4.4 Natural and Social Environment

4.4.1 Present Natural Conditions

(1) Natural Environment

1) Climate

The climate in Coastal area is tropical monsoon climate. The data at the meteorological station are available for Koh Kong and Sihanouk, and rainfall and temperature are shown below.

Temperature

There is no large fluctuation in temperature throughout year at Sihanouk and Koh Kong. Maximum temperature is between 30 and 34 Celsius, and Minimum temperature is between 21 and 25 Celsius. The weather is hot but not too much, and the temperature is stable.

Table 4.4.1 Monthly Maximum and Minimum Temperature (℃)

Month	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Sihanouk (2003 – 2008)												
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
Koh Kong (2001 – 2005)												
Maximum	31.3	32.3	32.9	33.6	32.6	31	30.4	30.7	30.5	31.8	32.3	32.1
Minimum	22.1	23.3	24.1	24.4	24.9	23.9	24.4	24.5	24.5	24.3	24	23.65

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

Rainfall

There are rainy season and dry season in Coastal area. The rainy season is normally from April to October, and most of precipitation is recorded in rainy season. The precipitation is particularly high from June to September. Localized torrential rains in the rainy season sometimes cause flooding. Annual rainfalls in Sihanouk and Koh Kong are shown in Table 4.4.2. Annual rainfall is almost constant in Sihanouk, while it relatively variants widely in Koh Kong. These annual rainfalls are abundant. Combined with the high temperature, the climate is suitable for the enrichment of flora and fauna.

Table 4.4.2 Annual Rainfall Recorded in Preah Sihanouk (2003-2008) and Koh Kong (2000-2005) (mm)

2000	2001	2002	2003	2004	2005	2006	2007	2008	Average
Sihanouk									
-	-	-	2821.1	2796.3	2779.6	2808.25	2782.5	2749.0	2789.5
Koh Kong									
4052.3	4949.5	2310	2904.1	3644	3939	-	-	-	3633.1

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

2) Flora, fauna and threatened species

Coastal area is a part of Indo-Burma Biodiversity Hotspot designated by Conservation International (CI). Although whole Cambodia is included in the hotspot, Coastal area is one of the biggest in tack block of natural forest in the hotspot (FoA, 2007, The southern cardamom forest management plan for sustainable development).

Biodiversity surveys were conducted mainly in the Cardamom mountain. Following are the two of the latest biological survey reports that describe the flora, fauna and carry threatened species lists.

- Forestry Administration, 2009, Management Plan of Central Cardamom Protected Forest for Watershed Protection and Biodiversity Protection 2009-2014.
- Forestry Administration, 2007, The Southern Cardamom Forest Management Plan for Sustainable Development.

Central Cardamom protected area is covered with tropical rainforest. Most trees are evergreen, and dominant species are mainly Dipterocarpaceae sp. In all 245 woody plants and medicinal plants were recorded and five threatened species included in IUCN red list 2002 were detected. As for mammals, 76 species were recorded, and 25 IUCN threatened species such as Asian elephant, Indochinese tiger, Clouded Leopard and Pileated gibbon. In total 184 bird species were recorded, and nine IUCN threatened species such as Chestnut-headed partridge, White-winged duck and Silver oriole were detected. As for reptiles, 85 species were recorded, and 11 IUCN threatened species such as Siamese crocodile, Yellow-headed temple turtle, Mangrove terrapin and Elongated tortoise were detected. Also, 46 amphibian species and 44 fish species were recorded.

FoA in association with international NGO (WildAid) conducted a research in the Southern Cardamom forest. The forest is a watershed flushing to the bays of Koh Kong and Dong Peng. The vegetation is similar to Central Cardamom, and 204 species were recorded. As for mammals, 56 species were recorded and 23 IUCN threatened species such as Asian elephant, Indochinese tiger, and Eurasian otter were detected. As for birds, 188 species were recorded, and 11 IUCN threatened species such as Chestnut-headed partridge, white-singed duck and sarus crane were detected. In all 58 reptile species were recorded, and 11 IUCN threatened species such as Siamese Crocodile, Mangrove terrapin and Cantor's giant soft shell turtle were detected. Also 36 amphibian species were recorded. The number of species is slightly smaller than the number for Central Cardamom, but most species including threatened species are the same. Those species are considered to move between the two protected forests, therefore, the forest concession area between the two protected forests (forestry has been suspended since 2001) should be protected. Particularly, Asian elephants move a long distance seasonally. They move whole Cardamom mountain and Botum Sakor national park. A large elephant corridor (second largest corridor in the world) is inhabited by a large number of elephants. The elephant corridor, continuous still intact forest, must be a treasure of the country.

The Central and Southern Cardamoms hold almost all of the large mammals and half of the birds of Cambodia, including a number of threatened species. From 1998 to 2002, ecological surveys had been conducted by FoA and MOE in association with NGOs, and historical data on new species as well as rare and endangered species were listed in the Cardamom mountain (FoA and WildAid, 2003, Southern Cardamom Mountains Wet Season Biological Survey 2002). However, various forest offences continue to take place as shown in Table 4.4.3. Cases fined are increasing recently. According to rangers, wildlife poaching is increasing. The

poaching is a serious issue for the large mammals. Totally 27 elephants and 12 tigers were killed in the Southern Cardamoms from 2000 to 2002, and the products were exported. FoA and WildAid 2003 listed issues i.e. habitat loss and degradation, hunting for local consumption, commercial trade and medicine, road construction, poverty and lack of sustainable agriculture methods, and lack of conservation awareness.

Among those, fundamental problems are poverty and lack of conservation awareness. Poverty induces illegal activities. The poor people in rural areas are not protected by the Government, and they need to use nature production. Until some decades ago, the balance between the use and production had been balanced, but recently, with population growth and disorderly development, the balance has been upset. The production has decreased, and the poor people have to survive with illegal activities.

Lack of conservation awareness is the serious issue to stop the illegal activities. In general people can not understand the limitation and fragility of the nature. In particular, poor people can not have enough education and afford to consider that their activities induce the serious problem in future. Accordingly they continue illegal activities and degrade the nature.

Table 4.4.3 Cases of Forest Offenses, 2000 - 2006

Year	Cases Arrested	Cases sent to Court	Cases Fined	Fine collected (1000 riel)
2000	320	263	50	166,844
2001	309	239	49	197,597
2002	513	379	131	351,947
2003	372	239	71	221,693
2004	401	350	221	608,188
2005	586	395	191	788,230
2006	711	431	280	695,455

Source: FOA, 2007, Cambodia: Forestry Statistics

These issues are also applicable on shoreline and offshore. Clearance of mangrove forests and degradation of sea grass beds and coral reefs with trawling fishing are inducing the loss of marine organisms because the areas are spawning grounds and nursery of most marine organisms. State of the Coastal Environment and Socio-Economy in Cambodia (MOE, 2005) predicted that mangrove area in 2015 will be 60% of the coverage in 1993 based on the trend from 1993 to 2002.

Fishery administration (FiA) distributes the list of 58 threatened marine organisms (fish, turtle, crocodile, dolphin, whale, shell, coral, crab and shark) with photographs to fishery communities and local authorities. FiA endeavors to conserve them by the restoration of habitats and raising public awareness, but illegal activities are not decreasing and fishing pressure (by the improvement of fishing gears and growth of fishery population) to marine organisms are increasing.

(2) Pollution

1) Water quality

Water quality survey was conducted in 2003. The results are shown in Table 4.4.4. 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.

Compared to the WHO drinking water quality standard values, the values of Feacal Coliform is much higher. In the urban areas, wastewater is often discharged into freshwater bodies without treatment. Most sewage water is drained through open channels, or into ponds. In most areas, there are no adequate sanitation facilities and people defecate in fields or water bodies, resulting in contamination of drinking water sources (MOE, 2007, Coastal Environmental Management Action Plan 2007-2011).

The concentration of total suspended solid (TSS) is unstable in coastal water. However, on the whole, the values are higher than limitation values of aquatic cultivation area of Vietnam (5 mg/L). The high concentration of the TSS causes serious impact to brackish-marine organisms in particular coral reefs. The suspended load has two major effects: blockage of light and smothering of organisms by deposition of sediments and plugging of cavities in reefs. Concentration of 6 mg/L decreases the respiration rate of corals[1]. There are several factors such as sand dredging, land erosion, land reclamation and wastewater discharge to raise the concentration of TSS in Coastal area. Sand dredging seems one of the significant factors. Prime minister ordered stopping dredging in May 2009, but still several national and international companies are operating sand dredging for land reclamation and construction activities as of 21st October 2009 (The Phonm Penh Post). The dredging operations can destroy coral communities through smothering by silt suffocation, and also degrade the marine ecosystem. It results less fish catch of fishers and affect their livelihood. Land erosion is another significant factor to raise TSS concentration. Deforestation causes the erosion and eroded soil flows into the sea through rivers. Deforestation is basically banned by regulations, but illegal logging and clearance are common for energy, land title, and so on. Furthermore investors sometimes can get permission to clear land from the government for industrial development. Mangrove clearance causes the coastal erosion and raises the concentration of TSS. Mangrove clearance has been carried out in particular in Kep and Kampot to expand salt farms and agriculture land. Above activities and following TSS concentration rise induce the degradation of coastal and marine ecosystem.

Heavy metals such as Cadmium and Lead are extremely higher than standard values. Most of other heavy metals exceed the USEPA water quality standard values. The number of the data is limited to evaluate the precise condition, though, the tendency that the values of heavy metals in Preah Sihanouk are relatively higher than the values of the other provinces is observed. Some factories in Preah Sihanouk do not treat the wastewater and discharge the effluent to the public water. Application for new development is increasing in Preah Sihanouk at present, and effluent will increase accordingly. According to the sub-decree on water pollution control, MOE has to inspect the effluent and if a clear offence is detected, MOE shall fine or send the case to court. If MOE does not take appropriate action to this effect, serious problems will take place. The discharged water can contaminate the drinking water sources. In addition, the hazardous heavy metals may contain and be accumulated in the body of marine organisms as shown in Table 4.4.4. The table shows that higher values of heavy metals are accumulated in the body of fish in Preah Sihanouk. The value is not very high, but it is necessary to avoid occurrence of serious disaster in the future.

[1] E.S. Decocadiz and N.E. Montano (1999) ASEAN Marine Water quality Criteria for Total Suspended Solids

Table 4.4.4 Water Quality Data in Sihanouk 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	–
11	Faecal Coliform	MPN/100ml	<30	<30	36	<1000
12	Enterococci/100mL	MPN/100ml	0	0	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	–

Table 4.4.5 Water Quality Data in Koh Kong 2003

No.	Parameters	Unit	Sampling points		Standard
			In front of provincial office	Estuary bak Klorng	
1	Temperature	℃	30	29	–
2	pH	–	7.88	7.98	7.0–8.3
3	DO	mg/L	4.69	8	2–7.5
4	Salinity	‰	3	3	–
5	Nitrate (NO_3–N)	mg/L	0.0004	0.0005	–
6	Nitrite (NO_2–N)	mg/L	2.245	1.762	–
7	Ammonia (NH_3–N)	mg/L	0.26	0.86	–
8	Phosphate (PO_4^{3-}P)	mg/L	0	0	–
9	Total Phenol	mg/L	0	0	–
10	Oil and Grease	mg/L	25	24	–
11	Faecal Coliform	MPN/100ml	36	<30	<1000
12	Enterococci/100mL	MPN/100ml	<30	<30	–
13	Total Suspended Solids	mg/L	75.5	62.4	–
14	Chromium (VI)	mg/L	0	0	<0.05
15	Cadmium	mg/L	0	0	<0.001
16	Copper	mg/L	0.052	0.052	–
17	Lead	mg/L	0.18	0.15	<0.01
18	Manganese	mg/L	0	0	–
19	Zinc	mg/L	0	0	–
20	Total Iron	mg/L	0.423	0.378	–
21	Cobalt	mg/L	0.306	0.259	–
22	Lithium	mg/L	0.057	0.066	–
23	Nickel	mg/L	0.425	0.45	–

Table 4.4.6 Water Quality Data in Kampot 2003

No.	Parameters	Unit	Sampling points		Standard
			In front of provincial office	Estuary	
1	Temperature	℃	28.4	29	–
2	pH	–	7.95	8.2	7.0–8.3
3	DO	mg/L	7.38	5.97	2–7.5
4	Salinity	‰	2	2	–
5	Nitrate (NO_3–N)	mg/L	0.436	0.283	–
6	Nitrite (NO_2–N)	mg/L	0.946	0.258	–
7	Ammonia (NH_3–N)	mg/L	0	0	–
8	Phosphate (PO_4^{3-}P)	mg/L	0.0038	0.012	–
9	Total Phenol	mg/L	0	0	–
10	Oil and Grease	mg/L	21	9	–
11	Faecal Coliform	MPN/100ml	90	10	<1000
12	Enterococci/100mL	MPN/100ml	<30	<30	–
13	Total Suspended Solids	mg/L	258.2	319.6	–
14	Chromium (VI)	mg/L	0	0	<0.05
15	Cadmium	mg/L	0.04	0.05	<0.001
16	Copper	mg/L	0	0	–
17	Lead	mg/L	0	0.16	<0.01
18	Manganese	mg/L	0.03	0.01	–
19	Zinc	mg/L	0.36	0.65	–
20	Total Iron	mg/L	0.5	0.7	–
21	Cobalt	mg/L	0.05	0.13	–
22	Lithium	mg/L	0	0	–
23	Nickel	mg/L	0.5	0.4	–

Table 4.4.7 Water Quality Data in Kep 2003

No.	Parameters	Unit	Sampling points	Standard
			Beach resort	
1	Temperature	℃	28.9	–
2	pH	–	8.12	7.0–8.3
3	DO	mg/L	4.38	2–7.5
4	Salinity	‰	15	–
5	Nitrate (NO_3–N)	mg/L	0.828	–
6	Nitrite (NO_2–N)	mg/L	0.049	–
7	Ammonia (NH_3–N)	mg/L	0	–
8	Phosphate (PO_4^{3-}P)	mg/L	0	–
9	Total Phenol	mg/L	0	–
10	Oil and Grease	mg/L	6	–
11	Faecal Coliform	MPN/100ml	<30	<1000
12	Enterococci/100mL	MPN/100ml	<30	–
13	Total Suspended Solids	mg/L	462	–
14	Chromium (VI)	mg/L	0.011	<0.05
15	Cadmium	mg/L	0.04	<0.001
16	Copper	mg/L	0	–
17	Lead	mg/L	0.16	<0.01
18	Manganese	mg/L	0	–
19	Zinc	mg/L	0	–
20	Total Iron	mg/L	1.08	–
21	Cobalt	mg/L	0	–
22	Lithium	mg/L	0.03	–
23	Nickel	mg/L	0.33	–

Source (Tables 4.4.4-4.4.7): MOE, 2005, National Report on Land Based Pollution in Cambodia

Table 4.4.8 Biological Samples Data in Preah Sihanouk 2003

No.	Parameter	Mackerel (mg/kg dried)	Malabar red snapper (mg/kg dried)	Clam (mg/kg dried)	Crab (mg/kg dried)
1	Cadmium	3.2	2.3	1.4	2.1
2	Copper	10.3	9.3	14	12.6
3	Lead	5.1	5.1	10.2	5.1
4	Manganese	4.2	4.3	64.5	3.4
5	Zinc	95.4	28.8	179.6	128.1
6	Total Iron	149.3	127.8	448.6	77.5
7	Cobalt	3.7	2.4	2.2	3.3
8	Lithium	5.6	4.4	6.8	3.2
9	Nickel	7.6	7.6	0.8	1.5

Table 4.4.9 Biological Samples Data in Koh Kong 2003

No.	Parameter	Mackerel (mg/kg dried)	Crab (mg/kg dried)
1	Cadmium	0	0
2	Copper	5.4	49.6
3	Lead	0	0
4	Manganese	0.078	0.207
5	Zinc	1.476	3.357
6	Total Iron	136.58	53.33
7	Cobalt	0	0
8	Lithium	0	0
9	Nickel	7.95	7

Table 4.4.10 Biological Samples Data in Kampot 2003

No.	Parameter	Mackerel (mg/kg dried)	Malabar red snapper (mg/kg dried)
1	Cadmium	0	0
2	Copper	5.2	3.4
3	Lead	0	0
4	Manganese	2	2.6
5	Zinc	37.6	24.2
6	Total Iron	69.5	76.8
7	Cobalt	0	0
8	Lithium	0	0
9	Nickel	0	0

Source (Tables 4.4.8-4.4.10): MOE, 2005, National Report on Land Based Pollution in Cambodia

2) Sediment quality

Soil erosions often happen in the rainy season due to heavy rainfalls. The main sources of soil erosion are deforestation and illegal agricultural practices (slush and burn). Soil erosion in the mountain shall make estuaries and seashore areas shallower by depositing sediment.

Sediment is sometimes polluted by chemical substances. Table 4.4.11 shows the sediment quality at Preah Sihanouk, Koh Kong and Kampot. The trend of the sediment quality survey result is similar to the water quality survey and biological sample survey. It implies that the samples of water and sediment suffer from same pollution sources. The values of cadmium and lead are close or slightly higher than the standard values (Dutch standard) at the stations in Preah Sihanouk. As the number of the data is limited, it is difficult to evaluate the condition exactly, but same as water quality, values are the highest at the stations in Preah Sihanouk. Further monitoring (if possible using reference materials) should be conducted.

Table 4.4.11 Sediment Quality Data in Preah Sihanouk 2003

No.	Parameters	Sampling points			Dutch Standard
		Land port (mg/kg dried)	Fish port (mg/kg dried)	Koh Khyong (mg/kg dried)	
1	Cadmium	2	12.8	1.4	5.53
2	Copper	15.5	6.4	25.5	197
3	Lead	30.5	22.9	43.2	91.3
4	Manganese	83.3	200.3	422.3	-
5	Zinc	23.8	13.2	44.6	315
6	Total Iron	996.5	1132.2	1188.5	-
7	Cobalt	6.6	5.9	12.1	-
8	Lithium	8.9	4.4	39	-
9	Nickel	11.6	11.6	36.7	36

Table 4.4.12 Sediment Quality Data in Koh Kong 2003

No.	Parameters	Sampling points		Dutch Standard
		In front of provincial office (mg/kg dried)	Estuary bak Klorng (mg/kg	
1	Cadmium	0	0	5.53
2	Copper	6.102	3.122	197
3	Lead	0.21	0.177	91.3
4	Manganese	0.911	0.099	-
5	Zinc	0.168	0.093	315
6	Total Iron	1099.395	462.745	-
7	Cobalt	7.253	2.927	-
8	Lithium	8.03	3.23	-
9	Nickel	17.3	23.675	36

Table 4.4.13 Sediment Quality Data in Kampot 2003

No.	Parameters	Sampling points		Dutch Standard
		In front of provincial office (mg/kg dried)	Estuary (mg/kg dried)	
1	Cadmium	0	0	5.53
2	Copper	4	2.4	197
3	Lead	0	0	91.3
4	Manganese	16.3	110.3	-
5	Zinc	7	8.88	315
6	Total Iron	889.8	1779.6	-
7	Cobalt	2.5	3.7	-
8	Lithium	2.8	3.7	-
9	Nickel	8.8	10.4	36

Source (Tables 4.4.11-4.4.13): MOE, 2005, National Report on Land Based Pollution in Cambodia

4.4.2 Present Social Environmental Conditions

(1) Overview of Social Environmental Condition of Coastal Area[2]

The people in Coastal area make living mainly by fishery and subsistence agriculture. According to the socio-economic survey that has been conducted by Ministry of Environment (MOE) for the preparation of Coastal Environmental Management Action Plan 2007-2011 (2007), villagers in 75% of coastal villages face food shortages. This is mainly due to natural disasters such as insects, storms, high winds, and prolonged dry seasons in recent years. In addition, coastal communities also lack in sufficient infrastructure and social services, such as schools, hospitals, community roads to go to coastal fishing areas and electricity.

Many households in Cambodia's coastal villages lack in regular and stable income. Many fishermen are unable to go out fishing more than 10-15 days/month due to the incidence of storms and other natural disasters. Many villages indicated the lack of access to stable markets for products beyond their local villages. In regard with marine harvesting, people keep little of the marine catch for domestic consumption while putting most of their catch to sell to local traders.

In 1995[3], Cambodian Government designated mangrove areas in Coastal area, which provide rich fishing site, as protected areas. In the following year, 1996, the Government ratified Law on Environmental Protection and Natural Resources Management. Due to the ratification of this law, fishermen were not allowed to engage in fishery in these protected mangrove areas, which caused the decrease in catch and consequently boosted illegal fishing in the protected sea area[4]. Thus environmental protection policy and practice, such as mangrove tree protection, ironically has been negatively affecting the livelihood of coastal households.

(2) Social Indicators on health, education and poverty in Coastal Area

Three aspect of socio-economy relating to the local communities in Coastal area will be focused here, including the health, education and poverty;

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 Coastal area are shown in the table below.

[2] Based on the hearing from Provincial Governments and commune council members
[3] Based on the hearing from Coastal Coordination Unit, Ministry of Environment
[4] Based on the hearing from Provincial Governments and commune council members

Table 4.4.14 Principal Health Sector Indicators in Four Provinces and Entire Coastal Area[5]

Issues/Province	Preah Sihanouk		Koh Kong		Kampot		Kep		Cambodia	
Access to Toilet or Latrines (%Households)	2003	2005	2003	2005	2003	2005	2003	2005	2006[6]	
	30.44%	36.67	20.39	23.42	7.88	9.82	4.89	11.95	28.00	
Number of Malaria OPD[7] cases (2000-2007)[8]	2000	2007	2000	2007	2000	2007	2000	2007	2000	2007
	831	34	1,463	347	4,843	1,426	162	0	109,137	67,341
Tuberculosis Prevalence (per 100,000 population)	1999	2004	1999	2004	1999	2004	1999	2004	2004[9]	
	101.0	106.9	90.0	61,5	242,0	148.6	84.0	79.3	140.1	
Estimated adult HIV/AIDS Prevalence (aged 15-49, by gender[10])	2005 (M)	(F)	2005 (M)	(F)	2005 (M)	(F)	2005 (M)	(F)	2005 (Total)	2007[11] (Total)
	0.7	1.7	0.7	1.7	0.8	0.8	0.8	0.8	1.9	0.8

- Access to Toilet or Latrines: According to the data in 2005, the rate of people with access of household to toilets or latrines in Preah Sihanouk is higher than the national level in 2006. This is due to the fact that the province includes Preah Sihanouk that is one of the most urbanized areas in the country and there are better socio-economic infrastructure compared with other coastal provinces. On the other hand, the rate in Kampot and Kep are far lower compared with other provinces. The improvement to increased access to toilet or latrines will be an issue for these provinces.

- Malaria Incidences: At a 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, 76% in Koh Kong and 71% in Kampot respectively. As for Kep, in 2007, there is no Malaria OPD is reported. This improvement is significant in Coastal area. 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[12]; low socio-economic status, crowded living conditions (high population density) and migration from other places with a high number of cases of tuberculoses. According this criteria and the actual population density in coastal provinces[13] (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..

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

- 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 carries 2005 data by gender. It is very interesting that, in Preah Sihanouk and Koh Kong, 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 and Koh Kong would also have declined. However it is very important to conduct continuous surveys on recent and future prevalence in Coastal area, 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 Coastal area is shown in the table below.

Table 4.4.15 Principal Education Sector Indicators in Coastal Area and the Country

Issues/Province	Preah Sihanouk			Koh Kong			Kampot			Kep			Cambodia		
Literacy Level in 2005 (15-17 y/o and 18-64 y/o)	15-17	18-64		15-17	18-64		15-17	18-64		15-17	18-64		15-64 (2005[14])	15-64 (2007[15])	
	89%	88		77	74		86	85		87	92		90	90	
School Attendance in 2005 (primary; 6-14 and secondary; 15-17)	6-14	15-17		6-14	15-17		6-14	15-17		6-14	15-17		6-14[16]	15-17	
	83%	66		70	54		86	69		85	56		90	NA	
Number of Primary Schools in 2008[17]	2008			2008			2008			2008			2008		
	96			130			481			35			9,431		
Number of Primary Schools by region in 2008[18]	U[19]	R	Re	U	R	Re	U	R	Re	U	R	Re	U	R	Re
	96	0	0	11	76	43	22	459	0	35	0	0	1,202	7,587	642
Number of Secondary Schools in 2008[20]	2008			2008			2008			2008			2008		
	22			28			79			5			1,321		
Children Ratio to Classroom	2002	2005		2002	2005		2002	2005		2002	2005		2002	2005	
	91	81		135	95		78	68		92	73		NA	NA	
Student Ratio to Classroom	2002	2005		2002	2005		2002	2005		2002	2005		2002	2005	
	44	45		45	44		43	44		38	41		NA	NA	
Children Ratio to Teachers	2003	2005		2003	2005		2003	2005		2003	2005		2003	2005	
	58	54		106	87		52	50		52	44		NA	NA	
Student Ratio to Teachers	2003	2005		2003	2005		2003	2005		2003	2005		2003	2005	
	42	42		67	59		45	42		37	33		NA	NA	

- Adult Literacy: Because of a hard effort of Cambodia to attain universal education for all (EFA)[21], in which Ministry of Education, Youth and Sport has prepared Education

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

for All National Plan 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 Coastal area, Preah Sihanouk, Kampot and Kep attained nearly 90% of adult literacy in 2005. However Koh Kong shows a much lower literacy rate that does not even reach 80%. This trend is far behind from EFA in Cambodia, which aims at 100% of adult literacy rate[22]. This may be due to the fact that Koh Kong is a mountainous area and has many remote communities where the accessibility to education services is limited.

- School Attendance: Only the data in 2005 are available for primary school attendance at national and provincial level. At national level, 90% of the population attends the primary schools, while at provincial levels, the attendance rate did not reach the 90% mark; that are 83, 86 and 85% in Preah Sihanouk, Kampot and Kep respectively. In particular, the primary school attendance in Koh Kong was as low as 70%. This may be also explained by the geographical condition (mountainous and remote areas). It is also shown in the table that, in Koh Kong, there are 33% of primary school in remote area while in other provinces there are none.

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

  Interestingly enough, Kep reveals 29% downfall in the secondary school attendance compared with the primary school. This trend in Kep may be partly due to the limited number of existing secondary school. In general, it is clear that, in coastal area, fewer students attend a secondary school, which does not reach even the 70% mark.

  According to Ministry of Education, Youth and Sport[23], problem of the low school attendance is not only due to the lack of schools but 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 is indispensable.

- The Children to Classroom and Children to Teacher Ratio: According to Cambodian EFA[24], these ratios must be 40 pupils and/or students to 1 classroom and/or teacher. Actually, however, these ratios in primary school level are far too high 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.

[21] 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.
[22] Education for All National Plan 2003-2005
[23] Education for All National Plan 2003-2015
[24] Education for All National Plan 2003-2015

3) Poverty

According to the Statistical Yearbook of Cambodia 2008 (Ministry of Planning, Cambodia) poverty indicators in Coastal area are shown in the table below.

Table 4.4.16 Poverty Indicators in Coastal Area, Other Region and the Country[25]

Issues/Province	Phnom Penh	Plains	Tonle Sap	Coastal	Plateau/ mountains	Cambodia
Poverty Estimates (HCI: head count index or poverty rate) by region	2004	2004	2004	2004	2004	2004
	4.6%	32.1	42.8	26.8	52.0	34.7
Poverty Gap Index (PGI[26])	2004	2004	2004	2004	2004	2004
	1.2%	7.5	12.2	5.7	15.2	9.0

- HCI: According to Cambodia Socio Economic Survey 2004, about 35 percent of Cambodian population was estimated to live below the national poverty line, and 20 percent below the lower food poverty line. The incidence of poverty was estimated by five geographical zones (Phnom Penh, Plains, Tonle Sap, Coastal, and Plateau/Mountains). The higher incidence of poverty is observed in Plateau/Mountain zone, while the lower incidence of poverty is observed in Phnom Penh. The rural and remote areas (plateau/mountain, Tonle Sap and plain) experience much higher poverty rate. It is noteworthy that the poverty rate in Coastal area is second lowest after Phnom Penh. This may be because Preah Shihanouk, the 3rd largest urban area, which has the only international seaport in Cambodia, and international beach resorts in Preah Sihanouk as well as Kampot and Kep contributes to the lower poverty rate in Coastal area.

- Poverty Gap: While the national level of poverty gap is 9.0, the percentage of Tonle Sap and Plateau/Mountains regions are much higher than that of national level by accounting for 12.2 and 15.2% respectively. The poverty gap is also larger in rural and remote areas. As for Plain and Coastal regions, the data shows 7.5 and 5.7% respectively. The poverty gap of these two regions is lower than that of national level. In particular, that of Coastal region is the lowest in Cambodia, second to 1.2% in Phnom Penh. The lower poverty gap in Coastal region may be attributable to the favorable geographical and socio-economical characteristics of the region, which holds large urban and international tourist areas.

4.4.3 Land Use

To analyze the existing land use condition of the Study area, the land use analysis was conducted. The analysis utilized ASTER VNIR satellite imagery with 15 m spatial resolution, covering the period from 2002 to 2009. The land use map was classified into eight categories: urban, dense forest, sparse forest, mangrove forest, paddy field, grassland, fish pond, and water, as shown in Figure 4.4.1. The detailed description of each class is illustrated in Table 4.4.17.

