MINISTRY OF LAND MANAGEMENT, URBAN
PLANNING AND CONSTRUCTION (MLMUPC)
ROYAL GOVERNMENT OF CAMBODIA

JAPAN INTERNATIONAL
COOPERATION AGENCY (JICA)

THE STUDY ON NATIONAL INTEGRATED STRATEGY OF COASTAL AREA AND MASTER PLAN OF SIHANOUK-VILLE FOR SUSTAINABLE DEVELOPMENT

FINAL REPORT

BOOK II

MASTER PLAN FOR PREAH SIHANOUK AND DEVELOPMENT STRATEGY FOR KAMPOT

CiCaDs
Cambodia Integrated Coastal Area Development Strategies

NOVEMBER 2010

NIPPON KOEI CO., LTD.
KRI INTERNATIONAL CORP.
VALUE PLANNING INTERNATIONAL, INC.

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PREFACE

In response to a request from the Royal Government of Cambodia (RGC), the Government of Japan decided to conduct “The Study on National Integrated Strategy of Coastal Area and Master Plan of Sihanouk-ville for Sustainable Development”, and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA selected and dispatched a Study Team headed by Mr. YAMADA Koji of Nippon Koei Co., Ltd. to Cambodia between March 2009 and June 2010.

In cooperation with RGC, the JICA study team conducted field surveys and formulated the National Integrated Strategy of Coastal Area and Master Plan of Sihanouk-viile, through discussions with concerned officials of RGC. Upon returning to Japan, the JICA study team conducted further studies and prepared this final report.

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

Finally, I wish to express my sincere appreciation for all the official concerned of RGC and other experts for their close cooperation and assistance extended to the study team.

November 2010

Kiyofumi KONISHI

Director General

Economic Infrastructure Department

Japan International Cooperation Agency

November 2010

Mr. Kiyofumi KONISHI

Director General, Economic Infrastructure Department

Japan International Cooperation Agency

Tokyo, Japan

Subject: Letter of Transmittal

Dear Sir,

We are pleased to submit herewith the Final Report of "The Study on National Integrated Strategy of Coastal Area and Master Plan of Sihanouk-ville for Sustainable Development". This study was conducted by Nippon Koei Co., Ltd. in association with KRI International Corp and Value Planning International Inc., under a contract to JICA during the period from March 2009 to September 2010. The report comprises a Summary and Main Report for the National Strategy of Coastal Area (as Book I), plus a Summary and Main Report for the Master Plan of Sihanouk-ville (as Book II).

The report proposes strategies and recommends implementation plans to achieve the well-balanced and sustainable development in Coastal Area of Cambodia. These recommendations reflect the results of National Integrated Strategy of Coastal Area and the Master Plan of Sihanouk-ville.

We would like to take this opportunity to express our sincere gratitude to your Agency, Ministry of Foreign Affairs of Japan, JICA Cambodia Office, the Embassy of Japan, and the Royal Government of Cambodia including the main counterpart, Ministry of Land Management, Urban Planning and Construction (MLMUPC) and all the other concerned organizations those who rendered unstinting assistance to JICA Study Team through the study period. The Final Report is the fruit of excellent collaboration between all participants in this study.

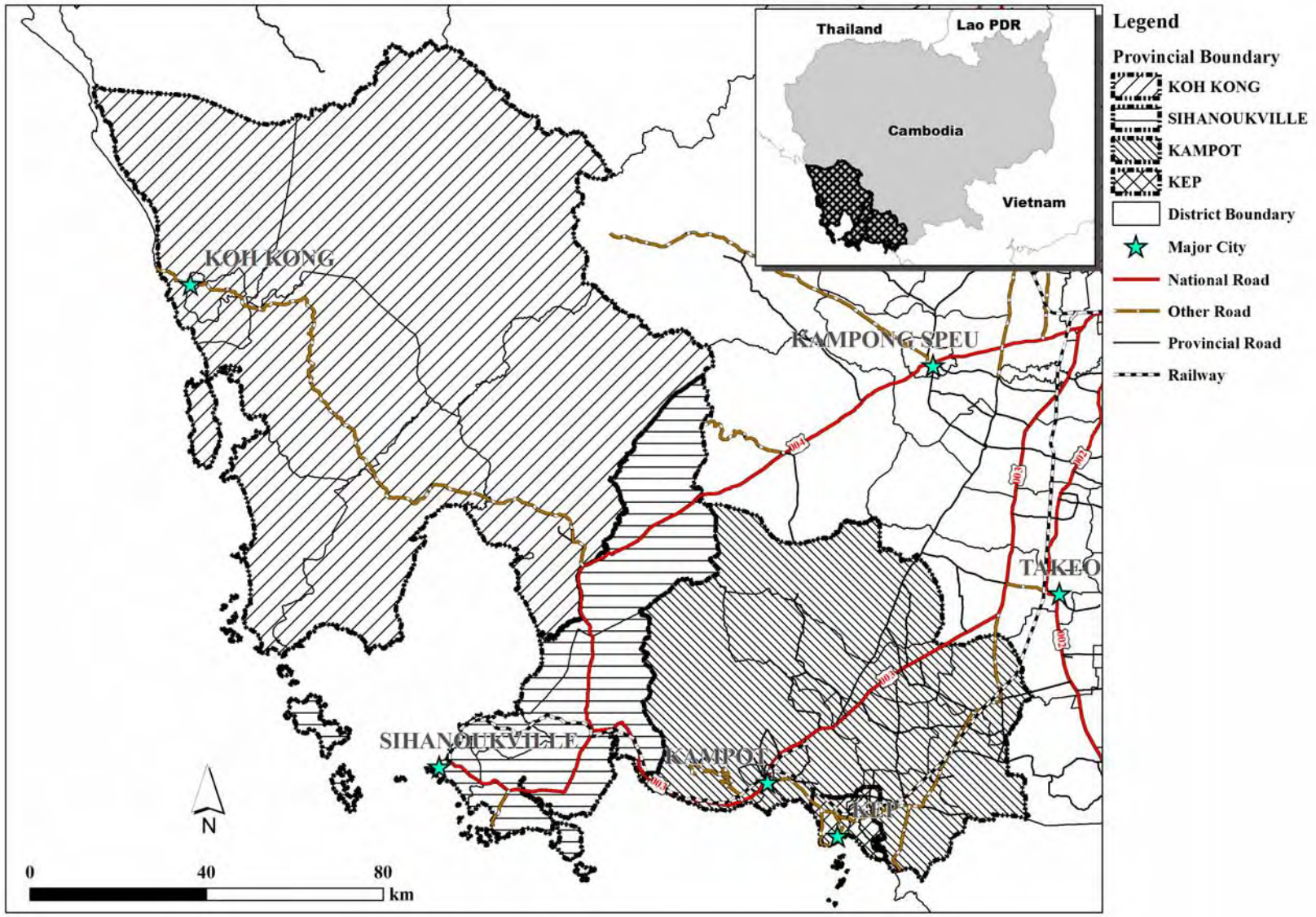
Yours faithfully,

YAMADA Koji

Team Leader, JICA Study Team

The Study on National Integrated Strategy of Coastal Area and Master Plan of Sihanouk-ville for Sustainable Development

Location Map



Executive Summary

1. Background: Numbers of projects have been developed recently without substantial urban development plan and management in Coastal area of Cambodia, which is composed of the four (4) provinces; Preah Sihanouk, Koh Kong, Kep, and Kampot. Some negative aspects have also started to take shape in this region. In order to regulate and control such the uncontrolled developments in Coastal area, a thorough study for sustainable development needs to be carried out.

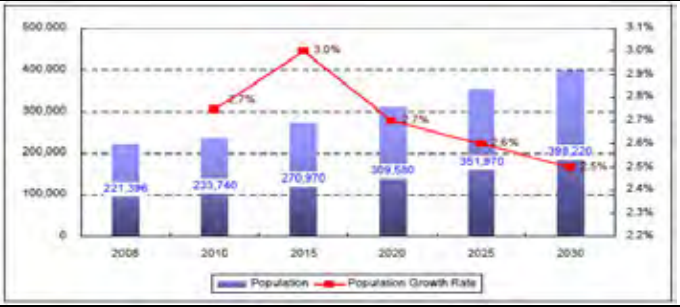
"The Study on National Integrated Strategy of Coastal area and Master Plan of Sihanouk-ville for Sustainable Development", hereinafter called the Study, has been conducted since March 2009 to formulate "the national integrated strategy of Coastal area" and "master plan of Preah Sihanouk for sustainable development", targeting at year of 2030.

This report focuses the Master Plan of Preah Sihanouk and Development Strategy for Kampot.

2. Development Issues in the Present Condition: Summarized as follows:

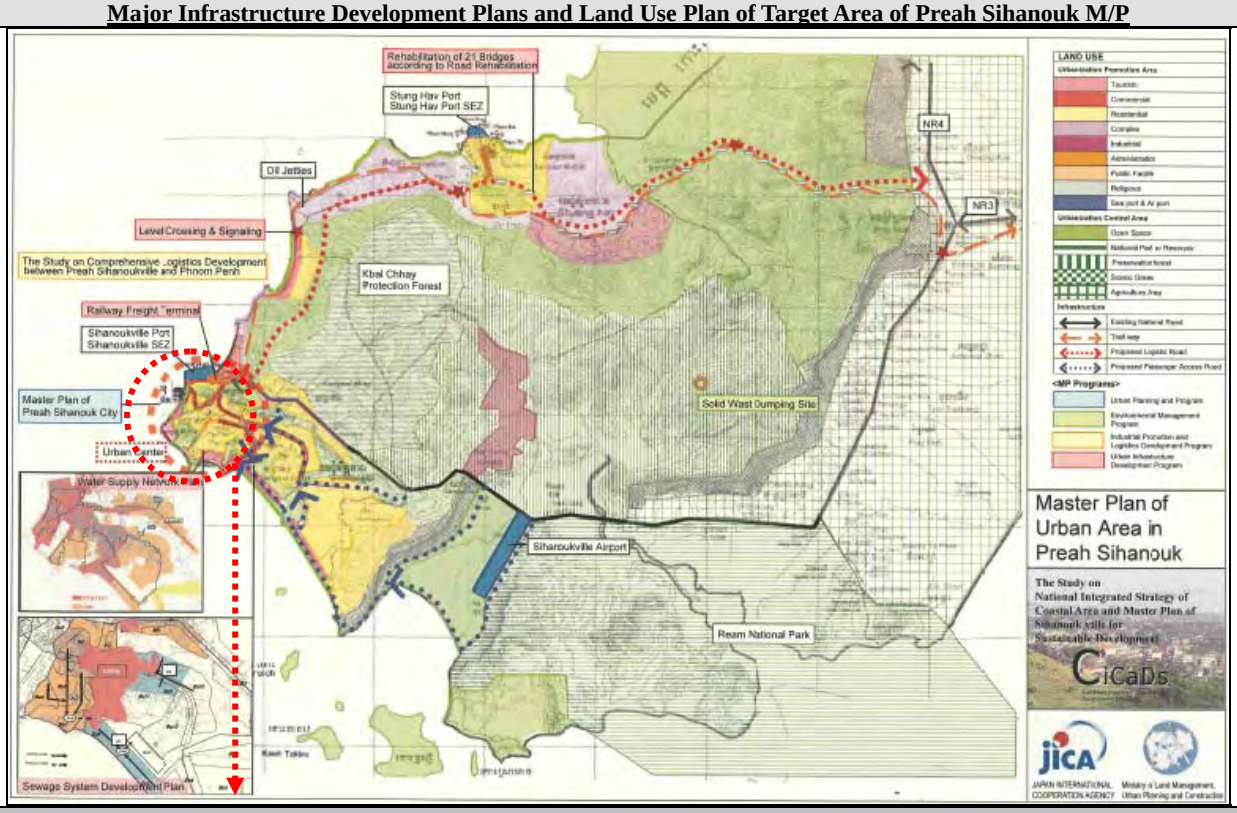
Land Use Condition	Infrastructure
• Urban areas are spreading at fringe area of existing urban areas without proper provision of infrastructure, as the center of the urban area is weak and unclear. • NR No.4 is the sole road network, so all the heavy tracks/trailers, buses and cars for residents and tourists are mixed. • Conservation of two water reservoirs that is important concern on urban land use planning. • Informal settlements are scattered in and around the urban area.	Road: The mixed traffic of heavy vehicles and light vehicles and container trailers' parking on the shoulder of the road lead to traffic accidents on NR. No.4. Railway: Delay of the on-going rehabilitation project by ADB, and needs for further improvement after this projects for the safe and stable railway transportation. Port: Inconsistent development plans of ports in Coastal area and competition to Cai Mep Chi Bai Port. Water Supply: Low access rate of urban water supply system and deterioration of existing main pipes and lack of storage facility's capacity. Sewage: Low connection rate and limited service provision due to the lack of government's monitoring system and that connecting to the system is not compulsory. Solid Waste: Low quality of collection and dumping services by the private operator, and urgent needs for constructing a new dumping facility.

3. Master Plan of Preah Sihanouk: Based on the abovementioned development issues, M/P for Preah Sihanouk toward the target year of 2030 have been prepared, as summarized below:

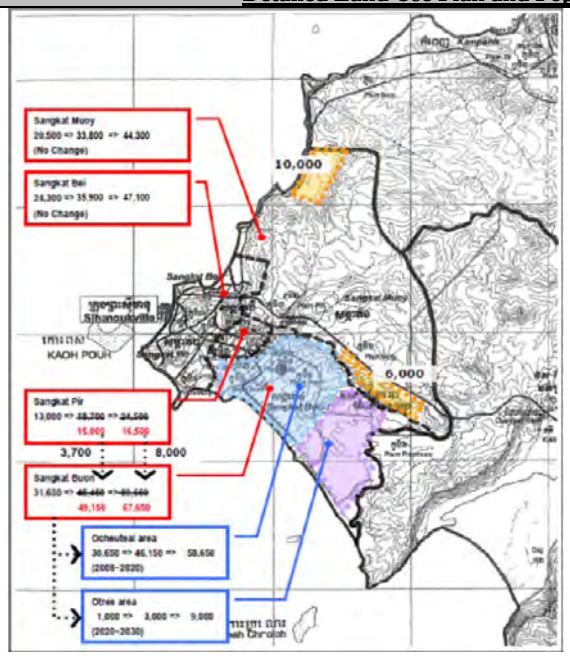
Development Goals	Population Frame of Preah Sihanouk Province for 2030
1. Function as the **National Gateway** of international trade, economies, human resource and technologies; 2. Be a **National Growth Center** with diversified economic activities and urban services; 3. Be the **National Logistic Center** liked with World Markets; 4. Be an **Industrial Center** with modern & non-traditional manufactures and agro-industries; 5. Be an internationally reputable **Marine Resort** harmonized with the most livable environment	

Industrial Promotion Strategies for Preah Sihanouk	
Type of Industries	Industrial Promotion Strategies
Export-oriented Industries	Improvement and Strengthening the SEZ Scheme
	Improvement of the skills of labors and securing labor forces
	Securing competitive and stable electricity
	Creation of industrial cluster by targeting industries to be promoted
Resource-based Industry	Promotion of Fishery via Aquaculture
	Improvement of quality and quantity of agricultural products
Tourism	Promotion of Regional Tourism via establishment of Coastal Area Hotel Association
	Activation of tourists' movement in Preah Sihanouk and Coastal Area

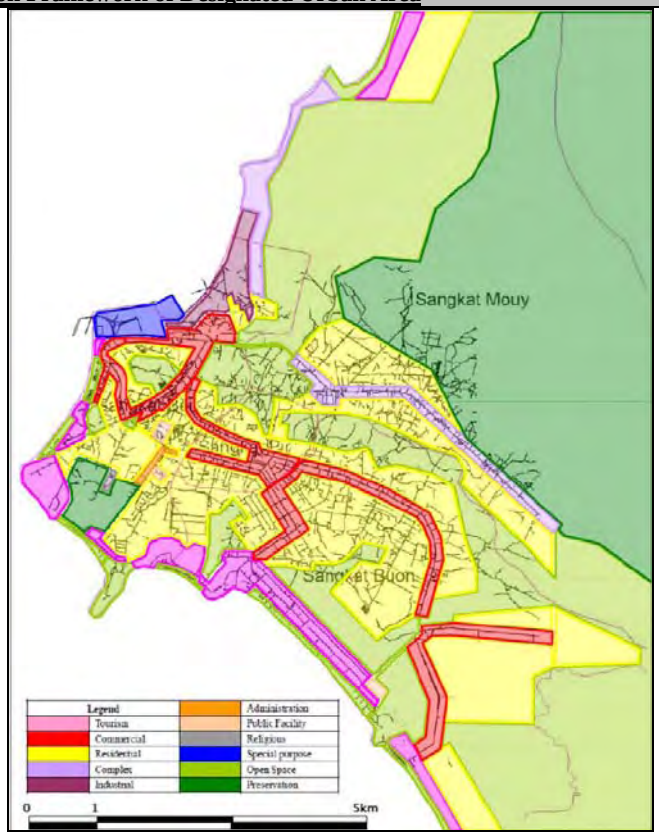
Major Infrastructure Development Plans and Land Use Plan of Target Area of Preah Sihanouk M/P



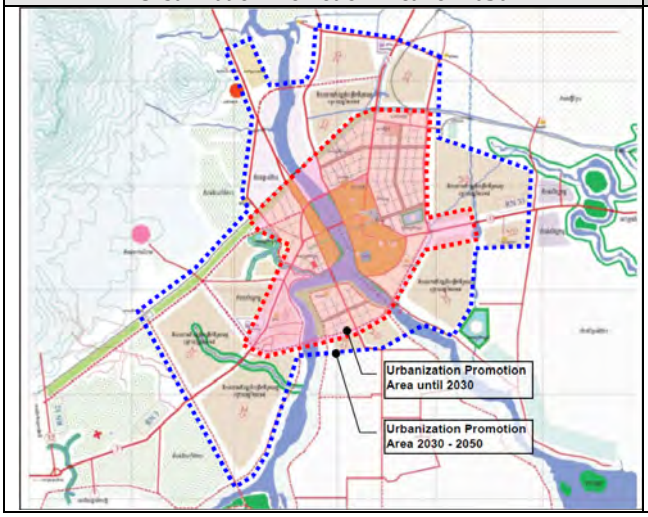
Detailed Land Use Plan and Population Framework of Designated Urban Area



	2008*	2010		2020		2030	
		No.	G/R(%)	No.	G/R(%)	No.	G/R(%)
Sangkat Muoy	20,492	21,700	2.9	33,800	4.5	44,300	2.7
Sangkat Pir	13,041	13,800	2.9	15,000	0.8	16,500	1.0
Sangkat Bei	24,276	25,750	3.0	35,900	3.4	47,100	2.8
Sangkat Buon	31,638	33,550	3.0	49,150	3.9	67,650	3.2
Urban Area	89,447	94,800	3.0	133,850	3.5	175,550	2.7

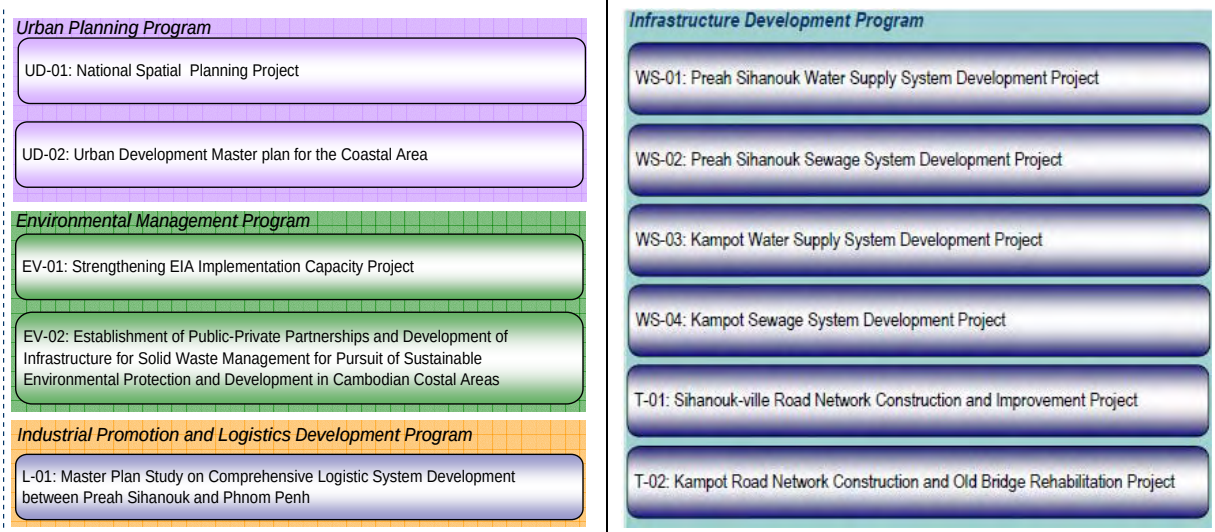


4. Development Strategy for Kampot: Urban Development concepts of Kampot City for the year 2030 are as follows:

Urbanization Promotion Area for 2030	Road Network for 2030
	

5. Priority Projects: The Priority Projects based on the M/P of Preah Sihanouk and Development Strategy of Kampot have been identified as follows:

Priority Projects



The Study on National Integrated Strategy of Coastal Area and Master Plan of Sihanouk-ville for Sustainable Development

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List of Abbreviations

AC	Asbestos Cement
ACHR	Asia Coalition of Housing Rights
ACMECS	Ayeyawady – Chaophraya – Mekong Economic Cooperation Strategy
ADB	Asian Development Bank
AFD	Agence Française de Développement
AIG	Attwood Investment Group
AISP	ASEAN Integration System of Preferences
AJCEP	Agreement on Comprehensive Economic Partnership among Japan and Member States of the ASEAN
APO	ASEAN Productivity Organization
ASEAN	Association of South-East Asian Nations
ATC	Agreement on Textiles and Clothing
BAAC	Bank for Agriculture and Agriculture Cooperatives
BOT	Build-Operate-Transfer
CAA	Cambodia Angkor Air
CAPCB	Coastal Area Program Coordination Body
CCBEN	Cambodia Community Based Ecotourism Network
CCU	Coastal Coordinating Unit
CDC	Council for the Development of Cambodia
CDF	Community Development Found
CEDAC	Centre d'Etude et de Developpement Agricole Cambodgien
CFS	Container Freight Station
CI	Conservation International
CIB	Cambodian Investment Board
CIPP	Context, Input, Process and Product
CLP	Council of Land Policies
CMDGs	Cambodia Millennium Development Goals
CMP	Community Mortgage Program
CMT	cut, make, and trim
CNR	Cambodian National Railway
CNRO	Cambodian National Right Organization
CODI	Community Organization Development Institute
COM	Council of Ministers
COP9	Ninth Conference of the Parties
CPMEC	Chamber of Professional and Micro-Enterprises of Cambodia
CR	Cambodia Riel
CRC	Conditional Registration Certificates
CSEZB	Cambodian Special Economic Zone Board
D&D	Distribution & Deconcentration

DLMUPCC	Department of Land Management, Urban Planning, Construction and Cadastre
DOE	Department of Environment
DPWT	Department of Public Works and Transport
DTIS2007	Cambodia's 2007 Trade Integration Strategy
EEA	Environmental Examination Application
EEZ	Economic Exclusive Zone
EIA	Environmental Impact Assessment
EIC	Economic Institute of Cambodia
ELC	Economic Land Concessions
EMCZ	Environmental Management in the Coastal Zone-Cambodia
EMP	Environmental Management Plan
EPA	Economic Partnership Agreement
FDI	Foreign Direct Investment
EWEC	East-West Economic Corridor
FCL	Full Container Load
FiA	Fishery Administration
FiAC	Fishery Administration Cantonment
FoA	Forest Administration
FoAC	Forestry Administration Cantonment
FRC	Final Registration Certificate
FTA	Free Trade Agreements
GARs	Gross Attendance Rations
GCI	Growth Competitiveness Index
GDCC	Government-Development Partner Coordination Committee
GDCE	General Department of Customs and Excise
GIS	Geographic Information System
GMS	Greater Mekong Sub-region
GOJ	Government of Japan
GSP	Generalized Tariff Preferences
HBC	Hospitality Business Collage or Center
ICD	Inland Container Depot
IDRC	International Development Research Center
ILO	International Labor Organization
IEAT	Industrial Estate Authority of Thailand
IEIA	Initial Environmental Impact Assessment
IMF	International Monetary Fund
IRC	Inter-Ministerial Resettlement Committee
JICA	Japan International Cooperation Agency
KKSEZ	Koh Kong SEZ
KKVC	Koh Kong Provincial Vocational Center
KPI	Key Performance Indicators
LACRM	Local Area Coastal Resource Management Plan
LCL	Less than Container Load

LDC	Least Developed Country
LOI	Law on Investment
MADeC	Marine Aquaculture Development Center
MAFF	Ministry of Agriculture, Forestry and Fisheries
MEA	Millennium Ecosystem Assessment
MEF	Ministry of Economy and Finance
MFA	Multi Fiber Agreement
MFIs	Micro-Finance Institutions
MFN	Most Favored Nations
MIME	Ministry of Industry, Mines and Energy
MLMUPC	Ministry of Land Management, Urban Planning, and Construction
MLVT	Ministry of Labor and Vocational Training
MOC	Ministry of Commerce
MOE	Ministry of Environment
MOI	Ministry of Interior
MOWRAM	Ministry of Water Resources and Meteorology
MOT	Ministry of Tourism
MPWT	Ministry of Public Works and Transportation
MRD	Ministry of Rural Development
MRICOP	Mong Reththy Investment Cambodia Oil Palm Co., Ltd.
NAALD	National Authority for Addressing Land Disputes
NARs	Net Attendance Ratios
NAOL	National Agency for Occupations and Labor
NCAK	National Collage of Agriculture, Kampot
NCDD	National Committee for Sun-National Democratic Development
NCLMUPC	National Committee of Land Management, Urban Planning and Construction
NCSC	National Coastal Steering Committee
NESDB	National Economic and Social Development Board
NGO	Non-governmental Organization
NIS	National Institute of Statistics
NPRS	National Poverty Reduction Strategy
NRML	Natural Resource Management and Livelihood Programme
NSDP	National Strategic Development Plan
NSEC	North-South Economic Corridor
OCOP	One Community, One Product
ODA	Official Development Assistance
OVOP	One Village One Product
OWOP	One Workshop, One Product
PAS	Port Authority of Sihanoukville
PAT	Port Authority of Thailand
PIPs	Public Investment Program
PMIS	Provinces-Municipalities

PMED	Provincial-Municipal Environmental Department
PPP	Public-Private Partnership
PRRO	Provincial Rural Road Office
QIP	Qualified Investment Project
RDB	Rural Development Bank of Cambodia
RGC	Royal Government of Cambodia
RHC	Reproductive Health Association of Cambodia
S/C	Steering Committee
SD-ELC	Sub-Decree (RGC) No. 146 ANK/BK on Economic Land Concessions
SEC	Southern Economic Corridor
SEDP	Socio-Economic Development Plan
SEZ	Special Economic Zone
SHM	Stakeholder Meeting
SLMC	State Land Management Committee
SLWG	State Land Working Group
SMEs	small- and medium-scale enterprises
SPZ	Special Promotion Zone
SRT	State Railway of Thailand
SUPF	Solidarity for Urban Poor Federation
SWAp	Sector Wide Approach
SWSA	Sihanoukville Water Supply Authority
SWM	Solid Waste Management
TDSP	Trade Development Support Program
TEEF	The Economics of Ecosystems and Biodiversity
TFR	Total Fertility Rate
TPC	Thaneakea Phum (Cambodia) Ltd.
TSS	Total Suspended Solid
UCDO	Urban Community Development Office
UNDP	United Nations Development Programme
UPDF	Urban Poor Development Fund
USD	US dollar
VAT	Value Added Tax
WB	World Bank
WEF	World Economic Forum
W/G	Working Group
WTO	World Trade Organization
3R	Reduce, Reuse and Recycle

Exchange Rate

(As of November 30, 2009)

USD1.00 = JPY 87.8

CHAPTER 1: INTRODUCTION

1.1 Background of the Study

The Mekong Region is a focus of Japanese ODA assistance in the recent years. In 2007, the Government of Japan (GOJ) adopted a new concept for the partnership between the Mekong Region and Japan, which focused primarily on the three pillars;

- Reinforcing regional integration; Japan will contribute to strengthen ASEAN's integration and relations among the countries in the Mekong region through well-balanced development of the region.
- Attaining sustainable economic growth; With a view to vitalizing the economic potential of the Mekong region for the whole of Asia, Japan will, in addition to economic cooperation, support facilitating trade, investment and the exchange of people in the region to achieve region-wide sustainable economic growth.
- Harmonizing with the environment; Recognizing the natural richness of the Mekong region, Japan will pay due consideration to orderly development and environmental conservation.

