JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
SOCIALIST REPUBLIC OF VIETNAM

The Study
on
Urban Environmental Management
in Vietnam

PROGRESS REPORT (2)

Volume 03

Study Report on Water Supply, Drainage and Sewerage

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NIPPON KOEI CO., LTD.

YACHIYO ENGINEERING CO., LTD.

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Abbreviations

ADB	Asian Development Bank
AUSAID	Australian Agency for International Development
BOO	Built-Operate-Own
BWACO	Ba Ria - Vung Tau Water Supply Joint Stock Company
CDTA	Capacity Development Technical Assistance
COD	Chemical Oxygen Demand
CSC	Central Steering Committee
D/D	Detailed Design
DANIDA	Danish International Development Agency
F/S	Feasibility Study
FINNIDA	Finnish International Development Agency
GDP	Gross Domestic Product
GOF	Government of Finland
HAWACO	Hanoi Water Company Limited
HPWSCO	Haiphong Water Supply One Member Company Limited
HSDC	Hanoi Sewerage and Drainage Company
HUEWACO	Water Supply State One Member Company Limited
IZ	industrial zone
JICA	Japan International Cooperation Agency
JPP	JICA Partnership Program
M/P	Master Plan
MARD	Ministry of Agriculture and Rural Development, Vietnam
MFF	Multi-tranche Financing Facility
MLIT	Ministry of Land, Infrastructure, Transport and Tourism, Japan
MOC	Ministry of Construction, Vietnam
MOF	Ministry of Finance
MOH	Ministry of Health
MPI	Ministry of Planning and Investment, Vietnam
NRW	Non-revenue Water
NRWF	National Revolving Water Fund
O&M	Operation and Maintenance
ODA	Official Development Assistance
PPC	Provincial People's Committee
SADCO	Sewerage and Drainage Company
SAWACO	Sai Gon Water Corporation
SCFC	Steering Center of Urban Flood Control Program, Ho Chi Minh City
SOE	Stated-owned Enterprise
T/A	Technical Assistance
TT-Hue	Thua Thien Hue
UDC	Urban Drainage Corporation, Ho Chi Minh City
UFW	Unaccounted-for Water
URENCO	Urban Environment Company
USD	United States Dollars
VAT	Value Added Tax
VINACONEX	Vietnam Import-Export Construction Corporation
VND	Vietnamese Dong
VWSA	Vietnam Water Supply Association
WHO	World Health Organization
WSC	Water Supply Company
WSP	Water Safety Plans
WSPST	Water Supply and Sanitation Program for Small Towns
WTP	Water Treatment Plant
WWTP	Wastewater Treatment Plant

CHAPTER 1
INTRODUCTION

1.1 Background

Vietnam has been gaining the successful economic development with the transition from a centrally planned economy to a market-oriented system since the middle of 1980s. Economic growth is still being kept at a high rate since 2000. Gross Domestic Product (GDP) has been increasing with an average rate of 7.3% from 2000 to 2009. GDP per capita has increased from 402 USD in 2000 to 1,064 USD in 2009. Some 70% of GDP is generated in urban areas.

Rapid urbanization has been taking place in line with the economic growth. Of the total population of 85.8 million in 2009, 25.4 million or 30% live in urban areas and increase continuously from 24% in 2000. An average growth rate of the urban population has averaged 3.5 % per year from 2000 to 2009. The urbanization in Vietnam is expected to be maintained with the growth of industrial and commercial development to attract residential growth as well as to increase the need for urban infrastructure and basic urban services to the future.

The said urbanization has been putting pressure on the urban environment. The development of different sectors relating to urban environment management needs to keep pace with the overall economic development. In the urban water supply and sanitation sector in Vietnam, considerable achievements have been taking place in terms of infrastructure development as well as legal and institutional reforms with the government supports being assisted by development partners. In addition, the government legal frameworks for the urban water supply and sanitation sector, Decree No.117/2007/ND-CP and Decree No.88/2007/ND-CP, stipulate the clear directions to implement the government policy for the betterment of the sector issues to the future.

Meanwhile, it is pointed out that the progress of implementation for the issues on urban water supply and sanitation sector needs to be accelerated to cope with the rapid urbanization in line with the strong economic growth that has been taking place since 1990s and are further expected in the coming years.

1.2 Sector Study on Water Supply, Drainage and Sewerage

Japan has been assisting Vietnam to implement the various projects under the mutual cooperation for the purpose of improving the urban environmental management in different sectors. Japan's country assistance program for Vietnam, formulated in 2009, has set the urban environmental management as one of the essential sectors to be cooperated.

In consideration of the need for preventing the urban environment from degradation due to the rapid urbanization and industrialization, the country assistance program points out that the Japan's cooperation in the urban environmental management is to be devoted to the development and rehabilitation of urban infrastructure as well as administrative and technical capacity development contributing toward the better urban environment.

The Study on Urban Environmental Management in Vietnam is being done by Japan International Cooperation Agency (JICA) to examine the current status and issues for clarifying the future directions and approaches on urban environmental management in Vietnam and to focus on the succeeding Japanese ODA programs to be formulated and designed with due considerations in priority needs in Vietnam.

Since 1990s, JICA is a major development partner for the water supply, drainage and sewerage sectors in Vietnam up to date and seeks future directions and approaches to the sectors accordingly. As a part of the captioned Study, the sector study on water supply, drainage sewerage is being carried out with the following objectives.

1) To recognize the updated status in the urban water supply, urban drainage and sewerage sectors in terms of policy, planning, implementation, and operation and maintenance
2) To clarify the principal issues on the urban water supply, urban drainage and sewerage sectors
3) To identify the directions for further development of the urban water supply, urban drainage and sewerage sectors
4) To study the directions for cooperation by Japanese ODA to the urban water supply, urban drainage and sewerage sectors

The study area covers Hanoi City, Haiphong City, Hue City (TT-Hue Province), Danang City, Dong Nai Province, Binh Duong Province, and Ho Chi Minh City, where the principal ODA finances by have been taking place.

CHAPTER 2
SOCIO-ECONOMIC OVERVIEW

2.1 Whole Country

2.1.1 General

Vietnam is located in the southeastern extremity of the Indochinese peninsula and occupies about 331,000 km2. The 'S-shaped' country has a north-to-south distance of 1,650 km with a coastline of 3,260 km and about 50 kilometers wide at the narrowest location. It borders the Gulf of Thailand, Gulf of Tonkin, and South China Sea, alongside China, Laos, and Cambodia. The country is characterized with the highlands and the Red River Delta in the north, the central mountains, the coastal lowlands, and the Mekong River Delta in the south.

2.1.2 Administrative Units

The total area of the country is classified into 63 administrative divisions consisting of 5 cities under direct authority of the central government (Hanoi City, Haiphong City, Danang City, Ho Chi Minh City and Can Tho City) and 58 provinces.

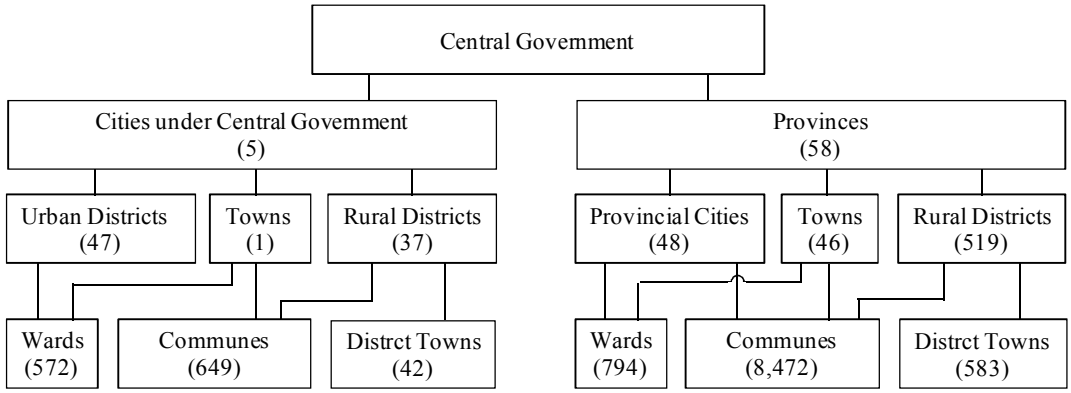
The cities under direct authority of the central government comprise urban districts, provincial towns and rural districts. Urban district is further sub-divided into wards, and provincial town comprises wards and communes. Rural district is composed of district towns and communes.

The provinces comprise provincial cities and/or towns and rural districts. Provincial city is further sub-divided into wards, and provincial town comprises wards and communes. Rural district is composed of district towns and communes.

Table 2-1 Administrative Units in Vietnam (2009)

City / Province	Provincial Cities	Urban Districts	Provincial Towns	Rural Districts	Wards	District Towns	Communes
5 Cities		47	1	37	572	42	649
Hanoi City		*(10)*	*(1)*	*(18)*	*(154)*	*(22)*	*(401)*
Haiphong City		*(7)*		*(8)*	*(70)*	*(10)*	*(143)*
Danang City		*(6)*		*(2)*	*(45)*		*(11)*
Ho Chi Minh City		*(19)*		*(5)*	*(259)*	*(5)*	*(58)*
Can Tho City		*(5)*		*(4)*	*(44)*	*(5)*	*(36)*
58 Provinces	48		45	519	794	583	8,472
Total	48	47	46	556	1,366	625	9,121

Source: Statistical Yearbook of Vietnam 2009, General Statistical Office of Vietnam



Source: Number of administrative units (in parenthesis) refers to Statistical Yearbook of Vietnam 2009, General Statistical Office of Vietnam.

Figure 2-1 Administrative Structure in Vietnam (2009)

2.1.3 Land Use

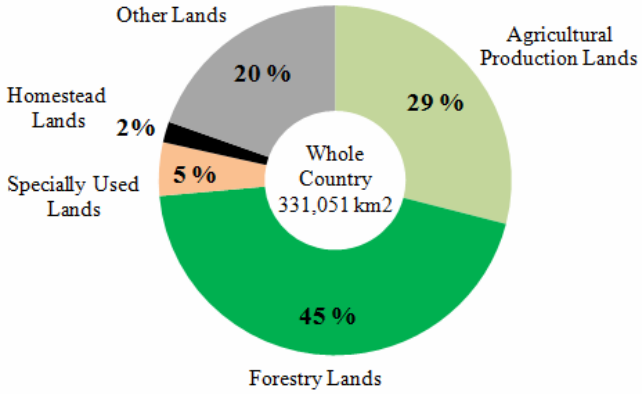
The total area of the country is about 331,000 km2. The land uses are broadly classified as follows.

1) 'Agriculture Production Lands' refer to the land used in agricultural production, including annual crop lands and perennial crop lands.
2) 'Forestry Lands' refer to the land used in forestry production or experiment, including productive forests, protective forests and specially used forests.
3) 'Specially Used Lands' are those being used for other purposes, not for agriculture forestry and living. It includes the lands used by offices and non-profit agencies, security and defense lands, lands for non-agricultural production, and business and public lands.
4) 'Homestead Lands' are those used for house and other works construction serving living activities of urban and rural inhabitants.

The remaining lands, which are not covered by any of the classifications above, include religious lands, cemeteries, rivers, water surfaces, unused flatlands, unused mountainous lands and non-tree mountains. Such lands are referred to as 'Other Lands' hereunder.

Of the total area of the country, 29% is used as 'Agricultural Production' and 45% is covered with 'Forestry Lands'. Meanwhile, the lands used for the intensive purposes account for only 7% of the total area of the country, comprising 5% for 'Specially Used Lands' and 2% of 'Homestead Lands'.

Land Use	Area (km2)	%
Agricultural Production Lands	95,988	29%
Forestry Lands	147,578	45%
Specially Used Lands	16,295	5%
Homestead Lands	6,339	2%
Other Lands	64,851	20%
Total	331,051	100%



Source: Statistical Yearbook of Vietnam 2009, General Statistical Office of Vietnam

Figure 2-2 Land Use in Vietnam (2009)

2.1.4 Population

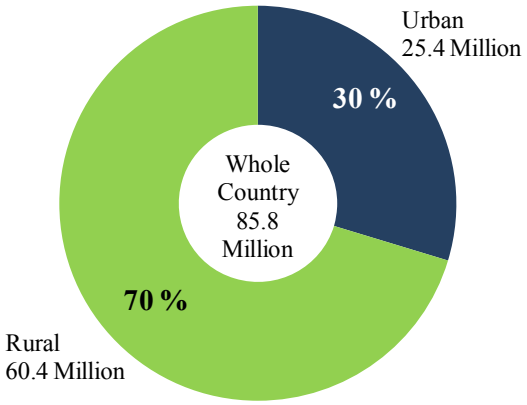
The total population in the whole country is 85.8 million, consisting of 25.4 million (30%) of urban population and 60.4 million (70%) of rural population. By administrative unit, Ho Chi Minh City has the largest population of 7.16 million. Hanoi City, the capital of the country, has the second largest population of 6.45 million. The population in Haiphong City is the third largest (1.84 million), followed by Can Tho City (1.19 million) and Danang City (0.89 million).

Table 2-2 Urban and Rural Population in Vietnam (2009)

Unit: 1,000 persons

City / Province	Urban	Rural	Total
5 Cities	11,013.1	6,514.7	17,527.8
Hanoi City	*(2,644.5)*	*(3,807.4)*	*(6,451.9)*
Haiphong City	*(846.2)*	*(991.0)*	*(1,837.2)*
Danang City	*(770.9)*	*(116.5)*	*(887.4)*
Ho Chi Minh City	*(5,968.4)*	*(1,194.5)*	*(7,162.9)*
Can Tho City	*(783.1)*	*(405.3)*	*(1,188.4)*
58 Provinces	14,423.8	53,895.4	68,319.2
Total	25,436.9	60,410.1	85,847.0

Source: The 2009 Vietnam Population and Housing Census: Completed Results, General Statistical Office of Vietnam

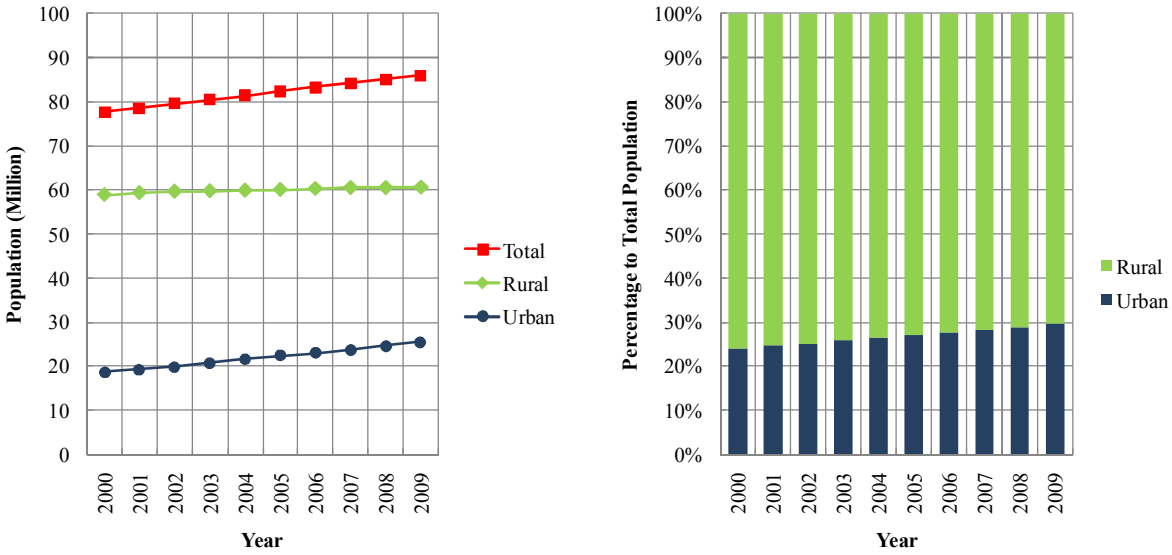


Source: The 2009 Vietnam Population and Housing Census: Completed Results, General Statistical Office of Vietnam

Figure 2-2 Urban and Rural Population in Vietnam (2009)

The total population in the whole country has been increasing from 77.6 million in 2000 to 85.8 million in 2009 with an average growth rate of 1.2%/year. The population growth is taking place mainly in the urban areas. The urban population has been increasing from 18.7 million in 2000 to 25.4 million in 2009, corresponding to a high growth rate of 3.5%/year. The population growth in the rural areas tends to be stabilized. The rural population has been increasing from 58.9 million in 2000 to 60.4 million in 2009 with a moderate growth rate of 0.3%/year.