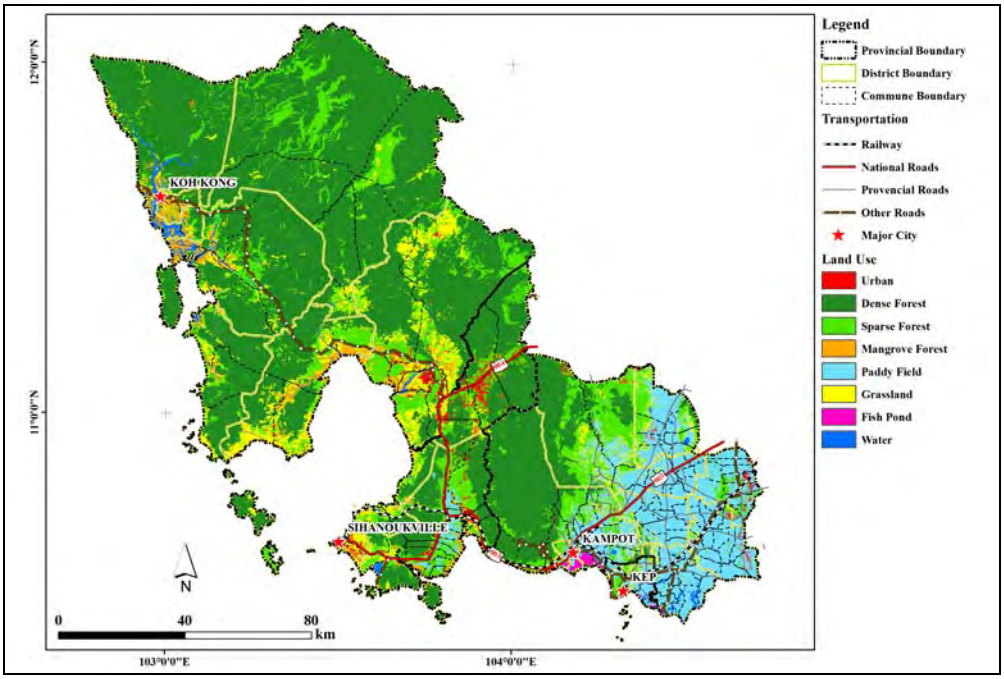
Total forest land (Dense and Spars) is 78% in the coastal area according to the processed land use map. Spars forest may include plantation, but the total forest land in the coastal area must be more than 60% that is the target of the National Strategic Development Plan. In particular Koh Kong is covered with broad dense forest. Broad forest has a capacity to maintain several wildlife and other natural resources. Once it is separated or shrank, it is difficult to restore the wildlife and other natural resources. Dense

[25] Statistical Yearbook of Cambodia, 2008, Ministry of Planning
[26] The Poverty Gap Index (PGI) measures the average gap between the poor population's level of income and the poverty line, expressed as a percentage of the poverty line.

forests in Koh Kong and lying forests on the north of Sihanouk and west of Kampot must be protected. However, some patches of sparse forest are found in the dense forest. Those look illegal logging and slash-and-burn. Some international NGOs such as Conservation International and Flora and Fauna International are assisting the activities of FoA rangers, nevertheless, illegal activities seems not to be controlled sufficiently. Preaek Kampong Sdm River is flowing vertically in the east Koh Kong. Around this river is grassland and it divides broad dense forest, east and west. Further exploitation along the River must be avoided.

Mangrove forests are distributed along the coast in particular in Koh Kong. The mangrove forests locate near towns (such as Koh Kong and Srae Ambel). Looking at Srae Ambel, mangrove forest is divided by urban area along the Preaek Kampong Sdm River. According to the Coastal Environmental Management Action Plan (MOE, 2007), mangrove forest in Kampong Trach was 3854 ha in 1997 and 319 ha in 2002. On the land use map processed by the Study team, mangrove forest is not found. During the site reconnaissance, it was observed that salt farms were spread along the coast, and seedlings were found on the abandon place. It shows the area is suitable for mangrove growth and former mangrove forest. Mangrove forest play essential role for marine organisms as nursery and spawning ground. It functions for marine water purification. Mangrove forest is easily cleared because it locates near residential area. Therefore the land clearance must be strictly prohibited.

Paddy field is dominant in Kampot. Paddy field does not function only for rice production but also for prevention of disaster and habitat of living organisms adapted to the environment. As the paddy field is contiguous to Bokor National Park, the combination enhances the biodiversity in the area. The combination must be maintained in terms of environmental protection in the coastal area.



Source: JICA Study Team

Figure 4.4.1 The Land Use Map of the Study Area

Table 4.4.17 The Land Area in (ha) of each Land Use Category in each Province

	KOH KONG		SIHANOUK		KAMPOT		KEP		Total	
Land Use Class	Area (ha)	Area (%)	Area (ha)	Area (%)	Area (ha)	Area (%)	Area (ha)	Area (%)	Area (ha)	Area (%)
Urban	10,916	1	15,176	6	10,380	2	712	4	37,184	2
Dense Forest	788,740	72	136,133	52	138,843	30	113	1	1,063,829	58
Sparse Forest	167,223	15	67,687	26	89,175	19	3,155	18	327,240	18
Mangrove Forest	33,386	3	7,372	3	759	0	252	1	41,769	2
Paddy Field	0	0	7,802	3	194,661	41	10,607	60	213,070	12
Grassland	78,943	7	22,569	9	27,334	6	1,520	9	130,366	7
Solt Farm	0	0	11	0	2,707	1	627	4	3,345	0
Water	21,110	2	3,941	2	5,551	1	592	3	31,194	2
Total	1,100,318	100	260,691	100	469,410	100	17,578	100	1,847,997	100

Source: JICA Study Team

4.4.4 Protected Areas and National Parks

(1) Protected areas

There are eight protected areas in the coastal area as shown in Table 4.4.18. National parks in Coastal area account for five out of seven national parks in the country. Management objectives of national parks are written in protected areas law as follows;

- Protect the natural area and landscape that are of national and international importance for the purposes of psychology, science, education, recreation, and tourism,
- Maintain priority for physio-geographical samples for areas, living resources community, genetic resources and species to offer stability and ecological variations,
- Manage the use for tourism for the psychological, educational, cultural, and recreational purposes to the extent that can ensure limited to no disturbances to the area,
- Eliminate and prevent illegal use and occupation of any part of the area,
- Maintain the respect for ecological privileges, land shape, sacredness or beauty, which are the causes for the establishment of such protected areas, and
- Meet the needs of indigenous group including the use of alternative resources, at a level that can meet other objectives of management.

National parks provide important habitats to wildlife including threatened species. It must be protected properly with scientific research and strict law enforcement. Recreation and tourism are other purpose of national parks, but in the above context, natural components such as forests, wildlife, natural scenery, and culture of indigenous people are the resources of the recreation and tourism. Protection and sustainable resource use must be the concept of national parks.

However, some national parks suffer from development activities that have significant impact to natural resources. Union Development Group Co., Ltd. (Chinese enterprise) has got the concession of west and south part (in total about 36,000 ha) of Botum Sakor national park that is a part of an important Asian elephant corridor, and applied QIP for mass tourism including large clearance and construction activities to CDC on 25th January 2008. As the investment was more than USD 50 million, COM examined and final registration certificate was issued from CDC on 17th June 2008. In the process, royal degree No.NS/RKT/0408/392 that cut off the west and south part from Botom Sakor national park and revised the area from 171,250 ha to 135,250 ha was issued on 9th April 2008. The cut

off area is still under management of MOE (MOE pers. com.), according to the director of national park and wildlife sanctuary department, but no patrol is carried out due to lack of access road. Wildlife alliance, an international NGO, visited the area in January 2009 with a helicopter, and observed forest (including mangrove) logging and burning at a dozens of locations.

Another development process was carried out in Ream national park. 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 areas on the documents, though the area is 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. The plans are general mass tourism development that can be done even along the beach near Sihanouk city. There is no special consideration for utilizing the important nature and nursery of marine organisms.

The other national parks are not critical at present. Bokor national park has broad and steep forest. The area has suffered from illegal logging and poaching so far, but still rich wildlife habitat is maintained. QIP has been provided to Sokha group for most area of the national park, but it seems that they intend to develop only southern part where French developed as a summer resort during French colony period for the time being.

Table 4.4.18 Protected Areas in Coastal Area

Category	Name	Area (ha)
National Park	Kirirom	35,000
	Preah Bokor	149,000
	Preah Ream	21,000
	Kep	5,000
	Botum sakor	135,250
Wildlife Sanctuary	Phnom Samkos	333,750
	Peam Krosop	23,750
Multiple Use Area	Dong Peng	27,700

Source: Protected Areas Law (2008)

Peam Krasop wildlife sanctuary keeps relatively good condition. Typical mangrove species, *Rizophora apiculata*, is dominant along the frontline, and several mangrove species were observed in the forest during field reconnaissance. 64 species were recorded by the survey of Participatory Management of Mangrove Resources by MOE and International Development Research Center (IDRC) (Two-year technical report, 2001). Fishery community and fishery administration cantonment in association with IDRC and DANIDA have been carrying out mangrove reforestation since 1997, and it looks pristine mangrove forest at present. It must be the nursery of marine organisms and the important area to increase marine stock.

Dong Peng multiple use area is more critical than Botum Sakor national park. The management objectives of multiple use area are as follows;

- Protect and maintain biodiversity and long-term natural value of the area,
- Promote management for responding to the objective of generating sustainable products,

- Protect the base of natural resources to prevent diversion of land use in the form that cause threats to the biodiversity of the area, and
- Contribute to the national and local economy and development.

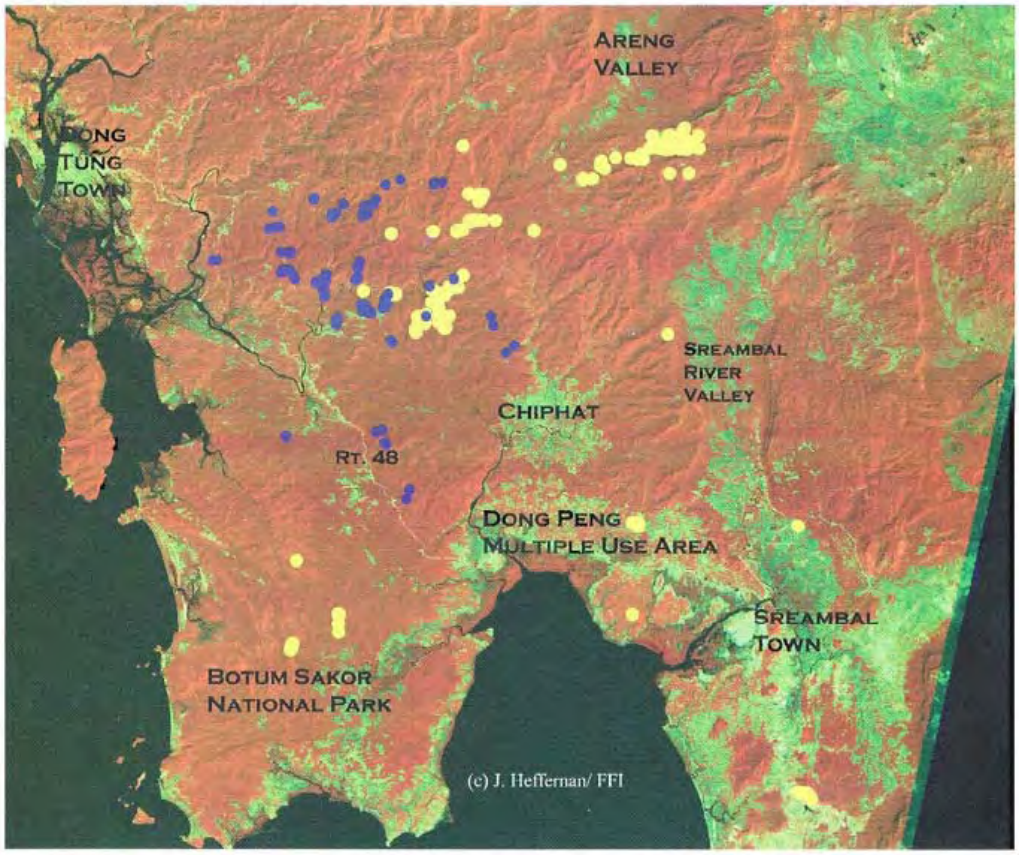
As mentioned above, the prior objective is to protect the biodiversity. However, several development plans have occupied the area. Furthermore, there is a plan to resettle the thousands of squatters next to the Sihanouk port to the area. Dong Peng multiple use area consist of large mangrove forests. If the exploitation proceeds with, it make the negative impact to the fishery along the south part of Botum Sakor national park, Dong Peng multiple use area and Preah Sihanouk province.

Fundamental issue is weak law enforcement. Relevant legislation such as Protected Areas Law, sub-decree on EIA, Law on Investment (LoI) and Law on Concession may not be enforced properly. Capacity and number of officials, budget, and cooperation among organizations are not enough and cause problems. EIA has not been implemented in provincial level. Provincial capacity seems the reason why EIA is not implemented. Furthermore, officials sometimes intentionally do not use mandate. It is possible to change the interpretation of legislations as interested people wish. As the result, critical developments have been permitted in protected areas. Another issue regarding legislation is that some legislation is incomplete. For example, boundary and zoning of protected areas are determined by sub-decree, but it has not been out. Investors and MOE can insist the expected core zone as sustainable use zone. Detail EIA process is not explained in Sub-decree on EIA. MOE is preparing the EIA guideline has just published in September 2009, but it is still not enough. Detail EIA manual must be necessary. Concession law includes the sentence ‘unless otherwise specified in the concession agreement’ in many paragraphs.

(2) Protected forests

There are three protected forests in Coastal area as shown in Table 4.4.19. Central Cardamom and Southern Cardamom are located in the same Cardamom mountain area. As there are forest concessions between the two protected forests, those were separated. Central Cardamom was designated in 2002. The forest is strictly protected by rangers of FoA in collaboration with international NGOs such as Conservation International (CI) and WildAid (the NGOs have workstation at Ruessei Chrum village in Central Cardamom Protected Forest). They have patrolled and conducted researches in the forest.

Southern Cardamom was designated in 2004. National Route 48 passes through the protected forest, but no blatant land clearance was found along route 48. There are check points where solders live along the route 48, and signposts that show the protected forest are hammered at regular intervals. South Cardamom is a part of Cardamom mountain, and adjacent to Botom sarkor national park. A series of forests here formulate the elephant corridor. The corridor is the second largest elephant corridor in the world. The locations where elephants recorded during surveys by FoA/Fauna and Flora International (FFI) (2003) and FoA/WildAid (2002) are shown in Figure 4.4.2. A report on the status, distribution and issues surrounding the domesticated Asian elephant in Cambodia (Chheang et al, 2001) estimated the population of elephant in the area as 160 – 200. The coastal slopes are quite important for the conservation of the Asian Elephant in Cambodia. If the series of forest would be divided, the population would probably decrease sharply.



Source: Joe Heffernan & Chheang Dany, 2003, The Asian Elephant in Southwest Cambodia, A Proposed Conservation Framework (Yellow dots indicate data collected by FFI/FoA and blue dots indicate data collected by WildAid/FOA)

Figure 4.4.2 Distribution of Elephant Data Points in South West Cambodia

Kbal Chhay protection forest is the catchment of water supply to Sihanouk city. FoA are doing patrol and reforestation. Acacia sp., Eucalyptus sp. and other trees were planted in about 1,000 ha of the catchment from 2001 t o 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.

Table 4.4.19 Protected Forests in Coastal Area

Name	Area (ha)
Kbal Chhay	6,027
Central Cardamom	401,313
Southern Cardamom	144,275

Source: Cambodia Forestry Statistics 2006

(3) Marine conservation areas

In order to restore the habitats of marine organisms and increase the marine stock, Fishery Law stipulated marine conservation areas. In Coastal area, basically fishery community and commune apply the designation of the marine conservation area to FiA cantonment. The cantonment has the meeting with relevant organizations, and if it is approved, provincial governor and relevant organizations sign on the application document with a map to ensure the location of the marine conservation areas.

The areas are expanding and the activity is restoring the condition of habitats such as sea grass beds and coral reefs. However, the budget is limited to demarcate with concrete polls and patrol, the designated area is so small to make enough effect. Many threatened species use the large habitats (e.g. Dugong live in the large sea grass area, Hawksbill turtles live in the coral reef area, etc.), therefore, expansion of marine conservation areas are necessary.

4.5 Human Resource Development

4.5.1 Educational Attainments of People in Coastal Area

The Cambodian Government needs to make further effort to promote people's educational level as a whole so that they will be capable to manage their lives and enjoy the prosperity. This is a crucial task for Cambodia to become productive, industrial and competitive, thereby leading to her sustainable socio-economic development.

Looking into the current situation of the education attainment of household population, as shown in Table 4.5.1, there is much room to strengthen the educational attainment. Those who completed the primary education share 10.6% of the total household population in the Kampot/Kep area, and 6.6 % in the Preah Sihanouk/Koh Kong area. Those figures are low, but not significantly different from those of the national average and Phnom Penh. However, the share of those who completed the secondary education was 2.1% and 2.9% for the Kampot/Kep and Sihanouk/Koh Kong areas respectively, which are significantly inferior to that of Phnom Penh, 9.2%. And, those who were educated at higher institutes share as low as 1.4% in the Sihanouk/Koh Kong area, compared with 13.2% in Phnom Penh.

Table 4.5.1 Educational Attainment of Household Population 2005 in Comparison with National Average and Phnom Penh

(Unit: %)

	Level of Education						Don't Know/Missing	Total
	No Education	Some Primary	Completed Primary	Some Secondary	Completed Secondary	More than Secondary		
National	13.3	50.5	8.9	22.3	2.6	2.0	0.4	100
Urban	8.7	37.7	8.8	29.2	7.3	7.5	0.8	100
Rural	14.1	52.9	8.9	21.1	1.7	0.9	0.3	100
Phnom Penh	5.0	32.0	8.8	31.6	9.2	13.2	0.2	100
Kampot/Kep	10.6	55.0	**10.4**	21.0	**2.1**	0.6	0.3	100
Sihanouk/Koh Kong	17.9	45.6	**6.6**	20.7	**2.9**	1.4	4.9	100

Notes: Completed Primary School stands for completion of grade 6 at the primary level and grade 12 at the secondary level.
Source: Cambodia Demographic and Health Survey 2005

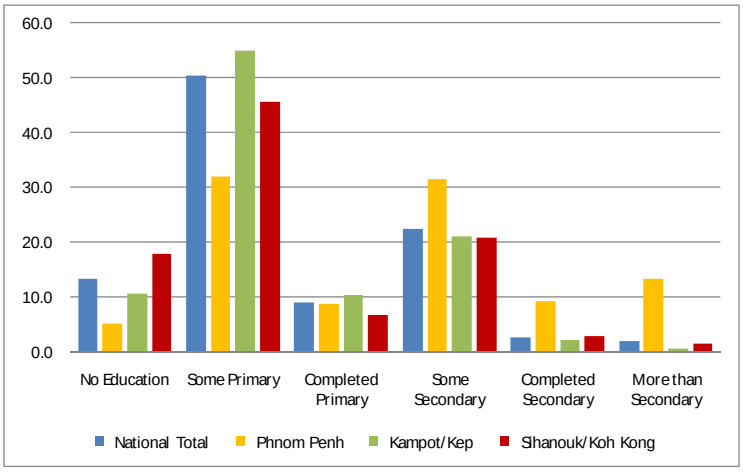


Figure 4.5.1 Educational Attainments in Costal Area in Comparison with National Average and Phnom Penh

As seen in Table 4.5.1, it can be identified that the enrolment ratios of both primary and secondary school are comparatively high, but those who complete the grades are so marginal. Why do so many students dropped out the school on the way? Table 4.5.2 indicates distribution patterns of the reasons for not attending school in comparison with Phnom Penh, Urban, Rural and national average from the Socio-economic Survey 2007.

Interestingly, there are less differences in top three reasons between areas, that is, "don't want", "Must contribute to household income" and "Must help household chores". The household-related reasons are very heavy, but it should be noted that the reason for "High cost schooling/no money" is very minimal, almost none even in rural area. Since the household-related reasons are rooted into the poverty, "no money" must be a direct reason. However, it might be said that children as well as parents do not like to recognize that money is the first reason for not attending school. The drop-out ratios of both primary and secondary schools should be lessened, along with improvement of people's economic and livelihood conditions together with encouragement of lasting schooling though a enhanced government policy.

It is also noted that the physical and spatial conditions attributed to schools are not major reasons, compared to household-related reasons for not attending schools.

Table 4.5.2 Reasons for Not Attending School aged 5-17 years, 2007

Reasons for Not Attending School		Phnom Penh	Urban	Rural	National Total
1	Don't want	**12.0**	**27.4**	**21.7**	**21.8**
2	Did not do well in school	11.1	4.6	6.4	6.4
3	No suitable school available or too far	-	0.6	7.1	6.4
4	No teacher, No supplies	-	5.3	0.9	1.2
5	High cost of Schooling / No money	1.8	-	0.1	0.1
6	Must contribute to household income	**11.4**	**17.2**	**18.3**	**18.0**
7	Must help household chores	**16.2**	**18.2**	**16.6**	**16.7**
8	Due to disabilities/illness	8.1	2.9	4.8	4.8
9	Others	39.4	23.9	24.2	24.7
Source:	Cambodia Socio-economic Survey 2007, National Institute of Statistics				

While, the school attendance ratios imply educational conditions at the practical level, Table 4.5.3 shows the net attendance ratios (NARs) and gross attendance rations (GARs) at primary (1st to 6th grade) and secondary school (7th to 12th grade), compared to the national average and Phnom Penh in 2005. Looking into NARs for secondary school, 33.2% and 22.9% represent the Kampot/Kep area and the Sihanouk/Koh Kong area respectively, compared to 45.7% in Phnom Penh. It is generally said that the current school attendance situation of school-age population in Coastal area is not necessarily inferior to that of national average of rural areas, however, significantly lower than that in Phnom Penh.

The educational attainment level may not necessarily be linked with the skill and knowledge levels in the industrial sector, because most of workers are likely to be trained through on-the-job basis. However, basic knowledge to be attained at schools is required for industrial workers who are capable to contribute to the socioeconomic development in a sustainable manner. In this sense, particularly important is the upper secondary education (10th to 12th Grade) where are capable to foster intermediate class technical workers, engineers and managers.

Table 4.5.3 School Attendance Ratios, 2005 in Comparison of The National Average and Phnom Penh

	Net Attendance Ratio (NAR %)			Gross Attendance Ratio (GAR %)			Gender Parity Index
	Male	Femal	Total	Male	Female	Total	
Primary School							
National	76.4	78.2	77.3	112.5	107.9	110.2	0.96
Urban	76.6	79.5	78.0	104.9	101.9	103.4	0.97
Rural	76.3	78.0	77.1	113.7	108.8	111.2	0.96
Phnom Penh	78.4	79.1	78.7	98.9	103.6	101.1	1.05
Kampot/Kep	83.6	82.9	**83.2**	122.6	116.0	**119.3**	0.95
Sihanouk/Koh Kong	66.2	68.7	**67.5**	97.4	92.8	**95.1**	0.95
Secondary School							
National	29.9	26.7	28.3	39.8	30.7	35.3	0.77
Urban	47.0	43.3	45.0	64.1	50.2	56.6	0.78
Rural	27.0	23.3	25.2	35.6	26.7	31.3	0.75
Phnom Penh	52.3	40.7	45.7	70.8	47.3	57.3	0.67
Kampot/Kep	33.3	33.2	**33.2**	44.2	39.7	**41.9**	0.9
Sihanouk/Koh Kong	27.4	18.3	**22.9**	35.2	20.6	**28.0**	0.58

Notes: 1) NAR for primary school is the percentage of the primary-school-age (7-12 years) population that is attending primary school; and the NAR for secondary school is the secondary-school-age (13-18 years) population that is attending secondary school. By definition, NAR cannot exceed 100 percent.

2) GAR for primary school is the total number of primary school students, expressed as a percentage of official primary-school-age population. Alike, GAR for secondary school is the total number of secondary school students, expressed as a percentage of official secondary-school-age population. By definition, if there are significant numbers of overage and underage students at a given level of schooling, the GAR can exceed 100 percent.

3) The Gender Parity Index is the ratio of GAR for female to the GAR for male.

Source: Cambodia Demographic and Health Survey, 2005

4.5.2 Limitation of Higher Educational Opportunities

In order to encourage a new industrialization process in Coastal area as planned, quality labor force is one of critical conditions. In particular, a remarkable number of capable young managerial and technical personnel will be required in Preah Sihanouk in the future. A well-developed higher educational system is expected to be available in the strategic area. However, opportunities for higher education are still limited in number over the country, and their locations are concentrated into the Phnom Penh Metropolitan Area, and scared outside the capital city.

Table 4.5.4 shows numbers of students enrolled in major higher educational institutes in recent years, although the data seems less accurate unfortunately. National universities with different majors accommodate a total of more or less 25,000 to 30,000 students are annually enrolled in recent years, including Faculty of Pedagogy which 7,000 to 9,000 students. In the same table, some selected vocational institutions located in provinces outside the capital city are listed, such as Kampong Ampil Agriculture School (Takeo), Battambang Agriculturer School, Kampong Cham Agriculture School and Donbosco Vocational School. Unfortunately, the numbers of enrolled students are not recorded in this statistical data, and brisk higher education cannot be observed at these institutes.

While, the numbers of students at national universities and major selected private institutions are tabulated in Table 4.5.5. It is noted that some of new public universities as well as private universities have recently been established, focusing on specialized fields such as technology, agriculture and trade, and that opportunities for higher education have gradually been increasing, thanks to mushrooming of private establishments.

Table 4.5.4 Number of Students Enrolled in Higher Educational Institutes

	2002	2003	2004	2005	2006
1. Higher Education					
Royal Unversity of Fine Art	713	1,190	1,255	1,295	1,599
Institutes of Agriculture, Chamckardong	2,523	6,042	6,206	6,755	7,528
Royal Unversity of Phnom Penh	930	986	1,370	1,763	2,665
Unversity of Health Science	424	905	1,254	1,568	1,770
University of Maharishi Vedic	1,287	4,822	4,802	5,393	6,172
Facluty of Laws and Economic Science	300	-	-	-	-
Facluty of Pedagogy	1,022	364	9,108	6,724	7,522
National Institute of Management	407	0	393	476	956
Cambodia Technilogy Institute	981	1,537	813	722	760
2. Technical and Vocational Center and School (Selected)					
School of Agriculture Prek Leap	160	1,001	0	0	518
Kampong Ampil Agriculture School (Takeo)	-	-	-	-	-
Battambang Agriculturer School	-	-	-	-	-
Regional School for Medical Cadres in Kampot	90	196	-	-	-
Kampong Cham Agriculture School	90	-	-	-	-
Donbosco Vocational School	-	-	-	-	-
School of Transportation JVC P. Sihanoukville	60	64	-	-	-

Source: Department of Planning, Minsitry of Education, Youth and Sports

Table 4.5.5 Number of Students in Higher Educational Institutes

	2002/03	2003/04	2004/05	2006/2005
1. Public Education				
Royal Unversity of Fine Art	730	813	722	760
Royal University of Agriculture	1,148	1,255	1,295	1,490
Royal Unversity of Phnom Penh	5,851	6,206	6,755	7,528
Unversity of Health Science	1,091	1,370	1,763	2,665
University of Maharishi Vedic	947	1,254	1,568	1,541
Royal University of Laws and Economic Science	4,667	4,802	5,393	6,172
Facluty of Pedagogy				
National Institute of Management	8,698	9,108	6,724	7,272
Cambodia Technilogy Institute	349	393	476	682
National Institute of Technology	-	-	-	624
Natinal School of Kampong Cham Agriculture	-	-	-	396
National School of Agriculture, Prek Leap	-	-	-	267
National Institute of Trade	-	-	-	554
University of Svay Rieng	-	-	-	838
Institute of Preah Kossamak Poly Technology	-	-	-	368
2. Private Education (Selected)				
Norton University	4,681	4,548	5,285	6,147
University of Build Bright	4,825	5,984	7,894	10,617
University of Panhasas	2,846	891	1,503	1,650
University of Asia	418	597	842	1,116
University of Poly Technologies	161	225	225	654
University of Cambodia Speciality	431	1,091	1,419	1,833
International University	175	-	1,085	1,705
Khemrak University	-	-	369	1,417
University of Asia Europe	-	-	782	3,375
Human Resource University	-	-	2,426	3,293
Unversity of Technology and ?	945	1,104	1,068	986
Vanda Institute	552	730	991	1,426
Institute of SITEC	55	235	304	545
University of Management and ?	788	1,447	2,080	2,853
Institute of Management Science	862	783	897	1,120

Source: Department of Planning, Minsitry of Education, Youth and Sports

4.6 Donor Activities

4.6.1 Donor Activities on Land Management

(1) Natural Resource Management and Livelihood Programme (NRML): DANIDA/DFID/NZAid, Land Management Sub-Component

- Term: June, 2006 – December 2010
- Budget of the Sub-Component –Land Management in 2009: $1,.45mil.

NRML has 3 components, which are the Component I-NRM in D&D, Component II-Civil Society & Pro-Poor Markets and Component Ⅲ-Sector and Policy Development. Land Management Sub-Component is in the Component Ⅲ. (Figure 4.6.1) The main objective is the capacity development for the land management of MLMUPC and Local level in the concept of D&D (Distribution & Demarcation). The progress report of the Semester I has been submitted in September, 2009. Also Implementation Manual on Commune Land Use Planning to support Commune Development Plan and Commune Investment Program has been submitted in November, 2009 as well as the promulgation of the sub-decree on Commune/Sangkat Land Use Planning Procedure on May 05, 2009. In the manual it is described as that the commune land use planning is an important tool for commune council as well as stakeholders at sub-national level to contribute in management and using the natural resources in sustainable and equitable manner.

The purposes of the commune land use planning include:

- Provide competency to commune/sangkat councils in preparing effective land and natural resources use and management,
- Support equitable and sustainable and sustainable socio-economic development,
- Contribute to the people poverty reduction,
- Help to achieve high productivity of land use in the commune/sangkat based on the actual conditions and natural potential of the land,
- Respond to the land need of authorities and commune/sangkat residents,
- Help prevent degradation and inappropriate use of land and natural resources,
- Facilitates better fulfillment of commune/sangkat council role as state representatives in determining and managing sate land in the commune/sangkat,
- Seek supplementary technical support from various institutions and unites as well as from private sector for preparation of commune/sangkat development plan and investment program.

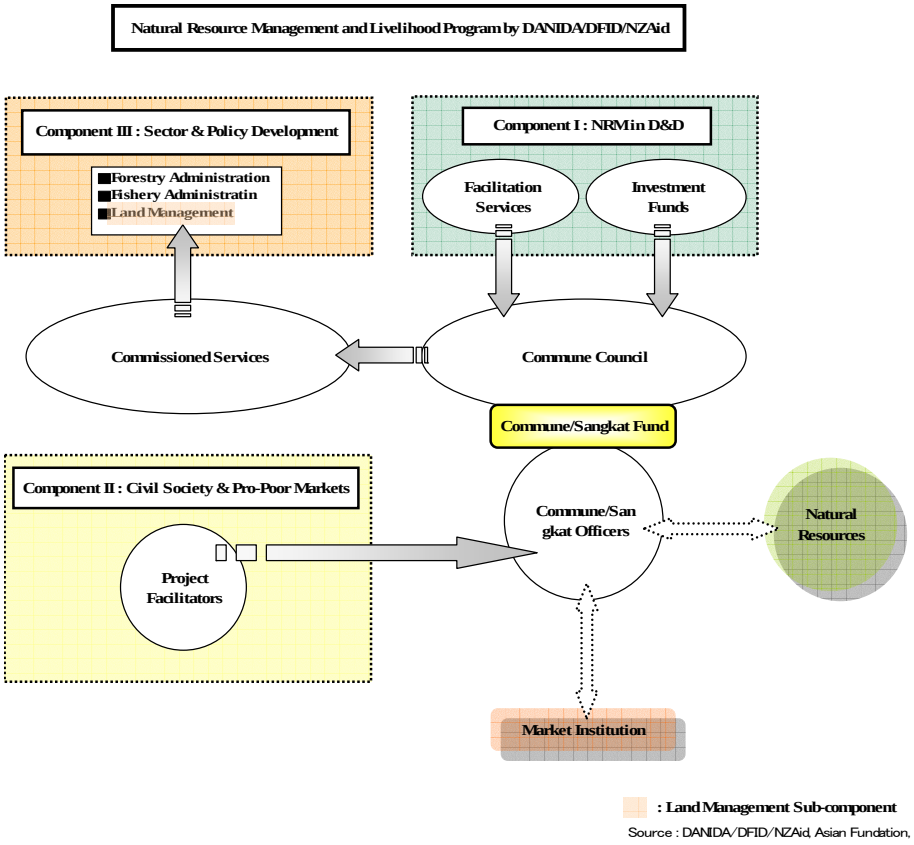


Figure 4.6.1 NRML by DANIDA/DFID/NZAid

(2) Cambodia-Land Administration Management and Distribution: World Bank

- Term : March, 2009 – N/A
- Total Budget : $2.23mil.

