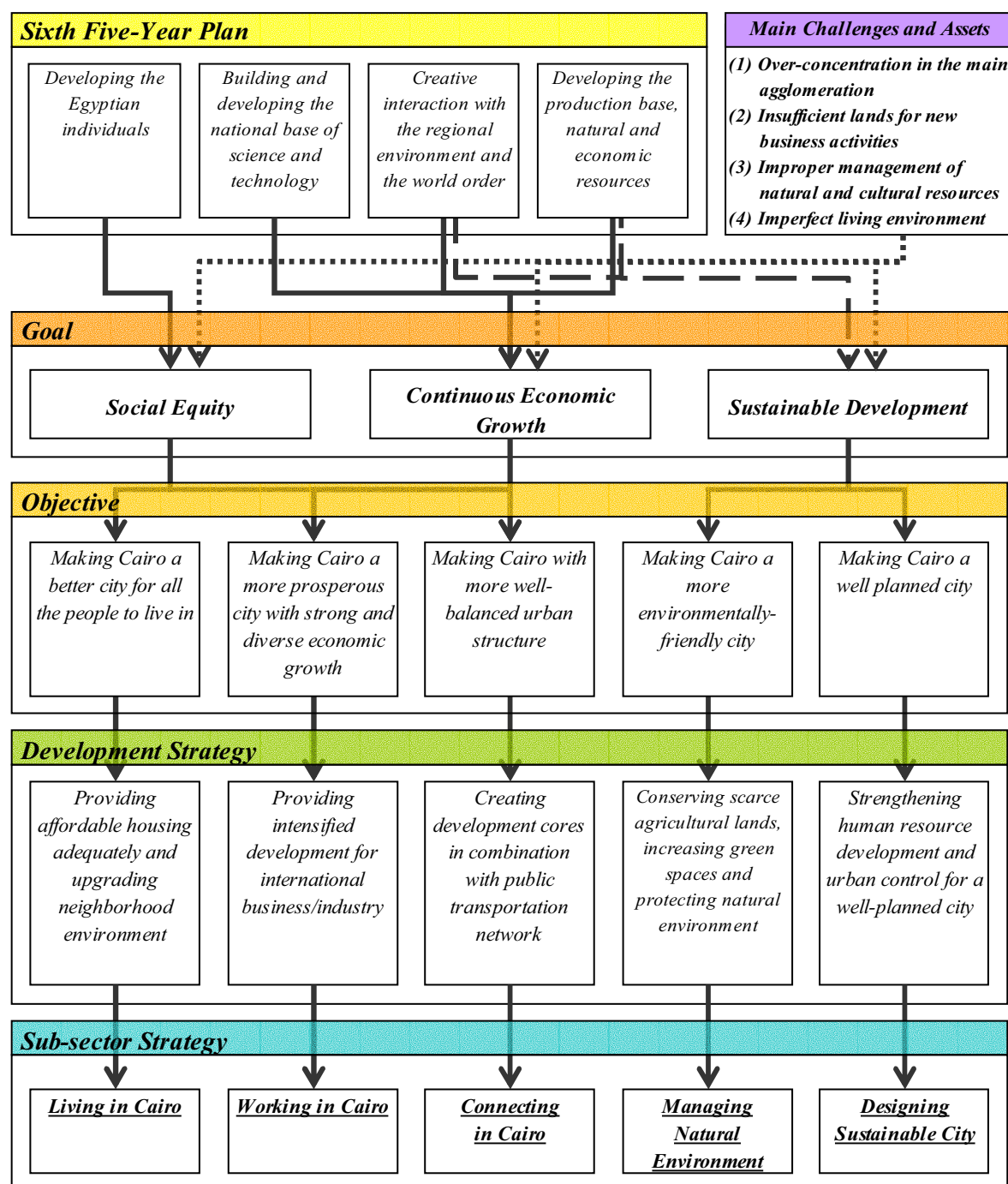
Figure 3.1 SWOT and Main Challenges for the Study Area

4 Goals, Objectives, and Development Strategies

4.1 The spatial structure of the Study Area has to be properly shaped and managed to fulfill the requirements of the main challenges and assets. Thus, the following goals for the Study Area were set up in order to meet the above objectives:

- 1) “*Social Equity*”: To provide an equitable living environment for all the people living and working in the Study Area
- 2) “*Continuous Economic Growth*”: To bring about uninterrupted growth of the urban economy, achieving wealth and stability for the people in the area and attracting competitive international businesses, which will improve the quality of life for all the people in the Study Area.
- 3) “*Sustainable Development*”: To bring about future development that enables more effective use of scarce resources such as land, capital and skilled labor in the Study Area..