Cambodia is an important country constituting the southern part of the Mekong Region. As it lies between Thailand and Vietnam, Cambodia constitutes a central part of the coastal area facing the Gulf connecting to Thailand and Vietnam. Coastal area of Cambodia thus finds its strategic location on the development corridor connecting Bangkok on the west, Phnom Penh in the center, and Ho Chi Minh on the east, which is often called the Southern Economic Corridor.

The importance of Coastal area to the Cambodian economy lies primarily in the fact that it accommodates the nation’s only deep seaport, Sihanoukville Port. GOJ has been assisting the improvement and expansion of this seaport with Japanese ODA loans so as to facilitate Cambodia with modernized, efficient seaport as the gateway to the world for international trades.

Another important factor of Coastal area of Cambodia is the connection to Phnom Penh, the Capital area of Cambodia. The areas encompassing Sihanouk and Phnom Penh were studied in depth in the 2003 JICA Study, Phnom Penh Sihanoukville Growth Corridor Study. As the two growth centers at Sihanouk and Phnom Penh were the fastest growing regions of Cambodia powering the economic growth of Cambodia, this study denoted the region as “the Growth Corridor of Cambodia”, and proposed the regional development strategies including the development of Special Economic Zone (SEZ) in conjunction with the Sihanoukville Port. This SEZ has been positively supported under the Japanese ODA programs, and the construction will start soon.

While development activities related to international trades have been active in Coastal area, some negative aspects also started to take shape. In Preah Sihanouk City (formerly called Sihanoukville), a number of developers started for formulate numerous development projects, and development projects started to rip off greenery on the hills and pollute water with mud and affluent. In order to regulate

and control development projects in Coastal area of Cambodia, a through study of the region for sustainable development and conservation needs to be carried out. Also, in urban areas susceptible to uncontrolled development needs to have urban master plans in effect.

In 2008, RGC made an official request to GOJ to carry out this study to counter the aforementioned issues, and GOJ decided to adopt this request, and Japan International Cooperation Agency (JICA) dispatched a preliminary study mission to Cambodia in 2008, and agreed upon the scope of work for this project in December 2008.

1.2 Objectives of the Study

1.2.1 Objectives of the Study

The Study on National Integrated Strategy of Coastal area and Master Plan of Sihanouk-ville for Sustainable Development, hereinafter called the Study, ha the following objectives;

1) to formulate the national integrated strategy of Coastal area and master plan of Preah Sihanouk for sustainable development, targeting at year of 2030

2) to formulate capacity development plan for governments including the Ministry of Land Management, Urban Planning, and Construction (MLMUPC), and the provinces on regional development, through examination of the systems and institutions to enhance the effectiveness of the master plans of Preah Sihanouk and other cities in Cambodia

1.2.2 Outputs of the Study

The outputs of the Study are;

1) national integrated strategy of Coastal area for sustainable development including the strategies of industrial development, infrastructure development, environmental management, and development for core cities in Coastal area

2) master plan of Sihanouk-ville including the plans of land use, infrastructure development, etc. which target year is 2030

3) capacity development plan including drafts of training program, institutions improvement, organizations improvement, etc.

This report, Book II, describes mostly the item 2) of the above outputs of the Study.

1.3 Study Area for Book II

The Study Area of Book II is Sihanouk-Ville, with a focus on the urban area of it. Also, Kampot City was selected as a regional core city in the Interim Report, and therefore development strategies for the city will be studied together with considerations for infrastructure development.

1.4 Implementation Arrangement

The executing agency of the Study was set as the Ministry of Land Management, Urban Planning and Construction (MLMUPC), together with the four provi

nces. MLMUPC is the ministry in charge of establishing and enforcing the urban planning and land management. Accordingly the Steering Committee (S/C) was established under the chairmanship of Secretary of State for MLMUPC.

1.5 Work Progress

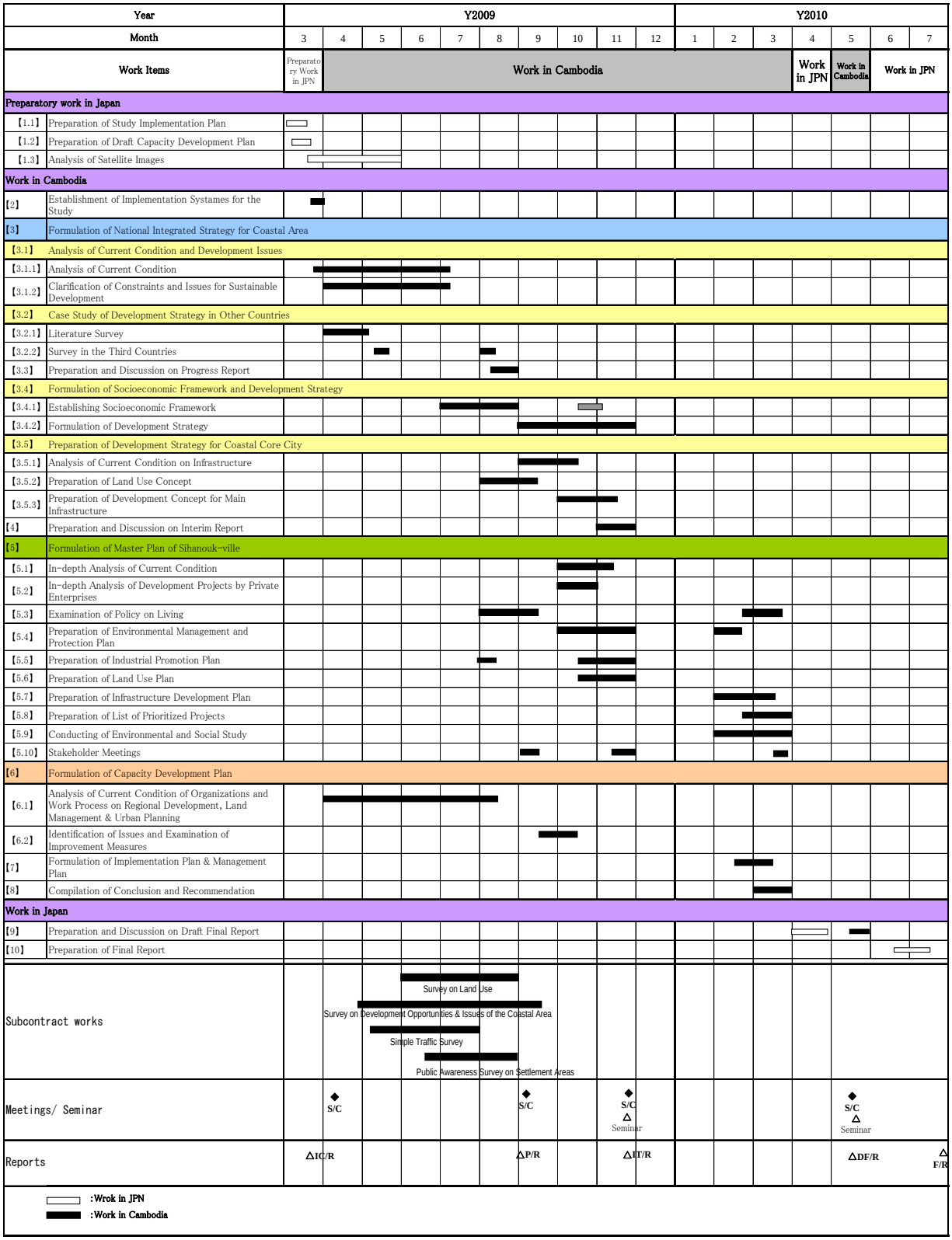
A team to carry out this study (JICA Study Team), consisting of experts in relevant fields, was dispatched by JICA to Cambodia in March 2009, the first S/C was held in Phnom Penh on 30th March 2009.

Progress Report which summarized the findings and issues related to Coastal area was prepared to make the basis for the planning, and discuss basic framework for planning. In September 2009, the Progress Report was submitted to the Cambodian side, and on 3rd September 2009, the second S/C was held in Phnom Penh on the subject of this Report.

Interim Report was compiled to present the study summary up to the interim point of the Study in November 2009, and the third S/C and the first Seminar were held in November on this subject.

In May 2010, JICA Study Team prepared Draft Final Report, composed of Book1 and Book2, and the Report was submitted to MLMUPC at the fourth S/C, which was held in the end of May 2010. The second Seminar was also held at the same timing.

At the end of the study period, Final Report is submitted to MLMUPC through JICA in September 2010.



Source: JICA Study Team

Figure 1.5.1 Work Schedule

CHAPTER 2: ISSUES IN THE PRESENT CONDITIONS OF PREAH SIHANOUK

2.1 Socio Economic Condition

According to the 2008 census, the total population in Preah Sihanouk province was 221,396, of which 40.6% lived in urban area. Out of the total population in the province, 32.4% (71,699) was under 15 years of age. Working age population (age between 15 and 64) was 145,862 or 65.9% of the population.

The economically active segment of the population (employed population + unemployed population) was 102,290, which accounted for 46.2% of the total population in the province. Population density of the province was 230/km^2, which was considerably higher than the national average of 56/km^2.

Population of the Preah Sihanouk province has increased by 2.6% per annum between 1998 and 2008. During the same period, the number of labor force in the Study area has increased more rapidly from 56,346 in 1998 to 101,739 in 2008 with an annual average increase rate of 6.1% (see Table 2.1.1).

Table 2.1.1 Changes in Population and Labor Force in the Study Area

	Population			Labor Force
	Urban	Rural	Total	
Census 1998	66,723	103,932	170,655	56,346
Census 2008	89,846	131,550	221,396	101,739
Annual Growth Rate (98-08)	3.0%	2.4%	2.6%	6.1%

Source: CENSUS 1998 and 2008, NIS

Such a rapid increase in the labor force was attributed to four (4) main factors; namely 1) an increase in the total population, 2) an increase in the percentage of working age population to total population (54.6% -> 65.9%), 3) an increase in the labor force participation rate[1] (57.3% -> 69.3%), and 4) a decrease in the crude unemployment rate (8.2% -> 2.1%).

Particularly the labor force participation rate of female population in Preah Sihanouk province was considerably lower than the other provinces in 1998 (Preah Sihanouk 40.5%; National Average 71.9%). Such this tendency, however, has been ameliorated during the past decade (from 40.5% in 1998 to 60.3% in 2008). Also the high female's crude unemployment rate has decreased from 10.5% in 1998 to 2.7% in 2008. Female's participation in economic activities was one of the major contributors for the labor supply expansion.

[1] Labor force participation rate refer to the ratio of labor for aged more than 15 to the total population of the same age group.

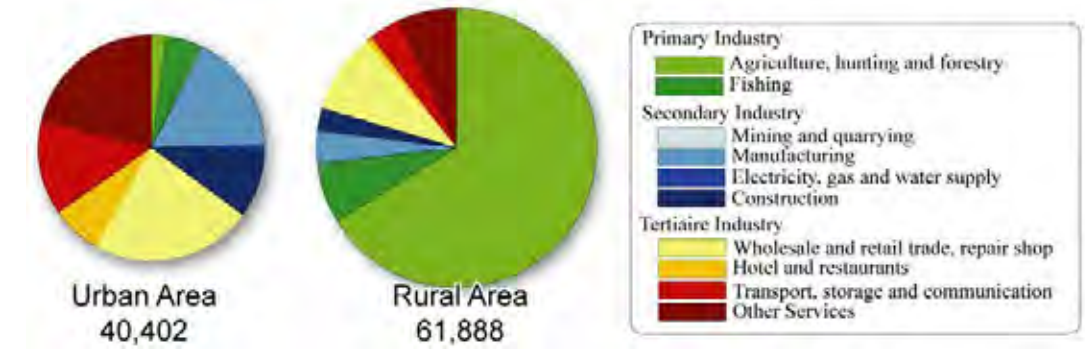
Figure 2.1.1 illustrates the labor force in the urban and rural areas of Preah Sihanouk province by industry in 2008. The dependency on agricultural sector in absorbing labor force was relatively low in Preah Sihanouk province. The labor force engaged in agriculture sector accounted for 40.9% of total labor force in the province (2.1% in urban and 66.2% in rural area), which was significantly lower than the national average (71.0%) as well as the coastal provinces average (70.6%).

In the case of rural area of Kampot province, where there are vast paddy fields in the level and fertile alluvial plain, 89.5% of labor force was engaged in agriculture. Also, 75% of labor force living in Kep province was engaged on agriculture.

Compared with other provinces, fishery plays an important roll in Preah Sihanouk province. About 5.2% of labor force in the urban and 6.9% of labor force in the rural area was engaged in the fishery sector.

In Preah Sihanouk province, secondary sector plays an important roll in the economy, absorbing 14.9% of labor force, which was much higher than the national average (8.6%) as well as the coastal provinces average (5.8%). Manufacturing sector absorbed 9,131 labor force in the province, which included wearing apparel 4,985, food product 1,029, leather and related product 777, furniture 444, fabricated metal products, except machinery 314 and so on.

The tertiary industry absorbed about 38.0% of labor force of the province (64.9% in urban area and 20.4% in rural area). In the urban area of Preah Sihanouk, transport sector and tourism related sector (hotel and restaurant) are well developed, occupying 13.6% and 7.3% of the total labor force, respectively.



Source: 2008 Population Census, NIS

Figure 2.1.1 Labor Force of Urban and Rural Area of Preah Sihanouk Province, by Industry in 2008

2.2 Urban Planning

2.2.1 Brief History of Preah Sihanouk City

The port city in the Preah Sihanouk Province was formerly named *Kompong Som*. Later the name of the city was changed to Sihanoukville in commemoration of the King in 1990's. Recently, due to the change in the administrative boundary and definition, now it is proper to name it Sihanouk City, as the urban part of the Preah Sihanouk Province is denoted City now.

(1) Birth of a New City[2]

Before 1954 Cambodia depended its on the Mekong River for international sea trade, but the independence left the Mekong Delta in the territory of Vietnam. In pursuit of direct sea access, Kampong Som was selected as the site for a seaport, due mainly to water depth along the shore and access to the capital.

In 1959, a plan for the port and an adjoining town was formulated by the French and the construction of the port was started with the French assistance. For the connection between the new town and the Capital City Phnom Penh, a new road was granted by the United States, which is the NR 4 today.

Between 1955 and 1960, the seaport and a road connecting to Phnom Penh were constructed. The Port was a 290 m long jetty that can accommodate vessels on both sides. The funds for the port came from Australia and those of the road from USA. Upon completion, the town was renamed Sihanoukville in honor of the king, and the road was commissioned as National Route No.4.

(2) Flourishing New City[3]

Successful implementation of the Port put Sihanoukville in a flurry of construction in 1960's. Catching up the neighboring Kep as a holiday destination, hotels and villas were built alongside the scenic Sihanoukville beaches, one notable example being the Independence Hotel (built in 1964, abandoned in 1975) near the Independence Beach. Industries made their way to the vicinity of the Port, with the original Angkor Brewery (operated by the Government 1965 – 75, refurbished for operation in 1991) and a truck and tractor plant. The city flourished and expanded. The second phase of port construction was started in 1965, which produced the New Port with a 350 m long wharf at a 10 m draft. The construction, however, came to a halt with a *coup d'etat* in 1970.

Despite the good start, the city was affected by the civil war from 1970 to 1975, and was abandoned due to the policy of the Khmer Rouge in 1975 to 1979, with much of the infrastructure was left unused.

In 1979, Sihanoukville city was resettled by people who had to leave the city before, but little municipal work was done in those time. The land title then was generally state owned.

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[2] Vann Molyvann, Modern Khmer Cities, Reyum Publishing, Phnom Penh, 2003.

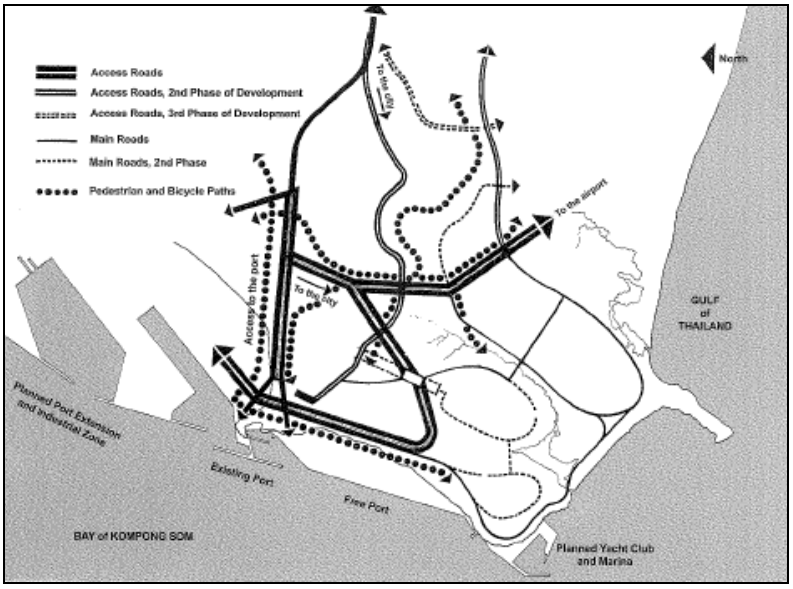
[3] So Sok, Report on Urban Plannign and Urban Development of Sihanouk Ville, Cambodia, Unpublished internal Paper for MLMUPC, 2002.

But a change came when Government transferred the land title from the state to people. People sought land by "land grabbing" and construction was taking place at a rapid and uncontrolled pace. This put the government to reconsider the urban planning policy.

2.2.2 Overview of Urban Planning

(1) First urban master plan of 1959

The first urban master plan of 1959 depicted a city with the population of up to 55 to 60,000. The plan reserved land for the port and its future expansion which is the port area of today, and proposed a town center in the Victory Beach area today, and reserved the southern area along the beach for tourism resort. The urban area envisioned in the plan was very small, about 700 hectares of land.



Source: Vann Molyvann, Modern Khmer Cities

Figure 2.2.1 Road Network Proposed in First Master Plan of Sihanoukville (1959)

(2) Fraser Thomas Study

In 1993, Government implemented a policy of adopting an urban planning strategy and identified Sihanoukville as one of the leading cities for economic recovery of Cambodia. Government adopted a zoning scheme.

A New Zealand consulting firm, the Fraser Thomas were commissioned by the New Zealand Ministry of Foreign Affairs and Trade in April 1995, at the request of the Government of Cambodia to undertake a comprehensive study of the City's future infrastructure needs. The study, completed in December 1995, considered the land use zones and draft Master Plan proposed for the City. It included the analysis of, recommendations for, and the implications of:

- city growth
- water supplies
- waste water drainage

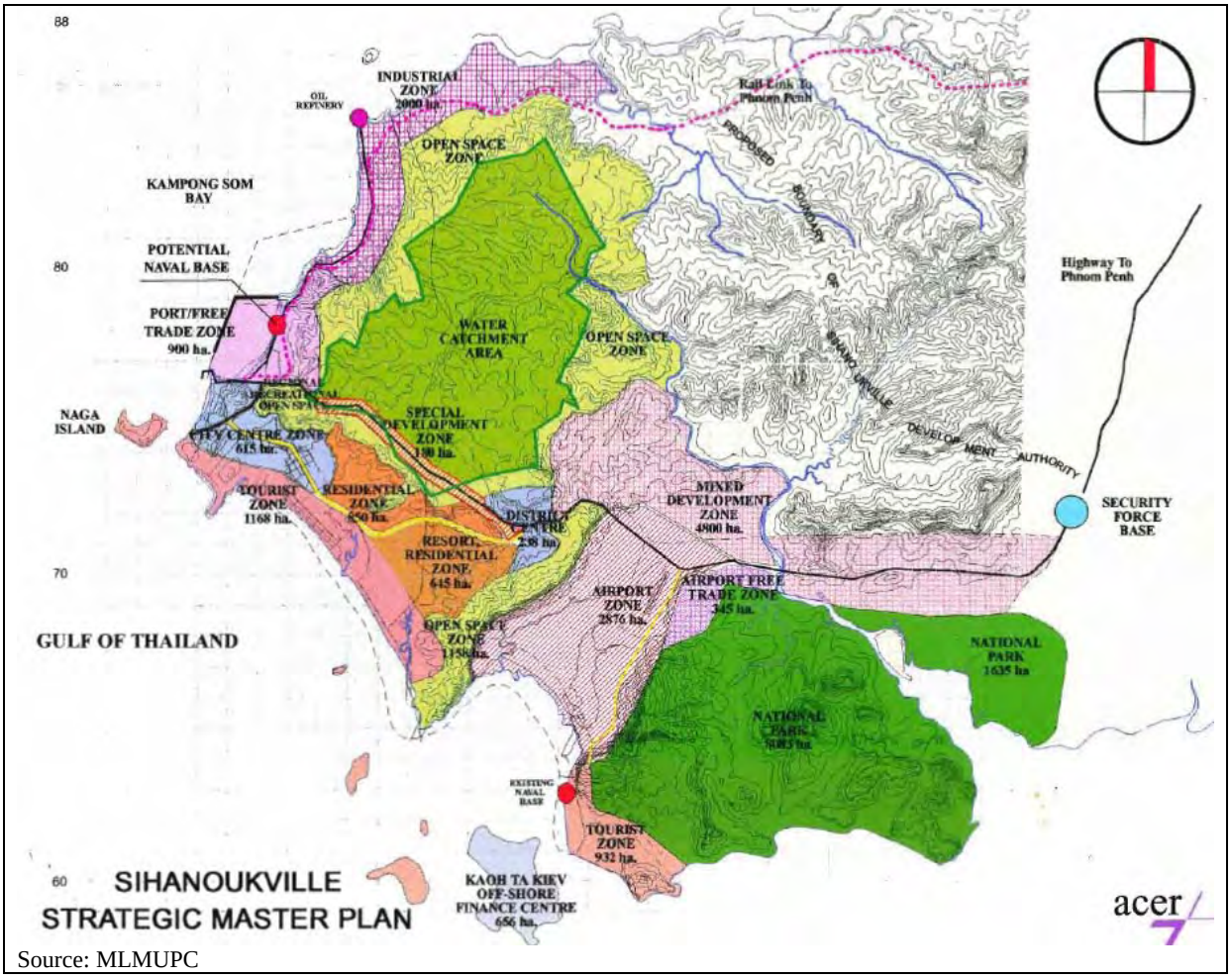
- stormwater drainage
- road network
- solid waste management
- free trade and industrial zones
- water quality management(receiving water standards)

(3) Ariston Study

Just about the same time with the above, a Malaysian investment company Ariston proposed "Sihanoukville Strategic Master Plan, which was prepped by Acer Consultants. The city then was booming, with the population growth at 9% per annum, and the city was projected to grow rapidly. The Ariston Study presumed the target population in 2015 between 220,000 and 270,000, as compared to 47,000 in 1995, when Study was carried out.

The plan gave a broad and strong urban planning vision. The Strategic Plan proposed a large urban area behind the beach resort areas along the coast, and an industrial zone belt from the Port through to Stung Huv area, and Ream and Kbar Chay as green areas, as shown in Figure 2.2.2.

The plan was formulated apparently in exchange with a grant of land concession, but the plan was not officially approved.



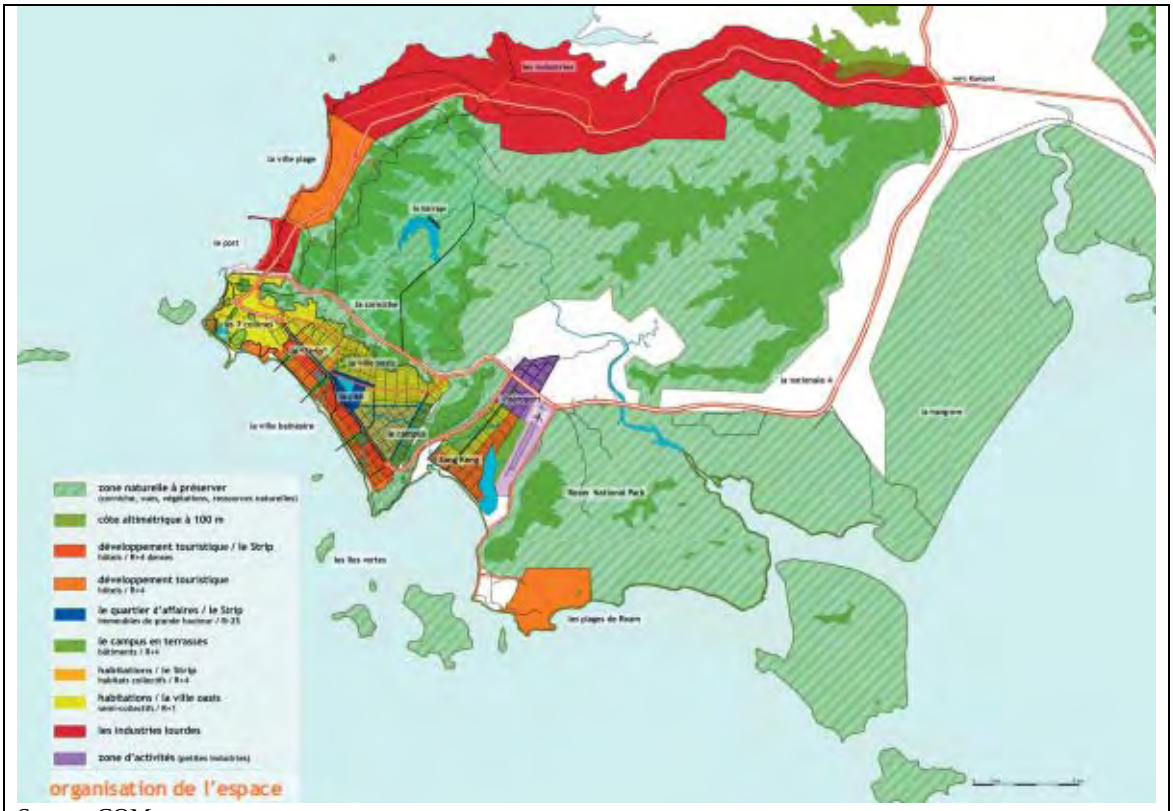
Source: MLMUPC

Figure 2.2.2 Sihanoukville Strategic Master Plan Proposed by Ariston

(4) SCA-Vinci Study

In 2006, a French investment company Vinci together with its domestic airport concessionaire firm SCA carried out a study, "project de schema directeur de Sihanoukville" (Project of Schematic Direction for Sihanoukville) under the Council of Ministers.

The target population is stated to be 700,000 in 2040. The plan seemed to follow the basic structure of urban development from the Ariston study, and elaborated. Southern part of Sihanoukville was residential and resort, extending southeast towards the airport. The industrial belt from the Port to Stung Huv proposed by Ariston before was changed to residential use, and the belt from Stung Huv to Prey Nob along the inland route along the railway was proposed as industrial zone. .