This project is for the land titling and distribution starting from the north-west provinces in Cambodia. The farther information will be provided on the next stage.

4.6.2 Donor Activities on Industrial Sector

Various donors have been actively providing assistance for promoting industries in Cambodia. Recently closed coordination has been made among international development agencies to develop industrial sector of Cambodia. Following programs unites all activities funded by international development agencies to assist the Government of Cambodia.

(1) Trade Integration Strategy (DTIS 2007)

In the end of 2006, Cambodia's 2007 Trade Integration Strategy (DTIS2007) was launched under the initiative of the United Nation Development Program (UNDP) and Ministry of Commerce. DTIS identified 19 product and service sectors with strong potentials to drive export diversification in Cambodia. Identified following 19 products and service sectors;

1. Garments	8. Silk	15. Light Manufacturing
2. Footwear	9. Soybeans	16. Tourism
3. Rice	10. Livestock	17. Labor Services
4. Cassava	11. Corn	18. Web-based Services
5. Rubber	12. Beer	19. Transport & Transport- Related Services
6. Fishery	13. Fruits & Vegetables	
7. Cashew Nuts	14. Wood Products	

In order to improve performance of these sectors, DTIS2007 made recommendations for following five issues; 1) Trade Facilitation, 2) Investment Facilitation, 3) Cutting Technical Barriers to Trade, 4) food sanitation, and 5) Intellectual Property Right.

(2) Trade Sector Wide Approach (Trade SWAp)

In December 2007, UNDP, the World Bank, EU proposed "Trade Sector Wide Approach (Trade SWAp)" based on recommendations of DTIS2007. Implementation of Cambodia's trade and industrial development strategy is being done on the basis of the Trade SWAp. Responsibilities are shared by donors, and they make concerted efforts towards the solution of these issues.

In order to realize the recommendations made under DTIS2007, Trade SWAp setup following three pillars, "Pillar-1: Legal Reform and Cross Cutting Issues (mainly supported by World Bank)", "Pillar-2: Product and Service Export Sector Development (mainly supported by UNDP)", and "Pillar-3: Capacity Building for Trade (mainly supported by UNCTAD)".

Related donors are developing activity matrix by pillars and by sectors, which defines the activity of each program, and donor as well as Cambodian counter part agency in charge of each program. These programs are executed in line with the rolling plan for 3 years (2008 - 2011).

(3) Trade Development Support Program (TDSP)

The Cambodian Ministry of Commerce, together with four of its international development agencies (World Bank, European Commission, DANIDA and UNIDO), launched TTDSP aimed at assisting Cambodia to expand its international trade. TSDP constitutes part of Trade SWAp activities. The program is financed by the European Commission, DANIDA and UNIDO, and it is administered by the World Bank.

The development objective of the program is contribute to increase the government's efficiency in formulating and implementing effective trade policies. There are four components to the project. The first component of the project is trade policy formulation and implementation. This component will support the Government's trade strategy, in particular: i) technical barriers to trade and sanitary and photo-sanitary measures; ii) trade facilitation; and iii) other legal reforms and World Trade Organization obligations. The second component of the project is performance monitoring. This component will support to surveys and monitoring tools to assess progress in implementing the Government's trade strategy and provide evidenced-based feedback. The third component of the project is institutional and human capacity. This component will support to the development of strengthened institutions, stronger incentives, and improved technical ability to formulate and

implement the Government's trade policy. The fourth component of the project is implementation support to TDSP. This component will support the development of the Ministry of Commerce's implementation capacity to act as a Secretariat for the "Trade SWAp" and program manager for the TDSP. This will include support to assist it in meeting its fiduciary responsibilities. This will also support other departments' and agencies' capacity in implementing the TDSP.

4.7 Major Findings through the Stakeholder Meetings (SHM)

4.7.1 Findings of major present issues and development needs through 1st and 2nd SHMs

The detail contents of the discussion points of SHMs are described in Chapter 8 and the Stakeholder Meeting Reports are attached in appendix

The present issues and development needs in Coastal Area that have been identified through 1st and 2nd SHMs can be divided into five areas; i.e. i) economy, ii) regional industry, iii) urban development and land management, iv) social and environmental conditions, and v) infrastructure conditions. In this section present issues and development needs in each province as well as in the coastal area will be analyzed in order to identify the future visions of strategy for coastal development.

Based on this present issues identified in SHM, future needs has been derived.

(1) Findings of major present issues and development needs through 1st SHM

The following Table 4.7.1 summarizes findings of major positive and negative factors of each province which have been identified through SHM.

Table 4.7.1 Present Issues and Development Needs of Each Province

Koh Kong Province		
Economy	Positive	-The province is situated in the border with Thailand and there is a high potential that it makes the province national and international gateway
	Negative	-High poverty ratio -Lack of economic infrastructure -Lack of strategy and/or plan as an international and national gateway for economic development -Lack of economic support for poor people including micro finance -Lack of policy and/or plan to enhance tourism
Industry	Positive	-Abundant land available for industry -Potential of international industrial area in the border with Thailand -Abundant natural resources
	Negative	-There is no clear policy of industrial development
Urban development and Land Management	Positive	-Abundant land available
	Negative	-There is no clear land use plan -There is no clear land use plan in coastal zone
Social and Environmental condition	Positive	-High potential environmental resources -Beautiful oceanic tourism spot and national parks having precious fauna and flora
	Negative	-High poverty ratio -Lack of social infrastructure including schools and health centers -There is no balance between development and environmental conservation -Lack of environmental infrastructure and system including solid waste management and drainage system
Infrastructure Condition	Positive	-Available land for infrastructure development
	Negative	-Lack of socio-economic infrastructure -Lack of roads
Preah Sihanouk Province		
Economy	Positive	-The province has only deep sea port and is the biggest economic international gateway - Oceanic tourism place -Attract international and national investment
	Negative	-Lack of economic infrastructure including energy -Lack of M/P for the rapid expanding Sihanouk-ville City
Industry	Positive	-There are many Special Economic Zones (SEZ) -Higher potential of international industrial area -Abundant available land
	Negative	-There is no balance between industrial development and environmental conservation
Urban development and Land Management	Positive	-Rapid urbanization
	Negative	-There is no clear land use plan -There is no clear urban development plan
Social and Environmental condition	Positive	-Beautiful oceanic tourism spot and national parks having precious fauna and flora
	Negative	-Expanding disparity between rich and poor -Lack of law enforcement on illegal settlement -Lack of parking lot for trucks which carry the products from the port -Lack of drainage system -Lack of waste water system
Infrastructure Condition	Positive	-Available land for infrastructure development
	Negative	-Needs of improvement of roads in particular No 4 -Lack of fish port -Lack of economic infrastructure including energy and water

Kampot Province		
Economy	Positive	-High potential of being international logistic centre by being situated near the border with Vietnam - Oceanic tourism place -Attract international and national investment
	Negative	-Lack of economic infrastructure including energy -Lack of M/P for the rapid expanding Sihanouk-ville City
Industry	Positive	-Province is willing to attract investors -The province is willing to attract labor intensive industry
	Negative	-There is no clear plan and/strategy as well as measures which industry the province can attract
Urban development and Land Management	Positive	-Rapid urbanization -Provincial government is preparing urban development plan/land use plan by themselves
	Negative	-There is no clear land use plan in coastal zone
Social and Environmental condition	Positive	-Beautiful oceanic tourism spot and national parks having precious fauna and flora -Many historical monuments which attract tourists
	Negative	-There is no balance between development and environmental conservation -Unfavorable development in national park -Lack of drainage system -Lack of waste water system -Lack of water supply system
Infrastructure Condition	Positive	-Available land for infrastructure development
	Negative	-Needs of improvement of roads and bridges -Lack of economic infrastructure including energy and water
Kep Province		
Economy	Positive	-One of the most famous tourist place in Cambodia and attract many tourists - Oceanic tourism place -The province has border with Viet Nam -High potential as an international logistic centre
	Negative	-Main economic activities are subsistence agriculture and fishery
Industry	Positive	-Main industry is tourism
	Negative	-There is no clear plan and/strategy as well as measures for the province to be international logistic centre
Urban development and Land Management	Positive	-Provincial government is preparing urban development plan/land use plan by themselves
	Negative	-There is no clear land use plan in coastal zone
Social and Environmental condition	Positive	-Beautiful oceanic tourism spot and national parks having precious fauna and flora
	Negative	-There is no balance between development and environmental conservation -Unfavorable development in national park -Lack of drainage system -Lack of waste water system -Lack of water supply system -There are many landless people
Infrastructure Condition	Positive	-The province has a border with Viet Nam
	Negative	-Needs of improvement of roads and bridges -Lack of economic infrastructure including energy, water and roads

Source: JICA Study Team

(2) Opinions/suggestions on the Development Strategy in the 2nd SHM

In the 2nd SHM, the Study Team and MLMPUC presented "National Integrated Strategy of Coastal Area," based on the findings of baseline survey and 1st SHM. Accordingly stakeholder discussion mainly concentrated on the opinions/suggestions of the stakeholders on the strategy that was prepared by the Study Team and MLMPUC. The main strategy consists of three development management's strategies; those are land use development,

investment development and environmental management.

Table 4.7.2 The Opinions/Suggestions on the Development Strategy in 2nd SHM

Koh Kong Province	
Land Use Development	-Land law should be strengthened -Land use should be appropriately managed -Economic land concession should be well controlled -Monitoring of implementation should be properly done
Investment Development	-Investment law should be reinforced -Local government should be involved in investment activities
Environmental Management	-Environmental management should properly be executed -Local government should take an action pollution reduction
Preah Sihanouk Province	
Land Use Development	-Land law should be strengthened -Land use management should be appropriately executed -Land use should be utilize with a good direction
Investment Development	-Investment law should be reinforced -Any investment projects should be studied in detail before the implementation
Environmental Management	-Environmental management should properly be executed -Disseminate and educate people on environment -Development activities in conservation area should be studied
Kampot Province	
Land Use Development	-Land law should be strengthened -Land use management should be appropriately executed -Land use should be utilize with a good direction
Investment Development	-Investment law should be reinforced -NGOs and other donors should take participatory methodology to protect conservation area
Environmental Management	-Environmental management should properly be executed -Disseminate and educate people on environment -Development activities in conservation area should be studied
Kep Province	
Land Use Development	-Land law should be strengthened -Land use management should be appropriately executed
Investment Development	-Investment law should be reinforced -In case of investment activities come, farmers and other land owners should be protected by being given market to sustain their lives
Environmental Management	-Environmental management should properly be executed -Disseminate and educate people on environment -Development activities in conservation area should be studied

Source: JICA Study Team

4.7.2 Overall results of SHMs

Apparently the socio-economic infrastructures including transport and environmental issues are major concerns among stakeholders. Especially these attract stakeholders as issues in the whole Coastal area, which are circumstances of road and water, environmental degradation and reforestation, management over lands and investment, and sanitary awareness of people. Stakeholders from Ko Kong Province show high concerns in Lack of Development Management overall, including management over land, environment and investment, a provincial development master plan, and laws and regulations over management. These findings in the two SHMs shall be reflected in the following chapter on development vision.

4.8 Major Findings through Hearing Survey

Coastal area has multi-faceted potential for development for different parties. In order to depict some of the layers for development, a small hearing survey was carried out for this Study with 30 organizations, institutions and agencies in located in Coastal area and in Phnom Penh. though June to August 2009.

The following are some of the main points found in the survey

- Most of the respondents answered that "sand and beaches" followed by "forest and mangrove" are the most important resource of Coastal area, which indicates that the nature is the most important and imperative element in regional development vision in Coastal area
- About half of the respondents say that there is a misuse of natural resource in Coastal area, and asked about the suggested improvement in development of those resources, the most popular response was "the proper land use plan".
- With regard to the question about the preferred improvement in the resources, the most popular answer was "proper land use plan", followed by "natural environmental resource management".
- All the respondents said that there is no adequate infrastructure to support the development of Coastal area now. Asked about what type of infrastructure most inadequate, about two third of respondent chose "road infrastructure".
- Asked about negative impact from current development, more than half of the respondents said that there is such negative impact, and the "environmental pollution" is the most typical incidence of the negative impact.
- Asked about the suggested measures for alleviation of the negative impact, "law enforcement", "proper land use plan" and "environmental management" were the top three suggested measures by the respondents.
- Asked about the type of appropriate developments, the most popular response was "tourism" followed by "industry".

CHAPTER 5: STRATEGY FOR COASTAL DEVELOPMENT

5.1 Visions for Coastal Development

5.1.1 Analysis of Issues and Potentials of Coastal Area

For preparing the pragmatic Visions for Coastal area development, the main issues and potentials in the present conditions of the Coastal area, which has been derived from Chapter 4, were summarized and evaluated in terms of its i) Strength, ii) Weakness, iii) Opportunity, and iv) Threat, namely SWOT.

(1) Strength of the Coastal Area

Strength of the Coastal area is enumerated as follows:

i) Economy

- Achieving rapid and continuous economic growth driven by the private sector through FDI and Export increase;
- GSP and MFN status of the WTO regime to US, EU and other developed country; and
- Significant improvement of fiscal situation.

ii) Industry

- Drastic increase in the labor force;
- Concentration of private sector investment (more than 40% of the whole nation); and
- Unique development resources such as aquaculture, fruits and forest products.

iii) Urban Development and Land Management

- Donor Activities are on-going (for instance, land management development project by DANIDA/ DFID/NZAid).

iv) Social and Environmental Condition

- Beautiful oceanic tourism spots and national parks having precious fauna and flora.

v) Infrastructure Condition

- Sihanoukville Port is the only deep sea port in Cambodia.

(2) Weakness of the Coastal Area

Weakness of Coastal area is enumerated as follows:

i) Economy

- Informal trading and immature taxation system leads weak state revenue.

ii) Industry

- Monotonous economy highly depending on garment industry;
- Improper use of agricultural chemical that leads high risk and low value crops;
- Significant demand for organic products;
- Few initiative to promote tourism attractions over Coastal area for foreign tourists;
- Many of the registered investment projects in Coastal area are inactive or unapproved, as they are tourism and area development that are tend to be easily halted;
- Underperformance of using tariff concessions under ASEAN; and
- Weak business and financial market sophistication and innovation.

iii) Urban Development and Land Management

- Weak institutions including issues with corruption and inobservance of land use plan.

iv) Social and Environmental Condition

- Limitation of higher education opportunities and very weak in health.

v) Infrastructure Condition

- Quality and quantity of road infrastructure.

(3) Opportunity of Coastal Area

Opportunity of Coastal area is enumerated as follows:

i) Economy

- Recovery of world economy from the serious global financial crisis is expected; and
- High potential and attention on development of the Southern Economic Corridor in GMS.

ii) Industry

- Relatively abundant youth working age population; and
- Significant demand for organic products

iii) Urban Development and Land Management

- Existing of rich natural and cultural resources and good access to growth corridor, which will enhance urban development for creating attractive cities

iv) Social and Environmental Condition

- Growing People's Awareness for environmental conservation.

v) Infrastructure Condition

- Multipurpose terminal development for Sihanoukville Port, rehabilitation of Railway and Sihanoukville Airport are on going (or pledged).

(4) Threat of Coastal Area

Threat of Coastal area is enumerated as follows:

i) Economy

- Vulnerable for the external economy as the country highly depending on exporting garment.

ii) Industry

- Vulnerable for the external economy as the country highly depending on exporting garment.

iii) Urban Development and Land Management

- Increase in the number of urban poor people, which limits the development opportunities and may lead to relocation problems.

iv) Social and Environmental Condition

- Concentration of tourism, commercial and industrial development investment projects may lead to the environmental destruction.

v) Infrastructure Condition

- Goods are increasingly distributed to/ from *Cai Mep Chi Bui* Port in Vietnam through Phnom Penh port; and

- Congestion and traffic accidents due to the heavy and light traffic mix and increase in traffic volume.

Source: JICA Study Team

Figure 5.1.1 Cross SWOT Matrix

5.1.2 Proposed Visions

Based on the analysis of opportunities and constraints of Coastal area, and viewing the importance of Coastal area for the entire Cambodian national economic development in the long-term future, an underlying principle for the development is to form a "**Resonance Region**" for the four provinces: in the sense that one positive initiative in one province shall resonant and reflect to all four provinces; Koh Kong, Preah Sihanouk, Kampot and Kep (**SK**^{3} provinces). Under this planning principle, four (4) visions are proposed to be pursued as the orientations of development as follows:

Vision 1: Strengthening of the Advanced National Gateway for National and Regional Development

Along with the on-going development and modernization of the Sihanoukville Port as the Cambodia's main seaport and future establishing of the Sihanoukville Airport in the national and regional/international air networks, and further the development and accumulation of export-oriented industries around this gateway, Coastal area shall be an advanced national gateway that will encourage international exports and imports, thereby leading to the accelerated and sustainable economic development for Cambodia.

Vision 2: Facilitation of Distinctive Regional Industry and Economy in Coastal Area

Unique economic and industrial activities, using locally available resources such as agricultural, forestry and marine products, shall be integrated to enhance the economic competitiveness in Coastal area. The socially participatory system to encourage these activities will form a distinctive and valuable social capital which is a basis of sustainable development of Coastal area.

Vision 3: Conservation of the Safe and Comfortable Living Environment

All those who live in Coastal area must enjoy their safe and comfortable lives, and the social environment to assure and enhance this condition must be formed. This is one of the most vital prerequisite conditions on which to invite Foreign Direct Investments (FDI) as well as international business people and tourists.

Vision 4: Well-managed of Beauty and Heritage of Coastal Resources to Next Generations

Valuable natural, environmental and historical/cultural resources shall be managed properly in such a way that social costs to pay for the losses shall not be transferred to the next generations. Coastal resources shall be strictly conserved and any disorderly and exploitative development activity which would not observe this principle should be stopped or regulated.

A relational structure of these four (4) visions is conceptually illustrated on Figure 4.1.1. As seen in this figure, Visions 1 and 2 are related to each other, and for the realization of these two visions, an **appropriate industrialization scenario** needs to be clearly depicted, not based on a classic model that the development of the industrial sector needs a widespread labor force shift from the agricultural sector. The agricultural sector should be strategically encouraged by promoting the value-added process and improving the marketing mechanism at regional level, on the one hand, and the modern industrial sector shall be fostered making the best use of its location advantage on the other hand.

Whilst, the realization of Visions 2 and 4 needs to formulate a well-functioning land use management, in particular, coastal and forest areas should be conserved from any distractive activity. Legally enforced power for the land use control and management shall be given to the local governments as well as the central authorities concerned.

Source: JICA Study Team

Figure 5.1.2 Visions and Orientations of Development for Coastal Area

5.2 Socio Economic and Spatial Planning Framework for Coastal Area

5.2.1 Population

Population projection up to the target year 2030 for Coastal area has been conducted by JICA Study Team (hereinafter referred as "the Team"). The projection basically followed the long term population projection done by National Institute of Statistics (NIS) in 2004, as this projection is the only long term projection officially approved by Royal Government of Cambodia (RGC). Additionally, the Team has carried out an extra revision on the NIS 2004 projection for adjusting into the current demographic situation based on the final figures of 2008 Census, as well as the future socio-economic frame considered for this Study. The future socio-economic frame was developed based upon the proposed Visions stated in the previous section. This revised projection is adopted for the strategic plan of this Study.

The population framework was prepared based on the present administrative boundaries, which were slightly changed in May 2009.

(1) NIS 2004 Population Projection

"First Revision Population Projections for Cambodia 1998-2020" prepared by NIS in June 2004 is the only available long term population projection of each province conducted by RGC. In accordance with the comparative analysis with the provisional data of 2008 census, the main features of the projection can be summarized as follows:

- NIS has employed a somewhat high Total Fertility Rate (TFR) to estimate the population growth, and even the low variant basis population projection was slightly higher than the current actual population in 2008 census;
- In regard to the Study area, there is a substantial difference between the actual migration and the predicted migration in the 2004 projection.

Although the NIS projection was publicized in 2004, the projection data had not been linked with the actual population number announced in 1998 census, and thus the population projection data was first adjusted to link with the previous census (1998) population. This figure is shown in Tables 5.2.1-5.2.2.

Table 5.2.1 NIS 2004 Projection for Growth Rate (adjusted into 1998 census)

	2008 - 10	2011 – 2015	2016 – 2020	2021 – 2025*	2026 – 2030*
Kampot	1.5%	1.6%	1.6%	1.5%	1.4%
Koh Kong	4.0%	3.7%	3.4%	3.1%	2.3%
Kep	3.2%	3.2%	3.0%	2.7%	2.5%
Preah Sihanouk	3.2%	3.1%	2.9%	2.7%	2.5%
Coastal Area	2.4%	2.4%	2.3%	2.2%	2.0%

Note: *Estimated by JICA Study Team
Source: NIS and JICA Study Team

Table 5.2.2 NIS 2004 Population Projection (adjusted into 1998 census)

	2008	2010	2015	2020	2025*	2030*
Kampot	595,390	613,480	664,367	719,750	774,730	829,770
Koh Kong	186,700	201,980	242,250	286,050	333,560	385,060
Kep	39,570	42,150	49,290	57,080	65,330	74,060
Preah Sihanouk	237,290	252,850	295,120	341,100	389,900	441,390
Coastal Area	1,058,950	1,110,460	1,251,030	1,403,980	1,573,520	1,730,280

Note: *Estimated by JICA Study Team
Source: NIS and JICA Study Team

(2) Revised NIS 2004 Population Projection as Low Scenario

As discussed in the previous section, the NIS 2004 population projection has employed a somewhat high TFR. Referring to the past two census population (1998 and 2008), there is a difference of 0.3% for the annual population growth rate between the NIS 2004 population projection and actual annual growth rate based upon the census (See Table 5.2.3).

Table 5.2.3 Comparison of NIS 2004 Population Projection and Census 98/08

Item	1998	2008
NIS 2004 population projection: whole country	12,132,172	14,655,950
Annual growth rate (%)	--	1.9%
Population by Census 98 and 2008: whole country	11,437,658	13,389,910
Actual annual growth rate (%)	--	1.6%

Source: NIS

As the NIS 2004 population projection is slightly higher than the actual population shown in the 2008 census with an overall margin of about 0.3%, the provincial growth rates are adjusted with this margin factor. Also, this revised population growth scenario was subsequently linked with the actual number of population counted by 2008 census. The long term population projected based upon these revisions is summarized in Tables 5.2.4-5, and this revised one is defined as “low scenario for NIS 2004 population projection” for its nature.

Table 5.2.4 Low Scenario for NIS 2004 Projection (Growth Rate)

	2008 – 10	2011 – 2015	2016 – 2020	2021 – 2025	2026 – 2030
Kampot	1.2%	1.3%	1.3%	1.3%	1.3%
Koh Kong	3.5%	3.2%	3.0%	2.9%	2.8%
Kep	2.9%	2.7%	2.6%	2.5%	2.4%
Preah Sihanouk	3.0%	2.7%	2.6%	2.5%	2.4%
Coastal Area	2.0%	1.9%	1.9%	1.9%	1.9%

Source: JICA Study Team

Table 5.2.5 Low Scenario for NIS 2004 Projection

	2008*	2010	2015	2020	2025	2030
Kampot	585,850	599,990	640,020	682,720	728,280	776,850
Koh Kong	117,481	125,850	147,320	170,780	197,020	226,190
Kep	35,753	37,860	43,250	49,170	55,630	62,630
Preah Sihanouk	221,396	234,880	268,350	305,110	345,190	388,650
Coastal Area	960,480	998,580	1,098,940	1,207,770	1,326,110	1,454,320

Note: *Final result for 2008 Census.
Source: JICA Study Team

According to the low scenario for NIS 2004 population projection, the population of Coastal area in the target year 2030 is expected to reach 1.45 million.

However, an additional modification is still required. Although the NIS 2004 projection expected the large number of population inflow in Coastal area during the short-term period, the actual demographic situation in the area did not follow this direction. So, the NIS 2004 projection forecast the timing of far-reaching population influx into Coastal area to occur too early according to the current industrial development achievement of the region. In this context, the latest trend of population growth for each province shall be considered for the short term period.

(3) Population Projection for the Study

1) Presumptions

Based on the NIS's population projection analysis, the long term population projection was finally conducted by the Team. Considering the Visions proposed in the foregoing section, the following presumptions were made:

i) Up to the Midterm Year (2020)

Preah Sihanouk and Kep Provinces: The both provinces would initially pull the population growth in Coastal area by the mid-term period. On-going and planned SEZ and large scaled housing development projects are constructed in Preah Sihanouk province, whereas tourism development projects would have significant impact on the population growth of Kep province, where the current population size is rather small.

Kampot and Koh Kong Provinces: Considering the current demographic condition and size of economic activities, it is unlikely to achieve such a high population growth as Preah Sihanouk and Kep experience. However, due to the implementation of proposed SEZ and tourism development projects, the current population outflow trend is expected to be halted.

ii) Up to the Target Year (2030)

Preah Sihanouk and Kep Provinces: The sound population growth shall be kept by the target year.

Kampot and Koh Kong Provinces: Thanks to the full-fledged border economic development, the far-reaching population influx would occur to the both provinces. However, the population growth rate of Kampot province shall remain at humble level, as for its large

population size. For Koh Kong province, it is unlikely to achieve the massive population growth as NIS projected, even though the various industrial and commercial development are materialized, as the protected are occupies large part of its land area

.2) Projection Result

The projection results are summarized in the following Tables 5.2.6 - 7. The total population of the mid term year (2020) will be 1.2 million, and subsequently the total population will reach 1.46 million in the target year of 2030.

Table 5.2.6 Population Growth Rate: the Team's Scenario

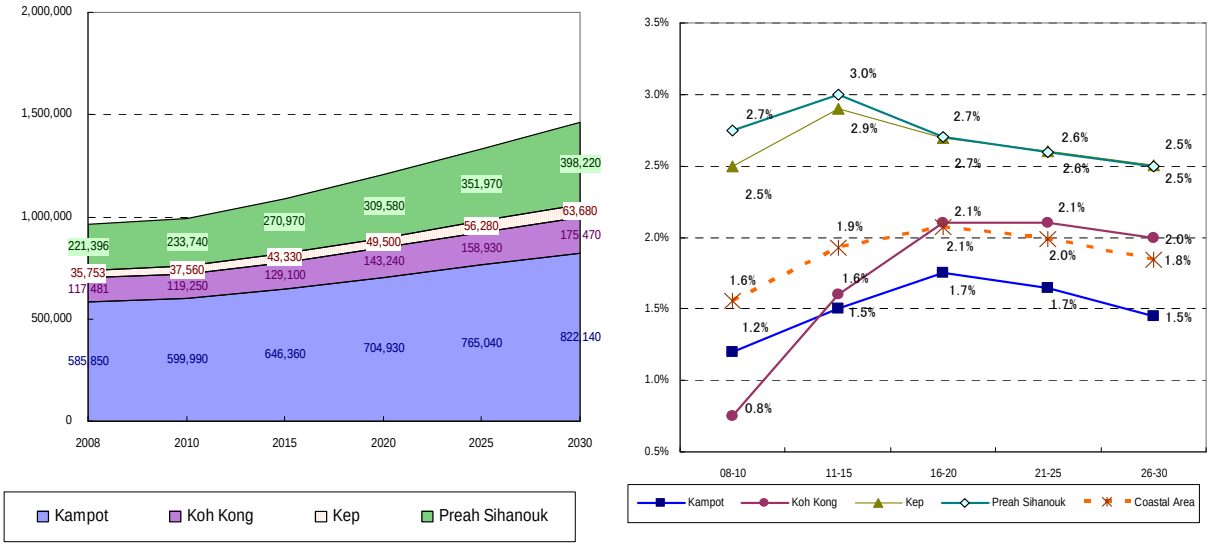
	2008 – 10	2011 – 2015	2016 – 2020	2021 – 2025	2026 – 2030
Kampot	1.2%	1.5%	1.7%	1.7%	1.5%
Koh Kong	0.8%	1.6%	2.1%	2.1%	2.0%
Kep	2.5%	2.9%	2.7%	2.6%	2.5%
Preah Sihanouk	2.7%	3.0%	2.7%	2.6%	2.5%
Coastal Area	1.6%	1.9%	2.1%	2.0%	1.8%

Source: JICA Study Team

Table 5.2.7 Population Projection: the Team's Scenario

	2008*	2010	2015	**2020**	2025	**2030**
Kampot	585,850	599,990	646,360	**704,930**	765,040	**822,140**
Koh Kong	117,481	119,250	129,100	**143,240**	158,930	**175,470**
Kep	35,753	37,560	43,330	**49,500**	56,280	**63,680**
Preah Sihanouk	221,396	233,740	270,970	**309,580**	351,970	**398,220**
Coastal Area	960,480	990,540	1,089,760	**1,207,250**	1,332,220	**1,459,510**

Note: *Final result for 2008 Census.
Source: JICA Study Team



Population Projection | **Growth Rate**

Source: JICA Study Team and NIS

Figure 5.2.1 Population Projection and Growth Rate: the Team's Scenario

(4) Closed Population Projection: for the comparative analysis

For the comparative analysis sake, the Team also estimated the natural growth pattern that is equivalent to the numerical shift of closed population[1]. This is a hypothetical case that precludes cross provincial movements of people, so the figure does not reflect the current demographic situation. However, the case can be a benchmark to understand how the Team's scenario, which is estimated based upon the proposed Visions and Industrial Promotion Strategy, impacts the future demographic movement in Coastal area.