The growth rates of the urban and rural population suggest that the urbanization tends to continue in Vietnam. An urbanization rate (= percentage of urban population to total population) has been increasing from 24% in 2000 to 30% in 2009.

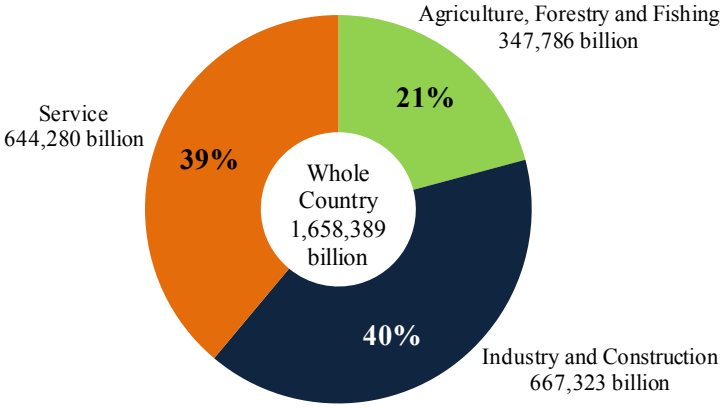


Source: Statistical Yearbook of Vietnam 2009, General Statistical Office of Vietnam

Figure 2-4 Population Growth and Urbanization Rate in Vietnam (2000-2009)

2.1.5 Economy

Gross Domestic Product (GDP) of the whole country amounts to 1,658,389 billion VND (or 97.18 Billion USD) at current price and per capita GDP is 19,278 thousand VND (or 1,064 USD) in 2009. GDP comprises those of three (3) economic sectors such as 1) Agriculture, Forestry and Fishing, 2) Industry and Construction, and 3) Service, which account for 21%, 40% and 39% respectively.

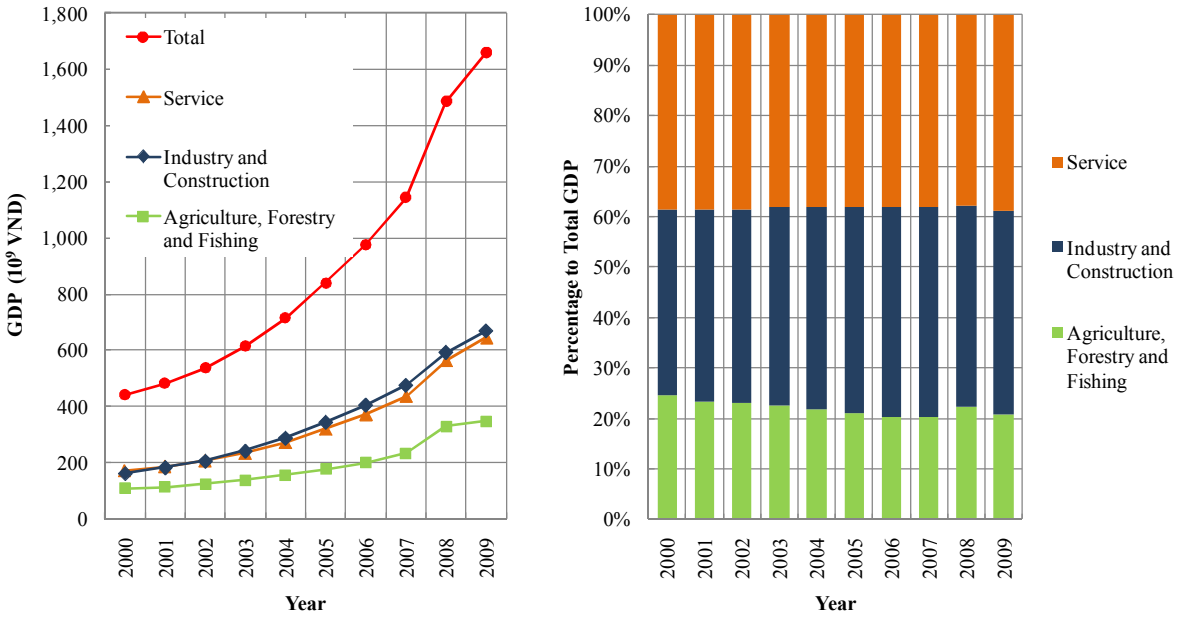


Source: Socio-economic Statistical Data of 63 Provinces and Cities, 2009, General Statistical Office of Vietnam

Figure 2-5 GDP at Current Price by Economic Sector in Vietnam (2009)

GDP at constant price has been growing rapidly from 441,646 billion VND in 2000 to 1,658,389 billion VND. Per capita GDP has been increasing from 5,689 thousand VND (or 402 USD) in 2000 to 19,278 thousand VND (or 1,064 USD) in 2009.

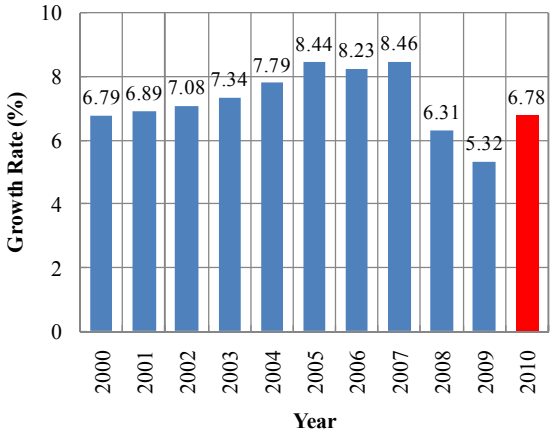
Agriculture, Forestry and Fishing has been lowering its percentage to the total GDP gradually from 25% in 2000 to 21% in 2009. Industry and Construction has been increasing its percentage from 37% in 2000 to 40% in 2009. Service has been keeping its percentage around 38% since 2000.



Source: Statistical Yearbook of Vietnam 2009, General Statistical Office of Vietnam

Figure 2-6 GDP Growth and Percentage by Economic Sector in Vietnam (2000-2009)

The real growth rate of GDP at 1994 constant price was increasing year by year since 2001 and well over 8% for the years 2005, 2006 and 2007. The real growth rate of GDP was dropped to 6.32% in 2008 due to the world-wide financial crisis and remained 5.32% in 2009. Recent forecast by General Statistical Office of Vietnam indicates that the real growth rate of GDP in 2010 is estimated at 6.78%.



Source: Website of General Statistical Office of Vietnam

Figure 2-7 Real GDP Growth Rate in Vietnam (2000-2010)

2.1.6 Urban Centers

The administrative units are classified into 6 grades of 'urban centers' such as Special Grade, Grade-I, II, III, IV and V, which are defined respectively with socio-economic functions, population scale and density, infrastructure development situations, and architectural and landscape development situations in accordance with the Decree No.42/2009/ND-CP on the Grading of Urban Centers.

Table 2-3 Grade of Urban Centers in Vietnam

Grade	Socio-economic Function	Total Population	Population Density [3] (person/km^2)	Non-Agricultural Labor Force [3]
Special Grade	Capital or National Center	> 5,000,000	> 15,000	< 90%
Grade-I	Inter-Provincial or National Center	> 1,000,000 [1] > 500,000 [2]	> 12,000 [1] > 10,000 [2]	< 85%
Grade-II	Provincial or Inter-Provincial Center	> 800,000 [1] > 300,000 [2]	> 10,000 [1] > 8,000 [2]	< 80%
Grade-III	Provincial or Inter-Provincial Center	> 150,000	> 6,000	< 75%
Grade-IV	Intra-Province Regional or Provincial Center	> 50,000	> 4,000	< 70%
Grade-V	District or Inter-Communal Center	> 4,000	> 2,000	< 65%

Note: 1) For City under Authority of Central Government
2) For City under Authority of Province
3) In Principal Urban Districts ('Inner Area')
Source: Decree No.42/2009/ND-CP on the Grading of Urban Centers

There are 755 urban centers, including 2 of Special Grade, 10 of Grade-I, 12 of Grade-II, 47 of Grade-III, 50 of Grade-IV and 634 of Grade-V, as of December 31, 2010.

Special Grade consists of the cities under the authority of the central government (Hanoi City and Ho Chi Minh City), comprising the administrative units of urban districts and rural districts. District towns under rural districts correspond mostly to Grade-V urban centers, which are referred to as 'satellite urban centers'. For example, Hanoi City is a Special Grade urban center and comprises the administrative units of 10 urban districts, 1 town (Son Tay town: Grade-III urban center), and 18 rural districts with 22 district towns that correspond mostly to Grade-V urban centers.

Grade-I and II comprise the cities under the authority of the central government and provincial cities. Of these, 3 of Grade-I urban centers are the cities under the authority of the central government (Haiphong City, Danang City and Can Tho City) and consist of urban districts and rural districts. Under these cities, district towns under rural districts correspond mostly to Grade-V urban centers. The remaining 7 of Grade-I urban centers and 12 of Grade-II urban centers are the provincial cities.

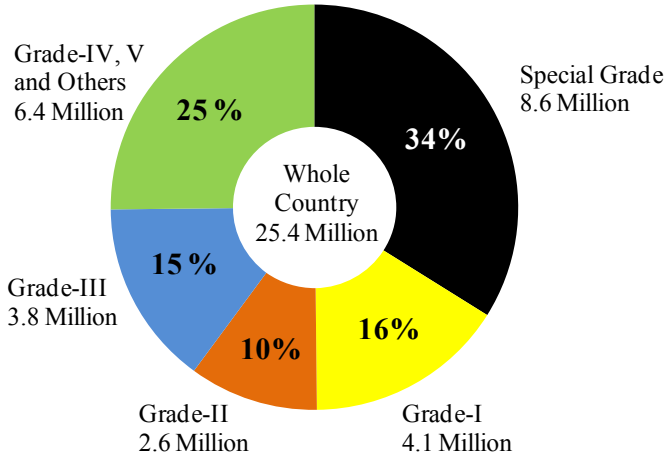
Grade-III is composed of 36 provincial cities and 11 provincial towns. Grade-IV consists of 29 provincial towns and 11 district towns. Grade-V includes the rest of district towns under rural districts.

Table 2-4 Number of Urban Centers by Grade in Vietnam (as of December 31, 2010)

Grade of Urban Centers	No. of Urban Centers	Remarks
Special	2	✓ 2 cities under the authority of the central government, including satellite urban centers (mostly Grade V)
I	10	✓ 3 cities under the authority of the central government, including satellite urban centers (mostly Grade V) ✓ 7 provincial cities
II	12	✓ 12 provincial cities
III	47	✓ 36 provincial cities ✓ 11 provincial towns ✓ Son Tay town is a satellite urban center belonging to Hanoi City.
IV	50	✓ 29 provincial towns ✓ 11 district towns
V	634	✓ Mostly corresponding to district towns under rural districts ✓ Some of district towns are satellite urban centers belonging to the cities under the authority of the central government.
Total	755	

Source: Website of MOC

When the population surveyed in 2009 is classified with the grade of urban centers above, Special Grade covers 8.6 million accounting for 34% of the urban population in the whole country. Grade-I, II, and III cover 4.1 million (16%), 2.6 million (10%) and 3.8 million (15%), respectively.



Remarks:

Special Grade includes the populations of the satellite urban centers belonging to the cities under the authority of the central government.

Grade-I includes the populations of satellite urban centers belonging to the cities under the authority of the central government.

Grade-III does not cover the population of Son Tay town under Hanoi City.

Grade-IV, V and Others do not cover the populations of the satellite urban centers belonging to the cities under the authority of the central government.

The figures of the population refer to the 2009 Vietnam Population and Housing Census: Completed Results.

Figure 2-8 Percentages of Urban Population by Grade of Urban Centers

2.2 Study Area

2.2.1 General

The Study Area covers Hanoi City, Haiphong City, Hue City (TT-Hue Province), Danang City, Dong Nai Province, Binh Duong Province, and Ho Chi Minh City.

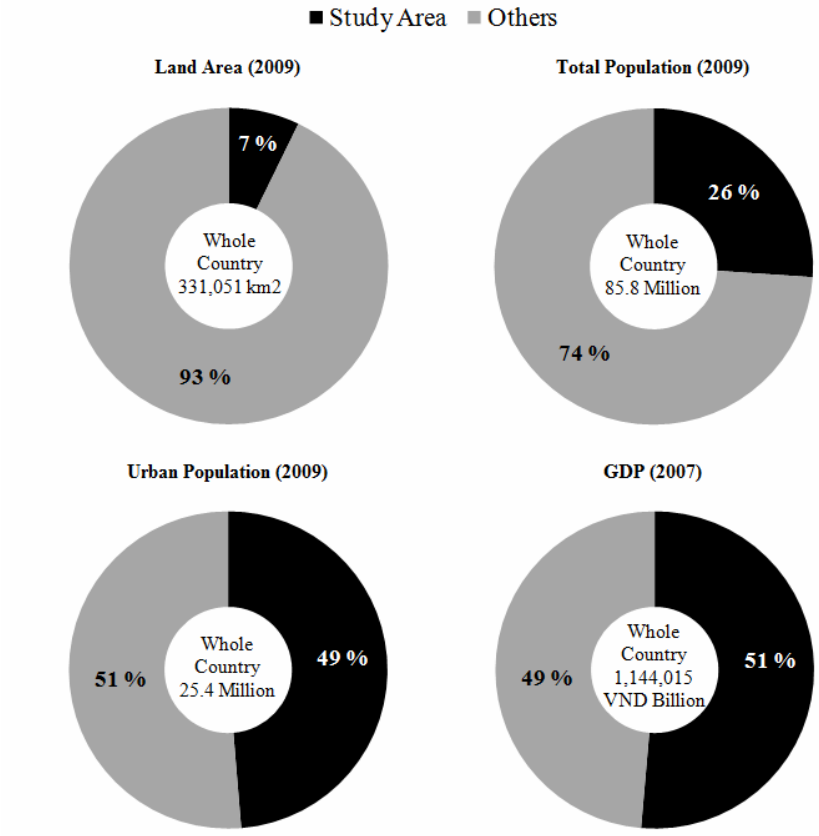
The sum of the land areas of the Study Area is 23,894 km2, which accounts for 7% of the total area of the whole country (331,051 km2). The total population in the Study Area is 22.4 million, which accounts for 26% of the total population of the whole country (85.8 million). As the Study Area includes the manor urban centers of the country, the urban population in the

Study Area is totaled up to 12.4 million corresponding to 49% of the total of urban population in the whole country (25.4 million). Gross Domestic Products (GDP) at constant price in the Study Area amounts to 587,761 billion VND accounting for 51% of GDP in the whole country (1,144,015 billion VND).

Table 2-5 Land Area, Population and GDP in Whole Country and Study Area

Region	Land Area [1] (2009)		Total Population [2] (2009)		Urban Population [2] (2009)		GDP [3), 4)] (2007)	
	km2	%	1,000p	%	1,000p	%	Billion VND	%
Whole Country	331,051	100%	85,847	100%	25,437	100%	1,144,015	100%
Study Area	23,894	7%	22,391	26%	12,386	49%	587,761	51%
Others	307,157	93%	63,456	74%	13,051	51%	556,254	49%

Source: 1) Statistical Yearbook of Vietnam 2009, General Statistical Office of Vietnam
2) The 2009 Vietnam Population and Housing Census: Completed Results, General Statistical Office of Vietnam
3) Socio-economic Statistical Data of 63 Provinces and Cities, 2009, General Statistical Office of Vietnam
Note: 4) GDP of Hanoi City refers to the data as of 2008 at the expansion of the city.



Source: 1) Statistical Yearbook of Vietnam 2009, General Statistical Office of Vietnam
2) The 2009 Vietnam Population and Housing Census: Completed Results, General Statistical Office of Vietnam
3) Socio-economic Statistical Data of 63 Provinces and Cities, 2009, General Statistical Office of Vietnam
Note: 4) GDP of Hanoi City refers to the data as of 2008 at the expansion of the city.