4.2 On the basis of the proposed goals and objectives, development strategies and sub-sector strategies were formulated for the Study Area as depicted in Figure 4.1 and Table 4.1.



Source: JICA Study Team

Note: Cairo in this figure defines to cover the Study Area.

Figure 4.1 Goals, Objective, and Development Strategy for the Study Area until 2027

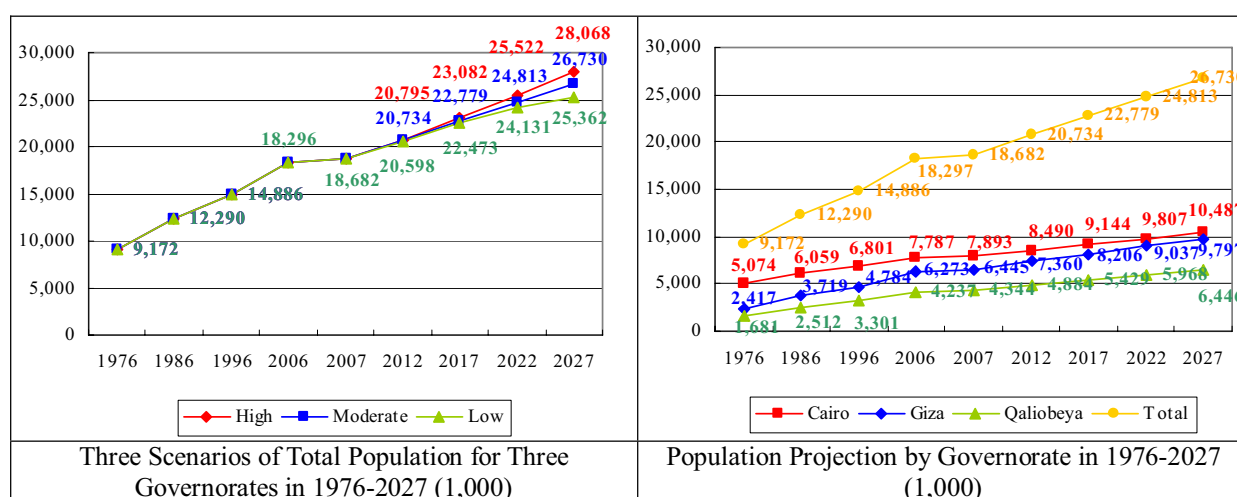
Table 4.1 Objectives and Development Strategies for the Study Area for the Target Year of 2027

	Statement	Description
Objective	<i>Making Cairo a better city for all the people to live in</i>	- Outcome of the continuous growth and sustainable development of the Study Area has to be enjoyed not by a limited number of people with good means of livelihood, but equally by all the people including those with limited means of livelihood with a fair share for all.
	<i>Making Cairo a more prosperous city with strong and diverse economic growth</i>	- In order to attract new businesses and high value industries mainly in NUCs, it is imperative for the Study Area to have a competitive advantage for attracting such businesses and industries, while taking into consideration the national and regional strategic plans.
	<i>Making Cairo with more well-balanced urban structure</i>	- Excessive population concentration in the main agglomeration needs to be remedied by converting to a multi-polar urban structure. Urban development will be integrated and incorporated with the urban transport network into a single format to encourage reshaping of the urban structure.
	<i>Making Cairo a more environmentally-friendly city</i>	- Green and open spaces are limited and dispersed in the main agglomeration, and agricultural lands extend in the outskirts along the bountiful River Nile that runs through the Study area. - The environmental potential needs to be managed fully for the attractive townscape and amiable urban environment for the people in the Study Area. Infringement of urban development on the agricultural areas needs to be controlled, as these agricultural areas are the precious green area of the Study Area.
	<i>Making Cairo a well planned city</i>	- To realize the sustainable development of the Study Area, the master plan needs to be duly implemented by the responsible authorities. Urban planning laws and their enforcement system need to be strengthened so as to form the city into the preferable shape. - The Study Area has plenty of historical, cultural and natural resources that make the city beautiful and attractive with unique townscape for tourists and citizens alike. More efforts should be made to maintain, preserve and utilize these resources to make the townscape more attractive.
Development Strategy	<i>Providing affordable housing adequately and upgrading neighborhood environment</i>	- A range of supply side issues needs to be addressed such as the supply of more affordable housing, improvement of informal areas and a better quality of living environment by upgrading of informal areas.
	<i>Providing intensified development for international business/industry</i>	- Urban development needs to create the business environment for promoting the international competitiveness by providing the new candidate sites for their activities in new urban communities, taking into consideration the infrastructure and traffic conditions. The efforts will be also made for the tourism sector by encouraging existing potentials of historical assets.
	<i>Creating development cores in combination with public transportation network</i>	- Future scale and phasing of development with the existing capacity is integrated to create multi-polarized urban form with public transportation by integrating main agglomeration and new urban communities.
	<i>Conserving scarce agricultural lands, increasing green spaces and protecting natural environment</i>	- Growth can only be accommodated without encroaching on agriculture land, protection area, and open spaces.
	<i>Strengthening human resource development and urban control for a well-planned city</i>	- Enhancement planning authority is needed to realize urban planning.