Table 5.2.8 Population Growth Rate: Closed Population

	2008 – 10	2011 – 2015	2016 – 2020	2021 – 2025	2026 – 2030
Kampot	1.5%	1.4%	1.3%	1.3%	1.2%
Koh Kong	2.1%	1.9%	1.8%	1.7%	1.7%
Kep	1.5%	1.3%	1.2%	1.2%	1.2%
Preah Sihanouk	1.6%	1.5%	1.4%	1.4%	1.3%
Coastal Area	1.6%	1.5%	1.4%	1.4%	1.3%

Source: JICA Study Team

Table 5.2.9 Closed Population Projection

	2008*	2010	2015	2020	2025	2030
Kampot	585,850	603,693	646,694	689,537	734,621	780,171
Koh Kong	117,481	122,512	134,696	147,100	160,261	174,445
Kep	35,753	36,803	39,332	41,845	44,439	47,094
Preah Sihanouk	221,396	228,676	246,287	263,921	282,404	301,318
Coastal Area	960,480	991,684	1,067,009	1,142,403	1,221,725	1,303,027

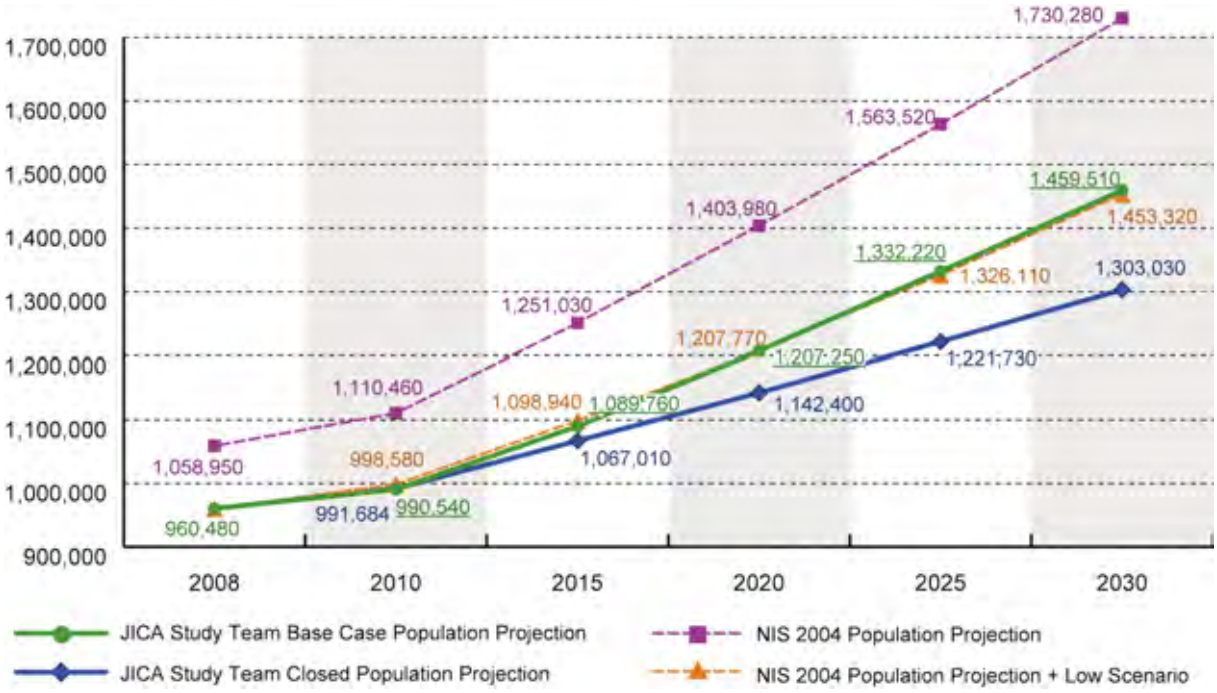
Note: *Final result for 2008 Census.
Source: JICA Study Team

(5) Comparative Analysis Results

Figure 5.2.2 describes each of the four future population scenarios. Tracking the line chart for the Team's scenario, which is shown in green, the followings can be found:

- In short term, the population growth remains low level, and the estimated population would not even reach the natural growth value;
- In mid term, the scenario will achieve the higher population growth than that of natural growth pattern, as population influx will occur; and
- In the year 2030, the population will reach and slightly take over the low scenario of NIS 2004 population projection.

[1] Closed population is normally predicted by the cohort analysis, which is widely employed for the demographic project. However, since the basic indicators for simulating a cohort model are not available at this moment, the natural growth pattern was acquired by deselecting the number of migrants, which was originally projected by NIS 2004 population projection.



Source: JICA Study Team

Figure 5.2.2 Long Term Population Projection of Coastal Area: Four Scenarios

(6) Urban and Rural Population Projection for Coastal Area

Finally, the urban and rural population for each province was also estimated based upon the Cambodia's urban population projection provided by the United Nations[2]. According to the final results of Census 2008, percentage of the urban population to the total population of Coastal area is 19%, at present. This percentage will reach 32% at the target year of 2030 by adopting the UN's urbanization prospects. The both urban and rural population projection for Coastal area is summarized in the following Table 5.2.10.

Table 5.2.10 Urban and Rural Population Projection for Coastal Area

	2008*		2010		2020		**2030**	
	No.	Share(%)	No.	Share(%)	No.	Share(%)	No.	Share(%)
Urban	178,851	19%	198,110	20%	301,810	25%	**467,040**	**32%**
Rural	781,629	81%	702.430	80%	905,440	75%	**992,470**	**68%**
Total	960,480	100%	990,540	100%	1,207,250	100%	**1,459,510**	**100%**

Note: *Final results for Census 2008.
Source: JICA Study Team

As referential data, the urban and rural population for each province was also projected. Table 5.2.11, which summarizes the provincial urban/ rural population projection, revealed that urbanization will be promoted firstly in Kep and Preah Sihanouk provinces in and before the midterm, whereas Kampot province will experience the demographic movement from the rural into urban areas at the later stage, as the redundant workers for agricultural industries will be absorbed in the service industries in urban

[2] United Nations. Department of Economic and Social Affairs. Population Division. World Urbanization Prospects: The 2007 Revision Population Projection Database. Available from http://www.un.org/esa/population/unpop.htm

areas due to a rise in productivity. As there is little surplus in the urban area of Koh Kong province, the percentage of the urban population is not expected to rise sharply.

Table 5.2.11 Urban and Rural Population Projection for Each Province in Coastal Area

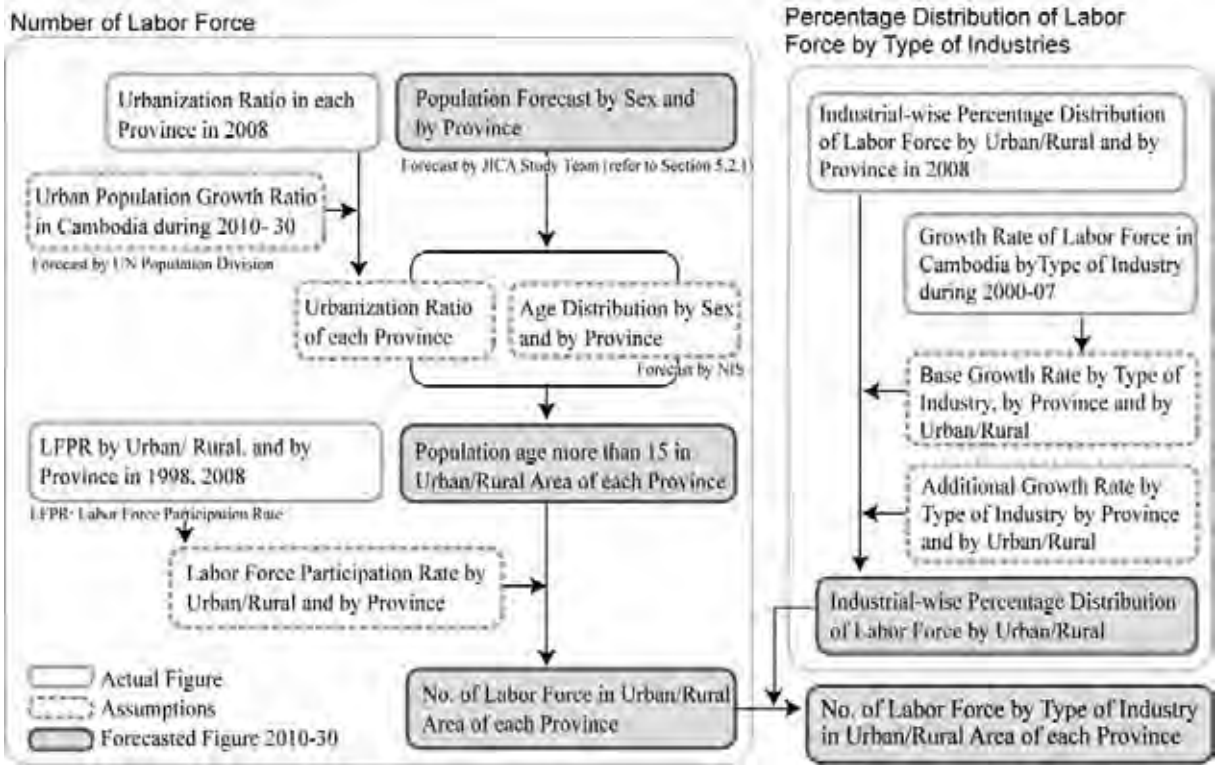
		2008*		2010		2020		**2030**	
		No.	Share(%)	No.	Share(%)	No.	Share(%)	No.	Share(%)
Kampot	Urban	48,274	8%	56,070	9%	70,080	10%	**145,690**	**18%**
	Rural	537,576	92%	543,920	91%	634,850	90%	**676,450**	**82%**
Koh Kong	Urban	36,053	31%	36,610	31%	45,120	32%	**61,410**	**35%**
	Rural	81,428	69%	82,640	69%	98,120	68%	**114,060**	**65%**
Kep	Urban	4,678	13%	4,920	13%	16,340	33%	**21,010**	**33%**
	Rural	31,075	87%	32,640	87%	33,160	67%	**42,670**	**67%**
Preah Sihanouk	Urban	89,846	41%	100,510	43%	170,270	55%	**238,930**	**60%**
	Rural	131,550	59%	133,230	57%	139,310	45%	**159,290**	**40%**

Note: *Final results for Census 2008.
Source: JICA Study Team

5.2.2 Employment

(1) Methodology of the Forecast

Figure 5.2.3 shows the schematic flow diagram for a labor force forecast. The forecast model consists of 1) a number of labor force forecast sub-block, and 2) an industrial-wise percentage distribution forecast sub-block. Using following model, labor force of urban and rural area of each province was forecasted by type of industries up to 2030.



Source: JICA Study Team

Figure 5.2.3 Schematic Flow Diagram for a Labor Force Forecast

(2) Number of Labor Force

Labor force of each province was forecasted by urban and rural. The key indicators used for forecasting number of labor force were a) urbanization ratio, b) labor force participation rate, and c) percentage of population age more than 15.

Of which, "a) Urbanization Rate" was estimated with referring to the urbanization forecast of Cambodia made by the United Nation Population Division. "c) Percentage of Population age more than 15" was calculated based on age-specific population forecast of each province, which was quoted from "First Revision of Population Projections for Cambodia, NIS, June 2004".

"b) Labor Force Participation Rate" was considerably increased during the past decade (1998 - 2008). The rates were projected by the Study team, taking in to consideration of following point of view;

- Labor force participation rate in the Study area has significantly increased during the past decade. Such increase in labor force participation rate is expected in urban area of 4 target

provinces and rural area of Preah Sihanouk and Koh Kong, where are still suffering lower participation rate and higher unemployment rate.

- Labor force participation rates in rural area of Kep and Kampot are remained high, because of agriculture's high labor absorption.
- Development of secondary and tertiary sector in urban area expected to provide more job opportunities in the future. This will contribute for ameliorate low labor force participation rate in urban area of Koh Kong and Preah Sihanouk.
- Increase in the female's participation in working in Sihanouk and Koh Kong provinces; where labor participation was currently lower than the other provinces (please refer to 4.1.3). Development of manufacturing sector and service sectors in these provinces is expected to provide more job opportunities for female worker's.
- Labor force participation rate of urban area of Preah Sihanouk province in 2030 will be still lower than the other provinces due to expected higher advancing rate to higher education (higher school, college, university, etc.).

Assumptions adopted for the forecast were summarized as following table;

Table 5.2.12 Major Assumptions adopted for Forecasting Number of Labor Force

		Koh Kong (Urban)	Koh Kong (Rural)	Kampot (Urban)	Kampot (Rural)	Kep (Urban)	Kep (Rural)	Sihanouk (Urban)	Sihanouk (Rural)
1) Total Population	2008	117,481		585,850		35,753		221,396	
	2020	143,240		704,930		49,500		309,580	
	2030	175,470		822,140		63,680		398,220	
2) Urbanization Rate (a)	2008	30.7%		8.2%		13.1%		40.4%	
	2020	32.0%		10.0%		33.0%		55.0%	
	2030	35.0%		18.0%		33.0%		60.0%	
3) Population by Urban/Rural	2008	36,053	81,428	48,274	537,576	4,678	31,075	89,447	131,949
	2020	45,837	97,403	70,493	634,437	16,335	33,165	170,269	139,311
	2030	61,415	114,055	147,985	674,155	21,014	42,666	238,932	159,288
4) Percentage of Population Age more than 15 (b)	2008	66.67%	62.36%	62.36%	63.84%	67.46%	62.03%	72.78%	64.12%
	2020	66.80%	66.80%	66.20%	66.20%	66.40%	66.40%	66.40%	66.40%
	2030	66.80%	66.80%	66.20%	66.20%	66.40%	66.40%	66.40%	66.40%
5) Population Age more than 15	2008	24,037	50,781	30,105	343,184	3,156	19,277	65,096	84,601
	2020	30,619	65,065	46,666	419,997	10,846	22,022	113,059	92,503
	2030	41,025	76,189	97,966	446,290	13,954	28,330	158,651	105,767
6) Labor Force Participation Rate (c)	1998	65.94%	56.61%	61.51%	79.29%	81.61%	-	62.94%	-
	2008	62.25%	74.12%	74.12%	82.08%	75.25%	83.14%	61.30%	71.87%
	2020	65.00%	76.00%	74.00%	82.00%	75.00%	83.00%	65.00%	75.00%
	2030	72.00%	80.00%	74.00%	82.00%	75.00%	83.00%	70.00%	80.00%

* Note: 1998 and 2008 data was quoted from CENSUS 1998/ 2008. 2020 and 2030 data was assumed by the Study team
Source: JICA Study Team

Number of labor force in the Study area was forecasted as follows;

Table 5.2.13 Number of Forecasted Labor Force

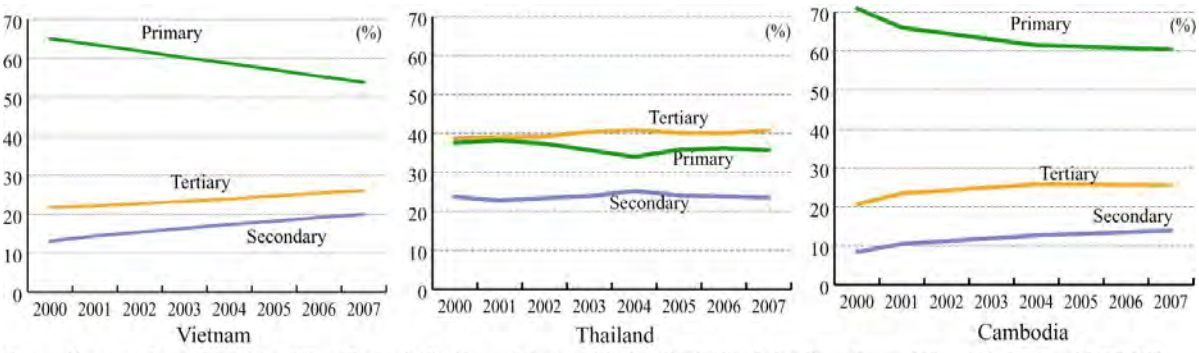
	Koh Kong (Urban)	Koh Kong (Rural)	Kampot (Urban)	Kampot (Rural)	Kep (Urban)	Kep (Rural)	Sihanouk (Urban)	Sihanouk (Rural)	Study Area Total
2008 (Actual)	15,128	38,434	23,014	286,079	2,401	16,313	40,402	61,881	483,652
2020 (Forecasted)	19,900	48,800	34,530	344,400	7,380	17,180	84,790	75,850	632,830
2030 (Forecasted)	28,720	60,950	70,540	365,960	10,050	22,660	118,990	84,610	762,480

* Note: 2008 data was quoted from CENSUS 2008. 2020 and 2030 data was projected by the Study team
Source: JICA Study Team

(3) Percentage distribution of Labor Force by Industrial Sector

Figure 5.2.4 illustrates change in the percentage distribution of the labor force by industrial sector in Cambodia, Thailand, and Vietnam. As shown in the figure, while the percentage distribution of the labor force in Cambodia and Vietnam has changed along with the Petty=Clark's rule (labor force reallocation from agricultural to non-agricultural activities), distribution of sector-wise labor force has no change in Thailand.

In Cambodia, percentage of primary, secondary, and tertiary sector has changed -1.50% point, +0.79% point and +0.71% point per annum, respectively during the period from 2000 to 2007. Such trend in Cambodia is similar with that of Vietnam (primary: -1.60% point, secondary +0.98% point, and tertiary: +0.62% point).



Source: Vietnam= General Statistics Office, Thailand=The National Statistical Office, Cambodia= Labor Force Survey 2000, 2001, 2004, and 2007, NIS

Figure 5.2.4 Change in the Sector-wise Labor Force Proportion in Cambodia, Thailand, and Vietnam from 2000 to 2007

Also, percentage distribution labor force by industrial sectors of Cambodia in 2007 (primary: 60.4%, secondary: 23.5%, and tertiary: 25.6%) was resembles from that of Vietnam in 2002 (61.9%, 15.4%, 22.7%).

Percentage distribution of labor force of the Study area by industrial sector up to 2020 was estimated using same trend as 2000 -2007, which was almost same as that of Vietnam. Speed of labor force reallocation among the industries was estimated to be slowdown by 50% during the remaining period (2021 - 2030). In addition to these base growth rates, additional growth rates were applied taking development potential of each province as well as visions and key plans shown in Chapter 5.1 in to consideration (please refer to the table 5.2.15). Percentage distribution of labor force proportion by industrial sectors is forecasted as follows (please refer to table 5.2.12 - 14);

Table 5.2.14 Percentage Distribution of Labor Force by type of Industry in 2008

	Koh Kong (Urban)	Koh Kong (Rural)	Kampot (Urban)	Kampot (Rural)	Kep (Urban)	Kep (Rural)	Sihanouk (Urban)	Sihanouk (Rural)
Agriculture, hunting and forestry	17.5%	56.9%	35.3%	88.7%	51.9%	75.6%	2.1%	66.2%
Fishing	14.9%	19.0%	1.4%	1.4%	6.2%	6.4%	5.2%	6.9%
Manufacturing	3.5%	1.5%	6.8%	1.1%	3.0%	1.4%	17.0%	3.7%
Construction	6.2%	3.6%	3.5%	0.6%	7.2%	2.1%	9.9%	2.5%
Other Secondary Industries	0.8%	0.4%	0.9%	0.3%	0.5%	0.1%	0.9%	0.3%
Wholesale and retail trade, repair	25.1%	7.9%	20.2%	2.7%	9.7%	4.6%	22.9%	9.2%
Hotel and restaurants	2.2%	0.6%	1.8%	0.1%	0.5%	1.6%	7.3%	0.8%
Transport, & communication	7.9%	2.7%	6.5%	0.8%	1.8%	1.3%	13.6%	3.6%
Other Seri vices Industries	21.9%	7.4%	23.7%	4.3%	19.2%	6.9%	21.1%	6.8%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: JICA Study Team

Table 5.2.15 Forecasted Percentage Distribution of Labor Force by type of Industry in 2020

	Koh Kong (Urban)	Koh Kong (Rural)	Kampot (Urban)	Kampot (Rural)	Kep (Urban)	Kep (Rural)	Sihanouk (Urban)	Sihanouk (Rural)
Agriculture, hunting and forestry	9.6%	49.7%	20.0%	80.2%	34.2%	62.7%	0.9%	51.3%
Fishing	8.6%	13.9%	0.8%	1.2%	4.1%	5.3%	2.1%	5.1%
Manufacturing	7.5%	3.4%	12.7%	3.2%	6.6%	3.6%	24.6%	8.9%
Construction	11.2%	7.8%	6.2%	1.6%	14.8%	5.4%	13.5%	5.6%
Other Secondary Industries	1.3%	0.8%	1.5%	0.8%	0.9%	0.2%	1.2%	0.7%
Wholesale and retail trade, repair	26.1%	10.4%	21.8%	4.4%	12.1%	7.2%	19.0%	12.8%
Hotel and restaurants	2.6%	0.9%	2.2%	0.3%	0.8%	2.5%	6.1%	1.1%
Transport, & communication	10.5%	3.5%	7.8%	1.3%	2.4%	2.1%	15.2%	5.1%
Other Seri vices Industries	22.7%	9.7%	27.0%	7.0%	24.0%	11.0%	17.5%	9.4%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: JICA Study Team

Table 5.2.16 Forecasted Percentage Distribution of Labor Force by type of Industry in 2030

	Koh Kong (Urban)	Koh Kong (Rural)	Kampot (Urban)	Kampot (Rural)	Kep (Urban)	Kep (Rural)	Sihanouk (Urban)	Sihanouk (Rural)
Agriculture, hunting and forestry	6.5%	47.2%	13.7%	74.2%	25.8%	54.1%	0.5%	43.0%
Fishing	6.2%	11.0%	0.5%	1.2%	3.1%	4.6%	1.2%	4.0%
Manufacturing	11.5%	4.8%	19.6%	5.0%	8.9%	5.5%	28.9%	13.2%
Construction	14.4%	10.4%	7.6%	2.5%	19.9%	8.3%	15.0%	7.9%
Other Secondary Industries	1.7%	1.1%	1.9%	1.6%	1.3%	0.3%	1.3%	1.0%
Wholesale and retail trade, repair	24.5%	10.8%	20.6%	5.3%	12.6%	8.6%	16.3%	13.9%
Hotel and restaurants	2.8%	1.0%	2.4%	0.4%	0.9%	3.0%	6.2%	1.2%
Transport, & communication	11.1%	3.6%	8.3%	1.5%	2.5%	2.5%	15.6%	5.5%
Other Seri vices Industries	21.3%	10.0%	25.6%	8.4%	25.0%	13.1%	15.0%	10.3%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: JICA Study Teams

Table 5.2.17 Additional Growth Rate by Type of Industries

	Preah Sihanouk (Urban)	Preah Sihanouk (Rural)	Koh Kong (Urban)	Koh Kong (Rural)	Kampot (Urban)	Kampot (Rural)	Kep (Urban)	Kep (Rural)
Agriculture and forestry		Ⓓ Development of Large Scale Plantation		Ⓓ Development of Large Scale Plantation		Ⓓ Development of Large Scale Plantation		
Fishing				Ⓓ Aquaculture and deep-sea fishery		Ⓓ Sea weed Aquaculture		
Manufacturing	①Ⓐ Sihanouk SEZ, Port SEZ, etc.	② Agro-processing, Fishery Processing,	② Manufacturing activities near to Thai Boarder (incl. KKSEZ)	② Agro-processing	② Agro-processing		② Fishery Processing, Agro-processing	② Agro-processing
Construction	①③Ⓐ Construction activities along with urbanization		③ Construction Activities near to Thai Boarder					
Other Secondary Industry	②		② Sand Dredging			② Cement Industries		
Wholesale & retail trade, repair goods	①Ⓑ Commercial Development along with Urbanization		Ⓑ Commercial Development along with Urbanization					
Hotel and restaurants	①Ⓒ④ Tourism Development (Beach Resort, Island Resort)		Ⓒ④ Tourism Development (Eco-tourism)	Ⓒ④ Tourism Development (Eco-tourism)	Ⓒ④ Tourism Development (Riverside and Historical Building)	Ⓒ④ Tourism Development at Bokor Plateau (Eco-tourism, Golf, Casino)	Ⓒ④ Tourism Development (Seaside)	
Transport, storage & communication	①Ⓐ Logistics activities from/to SHV Port and SEZs		Ⓑ Boarder Trade with Thailand		Ⓑ Boarder Trade with Vietnam		Ⓑ Trade between Vietnam (through Phu Quoc Island)	
Other Services	Ⓑ Commercial Development along with Urbanization				Ⓑ Commercial Development along with Urbanization			

Source: JICA Study Team

Note: Color of the column indicates growth potential

Significant Growth: +2.0% Point High Growth: +1.0% point Moderate Growth: +0.5% point

Figures in the circle indicate concerned vision and key plans mentioned in Chapter 5.1

①: Vision 1. Strengthening of the Advanced Gateway for National Development
②: Vision 2. Facilitation of Distinctive Regional Industry and Economy in the Coastal Area
③: Vision 3. Conservation of the Safe and Comfortable Living Environment
④: Vision 4. Well-managed of Heritage Coastal Resources to Next Generation
Ⓐ: Key Plan A. Formation of the International Logistic Center
Ⓑ: Key Plan B. Formation of the Regional Market
Ⓒ: Key Plan C. Development of International Tourist Destination
Ⓓ: Key Plan D. Promotion of Regional Agriculture/Fishery

(4) Result of Labor Force Forecast (Base Case)

Based on the population above age 15, as well as the abovementioned figures regarding labor force participation rate and proportion of labor force by industrial sector, the forecasted labor force of Coastal area has been acquired (please refer to the table 5.2.18 – 5.2.21, and the figure 5.2.5)

According to the Team's calculation, the total labor force of Coastal area will increase from 483,700 in 2008, 617,600 in 2020, and 758,600 in 2030. Labor force in the Study area is projected to grow 2.06% per annum from 2008 to 2020, then 2.08% per annum from 2020 to 2030.

Percentage distribution of employment of agricultural is expected to decline moderately (from 75.1% in 2008 to 49.5% in 2030), reflecting the agriculture industry's ability to produce more with fewer workers overall. Since total number of labor force in the Study area is expected to increase, labor force in primary industries is projected to increase slightly, except for Preah Sihanouk province. In Preah Sihanouk province, labor force will be reallocated from primary industries to secondary and tertiary industries.

Labor force of the secondary industries in the Study area is projected to grow 7.9% per annum, and will be occupied 19.9% of total labor force in 2030. Labor force engaged in manufacturing sector is expected to grow 8.1% per annum, and will absorb 84,300 labor forces in 2030. Labor force of manufacturing sector in urban area of Preah Sihanouk province in 2030 (32,100) is project to occupy 24.6% of total labor force in urban area of the province.

Population growth, subsequent urbanization and an expanding economy are expected to boost the demand for tertiary industries, contributing to job growth. Labor force of the tertiary industries in the Study area is projected to grow 4.27% per annum. In 2030, tertiary sector will be absorbed 30.6% of labor force in the Study area. New tourism related jobs projected be created as hotels and restaurants expand their capacity to meet increasing tourists. Number of labor force engaged in hotel and restaurant sector in the Study area is expected increase from about 5,100 in 2008 to 13,200 in 2030. Transport sector is projected to grow more rapidly from 14,000 in 2008 to 39,900 with 4.90% of annual increase.