Figure 2-9 Land Area, Population and GDP in Whole Country and Study Area

2.2.2 Administrative Units

Hanoi City, Haiphong City, Danang City and Ho Chi Minh City are designated as the cities under the authority of the central government, comprising urban districts, provincial towns and rural districts. Urban district is further sub-divided into wards, and provincial town comprises wards and communes. Rural district is composed of district towns and communes.

The provinces of TT-Hue, Dong Nai, Binh Duong and Ba Ria - Vung Tau comprise a provincial city and/or town and rural districts. Provincial city is further sub-divided into wards, and provincial town comprises wards and communes. Rural district is composed of district towns and communes.

Table 2-6 Administrative Units in Study Area (2009)

City / Province	Provincial Cities	Urban Districts	Provincial Towns	Rural Districts	Wards	District Towns	Communes
Hanoi City		10	1	18	154	22	401
Haiphong City		7		8	70	10	143
TT-Hue Province	1			8	24	9	119
Danang City		6		2	45		11
Dong Nai Province	1		1	9	29	6	136
Binh Duong Province			1	6	11	9	71
Ba Ria - Vung Tau Province	1		1	6	24	7	51
Ho Chi Minh City		19		5	259	5	58

Source: Statistical Yearbook of Vietnam 2009, General Statistical Office of Vietnam

2.2.3 Land Use

The cities and provinces in the Study Area correspond to the major urbanizing areas in the country, but the majority of the lands are used for the purposes of 'Agricultural Production Lands' and 'Forestry Lands'.

Table 2-7 Land Use in Study Area (2009)

Classification	Hanoi City		Haiphong City		TT-Hue Province		Danang City	
	km2	%	km2	%	km2	%	km2	%
Agricultural Production Land	1,532	46%	512	34%	554	11%	87	7%
Forestry Land	241	7%	220	14%	2,891	57%	678	53%
Specially Used Land	686	21%	235	15%	209	4%	392	31%
Residential Land	349	10%	131	9%	160	3%	58	4%
Others	537	16%	424	28%	1,249	25%	68	5%
Total	3,345	100%	1,522	100%	5,063	100%	1,283	100%

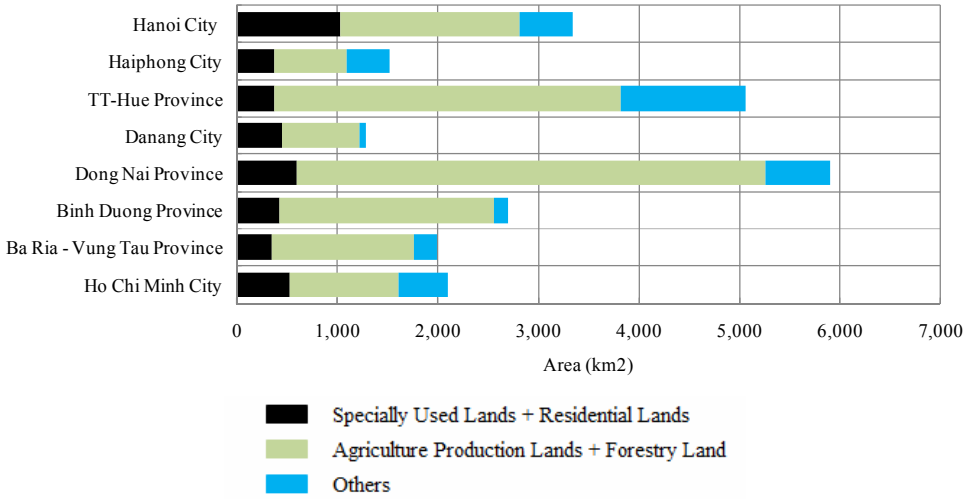
Classification	Dong Nai Province		Binh Duong Province		Ba Ria - Vung Tau Province		Ho Chi Minh City	
	km2	%	km2	%	km2	%	km2	%
Agricultural Production Land	2,875	49%	2,012	75%	1,061	53%	753	36%
Forestry Land	1,792	30%	125	5%	352	18%	344	16%
Specially Used Land	452	8%	338	12%	302	15%	306	15%
Residential Land	145	2%	81	3%	49	3%	212	10%
Others	639	11%	139	5%	223	11%	481	23%
Total	5,903	100%	2,695	100%	1,987	100%	2,096	100%

Source: Statistical Yearbook of Vietnam 2009, General Statistical Office of Vietnam

The percentage of the lands used for the intensive purposes ('Specially Used Lands' and 'Homestead Lands') are 31% in Hanoi City, 24% in Haiphong City, 36% in Danang City, and 35% in Ho Chi Minh City. The percentages are lower in the other provinces, i.e. 7% in

TT-Hue Province, 10% in Dong Nai Province, 16% in Binh Duong Province, and 17% in Ba Ria - Vung Tau Province.

The percentages of the lands used for the intensive purposes suggest that the population and economic activities would be highly concentrated into the limited extents of the urbanized areas.



Source: Statistical Yearbook of Vietnam 2009, General Statistical Office of Vietnam

Figure 2-10 Land Use in Study Area (2009)

2.2.4 Population

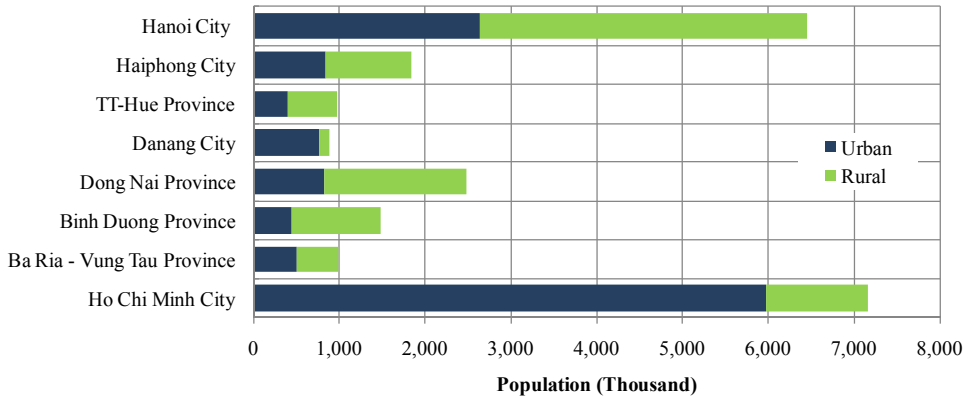
Ho Chi Minh City is the largest city in Vietnam with the total population of 7.16 million, which consists of the urban population of 5.97 million (accounting for 83% of the total population) and the rural population of 1.19 million (17%). Hanoi City is the second largest and has 6.45 million comprising 2.64 million of the urban population (41%) and 3.81 million of the rural population (59%). Haiphong City is the third largest city and has the total population of 1.84 million, followed by Danang City with 0.89 million.

Four (4) provinces include a provincial city and/or town as well as smaller urban centers. The major cities and towns in the provinces are Hue City (TT-Hue Province: total population 0.34 million), Bien Hoa City (Dong Nai Province: 0.70 million), Thu Dau Mot Town (Binh Duong Province: 0.22 million), and Vung Tau City (Ba Ria - Vung Tau Province: 0.30 million).

Table 2-8 Population in Study Area (2009)

City /Province	Urban		Rural		Total	
	1,000p	%	1,000p	%	1,000p	%
Hanoi City	2,641.6	41%	3,830.6	59%	6,472.2	100%
Haiphong City	849.1	46%	992.6	54%	1,841.7	100%
TT-Hue Province	393.0	36%	695.7	64%	1,088.7	100%
Danang City	773.5	87%	117.0	13%	890.5	100%
Dong Nai Province	828.0	33%	1,663.3	67%	2,491.3	100%
Binh Duong Province	448.3	30%	1,048.8	70%	1,497.1	100%
Ba Ria - Vung Tau Province	496.1	50%	500.8	50%	996.9	100%
Ho Chi Minh City	5,964.0	83%	1,201.2	17%	7,165.2	100%

Source: The 2009 Vietnam Population and Housing Census: Completed Results, General Statistical Office of Vietnam



Source: Statistical Yearbook of Vietnam 2009, General Statistical Office of Vietnam

Figure 2-11 Population in Study Area (2009)

Average population growth rate in the Study Area ranges from 7.5%/year in Binh Duoung Province and 0.4%/year in TT-Hue Province for the period from 2000-2009. Of eight (8) cities / provinces in the Study Area, six (6) cities / provinces have marked the population growth rates higher than the nationwide average of 1.2%/year.

Urban population has been increasing with a rate of 4.0%/year (2000-2007) and 1.7%/year (2008-2009) in Hanoi City and 3.5%/year in Ho Chi Minh City. Haiphong City, Binh Duoung Province and Ba Ria - Vung Tau Province have marked the higher growth rates of urban population than the nationwide average of 3.5%.

Rural population tends to be decreasing in Haiphong City, TT-Hue Province and Danang City located in the northern or central region in the country. Meanwhile, rural population keeps increasing as well in Dong Nai Province, Binh Duong Province, Ba Ria - Vung Tau Province and Ho Chi Minh City located in the southern region in the country.

Table 2-8 Population Growth Rate in Study Area (2000-2009)

City / Province	Urban	Rural	Total
Hanoi City (2000-2007)	4.0%	-0.5%	2.2%
Hanoi City (2008-2009)	1.7%	1.4%	1.2%
Haiphong City	4.0%	-1.1%	0.9%
TT-Hue Province	2.5%	-0.6%	0.4%
Danang City	3.5%	-2.0%	2.6%
Dong Nai Province	3.1%	1.7%	2.2%
Binh Duong Province	7.4%	7.6%	7.5%
Ba Ria - Vung Tau Province	3.9%	0.5%	2.1%
Ho Chi Minh City	3.5%	3.4%	3.5%

Source: Statistical Yearbook of Vietnam 2009, General Statistical Office of Vietnam

2.2.5 Economy

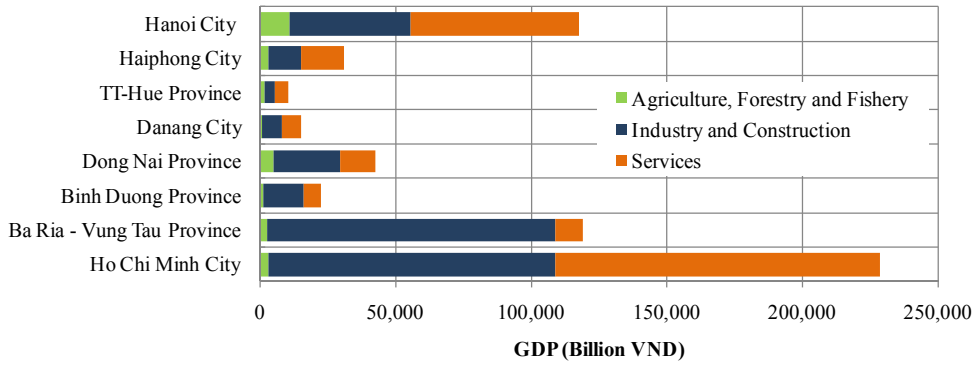
Because of the urbanization and economic activities highly concentrated in the Study Area, the majority of GDP is occupied by Industry and Construction and Service.

Ho Chi Minh City has marked the highest GDP of 228,795 billion VND at constant price, comprising 1% of Agriculture, Forestry and Fishery, 46% of Industry and Construction, and 52% of Service. Ba Ria - Vung Tau Province has attained the second largest GDP of 119,166 billion VND, resulting from the industrialization highly concentrated. Industry and Construction covers 89% of GDP in Ba Ria - Vung Tau Province. GDP in Hanoi City has amounted to 117,525 billion VND, which consists of 9% of Agriculture, Forestry and Fishery, 38% of Industry and Construction, and 53% of Service.

Table 2-9 GDP at Current Price by Economic Activity in Study Area (2007)

City /Province	Agriculture, Forestry and Fishery		Industry and Construction		Service		Total	
	Billion VND	%	Billion VND	%	Billion VND	%	Billion VND	%
Hanoi City	11,047	9%	44,424	38%	62,053	53%	117,525	100%
Haiphong City	3,407	11%	11,742	38%	16,117	51%	31,265	100%
TT-Hue Province	2,043	20%	3,717	36%	4,501	44%	10,261	100%
Danang City	616	4%	7,207	47%	7,461	49%	15,284	100%
Dong Nai Province	5,175	12%	24,714	58%	12,943	30%	42,832	100%
Binh Duong Province	1,442	6%	14,572	65%	6,619	29%	22,633	100%
Ba Ria - Vung Tau Province	2,692	2%	106,196	89%	10,279	9%	119,166	100%
Ho Chi Minh City	3,057	1%	106,052	47%	119,686	52%	228,795	100%

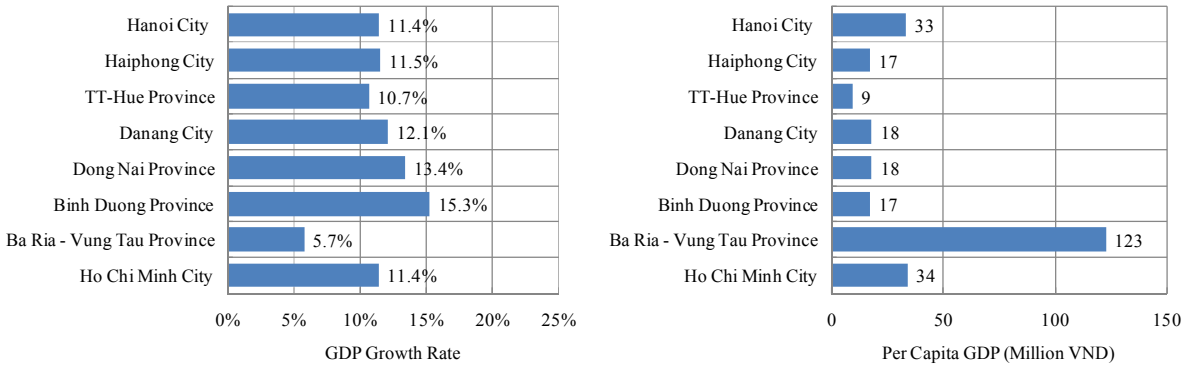
Source: Socio-economic Statistical Data of 63 Provinces and Cities, 2009, General Statistical Office of Vietnam
Note: GDP of Hanoi City refers to the data as of 2008 at the expansion of the city.



Source Socio-economic Statistical Data of 63 Provinces and Cities, 2009, General Statistical Office of Vietnam
Note: GDP of Hanoi City refers to the data as of 2008 at the expansion of the city.

Figure 2-12 GDP at Current Price by Economic Activity in Study Area (2007)

Average of the real growth rate of GDP at 1994 constant price for the period of 2000-2007 was well over 10%/year in the Study Area, except 5.7%/year in Ba Ria - Vung Tau Province. Binh Duong Province marked a rate of 15.3%/year, followed by Dong Nai Province (13.4%) and Danang City (12.1%). Ba Ria - Vung Tau Province attained the highest per capita GDP of 123 million VND in 2007. Ho Chi Minh City marked 34 million VND. Per capita GDP in Hanoi City was 33 million VND as of 2007 and afterward has become 18 million VND in 2008 because of the expansion to involve the surrounding rural districts. Per capita GDP in the other cities and provinces stayed in a range of 9 to 18 million VND.



Source Socio-economic Statistical Data of 63 Provinces and Cities, 2009, General Statistical Office of Vietnam
Note: GDP growth rate of Hanoi City refers to the data for 2000-2007 before the expansion of the city.
Per capita GDP of Hanoi City refers to the data as of 2007 before the expansion of the city.

Figure 2-13 Real GDP Growth Rate (2000-2007) and Per Capita GDP (2007) in Study Area

2.2.6 Urban Centers

There are four (4) cities under the authority of the central government, i.e. Hanoi City (Special Grade), Haiphong City (Grade-I), Danang City (Grade-I) and Ho Chi Minh City (Special Grade), which include the satellite urban centers mostly classified into Grade-V.