Source: COM

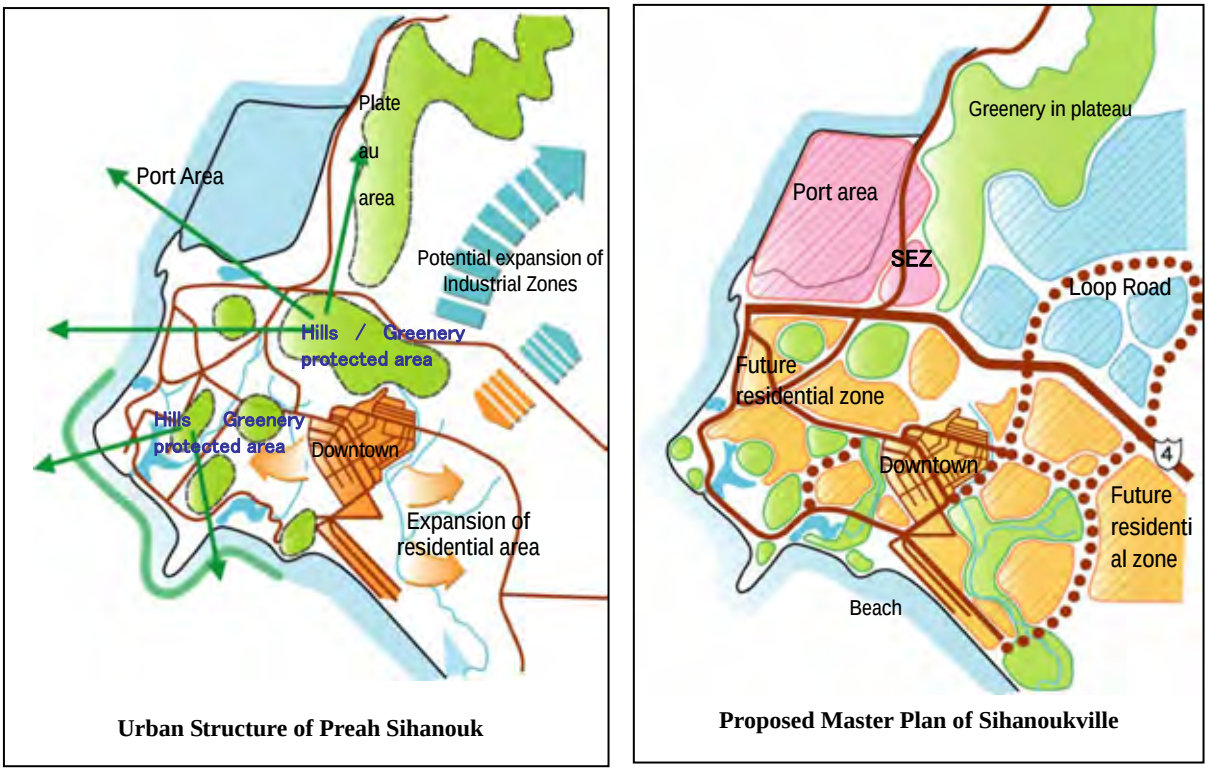
Figure 2.2.3 SCA-Vinci Plan in 2006

This plan has not yet been approved of by the Government, and that thus is not in effect.

(5) Unofficial Urban Plan by DLMUPC

In 2002, Sihanoukville DLMUPCC prepared a paper[4] in which some urban planning proposals and strategies were put together. This paper contains two major works for the urban planning of Sihanoukville. One is "the analysis of city planning", in which the author tried to establish the present and future urban structure of the city. The other is the proposed conceptual master plan for the central part of the city. While the two charts are restricted to a relatively small area in the center of the Sihanouk City, the ideas behind are thoughtful and sound.

[4] So Sok, Report on Urban Planning and Urban Development of Sihanouk Ville, Cambodia, Unpublicized paper, January 2002.



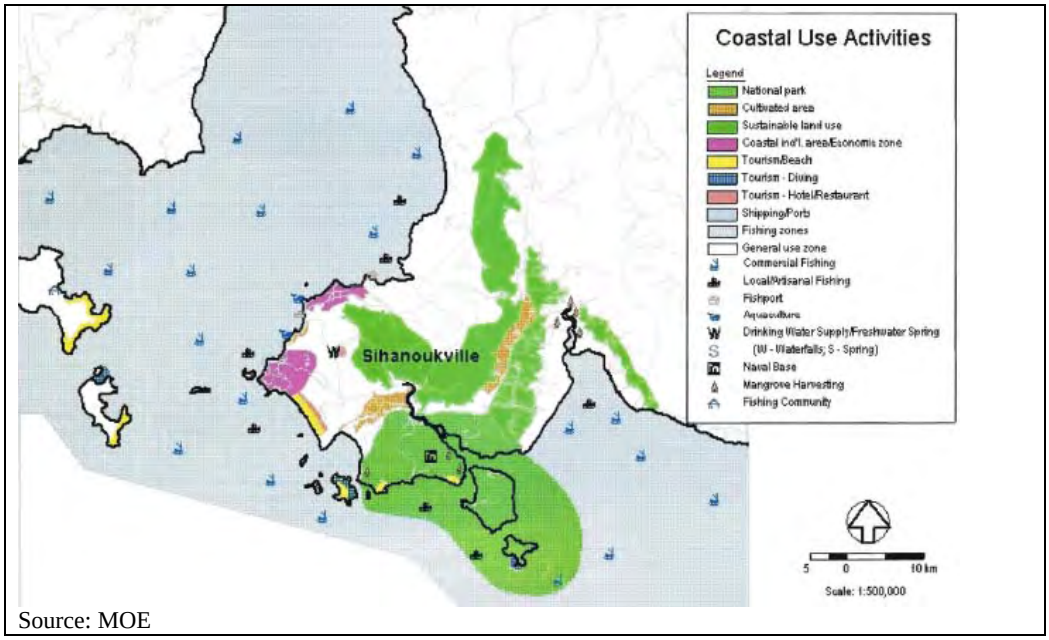
Source: MLMUPC

Figure 2.2.4 Unofficial Urban Plan by DLMUPC

(6) Sihanoukville Coastal Strategy

In 2003, "Sihanoukville Coastal Strategy" was publicized under the Governor of Sihanoukville Municipality. This strategy was formulated for the Sihanoukville Municipality (which had been converted to Province in 2009 with an extended boundary) .with three Districts; Mittapheap, Stung Hav and Prey Nob with a total of 1,283 km2, including a total coastal line of 119.5 km. This strategy was assisted by Regional Programme on Building Partnership in Environmental Management of the Seas of East Asia (PEMSEA) in local stakeholder consultation workshops and the development of the strategy.

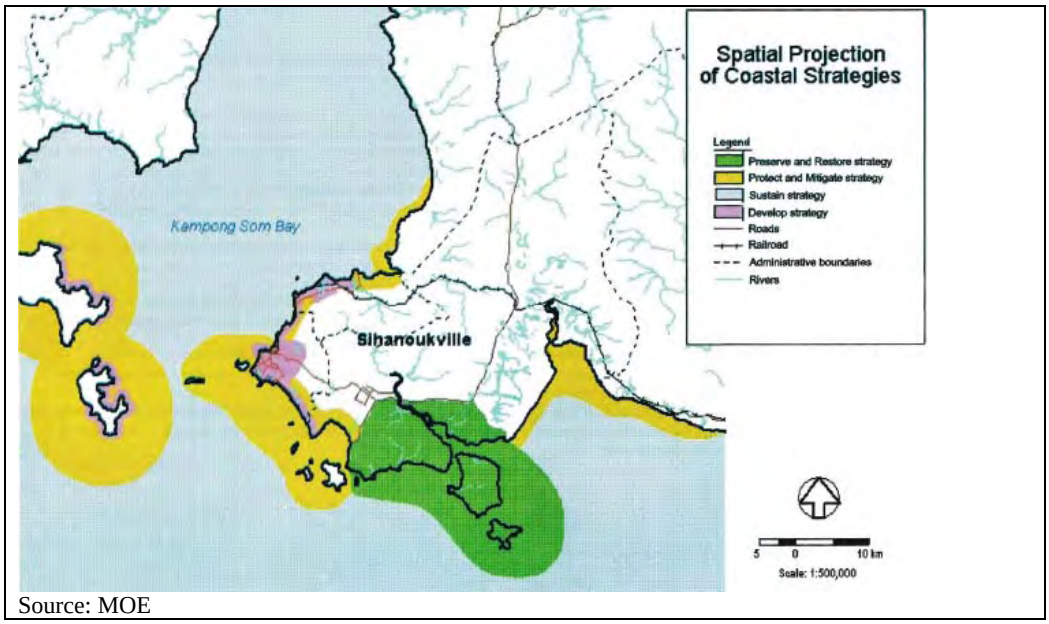
The next figure summarizes the coastal uses or costal values of Sihanoukville, as depicted in the Sihanoukville Coastal Strategy. It is shown that a large area around Ream and areas inside of the peninsula are either national park or sustainable land use with green color. The residential areas stretch mainly along NR4, and resort area along the beach south of Sihanoukville. The area of Mittapheap District and Stung Hav Districts around the ports are either coastal industrial / economic zones shown in pink color.



Source: MOE

Figure 2.2.5 Coastal Use Activities in Sihanoukville Coastal Strategy

The following charts depicts the spatial projection of coastal strategies, in which the areas are categorized in four basic strategies including 1) Preserve and Restore strategy, 2) Protect and Mitigate Strategy, 3) Sustain strategy, and 4) Develop strategy.

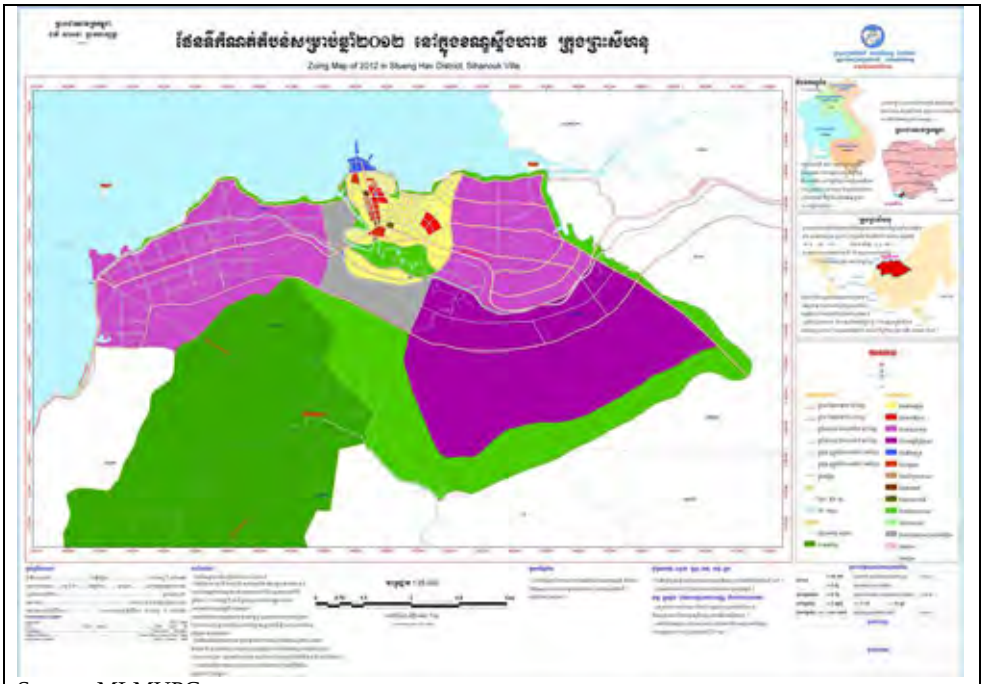


Source: MOE

Figure 2.2.6 Spatial Projection of Coastal Strategies

(7) Land Use Planning for Stueng Hav District by MLMUPC

Stung Hav is a District within Preah Sihanouk Province along the northern coastal line from the Sihanoukville Port. Also, a new road was built by the Government from Sihanoukville Port via Stueng Hav to Prey Nob town along NR4 in the last few years. Among others, there is an approved investment projects for SEZ near the existing village of Stueng Hav, the land use planning focused on balancing the existing natural resources such as mangrove forests and the planned industrial development.



Source: MLMUPC

Figure 2.2.7 Zoning Plan in MLMUPC Land Use Planning for Stueng Hav

(8) Lessons Learnt from Previous Urban Planning Efforts

By reviewing the previous urban planning efforts for Preah Sihanouk City, various lessons could be learnt for the present urban planning of the city. The following summarizes the lessons:

- Center of the city: Although the city is dispersed and somewhat scattered over a wide area, Downtown is the central area, as planned in the first master plan, and elaborated in the Unofficial Urban Plan by DLMUPCC. All the subsequent master plans followed this presumption.
- Preserved area: The protected area is established for the Ream National Park covering the forest and Coastal area south of the Peninsula. Also, the conservation of watershed of the Preak Tuk Sap River, which is the water source for the city river, is generally respected in the planning such as proposed in the Sihanoukville Coastal Strategy, MOE.
- Beaches: All the master plans agreed upon preserving and maintaining the beaches southeast of the city as a belt for beach resorts with hotels and guest houses.

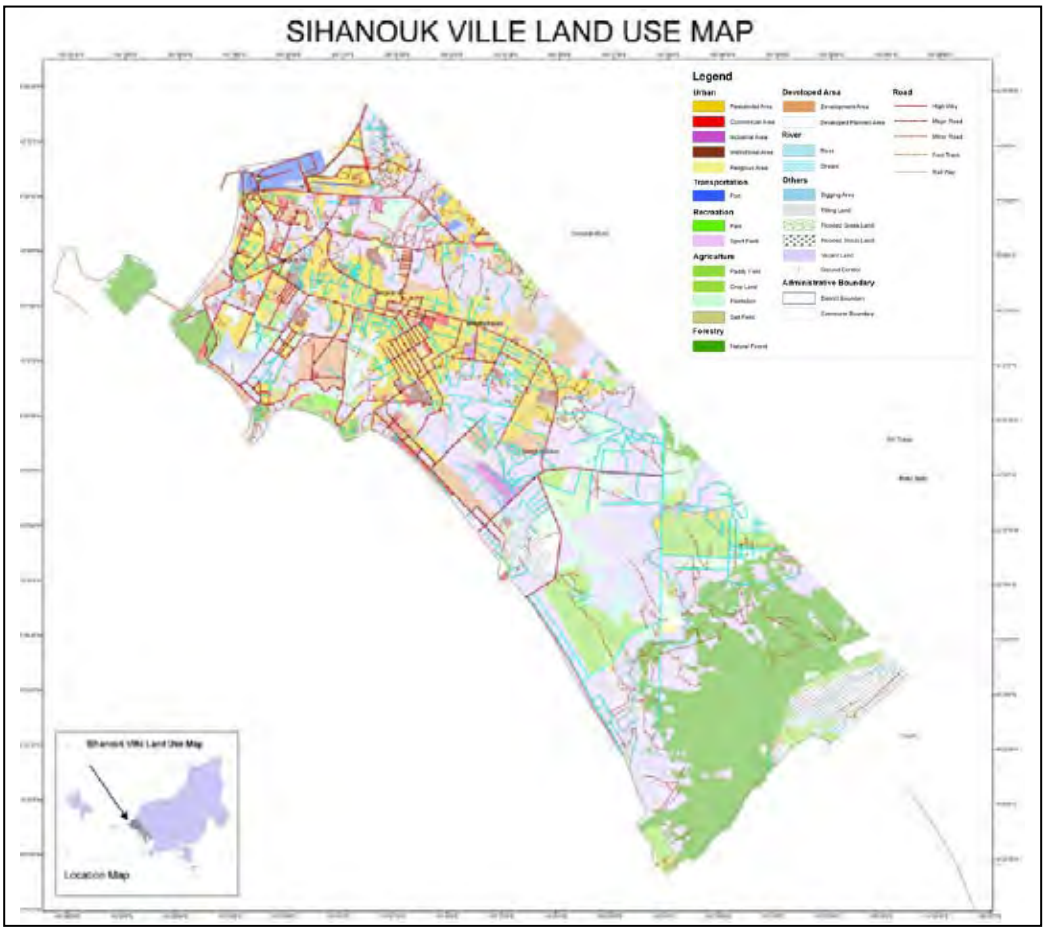
- New industrial corridor: Two of private sector urban master plans, namely, Ariston Plan and SCA/Vinci Plan, looked at the coastal area north of the city around Stung Hav area as a site for a new industrial and mixed development zone. Land Use Planning for Stung Hav District by MLMUPC followed this in principle, allowing for a more detailed and elaborate spatial structure through participatory planning process.

2.2.3 Existing Land Use of Urban District in Preah Sihanouk City

This sector describes the summary of land use analysis based on the result of satellite images interpretation and detailed Land Use Survey by JICA Study Team.

(1) Land Use Map

A detailed mapping of urbanized areas of both Preah Sihanouk City (75km^2) and Kampot City (25km^2) was carried out with the mapping scale of one to ten thousand (1:10,000). The land use map shown below is drawn up by GIS which combined the Quickbird satellite images interpretation having a spatial resolution of approximately 0.6 m together with ground surveys for confirmation. Relevant geographical images such as the road network, administrative boundaries have also been imposed. The following figure shows the detailed land use mapping for the urbanized area of Sihanouk area.



Source: JICA Study Team

Figure 2.2.8 Preah Sihanouk City Land Use Map

(2) Analysis of Present Land Use Area by Commune

The land use area of Urban Communes in Preah Sihanouk City is estimated from the satellite image mapping and ground surveys. Because of the survey area of satellite image, the total area of Sangkat Bei and Sangkat Buon is not exactly the same area of the commune area. The result of the estimation is shown below.

Table 2.2.1 Land Use Area of Three Urban Communes in Preah Sihanouk City

Land Use	Sangkat Bei		Sangkat Buon		Sangkat Pir	
	Area (ha)	(%)	Area (ha)	(%)	Area (ha)	(%)
Residential Area	239.6	22.0	342.8	14.3	124.2	52.6
Commercial Area	30.0	2.8	51.3	2.1	4.5	1.9
Industrial Area	6.3	0.6	25.7	1.1	1.4	0.6
Institutional Area	32.5	3.0	29.0	1.2	11.9	5.1
Religious Area	9.0	0.8	7.1	0.3	4.1	1.7
Port	37.7	3.5	0.0	0.0	0.0	0.0
Park	14.1	1.3	11.4	0.5	0.3	0.1
Sport Field	0.3	0.0	0.1	0.0	0.1	0.0
Development Area	72.2	6.6	155.8	6.5	21.5	9.1
Residential and Crop Land Area	14.1	1.3	26.4	1.1	0.8	0.3
Paddy Field – Irrigated Paddy	0.0	0.0	135.3	5.6	0.0	0.0
Crop Land - TOTAL	27.3	2.5	73.8	3.1	4.4	1.9
Crop Land - Cashew	*8.3*	*0.8*	*18.3*	*0.8*	*0.0*	*0.0*
Crop Land - Maize	*0.0*	*0.0*	*0.5*	*0.0*	*0.0*	*0.0*
Crop Land - Mustard	*0.0*	*0.0*	*15.7*	*0.7*	*2.4*	*1.0*
Crop Land - Jack Fruit	*2.4*	*0.2*	*1.1*	*0.0*	*0.0*	*0.0*
Crop Land - Mango	*6.6*	*0.6*	*6.7*	*0.3*	*0.0*	*0.0*
Crop Land - Mixed	*10.0*	*0.9*	*14.7*	*0.6*	*0.0*	*0.0*
Crop Land – Durain	*0.0*	*0.0*	*1.9*	*0.1*	*0.0*	*0.0*
Crop Land - Coconut	*0.0*	*0.0*	*14.8*	*0.6*	*2.0*	*0.9*
Plantation	19.4	1.8	196.5	8.2	0.0	0.0
Mangrove	0.0	0.0	0.4	0.0	0.0	0.0
Natural Forest	111.1	10.2	16.6	0.7	0.0	0.0
Sand/Beach	1.7	0.2	6.4	0.3	0.0	0.0
Pond	22.4	2.1	8.7	0.4	0.4	0.2
Stream	7.5	0.7	67.0	2.8	0.0	0.0
Rapid	1.9	0.2	1.0	0.0	0.0	0.0
Bridge	0.4	0.0	0.0	0.0	0.0	0.0
Rail Way	2.8	0.3	0.0	0.0	0.0	0.0
Major Road	26.8	2.5	19.5	0.8	6.0	2.6
Minor Road	21.0	1.9	64.6	2.7	1.8	0.8
Foot Track	0.0	0.0	0.0	0.0	0.0	0.0
Digging Area	0.0	0.0	9.8	0.4	1.3	0.6
Filling Land	21.7	2.0	15.9	0.7	0.2	0.1
Vacant Land	319.9	29.4	1005.8	41.9	52.0	22.0
Flooded Grass Land	8.8	0.8	55.6	2.3	1.4	0.6
Flooded Shrub Land	12.0	1.1	59.4	2.5	0.0	0.0
Cambodia Gulf	28.2	2.6	15.9	0.7	0.0	0.0
Total	**1088.8**	**100.0**	**2401.9**	**100.0**	**236.3**	**100.0**

Source: JICA Study Team

1) Sangkat Bei Commune

Sangkat Bei Commune is located at the west end of Preah Sihanouk City which include Sihanoukville Port, Victoria Beach, and Independence Beach. The residential and commercial

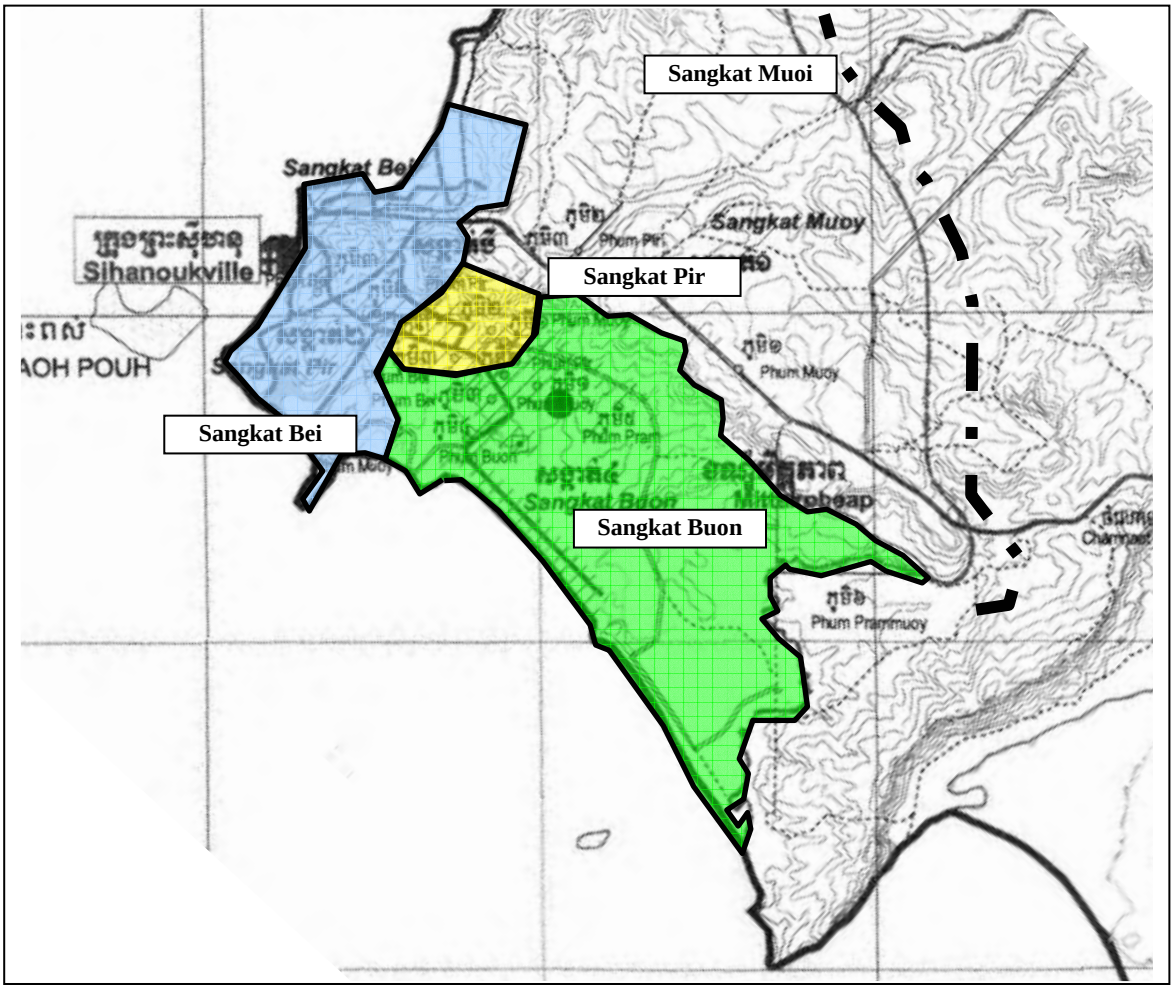
area covers 25% of the total area of the commune. The vacant land (unused land) represents 320 ha or 29% of total land. The natural forest covers 111 ha or 10% of the commune land. The development area which represent under construction area or fenced for development project shares 72 ha or 7% of the total area.

2) Sangkat Buon Commune

Sangkat Buon Commune occupies southern part of Preah Sihanouk City with Ocheuteal Beach and Otres Beach. The residential and commercial area covers 394 ha or 16% of the total land. More than 40% of the commune area or 1,000 ha is vacant land. The development area covers 156 ha or 6.5% of the area. Agricultural land use, which includes paddy field, crop land and plantation, is also shown in this area which covers about 400 ha or 17% of the total area.

3) Sangkat Pir Commune

Sangkat Pir Commune is small but located in the downtown of Preah Sihanouk City. More than half of its area is residential and commercial use. The vacant land shares 22% of total land, but area is 52 ha. It is not enough to accommodate future population growth.



Source: JICA Study Team

Figure 2.2.9 Location of Three Urban Communes in Preah Sihanouk City

2.2.4 Analysis of Major Urban Development Projects

(1) Outline of Major On-going Urban Development Project

1) Pearl City project

The Pearl City Project with more than 60 ha (exact area is not available at this moment) is the biggest development project in Preah Sihanouk City center, which located west end of Sangkat Buon Commune (north of Sokha Beach Resort & Hotel). The Project included residential village houses, market, school, hotels, hospital, entertainment and cultural centre, condominium and apartment houses etc…

The Project is operated by Thai Boon Roong, one of local giant Cambodian Company currently under direct control of Oknha Khov Samath, son of Okhna Theng Bun Ma. After completion of this big project, the image of city center of Preah Sihanouk City may change significantly.

2) Hawaii Beach Development

On the Hawaii Beach, the construction of the private resident and the shop house is almost completed. This project is developed by EMARIO Shonan Marine Corporation Ltd.

3) BS Holiday Villas and Condominiums

This project, which is operated by BS Group Cambodia, is located at the east end of Mittapheap Boulevard. This area has no service of tapped water and sewage water connection.

The first phase of 72 units house and the second phase of 140 units house of BS Holiday Villa project are going to finish in 2010. The 2 phases has been sold since the project started in end of 2007 and the current prices of house vary from $86,000 to $250,000.

4) Hilton Park Villa

This project is located at the middle of Mittapheap Boulevard with 372 units of residences. Construction work is still on-going at the site. Only the gate has been completed.

5) Rainbow Hills project

The Rainbow Hills Project is residential area development of 14.86 ha located on hill top at the east end of Preah Sihanouk City along NR4. This project includes 199 units of residences and shopping center which is developing by EMARIO Shonan Marine Corporation Ltd.

6) Koh Puos (Snake Island) development project

Island resort development projects have significant impact to natural environment in this Province. A Russian company's project started construction of a connection bridge to Koh Puos (Snake Island). This changes the natural landscape of Hawaii Beach.

7) Other Island development projects

Some image sketch of other island resort development show fatal damage of natural environment and landscape of island.