Table 5.2.18 Summary of Labor Force Forecast

		Koh Kong	Kampot	Kep	Preah Sihanouk	Coastal Area
Year 2008 (Actual)	Primary Industry	34,100 (64%)	266,000 (86%)	14,800 (79%)	48,200 (47%)	363,100 (75%)
	Secondary Industry	3,700 (7%)	8,300 (3%)	800 (4%)	15,200 (15%)	28,100 (6%)
	Tertiary Industry	15,800 (29%)	34,700 (11%)	3,100 (17%)	38,900 (38%)	92,500 (19%)
	Total	53,600 (100%)	309,000 (100%)	18,700 (100%)	102,300 (100%)	483,700 (100%)
Year 2020 (Forecasted)	Primary Industry	34,000 (49%)	285,500 (75%)	15,400 (58%)	38,600 (27%)	373,500 (61%)
	Secondary Industry	10,100 (15%)	27,200 (7%)	3,600 (14%)	40,600 (28%)	81,400 (13%)
	Tertiary Industry	25,300 (36%)	66,200 (18%)	7,500 (28%)	63,600 (45%)	162,700 (26%)
	Total	69,400 (100%)	378,900 (100%)	26,500 (100%)	142,800 (100%)	617,600 (100%)
Year 2030 (Forecasted)	Primary Industry	38,300 (42%)	282,000 (64%)	16,600 (49%)	38,800 (20%)	376,000 (49%)
	Secondary Industry	18,300 (20%)	55,700 (13%)	6,600 (19%)	70,300 (36%)	151,100 (20%)
	Tertiary Industry	33,900 (37%)	100,800 (23%)	10,800 (32%)	86,600 (44%)	231,500 (31%)
	Total	90,500 (100%)	438,500 (100%)	34,000 (100%)	195,700 (100%)	758,600 (100%)

Note: Above figures were rounded nearest 100. Totals in the above table are not necessary same as sum of each figure due to rounding.
Source JICA Study Team

Table 5.2.19 Labor Force by Type of Industry in the Study Area in 2008

	Koh Kong (Urban)	Koh Kong (Rural)	Kampot (Urban)	Kampot (Rural)	Kep (Urban)	Kep (Rural)	Sihanouk (Urban)	Sihanouk (Rural)	Grand Total
Agriculture, hunting and forestry	2,652	21,883	8,125	253,637	1,245	12,328	867	40,959	341,696
Fishing	2,253	7,302	312	3,939	150	1,049	2,083	4,299	21,387
Manufacturing	524	566	1,555	3,281	73	226	6,867	2,264	15,356
Construction	936	1,391	810	1,765	173	340	4,016	1,521	10,952
Other Secondary Industry	115	139	199	738	11	11	349	197	1,759
Wholesale and retail trade, repair goods	3,800	3,052	4,655	7,748	232	748	9,243	5,697	35,175
Hotel and restaurants	338	233	421	411	13	259	2,956	496	5,127
Transport, storage and communication	1,201	1,031	1,488	2,250	44	220	5,497	2,251	13,982
Other Services	3,309	2,837	5,449	12,310	460	1,132	8,524	4,197	38,218
Total	15,128	38,434	23,014	286,079	2,401	16,313	40,402	61,881	483,652

Source JICA Study Team

Table 5.2.20 Summary of Labor Force Forecast in the Study Area in 2020

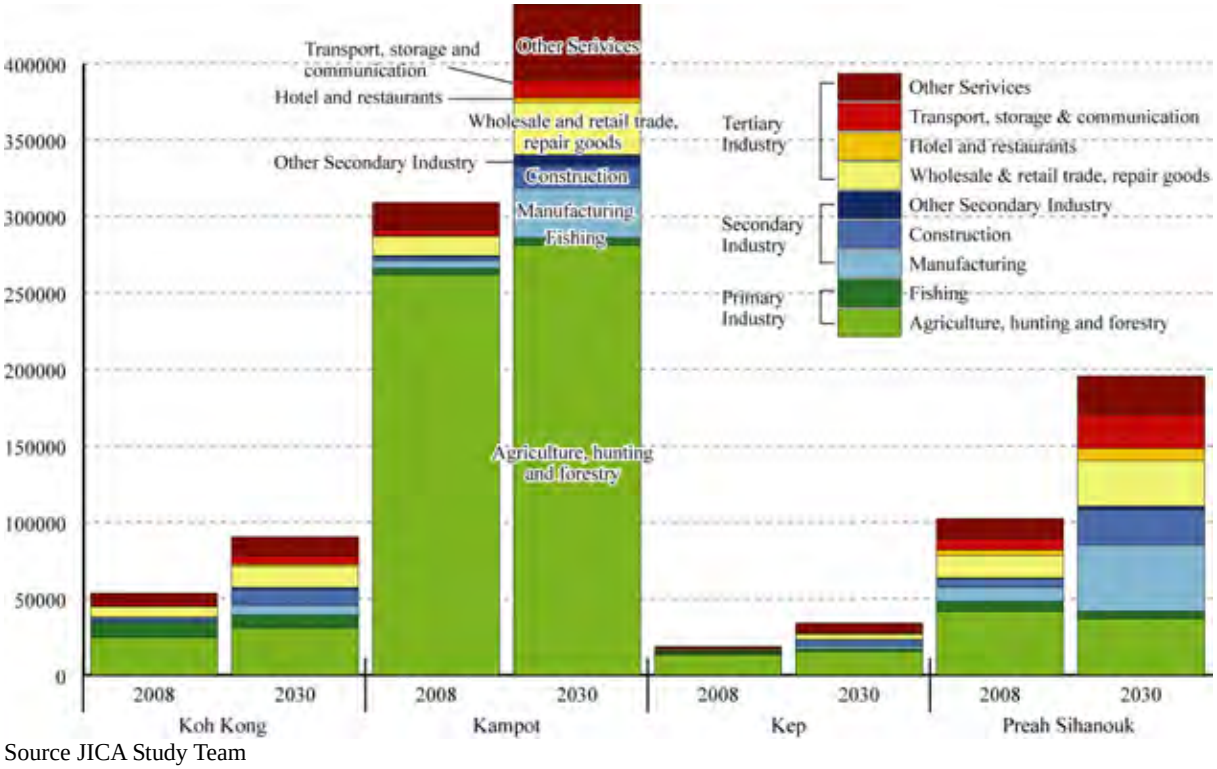
	Koh Kong (Urban)	Koh Kong (Rural)	Kampot (Urban)	Kampot (Rural)	Kep (Urban)	Kep (Rural)	Sihanouk (Urban)	Sihanouk (Rural)	Grand Total
Agriculture, hunting and forestry	1,900	24,570	6,890	276,050	2,780	11,460	650	35,610	359,910
Fishing	1,720	6,860	260	4,290	330	970	1,560	3,520	19,510
Manufacturing	1,490	1,660	4,370	11,150	540	660	18,060	6,150	44,080
Construction	2,230	3,850	2,150	5,650	1,210	990	9,950	3,890	29,920
Other Secondary Industry	260	400	530	2,840	80	30	850	500	5,490
Wholesale and retail trade, repair goods	5,190	5,140	7,520	15,110	990	1,320	13,950	8,880	58,100
Hotel and restaurants	520	440	770	900	60	460	4,460	770	8,380
Transport, storage and communication	2,080	1,740	2,710	4,390	200	390	11,140	3,510	26,160
Other Services	4,520	4,780	9,340	24,010	1,950	2,000	12,870	6,540	66,010
Total	19,900	49,450	34,530	344,400	8,140	18,280	73,490	69,380	617,570

Source JICA Study Team

Table 5.2.21 Summary of Labor Force Forecast in the Study Area in 2030

	Koh Kong (Urban)	Koh Kong (Rural)	Kampot (Urban)	Kampot (Rural)	Kep (Urban)	Kep (Rural)	Sihanouk (Urban)	Sihanouk (Rural)	Grand Total
Agriculture, hunting and forestry	1,920	28,790	9,900	271,430	2,700	12,730	570	36,370	364,410
Fishing	1,840	6,730	380	4,220	320	1,080	1,380	3,390	19,340
Manufacturing	3,400	2,900	14,190	18,380	930	1,300	32,060	11,170	84,330
Construction	4,250	6,320	5,490	9,310	2,080	1,950	16,650	6,660	52,710
Other Secondary Industry	490	690	1,350	5,680	130	60	1,400	860	10,660
Wholesale and retail trade, repair goods	7,240	6,560	14,900	19,320	1,320	2,030	18,100	11,790	81,260
Hotel and restaurants	820	640	1,710	1,300	90	700	6,920	1,030	13,210
Transport, storage and communication	3,270	2,220	6,050	5,610	270	600	17,270	4,660	39,950
Other Services	6,300	6,100	18,520	30,700	2,620	3,070	16,700	8,680	92,690
Total	29,540	60,950	72,500	365,960	10,470	23,510	111,060	84,610	758,600

Source JICA Study Team



Source JICA Study Team

Figure 5.2.5 Change in the Labor Force in the Study Area from 2008 to 2030

(5) Result of Labor Force Forecast (Do Nothing Case)

If various industrial development strategies are not executed (do nothing case), secondary and tertiary industries will be absorbed smaller number of labor force. Thus speed of labor force relocation among industries (from primary sector to secondary/tertiary sector) will be slower than the afore-mentioned case (base case).

As mentioned in "4.1.3 Employment", labor force participation rates in urban area of the Coastal area are generally lower than that of rural area. One common factor observed in these areas is lower dependency on agriculture for labor force absorption. These low labor force participation rates in urban area suggested that job opportunities other than agriculture are not enough in these areas. So, if secondary and tertiary industries will not contribute much in absorbing labor force, labor force participation rate will be remained low particularly in urban area of the study area (base case assumed improve in labor force participation rate especially in urban area).

Taking the above mentioned hypothesis in to consideration, the study team adopted following assumption for "do nothing case";

- Base Growth Rate of each industrial sector is 50% smaller than the "base case" (Change in proportion of labor force distribution: Primary sector= -0.75% per year, secondary sector= +0.49% per year, tertiary sector: +0.31%
- Additional Growth Rate: Not adopted for "do nothing case"
- No improvement in labor force participation rate (same as year 2008)

Based on forecasted population under "natural growth case[3]" (please refer to 5.2.1 (4)) as well as above assumptions, labor force forecast under "do nothing" case in 2020 and 2030 was calculated as following table. Total number of labor force of Coastal area was forecasted 587,800 in 2020 and 691,700 in 2030. Under "do nothing" case, labor force is projected to grow 1.64% per annum on an average during from 2008 to 2030, which is smaller than the growth rate under base case (2.07%).

Table 5.2.22 Summary of Labor Force Forecast under "Do Nothing Case"

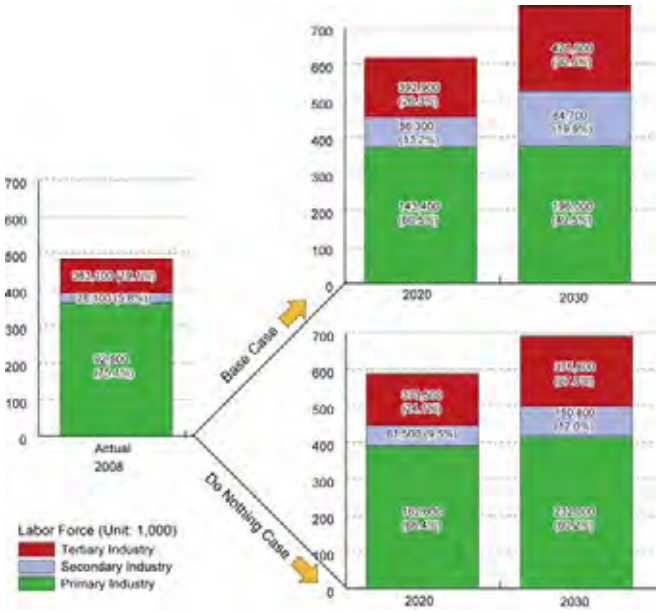
	2020 (forecasted)					2030 (forecasted)				
	Koh Kong	Kampot	Kep	Preah Sihanouk	Total	Koh Kong	Kampot	Kep	Preah Sihanouk	Total
Primary Industry	36,900	297,100	16,400	40,100	390,400	41,400	310,900	19,000	44,800	416,200
Secondary Industry	7,100	17,200	2,200	29,100	55,600	10,400	29,300	3,400	39,800	83,000
Tertiary Industry	23,800	55,600	5,900	56,400	141,800	30,500	85,700	8,000	68,300	192,500
Total	67,800	369,900	24,500	125,600	587,800	82,300	425,900	30,400	152,900	691,700

Source: JICA Study Team

[3] Closed population represents the births and deaths in a province's population and does not take into account migration. Base case population projection in Chapter 5.2 assumed positive net migration (in migration > out migration). The Study team assumed out migration and in migration will be balanced under do nothing case", and thus adopted "natural growth case" for do nothing case.

As shown in the figure 5.2.6, total labor force of Coastal area under "do nothing" case in 2030 is considerably smaller than that of "base case". Number of labor force engaged in secondary and tertiary sector under "do nothing case" is considerably smaller than that of "base case". Especially, in Preah Sihanouk, it is assumed that if government fails to execute various actions to promote industry, sizable labor force absorption by secondary industry cannot be expected.

On the other hand, labor force engaged in primary is projected to grow more rapidly the "base case", particularly in Kampot. Taking limited land resources suitable for agriculture in to consideration, labor productivity as well as land productivity of agriculture could be worsened.



Source: JICA Study Team

Figure 5.2.6 Difference between "Base Case" and "Do Nothing Case" (Percentage Composition of Labor Force by Industrial Sector)

5.3 Industry Promotion Strategy

5.3.1 Three Industrial Development Strategies

Based on visions and key plans recommended in Chapter 5.1 as well as the major issues on industry sector in Coastal area described in Chapter 4, following three (3) industrial promotion strategies were developed. Figure 5.3.1 illustrates relation among issues on industry sector in Coastal area, Visions, and the four industrial development strategies.

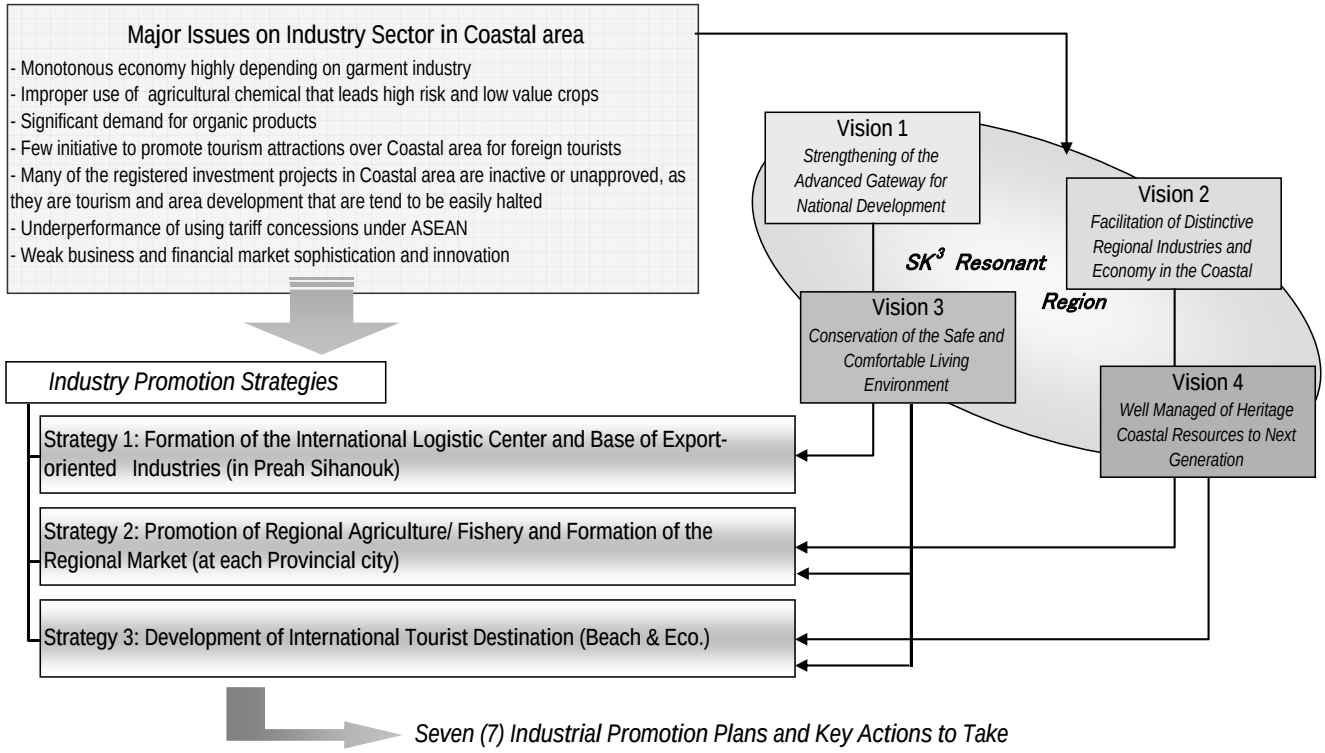


Figure 5.3.1 Relation among Issues on Industry Sector, Visions of Coastal Development and Industry Promotion Strategies

The JICA Study Team also proposed the industrial promotion sub-plans under the three (3) industrial promotion strategies to materialize each strategy. There are totally seven (7) industrial promotion sub-plans proposed in this section.

(1) Strategy 1: Formulation of an "**International Logistic Center and Base of Export-oriented Industries"**

Formulation of an international logistic center and base of export-oriented industries must be one of the most promising and practical strategies in order to realized Visions 1. The Sihanoukville Port is/will be the only the gateway for exports, imports, and a focal point in goods distribution over the nation. The international logistic functions at this port should be further strengthened so as to be competitive to major international ports in Vietnam and Thailand. To this end, in association with the port capacity expansion, a number of projects should be carried out in the medium- and long-term

perspectives, including the system improvement for the port management and the custom administration as well as physical developments of inter-modal transfer facilities with railways and roads transportation, logistic terminals, EPZ/SEZ/FTZ and so on. This shall be the lifeline of the Cambodian economy.

Based upon the abovementioned discussions, the following two (2) industrial promotion plans are proposed to materialize the Strategy 1.

1) Plan 1: Promoting Foreign Investments in SEZ to Diversify Export-Oriented Industries - Preah Sihanouk

As discussed in "4.1.2 Macro Economy" and "4.1.4 Industry", the garment sector, which is one of the major contributors to the Cambodian economy, is mostly dependent on imported fabrics. This limits its impact on the local economy.

Diversifying the industries from the present garment/footwear dominance is the priority task for Cambodia. Non-conventional, export-oriented, labor-intensive industries that could employ young people seeking jobs should be established to Preah Sihanouk, the national logistic center for exports and imports with considerable industrial development opportunities. As the Cambodian economy's current growth has been powered chiefly by export industries, efforts must be made to attract foreign investments in SEZ in Preah Sihanouk, which should have strong linkages with foreign markets while bringing technologies and management know-how into Cambodia.

2) Plan2: Promoting Industries that could Achieve Division of Labor with the Industries in the Neighboring Countries - Preah Sihanouk and Koh Kong

As discussed in "3.1.2 Macro Economy", preferential treatments under various GSP schemes, coupled with the cheap labor force, could trigger investment in certain industries in Preah Sihanouk and Koh Kong, which could enjoy Cambodia's preferential status and/or take over part of the manufacturing processes of industries in the neighboring countries, particularly Eastern Seaboard of Thailand. The western area of Koh Kong is relatively flat and the road condition from the Eastern Seaboard of Thailand is generally good, which enables the establishment of factories and efficient transport from and to Thailand. As is the case of existing SEZ in Cambodia, disadvantages in human resource capacity, institutions, and costs need to be overcome in order to accelerate establishment of industries.

(2) Strategy 2: Promotion of "**Regional Agriculture and Fishery**" and Formation of the "**Regional Market**" at Provincial Cities

Fishery potential is rich in all coastal zones, and great agricultural potentials exist in the Kampot Province, and a wide variety of forest products can be promoted in the Koh Kong Province. Thus, the fundamental industrial activities ought to be agriculture and its related processing.

The agriculture is still at a subsistence level. However, some surplus, if it is produced, is likely to be purchased by middlemen or merchants at disadvantageous prices. If the local market is functioning well, farmers will have opportunities to sell their products at market prices, and they will soon involve in the market economy. In order to promote higher productivity, sustainability of production and value-added process of agro-products, technical know-how should be further introduced in association with livelihood development in communes. The cities of Preah Sihanouk, Kampot and Koh Kong

shall function as market channels between consumers and farmers in their hinterland areas. Thus, farmers need to be empowered for the marketing economy even in the international markets. The Koh Kong City will be a cross-border market with Thailand, and the Kampot City shall be potential to foster a cross-border market with Vietnam.

Integrating all the agricultural products, Coastal area will proudly become a uniquely advanced agricultural frontage in Cambodia. The OVOP (one village one product) movement needs to be encouraged in this context, providing both technical and financial assistances for those who strive to help themselves to deal in unique products. Donors' attentions shall be further derived for this objective.

The agriculture is still at a subsistence level. However, some surplus, if it is produced, is likely to be purchased by middlemen or merchants at disadvantageous prices. If the local market is functioning well, farmers will have opportunities to sell their products at market prices, and they will soon involve in the market economy. The cities of Preah Sihanouk, Kampot and Koh Kong shall function as market channels between consumers and farmers in their hinterland areas. Thus, farmers need to be empowered for the marketing economy even in the international markets. The Koh Kong City will be a cross-border market with Thailand, and the Kampot City shall be potential to foster a cross-border market with Vietnam.

Finally, to materialize the strategy, the following sub-plans are proposed.

1) Plan 3: Promoting Investments that have Linkages with Local Industries and Resources – Kampot

Although promoting investments in labor-intensive industries directly leads to an increase in employment, investments in those industries that use local materials should be further promoted in order to maximize ripple effects on the local economy. Since Kampot Province is one of the largest producers of vegetables and meat in the country, establishment of food processing factories (such as frozen or canned food, sausages and hams) utilizing local materials should be encouraged.

2) Plan 4: Promoting Production and Supply of High Value Added Vegetables and Fruits – Kampot and Koh Kong

A variety of food crops and fruits are produced in Kampot Province and supplied to domestic markets. Koh Kong Province is also reputed for the production of *rambutan*, jack fruits and pineapples. Exploration of fruits and vegetable suitable for export market and their quality improvement will be needed. Hotels and restaurants in Coastal area, particularly located in Sihanouk City, are also promising supply destination, because many of these hotels and restaurants wish to buy organic vegetables[4]. In order to produce high value added vegetables and fruits, it is recommended to organize farmer's group and establish a trustworthy monitoring systems for production and quality control. In the medium to long term, cold chain system needs to be established for preserving quality of several types of vegetable and fruits.

[4] According to a supply chain survey conducted by the JICA Study Team, most touristic hotels and restaurants in Preah Sihanouk and Kep Provinces procure food at local markets without knowing its origins.

3) Plan 5: Promoting Aquaculture and Fish Processing – Koh Kong, Preah Sihanouk and Kampot

As mentioned in "4.1.4 Industry", there is strong demand for fish from Phnom Penh, Thailand, and Vietnam. Among other provinces, Koh Kong represents more than half of the fish catch from marine fishery in the country, and recent development in transport infrastructure has facilitated transport of fresh fish from Koh Kong to Phnom Penh. However, it is reported that fish stocks are diminishing due to over-fishing. Since relatively small investment is required for aquaculture and the techniques are mostly replicable at the individual level, it is recommended that expansion of aquaculture be promoted through micro-credit facilities and development of hatcheries. The establishing of fish processing factories should also be promoted in Coastal area.

4) Plan 6: Promoting One Village One Product (OVOP)

The OVOP approach encourages farmers or firms to develop a product or industry unique to their region and develop it into a nationally recognizable and, where appropriate, a globally recognizable product.[5] Locally-available resources are mostly utilized as materials for the developed products. The activity starts with the identification of unique products in the region as well as their niche markets.

(3) Strategy 3: Development of an "**International Tourist Destination**"

Coastal area is generally tourism resources-rich, and is actually endowed with great potentials to become an international tourist destination in South-east Asia. While maintaining the existing beaches in good condition and conserving and sustain ably utilizing the ecological values, "***Beach and Eco***" may be attraction to promote tourists and investments. As tourism potential areas are stretched over Coastal area, a more characterized and distinctive development scenario need to be delineated such as:

- Preah Sihanouk shall be the tourism gateway and the center of beach resorts;
- Kampot is a culture- and eco-hunting tourism center;
- Kep will be a health-oriented eco-resort (with fresh air and healthy foods); and
- Koh Kong is nature-lovers' eco-resort.

A number of islands located along with the coastal line are also potential places for special tourism development such as diving and/or resort for segregated market groups or even casinos. Thoughtful environmental considerations should be taken prior to the construction activities, otherwise the tourism value would easily be deteriorated along with the environmental deterioration.

The abovementioned touristic characteristic of each province shall be effectively introduced by the following promotion plan.

[5] Kiyoto Kurokawa, Fletcher Tembo and Dirk Willem de Velde, "Donor support to private sector development in sub-Saharan Africa -Understanding the Japanese OVOP programme" JICA / Overseas Development Institute, April 2008

1) Plan 7: Promoting Tourism Development by Linking up Several Touristic Spots within Coastal Area

Coastal area posses a number of touristic attractions, which includes beautiful beaches in Preah Sihanouk, Koh Kong and Kep; historical architecture in Kampot city and in Bokor Mountains; and national parks in Koh Kong, Kampot and Preah Sihanouk. Despite the richness and diversity of the touristic resources, the average length of stay by tourists is rather short.

One of the reasons of this would be the difficulty in obtaining touristic information about the tourist spots in Coastal area. It is recommended that information of touristic attractions in the four provinces be put together so that tourists could access to necessary information with ease. Also, the accessibility among the tourist spots, either by road or by sea, should be improved so as to boost more movement from one stop to another. For example the accessibility between Preah Sihanouk City and Kep be much more improved. Eco-tourism should also be promoted in Koh Kong Province where natural attractions amd wildlife are extensively observed.

Following the proposed three (3) major industrial promotion strategies together with seven (7) sub-promotion plans, key actions to take are mentioned in the subsequent sections (Chapter 5.3.2 – 5.3.4).

Figure 5.3.2 shown as below summarized relation between above-mentioned three (3) major industrial promotion strategies and each sub industrial promotion plans, enumerated totally seven (7) plans, and key actions to take in realizing these strategies.

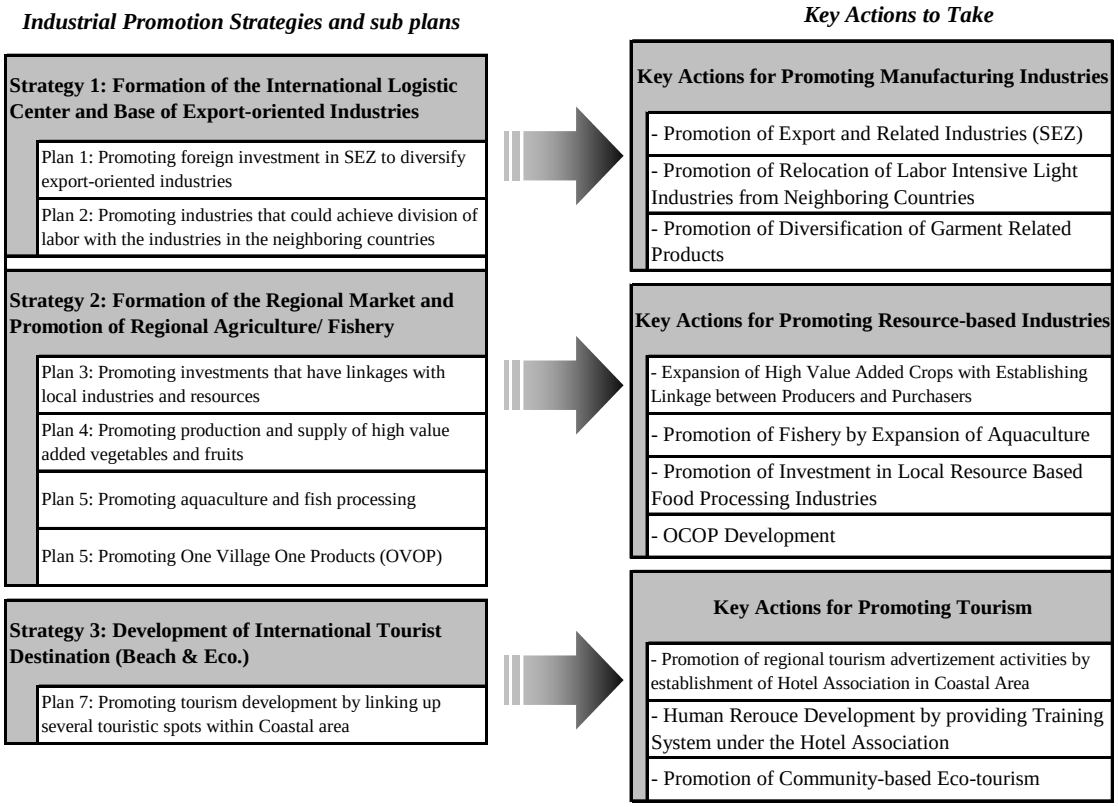


Figure 5.3.2 Relation between Major Strategies, Sub Plans and Key Actions to Take

5.3.2 Key Actions to Take (Manufacturing Industries)

As discussed in the foregoing sections, promoting manufacturing industries is the indispensable engine for economic growth of the Coastal Area.

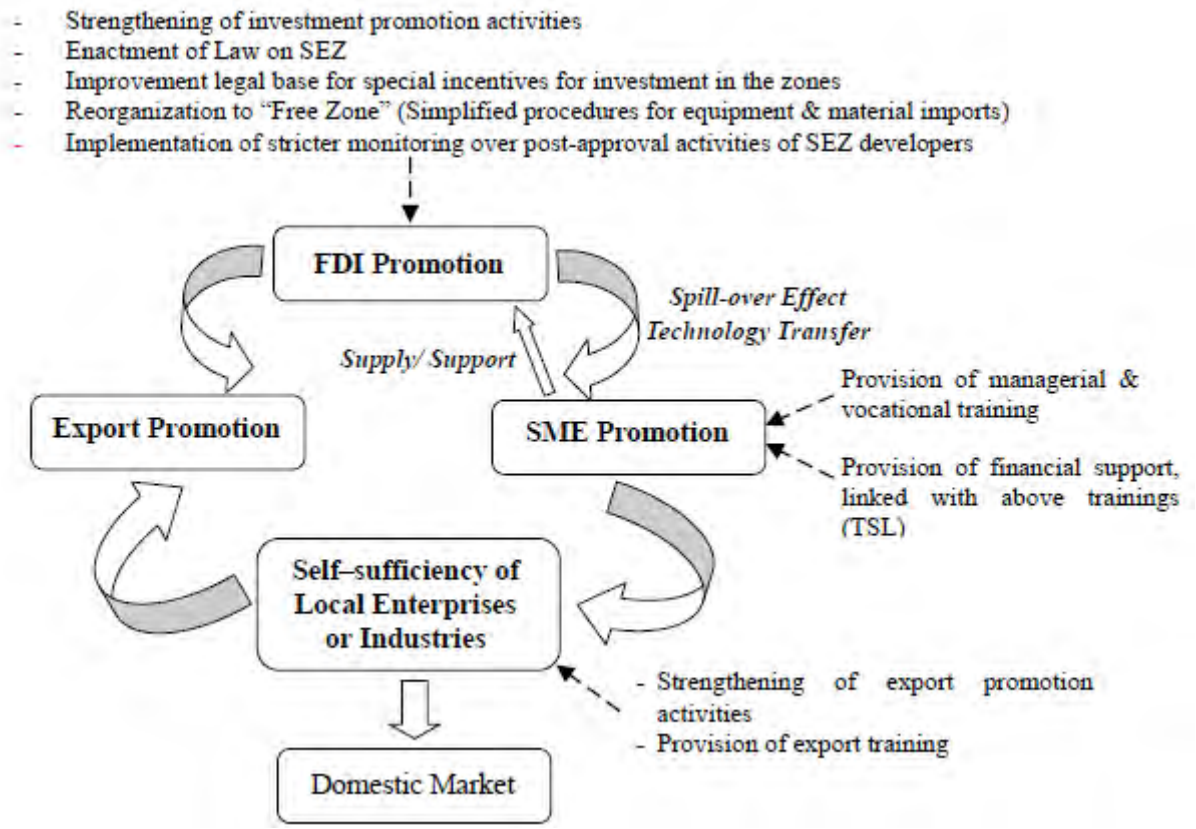
According to the Team's calculation, the total labor force of the Coastal area will increase from 483,700 in 2008 to 758,600 in 2030 (please refer to "5.2.2 Employment"). Currently, although the agricultural sector solely absorbed 75% of labor force in the Study area, percentage distribution of employment of agricultural is expected to decline moderately. The secondary and tertiary sector expected to absorb substantial number of labor force, instead. Particularly, manufacturing sector is expected to play important roll in absorb labor force.

(1) Promotion of Export and related industries: SEZ

1) Development Model

In the past, many developing countries tried to utilize the FDIs as a spring board for economic construction, rehabilitation or development of their countries. By having invited FDIs into their countries, they aimed to provide job opportunities to their nationals, earn foreign hard currencies, absorb new technologies and/or supply local-sourced materials or semi-products to FDI enterprises. In many cases, however, they finally failed to do so. To succeed in such attempt, they should have clear image of development model by utilizing the FDIs. They also have to understand that FDIs themselves would not bring anything but the job opportunities, unless the host country employs adequate policies to utilize FDIs as spring board for economic development. In order to succeed, the host country itself has to endeavor to improve the investment environment to attract utmost FDIs, to establish backward linkage between FDI and local enterprises and to encourage its SMEs to grow by absorbing the technologies and management of FDI enterprises.

Basing on such presupposition, one of the possible development models for Cambodia's Coastal area is presented in Figure 5.3.3.