Source: JICA Study Team

5 Planning Framework and Future Growth Pattern

5.1 The percentage of the Egyptian population residing in the three governorates of Cairo, Giza and Qaliobeya over the past three decades (1976-2006) has remained relatively stable at around 25%. However, it started to increase in 1996-2006 due to the growth of new urban communities. The latest population growth rate (Census 2006) was 2.08% per year, which was slightly higher than the level of 1.95% per year projected by Cairo Demographic Center. Taking into account this gradually increase in the share of total population in the three governorates, and noting that the growth rate is slightly higher than CDC's estimate, the JICA Study Team reviewed the projected population for 2027. The Study Team projected the total population in the three governorates to be 27 million for the target year of 2027 for a moderate growth rate case, in which the growth rate will slow down to the level proposed by CDC. The three governorates will maintain their share of the total Egyptian population, which will be less than 26%.

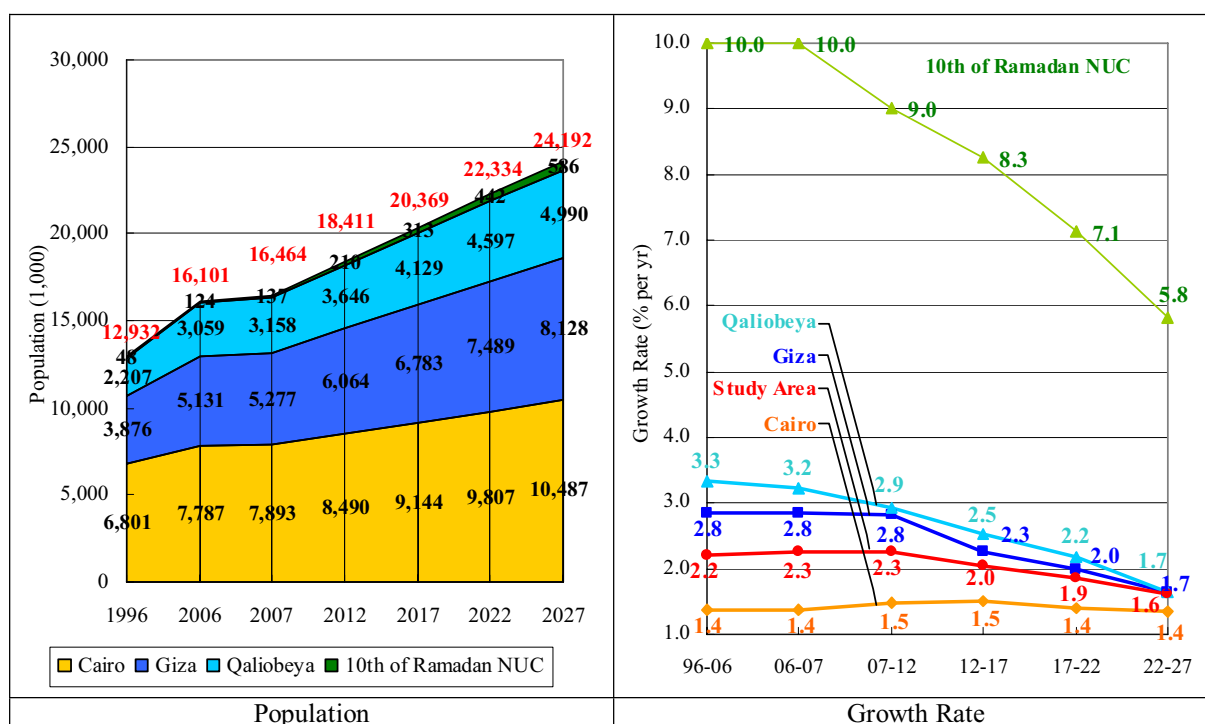


Source: Census, CAPMAS for 1976-2006

Source: JICA Study Team for 2007-2027

Figure 5.1 Three Scenarios of Total Population for Three Governorates up to 2027 and its Distribution

5.2 Accordingly, the population within the Study Area was projected to be about 24 million in the target year of 2027, based on the population growth rate by *shihakha*, as shown in Figure 5.2. The high growth rate in NUCs will be maintained over the next 10 years, which will lead to the overall projected growth rate for the Study Area.

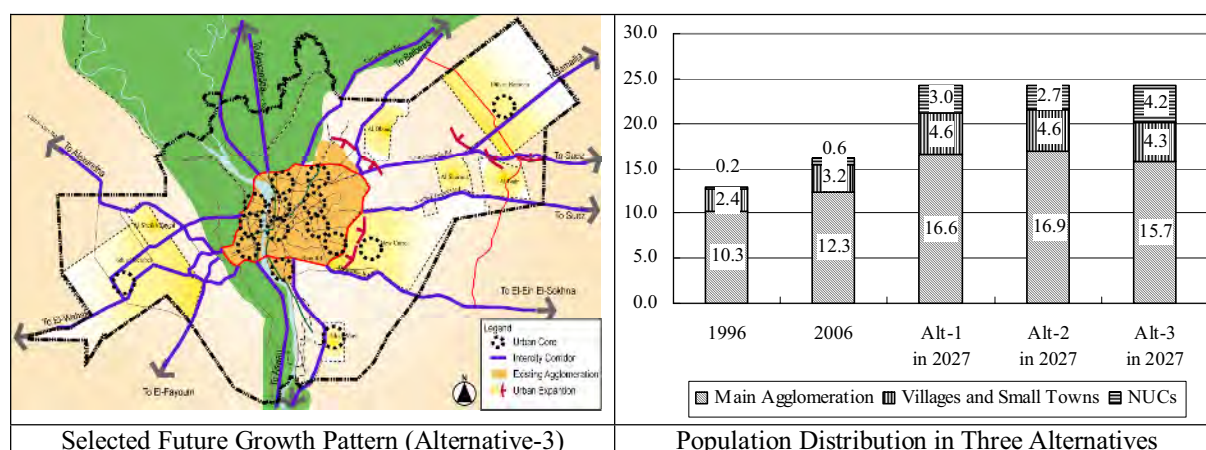


Source 1) Census, CAPMAS, 2006 for 1996-2006

Source 2) JICA Study Team for 2007-2027

Figure 5.2 Population Projection and Growth Rate of the Study Area until 2027