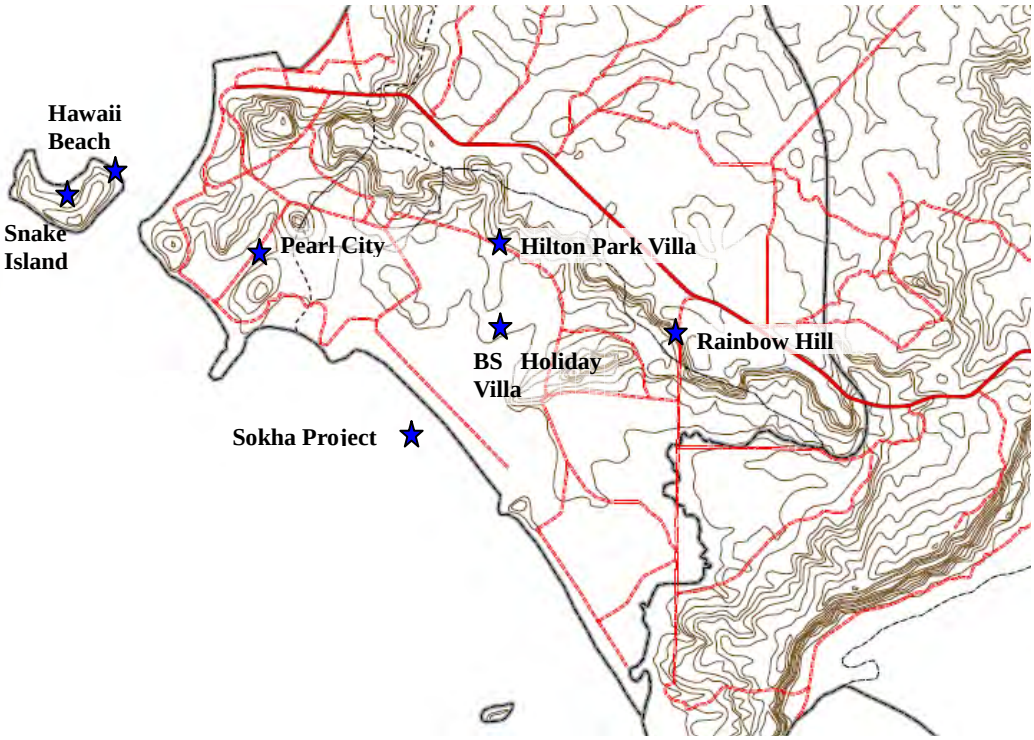
(2) Concern over Major Urban Development Projects

Located at fringe of city center

Most of the development projects are locate on the fringe of the urbanized part of the City. It would cause expansion of sparse urban land use towards the peri-urban areas. And also, most of them are located outside of the existing water supply service and sewerage collection service areas. Supply of clean and safe water and provision of proper sewerage treatment will be essential in urban development and protection of nature environment.

Lack of consultation from Local Authority

Due to the lack of effective Urban Master Plan and Building code, these development projects are not properly guided by and consulted with the municipality. It looks that a developer could plan their project as they like. It is necessary to establish appropriate consultation and permission mechanism for construction of buildings and projects.



Source: JICA Study Team

Figure 2.2.10 Location of Major Development Projects in Preah Sihanouk City

2.2.5 Living Environment

(1) Overview

Urban poor areas are scattered in two districts and one city in Preah Sihanouk province. Among them, the number of urban poor area in the City of Preah Sihanouk is the largest with five urban poor areas. Urban poor areas are distributed in not only in and around the Port areas but also inland areas.

As the city grows, there are high possibilities that people from rural areas or other provinces will form new urban poor areas in urban fringes or expand any of the existing urban poor areas, especially inland ones. The government needs to prepare land use plan and enforce land use control to respond the possible expansion of urban poor areas.

(2) Present Condition of Each Urban Poor Area

1) City of Preah Sihanouk

Source: JICA Study Team

Figure 2.2.11 Distribution of Urban Poor Areas in City of Preah Sihanouk

Table 2.2.2 Profile of Each Urban Poor Area in City of Preah Sihanouk

No.	1	2	3	4	5
Village and Commune	Village 1 , Sangkat Muoy	Village 2, Sangkat Muoy	Village 3, Sangkat Muoy	Village 1, Sangkat Bai	Village 3, Sangkat Bai
Number of Household	100 HH	250 HH	360 HH	80 HH	200 HH
Jobs	construction motor taxi driver	making brooms carrying cements	fishing	fishing	fishing construction
Year of Living	5 years	2 years	25 years	20 years	12 years
Origin	other provinces	Village 3 of Commune 1	other provinces	Sihanouk	other provinces
Access	market: 0.5km school: 0.5km health center: 3.5 km	market: 2km school: 2km health center: 3.5km	market: 3-4km school: 1 km health center: 0.5 km	market: 3-4km school: 0.5 km health center: 0.5 km	market: 1km school: 2km health center: 2km
Infrastructure	water: dig well electricity: supplied toilet: no	water: dig well electricity: supplied toilet: no	water: supplied electricity: supplied toilet: no	water: dig well electricity: supplied toilet: no	water: supplied electricity: supplied toilet: no
NGO support	RHAC (health care for poor)	RHAC (health care for poor)	RHAC and Malob Tapang	Malob Tapang (child care)	Malob Tapang (child care)
CBO	no	no	CBO for fisheries	no	no
Issue	employment toilet	land for plantation	land title	land title soft loan	land title employment
Possibility of Resettlement	Low	Low	High	Medium	High
Remarks	Inland poor area near Angkor Beer factory	Inland poor area near Angkor Beer factory	Northern part of fishers' village in the port and SEZ site	Located west of Sokker beach	Southern part of fishers' village in the port and SEZ site

Source: JICA Study Team

- Village 1 Sangkat Muoy

Urban poor area of village 1 in Sangkat Muoy is located in inland area near shoe factory. About 100 families are living in the area. The access to market and school is good, but access to health center is fairly bad for those who do not have vehicles. Although the possibility of resettlement is low in the area, the area is located within water protected area. The impact to water quality should be assessed and necessary measures should be taken based on the impact to be observed. Residents see that unemployment and no toilet are the issue for improving living environment of the area.

- Village 2 Sangkat Muoy

Urban poor area of village 2 in Sangkat Muoy is located in inland area near Angkor Beer factory and west of village 1. The access to market, school, and health center is fairly bad, and the distances between the area and the facilities such as market is more than 2.0 km. The area is formed recently, because the most of residents have lived in the area for about two years. Similar formation will increase in other in-land areas of Sihanouk City, if the government does

not control land use. This area is also within water protected area, and the same measures as proposed for Village 1 of the sangkat need to be taken.

- Village 3 Sangkat Muoy

Northern part of fishers' village in the port and SEZ site is Village 3 of Sangkat Muoy. Since the urban poor area of the village is located in the port and SEZ site, the possibility for the residents to be resettled is high due to expansion of the port and the SEZ development. Most of the residents are concerned about the land title. Mutual trust and understanding between the government and the residents should be formed through discussion regarding the development, the land title, the resettlement plan and compensation where resettlement is unavoidable.

- Village 1 Sangkat Bay

Urban poor area of Village 1, Sangkat Bay, is located on the coast and west of Sokker Hotel. The most of their livelihoods are fishing. Although the government does not have any development plan in the area now, the residents are concerned about the resettlement because the government used to request them to resettle to other places at past. The most of the household would like to have land title to continue living without the threat of resettlement and forced eviction. They also would like to have soft loan with low interest rate for improving their living condition because now they suffer from repaying the loan amount with high interest more than 20% from money lender.

- Village 3 Sangkat Bay

Village 3 of Sangkat Bay is located south of Village 3 of Sangkat Mouy. The urban poor area of Village 3 of Sangkat Bay is also to be more influenced by port expansion and SEZ development than that of Village 3 of Sangkat Muoy because the current port is right south of Village 3 of Sangkat Bay. As such, more households are to be affected by those developments. Establishing mutual trust between the community and the government is also a key to implement resettlement where resettlement is inevitable.

2) Steung Hav District

- Village 3, Tumnob Rolok Commune

Village No.3 of Tumnob Rolok Commune is located inland. The size of the urban poor area is smaller than that of village 1 in terms of the number of households. Although the area is located inland, fishing is the main jobs for livelihood. The residents are willing to obtain land title to improve the access to micro-finance, which generally requires land title.

- Village 1, Tumnob Rolok Commune

Village No.1 of the commune is located along the coastal area. Some houses are built up on the sea. The living environment is unsanitary as manifested by no toilet and uncontrolled littering. Plus, wooden jetty connecting houses on the sea and land is narrow and partially broken. The condition of the jetty is not safe for pedestrians. Most of the residents were resettled from the port area of Sihanouk about 30 years ago. They have kept fishing after the resettlement. The concern by the residents is that the volume of catching fish decreases.

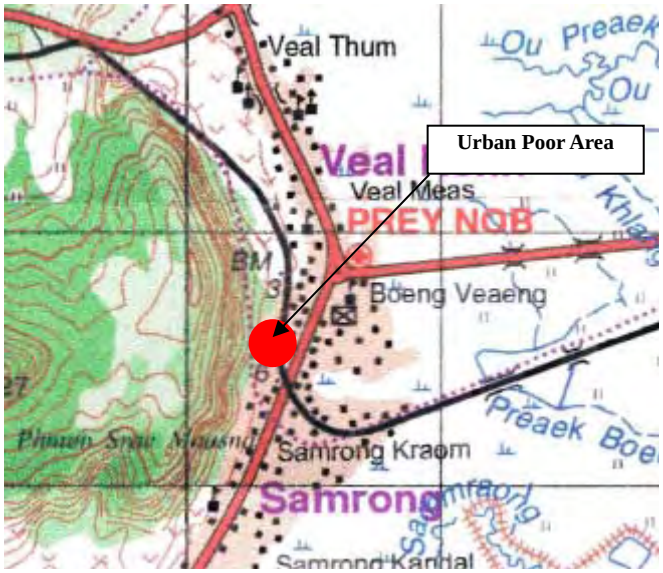
No.	1	2
Village and Commune	Village 3, Tumnob Rolok Commune	Village 1, Tumnob Rolok Commune
Number of Household	20 HH	350HH
Jobs	fishing	fishing
Year of Living	30 years	30 years
Origin	City of Sihanouk	other provinces
Access	market: 1km school: 0.2 km health center: 1 km	market: 0.2 km school: 1 km health center: 1 km
Infrastructure	water: supplied electricity: supplied toilet: no	water: supplied electricity: supplied toilet: no
NGO support	three NGOs	three NGOs
CBO	No	one for fisheries
Issue	land title micro-finance	low catch of fishes
Possibility of Resettlement	Low	Low
Remarks	The area is located in inland area and far from the sea.	The area is located along the coast.

Source: JICA Study Team

Figure 2.2.12 Distribution and Profile of Urban Poor Area in Steung Hav District

3) Prey Nob District

There is only one urban poor area in Prey Nob District. The area is located near the market and along the railroad track. The government does not have any development plan in the area at this stage, but set back of some houses will be necessary for securing ROW when rehabilitation of the railroad is realized.



Village and Commune	Boeng Veng Village, Veal Renh Commune
Number of Household	100 HH
Jobs	Vender, farmer
Year of Living	30 years
Origin	other provinces
Access	market: 0.5km school: 0.5km health center: 0.5 km
Infrastructure	water: supplied electricity: supplied toilet: no
NGO support	RHAC (health care for poor)
CBO	one for water resources management
Issue	food
Possibility of Resettlement	Low
Remarks	The area is located near market and along railroad.

Source: JICA Study Team

Figure 2.2.13 Distribution and Profile of Urban Poor Area in Prey Nob District

(3) Public Awareness of Living Environment of Urban Poor Areas

1) Outline of Public Awareness Survey

Public awareness survey was conducted to understand the current living environment and residents needs in urban poor areas. The survey was started in June and completed in August 2009. Two types of samples were surveyed; one type is the residents, and the other is non-residents who closely work with residents of urban poor areas such as government officials or NGOs. The sample numbers are 125 for residents and 23 for non-residents. The reason why the awareness of non-residents was surveyed is that Team needs to get objective views about the urban poor areas. The surveyed items are 1) socio-economy, 2) background information, 3) housing, 4) basic infrastructure, 5) living environment, 6) merit and demerit, and 7) future plan.

There are five target areas as shown in the table below. To grasp the living environment of urban poor areas broadly, the Team collected information not only in Mittakpheap district but also in Stuen Hav district and Prey Nob district

Table 2.2.3 List of Target Urban Poor Areas

No	Village Name of Poor Area
1	Village No.1, Commune No.1, Mittakpheap KHAN, Sihanoukville
2	Port Area of Village No.3, Commune No.1, Mittakpheap KHAN, and Sihanoukville
3	Inland Area of Village No.3, Commune No.1, Mittakpheap KHAN, and Sihanoukville
4	Village No.1, Tumnob Rolok Commune, Stuen Hav district, Sihanoukville
5	Boeng Veng Village, Veal Renh Commune, Prey Nob district, Sihanoukville

Source: JICA Study Team

2) Results

The survey covering the socio-economy, background information, housing and assets, basic infrastructure, etc. are shown in Table 2.2.4. Urban poor areas in City of Preah Sihanouk have advantages for finding jobs and setting up micro-small businesses However, the areas has disadvantages in infrastructure and living environment. More than 70% of respondents are willing to continue living in the settlement areas.

Table 2.2.4 Results of Public Awareness Survey

Categories	Sub-Categories	Result
Socio-economy	Demography	Average household size: 5.69
	Education	Rate of ever attended formal schools - 81% for age range from 6 -17 years olds - 85% for age range from 18-55 years old School attendance rate - 71% for age group from 6 to 17 years old Illiteracy Rate - 28% for more than 5 years old
	Health	Illness in last 30 days Yes (38%) No (62%) Place for advice and treatment 1) pharmacy (47%) 2) private clinic (22%) 3) public health facilities (8%) 4) others (13%)

	Employment	- 9% of children from 6 to 17 years olds are employed - 40% of working age population was employed
Background Information	Years of Living	1) less than 10 years (50.4%) 2) 11- 20 years (32.8%) 3) more than 21 years (16.8%)
	Origin	1) Preah Sihanouk (44.8%) 2) other coastal provinces (39.4%) 3) other provinces (15.8%)
	Reason to settle	1) easy to find job (37%) 2) easy to set up business (34%) 3) easy to access market (12%)
Housing and Assets	Wall material	1) Board/Wood (62.4%) 2) Concrete (18.4%) 3) Galvanized iron or aluminum (15.2%)
	Ownership of land title	Yes (57.6%) No (42.4%)
Basic Infrastructure	Needs	1) road/bridge (43.2%) 2) hospital/health center (21.6%) 3) schools (12.8%) 4) sewerage system (11.2%)
Merit and Demerit, etc.	Merit and Strength	1) set up micro-small businesses (50%) 2) easy to find jobs (48%) 3) access to fishing (29%)
	Demerit and Weakness	1) poor infrastructure and poor living condition (50%) 2) lack of access to public health services (38%)
Future Plan	Willingness to continue living in future	- Yes(74%) - No(26%)
	Reason of continue living	1) Easy to run the business (39%) 2) Could not afford land other places (26%) 3) This is their own land (12%)

Source: JICA Study Team

3) Points to be addressed in Master Plan

The survey result shows points to be addressed in the process of formulating master plan for City of Preah Sihanouk.

Economic opportunities

People tend to determine where to live based on the available economic opportunities. Where resettlement is unavoidable, how to ensure economic opportunities should be considered in the process of formulating resettlement plan

Access to health services

Even though the public health centers are within the walking distance, the results show that most of the people do not visit public health centers for the first treatment when they get ill. It was informed that there was lack of staff in health center. The in-depth analysis for provision of public health services is necessary to clearly grasp the situation.

Keeping the same quality of life

More than 70% of households answered that they would like to continue living in the same areas. In this regards, resettlement should be avoided as much as possible to provide the existing residents opportunities to continue living. Where resettlement is unavoidable, however, a resettlement plan should make the affected residents get similar economic and social benefits after the resettlement.

Improvement of Infrastructure

To improve the living condition in the urban poor areas, infrastructure should be developed. The road improvement including rehabilitation of jetties and constructing toilets may be prioritized for improving safety and sanitation. Most of the households have access to water and electricity, but the prices were very expensive for them, primarily because of private monopoly for the services.

(4) Current Activities by Stakeholders

1) Government

Social land concession

Provincial Department of Land Management (DLMUPCC) is planning to designate social land concession area in hilly areas near the water source area in order to accommodate urban poor in the City. The national cabinet ordered provincial governor of all provinces to find sites where social land concession can be applied for accommodating illegal settlers including households in urban poor areas. The exact location of social land concession area is not officially decided.

Cooperation to Urban Poor Development Fund

Municipality government just started to collect information of urban poor areas under UPDF scheme. However, municipality government has not provided any information on administrative services which is conducive to daily life of residents in urban poor areas. It means the flow of information is still in one way from the urban poor areas to the municipality government. The municipality sees that collaboration with UPDF scheme is important and it continues to take some activities for improving urban poor areas by taking into account advices of UPDF.

2) NGO

CNRO (Cambodian National Right Organization)

CNRO supports the residents to learn legal systems of Cambodia including land laws in order for the residents to protect themselves from forced eviction. CNRO has worked with residents near the airport where expansion of airport facilities is planned, to stop illegal forced eviction and unfair compensation by developers.

RHAC (Reproductive Health Association of Cambodia)

RHAC is a national NGO financed by USAID. RHAC is specialized in reproductive health, both clinic and health education in villages. RHAC supports the following areas.

- Reduce Transmission and Impact of HIV/AIDS
- Prevent and Control Infectious Diseases of Major Importance
- Improve Maternal /Child survival, Health and Nutrition
- Health system strengthening

M'Lop Tapang

M'Lop Tapang is a Sihanouk-based local NGO which supports children in education and training in villages. The goal of the NGO is giving street children access to the learning tools, resources, and opportunities they needed to empower themselves and become productive members of society. Now, it provides community education on child protection to parents in urban poor areas.

3) Community Based Organization

Most of the urban poor areas do not have community based organization for improving living environment. A few community based organizations have been established with the assistance of UPDF. However, the communities UPDF scheme covers were not always poor. Some also have developed community saving groups and receive loans from UPDF. However, only members of UPDF programs can receive the benefit of the development. Non-members cannot join the development.

(5) Identified Problems

Lack of land use control

Often the local government does not control newly arising poor areas being settled by outsiders in the City of Preah Sihanouk. One of the reasons for the lack of land use control was the lack of land use plan for the city. Village offices, which are the bottom level of governmental bodies, cannot control the arising new poor areas without legal grounds and instruments.

Lack of community based organizations

Community based organization is not established in most of urban poor areas, even though a few areas has established the organization under UPDF scheme or special purpose organization such as fisheries and water resources management. It is difficult to identify community needs for living environment improvement and promote activities without community based organizations.

Insufficient supports by government and NGO

The support by government to urban poor areas is still weak because the government only collects information from registered communities under the UPDF scheme. No governmental activities for disseminating administrative information have been observed. The supports by NGO are found in legal education, health care, and child care. Their supports to providing small infrastructure and soft-loan are not observed.

Insufficient infrastructure and public services

Infrastructure inside the urban poor areas is not sufficient. Many of the wooden connecting houses over the sea and land are partially broken, and cannot ensure the safety for the residents. Most of the households discharge waste directly to the sea and do not control littering, so sea water near the area is contaminated. This unsanitary condition causes water-bone disease. Plus, access to public health service is limited although public health center is within walking distance.

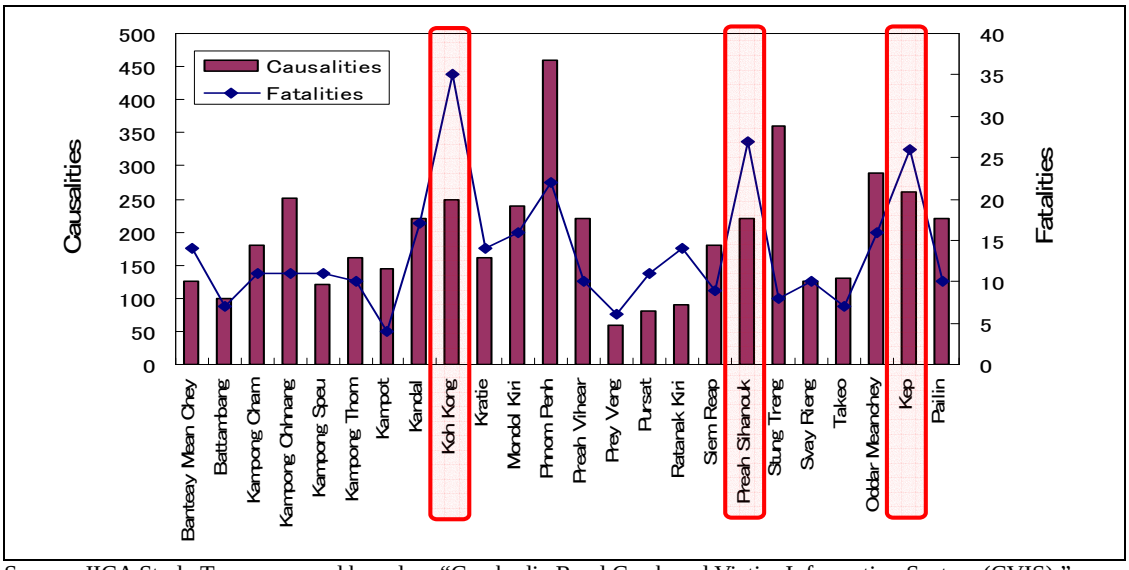
2.3 Infrastructure

2.3.1 Road and Railway

(1) Road Network

1) Increase of traffic accidents

As mentioned in Section 4.3.2 of Book I, the number of traffic accidents have increased by 150% over the last 5 years in Cambodia. In the study area, 61% of all traffic accidents resulted in slight injuries in 2008, followed by serious injuries which accounted for 30%, and fatalities at 10% on average. Comparing the number of road traffic fatalities and causalties by province per 100,000 inhbabitants in 2008, Preah Sihanouk sees the second highest number of fatalities per 100,000 inhabitants after Kampot, as shown below.



Source: JICA Study Team prepared based on "Cambodia Road Crash and Victim Information System (CVIS):".

Figure 2.3.1 Number of road traffic fatalities and causalities by province per 100,000 inhabitants (2008)

As the result of the traffic volume survey, it was found that there is an area where more than 600 heavy vehicles pass through a day in Preah Sihanouk. According to "Cambodia Road Crash and Victim Information System Annual Report 2008", almost 35% of fatalities were killed in motorcycle and 4-wheele vehicle collisions. Considering the data, there is possibility for traffic accidents to occur due to a collision between motorcycle and heavy vehicles.

2) Present condition of parking space around Sihanoukville Port

While most of trucks and trailars are parked in the parking space around Sihanoukville Port, there are spillover of heavy vehicles from the space now parked in the streets. Due to parking on a sholder of NR4, the road becomes narrow and there is possibility for traffic accidents around Sihanoukville Port. The present situation of the street parking is as follows.

Table 2.3.1 Present Condition of Parking Space around Sihanoukville Port

		
Around Sihanoukvill Port Photo 1	Around Sihanoukvill Port Photo 2	Around Sihanoukvill Port Photo 3

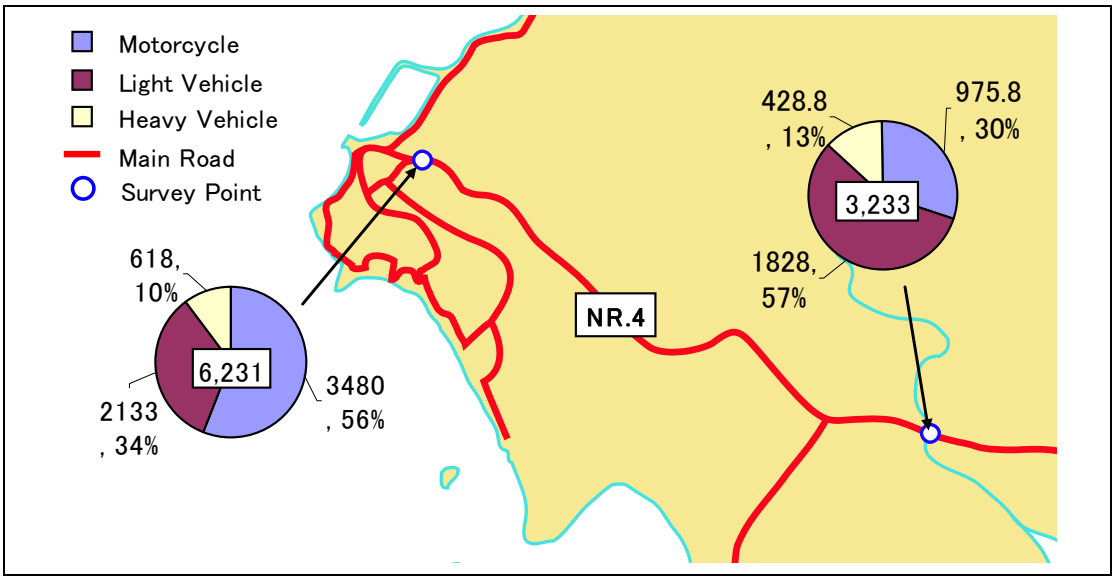
Source: JICA Study Team

The insufficiency of truck parking is often observed around the port. Though a provision of sufficient parking space for heavy vehicles is expected, there is often no space suitable for the truck parking.

3) Lack of access road from NR4 to the center of Preah Sihanouk City

At present, NR4 serves the only access road to Preah Sihanouk City. Therefore, a substantial detour along with NR4 will be necessary in order to visit the beach and the center of the city. For Preah Sihanouk where tourism is a main industry, the provision of more efficient transport network is required considering the growth of tourism. Though Sihanoukville Airport opened in November 2009, and it is estimated to increase the number of tourist visits gradually and steadily, they have to visit the coastal resorts passing through NR4 only in the present situation.

In comparison between the result of cordon line and the screen line surveys, it was found that the amount of the traffic volume counted at the survey point of the screen line survey doubled. It was also found that the traffic congestion occured near the center of Preah Sihanouk as follows.

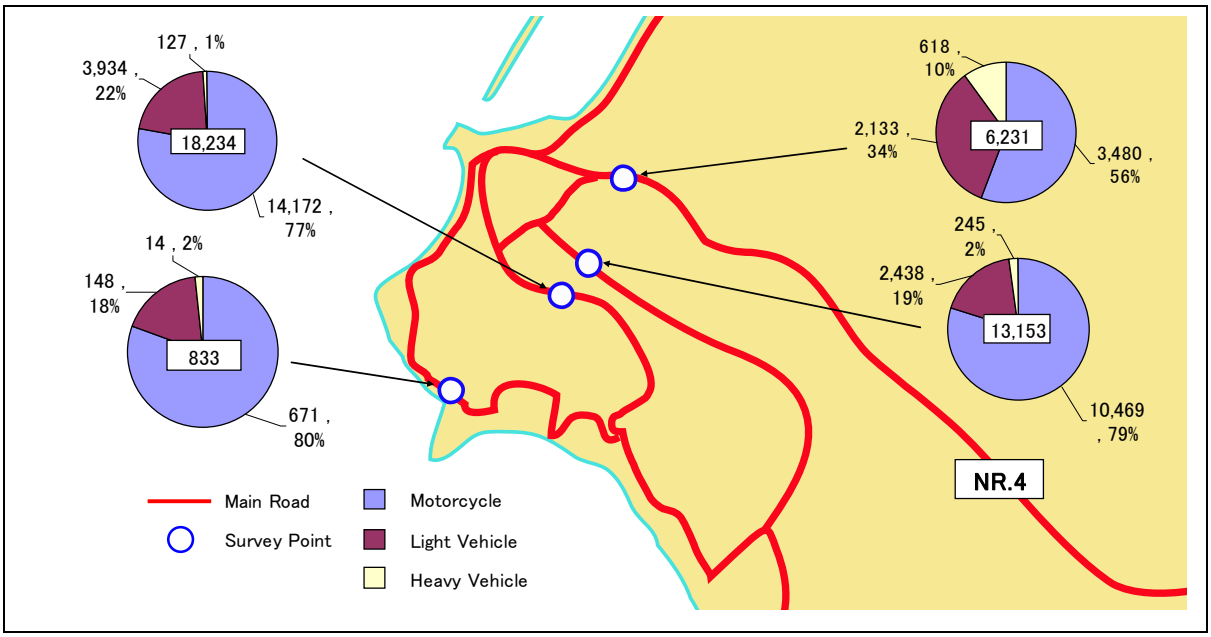


Source: JICA Study Team

Figure 2.3.2 Comparison between Cordon Line Survey and Screen Line Survey

4) No provision of industrial road (from Preah Sihanouk to Stueng Hav

Though a road connecting Preah Sihanouk and Stueng Hav in the north exists, it has not been provided as an industrial road which is enough for heavy vehicles to pass through. According to the development plan of Sihanoukvill Port SEZ, the rehabilitation of the existing road is planned but it does not have sufficient capacity for heavy vehicles. Apart from tank trucks which visit oil jetty, most of heavy vehicles come to Preah Sihanouk by NR4. As the result of the traffic volume survey, it was found that motorcycles accout for majority of the traffic as it gets closer to Preah Sihanouk, and the traffic congestion between motorcycles, light vehicles and heavy vehicles occured on NR4 as follows.