Source: JICA Study Team

Figure 5.3.3 Development Model for Coastal Area of Cambodia: Correlation between Investment, Export and SME Promotions

2) FDI Promotion

Examining the fact that some of the current investors locating in the SEZs belong to non-traditional fields, the SEZ scheme is deemed to be useful to realize the diversification of industries in Cambodia. Moreover it is an effective scheme to attract export-oriented industries. The Cambodian SEZ scheme, nevertheless, has not yet succeeded to attract the FDIs as expected and it is true to the SEZs in Coastal area as well. Only two (2) SEZs in the area could succeed in absorbing four (4) investment projects. Several reasons for this poor performance can be pointed out.

The first is that the SEZ developers have not been eager to develop infrastructures in their SEZs, although the SEZ Sub-Decree requires them to implement minimum 30% of investment capital within 365 working days after they received the FRC for QIPs and the issuance of Sub-Decree for establishing a SEZ. In some cases, after the developers received the CRC, they have not implemented even the detailed feasibility studies, which is required for receiving FRC, and just waited for the investors to come. In this regard, even the top management of the CSEZB once admitted to the news reporters that, if the developers had to input such large amount of money into the infrastructure development before they had the investors, most of the developers might go bankrupt. Most of the developers in other countries will usually start the development work as soon as they receive the governmental approval and, while they continue the construction work, they search the investors. Such

Cambodian way of zone development is not appropriate at all to induce the investors' confidence in Cambodian SEZ scheme.

To improve this situation, the legal base for the SEZ scheme has to be strengthened. Only SEZ Sub-Decree provides legal base for the SEZ scheme since the introduction of the scheme in December 2005. Although the enactment of Law on SEZ has been examined since then, it has not been materialized yet. Monitoring system over the post-approval activities of the zone developers has not been established yet in the CSEZB and no other government control or monitoring exists, although the SEZ Sub-Decree clearly states the CSEZB has the right to withdraw the SEZ license if the developer does not obey the minimum investment requirement within 365 working days.

At the start of the SEZ scheme, the top management of the CSEZ claimed that what the investors looked for when they decided their investments in the SEZ would be only good infrastructure and secured land plot but not the incentives. In reality, many prospective investors to the SEZ complained about the lack of sufficient fiscal incentives. They became reluctant to make investment in the SEZ by finding nothing special in Cambodian "Special" Economic Zone scheme. To response such requests from the investors, the RGC approved the exemption of VAT on the production equipment and materials to be imported into the SEZ. Although this special treatment was welcomed by the investors located in the SEZ, the exemption period is limited only to the end of 2010. The critical issues here are that such special treatment was introduced on ad hoc base and is even against the provision of Article 14.9 of 2003 LOI, which prescribes as "a QIP which is located in a designated SPZ or EPZ listed in a development priority list issued by the Council (CDC) shall be entitled to the same incentives and privileges as other QIPs stipulated in this law". Any legal scheme concerning the investment is expected to be transparent, non-discretional, predictable and accountable. In this context, the Law on SEZ has to be enacted at earliest occasion to provide the SEZ investors with the stable and confirmed special fiscal incentives.

Cambodian SEZ can be divided into several zones or areas such as production area, free trade area, service area, residential area and tourist area. Among them, the production and free trade areas have to be defined as "Free Zone" in order to realize much simplified customs clearance procedures and to abolish the approval system of duty free import basing on master list. Currently, the SEZ Sub-Decree requires the investment registration as QIP to locate in the SEZ. In fact, more freedom has to be granted to the investors to locate in the SEZ without registering as QIP so that cross-sector business can be promoted and the wider production base can be established. More importantly, such diversified production may lead to the establishment of backward linkage with the local enterprises.

To promote FDIs, the investment promotion functions also have to be strengthened. "Investment Promotion and Public Relation Department" of the CIB is currently in charge of investment promotion but they do not cover the investment projects in the SEZ or investment which do not seek for incentives. The investment promotional organization for All Cambodia has to be set up and be in charge of promotion of all sorts of investments into Cambodia.

3) SME Promotion

When FDIs are promoted, it contributes directly to the increase of exports because most of the FDIs target to utilize the lower production cost of host country and strengthen the export competitiveness.

At the same time, the host country may be able to expect the spillover effect. The technologies or management knowhow of FDI providers may be spilled over to the local business community. In case of Japanese automobile or electric appliance manufacturers, they even dispatch their engineers to the local suppliers to improve the production technologies and products quality so that Japanese companies may be able to purchase the local supply of better quality and cheaper price.

In order to enjoy and fully utilize such spillover effect, the local companies' production and management abilities have to be strengthened. The government must arrange and provide the sufficient opportunities of appropriate vocational trainings, both technical and managerial, together with the financial support to strengthen and enlarge the local companies' operation bases. As to the financial support, the government may arrange special soft loan scheme, which will be made available only to the local SMEs qualified through official vocational training. As a source of such soft loan, the introduction of Two-Step-Loan sponsored by donor may be sought out.

When such demands both from FDI providers and local enterprises are properly matched, the considerable progress and refining of the operational skills and abilities brought into and created in the local companies, also improve the competitiveness of FDI projects in exports market, promote the exports and induce more FDIs into the country. That would lead to the self-sufficiency of the local enterprises and well-established operation of FDI and projects in longer term.

Once the local companies become self-sufficient, they may start supplying their finished products to local market. Through the provision of proper export training to such local enterprises, the government may promote the exports of local made products as well.

4) Timeframe for Implementation

Recommendable timeframe for implementation of above model is as follows.

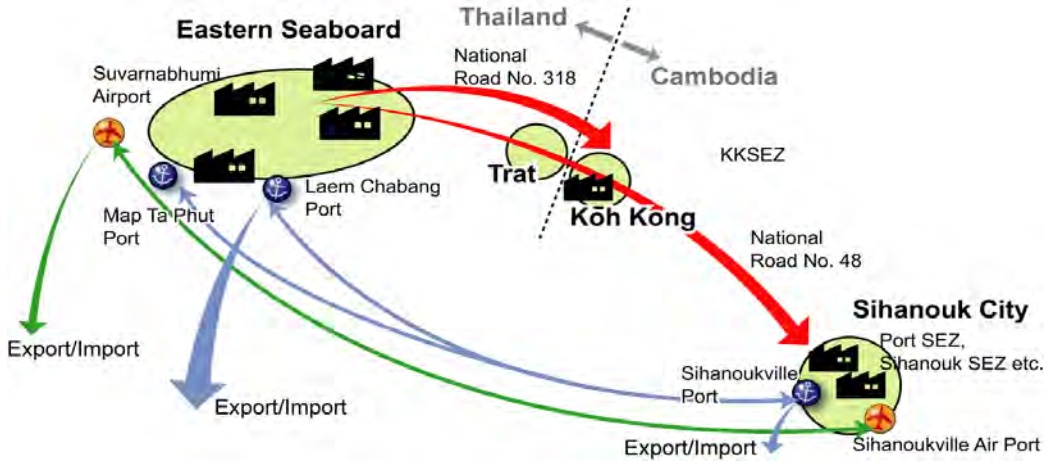
Table 5.3.1 Timeframe for Implementation

Issue	Measures	Starting Year	Target Year
FDI Promotion	Strengthening of investment promotion activities	2010	2010
	Enactment of Law on SEZ Improvement legal base for special incentives for investment in the zones Implementation of stricter monitoring over post-approval activities of SEZ developers	2010	2011
	Reorganization to "Free Zone" (Simplified procedures for equipment & material imports)	2010	2011
SME Promotion	Provision of managerial & vocational training	2012	2020
	Provision of financial support, linked with above trainings (TSL)	2012	2020
Self–sufficiency of Local Enterprises or Industries	Provision of export training Strengthening of export promotion activities	2015	2020
Export Promotion of Local Enterprises		2020	2030

(2) Promotion of Relocation of Labor Intensive Light Industries from Neighboring Countries

Cambodia's neighbors including Thailand and Vietnam export light manufacturing products significantly. Likewise, experience from other countries in the region suggest that a number of manufacturing products can "trickle down" over the medium term, with production moving from more advanced countries to lesser ones. Thus manufacturing industries that have moved from China to Vietnam/Thailand expected to move next to Cambodia.

Preferential treatments under various GSP schemes, coupled with the cheap labor force, could trigger relocation of certain industries from neighboring counties, including Eastern Seaboard of Thailand[6]. While relocation of technologically sophisticated, and/or capital-intensive industries cannot be happened in short to medium terms, relocation of labor intensive light manufacturing industries, which required a low skilled labor force, can be reasonably expected in the Coastal area, particularly SEZ located in Preah Sihanouk and Koh Kong[7].



Source: JICA Study Team

Figure 5.3.4 Sample of the Schematic Figure of Relocation of Industries from Thai Eastern Seaboard and Division of Labor

Industrial cluster of automobile manufacturing has already developed in Eastern Seaboard of Thailand. Automobile consists of about 30,000 – 40,000 of parts, and thus automobile industries needs various related suppliers of parts and materials. Some of labor intensive automobile related industries, such as manufacturing of seat for automobile and motorbike using sewing skill, manufacturing of wiring harness, assembly of automobile/ motorbike can be relocated to Coastal area. Also, other labor intensive light industries, such as manufacturing of umbrella, assembly of home electronics (e.g: air conditioner, refrigerator, washing machine, and vacuum cleaner), manufacturing of building materials, manufacturing of artificial flower/green, and gem cutting are considered to be promising.

As mentioned previously, manufacturing sector is expected to absorb labor force to cope with expected increase in the working age population (especially young age strata). Taking lower labor participation rate and higher unemployment rate in urban area of the Costal area, a special emphasis

[6] Distance from the boarder to Sihanoukville Port is 229 km (using national road 48) and to the Eastern Seaboard is about 300 km (using national road 318)

[7] In Koh Kong, feasibility study of special economic zone was made by Industrial Estate Authority to Thailand (IEAT) in 2004 based on the ACMECS (Ayeyawady – Chaophraya – Mekong Economic Cooperation Strategy) initiated by Thailand and other 4 countries. And then, Koh Kong SEZ (KKSEZ) was developed by the Cambodian capital company (Koh Kong International Resort Club Co. Ltd)

should be given to creating opportunities for young generation in urban area. The government needs to focus on inviting labor intensive manufacturing factories from neighboring countries.

Through facilitation of custom clearance at boarder (one-stop service), and further improvement in transport infrastructure, allowing mutual truck passage for licensed logistic companies will be needed to enhance relocation of part of industries from neighboring countries such as Thailand and Vietnam. Also, disadvantages in human resource capacity, institutions, and costs need to be overcome in order to accelerate establishment of industries.

(3) Promote Diversification of Garment Related Products

Even post MFA (Multi Fiber Agreement) phase-out environment, garment industries still dominate Cambodia's employment and exports. However the country remains at risk of a downturn in garment sectors. Since garment industries needs relatively light smaller investment, factories are able to relocate and/or close their operation when need arises.

Cambodia's 2007 Trade Integration Strategy was developed during 2006 and 2007 jointly by the Cambodian government and its development partners (such as World Bank, UNIDO, and EU) to reduce over dependency on garment sectors. Diversification of manufacturing industries is considered to be urgent task in Cambodia as well as the Costal area.

However, in Coastal area, garment industries employed about 8,100 workers in 2008, which occupied 53% of manufacturing sector's labor force in the area. Garments industries still have sufficient basis of a competitive advantage (such as preferential treatments under various GSP schemes, cheaper labor force, and skilled workers).

Currently, most of product design done in Chinese patent firms, Cambodian firms only focus on production with little values added. Cambodian garment sector is mainly producing low-cost mass-marketed products, such as T-shirts, shirts, pants, and jeans. Since workers engaged in garment sector have certain level of sewing skill. It is recommended to move gradually from production of slash priced bulk products to high-value added products with more design and labor content.

There are plenty of labor forces having sewing skill in Cambodia, and the country obtained preferential treatments from developed countries for various garment related product's export. Therefore, diversification of other garment related products is also recommended. Foot wear production is appears to be increasing its importance. Since EU imposed anti-dumping tariff on China and Vietnam in 2006 due to the products is unfairly subsidized by their respective government, footwear production has sifting from these countries to Cambodia. Promotion of footwear manufacturing industry expected to contribute for diversification of products. In terms of products diversification, production of high value added garment products as well as bag, leather products, wet suits, wigs, and stuffed animal toys are advised to be considered.

To promote garment related industries, the government needs think carefully about the measures and policies to shorten lead-time for provision of business licenses and custom clearance.

It is important for government to continue the support of trade facilitation, which needs to execute based on the recommendation made by such as Trade Sector Wide Approach (Trade SWAp), and Trade Development Support Program (TDSP) studied by UNDP, World Bank, DANIDA and EU. More effective trade facilitation would provide incentive for local producers to engage more in exports.

5.3.3 Key Actions to Take (Resource-Based Industry)

As discussed previously, promoting local resource-based industries, namely agriculture and fishery is the key to achieve sustainable development through creating employment in Coastal area. Taking into consideration the challenges and potentials discussed in "4-1 Issues in the Present Conditions of Coastal Area", key actions to take in promoting local resource- based industries are as follows.

(1) Agriculture: Promotion of High Value Added Agricultural Products

Donor agencies, including ADB, GTZ, AusAID, AFD (*Agence Française de Développement*), and MAFF have been extensively assisting the agriculture production and marketing systems in entire Kampot (and part of Preah Sihanouk). Government extension services have been strengthened in Kampot, while the new technologies transferred to pilot farmers are gradually spilled over to other farmers. Initiatives to establish and register local brands – geographical indications – are also taken by farmers' associations for some specific products including Kampot pepper.

Because of the difficulty in achieving a scale of economy due to the limited land availability, agriculture in Koh Kong Province has so far not received much attention or support. Moreover, the province's large distance to major markets such as Phnom Penh and Preah Sihanouk as well as harsh competition with the agriculture products imported from Thailand and Viet Nam due to the province's proximity to the agricultural areas in these countries makes it extremely difficult for farmers in the province to sell their products with competitive prices.

The following are the areas where support will be effective in promoting agriculture in this respect:

1) Establishment of a direct linkage between Producers and Purchasers

Although Kampot is producing a large amount of vegetables and rice, those agricultural products sold in high prices in Cambodia are mostly imported from Viet Nam or Thailand. Major hotels in Phnom Penh, Preah Sihanouk and Koh Kong tend to buy vegetables from abroad because of local products' inconsistency in quality and unreliability in delivery. The gap between demand and supply is mostly attributable to the lack of market information on the farmers' side. In other words, vegetables have been sold rather in an *ad-hoc* manner, with farmers not knowing what quality and timing are demanded by customers. Since filling this information gap is an important but time-consuming task, it needs to be supported by the MAFF in cooperation with donor agencies. Government extension officers or staff of not-for-profit organizations should facilitate organization of farmers, identify customers who wish to have a long-term relationship with local producers, and establish a linkage (a contract) between these two parties in which correct information about customers' preferences is delivered to farmers with proper price indications, while making sure that all transactions go smoothly according to the contract. Once both parties in a pilot area have established confidence in the market, the system will not need any further support from outside, and the system is expected to grow or be replicated in other areas relatively easily.

2) Long-term Expansion of High Value Added Agricultural Products

The market demand for high value added crops with introduction of organic and reduced chemical farming is substantial but limited by the inability of the market system to provide means to identify and verify organic and reduced chemical produce. Although more and more Cambodian consumers as well as customer-oriented hotels and restaurants are interested

in purchasing "safe products", there is currently no means in guaranteeing that the products they are purchasing are in fact organic or reduced chemical.

Pilot projects such as those currently being run by CEDAC provide a means by which market participants can identify specific farmers in the projects who produce authentic organic or reduced chemical produce. These initiatives should be reproduced and/or expanded through long-term programs. While perfect adherence to organic standards appears to be largely unnecessary in this market, the involvement of a trusted institution or body that directly links producers and purchasers of the reduced chemical produce would be effective. In the longer term, there should be an effort to establish an institution or body that can verify the compliance of organic standards, although it will be quite difficult in the Cambodian context due to its limited technical and financial capacity and market size.

3) Creation of a Farmer's Handbook to Disseminate Agri-Chemical Information

As farmers in Coastal area use a limited range of agri-chemical products (fertilizers and insecticides), instructions for which are usually made in a foreign language, it would be beneficial to farmers to create a type of Farmer's Handbook with necessary information in Khmer language. Based on the information sharing networks already existing in the agricultural community, the handbook could be disseminated to only one farmer within each farming community group. Once benefit is realized from the receiving farmer, the information would naturally be spread within the information network as occurs with most other methods and techniques.

The likely benefits from the creation of such a handbook would be: (1) a reduction in chemical use as most chemicals are currently being overused and farmers will find input cost savings by using less chemicals with at least an equal yield effect; and (2) increased yields per hectare.

(2) Fishery: Expansion of Aquaculture

Although the fishery sector for the most part in Coastal area appears to be developing independently, the development potential of marine fishing is limited due to the decreasing fish stock in Coastal area. In light of this, marine aquaculture is identified as a priority area. The promotion of marine aquaculture has not been sufficiently supported, since the transfer of aquaculture techniques, which is currently taking place under the individual initiatives of fishermen, is slow with aquaculture seeds still being obtained from the wild or imported from neighboring countries. There are also the risks of infectious fish disease outbreaks if proper disease control measures are not introduced. Although JICA is currently engaged in the construction of Marine Aquaculture Development Center (MADeC) in Preah Sihanouk, which will be used to conduct training in aquaculture and infectious diseases control techniques, there are seemingly few technical staff in the overseeing ministry, MAFF who have practical knowledge in the production of fingerlings and disease control. There is an urgent need for technical assistance in the capacity building of relevant staff in MAFF, which will enable the acceleration of technology transfers in marine aquaculture in Coastal area as well as the promotion of the domestic production of fingerlings through MADeC activities.

(3) Promoting Investment in Local Resource Based Food Processing Industries

Foreign direct investment at SEZs in such as Preah Sihanouk and Koh Kong will be indispensable engine for economic development. However, usually, most of foreign capital companies bring capital, materials and technology from abroad, and then after processing, they export their products to abroad.

Except for labor force, most of export-oriented industries located within SEZ are not procured any resources from hinterland. Thus, at initial operation stage, there are quite few backward linkage from the factories in SEZ.

On the other hand, since Coastal area has rich agricultural products and marine products, attention should be also given to promotion of local resource-based industry. According to 2008 Census, 2,563 of labor force in Coastal area were engaged in food processing industries (16.8% of manufacturing labor force), which was second largest sector next to garment industries. Food processing industries have potential to generate substantial backward linkage to agricultural sector in which a large majority of the population in Coastal area derives their living. Also fishery sector, livestock sector and other manufacturing sector will obtain benefit from food processing industry's backward linkage. Following table shows the list of premising food processing industries in Coastal area.

Table 5.3.2 List of Premising Food Processing Industries in Coastal Area

Type of Industries	Location
Agro-processing	
- Cassava Products (incl. Tapioca)	Preah Sihanouk, Kampot
- Rice Milling	Kampot
- Potato Powder	Kampot, Kep
- Crude Sugar Processing, Refining (Sugar Cane)	Kampot, Kep
- Animal Feed, Pet Food	Preah Sihanouk, Kampot
- Dry Fruits, Vegetable/Fruits Chips	Kampot, Koh Kong
- Milling and Drying of Spice (incl. Pepper, Chili)	Kampot, Koh Kong
- Palm Oil Extraction	Koh Kong, Preah Sihanouk
Fishery Processing	
- Frozen Shrimp	Preah Sihanouk, Koh Kong
- Frozen Fish Fillet	Preah Sihanouk, Koh Kong
- Fish Sauce	Koh Kong, Preah Sihanouk
- Live-fish Transport (incl. lobsters, crabs)	Preah Sihanouk, Koh Kong
- Shucked Crabs	Preah Sihanouk, Koh Kong, Kep
- Seaweed Processing (powder, dry)	Kampot
- Dried Shrimp	Preah Sihanouk, Koh Kong
Beverage, Alcohol	
- Beer, Beverage	Preah Sihanouk
- Drinking Water	Kampot, Kep, Koh Kong

Source: JICA Study Team

To promote local resources based food processing industries, challenges, a number of recommendations are suggested as follow:

i) Improve Quality of Raw Materials: In order to produce high quality vegetables and fruits, it is recommended to organize farmer's group and establish a trustworthy monitoring systems for production and quality control,

ii) Establishment of Food Safety Standards: Taking export of products into consideration, establishment of food safety standards is also important to remove non-tariff barrier of developed countries,

iii) Provision of Incentive for SMEs using Local Products: since SMEs play a significant role in promoting economic development, the government should consider arranging incentives (subsidy and other fiscal incentive) for local manufacturing firms,

iv) Improving Access to Finance: the inability of SMEs and farmers to access credit under favorable conditions is a further constraint to promote food processing industries,

v) Establishment cold chain system: in the medium to long term, cold chain system needs to be established for preserving quality of several types of products.

(4) OCOP (One Community, One Product) Development

The OVOP movement will focus mainly on the poor in rural areas, and income and employment opportunity would be increased by creation of local products and services on a value-added basis. The OVOP concept is applied to the development strategy for the revitalization of rural and community economy, and the demonstrated OCOP project is proposed for Coastal area. Agriculture and fishery sectors will be focused linked with tourism promotion in the project. Micro-financing program is also proposed in the OCOP demonstration project for Coastal area.

Taking into consideration the existing OVOP promotion policy mentioned in 4.1.7 of this report, the OVOP promotion project in Coastal area is proposed as OCOP project for systematic and continuous integration in terms of knowledge, skill development, business opportunity and problem solving which have been accumulated in the country. New challenge is made, and the major characters and factors in Coastal area are reflected in the OCOP demonstration project. The OCOP demonstration project is implemented based on agriculture and fishery sector in combination with tourism promotion for the period of two years under the PPP mode. RDB and CPMEC will play a central role under the coordination with the OVOP Secretariat in implementing the OCOP demonstration project by providing fund and training & business development services. The University of Agriculture and Fishery Department as the academic and governmental organization will play a supportive role in the OCOP research and development services. The OCOP development concept for Coastal area is proposed as income generating activities at the community level through the OCOP production activities, and as a result for the creation of community enterprises under the PPP mode which public and private sectors closely work together at the same level. In this regard, a broader cooperation and collaboration framework is considered for diversified OVOP movement in the country, and local-to-local collaboration framework is also expected between public and private sectors of Japan and Cambodia. In Japan unique production activities are being observed within the village community under the different development concepts, and such unique concepts cannot be shared with other societies and communities in Japan. In the OVOP Concept the issues to be addressed are different from at the community level, and actions to be taken will be different from at the community level, too.

Recognizing the uniqueness in the OVOP/OCOP activities, the following actions are advised to be taken by RGC as a priority policy solution of several major issues:

1) Build up Monitoring Capacity of various OVOP Movements

The OVOP/OCOP activities involve a large number of producers, products and financial arrangements, and a lot of problems and lessons in the OVOP/OCOP implementation will be identified. It will be effective to adjust the current OVOP development policy based on the feedback of the lessons in the current OVOP activities by creating monitoring and assessment mechanism at the government level. The monitoring and assessment mechanism needs professional analysis to avoid political and bureaucratic involvement.

2) Develop Human Resources for OVOP/OCOP Activities

The most important lesson from the OVOP activities in other countries is the necessity of the OVOP human resource development at the initial stage. Almost of all production groups will face the problems relating to the management, accounting, production technique & technology, marketing, IT technology and English. The human resource development is an urgent policy issue which is to be tackled by RGC in the OVOP implementation for the process of formulating community enterprises and micro-enterprises.

3) Create Financial Supporting Scheme for OVOP/OCOP Activities

The common lesson from other OVOP activities is the difficult financing accessibility, and financial supporting scheme is inevitable in implementing OVOP/OCOP activities.

5.3.4 Key Actions to Take (Tourism)

In spite of the wide variety and the large number of touristic attractions, the number of foreign visitors in Coastal area is rather limited since the advertisement of each attraction is conducted totally independently, while a clear and appealing image about Coastal area's attractiveness is absent.

The most prominent characteristic of the Coastal area is its rich nature-oriented life. Attractions of nature such as beaches, caves, waterfalls together with mouth watering local food such as fruits, seafood and pepper, people's nature-based life (forestry, agriculture and fishery) and wildlife should all be integrated to make a single refreshing touristic resort. In order to attract more tourists into the area, the Ministry of Tourism should, in cooperation with donor agencies, create and develop effective tools for advertisement and support the initiatives being taken by private tourism operators, including community-based ecotourism, in the following manner:

(1) Regional Advertising

Although tourists interested in the Coastal area can currently obtain basic information about the area and major attractions through websites, information on most of the touristic spots is only available on locally-made leaflets, at local hotels, or by word of mouth. Since individual touristic spots in Coastal area are not necessarily appealing enough to attract foreign tourists, packaging them into several day-tours and creating an integrated regional website advertising all attractions and tours is an indispensable step in making the whole region an attractive resort. Creation of an independent promotion video for Coastal area will become a strong tool for the Ministry of Tourism in advertising the attractiveness of the area on various occasions, while a combination of pictures and short-videos demonstrating waterfalls and eco-tourism sites inserted on the regional website will also be of great help in increasing exposure of the area to the outside world.

(2) Promotion of Collective Actions by Hotels

There are no hotel associations in any of the four provinces in Coastal area. Although many hotels in these provinces express their need in taking collective actions to provide more comfort and convenience to their guests, such as city cleaning, local transportation arrangements, and training of their staff and guides. None of these actions have so far materialized due to a general lack of mutual trust among hotels, as well as a distrust of government entities in the provinces. Since there is an evident need among hotels to conduct collective actions, it is recommended that a trusted not-for-profit

entity play an intermediary role by facilitating discussions among hotels and the government authorities, which will lead to solving their common problems and exploiting new opportunities to enhance attractiveness of the areas and increase visitors.

(3) Provision of Training Opportunities

There are no full scale training institutes for tourism industry in Cambodia in spite of the large demand for the training of hotel staff. Those hotels that wish to achieve an international level of customer satisfaction are obliged to send their staff to foreign countries, such as Thailand, or take time to train their staff by themselves. Recently-created Cambodian Hotel Association as well as hotels in Coastal area expressed their wish to send their staff to training courses if there are such opportunities in the country. It is advisable that training courses for hotel management and hospitality be established in Cambodian training institutes such as Cambodia-Japan Cooperation Center. The operation of these training courses would be profitable since trainees can be sponsored by their employers.

(4) Promotion of Community-based Eco-tourism

The community-based eco-tourism is a way to achieve harmony and balance between nature (protection of forests, marine resources, etc.), human life, and tourism, and it fits well with the image of Coastal area's "nature-oriented tourism". There are four community-based eco-tourism sites in Coastal area that are currently supported by NGOs (one in Kampot and three in Koh Kong) and registered in CCBEN (Cambodia Community Based Ecotourism Network), as well as several other eco-tourism sites operated by communities or private companies. These sites have good potential of tourism, and already attract hundreds of back-packers from all over the world every year.

Development community-based eco-tourism in Coastal area should be further promoted, although it should be noted that it is a long-term process and that the program must be carefully designed. Since rich natural resources are the primary source of attraction for visitors while long-term income generation is mostly the reason for local residents to participate in the program, the program must accommodate and satisfy these two (often conflicting) requirements. In addition, appropriate measures must be taken against adjacent communities that wish to intrude in the conserved areas for poaching and illegal logging/cutting. Moreover, the largest difficulty would be the necessity to change local residents' mentality toward foreigners; "fair" business behaviors in the international context and hospitality must be nurtured through training.

5.3.5 Human Resource Development

(1) Directions of Human Resource Development

Economic and social development would not be realized as expected in the long-term without effective measures for human resource development. For more diversified industrialization process in Coastal area, strategies with three directions are focused, that is, i) promotion of FDIs for non-traditional manufacturing; ii) encouragement of local resource processing (agriculture, fishery and forestry); iii) promotion of tourism business with upgrading quality of services.

As found in the hearing surveys with the large scaled factories operated in Preah Sihanouk province, it is quite difficult for the factory operators to secure the sufficient number of labors from the local. On the other hand, the Royal Government of Cambodia (RGC) has established the National Agency for Occupations and Labor (NAOL) under the administration of the Ministry of Labor and Vocational Training (MLVT), via Sub-Decree #67, to facilitate, develop and provide information services of

recruitment and vocational training. Also, there are actually numbers of job seekers in rural provinces, especially Battambang and Vietnamese border provinces in Cambodia. Therefore, it is required to cover such a shortage of labor in Coastal area by establishing the information network provided to both employers and employees through coordination between NAOL and each provincial government, in short term.

However, as mentioned above, it is essential to implement human resource development properly to the local people, to achieve the sustainable and continuous socio-economic development in Coastal area in the long run. Needless to say, in order for those local people to adapt to such a strategic industrialization process, their kills, knowledge and industrial minds should be trained and fostered, and the government sector is requested to provide such training opportunities for all those who intend to be done so. Special emphasis may be placed on each province as follows, based on its respective economic development target:

Koh Kong: In order to materialize the new industrial potentials linked with Thai industries, a number of young middle class engineers with basic skills for manufacturing, mechanical engineering, quality management and others should be trained and fostered. For this objective, a Koh Kong Provincial Vocational Center (KKVC) high school equivalent level is expected to be built and well-managed at the city of Koh Kong.

Preah Sihanouk: The city of Preah Sihanouk is the pivotal urban center for the whole Coastal area. One of the important pivotal functions must be to educate and train a variety of human resources so as to contribute to dynamic economic development. In this sense, a Hospitality Business Collage (or Center: HBC) is promising for those who are willing to work in and/or manage the tourism industry. The HBC shall be established with the national governmental initiative and may be managed by the private sector, with international donors and NGOs. The HBC shall provide a wide variety of business training opportunities with curricula of high school to collage levels. Another important area of human resource development is to foster a considerable number of middle-class engineers to work for manufacturing sectors as group leaders or managers. They need to be trained basic skills for computer operation, IT technologies and business management. Same as the case of Koh Kong, a Provincial Vocational Center (SVC) shall be established at a high school-equivalent level.

Kampot: Taking into account encouraged agricultural activities in the hinter land of Kampot, the city of Kampot is endowed with a potential to be an agricultural and agro-processing center. This latent potential shall be materialized by those young generation people who intend to be leaders and/or entrepreneurs for agro-processing business and advanced value-added farming. To support them, it is recommendable to establish a National Collage of Agriculture, Kampot (NCAK) with a variety of curricula to foster young leaders for agricultural development in not only Coastal area but also over the nation. So, this NCAK will be a national knowledge center for agriculture and its relevant business.

Kep: It must be an important government task to provide training opportunities for young generation to become local leaders and/or entrepreneurs for agricultural, fishery, food-processing, tourism and forwarding business. An attractive training program under “Community College System” shall be prepared in cooperation with HBC and SVC in Preah Sihanouk and NVAK in Kampot for all generations.