5.3 Three alternative future growth patterns for the Study Area were formulated, based on the existing urban form as well as different scenarios related to urban expansion and population growth (Figure 5.3). Alternative-1 was envisioned to show the future urbanization, based on the current population growth rate as a base case. Alternative-2 presumes that the future urbanization and population growth would progress continuously from the main agglomeration in both the east and west directions. Alternative-3 assumes the future urbanization and population growth will be controlled and occur mainly in NUCs so as to prevent continuous urbanization outwards from the main agglomeration. Among the three alternatives, Alternative-3 has positive effects for each of the established objectives. Therefore, Alternative-3 was selected as the most preferable future growth pattern. Alternative-3 will result in the largest population increase (4.2 million) being generally confined to NUCs and would restrain urban expansion in the main agglomeration, villages and small towns.



Source: JICA Study Team

Figure 5.3 Selected Future Growth Pattern (Alternative-3) and its Population Distribution in 2027

5.4 The planning framework for the Study Area was formulated in terms of population, economy, and social development as follows: (i) total population in the Study Area will be 24.2 million in 2027, with the incremental population of 8.1 million for the period 2007-2027; (ii) GRDP will increase at an annual growth rate of 8% and slow down to 6% as proposed in the Sixth Five Year Plan and the Long Term Vision 2022; (iii) strong growth will contribute to increased GRDP per capita, with an average growth rate at 5% per year, and reduce the unemployment rate to 5% by creating seven million new job opportunities by 2027; (iv) education enrolment rates in 2027 will be 100% for primary, preparatory, and secondary schools, as proposed in the Sixth Five Year Plan; and (v) the enrolment rate in universities will be 50% by 2027. The planning framework is summarized in Table 5.1.