Source: JICA Study Team

Figure 2.3.3 Result of the Traffic Survey around the Preah Sihanouk City

Though it is considered that an industrial road should be provided to prevent the present traffic congestion mixed with motorcycles, light vehicles and heavy vehicles, it has not been developed at present. In addition, the road connecting Stueng Hav with Veal Renh was rehabilitated up to 2007 but it was deteriorated seriously soon afterwards.

Table 2.3.2 Present Condition of Existing Road and Bridge between Stueng Hav and Veal Renh

		
Deteriorated Road Surface (1)	Deteriorated Road Surface (2)	Deteriorated Surface of Existing Bridge

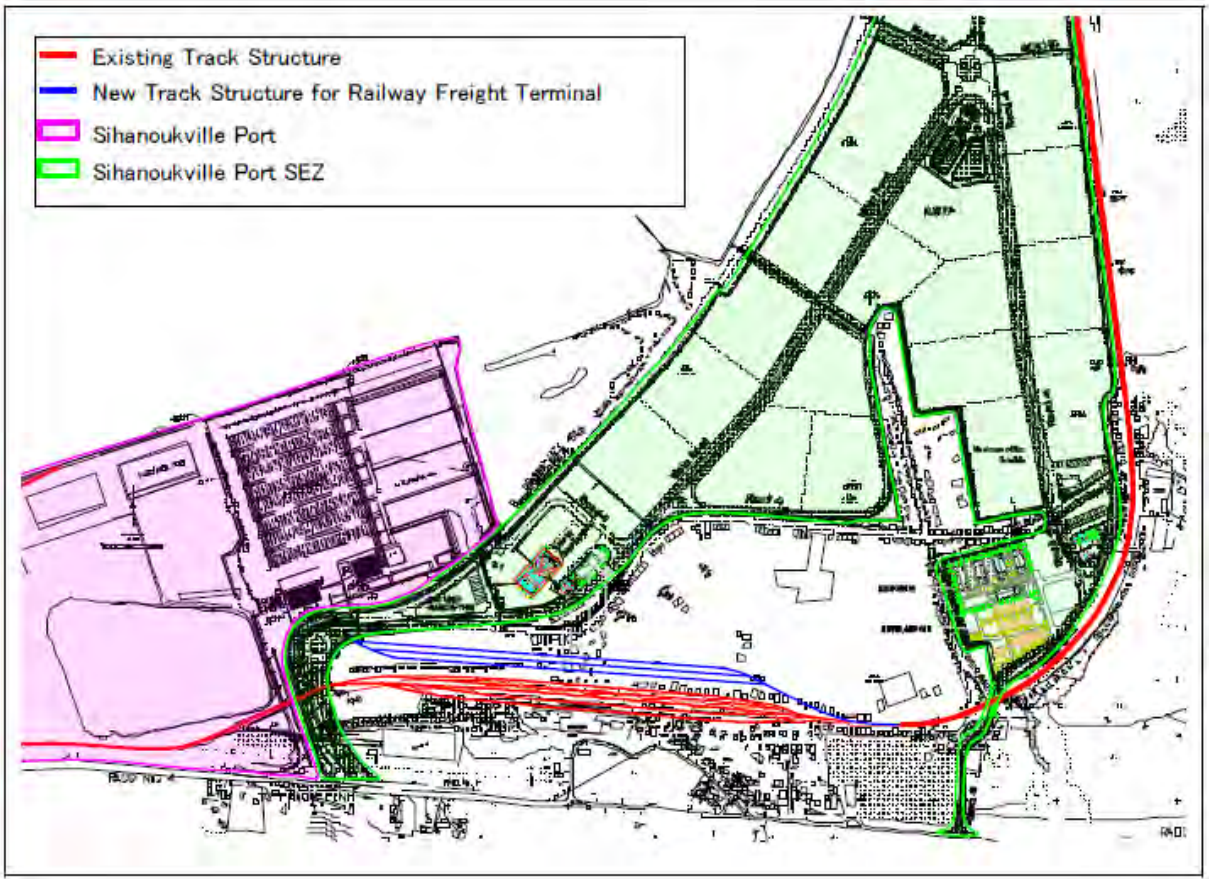
Source: JICA Study Team

(2) Railway

1) Development of railway freight terminal

A railway freight terminal will be developed in Sihanoukville Port. While track work for the railway freight terminal is included in the rehabilitation project of railway funded by ADB, earth work and asphalt pavement are not planned. As Toll company has officially engaged in a concession to operate railway system, it is considered that the operation of the railway freight terminal also will be implemented by Toll company. However, there is no plan to develop the railway freight terminal without track work.

Moreover, though the access route from Sihanoukville Port to the railway freight terminal has to be provided, the land where the access road is expected to develop is included in the land of Sihanoukville Port SEZ. To develop the railway freight terminal, the discussion between PAS and Toll company shall be needed. At present, even if the rehabilitation project of railway is completed, there is a possibility that the railway system may not function sufficiently due to the lack of cordination between PAS and Toll company.



Source: JICA Study Team

Figure 2.3.4 Location of Track Structure for Railway Freight Terminal

2) Development of signaling system and level crossing

In operation of a railway system, safe and stable traveling is required. According to the latest schedule of the railway rehabilitation project, the project will be completed in 2013. However the project does not include an installation of the signaling system and level crossing as safe facilities.

Though Toll company will operate the railway system after the completion of the rehabilitation, it is difficult to make sure safe and stable traveling without the provision of the safe facilities.

It is needed that the procurement of signaling system and level crossing should be discussed and implemented.

2.3.2 Port and Logistics

(1) Present Situation of Ports in Preah Sihanouk City

There are three commercial ports in Preah Sihanouk City, namely Sihanoukville Port, Oil Terminal and Tomnop Rolok Port as mentioned below.

1) Sihanoukville Port

Sihanoukville Port is located at the southeast entrance of Kompong Som Bay and serves as the only international deep seaport in Cambodia, and Port Authority of Sihanoukville (PAS) manages and operates the port. The present berth facilities are mentioned below.

- Old Jetty (Water depth -9.0 m & -7.0 m): A 290 meter long jetty at the western end of the port was constructed in the 1960's together with other facilities such as breakwaters and navigation channel. The facility has been deteriorated over the years, and needs to be rebuilt.
- Working crafts basin (Tug Boat Basin): An inner basin behind the Old Jetty, which accommodates tug boats, pilot boats, patrol boats, line handling boats, etc.
- New Quay (Water depth -9.0 m): A 350m long multipurpose quay, which accommodates barges and container ships.
- New Container Terminal (Water depth -10.0 m): A 400 m long wharf was built during the period from 2002 through 2008, and two gantry cranes and five transfer cranes were installed in January 2009. JICA provided ODA loans for these facilities and equipment.

2) Oil Terminals

Three Oil Terminals are located in Stueng Hav district of Preah Sihanouk Province, and are operated by the private firms, namely "CALTEX", "SOKIMEX" and "TELA". PAS imposed a port charge on theses firms and publicized the handling statistics. As to SOKIMEX, its jetty was first constructed as a state managed port, but in 1996, it was 100% privatized. SOKIMEX itself has its share of 81% and MARUBENI (Japan) 19%. Annual import volume is nowadays around 100,000 tons

3) Tomnop Rolok Port

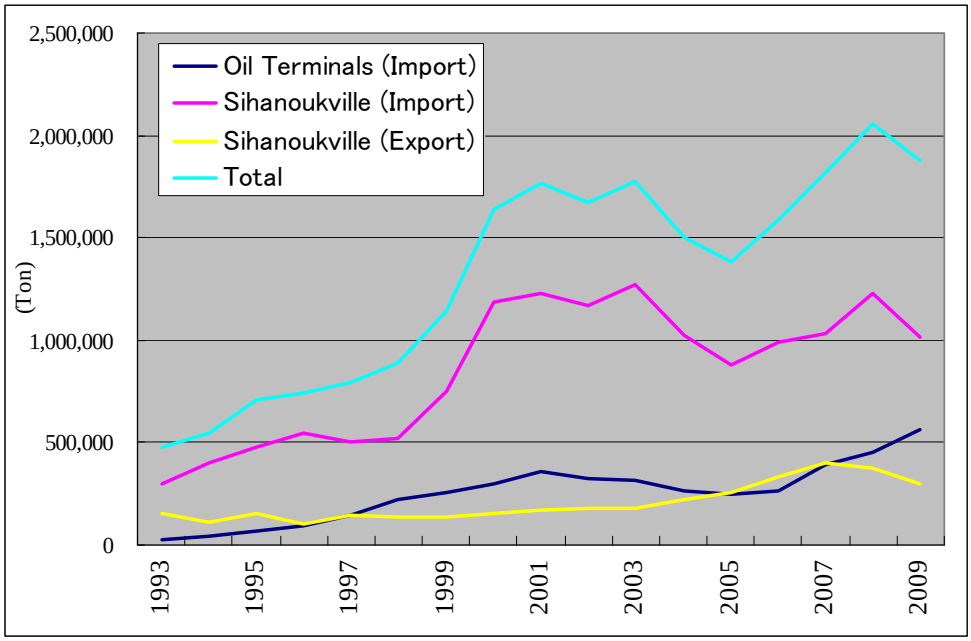
Tomnop Rolok Port is located in Tomnop Rolok Village inside Sihanoukville Port. Construction started in 1989 by the central government (Department of Public Works and Transport: DPWT and the Preah Sihanouk province). The port has a wooden berth of 700m^2, one warehouse (161 m^2) and one crane (25 tons). The current water depth is from 4 to 6 m. During low tides, the depth ranges from 2.8 to 3.9 m, and in the high tides from 5 to 6 m.

It had been state-owned under the DPWT until 1995. From January 01, 1996, DPWT went forward with privatizing operations according to the joint Decisions from Ministry of Public Works and Transport (MPWT) and Ministry of Economy and Finance through a bidding process. As a result, Tomnop Rolok Port is now operated by a private company.

Cargoes consist of conventional commodities such as construction materials (steel bar, cement, etc.) and consumer goods. The cargo throughput has decreased since Oknha Mong Port started to operate, and monthly cargo throughput in 2008 was approximately 600 - 800 tons. They are all imported from Thailand by wooden boats and barges.

(2) Cargo Throughput Trend of Sihanoukville Port and Oil Terminals

PAS keeps the cargo statistics of Sihanoukville Port and Oil Terminals. In line with the national economic growth, the cargo throughput has been steadily increasing, except for the import cargo of Preah Sihanouk. The cargo throughput of cement has decreased drastically since operation began at Oknha Mong Port, thus the import cargo of Preah Sihanouk has dropped since 2004. The cargo throughput has remarkably increased since 2004 and surpassed the 2 million tons in 2008, although it dropped in 2009 as shown in Figure 2.3.5. In 2009, container cargo, which is main cargo of Preah Sihanouk as shown in Figure 2.3.6, decreased 23% as compared with that of 2008, due to the influence of the global recession.

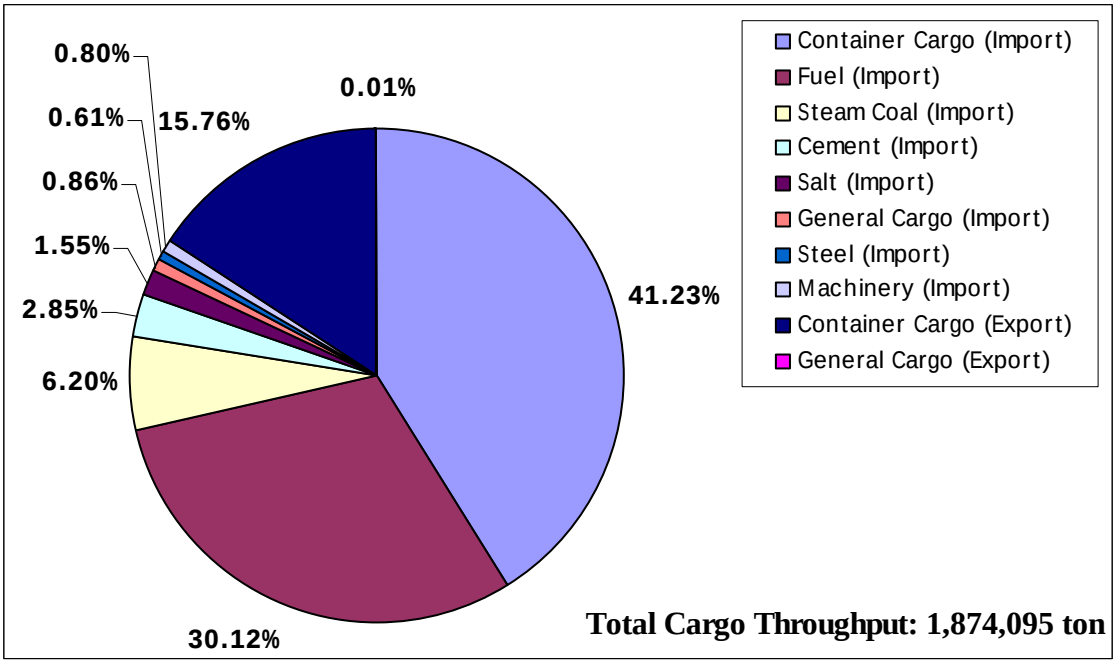


Source: PAS

Figure 2.3.5 Cargo Throughput Trend of Sihanoukville Port and Oil Terminals

Total cargo throughput in 2009 was 1,874,095 tons, of which 1,013,947 tons for Preah Sihanouk-Import, 295,578 tons for Preah Sihanouk-Export and 564,570 tons for Oil Terminals-Import respectively. Figure 2.3.6 indicates the content of cargo and its proportion.

On the other hand, cargo throughput of Tomnop Rolok Port could be estimated to be around 9,000 tons in 2008 according to the interview with the port personnel, and accounts for 0.4% out of total cargo throughput of three ports in Preah Sihanouk City.



Source: PAS

Figure 2.3.6 Commodity-Wise Portion of Sihanoukville Port and Oil Terminals in 2009

(3) Demand Forecast of Sihanoukville Port and Oil Terminals in 2020

The commodity-wise demand forecast in 2020 of Sihanoukville Port and Oil Terminals are summarized in Table 2.3.3. The forecast was based on the previous studies, including the Study on the Master Plan for Maritime and Port Sectors (2007) and SAPROF for Sihanoukville Port Urgent Development for Oil Supply Base & Multipurpose Terminal (2009), the interview with personnel concerned and current economic situation. The total throughput in 2020 will be 6,188,000 tons.

Cargo throughput of Tomnop Rolok Port has decreased since Oknha Mong Port started to operate. The Port is deemed to remain current situation due to limited yard area and inefficient cargo handling facilities. Cargo throughput of the Port is not counted for future demand forecast in this study.

Table 2.3.3 Demand Forecast of Sihanoukville Port and Oil Terminals in 2020

Commodity	Port	Export/Import	Estimated Volume (ton)
Container Cargo	Sihanoukville	Export, Import	3,792,000
General Cargo	Sihanoukville	Import	60,000
Machinery	Sihanoukville	Import	57,000
Sugar	Sihanoukville	Import	9,000
Steel	Sihanoukville	Import	142,000
Steam Coal	Sihanoukville	Import	200,000
Wheat	Sihanoukville	Import	148,000
Cement	Sihanoukville	Import	100,000
Wood Chip	Sihanoukville	Export	1,000,000
Fuel	Oil Terminals	Import	680,000
(Total)		Export, Import	6,188,000

Source: JICA Study Team made based on the previous studies

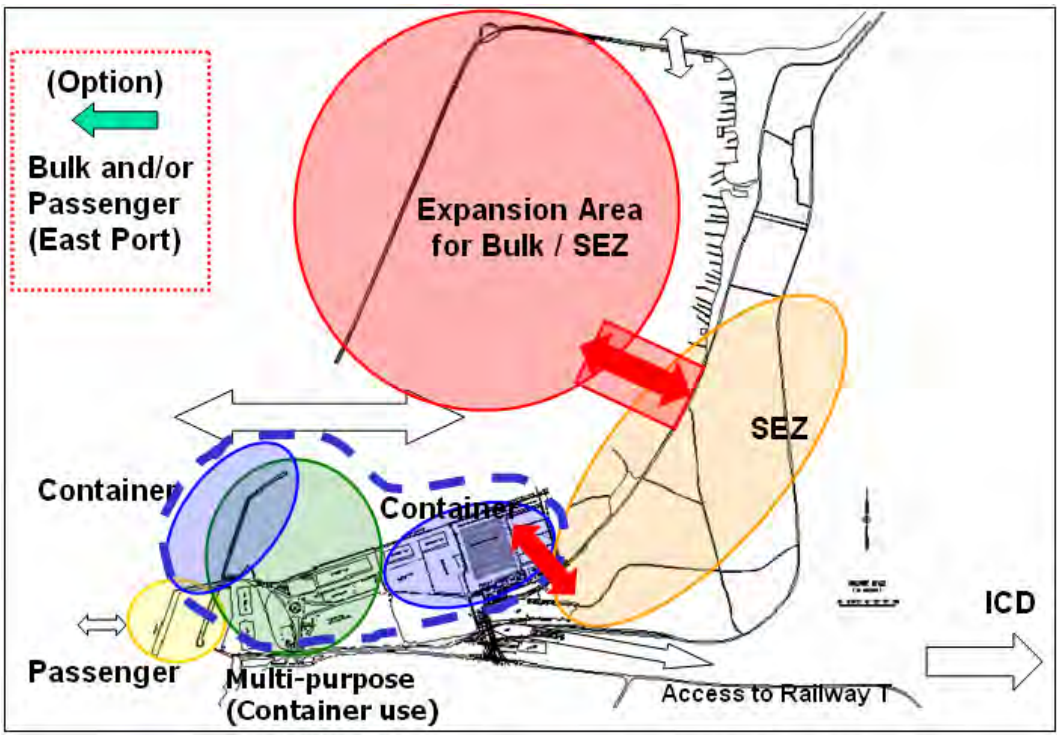
(4) Development Plan of Sihanoukville Port

Offshore oil and gas reserves have been discovered and are being developed lately near Sihanoukville Port, thus an oil supply base was required for the loading/unloading of the construction materials and construction-related commodities for the actual oil production. Moreover, due to the steady increase of bulk cargo demand such as wood chip and coal, multipurpose terminal is scheduled to be constructed in near future with a Japanese ODA loan. Figure 2.3.7 indicates the existing facilities in black and planned multipurpose terminal in colors.

Source: SAPROF for Sihanoukville Port Urgent Development for Oil Supply Base & Multipurpose Terminal (2009)

Figure 2.3.7 Layout of Existing Facilities and Planned Multipurpose Terminal

The container terminal of Sihanoukville Port has been developed with Japanese ODA loans in order to handle the increasing cargo demand due to the rapid economic growth of Cambodia. Furthermore, PAS intends to expand the container terminal in consideration of the potential of future container cargo demand. The Figure 2.3.8 indicates the outline of port zoning of a long-term development plan.



Source: Study on the Master Plan for Maritime and Port Sectors in Cambodia (2007)

Figure 2.3.8 Outline of Long-Term Development Plan

(5) Issue of Sihanoukville Port

1) Illegal Inhabitant Community in the Port Area

Sihanoukville Port has calm water area for vessel navigation within East and West breakwaters, which were constructed based on long-term development plan to meet the increasing cargo demand associated with the national economic growth. Seaside and water area surrounded by East and West breakwaters are the most essential property to support the port activities. However, illegal inhabitant community has been formed and expanded along the coastal line of this area. Most of inhabitants earn their living by fishing, and wooden jetties for fishery, houses and shops have been built along the water area. These facilities and fishing boats interrupt the development of port facilities and safety navigation for cargo vessel. With view to keeping smoothly port activities and improving in living standard of illegal inhabitants, drastic measure will be required to initiate in well-consideration of sensitive issues such as relocation and compensation for inhabitants. PAS possesses a candidate site for relocation as shown in Figure 2.3.9 (The area is surrounded by red-colored dotted line).

Source: JICA Study Team made based on information from PAS

Figure 2.3.9 Considerable Site for Relocation

2) Passenger Terminal to Develop the Tourism Industry

The number of passenger ships calling Sihanoukville Port has increased, and in 2008, 23 ships made calls and about 14,000 foreign tourists visited Preah Sihanouk. Passenger ships berthed at container terminal because the port has no exclusive facilities for passenger ships. While passenger ship berths at container terminal, vacant container boxes are placed on the yard in place of the fence, and temporary immigration control is established inside the container fence.

On the other hand, there is wooden jetty for domestic passenger boat inside the water area of Sihanoukville Port. The passenger boat, "Royal Khemra Express Boat" has plied between Preah Sihanouk and Koh Sdech three round-trips a week.

The number of foreign visitors to Cambodia by sea rose by 46 percent in the first six months of 2009 compared with the previous year, and the Government has promoted the tourism industry. With a view to contribute the development of tourism industry, the function of passenger terminal is required to be integrated and newly-built in the Sihanoukville Port

3) Enhancement of Competitiveness based on Improvement of Access Infrastructure

There are eight dry ports, also called the inland container depot (ICD), in and around Phnom Penh as mentioned in Section 4.3.3 of Book 1, and these dry ports are connected to Sihanoukville Port by road. Toll Group, which is the concessionaire for the railway operation, plans to construct a new dry port at Samrong in Phnom Penh connected by the railway line. As

the transportation cost to/from the port of Sihanoukville to Phnom Penh is generally a heavy burden to shippers/consignees, the new ICD at Samrong is expected to reduce this burden significantly.

In Thailand, Lat Krabang ICD plays a very important role for Laem Chabang Port as a distribution and collection center. Dry Port at Samrong will be able to encourage the use of Sihanoukville Port through reducing land transportation cost.

Now, Sihanoukville Port and Phnom Penh Port have handled container cargoes to/from Phnom Penh City. Sihanoukville Port has experienced a decrease in the cargo throughput due to global economic recession, while Phnom Penh Port has an increase in the cargo throughput taking on the benefit of the opening of the port along the basin of Cai Mep River, Vietnam, which has become a transit port for Phnom Penh Port. Sihanoukville Port has equipped high-performance gantry cranes and rubber tired gantry cranes, furthermore, the Port is required to make an effort to provide lower costs and faster services to shippers/consignees to compete against the rival port, Phnom Penh Port.

In order to reduce the land transportation costs and time, the function enhancement of ICD and railway transportation connecting the ICD are the most effective and practical logistic strategy for Sihanoukville Port.

4) Role of Sihanoukville Port

In Vietnam, more than twenty port and terminal development projects, including the container terminal and multipurpose terminal development project finance by Japan's ODA funding have been in progress along the river basin of Cai Mep and Thi Vai, which are located approximately 50 km south of Ho Chi Minh City. Among these ports, SP-PSA International Port started operation on May 2009 as the Viet Nam's first deep sea container terminal.

Due to the starting operation of these ports in Cai Mep and Thi Vai area, especially on container throughput between Phnom Penh City and Viet Nam could be expected to increase. Actually, Japanese shipping company started to ship around 100 TEU per month on this route in June 2009.

Phnom Penh Port is located along the Tonle Sap and the Mekong River. The distance to the border is about 110 km, and 330 km to Cua Tieu, River Mouth, in Vietnam. Navigation in the Mekong River is severely restricted to 4.5 m draft limitation at the river mouth of Cua Tieu and 37.5m air draft limitation under bridge clearance of My Thuan Bridge. These restrictions impose size and capacity limitation of ships to 160 TEU (1,900 DWT) for container barge as well as 1,000 DWT for tanker barge through the Mekong mainstream between Phnom Penh City and Viet Nam.

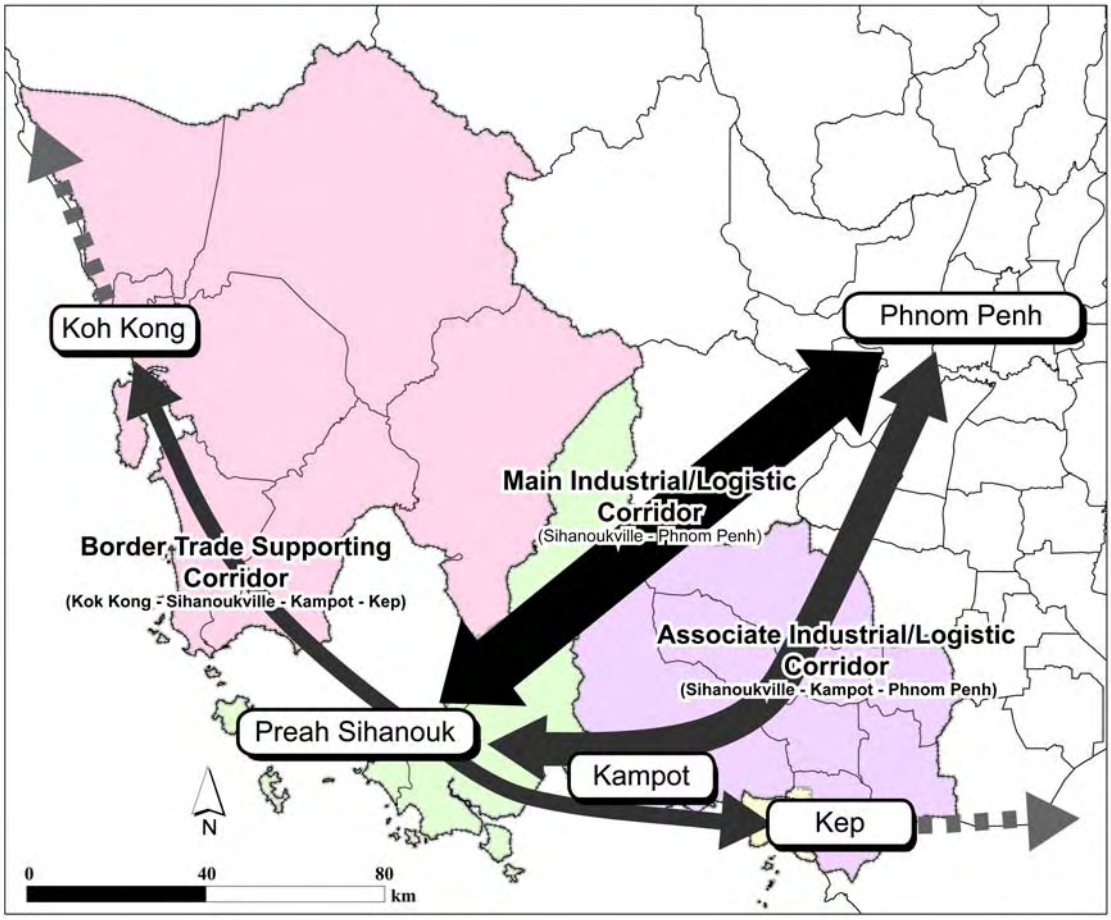
As mentioned above, existing Mekong River route will not accommodate the considerable container throughput in line with industrial growth in Cambodia. Thus Sihanoukville Ports will keep the current situation as the main port for container transportation to/from Phnom Penh City.