5.4 Spatial Development Strategy

5.4.1 Planning Issues for Regional Development

(1) Lack of Overall Development Policies for Coastal Area

No comprehensive regional development plans have been formulated for Coastal area, except for the Coastal Environmental Management Program (2002-2007), supported by DANIDA. This program attempted a number of pilot projects for the management of coastal resources, involving local stakeholders to enhance the community's livelihood status. Some of them have contributed greatly to the improvement of the people's quality of life and some are still challenging toward the objective of the program even after the project was terminated at present.

Based on such technical and social properties as derived from this DANIDA's initiatives, an overall development policy framework for environmental management should be formulated.

(2) Necessity of Urban Growth Management

Similarly as experienced in other Asian Countries such as Thailand, Malaysia and the Philippines, it is anticipated that an urbanization process will soon take place, along with economic development, in the regional city of Preah Sihanouk. The urbanization process is usually made by rural-to-urban migrants, and this happens due to two social pressures: Push-effect and Pull-effect. The push-effect is more effective, when the rural economy is poorer with lower absorptive capacity of labor force in the rural communities. The pull-effect is more powerful when the regional city rapidly grows with more job opportunities. As far as the city can provide as many job opportunities as demanded by rural-to-urban migrants, social problems will be minimal; however, when in reality jobless migrants settle in the city, they will easily fall to be the urban poor. Therefore, the effective urban growth management shall carefully be launched to look into the carrying capacities in both urban and rural areas.

(3) Necessity of Effective Environmental Management

The tourism development must be welcome, because the tourism sector will bring a high multiplier effect (2.0 to 2.5 usually) of tourists' expenses on the local economy through the market mechanism. The development of SEZ may also be welcome, because the development will provide new job opportunities to local people. However, it should be noted that if environmental degradation takes place due to these development activities, sustainable growth cannot be ensured in the future: Tourism will be soon discouraged, and social costs for diseconomies accrued from the environmental deterioration should be paid by the next generation. Coastal lines and forest areas are particularly important and they should be protected from such disorderly development activities. All officials concerned with the planning and development administration need to be sensitive to this aspect, and rules and regulations should be enforced seriously to make best use of these resources in a sustainable manner.

(4) Appropriate Guidance for Agricultural Development

It is reported that majority of rural people in Coastal area suffer from a shortage of foods, although the area is endowed with great potentials in agricultural, fishery, husbandry and forest productions. In this

sector, a few problems are identified, that is, no marketing systems have been introduced yet, and quality control is inferior to that of other provinces, technologies are still backward, and so on. These problems and constraints may be resolved, if farmers strive for improvement of the situation, given strategically intensive supports from donors and the national government. In particular, the Kampot Province has great opportunities to be an advanced and outstanding agricultural area over the nation.

(5) Expectation from the Border Economies

Coastal area has direct connections with the two neighboring countries of Thailand and Vietnam, and the border areas are expected to benefit from their locational advantage, given a special national policy on making use of the border economic potentials as follows:

- Tourism is promising, and casino may be effective to attract tourists. However, it is noted that its direct impacts on the local economy will be minimal, unless foods and employees are provided by the local.
- Introduction of new technologies and collaboration of human resource are expected to benefit the development of the local economy. The new markets of agricultural and its processed products can be explored as far as the competitive position is kept.
- Manufacturing industries' locations are expected to increase in border areas under an ASEAN supply-chain network. In particular, the Eastern Seaboard Industrial Zone of Thailand is not economically distant from Koh Kong.
- Currently, the electric power for the border areas is purchased from both Thailand and Vietnam, respectively, under the power interchange policy. In this regard, the trading balance is negative for Cambodia. However, it will have a chance to make it positive, if the development of a potential hydro power station is realized in Koh Kong.
- Vietnam is accelerating the tourism development of Phu Quok island with the designation of a special economic zone in the port area. Phu Quok island is located near Kep and Kampot by sea route. With consolidating a network between these locations, an attractive international touristic area could be formed.

5.4.2 General Spatial Structure of the Coastal Area Development

(1) Recognition of Major Growth Centers

There exist three (3) centers to facilitate the regional development in Coastal area. Those are one (1) "Regional Growth Center" and two (2) "Sub-centers", as follows:

- **Preah Sihanouk Regional Growth Center**: having great growth potentials as the unique international sea-gateway for exports and imports at the Sihanoukville Port and its hinterland with potential for non-traditional export industries;
- **Koh Kong Sub-center**: endowed with a potential to become a new focal area for industrial locations as well as eco-tourism in Koh Kong, with potential in marine and forest resources, linking with the Thai economy (Regional Sub-center); and

- **Kampot-Kep Sub-center**: Existence of a new economic capacity to become a trading center in border area, Kampot and Kep, with potential in agriculture and tourism, connecting with the Vietnam economy (Regional Sub-center).

(2) Two Development Corridors

Two (2) development corridors should be strengthened as the backbone of Coastal area. One is the trunk corridor connecting between the international sea-gateway, Preah Sihanouk and the capital city, Phnom Penh; and the other is the regional corridor to integrate the sub-centers along Coastal area and the neighboring nations:

- **Preah Sihanouk-Phnom Penh Growth Corridor** (National Highways No. 3 and No.4):

This corridor, Preah Sihanouk-Phnom Penh Growth Corridor, is one of the most important national lifelines of Cambodia, connecting the Capital City's economy and the coastal logistic center to facilitate exports and imports. This corridor should assure functions of efficient goods distribution, smooth and safe tourist transport and business trips. The railway connection which is under rehabilitation now is expected to strengthen the inter-city mobility in near future. Along with the strengthening of the gateway function of the Sihanouk Port, this corridor will be empowered with export-oriented industrial development and location of new logistic activities. Cash-crops based agricultural development will be also taking place in association with the enhanced function of the goods distribution system linked with world markets as well as domestic market.

- **Coastal Integration Corridor** (National Highways Nos. 48. No.4. No.3. No.33 and No.117):

This corridor shall integrate various economic potentials being dispersed in Coastal area such as emerging trading activities in Koh Kong, national gateway and growth center at Preah Sihanouk, advanced agricultural development in Kampot, reputable resort in Kep, and promising trading center in the Vietnam border. Centering on the Sihanoukville Port, if it takes less than 3 hours drive to/from the eastern/western ends, this corridor shall integrate all economic potentials with one-day travel, which stands for an efficient economic sphere. Another promising growth opportunity is the integrated coastal tourism in this corridor which s endowed with rich natural resources such as mass habitants of mangrove, bio-diversified forests, waterfalls, long white sand beaches and so on. Thoughtful environmental and land management is a must in order to maintain these invaluable assets in sustainable manner, mobilizing overall growth management measures.

Figure 5.4.1 illustrates a conceptual spatial structure based on the above development directions. It should be noted that the **Preah Sihanouk-Phnom Penh Growth Corridor** shall be further strengthened in terms of freight mobility between the capital metropolitan region and the solo national gateway function. An alternative industrial highway capable to accommodate full-loaded container trucks shall be further explored to develop in the long-term.

Source: JICA Study Team

Figer5.4.1 Coastal Zone Frame

(3) A Scenario on Formation of the Regional Development Structure

On the practical ground, the spatial structure to ensure the regional development should be formed with a strategic scenario as follows:

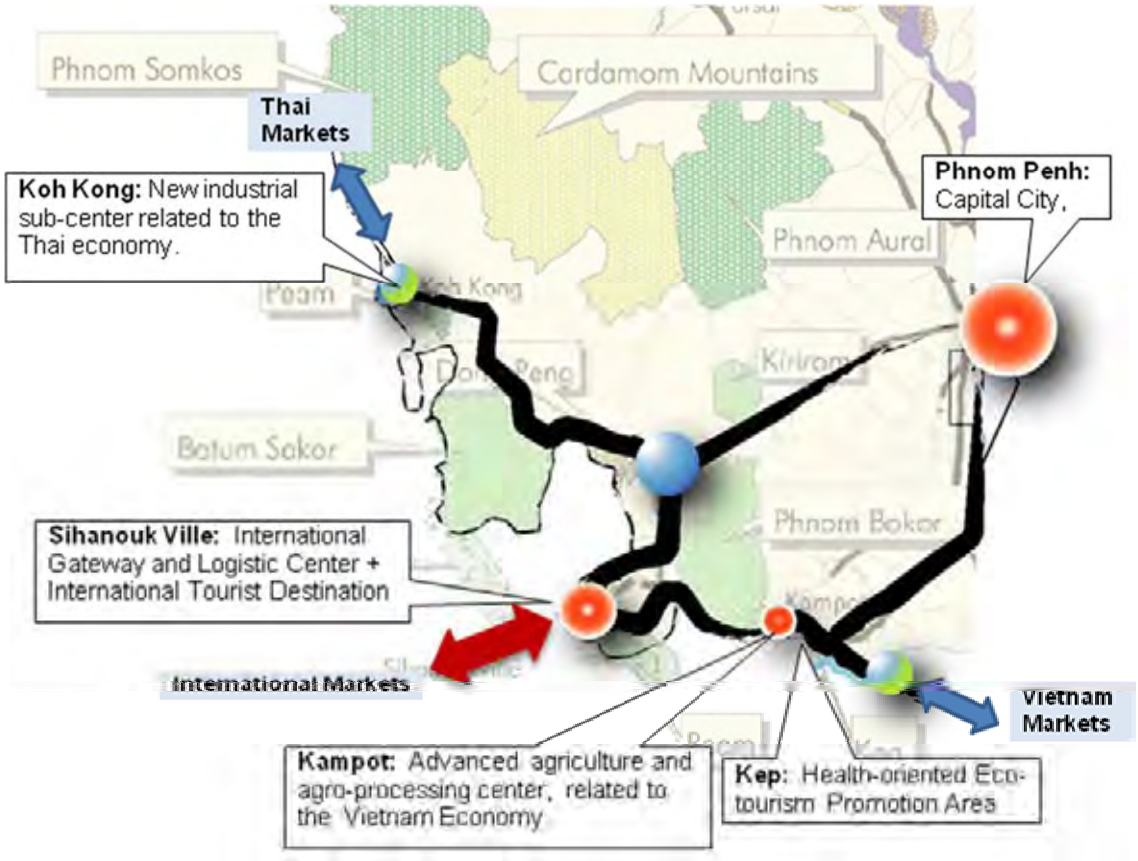
- **Stage 1:** Development of the Preah Sihanouk-Phnom Penh Growth Corridor, strengthening the gateway function at the Sihanoukville Port, and encouraging the local industries as well as proactive inducement of foreign investments on the manufacturing sector based on the strategies as discussed in Section 5.3. Policy emphasis should be placed on overall development of the Sihanoukville Port, including modernization of the custom system and the cargo handling system as well as the expansion of the physical capacity. Improvement and widening of National Route No.4 and No.3 will be much needed, and the on-going railway rehabilitation also occurs in this stage.

- **Stage 2:** Development of the Coastal Integration Corridor, strengthening the industrial functions at Koh Kong Sub-Center in relation to the Thai economy, and agricultural and

trading functions in Kampot-Kep Sub-Center in relation to the Vietnam economy. Encouragement of the border economy may be a key to stimulate these local economies. On-going and planned improvement of the regional roads needs to be accelerated in this stage.

- **Stage 3:** Integration of the two growth corridors linking with the international or Asian market and neighboring countries' markets. At this stage, Coastal area should be networked with basic economic infrastructures such as roads; information systems; power and water supplies. Emphasis in the policy should be put on the development of financial, educational and technological functions at provincial cities of Koh Kong, Preah Sihanouk, Kampot and Kep. Also, the full utilization of the Sihanoukville Airport in the international/regional air network shall be launched. Further enhancement of the two corridors, such as the development of expressway, should also be contemplated.

The planning concepts to ensure Coastal area development are spatially proposed as shown in Figure 5.4.2.



Source: JICA Study Team

Figure 5.4.2 General Development Structure of Coastal Area

5.4.3 Development Directions for Growth Centers

Urban centers' functions are essential to support their hinterland economies, providing with market access of commodities and services, financial, information, education and health services, and so on. In this sense, the three (3) growth centers need to be further developed in such a way that urban services shall be available as much as required by their influence areas.

(1) Preah Sihanouk Regional Growth Center

As mentioned earlier, the City of Preah Sihanouk holds great growth potentials as the unique international sea-gateway for exports and imports. The ocean-going commercial port is not a regional facility but a nationally strategic facility whose function shall determine the Cambodian economic position in the world market and her national security in the world-wide goods distribution. It is predictive that this regional growth center will be growing in parallel with the Cambodian national economy, simply because cargo transport volumes for exports and imports can closely be represented by the entire economic situation. Therefore, the Preah Sihanouk shall be developed as a strategic city leading to the national development. The following directions are proposed:

- The Sihanoukville Port shall be one of the Asian ports, that has to be competitive in the region strategically. Needless to say, the competitiveness means not only its physical capacity, but also, more importantly, modernized port operation and management systems, including establishment of a transparent and rational custom system.

- Such a vital gateway may be strengthened in association with development of: 1) **industrial parks** in its hinterland; 2) a **comprehensive logistic center** directly adjacent to the port for storage and transshipment and the railway to be rehabilitated; 3) a **trading center** linked with the ASEAN market as well as the Siam Bay market, and 4) other relevant facilities.

- As for the tourism industry, Preah Sihanouk will be ale to a reputable international tourist destination, if a proper guidance and land use control is given to private investments in this sector. The long beach strips with white sands are a valuable asset for the beach resort. In particular, ***Ochheuteal Beach*** with 3.0 km long and ***Otres Beach*** with 3.5 km long should be developed in strict consideration of environmental conservation under the thoughtful guidelines to be regulated by the local government. Rich mangrove forests are another attractive tourism asset to be integrated with the beaches. A long-tem master plan is necessary to be formulated for this purpose.

- Basic infrastructures such as the water supply system with a sufficient capacity must be secured. The water supply condition for Preah Sihanouk is unclear due to the lack of reliable future water source, and this issue has to be addressed urgently. Also, the solid waste management system, the storm water drainage system, the sewerage system and the power supply system are all needed to be improved and/or expanded in capacity. The existing sewerage system, however, has been underutilized, due to less subscribers' connections to the treatment facility. Its management and operation system needs to be improved so as to formulate the feasible network covering service areas where the sewage treatment is actually necessary.

- Housing and commercial areas shall be expanded along with the increasing urban population. Based on a preliminary projection by JICA Study Team, the City of Preah Sihanouk will have an increase of about 150,000 persons from 2008 up to 2030, and this population increase will require new land use for residential areas of about 3,000 hectares, and commercial area of 500 hectares. In order to properly manage such urbanization process, a comprehensive land use plan should be urgently formulated, including a functional road network system.

(2) Koh Kong Sub-center

The city of Koh Kong is endowed with a promising potential to become a new focal area for industrial locations in Koh Kong, linking with the Thai economy. The following opportunities are noteworthy in terms of development opportunities:

- Industrial locations linked with the Thai economy or part of the ASEAN supply chain network may be realized, given sufficient incentives for their productive activities as well as the initial investment. In addition to the institutional incentives, provision of infra-services such as water and power is essential. The economically efficient transport system for shipping will be a key.

- Tourism potential targeting the Thai tourist market is still promising, however, too much expectation on benefits from tourism will result in over investment or environmental disruption of the natural resources.

- Several candidate locations for hydropower stations have been identified in the western part of Koh Kong Province by the engineering study. For the sake of the materialization, further detailed feasibility study should be conducted from the viewpoint of social and environmental acceptance as well as engineering and economic viewpoints. If the project is realized, the power can be sold to the Thai side, thus the trade balance will greatly be improved.

- Given success of the oil and natural gas exploration project[1] located offshore of Koh Kong, the Siam Bay, this project will bring tremendous profits to the national economy, and its landing point is located in Koh Kong, a great change will take place in Koh Kong local economy. It is reported that here exists a candidate location of a deep seaport at Kirisakor, which may be suitable for the oil and gas landing point. The project should be thoughtfully prepared.

- Another great impact on the land use in Koh Kong is anticipated, if the SEZ concession project with about 37,400 hectares is carried out in practice in Coastal area. Such a huge scale concession has been admitted even in the national park area. The master plan delineates a township development with a 180,000 population. It is not time at present to comment on or assess the reality of this project.

- Introduction of new technologies of cold chains and food-processing technologies will possibly change its disadvantageous position that Koh Kong is remote from major consumers markets. This is the case in Kampot as well. Facilitation of agricultural and forestry products should be further pursued.

(3) Kampot-Kep Sub-center

Kampot and Kep possesses a new economic capacity to become a trading center or a regional market connecting with the Vietnam economy. This sub-center should also be developed as an agro-processing center, gathering unique agricultural and fishery products such as pepper, dairy products, crab, seaweeds, etc. The following activities are proposed to be encouraged to strengthening the economic position of Kampot and Kep:

[1] Several steps, such as the conclusion of a bilateral agreement with Thailand and a feasibility study, shall be cleared before the commencement of the commercial exploration whose target year is 2012. It is reported that the deposit is estimated at about 700 million barrels of crude oil and 3,000 to 5,000 billion m^3 of natural gas in the mining concession area.

- It is essential to strengthen the **banking function** to provide financial supports for strongly motivated farmers and agricultural enterprises and form local capitals for new investments for agro- and fishery products-processing. For this sake, organization of "Saving Groups" and/or "Farmers Co-op" deserves to be pursued so as to be suitable for the local reality. A variety of **micro-credit systems** also need to be prepared.

- Technologies for improvement of productivities and value-added should be introduced in this area through the encouragement of human resource development programs, and for this sake, a **College of Agriculture** is recommended to be located in Kampot. This collage shall be a knowledge center of:

  - Experimental activities for development of value-added and marketable products;

  - Introduction of new technologies/technique for cultivation; quality products selection and sorting; packaging; transportation; freezing; marketing; food-processing manufacturing; food safety and quality management, so on.

  - Engineering technologies of infrastructures for irrigation; drainage; farm-to-market roads; and water management, etc.

  - Fostering motivated young leaders and entrepreneurs in the agricultural and its related sectors, including financing and management.

- A **regional market** for agro-products should be developed as a modernization frontage of agriculture-based marketing system. This is necessary to assure the competitive position in trading of agro-products with Vietnam.

- Kampot is rich in tourism development assets such as historical buildings and its streetscape. **Culture-hunting tourism** may be attractive for those who are interested in Cambodian indigenous history. This cultural asset will become more attractive, when the eco-tourism in the Kep Province is jointly promoted as an excursion package for both nature-lovers and culture-lovers.

- As recognized above, **Kep** will be an outstanding destination of "eco-resort", particularly for those who are health-conscious. Fresh air and diet seafood will be attractions to promote Kep's tourism.

5.4.4 Comprehensive Transport Network Systems

(1) Trunk Roads and Road Network

National Routes No. 3 and No.4 between Kampot, Preah Sihanouk and Phnom Penh are, as mentioned earlier, the national trunk roads and formulate the industrial growth corridor. In general, NR No.4 is maintained in a good condition, but insufficient capacity, while, NR No.3 still has some unpaved or deteriorated sections, and is expected to be urgently improved to a standard level. Both trunk highways should be kept well-maintained as the national axes in such a condition that the coastal growth centers is connected with Phnom Penh within 3 hours and half at the 60km/h average speed.

Another issue is to develop an alternative industrial highway with a heavy-loaded structure strong enough to accommodate full-size container trailers and smooth and safe freight mobility between Phnom Penh and the Sihanoukville Port. Along with the development of the national port, it is

anticipated that the road transport capacity of NR No.4 will be getting more critical, and the congestion with mixed traffics of community and long-haul traffics will lead to serious problems load side communities in terms of safety. So, the necessity of a new highway in parallel with NR No.3 is obvious in the long-term, but its feasibility shall be further explored, taking into account traffic demands in practice and the competitiveness with railway which is expected to be improved under a privatization scheme.

As for the Coastal Integration Corridor, NR No. 48 to/from Koh Kong has been developed with a Thai assistance recently, and this route has to be long well-maintained against heavy rainfall in wet season. Improvement and maintenance of NR No.33, connecting to/from the Vietnam border, is also important and needs to be well-maintained. A new bypass road in Coastal area directly connecting between the Vietnam border and the Kep town along the scenic coastal line deserves to be improved. This road will contribute to agricultural development (including salt production) in areas alongside the road, as well as enhancing the touristic potential. More detailed discussions on road network are referred to Sections 4.3 and 5.6.

(2) Railway Rehabilitation

It is informed that a rehabilitation project of the existing railway between Phnom Penh and Preah Sihanouk via Kampot and Takao is being implemented with a financial support by Asian Development Bank, as reviewed in Subsection 4.3.2. This project is expected to improve the mobility in the industrial major corridor for freight transports between Phnom Penh and Preah Sihanouk to a remarkable extent. It is sure that the safe, comfortable and speedy transportation will benefit tourism development in Kep, Kampot and Preah Sihanouk. Given a 60 to 80 km/h operation on the average, it will be possible to reach these resorts with 3-4 hours travel from Phnom Penh, thereby uplifting the accessibility at a considerable level. More detailed discussions on road network are also referred to Sections 4.3 and 5.6.

(3) Airport Rehabilitation and Aviation

The Sihanoukville Airport has long been awaited to resume regular operation, being equipped with the aviation aid system. Some feasible flight routes and schedule for commercial operations are being explored, taking into account tourism and business relations. The national flag air transport operator is currently seeking for feasible air routes with Siem Reap.

5.4.5 Land Use Planning with Enhanced Natural Resource Management

(1) General Planning Concept

In general, the development of Coastal area would be promising in the future, only if the natural and environmental resources be well maintained, properly conserved and fully utilized in a sustainable manner. Otherwise, those valuable resources for tourism and local economies will be irrevocably damaged, thereby leading to losing the economic take-off opportunities. In particular, a special attention to such environmental considerations needs to be oriented to Preah Sihanouk and Kep Provinces which are endowed with latent potentials for tourism development.

Land use planning shall be started with identification of areas which should be conserved or protected in the long-term perspective with a more than 100 years time horizon. Coastal and forest resources are particularly important. The identification of those areas needs to be based on a scientifically analytical methodology for assessing the natural characteristics from a various standpoints such as disaster

management, ecological value, environmental needs, and indigenous livelihood and so on. Formulation of a **symbiosis system** with nature and socio-economic development must be a common vision to be shared by all stakeholders in Coastal area, and this vision should be materialized with formulating such a land use plan oriented by this vision.

(2) Proposed Land Use Classification

In order to realize balanced land use between development and natural conservation over the land within the national territory, the well-governed administration for land use is a must, and this is a major aim of the underlying Law on Land Management, Urban Planning and Construction. In this regard, it is recommended that all the land area within the national territory is legally classified into five (5) categories of land use, and that land use of each categorized area is legally guided, controlled and/or managed under respectively-focused rules, regulations and/or law to assure the administrative enforcement to the end, those are: 1) Protection Area; 2) Protected Forest Area; 3) Agricultural Area; 4) Conservation Area; and 5) Urban Area. It should be noted in particular that as Protection Area and Conservation Area are designated because of its importance of conservation and/or protection from the environmental standpoint, development and construction activities shall be strictly controlled under a legal framework, thereby minimizing issuance of "**Concession** for Development" in these areas.

Administration for the environmental protection and the economic development should not be contradicted each other, but should be balanced and coordinated. It must be a minimal requirement to be enforced that any development activity in these areas should prepare and carry out appropriate countermeasures to recover the environmental degradation, if it can be predicted. The attributions of the five categorized areas are as follows:

i) **Protection Area**: The natural resources such as forests, water, unique geological configuration, soils, vegetations, flora, fauna and others should be conserved through a strict designation as the Protected Area under the Law, which may encompass both privately and publicly owned land. Changes of land use to housing and other commercial purposes should be controlled or restricted, but small-scale development of eco-tourism or recreational facilities may be allowed under conditions to be stipulated by governmental guidelines.

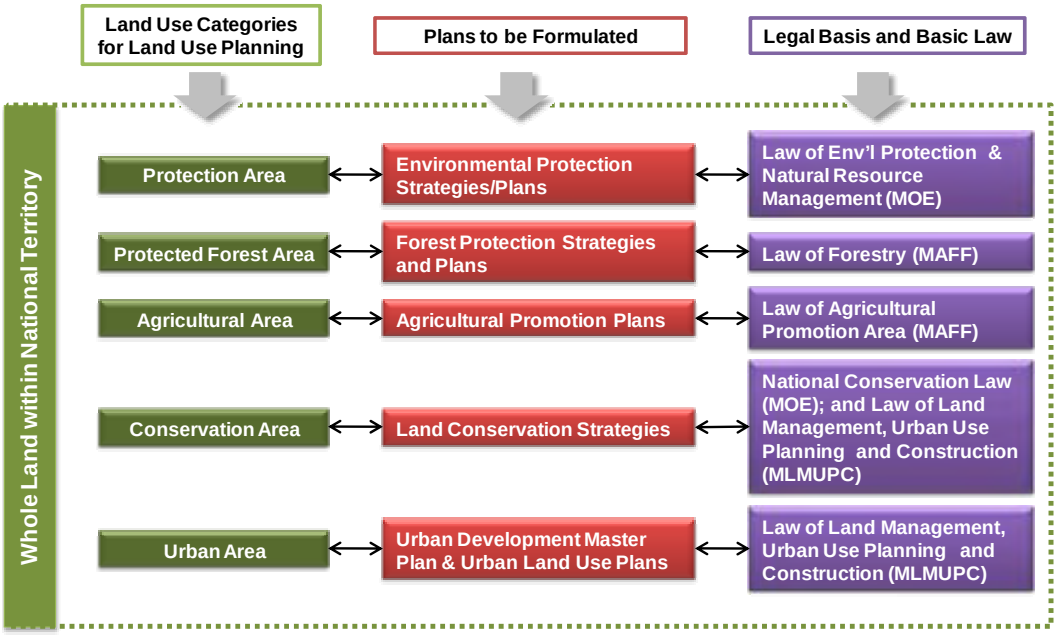
ii) **Protected Forest Area:** Land use for natural forests, multi-functional secondary forests, forest-related production areas is promoted. Both public- and private-own land can be designated for this category. Commercial transaction of land ownership is allowed only with a condition that environmental measures should be undertaken to protect and recover the environmental degradation and/or negative impacts.

iii) **Agricultural Area:** Land use of agricultural purposes are of priority, and public investments on agro-infrastructure development such as irrigation, farm-to-market roads, post-harvest facilities shall be encouraged in designated agricultural promotion area.

vi) **Conservation Area:** Areas to be conserved or protected from the disaster management, water resources management as well as environmental ecological viewpoints should be designated in this category of land use. All construction activities should be controlled and managed by the authority concerned.

v) **Urban Area**: Urbanization shall basically be promoted and encouraged; therefore, land development is allowed to be carried out under city planning guidelines and/or in accordance with the urban land use plan which is to be authorized by both local and national governments under the Law on Land Management, Urban Planning and Construction (1994).

Figure 5.4.3 presents a proposed concept on the land use and land use planning related with the relevant legal bases. More detailed discussions on logical rationales behind this concept are referred to Section 6.1, Chapter 6.



Source: JICA Study Team

Figure 5.4.3 Proposed Land Use Classification

(3) Establishment of Enforced Environmental Management System

Needless to say, the sustainable growth can be realized only under balanced development between the environmental conservation and the socioeconomic development. The development without any consideration of deliberate countermeasures against negative impacts must be strictly controlled. This is a basic principle to establish an environmental management system which is enforced within a legal framework where its chief responsibilities are mandated to the local (provincial) governments and authorities concerned.

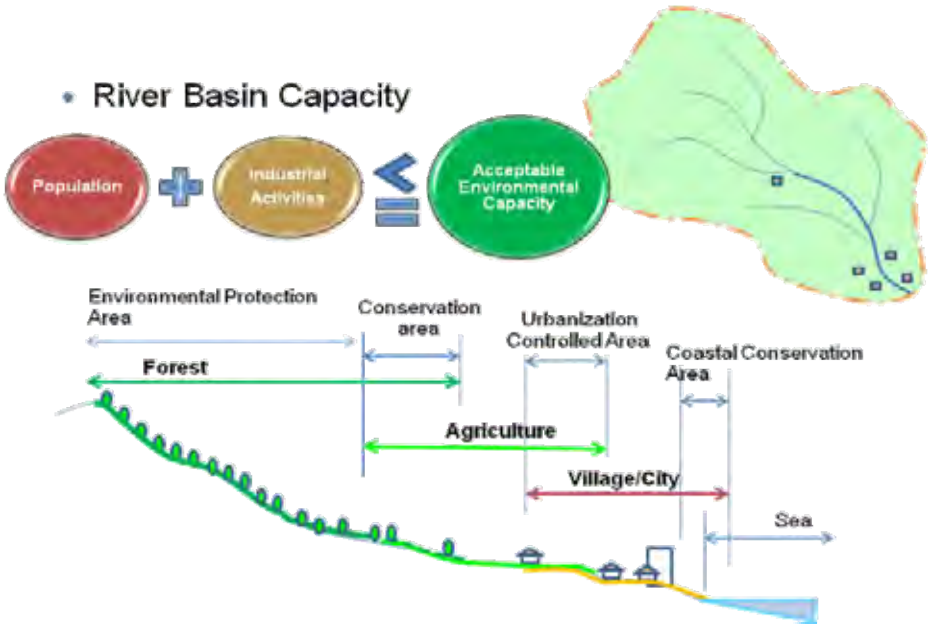
It is often observed that the current administration of issuance of "Economic Land Concessions (ELC)" by the central government (mainly by CDC) are not necessarily well-coordinated by the local requirements, although the admitting process institutionally include consultations with the local and environmental administration. The administration of ELCs is inherently to approve the investment, not to permit the actual implementation of the project. However, from the land use point of view, the current process for the issuance of ELCs should be reformed in such a way that further environmental appraisal and coordination with land use administration is practically and sufficiently undertaken, prior to its final admission, in consideration of its administrative capacity. This recommendation is based on the recognition that since the recovery of deteriorated environment usually requires a remarkably long time (30 to 100 years) and a tremendous amount of social costs which are all shouldered by the next generation, thoughtful actions are of our responsibility, or should be undertaken by the current generation.

At present, a serious problem is found in some of the SEZ construction sites in Preah Sihanouk Province where neither appropriate environmental protection nor countermeasures against floods and serious sediment discharge directly into rivers or the sea, is lacking. This will incur serious impacts onto mangrove habitants and marine resources. Therefore, an enforceable environmental management system should urgently be established so that the relevant authorities as well as the provincial government can take necessary actions to supervise the construction sites and enforce the projects owners to undertake appropriate countermeasures or compensations promptly.

The further discussions on development management issues are also referred to Chapter 6.

(4) Introduction of the River Basin Land Use Management System

The river basin can be regarded as a spatial sphere of the ecological system; therefore, the river basin is a rational basis of the land use management system. A principle of land use planning is that cumulative environmental loads imposed by human settlements, social and economic activities shall not exceed the total carrying capacity of the river basin, in terms of use of resources such as water, land, flora and fauna and all others, as conceptually shown in Figure 5.4.4. This figure also indicates a rational land use system in the vertical spatial characteristics of the river basin.