Hue City (TT-Hue Province) is designated as Grade-I. Bien Hoa City (Dong Nai Province) and Vung Tau City (Ba Ria - Vung Tau Province) are classified into Grade-II. Son Tay Town (Hanoi City), Thu Dau Mot Town (Binh Duong Province) and Ba Ria Town (Ba Ria - Vung Tau Province) are classified into Grade-III. Besides there are five (5) of Grade IV urban centers, which are two (2) provincial towns and three (3) district towns.

Table 2-10 Urban Centers in Study Area

City / Province Urban Center [1]	Grade [1]	Population (2009) [2]			Remarks
		Urban	Rural	Total	
Hanoi City		**2,644,536**	**3,807,373**	**6,451,909**	
Hanoi City	Special	2,644,536	3,807,373	6,451,909	City under Authority of Central Government
(Son Tay Town)	(III)	(66,517)	(59,232)	(125,749)	Provincial Town, belonging Hanoi City
Haiphong City		**846,191**	**990,982**	**1,837,173**	
Haiphong City	I	846,191	990,982	1,837,173	City under Authority of Central Government
TT-Hue Province		**391,112**	**696,308**	**1,087,420**	
Hue City	I	302,983	32,592	335,575	Provincial City
Huong Thuy Town	IV	13,497	82,625	96,122	Provincial Town
Tu Ha Town	IV	74,632	581,091	655,723	District Town / Huong Tra District
Others					
Danang City		**770,911**	**116,524**	**887,435**	
Danang City	I	770,911	116,524	887,435	City under Authority of Central Government
Dong Nai Province		**824,823**	**1,661,331**	**2,486,154**	
Bien Hoa City	II	652,646	48,548	701,194	Provincial City
Long Khanh Town	IV	50,615	80,089	130,704	Provincial Town
Others		121,562	1,532,694	1,654,256	
Binh Duong Province		**443,245**	**1,038,305**	**1,481,550**	
Thu Dau Mot Town	III	187,379	35,466	222,845	Provincial Town
Lai Thieu Town	IV	255,866	1,002,839	1,258,705	District Town / Thuan An District
Di An Town	IV				District Town / Di An District
Others					
Ba Ria - Vung Tau Province		**496,885**	**499,797**	**996,682**	
Vung Tau City	II	282,415	13,822	296,237	Provincial City
Ba Ria Town	III	66,341	28,384	94,725	Provincial Town
Others		148,129	457,591	605,720	
Ho Chi Minh City		**5,968,384**	**1,194,480**	**7,162,864**	
Ho Chi Minh City	Special	5,968,384	1,194,480	7,162,864	City under Authority of Central Government

Source: 1) Grade of urban center refers to the website of MOC.
2) Figures of population refer to the 2009 Vietnam Population and Housing Census: Completed Results, General Statistical Office of Vietnam.

CHAPTER 3
SECTOR OVERVIEW - URBAN WATER SUPPLY

3.1 General

3.1.1 Nationwide Status

The recent information published by the Ministry of Construction (MOC) indicates the nationwide status of urban water supply as follows, which would be based on the data as of 2009.

1) Almost all provincial urban areas (63 provinces) have been getting investment projects for rehabilitating, upgrading, extending water supply systems. Water demands in large urban centers and industrial zones have been satisfied in general.
2) Surface water sources account for 70% of the total water sources and the remaining 30% are groundwater sources.
3) 68 water supply companies (WSCs) are serving clean water to the urban areas. There are more than 420 water supply systems and the total design capacity of water supply reaches 5.9 million m3/day. The developments have been focused mainly for water production facilities but the water distribution network improvement, i.e. rehabilitation of old network and extending new network, is not yet paid sufficient attention. As a result, the operational capacity of water supply stays at 4.5 million m3/day accounting for 77% of the design capacity.
4) Service coverage rate is 73% on average and ranges from 75% to 90% in the major cities, i.e. 88.5% at Hanoi City and 87% at Ho Chi Minh City.
5) The rate of water leakage has been reduced considerably from 30% on average in 2009, compared with 40% in 2000, but remains still high compared with other countries. Average water consumption is 90 liter/person/day, 110 to 130 liter/person/day in large centers liter/person/day and 70 to 80 liter/person/day in small towns.

Meanwhile, the documents issued by ADB suggest as described hereunder that the service levels of urban water supply have been improving in large cities but still need further improvements in middle and small cities.

1) As of 2006, the service coverage ratio was about 70% in the urban centers of Special Grade and Grade-I, 45% to 55% in Grade-II and III, 30% to 35% in Grade-IV, and 10% to 15% in Grade-V. According to the benchmarking survey done by Vietnam Water Supply Association (VWSA), 60% of WSCs ensure water supply for 24 hours a day but most of the rest operate 14 to 20 hours a day, and a few cities are able to operate for only 8 to 10 hours per day.
2) In urban areas, the population with access to 'improved water sources' is officially given as 98%. However, the urban population with a house connection is only 59%. The remaining 39% has access to 'other improved sources' such as shared stand posts or protected wells. Only a third of 754 towns has piped water supply.

3.1.2 Water Sources

(1) Surface Water

1) Northern Region

In the Red River - Thai Binh River system, the rivers are characterized with water level variation by season and high content of floating substances. In the past, the water intakes

were likely to face the operational difficulties caused by sediment deposit with the occurrence of flood in the rainy season. The solutions of the operational difficulties have been implemented with the use of ODA finances for rehabilitating and upgrading water supply facilities since 1990s.

Water intakes at irrigation reservoir or canal are often facing water shortage in the dry season because of improper management of water exploitation. Even though there is a regulation to give priority use for urban water supply, the use of water by irrigation reduces the available flow at the raw water intake.

In line with the need of surface water exploitation in Hanoi City, the first water supply system based on the surface water sources of the Da River was completed with a design capacity of 300,000 m3/day and was partially operated since 2009.

2) Central Region

The rivers are characterized with a large variation of flow by season. Due to the decline of river flow in the dry season, the problem of salinity intrusion occurs in some areas. The Huong River is a major source for the water supply to Hue City. The river was affected by salt intrusion in every dry season. To solve this problem, the Thao Long barrage to prevent salinity intrusion was constructed to the downstream of the water intakes in 2005. Salt water intrusion also takes place in the Tuy Loan River, which is a major source for Danang City.

3) Southern Region

The Dong Nai River basin covers the largest population center in Vietnam, including Ho Chi Minh City and the neighboring provinces such as Binh Duong Province, Dong Nai Province and Ba Ria - Vung Tau Province. The Dong Nai River and a major tributary of the Saigon River are utilized as the surface water sources for the urban areas and industrial parks concentrated in the south of the basin. Due to the urbanization coupled with the industrial development in the basin, the downstream reaches of the rivers are facing the threat of water pollution.

Ho Chi Minh City is served principally with the surface water sources of the Sai Gon River and the Dong Nai River. The water production capacity based on the said surface water sources is 1,350,000 m3/day in total for the water supply in Ho Chi Minh City. Due to the urbanization coupled with the industrial development in the surrounding areas, the locations of the surface water intake on the Sai Gong River suffer from the threat of water pollution. At the surface water intake on the Sai Gong River with a capacity of 300,000 m3/day, the water pollution is already at a serious level for water purification. Ho Chi Minh City considers relocating the surface water intake on the Sai Gong River to the far upstream at the Dau Tieng Reservoir in Tay Ninh Province.

Dong Nai Province is exploiting the surface water from the Dong Nai River and associated tributaries and/or lakes. The water production capacity based on the said surface water sources is some 240,000 m3/day in total for the water supply.

(2) Groundwater

A majority of cities using groundwater have a small production capacity (from 5,000 to 15,000 m3/day) to medium production capacity (from 20,000 to 40,000 m3/day) for the water supply. Meanwhile, Hanoi City and Ho Chi Minh City are exploiting a large amount of groundwater.

Hanoi City is served principally with groundwater with an average water production of some 600,000 m3/day. The majority of the groundwater production is taking place in the city center composed of the urban districts and suburbs located to south-west of the Red River. It was recognized that an allowable amount of groundwater exploitation should be 700,000 m3/day in the corresponding areas until 2010. However, the threats of the groundwater sources have already been reported such as drawdown of groundwater level at production well, reduction of groundwater production, groundwater pollution and land subsidence.

In Ho Chi Minh City, a sustainable amount of groundwater exploitation is estimated around 500,000 to 800,000 m3/day. Groundwater exploitation was estimated around 600,000 m3/day for different purposes (as of 2005). The groundwater is under the threats of salt water intrusion, water table drawdown and contamination that have already been observed. Therefore, the urban water supply based on the groundwater sources is limited in Ho Chi Minh City. The water supply system at Hoc Mon well field was rehabilitated with a design capacity of 72,000 m3/day.

3.1.3 Water Treatment Plants

Hanoi City is served principally with groundwater with an average water production of some 600,000 m3/day composed of 14 major WTPs (design capacity of 30,000 to 80,000 m3/day) and some number of minor WTPs within the former areas of the city as well as others in Ha Dong District and Son Tay City involved to Hanoi City expanded in 2008. These WTPs are operated under the management of Hanoi Water Company Limited (HAWACO). As raw water taken from deep wells contains Iron (Fe) and Manganese (Mn^{2+}), all the water treatment plants need to have the process to remove Fe and Mn^{2+}. The WTP at Nam Du (30,000 m3/day) commissioned in 2001 has the bio-filter process to remove Ammonia (NH^{4+}) in addition to the process of Fe and Mn^{2+} removal.

The first WTP based on the surface water sources of the Da River was completed in Hanoi City with a design capacity of 300,000 m3/day and is partially operated since 2009. This WTP and associated water supply facilities were constructed by the private investment company (Vietnam Import-Export Construction Corporation: VINACONEX) and are operated by a new water supply company established under VINACONEX.

In Ho Chi Minh City, two (2) large WTPs are operated under the management of Sai Gon Water Corporation (SAWACO). The Thu Duc WTP initiated its operation since 1966 as the first WTP to take the raw water from the Dong Nai River at Hoa An for the water supply in the city. Resulting from the recent rehabilitation and upgrading completed in 2002, the Thu Duc WTP has a design production capacity of 750,000 m3/day. The Tan Hiep WTP takes the raw water from the Sai Gong River at Hoa Phu and has a design production capacity of 300,000 m3/day.

Recently, the new WTPs have been invested in Ho Chi Minh City by the private investors. An additional Thu Duc WTP was completed and initiated its operation in 2009 under the management of Thu Duc Water BOO (Built-Operate-Own) Company established by the investors. The design production capacity of this WTP is 300,000 m3/day for bulk water supply to SAWACO. Another one is the Kenh Dong WTP invested by Kenh Dong Joint Stock Water Supply Company. This WTP with a design production capacity of 200,000 m3/day is under construction to take raw water discharged through a canal from the Dau Tien Reservoir in Tay Ninh Province. Clear water produced at this WTP will be served in the northwest of Ho Chi Minh City and for bulk water supply to SAWACO.

The water supply systems in the other major cities comprise WTPs with different design capacities of 100,000 m3/day or less as whole, depending on the water demands respectively.

3.1.4 Water Distribution Network

Most of the water distribution networks in the cities in Vietnam had been constructed originally before 1970s and remain unimproved for the tens of years afterward. Before 1990s, the degradation of the water distribution networks was critical in terms of water supply amount, pressure and quality unsatisfactory for consumers. Water produced at WTP was lost with a high rate due to physical leakage from the water distribution network.

From 1990s up to present, in projects of rehabilitation and expansion financed from ODA, the design, construction and equipment provision of water distribution networks have been deployed on the basis of the modernized standards. Resulting from the years of the

implementation, remarkable improvements of water distribution network have been attained up to date in some major cities.

In Haiphong City, the water supply system suffered from the critical degradation with a water loss exceeding over 70% of the total water production before 1993 and could not provide water supply services satisfactory for the consumers. The said situations have been improved with the supports of the ODA by Finland and World Bank, by means of strengthening the management of the water distribution network within a series of the capacity development for the water supply company (WSC) since 1993. According to the recent information published by Haiphong Water Supply One Member Company Limited (HPWSCO), HPWSCO attained the reduction of non-revenue water (NRW) at a rate of 20% in 2008 with the betterment of the service quality under the corporate-style management established.

Some other WSCs have also attained the reduction of NRW at a satisfactory level. According to a survey by JICA (2009), TT-Hue Construction and Water Supply State One Member Company Limited (HUEWACO) marked a ratio of NRW at 15%, and Ba Ria - Vung Tau Water Supply Joint Stock Company (BWACO) marked less than 15%.

Meanwhile, as commented by the MOC, the need of improving and/or expanding the water distribution network has moved to a prioritized issue on the water supply in Vietnam. In the early stage of developing the water supply systems, the investments has been likely to concentrate into the upstream components such as raw water intake, conveyance pipeline, WTP, transmission main and trunk distribution mains. Therefore, a time lag is taking place in the development of the water supply system between upstream components and rehabilitation / expansion of distribution network with service connections.

Suggested from a ratio of water loss around 30% on the nation-wide average, many urban water supplies would still stay with a high rate of water loss. Even in the large cities, it is reported that a ratio of water loss stays around 30% in Hanoi City and 40% in Ho Chi Minh City. Besides, it is also reported that the WTP completed by VINACONEX is operated with one-third of the design capacity (300,000 m3/day) due to the delay in expanding the water distribution network.

3.1.5 Sector Reform

Since 1990s, many responsibilities for public works including water supply, drainage and sewerage have been decentralized in Vietnam. Provincial People's Committee (PPC) has a responsible department to oversee the project implementation as well as operation and maintenance for water supply, drainage and sewerage facilities in its locality. Under the PPC, the operation and maintenance for public works are handled by stated-owned enterprises (SOEs), comprising water supply company, drainage and sewerage company and others handling different urban infrastructures.

The government has been promoting 'equitization', which is officially defined as the transformation of the ownership of the mode of production from one entity to several entities. The equitization of SOEs therefore refers to the diversification of ownership including private ownership. In certain types of SOEs, the government retains full ownership or a controlling interest (over 50% of capital). Meanwhile, there are SOEs that have not been equitized because of strategic importance.

The Decision No. 38/2007/QD-TTg, dated 20 March, 2007 on criteria for classification and list of enterprises with one hundred (100) percent state owned capital, gives that SOEs involved in water supply, drainage and sewerage in urban centers have been classified into those to be equitized with more than 50% shareholding by the state. Resulting from this Decision, the equitization process of the water supply companies (WSCs) serving for Grade-III urban centers or higher has been completed by 30 June 2010.

In spite of the equitization process of WSCs as above, ADB points out that the decentralization is still in process and local governments and their agencies are not fully

prepared to assume decentralized responsibilities because of the following situations at present.

1) Equitization has not been bringing improved efficiencies, as WSCs get involved in non-core activities and in the absence of incentives to expand distribution systems to marginal areas.
2) Decisions on raising tariffs do not stay with WSCs but with PPCs, who have little incentive to increase tariffs.

It is also pointed out that the lack of clarity on the ownership of the treatment, transmission, distribution assets of water supply systems creates a risk to effective operation and maintenance and will cause the value of these assets to gradually deteriorate.

3.2 Present Policy Frameworks

3.2.1 Legal Framework

The Decree No.117/2007/ND-CP of 11th July 2007 on clean water production, supply and consumption, covers activities in the domains of production, supply and consumption of clean water under concentrated water supply systems in urban areas, rural areas, industrial parks, export processing zones, hi-tech parks and economic zones (below referred to as 'industrial parks in short). This Decree sets out the rights and obligations of organizations, individuals and households engaged in activities related to clean water production, supply and consumption in Vietnam.

3.2.2 Development Orientations in the Last Decade

In the last decade, the development of urban water supply in Vietnam was planned and implemented in accordance with the Decision No.63/1998/QD-TTg, dated on 18 March 1998, ratifying the orientation for the water supply development of urban areas and industrial zones up to the year 2020.

This Decision established the criteria to be followed for the development of the urban water supply systems and for the formulation of appropriate investment plans in order to develop the water supply service in a stable and sustainable manner, including the following principal targets.