Regarding shipping route, wharf depth of container terminal locates in Cai Mep and Thi Vai area is -14 m, which can accommodate around 4,000 TEU container ships for North American or Europe shipping routes. On the other hand, wharf depth of container terminal of Sihanoukville Port is -10 m, which accommodate around 1,000 TEU container ships for intra-Asian shipping route.

Role of the port on container shipping network is dependent on its accommodating container ship size. Container terminal in Cai Mep and Thi Vai area is possible to play the role of a Hub Port on North America-Asia route, while Sihanoukville Port plays the role of Feeder Port on intra-Asian shipping route. Most of the container cargoes between Sihanoukville and West Coast of USA have been currently transshipped at Singapore Port.

(6) Logistics

In consideration of the cargo throughput, its origin and destination and the industrial activities, the axis for logistic movements in the study area will be composed of following three industrial/logistic corridors, namely 1)Main Industrial/Logistic Corridor (Preah Sihanouk - Phnom Penh), 2)Associate Industrial/Logistic Corridor (Preah Sihanouk - Kampot - Phnom Penh) and 3)Border Trade Supporting Corridor (Kok Kong – Preah Sihanouk - Kampot - Kep) as shown in Figure 2.3.10.



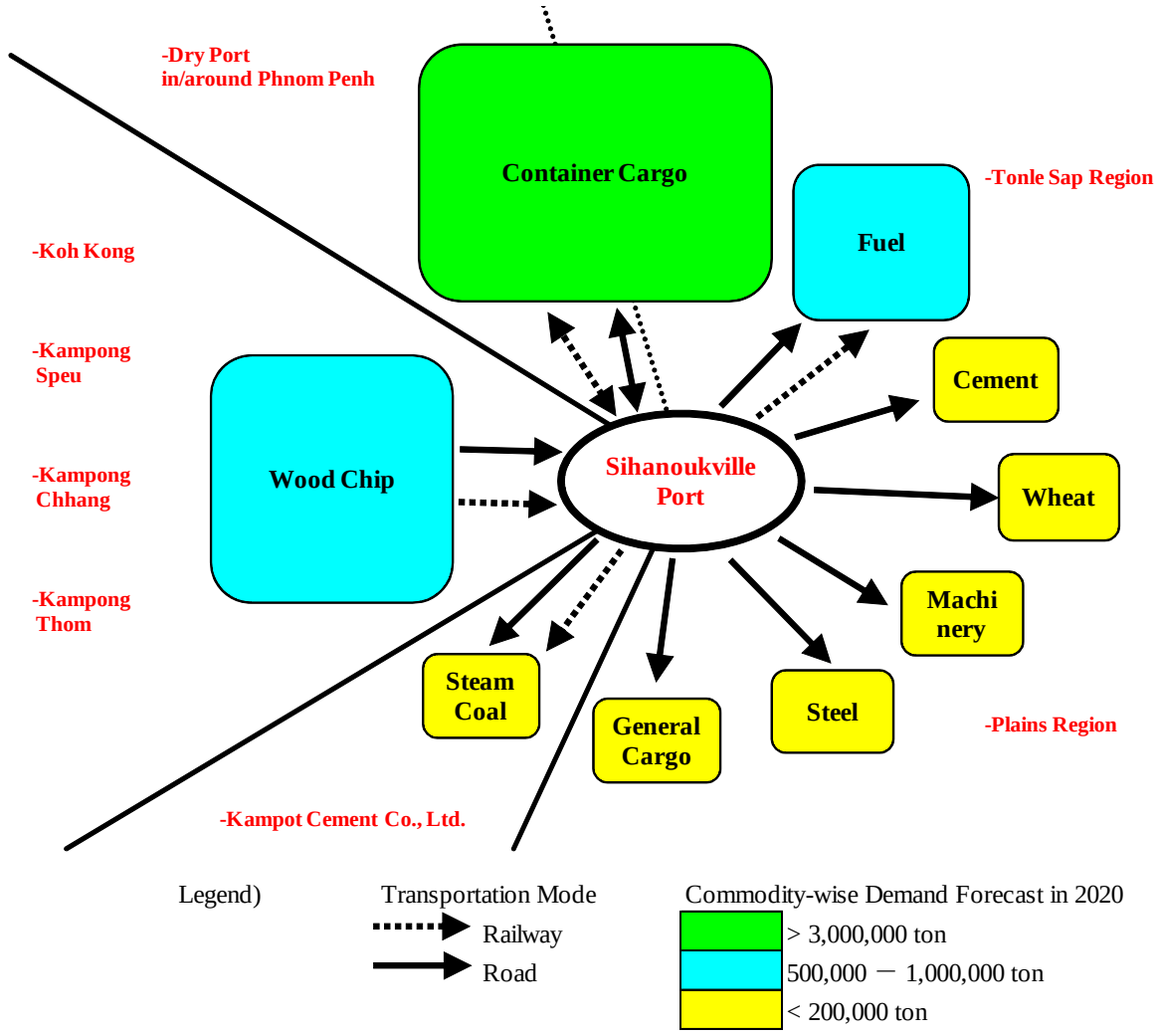
Source: JICA Study Team

Figure 2.3.10 Image of Logistic Axis in the Study Area

Among above mentioned logistic axis, Sihanoukville Port will play the most important role of the logistic center and the national gateway. Figure2.3.11 shows commodity-wise transportation flow and origin and destination to/from Sihanoukville Port based on the demand forecast in 2020. Container cargo is prospected to be steadily increased corresponding with economic growth. Transport

infrastructure such as industrial road and freight dedicated railway will be required to meet the future container demand.

Currently, National Road No.4 is only the national logistic backbone which connects between Sihanoukville Port and Phnom Penh. In September 2009, National Road No.4 was blocked with flood and logistics was paralyzed. Another transportation route in cooperation with National Road No.4 is essential from the viewpoint of keeping the function of national logistic backbone at the disaster.



Source: JICA Study Team

Figure 2.3.11 Commodity-wise Transportation Flow and Origin and Destination to/from Sihanoukville Port

2.3.3 Water Supply

(1) Existing Condition

1) Service Area

The Preah Sihanouk water system supplies approximately 23,400 customers within the urban area of Preah Sihanouk province. The water supply system serves about 32% of the urban population (2008). The extent of the existing service area is identified in Figure 2.3.12.

2) Water resources

Preah Sihanouk obtains its water supply from a small urban lake (Boeng Prek Tuk), 3 wells north east of the central market and a treated water pipeline from the Kbal Chay treatment plant. Table 2.3.4 summarizes the Preah Sihanouk water supply sources.

Table 2.3.4 Existing Water Supply Sources

Source name	Note	Capacity (m3/day)	Annual Production Potential(1) (MCM)
Boeng Prek Tup	5 wet months	3,500	2.02
	7 dry months	8,000	
Kbal Chay	average yield(2)	66,800	21.94
Well #1		720	0.24
Well #2		720	0.24
Well #3		600	0.20
TOTAL		2,837	25

(1) Based on 90% capacity factor (10% allowance for down time)
(2) Reported by JETRO mission, Pacific Consultants 2008

- Boeng Prek Tup

"Boeng Prek Tup" is a small shallow lake (13 ha), located a short distance (3 km) south west of the city. The lake was the city's main source until 2008 when Kbal Chay was commissioned. The lake has an estimated catchment area of 270 ha from which it receives rainfall runoff and groundwater flows. During the rainy season (from May to October), the lake is recharged sufficiently to keep the lake full. During the dry season (from November to April) the lake level drops drastically.

In 2003 the crest level of the outlet weir was raised to increase the available storage volume to 430,000 m^3. Hydrological studies (Parsons Engineering 2000) have confirmed that the lake has a sustainable yield of only 3,500 m^3/day during the dry season (7 months). During the wet season the water balance indicates that the lake can sustain a daily withdrawal of 8000m^3/day equal to the theoretical design capacity of the treatment plant.

- Kbal Chay Reservoir

In 2008 Anco. Co., a private concession, constructed an impounding reservoir on the Prek Tuek River just upstream of the Kbal Chay waterfall to provide a long-term water supply

source for Preah Sihanouk. The scheme includes a surface water treatment plant located at the reservoir.

The reservoir has a catchment area of approximately 46 km2 located in a protected forested area.

Storage is provided by three dams in series which are reported to provide a total net storage volume of 9,375,000 m^3 (JETRO-Pacific Consultants 2008). A water balance model for the reservoir based on rainfall and evaporation for nearby Preah Sihanouk and daily discharge measurements taken over a five year period (2002 to 2006) indicates a potential maximum dry season yield of 66,800 m^3/day and a wet season yield of up to 535,000 m^3/day. There is no analysis to indicate the expected reliability of this yield.

- Groundwater Resources

Three groundwater wells were constructed in 2003 (World Bank) to provide a short term solution to the city's dry season shortage of water resources. Production wells are located on a hillside north of the urban area, in a zone that is influenced by the east stream valley. The wells can provide a combined production output of about 2000 m^3/day.

Three wells were constructed in 2004 but are no longer used by the water supply authority because treated water is now available from Kbal Chay at a lower cost.

3) Treatment

- Public Surface Water Treatment Plant

The city's water treatment plant, built in the 1950s, was last refurbished in 2003 under the World Bank's Urban Water Supply Project. The treatment plant is located at the highest point in Preah Sihanouk next to the Wat Leu temple at an average ground level of 122m above sea level.

The treatment plant is a conventional filtration plant with a design capacity of 7,600 m^3/day. Boeng Prek Tup has a low dry season yield making it impossible to use the full production capacity of the treatment plant.

The plant has 4 rapid sand filter cells with an air scour backwash system. The plant is also equipped with initial chlorine injection and chemical flocculation with small mixing basins prior to filtration.

Raw water is abstracted from the lake and pumped up to the publicly operated treatment plant via a 400mm diameter ductile iron pipe that was installed in 2003 (World Bank).

- Public Groundwater Treatment Plant

Water quality data from previous studies (Parsons Eng. March 2000) indicates that the total dissolved solids and all the inorganic constituents except iron and manganese are far below the WHO drinking water guidelines. The iron concentrations in production wells ranged from 0.22 to 13.2 mg/l and exceeded the WHO guideline (0.3 mg/l). The manganese concentrations ranged from 0.04 to 0.8 mg/l which is above the WHO guideline (0.1mg/l)

Groundwater is treated at a small stand alone packaged treatment plant (aeration and pressure filters) to remove iron and manganese before being used in the potable water system.

Treated water is chlorinated and pumped to two circular concrete storage tanks located next to the groundwater treatment plant. The tanks are reported to have a combined storage capacity of 200m^3 and an overflow level of 75m. Water from the tanks is distributed by gravity.

- Private surface water treatment plant

The plant at Kbal Chay is a conventional filtration plant with a design capacity of 10,000 m^3/day.

The plant has 4 rapid sand filter cells with an air scour backwash system. The plant is also equipped with initial chlorine injection, pre-aeration and chemical flocculation with small mixing basins prior to filtration

Production at the plant and pumping of treated water is interrupted by power failures because there is no standby generator.

4) Storage

Preah Sihanouk has three small storage reservoirs with a total capacity of 1150 cubic meters. There are no elevated tanks. Table 2.3.5 summarizes information related to these facilities.

Table 2.3.5 Storage Facilities

Name	Location	(1) Capacity (m3)	(2) Ground elevation
Treated water storage	Public water treatment plant	450	122
Balancing tank R1	Junction of NR4 and access road to Kbal Chay	500	110
Service reservoir R2	End of treated water transmission pipeline just below the public treatment plant	200	98
	TOTAL	1,150	

(1) Capacity of R1 and R2 is estimated based on visual observations
(2) Ground Elevations are approximate based on contour maps

5) Transmission and distribution

- Raw Water Transmission

Raw water for the public water treatment plant is pumped from Boeng Pre Tup. The raw water pumping station was refurbished in 2003 under the World Bank project. It is equipped with 3 pumps (1 standby) with discharge capacity of 45.8 liter/sec and pumping head of 135 m. A new raw water main (400 mm diameter ductile iron) was also constructed in 2003.

- Treated Water Transmission

Treated water from Kbal Chay is pumped via 2 350 mm diameter HDPE pipelines to a small balancing tank (reservoir #1) located at ground elevation of 110 m. Water is conveyed by gravity from the balancing tank to service reservoir #2 located near the public water treatment plant at ground elevation 100 m.

Details on the private water supply scheme such as size of transmission pumps, and storage capacity of the balancing tank and service reservoir are not available. Based on visual

observations this study assumes the balancing tank and service reservoir each have a volume of about 500 m^3.

The treated water transmission main is HDPE, has a diameter of 350 mm and a length of approximately 7 km. It provides a maximum conveyance capacity of about 208 m^3/hour (5,000 m^3/day).

- Distribution

The original distribution system dates from the late 1950s and early 1960s. The system was extended from 32 km to 52 km in 2004 (World Bank) and the number of connections increased from 921 at appraisal to 2,658 at closing of the project. The number of connections currently stands at 3711. Further expansion will be slow to achieve, because parts of the transmission lines and the network are very old, and also because the utility lacks materials and capacity to repair and expand the network

The distribution system includes pipelines from 63 mm to 250 mm in diameter, totaling approximately 50,500 linear meters of pipe. These are summarized by type of material in Table 2.3.6.

Table 2.3.6 Summary of Distribution Piping

Material	Length (m)	Age (years)
DI	17,415	50
HDPE	33,131	5
Total	50,546	

The distribution system is supplied by gravity from the public treatment plant and private sector service reservoir#2. The high elevation of these reservoirs creates high pressures in the areas of the city located at lower elevations. High pressures are controlled by partially closing butterfly valves in the distribution system.

The area along NR4 east of the treatment plant is supplied by a separate gravity trunk main from treatment plant. Ground elevations in this area range from 94 to 107 m and pressure is very low.

The water supply authority reports that residual chlorine levels are very low because the old pipes have a high chlorine demand and also because customers complain about taste and odor.

Despite high pressures non revenue water has been reduced from 30% before the World Bank project to only 15%.

- Water tariffs and production costs

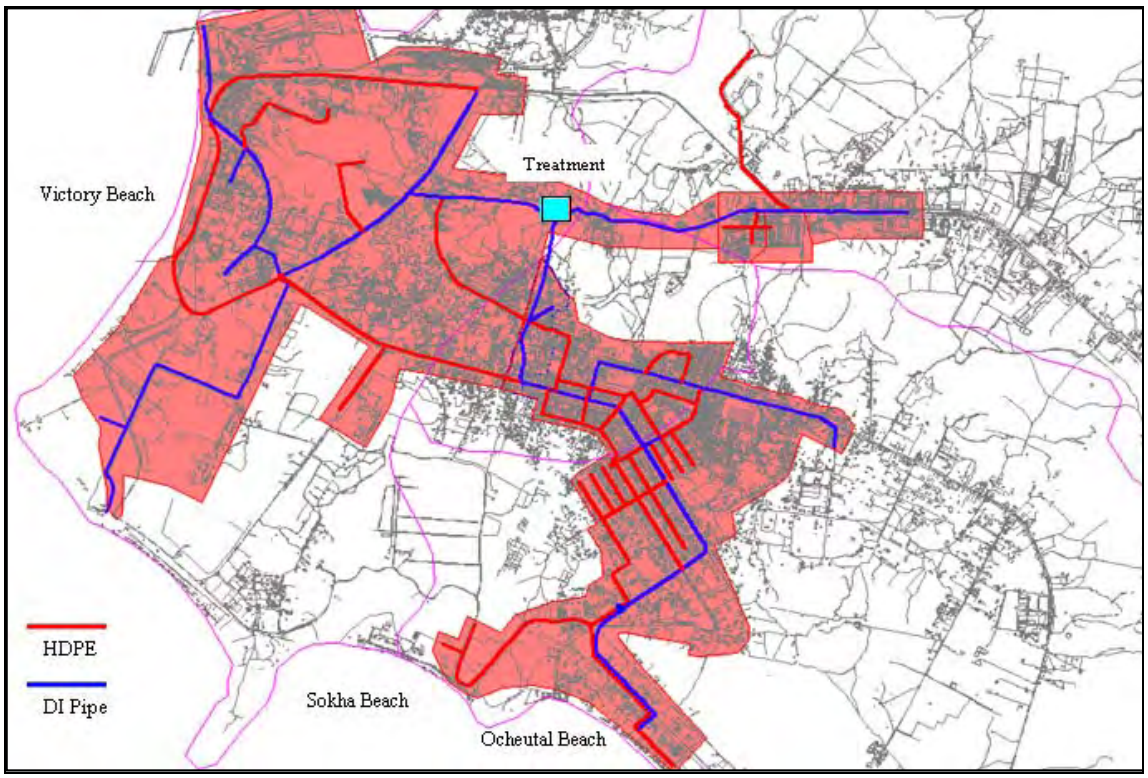
Current production costs reported by SWSA are 970 Riel /m^3. Treated water from Kbal Chay is purchased for 1000 riel/m^3.

Block tariffs are applied as follows:

(i) Type 1 (0-7m^3) : 1500 riel /m^3

(ii) Type 2 (8-15m^3/month) : 1800 riel /m^3

(iii) Type 3 (>15 m^3/month) : 2000 riel /m^3



Source: JICA Study Team

Figure 2.3.12 Existing Water Distribution System

(2) Water Demand

Detailed explanation for the water demand projection is given in Appendix attached at the end of Book II report. The following is the summary of the projection.

1) Population forecast

Preah Sihanouk is experiencing rapid growth. The population has grown from 66,723 in 1998 to 89,846 in 2008, an increase of 3% percent per annum. Future growth will occur mainly to the southeast side of Preah Sihanouk, along NR4 and on remaining undeveloped land throughout Preah Sihanouk. This study estimates that the urban population will be 169,696 by the year 2030. Population history and projections for Preah Sihanouk are shown in Table 2.3.7.

Table 2.3.7 Population History and Projections

Year	Urban Population
1998	66,723 a
2008	89,846 a
2020	128,592 b
2030	169,696 b

(a) source: Census
(b) source: JICA study team projections, October 2009

2) Domestic Water Demand

Domestic per capita water demands used for planning in this study are indicated in Table 2.3.8.

Table 2.3.8 Domestic Water Demand

Year	Domestic Consumption (liter per person/ day)
2020	140
2030	150

These values are the same as those adopted for planning by the water supply authority in Preah Sihanouk and are consistent with unit water consumption values adopted for planning in Phnom Penh, in Vietnam and other Southeast Asian countries.

Per capita domestic consumption is assumed to increase over time to reflect an improved living standard and improved service levels.

3) Commercial and Institutional Water Consumption

Commercial consumers including hotels and guesthouses meet their water demands by supplementing water from SWSA with groundwater from their own wells. It is not possible to determine exactly the amount of water used by these consumers without a detailed inventory and survey of existing hotels.

Projections carried out by this study indicate that there will be a significant increase in tourism activity in Preah Sihanouk. This study adds 25% to the domestic demand as an allowance for future commercial and institutional demand.

The water supply authority indicates that the Sokha Hotel complex is a large consumer and will increase its consumption in the near future as it completes an expansion of their guest facilities. This study adopts the water demand estimates proposed by the water supply authority for the Sokha Hotel as indicated in Table 2.3.9.

Table 2.3.9 Sokha Hotel Complex Water Consumption

Sokha Hotel	2008	2020	2030
Demand in m^3/ day	173	500	650

4) Industrial demand

Industrial activity in Preah Sihanouk is limited to Cambrew and a few small textile and garment manufacturers.

- Cambrew

Cambrew is the largest single consumer in Preah Sihanouk. Cambrew manufactures “Angkor” brand beers as well as soft drinks “Pepsi” and “7-up”. Cambrew has steadily increased its market share and the demand at present is on average 1800 m^3/day. Cambrew is at present

obtaining 50% of its water supply from SWSA. The balance is obtained from a separate treated water pipeline from the Kbal Chay water supply scheme.

- Port SEZ

A Special Economic Zone (SEZ) is being constructed next to Sihanoukville Port. The forecast demand is 2000 m^3/day by 2020. A total of 4 wells with a yield of 500 m^3/day have been drilled to supply the SFPZ in the short-term until the city's water supply network can be extended.

- Other factories

This study does not foresee the development of any large industries within the urban area that would impose an unusual demand on water supply. Most of the industrial activity will occur in the special economic zones that are being developed outside of Preah Sihanouk. However this study makes an allowance of 150 m^3/day in the demand forecast for smaller factories that may choose to locate outside the special economic zones. This number is the same as that proposed by the water supply authority.

5) Unaccounted for Water

Unaccounted for water (UFW) represents the difference between "net production" (volume of water delivered into a network) and "consumption" (the volume of water that can be accounted for by legitimate consumption, whether metered or not). UFW falls into two categories:

(i) Non physical Loss which is water consumed but not recorded by the consumer's meters or otherwise accounted for by government or other public use. It is reflected as a loss of revenue. It includes water consumed through illegal connections.

(ii) Physical loss which is water lost through leakage

The current (2008) figure for UFW in Preah Sihanouk is 15.6% which is low relative to the average value of 28% reported in a survey of 40 utilities in Southeast Asia (SEAWUN 2005). It is assumed that most of the UFW is due to leakage caused by high pressures in the system. The percentage of UFW water is expected to remain low because most of the piping is relatively new. This study assumes a typical planning value of 20%.

6) Peaking Factors

Water use varies with the time of year and the time of day. To account for these variations, peaking factors are commonly used in evaluating water system operating characteristics. Peaking factors are multipliers that are applied to the average day demand to approximate other peak water demands. Peaking factors are often estimated because of the lack of detailed water use data. Peak water demands and associated peaking factors that are important in evaluating water system performance are discussed below.

The average day demand (ADD) is the total volume of water used during a year divided by 365 days, usually expressed in terms of cubic meters per day (m^3/day). In order to estimate future demands based on population growth, ADD is also expressed in terms of liters per capita per day (lpcd). Peaking factors are applied to the ADD to estimate the other peak demands.

The maximum day demand (MDD) is the highest daily water use rate during the year. The MDD peaking factor is the ratio of MDD to ADD and normally occurs during the dry season. Records maintained by the Preah Sihanouk water supply authority indicate a MDD factor of 1.25.

The peak hour flow (PHF) is the highest hourly water use rate during the day. The hourly peaking factor is the ratio of PHF to ADD. This factor is usually estimated based on engineering judgment, since it is difficult to determine the actual maximum hour demand in the system. The water supply authority in Preah Sihanouk and Phnom Penh have adopted a MHD peaking factor of 1.8 and this is considered appropriate for planning purposes.

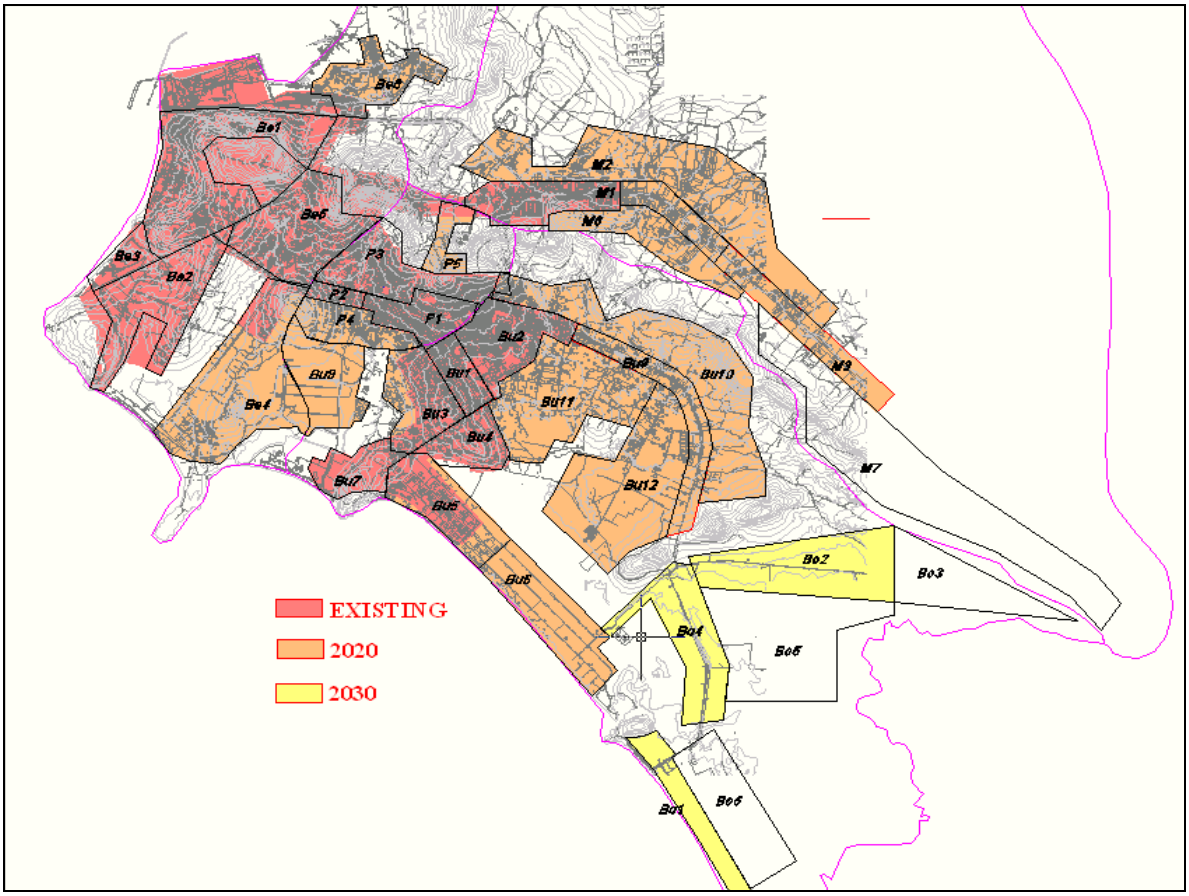
7) Water Demands for Existing and future conditions

For the purposes this study, water demands for the existing and future conditions are defined as shown in Table 2.3.10.