Table 5.1 Planning Framework of the Study Area until 2027

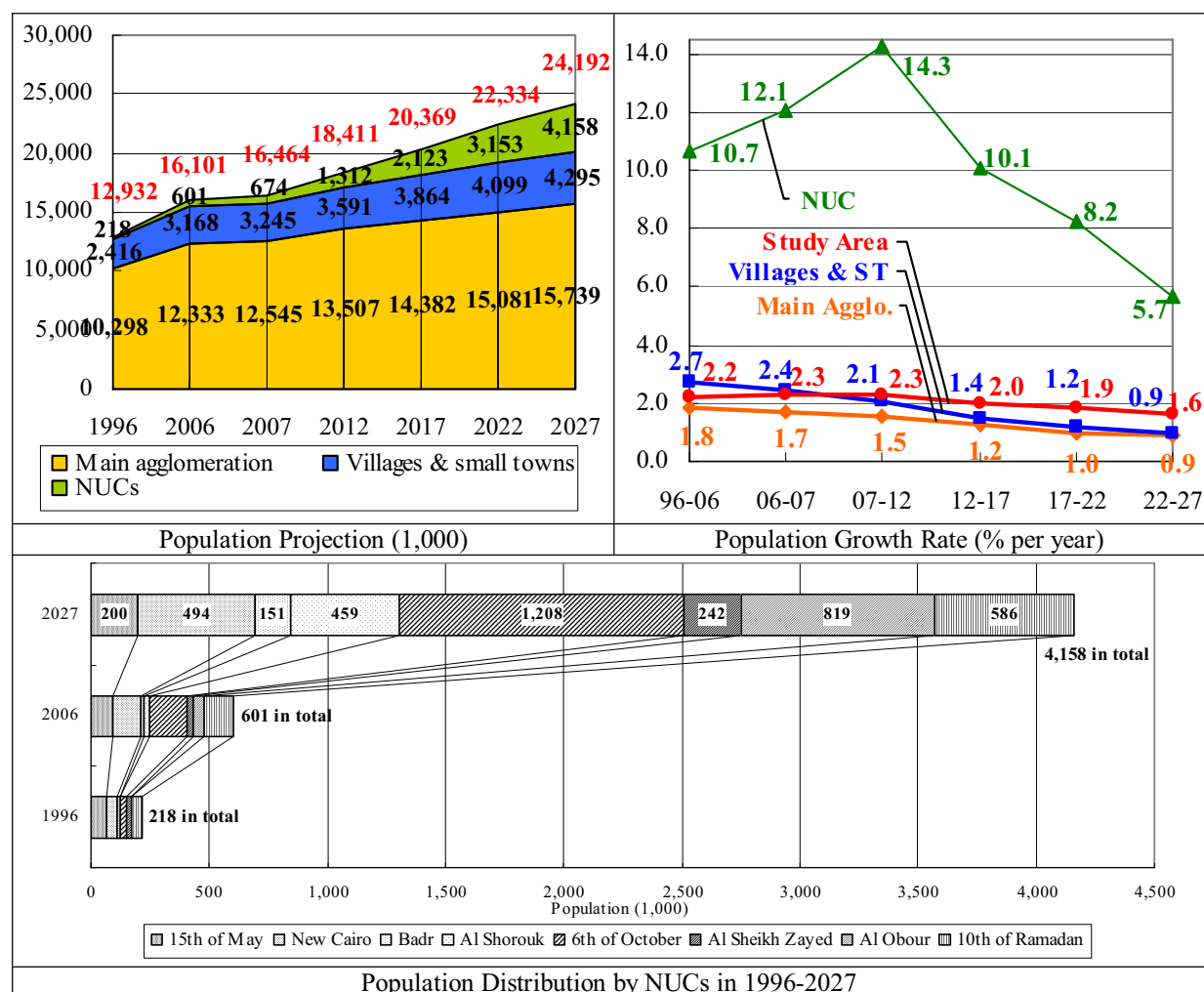
Indicator		Unit	2006 ¹⁾	2007 ²⁾	2012 ²⁾	2017 ²⁾	2027 ²⁾
Population	Total ¹⁾	1000	16,101	16,464	18,411	20,369	24,192
	Annual Growth Rate	%	2.22 (96-06)	2.25 (06-07)	2.26 (07-12)	2.04 (12-17)	1.61 (22-27)
	Age Structure ³⁾ (<5/5-14/>14)	%	10/19/71	10/18/72	9/17/74	8/16/76	7/15/78
Economy	GRDP	million LE	139,082	150,414	222,501	322,907	618,613
	Annual Growth Rate	%	-	8 (06-07)	8 (07-12)	8 (12-17)	6 (22-27)
	GRDP per Capita	LE	8,638	9,136	12,085	15,853	25,571
	Labor Force	1,000	4,613	4,777	5,506	6,316	7,761
	Unemployment	%	7	6	6	5	5
	No. of Workers	Primary	1,000	266	306	349	427
		Secondary	1,000	1,667	1,741	2,311	2,824
		Tertiary	1,000	2,384	2,467	3,323	4,126
		Total	1,000	4,310	5,196	5,982	7,378
Education	Enrolment Rate (Prim./Prep./Sec./Univ.)	%	100/50/ 58/37	100/52/ 59/37	100/63/ 61/40	100/71/ 71/44	100/100/ 100/50
	No. of Students	Primary	1000	1,827	1,828	1,963	2,075
		Preparatory	1000	479	501	675	847
		Secondary	1000	593	612	709	914
		University	1000	504	519	565	646