1) 100% of urban population to be served with the safe water of 120 to 150 liter/day/person until 2020 by means of rational exploitation, use and protection of water resources
2) Reform of the organizational structure of the water supply sector and renovation of financial policies and creation of capital sources for the urban water supply activities
3) Technological modernization of equipment and supplies and training of personnel
4) Encouragement of various economic sectors to invest in the development of urban water supply

This Decision envisaged that the water supply companies (WSCs) would establish their self-supported financial capability to cover the costs for their operation and maintenance practices as well as for further investments to improve and expand the water supply facilities.

3.2.3 Development Orientations Updated

(1) Principal Viewpoints

In 2009, the government updated the development orientations for the urban water supply. The Decision No.1929/2009/QD-TTg dated on 20 November 2009 describes the orientations for development of water supply in Vietnam's urban centers and industrial parks up to 2025, and a vision towards 2050.

The principal viewpoints of this Decision are;

1) Water supply shall be a production and business activity subject to the state control aiming to ensure the lawful rights and interests of water suppliers and water users, taking into consideration the provision of supports in water supply to the poor and regions meeting with exceptional difficulties.
2) Water supply activities shall be developed sustainably on the basis of tapping the utmost all resources, meeting the demand for clean water, and supplying quality water with good services in a stable and efficient manner.
3) Clean water shall be exploited, produced and supplied regardless of administrative boundaries. Exploitation of water sources to supply water for daily-life activities of communities shall be prioritized.
4) Rational, economical and safe use of clean water shall be encouraged with application of technologies for re-using water for different purposes.
5) Scientific and technological advances shall be applied in order to incrementally modernize the water supply industry, striving to reach the managerial and operational level of advanced countries in the world.
6) Water supply industry shall be popularized to encourage organizations and individuals of various economic sectors to invest in the development of water supply and to raise the proportion of private investors in water supply.

A vision towards the year 2050 is to satisfy the water supply demand in all urban centers and industrial parks (including industrial parks, export-processing zones, hi-tech parks and economic zones) on the basis of supplying quality water with good services in a stable and efficient manner.

(2) Development Targets till 2025

The developments for urban water supply envisage satisfying the service coverage of 100% for unit water demand of 120 liter/person/day, water loss to be reduced to 15%, and water supply service to be stabilized for 24 hours a day in all the urban centers in Vietnam by the year 2025.

Table 3-1 Development Targets of Water Supply for Urban Centers

Index	Grade of Urban Center	Year 2015	Year 2025
Service Coverage (%)	Grade III or Higher	90	100
	Grade IV		
	Grade V	70	
Unit Water Demand (litter/person/day)	Grade III or Higher	120	120
	Grade IV		
	Grade V	100	
Water Loss (%)	Grade III or Higher	18	15
	Grade IV		
	Grade V	25	
Service Stability (hours)	Grade III or Higher	24	24
	Grade IV		
	Grade V	--	

Source: Decision No.1930/2009/QD-TTg dated on 20 November 2009, approving orientations for development of water supply in Vietnam's urban centers and industrial parks up to 2025, and a vision towards 2050

(3) Implementation Principles

For approaching to the development targets till 2025, the Decision provides the implementation principles comprising the following eight (8) subjects.

1) Water sources
2) Investment in, development and management of, water supply systems
3) Mechanisms and policies on water supply activities
4) Research into and development of water supply technology, supplies and equipment
5) Human resource training and development
6) Management of water supply
7) Education and communications
8) International cooperation

3.2.4 Water Safety Plans (WSP)

The World Health Organization (WHO) has been supporting the Ministry of Construction (MOC) and Vietnam Water Supply and Sewerage Association (VWSA) to develop a roadmap for introducing Water Safety Plans (WSP) across the whole country.

Resulting from WHO's supports, the MOC issued the Decision No.16/2008/QD-BXD dated 31 December 2008 on the issuance of the regulation on water supply safety assurance. This Decision is a legal framework for preparation, implementation and supervision of WSP in order to ensure the safety in water production, supply and consumption. This Decision is applicable for domestic and foreign individuals and organizations operating activities related to safe water production, supply and consumption in Vietnam's territory.

According to this Decision, each WSC appointed as water supply unit should prepare its roadmap comprising the following 10 steps to establish WSP.

1) Development of human resources to perform WSP
2) Verification of descriptions of water supply system from water sources to water consumers, water quality requirements and service quality requirements
3) Establishment of technological diagram of water supply system
4) Stipulation, evaluation and prioritization of potential risks to the water supply system
5) Stipulation of risk management and prevention plan
6) Stipulation of standards for check and evaluation for implementing the risk management and prevention plan
7) Check and evaluation for implementing the risk management and prevention plan and developing evaluation criteria to carry out the safe water supply
8) Development and implementation of supporting plans
9) Establishment of a series of the prevention process to be managed by WSC
10) Establishment of documentation system for the information of organization and communications

3.2.5 National UFW/NRW Program

The government has issued the Decision No.1147/2010/QD-TTg, dated 24 November 2010, on approval of National Unaccounted-for Water, Non-Revenue Water Program to 2025.

This Decision it to enforce the Decision No.1929/2009/QD-TTg (20 November 2009) that provides the targets for UFW/NRW reduction (18% by 2020).

1) Public awareness improvement activities
2) Capacity building for local authorities

3) Capacity building for WSCs

4) Establishment and improvement of UFW/NRW policy framework

5) Assessment and monitoring of UFW/NRW due to technical reasons

This Decision also mentions the financing principles to implement NRW reduction program for allocating different sources. In general, state budget, grants or grant elements as part of mixed loans, and WSCs own capital will be allocated for the public awareness improvement and capacity building. ODA and commercial loans, credit and sources from other economic sectors will be allocated for the water distribution network infrastructures.

A Central Steering Committee (CSC) for National UFW/NRW Program will be established by the Prime Minister, chaired by the Minister of Construction and organized with the representatives of the other Ministries concerned. The CSC shall be responsible for (a) directing the development of annual and five-year implementation plans, (b) instructing implementation of the program, (c) instructing and coordinating issues relevant to the program, (d) reviewing, monitoring and supervising the program to be implemented in the provinces.

The Ministry of Construction (MOC) will organize entirely the program. The Ministry of Planning and Investment (MPI) and Ministry of Finance (MOF) will handle the financial subjects such as budget allocations and financial mechanisms to be effective for the program. Vietnam Water Supply and Sewerage Association (VWSA) will cooperate in sharing UFW/NRW experiences of WSCs, evaluating the performance of WSC and making recommendations for WSC to achieve its best performance.

Provincial People's Committees will (a) formulate regulations and guidance based on the UFW/NRW policy framework, (b) prepare annual and five-year plans including budget requirements, (c) implement the activities of the program at provincial level, and (d) report the activities to the MOC.

3.2.6 Water Tariff

Urban water tariffs are set by the Provincial People's Committees (PPCs) after the WSC submits their tariff proposal and often after the PCs obtain the consent of the People's Council.

In general, water tariffs vary for different consumer categories such as residential, administrative / non-business agencies, service businesses, production activity / industrial. Water tariffs are all based on volumetric charging and many of WSCs apply progressive tariff rates (increasing block tariffs).

In November 2004, the MOF and MOC issued a Joint Ministerial Circular No.104/2004/TTLT-BTC-BXD, stipulating the common tariff framework for the whole country, including rural areas, based on the principle of full cost recovery and a reasonable profit. Afterward, the water tariffs have been increased or adjusted significantly and helping to improve the financial status of WSCs.

The latest water tariff systems are based on the Circular No. 100/2009/TT-BTC of 20 May, 2009, promulgating the bracket of daily-life clean water prices (inclusive of VAT), issued by the MOF.

Table 3-2 Bracket of Water Tariff

Type of Area	Minimum Price (VND/m3)	Maximum Price (VND/m3)
Special Grade Urban Centers and Grade-I Urban Centers	3,000	12,000
Grade-II, III, IV and V Urban Centers	2,000	10,000
Rural Areas	1,000	8,000

Source: The Circular No. 100/2009/TT-BTC of 20 May, 2009, promulgating the bracket of daily-life clean water prices, the Ministry of Finance

The present water tariff system follows the Circular but differs by city / province. The water tariffs for administration, production and service are set higher than those for domestic. The water tariffs are reviewed annually. For example, Ho Chi Minh City plans to increase the water tariffs with a rate of 5% to 15% per year (depending on consumer category) for the next three (3) years.

Table 3-3 Present Water Tariffs (VND/m3, inclusive of VAT)

	Hanoi City	Haiphong City	TT-Hue Province	Danang City
Domestic	3,652 - 8,583	8,558	3,623	3,700 - 5,400
Others	5,204 - 10,957		4,988 - 8,085	6,100 - 12,200

	Dong Nai Province	Binh Duong Province	Ba Ria - Vung Tau Province	Ho Chi Minh City
Domestic	3,780 - 9,450	4,000 - 8,000	4,200 - 5,775	4,200 - 10,500
Others	6,090 - 12,600	6,500 - 8,000	5,775 - 8,400	7,035 - 12,400

Source: Based the data available in Website of each WSC

3.2.7 Organizations Concerned

The Decree No.117/2007/ND-CP describes the responsibilities for state management of water supply as below.

1) The Government shall perform the unified state management of water supply activities in the Vietnamese territory; promulgate and direct the implementation of strategies and orientations for water supply development at the national level.

2) The Construction Ministry (MOC) shall perform the function of state management of water supply activities in urban centers and industrial parks nationwide:

   - To study and formulate mechanisms and policies on water supply in urban centers and industrial parks and submit them to the Government or the Prime Minister for promulgation or promulgate them according to its competence;
   - To formulate and submit to the Prime Minister for promulgation and organize the implementation of programs and plans on development of water supply in urban centers and industrial parks at the national level;
   - To promulgate regulations, standards, econo-technical norms on water supply in urban centers and industrial parks;
   - To guide, direct and inspect urban and industrial-park water supply activities nationwide.

3) The Ministry of Agriculture and Rural Development (MARD) shall perform the function of state management of water supply activities in rural areas:

   - To study and formulate rural water supply mechanisms and policies and submit them to the Government or the Prime Minister for promulgation or promulgate them according to competence;
   - To formulate and submit to the Prime Minister for promulgation and organize the implementation of national programs on rural water supply;
   - To promulgate regulations, standards and techno-economic norms on rural water supply;
   - To guide, direct and inspect rural water supply activities nationwide.

4) The Ministry of Health (MOH) shall perform the function of state management of community health, promulgate standards of clean water used for daily-life activities,

organize the inspection and supervision of the realization of clean water standards nationwide. .

5) The Ministry of Planning and Investment (MPI):
   - To study and formulate mechanisms and policies to encourage and mobilize domestic and foreign investment capital sources for water supply works;
   - To act as coordinator in mobilizing official development assistance (ODA) capital sources for investment in water supply development in the order of priorities already approved by the Prime Minister.

6) The Ministry of Finance (MOF):
   - To perform the unified financial management of the ODA capital sources for investment in water supply development;
   - To coordinate with the Construction Ministry, the Ministry of Agriculture and Rural Development in guiding the principles and methods of determining clean water consumption prices, promulgate clean water price brackets and organize the examination and supervision of their implementation nationwide.

7) Ministries, ministerial- level agencies shall, within the ambit of their tasks and powers, coordinate with the Construction Ministry and the Ministry of Agriculture and Rural Development in performing the state management of water supply activities.

8) Provincial-level Peoples Committees shall, within the ambit of their tasks and powers, perform the state management of water supply activities in geographical areas under their management; define the functions and tasks of, and decentralize the management of water supply activities to, professional bodies and subordinate Peoples Committees. Construction Services of provinces and Communications and Public Works Services of centrally run cities shall act as professional advisory bodies, assisting provincial-level Peoples Committees in performing the state management of urban and industrial-park water supply; provincial/municipal Services of Agriculture and Rural Development act as professional advisory bodies, assisting provincial-level Peoples Committees in performing the state management of rural water supply in their localities.

9) Peoples Committees of all levels shall organize and develop water supply services to satisfy various demands in their localities, in compatibility with the community development, and participate in the common regional plannings on water supply; upon the appearance of demand for water supply, Peoples Committees at all levels must apply appropriate measures to select or newly set up water supply units, support, facilitate and supervise the materialization of water supply service provision agreements of water supply units in areas under their management, ensuring adequate water supply services and meeting communities demands for water use.

3.3 ODA

3.3.1 World Bank

The recent projects implemented by the World Bank finance are outlined below:

1) Vietnam Water Supply Project (1997-2006)

   The project (a) improve the quality of water supply services in Hanoi City, Haiphong City, Quang Ninh Province and Danang City through renovation of existing facilities in order to satisfy the demand of about 2.5 million people up to the year 2000; (b) ensure sustainability of the physical investments by developing the institutional capabilities of the water supply companies (WSCs), facilitating their commercialization and upgrading their staff skills through training; and (c) assist in preparation of a future investment

program to satisfy water demand after 2000. The project was implemented comprising the following components.

- Component 1: Renewal and upgrading of water supply facilities
- Component 2: Institutional measures to ensure sustainability
- Component 3: Support activities including construction management, training and various studies
- Component 4: Compensating, resettling and rehabilitating people affected by the project

2) Vietnam Urban Water Supply Development Project (2004-ongoing)

The objective of the project is to improve water and household sanitation services in district towns and large urban centers in ways that are financially and environmentally sustainable thus enhancing the health and economic potential of the resident households.

- Component 1: Competition Route - investment in new water supplies for district towns (15 towns in phase 1 and 120 towns in phase 2) where the water supply companies are willing to contract out delivery of services through competitive processes, and in household sanitation, including associated hygiene education program
- Component 2: Performance Route - investment to improve and expand services in the better performing water supply companies (Haiphong City in phase 1, and Ho Chi Minh City, Ha Tinh Province and Binh Thuan Province in phase 2)
- Component 3: Establishment of a non-subsidized water supply and sanitation lending facility
- Component 4: Investment in building capacity in the water supply and sanitation sector
- Component 5: Management of project implementation

3.3.2 ADB

ADB's involvement in the water and sanitation sector in Vietnam commenced in the early 1990s. Initial involvement focused on institutional and planning support to Ho Chi Minh City, followed by a first loan aimed at the rehabilitation of the city's water supply and sanitation systems. A sequence of three provincial towns water supply and sanitation loans provided the basis for improving essential infrastructure in over 30 provincial towns. Consistent with the government policy to encourage economic growth away from the major cities, two subsequent loans supported the integrated development of environmental infrastructure and services in small to medium towns in provinces of the central region.

Further loans are under preparation to support the expansion of water supply systems in Ho Chi Minh City, Haiphong City, Danang City and TT-Hue Province.

Table 3-4 Projects Financed by ADB for Water Supply Sector

Project	Type	Period
Ho Chi Minh City Water Supply and Sanitation Rehabilitation	Loan	1994-2004
National Water Tariff Policy Study	T/A	1994-1996
Institutional Strengthening HCMC Water Supply Company	T/A	1994-1998
HCMC Water Supply Master Plan	T/A	1994-1996
Capacity Building for Provincial Water Supply Sanitation Planning and Management	T/A	1995-1999
Provincial Towns Water Supply and Sanitation	T/A, Loan	1993-2004
Second Provincial Towns Water Supply and Sanitation	T/A, Loan	1994-2007
Third Provincial Towns Water Supply and Sanitation	T/A, Loan	1999-2010
Haiphong Water Supply Project	T/A	2008-
Ho Chi Minh City Water Supply Project	T/A	2008-
Hue Water Supply Project	T/A	2008-
Danang Water Supply Project	T/A	2008-
Central Region Small and Medium Towns Development Project	T/A, Loan	2004-
Thanh Hoa City Comprehensive Socio-economic Development Project	T/A, Loan	2007-
Vietnam Water Sector Investment Program, MFF	MFF [1)]	Proposed
Vietnam Water Supply Sector Investment Program PFR 1	Loan	Proposed
Supporting Vietnam Water Sector Project PFR2	Loan	Proposed
Supporting Vietnam Water Sector Project PFR3	MFF[1)]	Proposed

Source: Documents published on ADB Website
Note: 1) Multi-tranche Financing Facility

In February 2011, ADB has announced that the ADB's Board of Directors has approved a 1 billion USD financial support that will help improve clean water access for three (3) million families in Vietnam, including half a million poor households who will receive their own piped water connection for the first time.