Table 2.3.10 Water demands for existing and future conditions

Parameter	Units	2008	2020	2030
Population		23,450	68,897	117,016
Domestic Demand	lpcd	122	140	150
	m^3/day	2,858	9,646	17,552
	m^3/hour	119	402	731
Tourism/commercial demand	multiplier	0.25	0.25	0.25
	m^3/day	Included in	2,411	4,388
	m^3/hour	domestic demand-	100	183
Large consumers	m^3/day	1,263	3,450	4,600
	m^3/hour	53	144	192
Leakage	ratio	16%	20%	20%
	m^3/day	643	3,101	5,308
	m^3/hour	27	129	221
Average Day Demand	m^3/day	4,763	18,608	31,849
	m^3/hour	198	775	1,327
Maximum Day Demand	multiplier	1.25	1.25	1.25
	m^3/day	6,812	23,260	39,811
	m^3/hour	284	969	1,659
Maximum Hour Demand	multiplier	1.8	1.8	1.8
	m3/hour	12,261	41,869	71,659
	liter/sec	511	1,745	2,986
Total Annual Demand	million m^3	1.74	6.79	11.62

Source: JICA Study Team



Source: JICA Study Team

Figure 2.3.13 Water Supply Service Area

Source: JICA Study Team

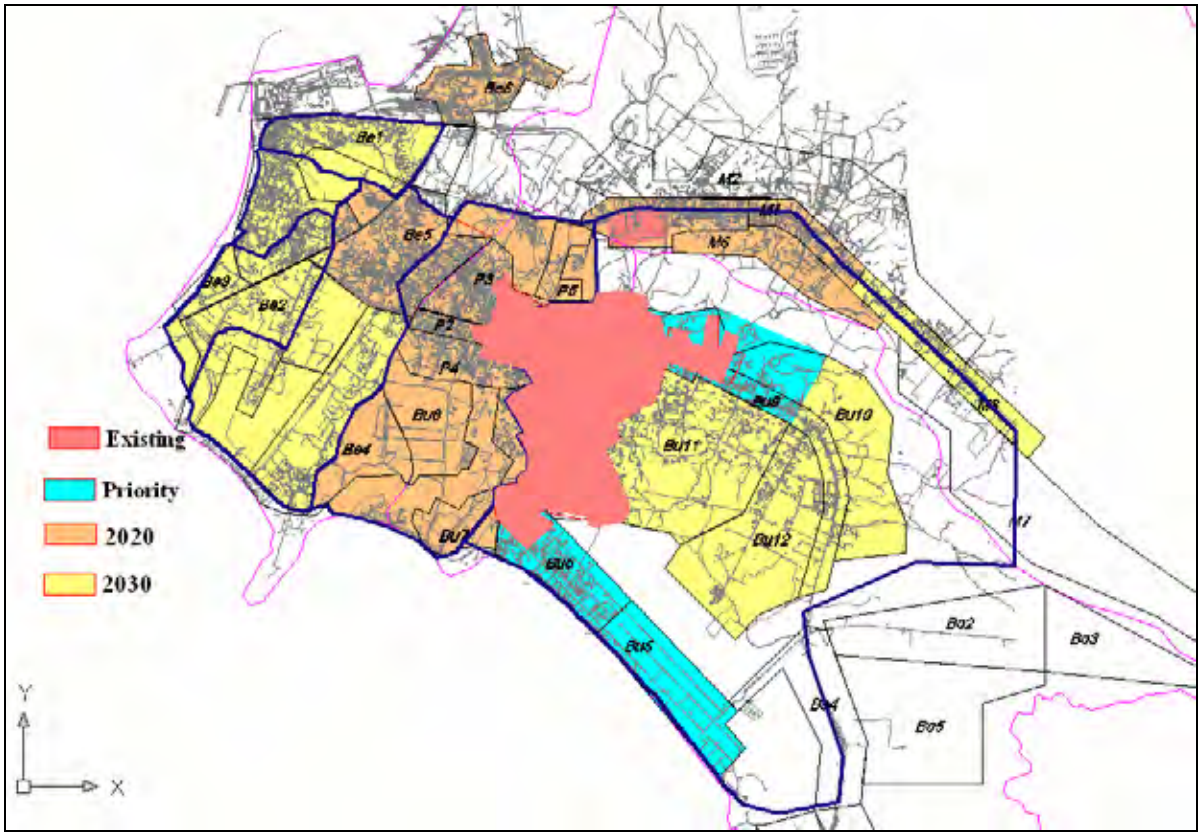
Figure 2.3.14 Potential Water Resources

2.3.4 Wastewater Disposal

(1) Wastewater Quantities

1) Service Area and Service Criteria

For planning purposes it is assumed that wastewater will in general be collected by a conventional sewerage system in urbanized areas where piped water supply is provided and where population densities will be at least 70 persons per hectare. Servicing areas with lower population densities is usually not financially viable. This planning criteria is similar to the one that was adopted for the ADB project. Areas with lower population densities can dispose of wastewater to septic tanks. Proposed wastewater collection areas are shown in Figure 2.3.15.

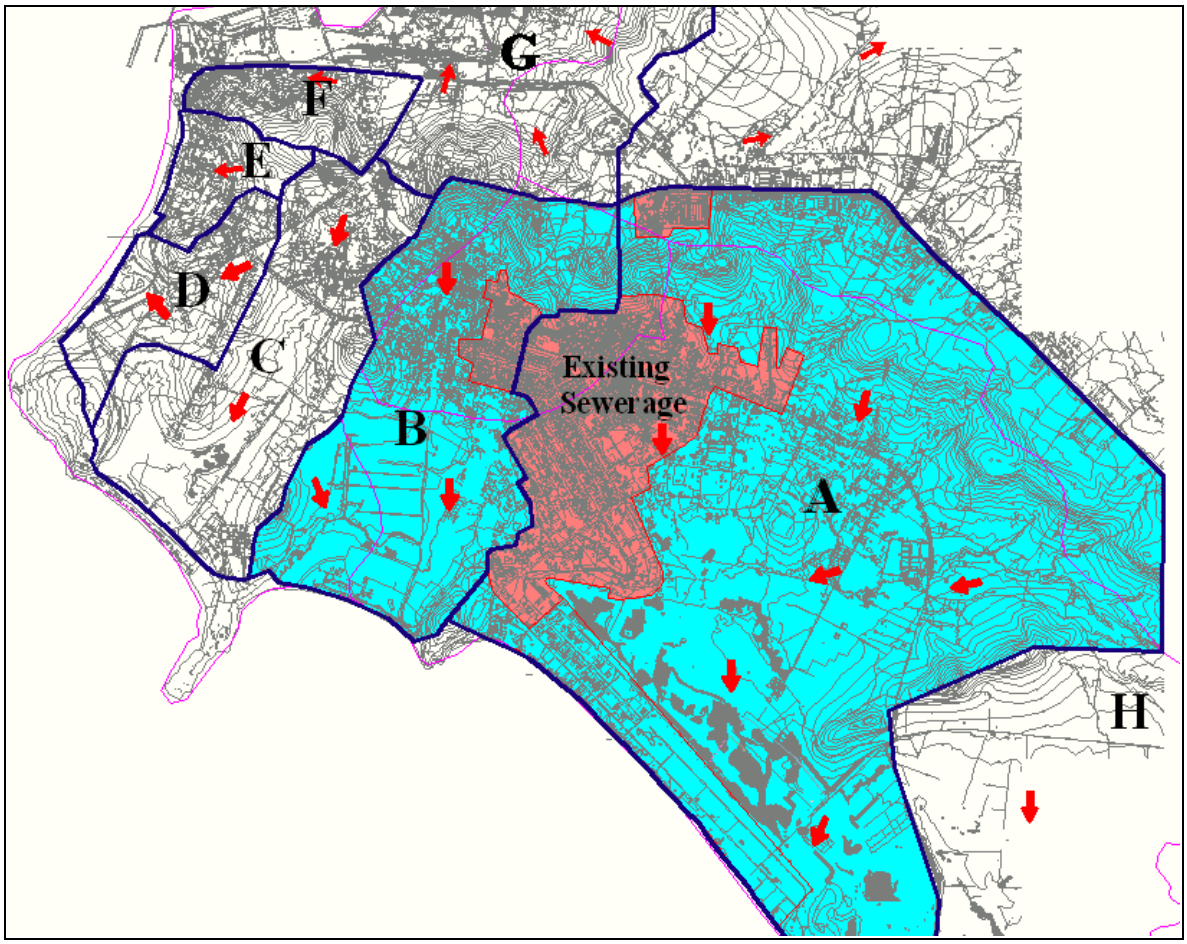


Source: JICA Study Team

Figure 2.3.15 Proposed Sewerage Service Areas

2) Natural Drainage

The physical layout of the collection system will depend on topography and to a very large extent on natural drainage. City areas generating wastewater are sub-divided into natural drainage catchments on the basis of topography to minimize pumping. Drainage catchments and the existing sewer service area are identified in Figure 2.3.16.



Source: JICA Study Team

Figure 2.3.16 Drainage Catchments

Catchment A: Includes the heavily populated commercial core of the City which has a wastewater collection system. Drainage in this catchment flows to a stream which discharges east of Ochheutal beach. Areas to the east of the city center are sparsely populated but land development is beginning to take place in the area.

Catchment B: The upper catchment includes part of the City Center. Drainage in this catchment flows to a stream which discharges to a pond located behind the Sokha beach resort hotel. A large land development project is taking place in the lower part of the catchment.

Catchment C: The area is sparsely populated but some development activity has already taken place in the upper catchment. Wastewater in this area drains to Boeng Prek Tup which is a source of raw water for the water supply system.

Catchment D: Wastewater in this area drains to Hawaii beach. Two large resorts are being developed along the beach front. This study assumes that these developments will provide their own wastewater treatment facilities since they have a vested interest in keeping the water and the beach clean.

Catchment E: Wastewater in this area drains to Victory beach. The area has a large number of hotels and restaurants.

Catchment F: Wastewater in this area drains mostly towards the Port but a small amount also discharges towards the Victory beach side.

Catchment G: wastewater in this area drains to the north east side of the Port. The area is heavily populated by informal settlements accommodating laborers and fishermen. This area is within the Port expansion zone and will likely be resettled when the port is expanded.

Catchment H: wastewater in this area drains to the Southeast into low lying marshy areas behind Otres Beach. The area is sparsely populated and will remain so until 2030.

3) Service population

The population generating wastewater is the same as the population connected to the water supply system. For the purposes of planning sewage collection and sizing treatment facilities the service population is divided into drainage catchment areas as shown in Table 2.3.11.

Table 2.3.11 Estimated Service Population by drainage catchment

Drainage Catchment	2008	2020	2030
A	11,509	32,276	57,133
B	6,208	11,946	16,388
C	1,729	7,336	13,312
D	898	4,018	7,840
E	1,052	2,842	3,712
F	979	2,646	3,456
G	0	2,597	3,392
H	0	500	3,551
Other	1,076	4,736	8,232
Total	23,450	68,897	117,016

4) Wastewater Generation Rates

Wastewater generation is a function of the water that is consumed however not all water is returned as wastewater. Some portion will be consumed for drinking and cooking or may be used for watering gardens or washing cars. The wastewater return factor generally ranges between 0.70 and 0.85. Higher return factors are typical for low to middle income households or high density urban areas whereas lower return factors are typical for high income households or lower density sub-urban areas with larger plots.

The return factors used for calculating wastewater quantities in this study are identified in Table 2.3.12.

Table 2.3.12 Wastewater Return Factors

Domestic/Commercial/Institutional	0.85
Hotels	0.70
Cambrew	0.50

5) Infiltration factor

Calculations for the amount of sewage collected during dry weather must include a factor for the groundwater that enters the system through leaking pipe joints and manholes. A factor of 15% is added to the total projected sewage flow to calculate the average daily wastewater flow. The factor reflects relatively high groundwater tables and poor surface drainage.

6) Wastewater Quantities for Existing and Future Conditions

For the purposes of this study the average daily wastewater amounts are defined as shown in Table 2.3.13

Table 2.3.13 Average Daily Wastewater Flow (dry weather)

Drainage Catchment	2008 m^3/day	2020 m^3/day	2030 m^3/day
A	2,044	5,762	9,723
B	841	1,781	2,550
C	375	1,493	2,587
D	107	550	1,150
E	125	389	544
F	117	362	507
G	-	355	497
H	84	1,046	2,476
Total	3,693	11,739	20,033

Note: Includes allowance for infiltration

These amounts include the following wastewater contributions from large water consumers.

Table 2.3.14 Wastewater Flow from Large Consumers

Catchment	2008	2020	2030	
A	585	1,170	1,170	Carnbrew
	88	128	128	Factories
B	147	425	553	Sohka Hotel
C	-	-	-	
D	-	-	-	
E	-	-	-	
F	-	-	-	
G	73	850	1,700	Port Authority
H	-	-	-	
Total	894	2,573	3,550	

7) Inflow factor

A separate wastewater collection system should not be receiving storm water flows since it will only be collecting wastewater from household connections. Nevertheless extraneous inflow of surface water does occur during wet weather typically through manhole covers. The hydraulic capacity of the collection system and the treatment plant must be designed to handle. Average daily wastewater flows should be increased by a typical factor of 1.2.

(2) Existing System

1) General Situation of Wastewater in Sihanoukville

Water quality surveys found that the most heavily polluted rivers are located in the more densely populated Southeast coast (Sihanoukville, Kampot and Kep) and are also impacting the near-shore waters. Urban wastewater treatment is absent in all urban centers except for part of Preah Sihanouk. Wastewater is discharged to open storm water drains, sometimes to septic tanks or pits, polluting freshwater sources and rivers that eventually discharge to the coastal marine environment. The uncontrolled discharge of wastewater has a negative impact on beaches, tourism development, and fishing industry.

Lack of sufficient monitoring is another issue. Water quality along the beaches is monitored regularly for fecal coliform. At the moment there is no data to establish if the discharge of wastewater is having an impact in terms of health risks to swimmers and fisheries. Water quality data is necessary to establish trends and support decision making for the implementation of future sewerage projects.

2) Service Area and Design Flows

The extent of Preah Sihanouk's existing wastewater collection system is shown in Figure 2.3.17. The area covers the commercial core and densely populated areas around it.

The collection system is designed to serve a population of 89,000 at full development.

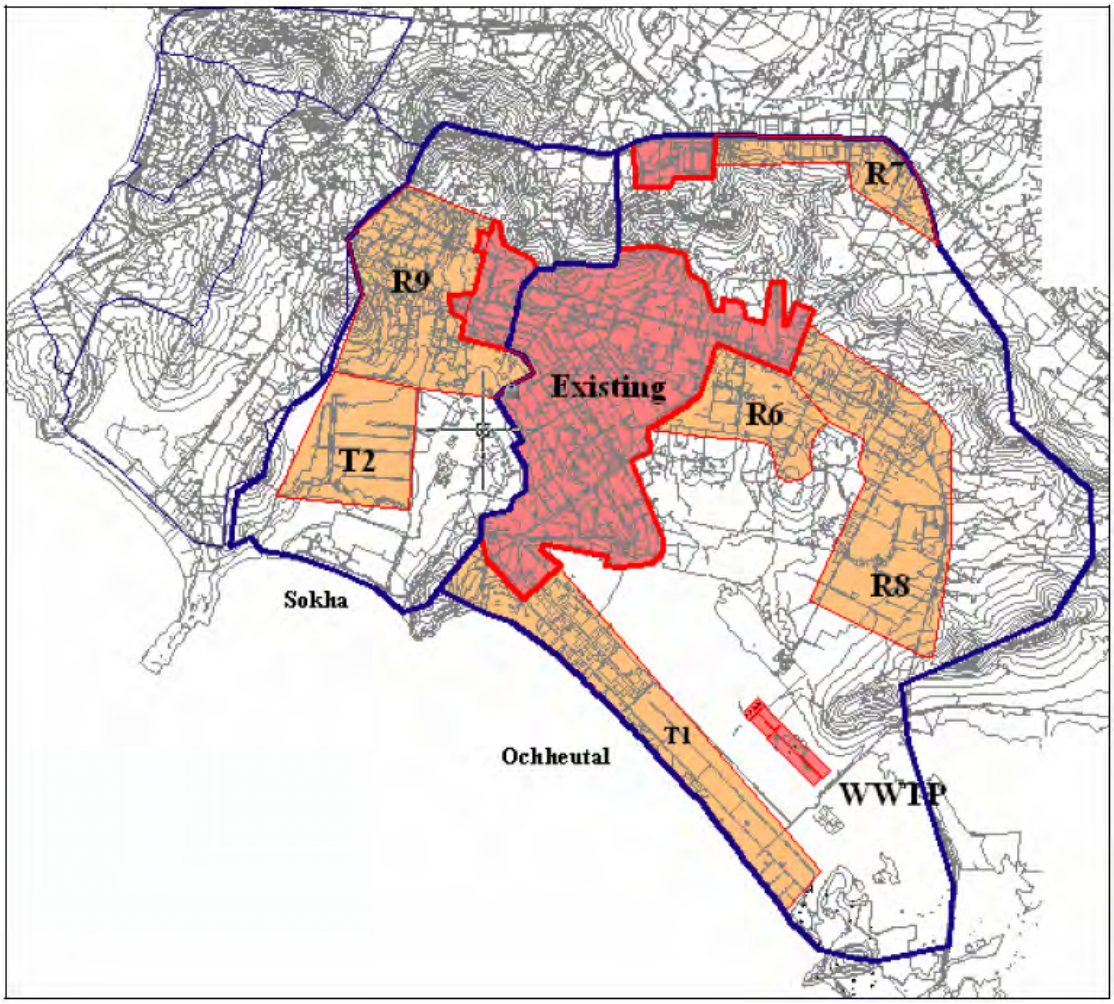
Table 2.3.15 Existing Service Area and Design Flows

Area	Design Population	Average Daily Wastewater Flow m^3/day	Drainage Catchment
Initial project service area	38,288	10,674	A
Future			
R6	6,579	855	A
R7	2,563	333	A
R8	12,461	1,620	A
Subtotal	59,891	13,482	A
Future			
R9	14,474	1,882	B
T2	14,653	4,979	B
subtotal	29,127	6,861	B
Total	89,018	20,343	

Note: Design flow for the initial service area includes 1600 m^3/day from Cambrew

The number of people presently connected to the system is unknown and there is no flow measurement to indicate the amount of wastewater that is reaching the treatment plant. This study estimates that the present population inside the sewer serviced area is 8,200 (2008).

Some of the existing system is the low connection of the wastewater sources to the system. This is partly due to the fact that there is no by-law to make it required to connect to the sewerage system. This results in low flow and slow velocity of wastewater in the system.



Source: JICA Study Team

Figure 2.3.17 Existing Sewerage Plan

3) Collection System

Calculations provided in the wastewater project design report indicate that the trunk sewer network is designed to accommodate the flows from future growth areas identified in Table 2.3.13.

Flows from future growth areas to the Northwest (R6, R7 and R8) are planned to flow by gravity into the upstream part of the network.

Flows from future growth areas to the West (R9 and T2) are planned to be pumped to the trunk sewer along Ochheutal beach.

Sewer pipes materials are corrosion resistant PVC and GRP. Pipe diameters have been sized on the basis of average design flows plus a 10% allowance for inflow of surface water and infiltration of groundwater into the system.

The south trunk sewer to the wastewater treatment plant is designed for a peak flow of 499 liter/sec.

4) Treatment Plant

The first stage of the treatment plant has a hydraulic capacity of 6,900 m^3/day and is designed for an organic loading of 1,380 kg/day (BOD). The treatment plant can be expanded in the future by duplicating stage 1 and by adding aeration equipment if organic loading exceeds design assumptions.

The system consists of two parallel hydraulic lines. Each line consist three types of ponds arranged in series: 2 anaerobic ponds in parallel, a facultative pond and a maturation pond. This series of pond is duplicated in a parallel line. The ponds are cost effective, require little maintenance and generally perform well for BOD and solids removal and can also reduce fecal Coliform levels to acceptable levels for discharge to receiving waters.

The anaerobic ponds (AP) are deep (4 m) to promote sedimentation of wastewater solids and anaerobic decomposition to methane. Pond volume is 5,520 m^3 with a hydraulic retention time of 1 day. Effluent from the AP flows by gravity to the facultative pond.

The facultative pond (FP) is a shallow pond (1.75 m) where wind action and sunlight combine to promote aerobic decomposition of remaining dissolved organic matter from the wastewater. Algal photosynthesis produces the oxygen required to support aerobic decomposition. Algal growth also raises pH which enhances inactivation of fecal coliform. The FP has a surface area of 7841 m2, and a hydraulic retention time of 3.7 days. Effluent from the FP flows by gravity to the maturation pond.

The maturation pond (MP) is a shallow pond (1.5 m) with longer residence time of 5 days that promotes further solar-UV disinfection and polishing of the wastewater, and enables effluent storage before discharge or subsequent reuse.

The system is designed to meet the following effluent standards:

BOD5	< 50 mg/liter
SS	< 80 mg/liter
Fecal Coliform	< 1000 MPN/100 ml

2.3.5 Solid Waste Management

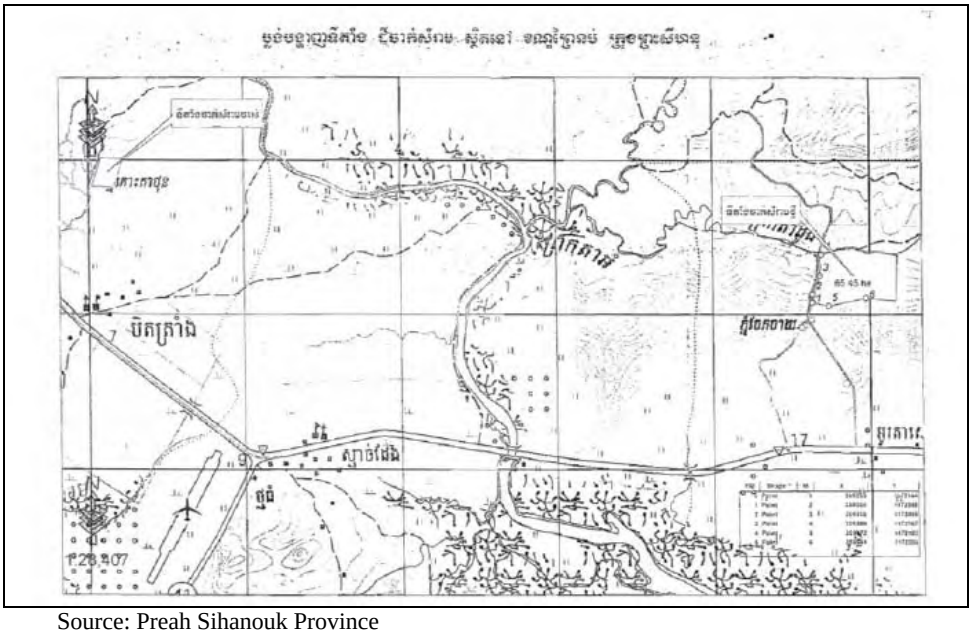
(1) Present Conditions of Solid Waste Management in Preah Sihanouk Province

The following are significant current conditions of SWM in Preah Sihanouk Province.

- Remaining capacity of the existing dumping site will be used up in the near future. The Province is planning a new sanitary landfill site to receive waste from Krong Preah Sihanouk (central town) and Prey Nob district. In addition, the existing dumping site is not sanitary, because soil cover is not conducted and, there is no leachette system. To establish the new sanitary landfill, technologies and operation systems to secure sanitary conditions should be introduced. Urgent preparation for the new landfill site is necessary because a sharp increase in the amount of household waste and commercial waste in urban areas are projected in accordance with the increase in population and tourists.

Source: JICA Study Team and MLMUPC

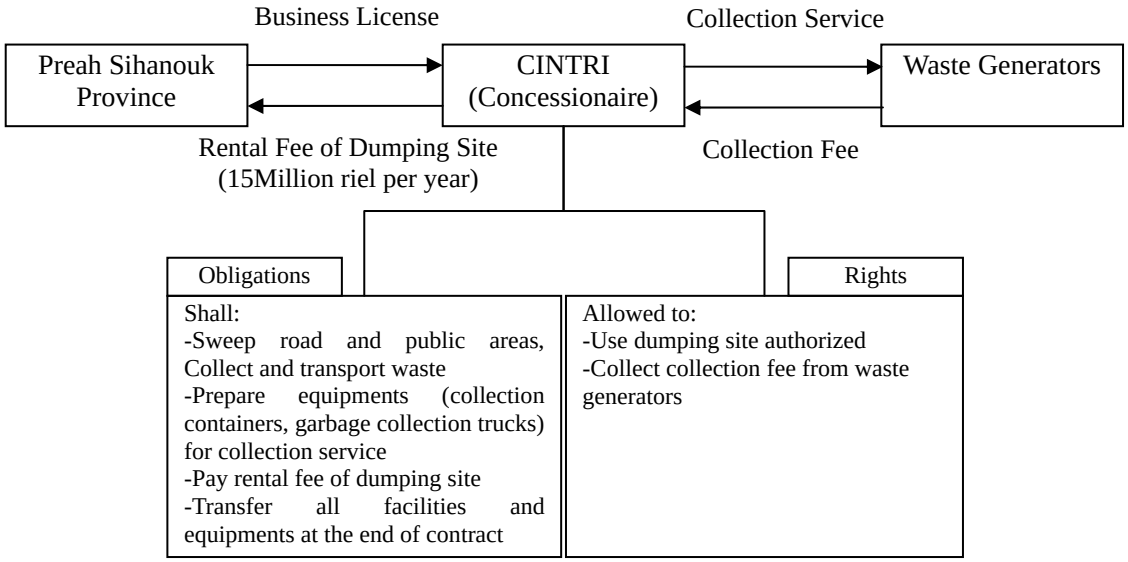
Figure 2.3.18 Location of Current Dumping Site and Proposed Site for Future Dumping Site in Sihanouk



Source: Preah Sihanouk Province

Figure 2.3.19 Proposed Sites for the New Dumping Sites in Sihanouk

- Insufficient Collection Service:
  In Preah Sihanouk Province collection service of solid waste has been provided only in the central town by a private company, with whom. Preah Sihanouk Province entered into a business agreement for garbage collection service. Under the contract while the company provides collection service with their own equipments such as collection containers and gage collection trucks, the company is allowed to collect a service fee from waste generators based on the list of garbage collection fee shown by type of waste generator. They are also allowed to dump collected waste at a dumping site in exchange for a rental fee. The contract period is 15 years from 2001 to 2015. At the end of the contract period, the above-mentioned equipments shall be transferred to the Province. This contract could be regarded as a type of concession contract. In fact, the private company who concluded the contract with the province went bankrupt, and then another company succeeded the previous contractor. However, the collection service has not been stable and sufficient to maintain the public sanitation condition. If the collection service is not properly provided in accordance with a sharp increase in the amount of waste, it would cause smell and affect a landscape. Finally these conditions would carry a negative image of the province to tourists and investors. At present, CDC and CINTRI of the concessionaire of collection service discuss improvement of the collection service in Preah Sihanouk Province toward and after 2015 when the present contract will expire. Under the present concession, there are lacks of a monitoring system for activities of the concessionaire and a performance-based payment system. These lacks of administrative systems may lead to the unstable and insufficient collection service.



Source: JICA Study Team (based on the contact document)

Figure 2.3.20 Structure of Contract of Garbage Collection Service in Sihanouk

- There is a village that has introduced primary collection service by Community-based SWM. It contributes to the improvement in collection of garbage collection fees from households, stable secondary collection service by the private company and improvement of sanitation in the community. This is a model activity coordinated by the International Cooperation Office and Project Coordinator of Integrated Costal Management (ICM) in Preah Sihanouk Province. The summary of the project is shown in the following table.

Table 2.3.16 Good Practice of Community-based SWM in Sihanouk

Profile of the Community	Village 1 Number of Households: 270 households Number of Groups: 16 groups
Commencing Time	Since 2006
Basic System of Community-based SWM	Community of SWM was organized with members selected from the village. The community is responsible for primary collection service, meaning collection of waste from its residents and businesses. A private company conducts secondary collection service, meaning collection and transport of waste collected by the primary collection service. The Community of SWM collects garbage collection fee from waste generators, and manages it.
Organization of Community of SWM	Leader: 1, Sub-leader:1, Financial management: 1 Leaders from each group: 16 (Note) they are different with community leaders. They are selected as leaders of Community of SWM
Primary Collection System	Two workers hired by the Community of SWM collect waste from each households and businesses by handcart from 8:00am to 2:00pm, and bring it to three designated loading points. CINTRI collects waste from three designated collection every day after 2:00pm.
Garbage Collection Fee	Community of SWM collects garbage collection fee from waste generators, households and businesses. At the beginning of the project, 200 households of 270 household (74%) paid for the fee. At present, 150 households (56%) paid for the fee. The Community of SWM introduces different collection fee according to economic status of households as follows: Normal: 3,000 to 4,000 riel/ month, Poor: 2,000 to 1050 riel/ month Total amount of collected fee: 500,000 riel/ month Amount of fee paid to CINTRI: 350,000 riel/ month (The remaining amount, 150,000 is appropriated to the primary collection service by provided by itself.)
Advantages and Issues	Advantages: Sanitary condition on the village was improved compared to before. Many waste generators in the village have paid for the garbage collection fee after implementation of Community-based SWM. Collection service provided by the company was improved; frequency of dates of garbage collection service was raised and stable. Community of SWM and the Private company hold meeting for adjustment of the service regularly and according to need. Issues: Collection ratio of garbage collection fee became lower than it at the beginning. If it reduces more, it is difficult to maintain the primary collection service. Equipments for primary collection service are aging.

Source: JICA Study Team (based on the hearing from the village)

- At present around 30 factories that discharge industrial waste are located in Preah Sihanouk Province. CINTRI collects industrial waste from factories. Some factories dispose and recycle it after treating sludge with treatment plants. At present, there is no report on pollution by industrial waste in Preah Sihanouk Province. However, in general some of industrial wastes could be hazardous waste referring to the sub-decree on Solid Waste Management, and in Sihanouk there are no companies that have license to treat hazardous waste. It is anticipated that the number of factories will increase in accordance with the economic development, and some of them may generate hazardous waste.