Source 1) Census, CAPMAS, 2006

Source 2) JICA Study Team

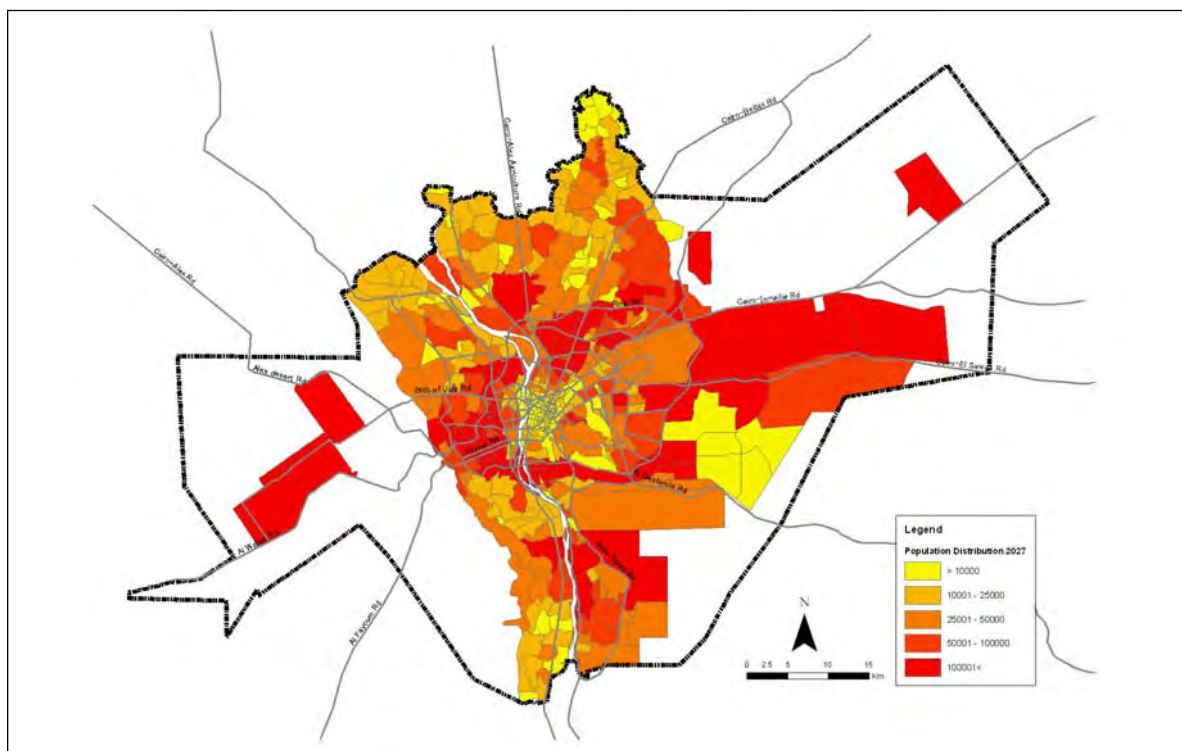
Source 3) Population projection, Cairo Demographic Center, 2001