The assistance is part of a nearly 2.8 billion USD investment program involving ADB, the Government of Vietnam, development partners and water company financiers. The program will help water companies to improve and expand clean water supply in some of Vietnam's largest cities through the installation of new pipelines and the repair and extension of existing networks. In addition to infrastructure improvements, the program will enhance the operational management and commercial viability of water companies.

ADB is providing 138 million USD for the program's first project in Ho Chi Minh City, where many poor households are not yet connected to piped water systems, and are paying almost twice the official water tariff. The Ho Chi Minh City project, which will be implemented by Sai Gong Water Corporation (SAWACO), will improve pressure and coverage for over half a million city residents, and provide almost 20,000 families with their first household water connections. The project is expected to increase water availability in Ho Chi Minh City to some 64 million m3/year over the next decade.

3.3.3 Finland

Finland started its cooperation with Vietnam for the water sector in 1985 with the Hanoi Water Supply Program (1985-2001). Another intervention was the Haiphong Water Supply and Sanitation Program (1990-2004). The cooperation consisted of investment in the sector infrastructure and technical assistance with the aim of strengthening the capacity of the relevant government institutions and of influencing the government policies in the sector.

In 2004, Finland extended the cooperation in the sector to small provincial towns with the Water Supply and Sanitation Program for Small Towns (WSPST) in Vietnam. The phase 1 of the program was active in four (4) provinces, i.e. Bac Kan, Haiphong, Hung Yen and Thai Binh until August 2009.

The phase 2 of the program was launched in September 2009 and will last until June 2013. The program has three result areas: i) the construction of clean water and sanitation systems for small towns, ii) strengthening operations, maintenance and financial management in the water companies owning the systems to ensure long-term sustainability of water supply and sanitation development in their localities and iii) activating the National Revolving Water Fund (NRWF) to set-up a national system for financing similar investments in the future.

In addition, the program continues work from the first phase of the program; finalizing construction of water supply and sanitation systems and supporting the activation of the Ministry of Construction (MOC) Water Laboratory.

The activities cover 41 projects in 26 towns in 8 provinces (4 in the Red River Delta and 4 in the Northern Mountainous regions), consisting of;

1) One (1) new water and sanitation scheme in each of four (4) provinces (Bac Kan, Haiphong, Hung Yen and Thai Binh)
2) Two (2) water and sanitation schemes for two (2) small towns in each of four (4) northern mountainous provinces (Ha Giang, Tuyen Quang, Yen Bai and Thai Nguyen)

The WSPST is implemented by MOC and is supported by a consultancy consortium made up of the Finnish firms.

3.3.4 Japan

In 1990s, Japanese ODA for the water supply sector in Vietnam financed for the water supply systems in small towns as sub-projects of the nation-wide programs for the rehabilitation and improvement of living conditions in small towns and rural districts. Besides, two (2) projects were completed with the grant aid finance, i.e. Gia Lam District in Hanoi City (32,100 m3/day, 1993-1995) and Hai Duong Province (10,200 m3/day, 1998-2001).

The project for the development of the water supply systems in Dong Nai Province and Ba Ria - Vung Tau Province was financed by the loan and initiated in 1998 (100,000 m3/day in Dong Nai Province and 50,000 m3/day Ba Ria - Vung Tan Province). In Hanoi City, Thang Long North WTP (50,000 m3/day) was completed in 2005 within a series of the infrastructure development under Thang Long North - Van Tri infrastructure development project financed by the loan.

Since late 1990s, Japanese ODA for the water supply sector in Vietnam are undertaken mainly in the manner of the technical cooperation program for improving technical and management capability of WSCs.

1) Water Sector Training Center Project (2000-2003)

   The project aimed at improving the water works technology and management training capability of Construction College No.2 in Ho Chi Minh City. The technical cooperation was performed for Water Sector Training Center of Construction College No.2 to establish the training courses for (a) water distribution plan, (b) corporate management and (c) reduction of NRW, and to organize and implement the training courses for WSCs in the southern region in Vietnam.

2) Project for Improvement of WSC's Corporate Management (2003-2005)

   The project was performed in the manner of JICA Partnership Program (JPP) with Yokohama City Government to delegate the experts of Yokohama Waterworks Bureau. The technical cooperation was performed for TT-Hue Construction and Water Supply State One Member Company Limited (HUEWACO) and Sai Gong Water Corporation (SAWACO). Afterward in 2009, Yokohama Waterworks Bureau, HUEWACO, SAWACO and Construction College No.2 concluded a memorandum to forward technical exchange and corporation continuously each other.

3) Project on Human Resources Development for Water Sector in the Central Region (2007-2009)

   Succeeding to the JPP in Hue City, the project performed the capacity development for HUEWACO to improve its capability on the management of (a) water quality, (b) water distribution network, (c) human resources development and personnel affairs, and (d) customer services. Resulting from the project, HUEWACO accomplished the implementation of the Water Safety Plan (WSP) and realized to announce the safety of tap water directly for drinking ('Declaration of Safe Water Supply') firstly in Vietnam.

4) The Project on Capacity Development for Urban Water Supply Utilities in the Central Region (2010-2013)

   The project aims at establishing a practical capacity development system, oriented to the WSP, for 18 WSCs operating in the central region. The principal activities of the project consist of;

   - Capacity development for Water Sector Training Center newly established in the central region
   - Extending HUEWACO's successful experiences over the other WSCs in the central region
   - Organizing a coordination network of MOC, Provincial People's Committees, VWSA, WSCs, Water Sector Training Center the central region, other training institutes, for attaining the aim of the project

CHAPTER 4
SECTOR OVERVIEW - DRAINAGE AND SEWERAGE

4.1 General

4.1.1 Nationwide Status

In Vietnam, existing drainage and sewerage systems in Grade-IV urban centers or higher are the combined system to drain both storm water and wastewater, consisting of open channels, ponds and sewers including box culverts, concrete pipes, drain ditches with concrete covers.

In the past, urban drainage and sewerage systems were constructed through different periods in unsystematic manners without an urban master plan. Many sewers are degraded and do not have sufficient capacity as required under the current urbanizing conditions and need to be replaced, rehabilitated or upgraded. In Grade-V urban centers or smaller towns, there is no combined system.

The report on the Water Sector Review Project (ADB, 2009) refers to an estimate by the Ministry of Construction (MOC) and the Vietnam Water Supply and Sewerage Association (VWSA) for service coverage rate of drainage and sewerage. The coverage of drainage and sewerage service is lower than that of water supply service. Service coverage would be about 40 to 50% on average, ranging from 70% in large urban centers and only 1 to 2% in Grade-V urban centers.

4.1.2 Storm Water

The major urban areas in Vietnam are formed in alluvial flatland affected by seasonal or tidal variation of water level in neighboring river and/or sea that causes the difficulty in natural drainage of storm water. Therefore, the urban inundation has been considered as the daily issues of such urban centers, where heavy rain causes inundation immediately.

The inundation occurs frequently at lowlands in Hanoi City and Ho Chi Minh City, which were inundated by the heavy rainstorm in November 2008. Many other urban centers such as Danang City and Can Tho City, which have not experienced inundation before, are now becoming major inundated areas. The inundation is resulting from many causes, such as heavy rain, flood from river, high tide and especially the climate change.

In the rainy season, about 30% of urban centers are suffered from inundation caused by heavy rains. Duration of inundation often lasts from 1 to 12 hours. Although storm water drainage systems in the areas prone to inundation have been cleaned up by periodical maintenance, such areas get inundated again after few years and many other areas have also been threatened by inundation due to the following reasons.

1) Drainage canals and sewers have been obstructed by buildings, resulting from illegal or unplanned construction.
2) Many lakes and/or ponds have been filled up for building houses and roads, which reduce the capacity of storm water retention effects.
3) As the density of houses and roads becomes high, rainwater runoff rate increases due to the loss of the areas covered with grass and/or green plants.
4) Waste dumping are uncontrolled and cause the stuck of flows through storm water drainage systems.

Among 63 provincial urban centers (consisting of 5 cities under direct authority of the central government and 58 provincial cities), 32 urban centers have got urban drainage and sanitation projects funded by ODA capital. Large-scale projects have been implemented in Hanoi City

and Ho Chi Minh City, followed by Haiphong City, Danang City, Hue City (TT-Hue Province), and Thu Dau Mot Town (Binh Duong Province).

4.1.3 Wastewater

Only a few urban areas have the integrated sewerage system consisting of sewer network and wastewater treatment plant. Many urban areas do not have any wastewater treatment plant, thus the wastewater is only primarily treated using septic tanks and then discharging into the public sewers or directly into the environment.

At present, 6 out of 68 urban centers of Grade III or higher such as Hanoi City, Ho Chi Minh City, Ha Long City, Danang City, Da Lat City and Buon Me Thuot City, have wastewater treatment systems.

The development of urban water supply systems has been increasing the per capita water consumption in urban areas. Resulting from the increase of water use, wastewater is also increasing and causing the environmental pollution. ADB refers to the 2008 MOC data indicating that less than 10% of urban wastewater is treated (250,000 m3/day, out of 3 million m3/day), although the need of wastewater treatment is a stated as the government priority. Serious environmental degradation and health concerns are caused by water pollution from untreated domestic wastewater and unregulated discharge of industrial and hospital wastewater.

Table 4-1 WWTPs Operated in Vietnam

Province / City	WWTP	Capacity (m3/day)
Hanoi City	Truc Bac	2,300
	Kim Lien	3,700
	North Thang Long	38,000
Quang Ninh Province / Ha Long City	Bai Chay	3,500
	Hon Gai	7,000
Danang City	Hai Chau	89,200
	Thanh Khe	
	Son Tra	
	Ngu Hanh Son	
Lam Dong Province / Da Lat City	Da Lat	7,400
Dak Lak Province / Buon Ma Thuot City	Buon Ma Thuot	7,000
Ho Chi Minh City	Binh Hung Hoa	30,000
	Binh Hung	141,000

Source: 1) Environmental Status, Solutions, Cooperation and Investment Needs in Vietnam, Dr. Dang Van Loi, Vietnam Environmental Protection Administration
2) Study on the Water Environment Improvement Project for Da Nang City in Socialist Republic of Viet Nam, March 2010, Nihon Suido Consultants Co., Ltd.
3) The Three Cities Sanitation Project, Implementation Completion and Results Report, World Bank, June 2009

Industrial growth is the backbone of the nation's rapid economic development, with industrial zones (IZs) accelerating profusely. However, installation of wastewater treatment facilities is still not adequately enforced. 70% of wastewater from approximately 220 IZs is discharged directly into rivers without treatment and 60% of IZs have no centralized wastewater treatment systems (National Environment Report 2009). Some of those installed are not even fully operational.

According to the survey conducted in 2006 by the Institute of Occupational Health and Environmental Hygiene, 634 hospitals out of 1,042 hospitals surveyed (consisting of central, provincial district and private hospitals) had no wastewater treatment system, and 217 hospitals needed upgrading of the system.

4.1.4 Sanitation

According to the World Bank report (Sanitation Management for Urban Areas in Vietnam, Baseline and Issues Report, Draft Version, January 2010), a rate of access to safe sanitation by urban population was 91% in 2008. The majority of safe sanitation is septic tanks. 80% of the urban population access to septic tank as safe sanitation.

Meanwhile, the use of septic tank would not necessarily mean primary treatment of domestic wastewater at household as suggested by the report on Water Sector Review Project (ADB, 2009). There are many households with septic tanks but not connected with the public sewers due to the absence of sewer networks in alleys. As a result, wastewater flows into open ditches around or infiltrates into the ground. Some households with water-pour toilets flush wastewater directly into the public sewers without any preliminary treatment. Septic tanks are operated with low capacity as sludge is not removed properly. Wastewater is then discharged into the public sewers with sediments and mud, which creates sedimentation in the public sewers and causes odor in the dry season.

The World Bank report also describes that there is evidence that the removal of sludge from septic tank is not very frequent even in the major cities of Vietnam as below.

1) Haiphong City

   Drainage and sewerage services in Haiphong City are provided by the Sewerage and Drainage Company (SADCO). A World Bank project purchased a fleet of sucking trucks for SADCO to service all households connected to the combined drainage system. Emptying septic tank services are to be provided on a 'free of charge' basis, funded by a fee collected through the water bill (as per agreement with the World Bank). The fee has recently increased from 10% to 15% of the water bill, and funds about 90% of SADCO's annual budget. However, it seems that most of the available budget is used to operate and maintain the drainage pumping system during flood season while the sewage emptying trucks stay parked in SADCO's parking facility.

2) Hanoi City

   Drainage and sewerage services in Hanoi are provided by Hanoi Sewerage and Drainage Company (HSDC). Top management at HSDC is concerned that most households do not empty their septic tanks regularly, and assumes that this will be the case in the foreseeable future.

3) Ho Chi Minh City

   The Urban Drainage Corporation (UDC) top management explained that their sucking trucks could hardly find one customer per day. In response to lack of interest of households to empty their septic tanks, UDC has been building main interceptors for collecting wastewater and carrying it out to WWTPs.

The main reasons of less frequency in removing sludge from septic tank are; (a) the septic tanks are not designed to facilitate this operation. The septic tanks are often built in in the bottom of the land plot. It suggests that the owner do not intend to organize such an operation very often. (b) sucking trucks are not available and/or need to be occupied with other purposes.

4.1.5 Sector Reform

The decentralization has been implemented for the urban drainage and sewerage sector as described in the sub-section 3.1.5 but the situations are different from the urban water supply sector.

According to the report on the Water Sector Review Project (ADB, 2009), there are 76 companies providing urban drainage and sewerage services, consisting of 49 in the cities under the central government or province, 23 in Grade IV cities under provinces, and 4 in the

districts under the city or provinces. Of these, only 4 companies in Hanoi City, Ho Chi Minh City, Haiphong City and Ba Ria - Vung Tau Province are specialized in urban drainage and sewerage services.

In the remaining cities, there are 32 water supply companies that are also taking charge of urban drainage and sewerage services. Other urban infrastructure companies provide urban drainage and sewerage services in combination with other infrastructure services such as solid waste collection, street management, parks, lightings, and funerals.

The budget for the operation and maintenance of urban drainage and sewerage system is totally funded by the subsidy from the provincial or city administration principally on the basis of the wastewater charges. Even though the stipulations given by Decree No.88/2007/ND-CP, the urban drainage and sewerage companies have a limited financial capability to carry out the operation and maintenance practices as prevailing wastewater charges are set at 10% of clean water charge by People's Committee.

4.2 Present Policy Frameworks

4.2.1 Legal Framework

The Decree No. 88/2007/ND-CP of 28 May 2007, on Urban and Industrial-Park Water Drainage provides for water drainage activities in urban centers and industrial parks, economic zones, export processing zones, hi-tech parks. It set out rights and obligations of organizations, individuals and households involved in water drainage activities. For rural population quarters where conditions permit the construction of concentrated water drainage systems, the application of this Decree is encouraged.

4.2.2 Development Orientations in the Last Decade

In the last decade, the development of urban drainage and sewerage in Vietnam was planned and implemented in accordance with the Decision No.35/1999/QD-TTg, dated on 5 March 1999, ratifying the orientation for the development of urban drainage up to the year 2020.

This Decision provided the orientations for the development of drainage in urban areas, serving the national industrialization and modernization and protecting the environment, as the basis for making appropriate investment to develop the drainage systems in the urban areas in a stable and sustainable way in each period, including the following principal targets.