- There are three areas polluted by solid waste scattered by residents. It is anticipated that they might affect not only environment but also human health and tourism. Some solutions are necessary in order to recover the polluted areas with social consideration to residents.

(2) Key Issues to Establish the Future Solid Waste Management in Preah Sihanouk Province

Based on the current conditions of SWM in Preah Sihanouk Province, the following are key issues.

- Establishment of a new sanitary landfill site to receive waste from urban area is urgent in consideration of increase in the amount of waste in future. In addition, technologies and operation systems to secure sanitary conditions of the new landfill should be introduced.
- It is indispensable to enhance administration of private concessionaire in order to achieve proper level of service. Contract conditions of the concession should be carefully reconsidered in 2015 when the present contract will expire. A monitoring system for activities of the concessionaire and a performance-based payment system should be added on the contract conditions. The province needs not only to regulate the private concessionaire but also prepare conditions to exert a market mechanism so that private sector would make effort to reduce costs and could make profit based on the concept of PPP (Public-Private Partnerships). In case that there is no profitability in collection service, even the type of the contract of concession should be reconsidered.
- It is desirable to introduce community-based SWM to other areas in harmony with 3R concept.
- Countermeasures should be prepared for hazardous waste from the factories in the future in consideration of an increase in the number of factories in accordance with the economic development. MoE is responsible for hazardous waste in accordance with the Sub-decree on Solid Waste Management, however, the province and MOE have to jointly address the establishment of hazardous waste management in order to efficiently prevent pollution derived from hazardous waste.
- Sanitary conditions in polluted areas should be improved in consideration of future development of tourism. It is important to consider how to involve residents living there. The following map shows polluted areas in Preah Sihanouk Province.

Source: JICA Study Team and MLMUPC

Figure 2.3.21 Location of Polluted Areas in Sihanouk

2.4 Natural and Social Environment

2.4.1 Present Natural Environmental Conditions

(1) Natural Environment

1) Climate

The climate in Preah Sihanouk province is mainly tropical monsoon climate. The data at the meteorological station are available at Sihanouk city, and rainfall and temperature are shown below.

Temperature

There is no large fluctuation in temperature throughout the year at Sihanouk city. Maximum temperature is between 30 and 33 degrees Celsius, and Minimum temperature is between 21 and 25 degrees Celsius. The weather is hot but not too much, and the temperature is stable.

Table 2.4.1 Monthly Maximum and Minimum Temperature 2003 - 2008 (℃)

Month	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Maximum	30.88	31.41	32.04	32.71	32.02	31.71	30.75	30.78	30.58	31.36	31.71	31.23
Minimum	23.70	23.81	24.78	25.27	21.58	25.05	24.19	24.63	24.51	24.34	24.62	23.65

Source: Meteorology Station in Sihanouk, Ministry of Water Resource and Meteorology

Rainfall

There are a rainy season and a dry season in Sihanouk city. The rainy season is normally from April to October, and most of precipitation is recorded in the rainy season. The precipitation is particularly high from June to September. Localized torrential showers in the rainy season sometimes cause flooding. Annual rainfall in Sihanouk is shown in Table 2.4.2. Annual rainfall is almost constant in Sihanouk. Combined with the high temperature, the climate is suitable for the enrichment of flora and fauna.

Table 2.4.2 Annual Rainfall Recorded in Sihanouk city (2003-2008) (mm)

2003	2004	2005	2006	2007	2008	Average
2821.1	2796.3	2779.6	2808.25	2782.5	2749.0	2789.5

Source: Meteorology Station in Sihanouk, Ministry of Water Resource and Meteorology

2) Flora, fauna and threatened species

Flora and fauna were surveyed in Ream national park by MOE. Ream national park contains a wide variety of habitats, such as mangrove forest, evergreen lowland forest, coral reef, rocky shore, sea grass bed, islands, and marine waters. These habitats support a wide variety of plant and animal species. Many of the species that are found here are threatened species.

Several large mammals inhabit in Ream. These are Common barking deer, Lesser mouse deer, Langur, and Crab-eating macaque, which can be seen throughout the park, and threatened species such as the Smooth-coated otter and Fishing cat. Malayan sun bear, Clouded leopard

and Indochinese tiger have also been reported. The estuary provides a seasonal habitat for marine mammals such as Eastern bottle-nosed dolphin and Irrawaddy dolphin.

Some raptores inhabit in Ream such as Brahminy kite, White-bellied sea eagle, and Grey-headed fish eagle. Kingfishers are common, that are Common kingfisher, Black-capped kingfisher and Stork-billed kingfisher. Threatened birds such as Milky stork, Painted stork and Lesser adjutant are also found.

These above species mostly depend on the nature of Ream national park because inland forests have been degraded and Ream is the last habitat. Development plans are proceeded with in Ream, and most important habitats might be lost. If it is carried out, most of above species must disappear from the surrounding of Sihanouk city.

Meanwhile, there are islands that belong to Preah Sihanouk Province. The islands and encompassing marine water are habitats of terrestrial and marine organisms. Coral reefs develop surrounding islands, particularly around Koh Tang island, Kaoh Rong island, Kaoh Rong Sanlem island and Koh Sdach island. There are about 70 taxa of corals in the coral reefs and those are designated as threatened species (Marine Endangered Species In Cambodia, 2009, FiA). The coral reef nurtures marine organisms including threatened species such as False killer whale, Indo-Pacific bottlenose dolphin, Dwarf spinner dolphin, Pantropical spotted dolphin, Long-beaked common dolphin, Haksbill turtle, Fluted giant clam and Commercial top.

The coral reefs, habitats of several threatened species, have been gradually degraded with illegal fishing (trawling and explosion) and deterioration of water quality. Recently, development plan (a Pavilion project) has come up. It must affect the coral reefs. At present, local tourism agencies manage eco-friendly activities such as diving tours. The anthropogenic impact is maintained as low level. The left important nature in Cambodia should be protected as it is now.

Coral Reef near Kaoh Rong Island
Source: EcoSeaDive 2009

(2) Pollution

1) Water quality

Water quality survey was conducted in 2003. The results are shown in Table 2.4.3. Standard values of No.1-13 in the table are public water for biodiversity conservation of Sub-decree on Water Pollution Control (1999), and standard values of No.14 to23 in the table are public water for public health protection. DO and Feacal Coliform satisfy standard values for biodiversity conservation. Oil and grease exceed. Nitrite exceeds the Canadian water quality guidelines for the protection of aquatic life.

Table 2.4.3 Water Quality Data in Sihanouk City 2003

No.	Parameters	Unit	Sampling points			Standard
			Land port	Fish port	Koh Khyong	
1	Temperature	℃	29	29.5	29.6	–
2	pH	–	8.18	8.1	7.64	7.0–8.3
3	DO	mg/L	6.59	6.24	5.56	2–7.5
4	Salinity	%	5	5	2	–
5	Nitrate (NO_3–N)	mg/L	0.952	1.246	0.877	–
6	Nitrite (NO_2–N)	mg/L	0.043	3.645	0.645	–
7	Ammonia (NH_3–N)	mg/L	0	0	0.001	–
8	Phosphate (PO_4^{-3}–P)	mg/L	0.023	0.035	0.015	–
9	Total Phenol	mg/L	0	0	0	–
10	Oil and Grease	mg/L	4	1	1	0
11	Faecal Coliform	MPN/100ml	<30	<30	36	<1000
12	Enterococci/100mL	MPN/100ml	<30	<30	38	–
13	Total Suspended Solids	mg/L	27.8	19	21.6	–
14	Chromium (VI)	mg/L	0	0	0.007	<0.05
15	Cadmium	mg/L	0.1	0.06	0.08	<0.001
16	Copper	mg/L	0	0	0	–
17	Lead	mg/L	0.3	0.2	0.32	<0.01
18	Manganese	mg/L	0.06	0.04	0.08	–
19	Zinc	mg/L	0.4	0.5	0.3	–
20	Total Iron	mg/L	0.6	0.7	0.9	–
21	Cobalt	mg/L	0.16	0.14	0.21	–
22	Lithium	mg/L	0	0	0	–
23	Nickel	mg/L	0.48	0.42	0.36	–

Source: MOE, 2005, National Report on Land Based Pollution in Cambodia

2) Air Quality, Noise and Vibration

As no survey has been conducted by MOE or related organizations, the EIA for Sihanoukville Prot Urgent Development for Oil Supply Base and Multipurpose Terminal (Port Authority of Sihanoukvill, 2008) was cited below.

Ambient air quality and noise level in port area was measured as a part of EIA . The sampling of ambient air quality and noise level was conducted at one location in the Sihanoukville Port Development Area for 24-hr period on September 07. The location of the measurements is 200m from the main gate of the Special Economic Zone with the coordinates (48 P0338559, 1178740).

The parameters of ambient air quality measured as Air Pollution indicators are TSP (total suspended particulates), CO, NO_2 and SO_2. The laboratory staff of the Ministry of Environment carried out all measurements and analysis.

The 24-hr average value of ambient air quality result recorded with the parameters values of CO (<10mg/m³), TSP (0.02mg/m³), NO_2 (0.012mg/m³) and SO_2 (0.004mg/m³), and they are well within the ambient air quality standards of Cambodia as shown in Table 2.4.4. Accordingly, the baseline ambient air quality is very good at the site.

Table 2.4.4 Results of Ambient Air Quality (Sept. 07)

No.	Parameters	Unit	Site	Remarks
1	Location	UTM	48 PO338559 1178740	Standard of MoE
2	Elevation	m	2.5	-
3	CO	mg/m³	<10	20 (8h average)
4	TSP	mg/m³	0.02	0.33
5	NO_x	mg/m³	0.012	0.1
6	SO_x	mg/m³	0.004	0.3

Source: JBIC EIA Update Study, 2007

The ambient noise was recorded along with the air quality measurement on September 07 for 24-hr period from 6:00am on September 2007 to 6:00am on September 2007. As shown in Table 2.4.5, maximum and minimum noise levels recorded as average was Lmax (62.84 decibels) and Lmin (45.55 decibels) with most machine noise falling within the standard range. These levels are assumed to be representative of the full-shift working hours.

Table 2.4.5 Results of Ambient Noise Level (Sept. 07)

Shift	Survey Period	Noise Level dB(A)				Remarks
		LAverage	Standard	Lmax	Lmin	
Day	6:00-7:00	53	70	61.8	42.3	
	7:00-8:00	56.2		69.5	51.9	
	8:00-9:00	51.2		63.3	42.5	
	9:00-10:00	50.5		62.4	44.7	
	10:00-11:00	51.0		66.8	45.0	
	11:00-12:00	52.8		63.1	48.0	
	12:00-13:00	53.2		75.1	44.0	
	13:00-14:00	50.3		62.2	45.9	
	14:00-15:00	50.8		64.9	45.1	
	15:00-16:00	55.3		72.6	47.8	
	16:00-17:00	54.4		63.4	51.8	
	17:00-18:00	50.3		60.8	45.5	
	18:00-19:00	49.2		60.5	43.0	
Evening	19:00-20:00	52.3	65	78.0	44.7	
	20:00-21:00	50.0		61.9	44.6	
	21:00-22:00	54.4		63.0	48.8	
	22:00-23:00	48.9		59.6	46.4	
Night	23:00-00:00	49.8	50	52.6	48.0	
	00:00-1:00	49.7		58.9	44.0	
	1:00-2:00	45.4		55.5	44.1	
	2:00-3:00	45.7		59.4	43.6	
	3:00-4:00	45.9		63.7	43.9	
	4:00-5:00	45.4		50.0	44.1	
	5:00-6:00	48.2		59.2	43.5	
24 hours Average		50.58		62.84	45.55	

Source: JBIC EIA Update Study, 2007

(3) Protected Areas

There are three protected areas managed by MOE in Preah Sihanouk Province, those are Riam national park, Kirirom national park, and Bokor national park. Kirirom national park extends over Sihanouk and Kampong Speu, and management office of MOE located in Kampong Speu. Bokor national park extends over Sihanouk and Kampot, and management office of MOE located in Kampot. Although the forests suffered from illegal logging and poaching, so far large scale development plan

has not been confirmed in Sihanouk side. The top of Kirirom national park (Sihanouk side) is popular tourism destination. People visit and enjoy beautiful scenery and clean air.

Ream national park is close to Sihanouk city. Sihanouk city is recently developing rapidly in terms of manufacturing and tourism. Growth of tourists is shown in Table 2.4.6. Both local and international tourists have been increasing and the growth in six years is approximately 4.5 times. However the number of facilities such as hotels and restaurants has not been increasing to meet the growth of tourists (Table 2.4.7).

Table 2.4.6 Number of Tourist (2002-2008)

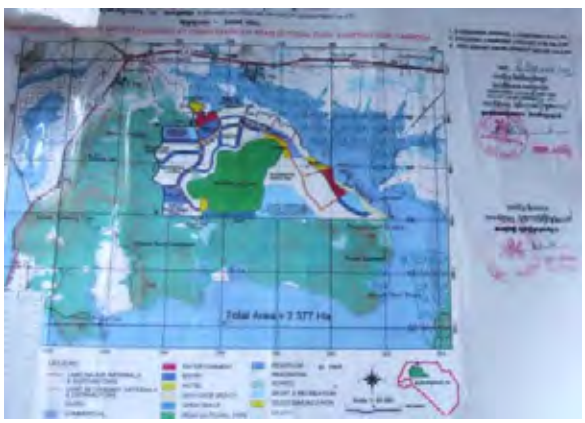
Year	Local Tourists	International Tourists	Total
2002	87555	39411	125566
2003	83888	33604	117492
2004	104021	40974	144995
2005	153842	46908	200749
2006	224872	63556	288428
2007	286219	93469	379688
2008	396850	135668	532518

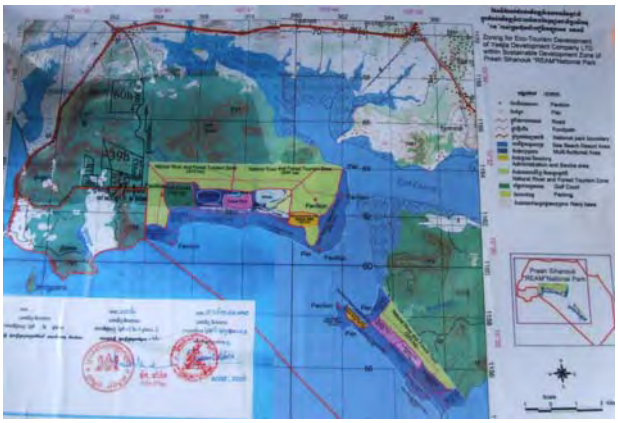
Table 2.4.7 Number of Hotels, Guesthouses, and Restaurants (2002-2008)

Year	Hotel（No./Rooms）	Guesthouse（No./Rooms）	Restaurant（No./Tables）
2002	38 / 1,213	61 / 566	53 / 719
2003	40 / 1,312	78 / 750	49 / 626
2004	42 / 1,470	83 / 925	49 / 628
2005	41 / 1,532	87 / 1,012	49 / 685
2006	38 / 1,466	100 / 1,246	64 / 865
2007	42 / 1,639	108 / 1,524	69 / 918
2008	46 / 1,782	111 / 1,533	78 / 1,039

Source: Department of Tourism in Preah Sihanouk Province, 2009

Therefore some investors have been developing facilities and Ream national park is one of the target sites. Yis Chea Tourism Development Co., Ltd. received final registration certificate for QIP on 12th November 2007 and Evergreen Success and Asia Resort Development Co., Ltd received final registration certificate for QIP on 11th July 2008. In and after the processes, Royal Government determined sustainable use zones on the land area of 5,670ha (3,300 ha and 2,377 ha respectively) in Ream national Park and transformed of state public land to state private land (sub-decree No.70 ANK.BK and No.71 ANK.BK). The areas were regarded as sustainable use zones on the documents, though the areas are at the center of the national park and current ecotourism site including mangrove forests. Their development plans are delineated on the maps signed by MOE (photos below). The plans are general mass tourism development that can be done even along the beach in Sihanouk city. There is no special consideration for utilizing the important nature and nursery of marine organisms.





Tourism can be a measure to conserve natural environmental conditions. For the purpose, it must be sustainable tourism. In order to achieve the sustainable tourism, MOT needs to proceed with the sustainable tourism development plan, MOE must examine the impact of tourism development in protected areas, and investors and CDC need to understand the structure and importance of natural resources for their next generation.

Kbal Chhay protection forest (6,027 ha) was designated by Sub-decree in 1997 for natural resource protection in Sihanoukville. It is the catchment of water supply to Sihanouk city now. FoA has been doing patrol and reforestation. Acacia sp., Eucalyptus sp. and other trees including threatened species were planted in about 1,000 ha of the catchment from 2001 to 2005, and the plantation is still expanding over the sparse forests. The condition is enough as water resource area, but the 6,000 ha is not enough for the future water supply. Furthermore the loss of the other forest induces the negative impact to the coastal fishery by sedimentation and less nutrient inflow to the littoral nursery. At least the forest in the watershed of Preaek Tuek Sab river should be protected and reforested.

Reforestation with *Afzelia xylocarpa* (threatened indigenous species)

2.4.2 Present Social Environmental Conditions

(1) Overview of Social Environmental Condition of Preah Sihanouk Province and Kampot[1]

1) Social environment of Preah Sihanouk

Sihanouk-Ville is the third biggest city in Cambodia. Sihanouk-Ville City has many potential sources and physical and non-physical infrastructure which serve as main economic development following the geography condition and situation of each District which can provide possibility for people to distinctively make a business for a good income along these areas and location.

There is an approximately 34.18% of the number of people, in the whole province, are engaged in agriculture, in particular, rice cultivation. Sihanouk-Ville city is a main market for agricultural products in the province; however, people obtain a large quantity of rice mainly from Battanbang Province2. Apart from rice, palm oil plantation shows high potential for export. Moreover the province has been planning to create food processing for fishery resource.

There are many potential places and services in the City, which serve for the tourism sector. The province also rehabilitated and strengthened good cooperation and provided possibility to investment companies to develop touristic area including coastal areas and resorts, islands. Meanwhile, some other potential places were threatened and damaged by uncontrolled new construction and settlement of the people and the natural resource destruction along the coastal area which completely caused to losing of the city beauty.

Sihanouk-Ville City is a developmental area of national and international import and export depending on international port for loading and uploading and stocking with an international

[1] Action Plan of SHV and Kampot Socio-economic data provided by Provincial Governments
[2] According to the hearing at the main market of Sihanouk-Ville

standard. According to the data of Sihanouk-Ville 2008, number of families whose main occupation is a business man is 7.69%. Moreover, there are small and big markets in the city, which can be means to people's traveling and transporting the products of the province.

Currently, private sector development of economic sector is participating in the development of local communities in the City including factory, enterprise, handicraft, modern hotels, guesthouse and services which have 69 places.

2) Kampot

Kampot province has about 677 households and 26% of them are female-headed households[3]. 27 % of the area is used for agricultural production, and 56 percent are estimated to be covered with forest.

- More than 85 percent of the population live and work in agriculture, forestry and fisheries. Natural resources are the base for their livelihood. Potential resources are rice production, vegetable and fruit production, fishing and small livestock production
- Limestone and phosphate mineral resources
- Seacoast (e.g. mangrove forests) fisheries and tourism
- Salt fields which supply a large part of Cambodians needs
- Bokor National Park, wildlife reserve and tourist attraction

One of the distinctive characteristics in demography in Kampot is that there are many Khmer Islamic minority families are residing in the province, which account for 16% of the total households.

The province had been famous as touristic resorts among the wealthy Cambodians and foreigners before the facilities were destroyed by Khmer Rouge. However, recently Cambodian private sector and foreign investors have started rehabilitating destroyed facilities for the further development of the province as a touristic place.

The local government also has been promoting the province as an industrial area.

(2) Social Indicators on health and education in Preah Sihanouk and Kampot Provinces

Two aspects of socio-economy relating to the local communities in Preah Sihanouk and Kampot Provinces will be focused here, health and education;

1) Health

According to the 2nd State of the Coastal Environment and Socio-Economy Report 2007 (Edited by the Coastal Coordination Unit, Ministry of Environment), and other statistic sources, the principal health sector indicators in the two provinces are as follows;

[3] Socio -economic survey by Kampot Province, 2009

Table 2.4.8 Principal Health Sector Indicators in two Provinces and Country4

Issues/Province	Preah Sihanouk		Kampot		Cambodia	
Access to Toilet or Latrines (%Households)	2003	2005	2003	2005	2006[5]	
	30.44%	36.67	7.88	9.82	28.00	
Number of Malaria OPD[6] cases (2000-2007)[7]	2000	2007	2000	2007	2000	2007
	831	34	4,843	1,426	109,137	67,341
Tuberculosis Prevalence (per 100,000 population)	1999	2004	1999	2004	2004[8]	
	101.0	106.9	242,0	148.6	140.1	
Estimated adult HIV/AIDS Prevalence (aged 15-49, by gender[9])	2005 (M)	(F)	2005 (M)	(F)	2005 (Total)	2007[10] (Total)
	0.7	1.7	0.8	0.8	1.9	0.8

Source: Shown in the foot note of this page.

- Access to Toilet or Latrines:

According to the data in 2005, the rate of people with access to toilets or latrines in their households in Preah Sihanouk is higher than the national level in 2006. This is due to the fact that the province includes Preah Sihanouk City that is one of the most urbanized areas in the country gifted with better socio-economic infrastructure compared with other coastal provinces. On the other hand, the rate in Kampot is lower compared with the average in Cambodia. The improvement to increased access to toilet or latrines will be an issue for Kampot.

- Malaria Incidences:

On the national level, the Malaria OPD number dropped by 38% between the years 2000 and 2007. On the other hand the drop of this number in coastal provinces is much larger level in Coastal area; 96% in Preah Sihanouk and 71% in Kampot, respectively. One of the reasons for this trend may be that the Government has restricted logging and other activities related to forestry resources exploitation.

- Tuberculosis Prevalence:

Although there is a tendency of significant decline in tuberculosis prevalence in Coastal area between 1999 and 2004, the number of tuberculosis patient in Kampot is yet larger than that of at the national level. Risk factors for TB include[11]; low socio-economic status, crowded living conditions (high population density) and migration from other places with a high number of cases of tuberculoses. According to this criteria and the actual population density in coastal provinces[12] (Preah Sihanouk; 230, Kampot; 120, Kep; 106 and Koh Kong; 13) it is likely that higher number of tuberculosis prevalence in Kampot could be partly due to a high population density and poor sanitation facilities, which is described earlier in this section.

- Estimated Adult HIV/AIDS Prevalence (aged 15-49):

As for estimated adult HIV/AIDS, there is no recent data available at provincial level. According to the Statistical Yearbook Cambodia with 2005 data by gender, it is noteworthy

[4] 2nd State of the Coastal Environment and Socio-Economy Report 2007 (Edited by the Coastal Coordination Unit, Ministry of Environment)
[5] UNICEF Statistics, 2009
[6] OPD; Out-patient Department attendance
[7] Statistical Yearbook of Cambodia, Ministry of Planning, 2008
[8] National Health Statistics Report, 2004 (Ministry of Health)
[9] Statistical Yearbook of Cambodia, Ministry of Planning, 2008
[10] UNICEF Statistics, 2009
[11] E-Medicine Health, 2009
[12] Refer Chapter 4.1.1, Table 4.1.3, Book I, Population density of Coastal Area

that, in Preah Sihanouk, female's prevalence is much higher than that of male accounting for 1.7, though they are less than that of at national level, which accounts for 1.9. The reason for this phenomenon is unknown.

The most recent survey shows the total percentage at national level is 0.8, which dropped by 42% compared with that of 2005. Based on this tendency of decline of prevalence, it can be assumed that the prevalence in Preah Sihanouk would also have declined. However it is very important to conduct continuous surveys on recent and future prevalence, since it is widely known that where there are new development interventions, it is very likely that HIV/AIDS prevalence will turn out to be higher. That is why HIV/AIDS issues are included in Environmental and Social Impact Assessment Guideline in many aid agencies including JICA and others that are active in Cambodia.

2) Education

According to the 2nd State of the Coastal Environment and Socio-Economy Report 2007 (Edited by the Coastal Coordination Unit, Ministry of Environment), and other statistic sources, the principal education sector indicators in two provinces is shown in the table below.

Table 2.4.9 Principal Education Sector Indicators in Two Provinces and the Country

Issues/Province	Preah Sihanouk			Kampot			Cambodia		
Literacy Level in 2005 (15-17 y/o and 18-64 y/o)	15-17	18-64		15-17	18-64		15-64 (2005[13])	15-64 (2007[14])	
	89%	88		86	85		90	90	
School Attendance in 2005 (primary; 6-14 and secondary; 15-17)	6-14	15-17		6-14	15-17		6-14[15]	15-17	
	83%	66		86	69		90	NA	
Number of Primary Schools in 2008[16]	2008			2008			2008		
	96			481			9,431		
Number of Primary Schools by region in 2008[17]	U[18]	R	Re	U	R	Re	U	R	Re
	96	0	0	22	459	0	1,202	7,587	642
Number of Secondary Schools in 2008[19]	2008			2008			2008		
	22			79			1,321		
Children Ratio to Classroom	2002	2005		2002	2005		2002	2005	
	91	81		78	68		NA	NA	
Student Ratio to Classroom	2002	2005		2002	2005		2002	2005	
	44	45		43	44		NA	NA	
Children Ratio to Teachers	2003	2005		2003	2005		2003	2005	
	58	54		52	50		NA	NA	
Student Ratio to Teachers	2003	2005		2003	2005		2003	2005	
	42	42		45	42		NA	NA	

Source: Shown in the foot note of this page.

- Adult Literacy:

Because of continuing efforts in Cambodia to attain universal education for all (EFA)[20], in which Ministry of Education, Youth and Sport has prepared Education for All National Plan

[13] Education Strategic Plan, 2005, Ministry of Education, Cambodia
[14] Ditto
[15] UNICEF Statistics, 2009
[16] Education Statistics 2008, Ministry of Education, Cambodia
[17] Education Statistics 2008, Ministry of Education, Cambodia
[18] U; Urban, R; Rural; Re; Remote area
[19] Education Statistics 2008, Ministry of Education, Cambodia

2003-2005 and Education Strategic Plan 2006-2010, the country attained high adult literacy rate in 2005 and 2007 by accounting for 90%. Though the data in recent yeas is not available, in Preah Sihanouk and Kampot attained nearly 90% of adult literacy in 2005.

- School Attendance:

Only the data in 2005 are available for primary school attendance at the national and provincial levels. At the national level, 90% of the population attend the primary schools, while the attendance rates at provincial levels did not reach the 90% mark; 83 and 86 % in Preah Sihanouk and Kampot, respectively.

As far as secondary school attendance is concerned, there is no data at a national level. At provincial level, the two provinces show less school attendance compared with primary school attendance. In Preah Sihanouk and Kampot, the attendance at secondary school drop by 17 and 16% respectively.

According to Ministry of Education, Youth and Sport[21], problem of the low school attendance is due to the lack of schools and also to the poverty. The lower school attendance, which is shown in the table, is found among poor families whose means of livelihood is limited and children often have to participate in this economic activity and cannot attend the schools.

Overall, it can be said that, in order to improve the poor education performance in the region, both the provision of more education facilities and the eradication of poverty among pupils and students will be indispensable.

- The Children to Classroom and Children to Teacher Ratio:

According to Cambodian EFA[22], the threshold ratios are 40 pupils and/or students to 1 classroom and/or teacher. Actually, however, these ratios in primary school level are far too high from the threshold to ensure a proper leaning environment. The reason why these ratios at secondary level are moderate is that the attendance rate at secondary school is low. In order for the Government to achieve EFA goals in coastal area, it is necessary to construct more schools/classrooms and increase numbers of teachers.

[20] The Education for All movement took off at the World Conference on Education for All in 1990. Since then, governments, non-governmental organizations, civil society, bilateral and multilateral donor agencies and the media have taken up the cause of providing basic education for all children, youth and adults.
[21] Education for All National Plan 2003-2015
[22] Education for All National Plan 2003-2015