5.5 The population within the Study Area will be distributed between the main agglomeration and other areas. The NUCs will maintain a relatively high annual growth rate at 9.6% on average from 2006-2027 (Figure 5.4). Villages and small towns will decrease their growth rate to a level of less than 1.0% by 2022-2027 with the average growth rate of 1.5% being at the level of natural growth between 2006-2027. In the main agglomeration, the growth rate will be less than 1.0% by 2022-2027. The population distribution and average population growth rates by *shiakha* in 2027 are shown in Figure 5.5 and Figure 5.6, respectively.



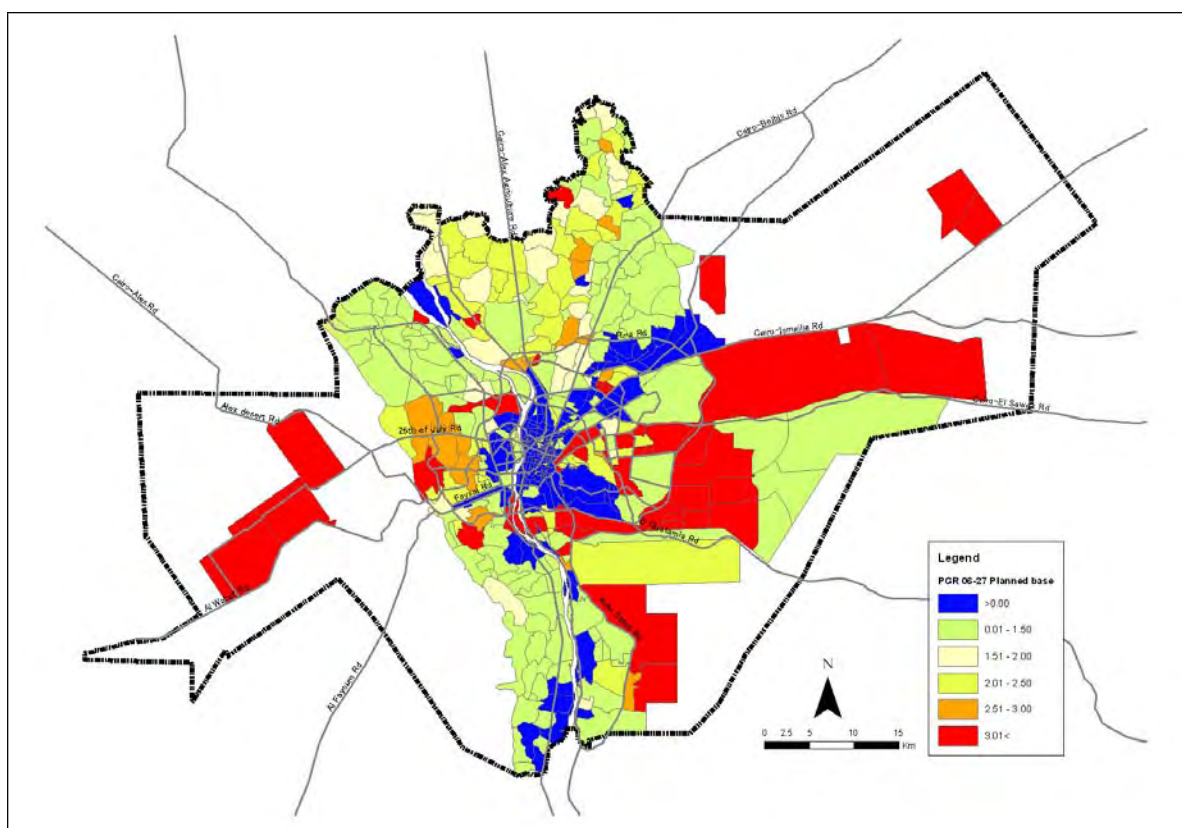
Source: JICA Study Team

Figure 5.4 Population and Growth Rate by Built-up Area and NUCs in the Study Area until 2027



Source: JICA Study Team

Figure 5.5 Population Distribution by *Shiakha* in 2027



Source: JICA Study Team

Figure 5.6 Average Population Growth Rate by *Shiakha* in 1996-2027