1) Immediate objectives up to 2005

   To improve urgently the existing situations in the urban areas and prepare principles for developing the urban drainage and sewerage systems:

   - Storm water drainage is prioritized to eliminate frequent inundations during the rainy season in the principal urban areas such as Hanoi City, Ho Chi Minh City and other Grade-I and II urban centers. In Grade-III to V urban centers, storm water drainage are improved with an appropriate level. Service coverage is improved from 30-40% under existing condition to 50-60%. The capital of Hanoi City needs a service coverage of 80%.
   - Sewerage system is improved with the priority for Hani City, Ho Chi Minh City and other major cities and tourist centers such as Haiphong City, Danang City, Ha Long City, Hue City and Vung Tau City. Industrial and hospital wastewater should be treated by on-site treatment before discharging into public sewer system.
   - Night-soil collection into pail should be eliminated in the cities until 2005 (Hanoi City until 2001). Enough number of public toilet need to be placed at the locations such as markets, train stations and bus stations. Existing urban drainage systems need to be maintained for avoiding degradation. Wastewater treatment systems are

constructed at industrial zones, export processing zone and new urban centers, together with establishment of effluent standards.

- Model of public utility for urban drainage and sewerage is established through stage-wise improvements to overcome the government subsidies mechanism and issue a policy of wastewater charge, in order for the urban drainage and sewerage company to have its income to cover const for the management of operation and maintenance.
- Principles for long-term sustainable development of urban drainage and sewerage are established, comprising (a) strengthening organization, (b) human resources development, (c) strengthening legal system related to water use, (e) education and popularization of urban drainage and sewerage for creating people's awareness, and (e) domestic production of equipment, accessories and materials

2) Long-term objectives up to 2020

To cope with sustainably the need of the urban drainage sewerage for protecting and upgrading the urban environment, serving better life for people, and stepping up to economic development in a speedy and sustainable way:

- Usual inundation during the rainy season is eliminated in the urban centers. Each urban center needs to have its own urban drainage and sewerage system with an appropriate technology of wastewater treatment for ensuring hygiene environment. Service coverage is improved to 80-90% and needs to be 90-100% in Hanoi City, Ho Chi Minh City, Grade-II urban centers or higher, urban centers located in the key areas of economic and tourist development, as well as industrial and export processing zones.
- Financial mechanism is established to ensure the sustainable development of the urban drainage and sewerage systems.
- New technology is introduced and applied for modernizing the urban drainage and sewerage system in order to reach the international standard or equivalent to that of the other regional countries.
- Advanced norms and rules are applied in order to integrate Vietnam's drainage system into other countries in the region and the world.

For approaching to the targets, the Decree envisaged the following implementation principles.

1) Institutional building

- The legal and organizational system for managing urban drainage and sewerage is strengthened under the Ministry of Construction (MOC) at national level and Provincial People's Committee (PPC) with urban drainage and sewerage company at each locality.
- Community popularization and education are carried out intensively for promoting public awareness of urban drainage and sewerage as well as public hygiene environment.

2) Financial arrangement

- Other than the stage budget, different financial sources such as domestic economic sectors and external grants and/or loans from donors need to be mobilized for the development of urban drainage and sewerage.
- Policy of wastewater charge is promulgated to cover the operation and maintenance costs for urban drainage and sewerage facilities.
- Policy of incentives for development of urban drainage and sewerage is issued to encourage possible investors.

- The government has to set a level of investment to protect the environment related to urban drainage and sewerage applicable to production, business and service establishments.

3) Technology development

- Development plan specialized for urban drainage and sewerage is prepared in conformity with urban development plan. New urban centers are developed simultaneously with urban drainage and sewerage works. Construction heights are stipulated and managed to prevent urban areas from inundation.
- Different measures and technologies for urban drainage and sewerage are applied, depending on topographic characteristics in each locality. For the majority of urban centers, simplified technologies are adopted, i.e. natural drainage of storm water, natural purification of wastewater.
- Advanced and modern technologies are applied for Hanoi City, Ho Chi Minh City, industrial areas, export processing zones, and tourist centers. Domestic products share about 70% of the materials, equipment and spare parts for urban drainage and sewerage systems for the period of 2010-2015.

4) Human resources development

- A sufficient number of personnel are trained to have skills for operation and maintenance of urban drainage and sewerage facilities. Through different projects, funds and technologies to be brought in Vietnam are used effectively. Sufficiently trained workers are mobilized from the central to provinces and localities by 2005.
- Comprehensive training program is worked out from the leading officials and managers, scientific and technical specialists, economists and financial managers to staff personnel.
- Favorable conditions are created for Vietnamese officials and workers to work directly with foreign specialists. Policies to encourage the participation and contribution of Vietnamese specialists living abroad are adopted.

4.2.3 Development Orientations Updated

(1) Principal Viewpoints

In 2009, the government updated the development orientations for urban drainage and sewerage. The Decision No.1930/2009/QD-TTg dated on 20 November 2009 describes the orientations for the development water drainage (urban drainage and sewerage) in Vietnamese urban centers and industrial parks up to 2025 and a vision towards 2050.

The principal viewpoints of this Decision are;

1) Water drainage is a public utility service. The State encourages domestic and foreign organizations and individuals of all economic sectors to invest and conduct business in the water drainage domain under the Vietnamese laws on investment, construction, operation and use of water drainage systems.

2) Water drainage systems shall be built in a synchronous manner, ensuring the drainage of storm water and wastewater, including collection, conveyance and treatment in each drainage basin. Investment shall be prioritized in the construction of synchronous water drainage systems in the large urban centers of Special Grade, Grade-I and II or urban centers being tourist centers or greatly affecting the environment.

3) Combined sewer system shall be built in combination with wastewater separating facilities in urban centers where sewer system already exists. Separate sewer system shall be built in industrial parks, high-tech parks, export processing zones, economic zone (below referred collectively to as industrial parks) and new urban centers as well as small

urban centers where water drainage systems are newly constructed. Existing lakes and ponds shall be used effectively to regulate storm water and reduce water source pollution.

4) Standalone industrial factories and service establishments, which discharge hazardous wastewater, shall treat it before discharging into the sewer system in urban centers or industrial parks.

5) Key works shall be invested in phased development to select a proper size and capacity. In particular, sewer systems, newly constructed or improved, shall be capable of carrying storm water and wastewater as forecast in a long-term water drainage planning.

6) Wastewater treatment technologies shall be selected to suit the natural conditions, sizes and characteristics of urban centers and economic conditions. The use of domestic technologies and equipment shall be prioritized.

7) Investment in construction and management of water drainage systems shall be popularized, mobilizing domestic and international resources.

8) The policy of water drainage charges shall be adopted for pollution sources to pay the cost of wastewater treatment. Then water drainage charges shall cover the management and operation of water drainage systems and partly investment costs.

A vision towards the year 2050 is described as below:

In urban centers of Grade-IV upwards, completed water drainage systems will be constructed to drain storm water, collect and treat wastewater. In small urban centers (of Grade-V) and craft villages, wastewater will be collected and treated at concentrated or scattered treatment stations. In urban centers, local inundation will be absolutely redressed and all wastewater will be treated before discharged into the environment in accordance with the effluent standards.

(2) Development Targets till 2025

The general objectives are to orientate the development of urban drainage and sewerage in urban centers and industrial parks to serve national industrialization and modernization as well as environmental protection; on that basis, to formulate plans and specific programs of action to develop water drainage in urban centers and industrial parks in a stable and sustainable manner in each period.

1) By 2015

Prioritized development of storm water drainage system:

- Frequent inundation during the rainy season in urban centers of Grade-II or higher shall be eliminated.
- Service coverage of storm water drainage system shall be expanded up to 70-80%.
- All storm water drainage systems shall be managed for proper operation and maintained periodically.

Development and upgrading of sewerage system:

- Sewerage system comprising sewers and wastewater treatment plant (WWTP) shall be constructed in urban centers of Grade-III or higher. 40-50% of domestic wastewater shall be collected, conveyed and treated in accordance with the effluent standards.
- All wastewater from hospitals and industrial establishments shall be treated in accordance with the effluent standards before discharged into the combined sewers in urban centers or the environment.
- All industrial parks shall have separated wastewater drainage systems to collect and treat wastewater in accordance with the effluent standards.

Public toilets for people and tourists shall be constructed in urban centers of Grade-IV or higher

2) By 2020

Storm water drainage system:

- Inundation shall be eliminated in urban centers of Grade IV or higher
- Service coverage of storm water drainage systems shall be expanded over 80%.

Sewerage system:

- Sewerage system shall be constructed in urban centers of Grade-III or higher. 60% of domestic wastewater shall be collected, conveyed and treated in accordance with the effluent standards.
- In urban centers of Grade-IV or V and craft villages, 40% of wastewater shall be treated in accordance with the effluent standards.
- Environmental pollution shall not be caused by storm water and wastewater collected and discharged through sewers and canals running in populated areas.

3) By 2025

Storm water drainage system:

- Inundation shall be eliminated in all urban centers
- Service coverage of storm water drainage systems shall be expanded to 90-95% and 100% in urban centers of Grade-IV or higher.

Sewerage system:

- Sewerage system shall be constructed in urban centers of Grade-IV or higher. 70-80% of domestic wastewater shall be collected, conveyed and treated in accordance with the effluent standards.
- In urban centers of Grade-V and craft villages, 50% of wastewater shall be treated in accordance with the effluent standards.
- In craft villages, decentralized WWTP shall be constructed for treatment of wastewater in accordance with the effluent standards.
- 20-30% of treated wastewater shall be recycled for watering plants, cleaning roads and using other purposes in urban centers and industrial parks.

(3) Implementation Principles

For approaching to the development targets till 2025, the Decision provides the implementation principles comprising the following nine (9) subjects.

1) To complete the system of the current legal provisions on water supply and drainage
2) Water drainage system development planning and plans
3) Investment in the development of water drainage systems
4) Mechanisms and policies applicable to water drainage sector
5) Development of water drainage technologies, equipment
6) Human resources development
7) Organization of water drainage management
8) Education and communications
9) International cooperation

4.2.4 Wastewater Charges

In the last decade, the wastewater charge systems have been developed for the financial requirements of the urban drainage and sewerage services. The prevailing wastewater charge systems are broadly classified as follows.

1) Water Drainage Charges

   The Ministry of Construction and the Government Prices Board issued the Circular No.09/1999/TTLT/BXD-BVGCP, dated on June 6, 1999, to permit the urban centers to levy a charge equivalent to 10% of clean water prices (not including value added tax) on wastewater discharge. Households and/or others discharging wastewater into the urban drainage and sewerage system are subject to this wastewater charge system.

   The water supply companies (WSCs) take charge of collecting the wastewater charges. After deducting about 5% of the costs required for the WSCs to collect the wastewater charges, the remaining amounts are sent to the budget of province or city administrations respectively.

   Recently, the Decree No.88/2007/ND-CP, dated May 28, 2007, on urban and industrial-park water drainage gives the new provisions for concreting the wastewater charge system, supplemented by the Circular No.09/2009/TT-BXD, dated May 21, 2009, detailing some provisions of the Decree No.88/2007/ND-CP.

2) Environmental Protection Charges

   Besides, the government issued the Decree No.67/2003/ND-CP, dated June 13, 2003, on environmental protection charges for wastewater. This is equivalent to 10% clean water prices (not including value added tax). Households and/or others discharging wastewater directly into the environment are subject to this wastewater charge system.

   After deducting the costs required for the organizations to handle directly the assessment and collection of the environmental protection charges, 50% of the remaining amount is incorporated into the budget of the central government for the Vietnam Environmental Protection Fund. Another 50% is allocated to the budges of the local administrations for the use of the environmental protection activities, including the urban drainage and sewerage services.

It is reported that some misunderstandings take place at provincial or city levels between two different manners of wastewater charge depending on 'Water Drainage Households' discharging wastewater to the urban drainage and sewerage system, or 'Individual Water Drainage Households' discharging wastewater directly to the environment. Some provincial or city administrations understand incorrectly that the water drainage charges are replaced with the environmental protection charges. Financial aspects for the urban drainage and sewerage services are lagged behind due to the said misunderstandings.

The wastewater charges for 'Water Drainage Households' are also defined as a thought of the environmental protection charges in the Decree No.88/2007/ND-CP. But the complexity remains on the wastewater charge system, which needs to cover a variety of wastewater dischargers, i.e. 'Served' or 'Not Served' by water supply service, 'Water Drainage Households' or 'Individual Water Drainage Households', and types of wastewater ('Domestic' or 'Other').

The methods to handle the wastewater charge in terms of its determination and collection procedures are also complicated in line with the complexity of the wastewater charge system. It takes time to establish the common understandings on the procedures for the approval of the methods to handle the wastewater charges among the organizations concerned.

Table 4-2 Wastewater Charge System

Domestic Wastewater		Water Drainage	
		Water Drainage Households discharging wastewater into water drainage system	Individual Water Drainage Households discharging wastewater into environment
Water Supply	Served with water supply system	Decree No.88/2007/ND-CP Wastewater volume to be charged is equivalent to 100% of clean water volume consumed. Water drainage charge is determined in accordance with a given formula. Water drainage charge is collected by Water Supply Unit.	Decree No.67/2003/ND-CP Water drainage charge is determined with a percentage (not exceeding 10%) of charge for clean water volume consumed. Water drainage charge is collected by Water Supply Unit.
	Not served with water supply system	Decree No.88/2007/ND-CP Wastewater volume to be charged is regarded as 4 m3 per person/month. Water drainage charge is determined in accordance with a given formula. Water drainage charge is collected by Water Drainage Unit.	Decree No.67/2003/ND-CP Water drainage charge is determined depending on clean water volume consumed, average clean water consumption per person and unit price in locality. Water drainage charge is collected by Water Drainage Unit.

Other Wastewater		Water Drainage	
		Water Drainage Households discharging wastewater into water drainage system	Individual Water Drainage Households discharging wastewater into environment
Water Supply	Served with water supply system	Decree No.88/2007/ND-CP Wastewater volume to be charged is equivalent to 80% of clean water volume consumed. Water drainage charge is determined in accordance with a given formula, depending on a level of COD content. Water drainage charge is collected by Water Supply Unit.	Decree No.67/2003/ND-CP Water drainage charge is determined in accordance with a rate to be charged (VND/kg) for each of the pollutants found in wastewater. Payer should remit the water drainage charge directly to State / Provincial Treasury.
	Not served with water supply system	Decree No.88/2007/ND-CP Wastewater volume to be charged needs to be metered. Water drainage charge is determined in accordance with a given formula, depending on a level of COD content. Water drainage charge is collected by Water Drainage Unit.	Decree No.67/2003/ND-CP Water drainage charge is determined in accordance with a rate to be charged (VND/kg) for each of the pollutants found in wastewater. Payer should remit the water drainage charge directly to State / Provincial Treasury.

Source: Interpretations of Decree No.88/2007/ND-CP and Decree No.67/2003/ND-CP by JICA Study Team

4.2.5 Organizations Concerned

Decree No.88/2007/ND-CP describes the responsibility for state management of water drainage activities

1) The State performs the unified state management of water drainage activities in the Vietnamese territory; promulgates, and directs the implementation of, strategies and orientations on water drainage development at the national level.

2) The Ministry of Construction (MOC) is responsible for performing the state management of water drainage in urban centers and industrial parks nationwide:

- To study and formulate water drainage mechanisms and policies and submit them to the Prime Minister for promulgation or promulgate them according to competence;
- To formulate and submit to the Prime Minister for promulgation and organize the implementation of, national programs and plans on water drainage development;
- To promulgate regulations, standards and techno-economic norms on water drainage;
- To guide, direct and inspect water drainage activities nationwide.

2) The Ministry of Natural Resources and Environment (MONRE) is responsible for performing the state management of environmental protection and pollution control in water drainage activities.

3) The Ministry of Agriculture and Rural Development (MARD) is responsible for performing state management of exploitation and protection of irrigation works; grants and revokes permits for wastewater discharge into irrigation works.

4) The Ministry of Planning and Investment (MPI):

- To balance the demands for investment capital from state budget sources under water drainage development programs and plans already approved by the Prime Minister;
- To study and formulate mechanisms and policies to encourage and mobilize domestic and foreign capital sources for investment in water drainage works;
- To act as a coordinator in mobilizing ODA capital sources for investment in water drainage development according to the priority order already approved by the Prime Minister.

5) The Ministry of Finance (MOF):

- To coordinate with the Ministry of Planning and Investment in balancing investment capital from state budget sources and to study and formulate mechanisms and financial policies to encourage and mobilize sources of domestic and foreign capital for investment in water drainage development;
- To perform the unified financial management of ODA capital sources for investment in water drainage development;
- To coordinate with the Construction Ministry in guiding, inspecting and supervising the collection and use of water drainage charges nationwide.

7) Ministries and ministerial-level agencies shall, within the ambit of their respective tasks and powers, coordinate with the Construction Ministry in performing the state management of urban and industrial-park water drainage.

8) Provincial-level People's Committees shall, within the ambit of their respective tasks and powers, perform the state management of water drainage activities in areas under their management; define the functions and tasks of, and decentralize the management of water drainage activities to, professional agencies and People's Committees at lower levels. Construction Services of provinces and Transport and Public Works Services of centrally run cities shall act as professional bodies to advise and assist provincial-level People's Committees in performing the state management of water drainage in their localities.

9) People's Committees of urban centers shall organize the formulation of plannings on, and investment in, construction of water drainage systems and organize the provision of water drainage services in areas under their management suitable to the community development and participate in regional plannings on water drainage, select units for management and operation thereof, conclude contracts and supervise the performance thereof.

4.3 ODA

4.3.1 World Bank

The recent projects implemented by the World Bank finance are outlined below:

1) Three Cities Sanitation Project (2000-2008)

The project development objectives were: (a) sustained improvements to public health; and (b) increased economic development, by reducing the incidence of flooding; upgrading the urban environment; and developing more efficient and financially sustainable sanitation and drainage companies (SADCOs) in Danang, Haiphong, and Quang Ninh Province (Halong City and Cam Pha).

The project had five components with similar subprojects in Danang City, Haiphong City and Quang Ninh Province (Halong City and Cam Pha Town) as follows.

- Component 1: Drainage - In areas where regular flooding occurred, existing drains were rehabilitated and new drains were constructed.
- Component 2 Sewerage and Sewage Treatment - The component improved the urban environment and reduced pollution by intercepting and treating sewage flows.
- Component 3: Solid Waste Management (Danang and Quang Ninh) - The project improved the collection and safe final disposal of solid waste through investment in trucks, other equipment, environmental service centers and sanitary landfills. In Haiphong solid waste was improved through assistance from the Japanese Bank for International Cooperation. The funds for this component were less than at appraisal due to lower than expected bid prices and the decision to pay for large works in Quang Ninh from the DANIDA trust fund.
- Institutional Development and Construction Management - This component improved the management and efficiency of the SADCOs and URENCOs. Technical assistance and training helped the cities establish technically and financially viable service companies. The project also provided technical assistance to the cities for construction management. FINNIDA, DANIDA and AUSAID provided assistance to Haiphong, Quang Ninh and Danang respectively.
- Component 5: Revolving Funds for Household Sanitation Facilities - Revolving funds in each city assisted low income households to construct or improve septic tanks, basic toilet hardware, and sewerage connections. The component was planned and implemented in a participatory manner and included a sanitation and environmental education campaign to inform the community of the linkages between health, environmental conditions, and sanitation. Eligible households received loans of up to VND 2,000,000 to fund sanitation improvement. The revolving funds are still in operation under Government management.

2) Ho Chi Min City Environment Sanitation Project (2001-ongoing)

The project area covers the Nhieu Loc - Thi Nge basin (33 km2) located mostly corresponding to a part of urban districts in Ho Chi Minh City. The project is broadly classified into the wastewater (Component 1) and drainage (Component 2) and comprises the following works.

- Interceptor sewers: total length 8.4 km
- Wastewater pumping station with primary treatment facility: 64,000 m3/day
- Improvement of existing combined sewers: expansion and replacement of main sewers and secondary sewers (total length 65 km), rehabilitation of secondary sewers (total length 30 km), and construction of tertiary sewers (total length 270 km)
- Canal dredging: total length 18 km

- Procurement of sewer cleaning equipment
- Technical assistance for capacity building

3) Vietnam Urban Upgrading Project (2005-ongoing)

The objectives of the project are to alleviate poverty in urban areas by improving the living and environmental conditions of the urban poor using participatory planning methods, and influencing planning processes to become more inclusive and pro-poor.

The project is being carried out in four (4) cities such Ho Chi Minh City and Can Tho City in the south and Haiphong and Nam Dinh in the north, comprising the following seven (7) components.

- Component 1: Tertiary infrastructure upgrading and service improvements
- Component 2: Complementary primary and secondary infrastructure
- Component 3: Resettlement housing
- Component 4: Land and housing management
- Component 5: Housing improvement loan program
- Component 6: Capacity Building
- Component 7: Development of a National Urban Upgrading Program

4) Coastal Cities Environmental Sanitation Project (2000 - ongoing)

The objective of the project is to improve the environmental sanitation in the project cities in a sustainable manner and thereby enhancing the quality of life for city residents.

The project is being carried out in three (3) cities along the coast of central Vietnam. Nha Trang City is the project's southernmost city and is the capital of Khanh Hoa Province, Quy Nhon City is located in the south-central region of Vietnam and is the capital city of Binh Dinh Province. Dong Hoi City is the northernmost city of the project and is the capital of Quang Binh Province.

The project comprises the following six (6) components.

- Component 1: Flood control, drainage and wastewater collection
- Component 2: Wastewater treatment plant
- Component 3: Solid waste management
- Component 4: Resettlement
- Component 5: Household Revolving Fund and School Sanitation Program
- Component 6: Capacity Building and Project Implementation

4.3.2 ADB

ADB's involvement in the water and sanitation sector in Vietnam commenced in the early 1990s. Initial involvement focused on institutional and planning support to Ho Chi Minh City, followed by a first loan aimed at the rehabilitation of the city's water supply and sanitation systems. A sequence of three provincial towns water supply and sanitation loans provided the basis for improving essential infrastructure in over 30 provincial towns. Consistent with the government policy to encourage economic growth away from the major cities, two subsequent loans supported the integrated development of environmental infrastructure and services in small to medium towns in provinces of the central region.

Table 4-3 Projects Financed by ADB for Urban Drainage and Sewerage Sector

Project	Type	Period
Ho Chi Minh City Water Supply and Sanitation Rehabilitation	Loan	1994-2004
Provincial Towns Water Supply and Sanitation	T/A, Loan	1993-2004
Second Provincial Towns Water Supply and Sanitation	T/A, Loan	1994-2007
Ho Chi Minh City Environmental Improvement Project	T/A, Loan	1997-2008
Third Provincial Towns Water Supply and Sanitation	T/A, Loan	1999-2010
Central Region Small and Medium Towns Development Project	T/A, Loan	2004-
Thanh Hoa City Comprehensive Socio-economic Development Project	T/A, Loan	2007-

Source: Documents published on ADB Website

At the Workshop titled Urban Sanitation and Wastewater Management in Viet Nam - Towards a Sustainable Business on 8 March 2011 in Hanoi City, ADB has announced its cooperation in the succeeding years.

ADB agrees with the Government that more attention now needs to be paid to urban environmental improvements. Therefore, a similar line of credit for urban wastewater is planned for 2013. An important opportunity now presents itself: laying the foundation for the effective management of urban wastewater, at the beginning of what is likely to be a prolonged growth of urban centers, large and small.

Preparation for the long term and large scale ADB program will start soon, with a "Capacity Development Technical Assistance" that will run for two years. The CDTA will be followed by a Project Preparation TA (PPTA) during 2012–2013, leading to a line of credit for the period 2013–2022 of $1-2 billion, probably combined with guarantees to encourage private sector involvement in the sector.

At the core of the upcoming CDTA will be about a dozen "City Sanitation Strategies". Each of these will consist of a rapid assessment of the set of conditions—funding, technology, skills, awareness—that are critical for the realization of a successful urban wastewater management project. Secondly, the CDTA will assess the needs for training and education as a step towards establishing a permanent capacity development structure that will train people to meet the skills requirements for the sector, whether they are in government and in utilities or in the consulting and construction industry. Finally, throughout the CDTA the current legal provisions that govern the sector will be assessed and evaluated. This will lead to a set of recommendations on amending or updating the key items of policy, legislation and regulation.

ADB expects that the CDTA will identify a range of issues that will assist MOC in updating its strategies and legislation. Some of these are likely to include the following:

1) *Citizens' awareness.* This would acknowledge the importance of promoting users' understanding of the need for wastewater management.
2) *Construction planning.* To create greater flexibility in construction master plans and sector development plans, allowing for a phased, affordable and evolutive form of planning, design and implementation of infrastructure and services.
3) *Wastewater collection systems.* To define strategies on combined vs separate storm water and wastewater systems; on centralized vs decentralized systems. To take informed decisions on how to deal with existing septic tanks: to phase out or to include; maintenance systems, desludging services and final sludge disposal.
4) *Wastewater treatment technologies.* To promote the acceptance of realistic effluent standards. Approach to decentralized treatment. Evolution of treatment technology and sophistication over time. Impact on energy use and sludge generation of treatment choices. Consideration on reuse of effluent for specific non-consumptive uses.

5) *Financing*. Impact of phasing out of concessional donor funding. Distinguishing between funding for capital expenditure, with state subsidies, and for running costs, to be covered by income from tariffs and charges. Recognizing the needs for regulatory reform as pre-condition for attracting private sector funding.

4.3.3 Finland

Finland was initiated the Haiphong Water Supply and Sanitation Program since 1990. The cooperation consisted of investment in the sector infrastructure and technical assistance with the aim of strengthening the capacity of the relevant government institutions and of influencing the government policies in the sector.

Under Three Cities Sanitation Project financed by the World Bank, the sub-project of Haiphong City was so called the World Bank '1B Component'.

For the implementation of the sub-project of Haiphong, the Government of Finland (GOF) provided the financial assistance for the preparation of engineering studies, detailed designs, and procurement actions on the basis of an agreement between GOF and Haiphong People's Committee for continuing GOF supports to the Haiphong Water Supply Drainage, Sewerage and Sanitation Program (phase IV) during the years 2001 - 2004.

From 2004 to date, Finland extended the cooperation in the sector to small provincial towns with the Water Supply and Sanitation Program for Small Towns (WSPST) in Vietnam as described in the sub-section 3.4.3 before.

4.3.4 Japan

Japan has been financing for the infrastructure development of the urban drainage and sewerage sector in Hanoi City and Ho Chi Minh City since early 1990s and extending over Haiphong City, Hue City, Binh Duong Province and Vinh Phuc Province in 2000s.

Table 4-4 Projects Financed by Japan for Urban Drainage and Sewerage Sector

Project	Type	Period
The Study on Urban Drainage and Wastewater Disposal System in Hanoi City	T/A (M/P, F/S)	1993-1995
Drainage Project for Environment Improvement in Hanoi City, 1st Stage	Loan	1995-2005
Drainage Project for Environment Improvement in Hanoi City, 2st Stage	Loan	2006-
Hanoi City (Thang Long North - Van Tri) Urban Infrastructure Development Project	Loan	1997-
Vinh Phuc Province Investment Climate Improvement Project	Loan	2007-
The Study on Sanitation Improvement Plan for Haiphong City	T/A (M/P, F/S)	2000-2001
Haiphong City Environmental Improvement Project, Sewerage and Drainage Component	Loan	2005-
Hue City Water Environment Improvement Project	Loan	2008-
Southern Binh Duong Province Water Environment Improvement Project	Loan	2007-
The Study on Urban Drainage and Sewerage System in Ho Chi Minh City	T/A (M/P, F/S)	1998-1999
Ho Chi Minh City Water Environment Improvement Project	T/A (D/D), Loan	2000-
Second Ho Chi Minh City Water Environment Improvement Project	Loan	2006-

Source: JICA Website

In addition to the infrastructure development, Japanese ODA for the urban drainage and sewerage sector in Vietnam are moving to the technical cooperation program for improving

technical and management capability of the urban drainage and sewerage companies in Hanoi City and Ho Chi Minh City, where a full-scale operation of the sewerage system with wastewater treatment plants (WWTPs) is taking place.

As a long-term objective, the technical cooperation program envisages that the outcomes of the capacity development in Hanoi City and Ho Chi Minh City will be extended successively over other cities being developed with sewerage infrastructure.

1) Comprehensive Water Environment Project in Hanoi City (2007-2010)

The project was performed in the manner of JICA Partnership Program (JPP) with Chiba Prefecture Government to delegate the experts of Chiba Sewerage Works Bureau. The technical cooperation was performed for Hanoi Sewerage and Drainage One Member Company Limited (HSDC) to implement the following activities:

- To organize a management body to be required for the operation of a full-scale sewerage system with WWTPs, including corporate management and human resources development
- To develop the technical capability of HSDC's staff to perform the operation and maintenance (O&M) practices for WWTPs
- To create the residents' understandings for the need of the urban drainage and sewerage system as well as sewerage charges for water environment improvement

2) Project for Capacity Development on Sewerage Management in Ho Chi Minh City (2009-2010)

Binh Hung WWTP with a capacity of 141,000 m3/day, which is presently the largest in Vietnam (and to be expanded up to 512,000 m3/day till 2020), was completed and initiated its operation in 2009. It was recognized accordingly that the capacity development for the management of the sewerage system with the WWTPs needed be accelerated in Ho Chi Minh City. The project aimed at strengthening O&M capability of Steering Center of Urban Flood Control Program (SCFC), taking charge of WWTPs management, in Ho Chi Minh City. The technical cooperation was carried out by the experts delegated from Sewerage Works Bureau of the Ministry of Land, Infrastructure, Transport and Tourism - Japan (MLIT) and covered the following subjects.

Table 4-5 Technical Cooperation for SCFC (Ho Chi Minh City)

Subject	Activities Supported
Capacity Development for O&M Management Body	● Establishment of a responsible division for O&M in SCFC ● Assignment of SCFC staff at WWTP ● Preparation of budgeting and financial management plan ● Preparation of asset inventory ● Preparation of equipment replacement plan ● Detailing subcontract documents for O&M works done by Urban Drainage Company (UDC) at WWTP ● Preparation of broacher and video for introducing WWTP to visitors
Capacity Development for O&M Supervision at WWTP	● O&M supervision by SCFC staff at WWTP ● Preparation and application of O&M guidelines ● Capacity building: O&M supervision for mechanical and electrical equipment ● Capacity building: water quality and sludge quality analysis ● Capacity building: troubleshooting ● Detailing particular conditions of subcontract documents for O&M works done by UDC at WWTP ● Preparation and application of unified reporting formats to be submitted by UDC ● Improvement of O&M methods for WWTP equipment ● Preparation of WWTP equipment inventory for management of O&M ● Introduction of energy saving activities ● Proposals for feedbacks on design of WWTP in view of O&M experienced

Source: Report on Project for Capacity Development on Sewerage Management in Ho Chi Minh City, JICA/MLIT, 2010

3) Strengthening of Operation and Maintenance for Sewerage Facilities in Hanoi City (2010)

The sewerage facilities under the management of HSDC are still limited to the WWTPs such as Kim Lien (3,700 m3/day), Truc Bach (2,500 m3/day) and North Thang Long (42,000 m3/day), which cover less than 10% of the required urban sewerage service in Hanoi City. At present, Yen So WWTP with a capacity of 200,000 m3/day is nearly completion, followed by Thong Nhat Park (Bay Mau Lake: 13,300 m3/day), Yen Xa (270,000 m3/day) and Phu Do (84,000 m3/day) in the succeeding 5 to 10 years. It is recognized accordingly that the capacity development for HSDC to manage O&M for the sewerage system with the WWTPs needed be accelerated.

The captioned technical cooperation study covered the following subjects to provide recommendations and advises for HSDC to strengthen its management capability for the O&M.

- Review of HSDC's O&M performance and plan for operating WWTPs (Kim Lien, Truc Bach and North Thang Long) and Yen So storm water pumping station
- Advices for HSDC to improve and strengthen the management the sewerage services, including (a) sewerage network expansion in North Thang Long, (b) introduction of a remote monitoring and centralized control system for the sewerage system, and (c) technical issues identified on the O&M for the sewerage system
- Advices for HSDC to organize a technical transfer program to other cities being developed with sewerage infrastructure
- Presentation for HSDC regarding the models of sewerage projects with public-private partnership (PPP) and preparation of a roadmap for future introduction of PPP to sewerage project in Hanoi City through consultations with HSDC

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