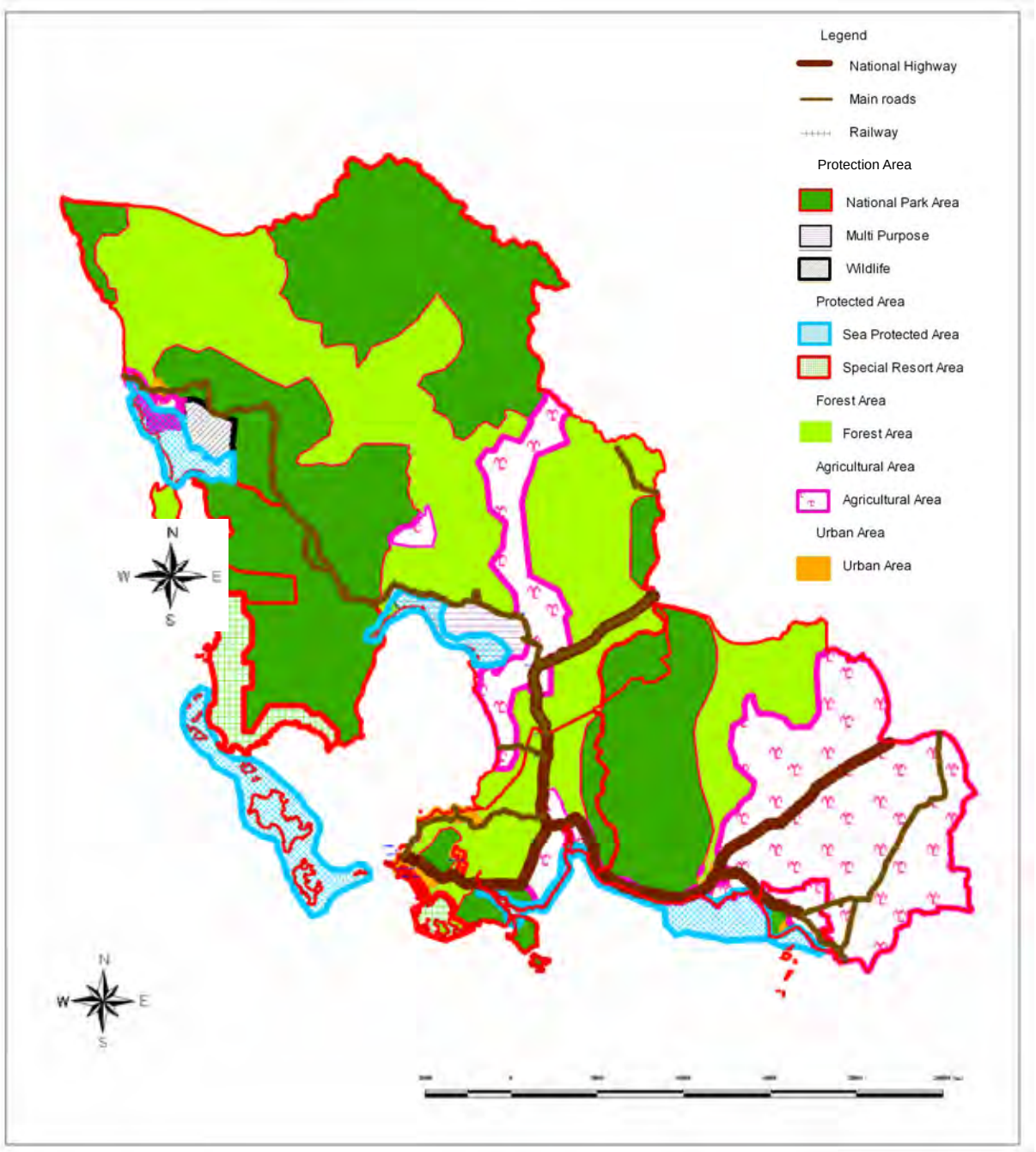


Source: JICA Study Team

Figure 5.4.4 Concept of River Basin Land Use Management

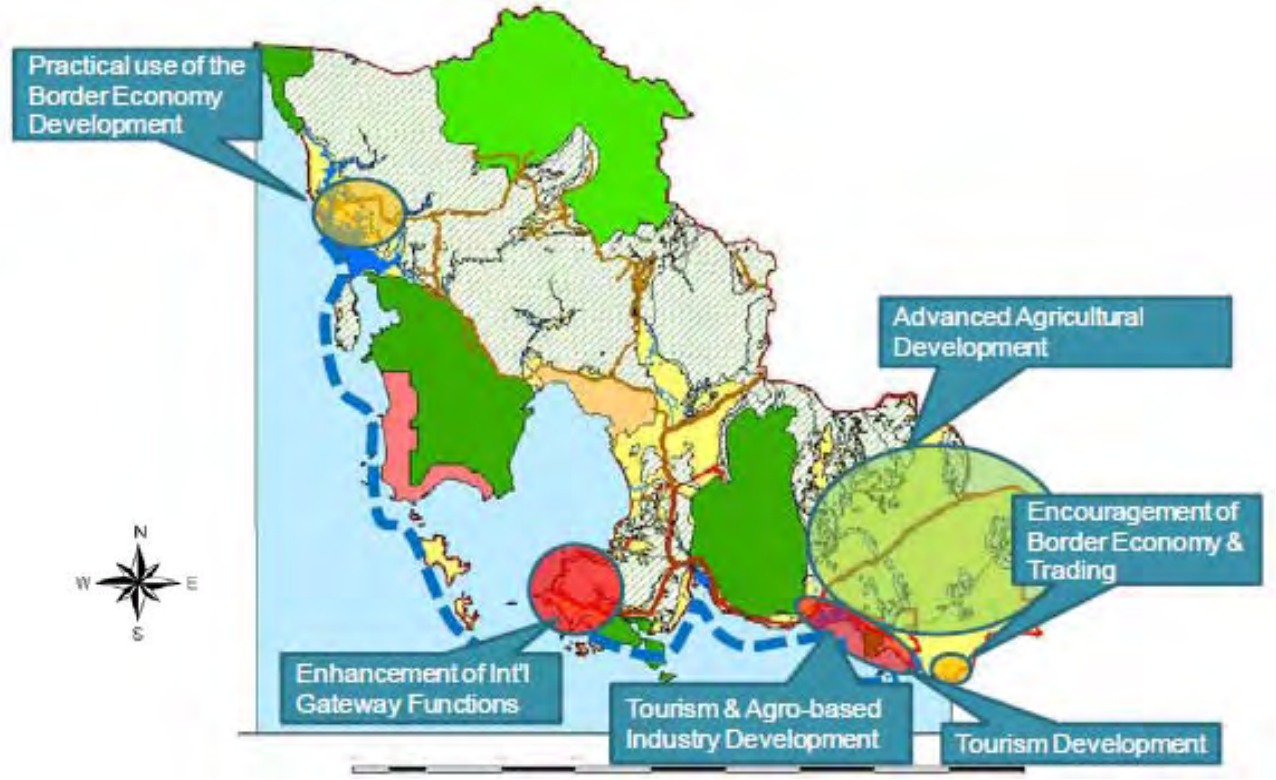
(5) Proposed General Land Use Plan for the Coastal Area

Based on the discussions above, a general land use plan is proposed as shown in Figure 5.4.5, and a genera spatial plan as shown in Figure 5.4.6. A detailed plan will be forthcoming based on a land potential analysis which is going on in the course of the Study.



Source: JICA Study Team

Figure 5.4.5 Proposed General Land Use Plan for Coastal Area



Source: JICA Study Team

Figure 5.4.6 Proposed General Spatial Plan for Coastal Area Development

5.4.6 General Spatial Structure of Each Province

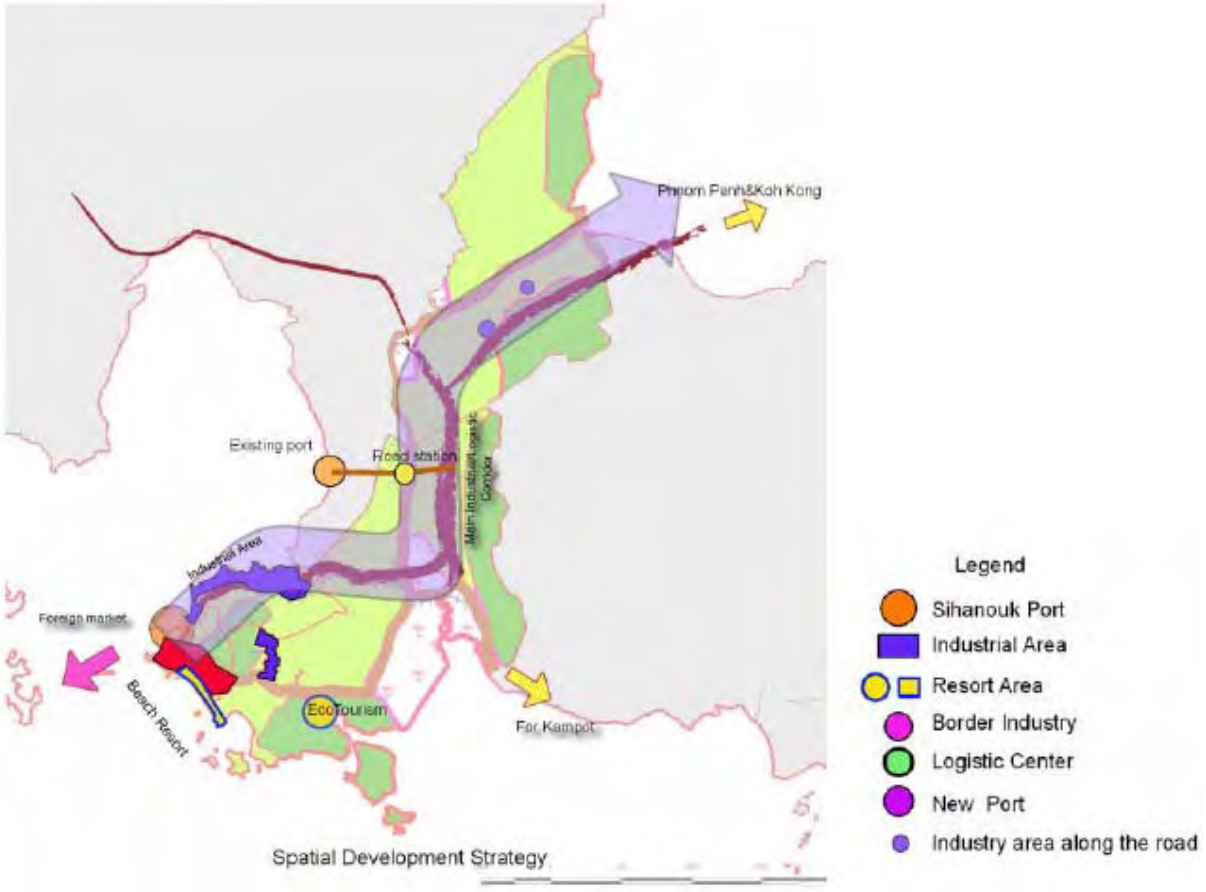
(1) Preah Sihanouk Province

Preah Sihanouk must be a leading province to boost the national economy and her industrialization process, having the solo international port. There are two directions to be enhanced with special strategies as follows (refer to Figure 5.4.7):

i) **Port-driven development:** The strong transport connection between the capital metropolitan region and the Sihanoukville Port is the basic precondition to realize this development direction. To this end, a new highway link in parallel with NR No.4 deserves to be further studied for its feasibility to enable full-container trailers to transport safely and efficiently. This new highway link is expected to function as a national industrial axis (part of Asian Highway No. 11) to enhance potentials of industrial locations and goods distribution-related business. In the line with this industrial corridor concept, a deliberate land use plan, covering the Sihanouk City and its related areas for industrial locations in the northern coastal strip via Stung Hav, is urgently prepared.

ii) **Rich natural resources-based development:** Balanced and harmonized economic growth, co-existing with abundant natural resources, is an ultimate target for the development. This is a critical requirement given to Preah Sihanouk. Invaluable coastal resources such as long white sand beaches, extensive mangrove habitats, and marine resources with bio-diversity, should be deliberately and strategically used for a variety of tourism development which shall function as an economic stimulus. In order to keep its sustainability, special rules and regulations should

be prepared to guide the tourism activities not to deteriorate the environment, such as designation of "Special Resort Conservation Area" where a strict environmental standard for sanitation is employed for any construction, and a clear-cut zoning system where core zone and conservation zone are definitely bounded. Any construction activity, which causes soil erosions and muddy flows toward the mangrove habitat areas of the Ream National Park, should be strictly controlled by the Provincial Government as well as Ministry of Environment.



Source: JICA Study Team

Figure 5.4.7 Preah Sihanouk Spatial Development Structure

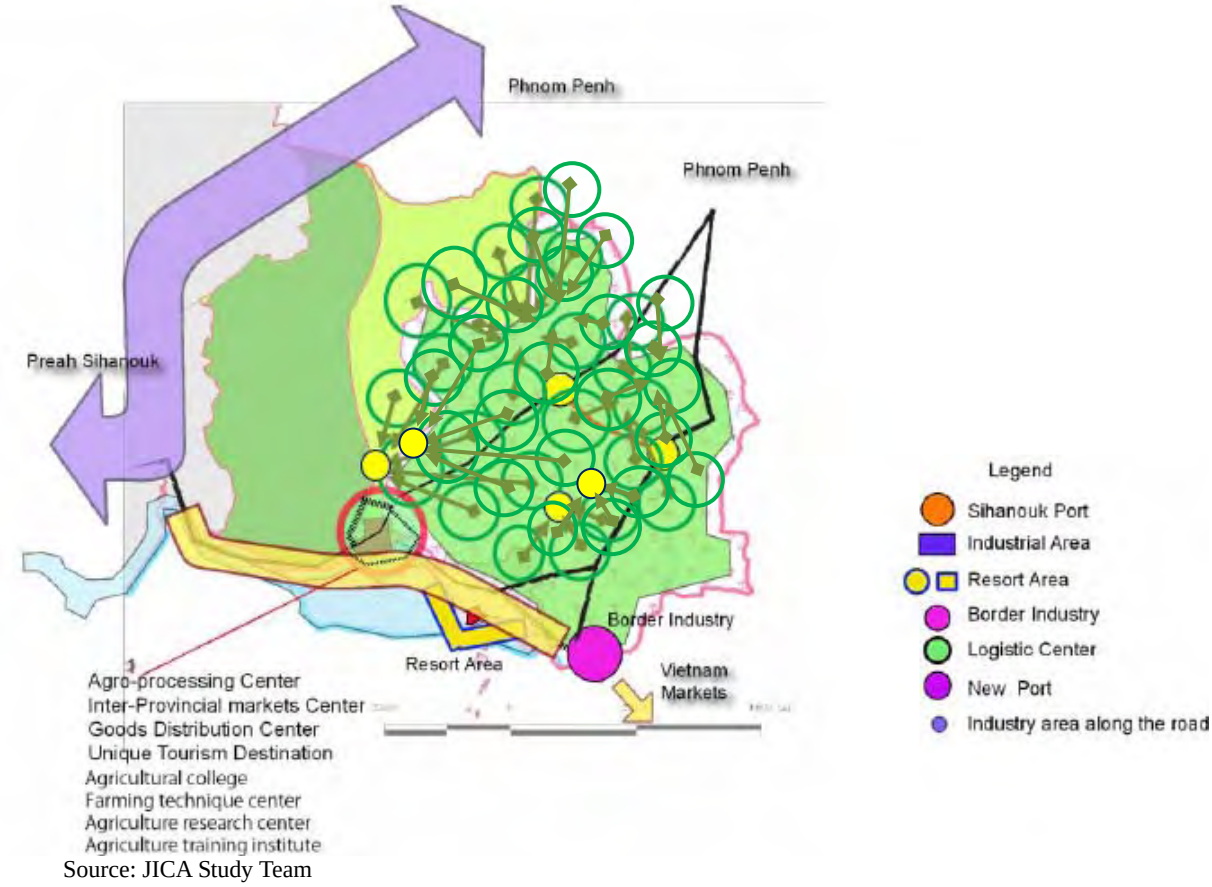
(2) Kampot Province

Kampot is located in fertile agricultural area in part of the Mekong delta, and a wide variety of agricultural products such as fruits and vegetables are grown. Special local product of "pepper" is famous for "Kampot Pepper" in Europe. However, due to the backwardness of a marketing system and transportation network, agricultural activities are still limited to a self-sufficiency level rather than a commercial level in general, although the trading activities with Vietnamese merchants are getting popular recently. The following are basic directions for development (refer to Figure 5.4.8):

i) **Advanced Agricultural Frontier Area**: In order to make the best use of the agricultural potentials, Kampot shall be an advanced agricultural frontier in the coastal area with higher educational and R&D functions for agriculture, and a logistic market center of agro-products including agro-processing products. Kampot shall be an agricultural center where young

leaders in the agricultural sector are trained, educated and/or start new agro-business with entrepreneurship. An agricultural market with an inter-provincial distribution and trading function, targeting at the Vietnam market, should be developed. These facilities shall be developed at Kampot City. Establishment of an agricultural collage shall strategically be a trigger of such a direction of provincial development as above.

ii) **Unique Tourism Development with Culture and Agriculture:** Some different tourism products shall be developed, making use of the local endowments. The local city with unique historical and cultural assets is a source to promote tourism business, and the neat rural villages with unique agricultural farming activities are a source of "***Green Tourism***" where tourists can experience in farming, harvesting, processing and eating fresh foods. For promotion of these movements, important is mobilization of local knowledge with local people's pride.



Source: JICA Study Team

Figure 5.4.8 Kampot Spatial Development Structure

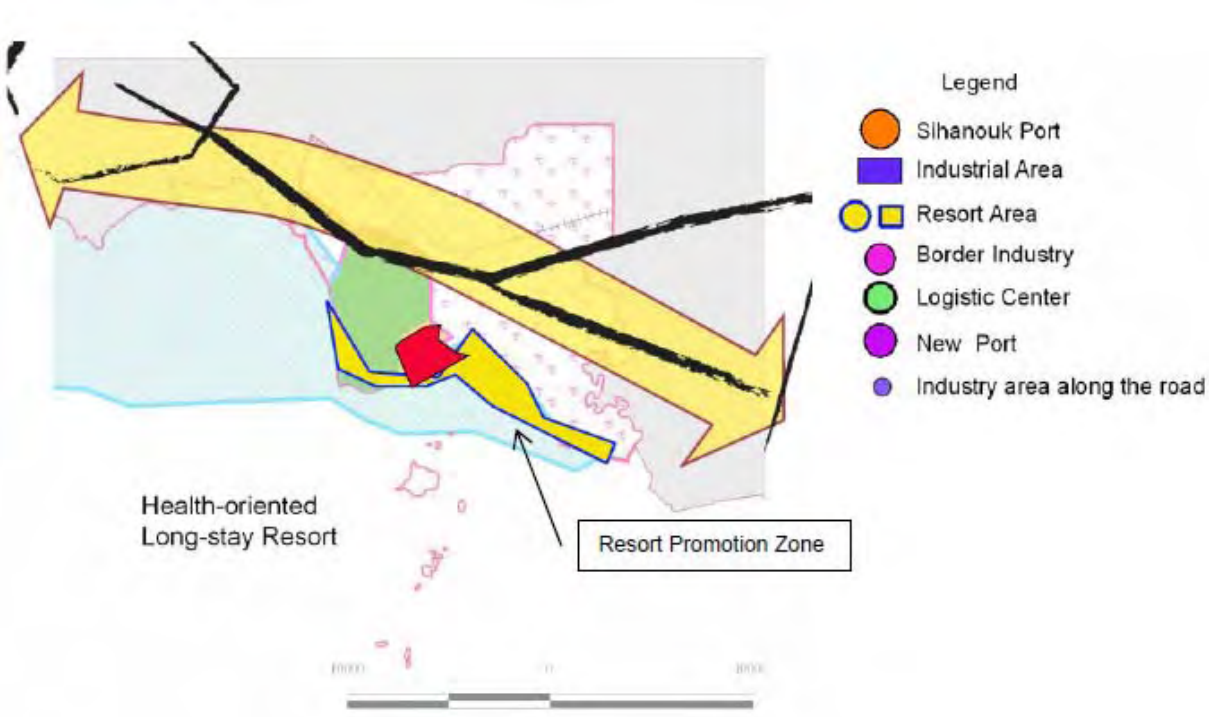
(3) Kep Province

Kep is historically reputable for an outstanding coastal resort in Cambodia and attracting both local and foreign nature-lover tourists. Neat, quiet and flower-rich landscape with fresh air and healthy seafood are all the tourism resources representing Kep. This should be kept and such tourism resource should be sustainably maintained with local people's efforts. Kep shall be different from other tourist resorts in terms of its environmental, hygienic and healthy images.

Therefore, special attention should be paid to the environmental management. Direct discharge of waste water from hotels and restaurants to the sea and rivers shall be strictly controlled in "the Resort Promotion Zone" (see Figure 5.4.9).

Agricultural and fishery activities are important in terms of supplies of healthy and fresh food to local hotels and restaurants. Production of new souvenirs, using local products such as seafood and pepper, should be facilitated by youth and tourism business groups in association of the movement of "One Community, One Product" which is supported by a micro financing system.

A linkage with Kampot is also important in terms of skill-training and knowledge-development in the agriculture-related business sector, if Kampot grows as an agricultural center as planned above.



Source: JICA Study Team

Figure 5.4.9 Kep Spatial Development Structure

(4) Koh Kong Province

Koh Kong is forest- and marine resource-rich. In the Thai border area, a high class casino hotel targeting at Thai tourists and a SEZ for inducement of new manufacturing industries are located. In the coastal area, a number of economic development plans and/or ideas have been launched, that is, a deep-sea port with industrial zone, agricultural plantations, a huge scale new town with 3,400 km^2 and so on. Thus, Koh Kong is becoming a focal area for some new economic movements, at the same time, deliberate environmental management for these projects is required as well. The following are the recommendable directions for the harmonized development in Koh Kong (refer to Figure 5.4.10):

i) **Urban Services at Koh Kong Urban Center:** As the urban service center to support agricultural and industrial activities in its hinterland areas, the development of the Koh Kong town needs to be further encouraged. Administrative, commercial and marketing, banking, cultural, educational, health services and so on should be all enhanced in their activities. This

is also a gateway for eco-tourism, so safe and reliable transportation services need to be available.

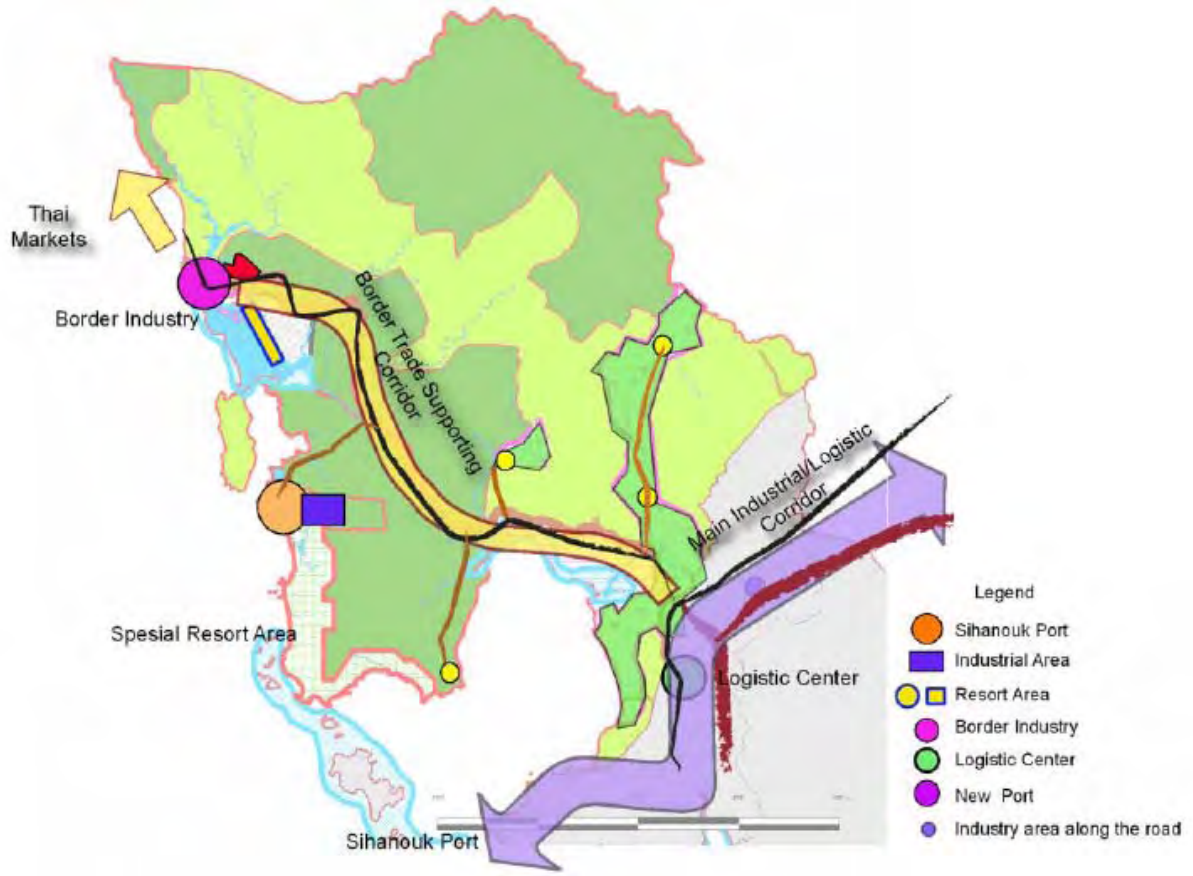
ii) **Border Economies and SEZ (Industrial Park) Development:** Proactive inducement of Thai tourists and foreign direct investments from Thailand and other Asian countries are expected in the border area as well as the industrial park which in under construction in the suburb of Koh Kong Town, thereby creating job opportunities for young generation people in the province.

iii) **Visions on Deep-sea Port and Industrial Development in Kiri Sakor:** As a new growth center, a vision of deep-sea port and industrial development, as a energy center, has been delineated by a private sector in Kiri Sakor District. In connection with these project ideas, economic land concessions have been given to huge scaled cash crop plantation projects as well. The implementation of such a long-term vision will be further explored in practical, based on both political and economic feasibility studies. Since this district is environmentally sensitive, some special environmental guidelines shall be given to the development, such as sufficient countermeasures against environmental degradation, keeping more than 60% of green coverage ratio, waste water discharge, air pollution and solid waste treatment.

iii) **Coastal Area New Town Project:** A huge scale new town project has been planned along the coastal area in or adjacent to the Boutum Sakor National Park. The environmental guidelines as proposed above should also be enforced for this project, if is in practice. The most attention shall be paid to occurrence of soil erosions which will bring fatal damages on invaluable marine resources such as mangrove and coral habitats.

iv) **Encouragement of Agricultural, Forestry and Fishery Sectors:** Value-added farming system should be explored, based on community-based approach, introducing animal and dairy husbandry, and plant husbandry/cultivation of forestry products such as a variety of mushrooms, peppers and apiculture. Such new farming movements shall be promoted, utilizing national land areas. Contract-farming systems for cash crops production should also be promoted in association with the development of a market-information dissemination system. Aquaculture is one of the most promising industries, making use of local resources, and new business models, including processing industries, are expected to be extended in this province. The aquaculture will be a good business area for local investors, provided with appropriate technologies from donors and relevant organizations.

v) **Eco-tourism Development:** Vivid villages, challenging such value-added farming system development as mentioned above, are the important resource of ***Eco-tourism*** or ***Green-tourism*** themselves. Tourists are attracted by vivid people working together with natural gifts. Therefore, it is a viable strategy that eco-tourism and green-tourism shall be introduced together with the agricultural, forestry and fishery development as discussed in vi) above.



Source: JICA Study Team

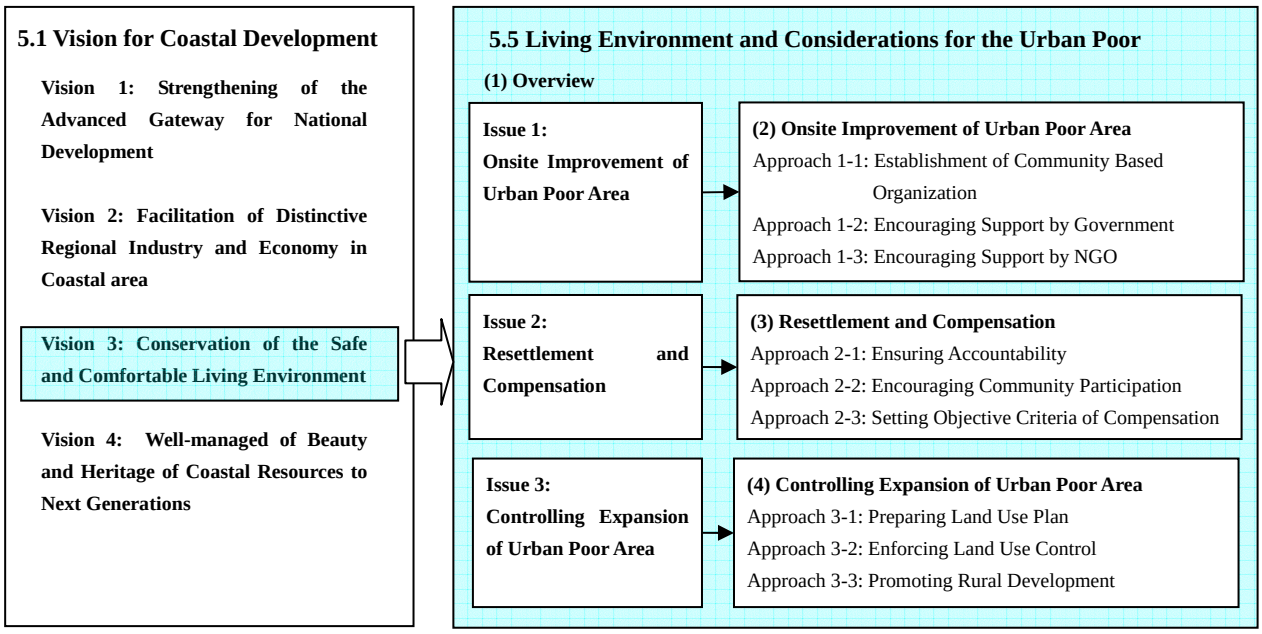
Figure 5.4.10 Koh Kong Spatial Development Structure

5.5 Living Environment and Consideration for the Urban Poor

(1) Overview

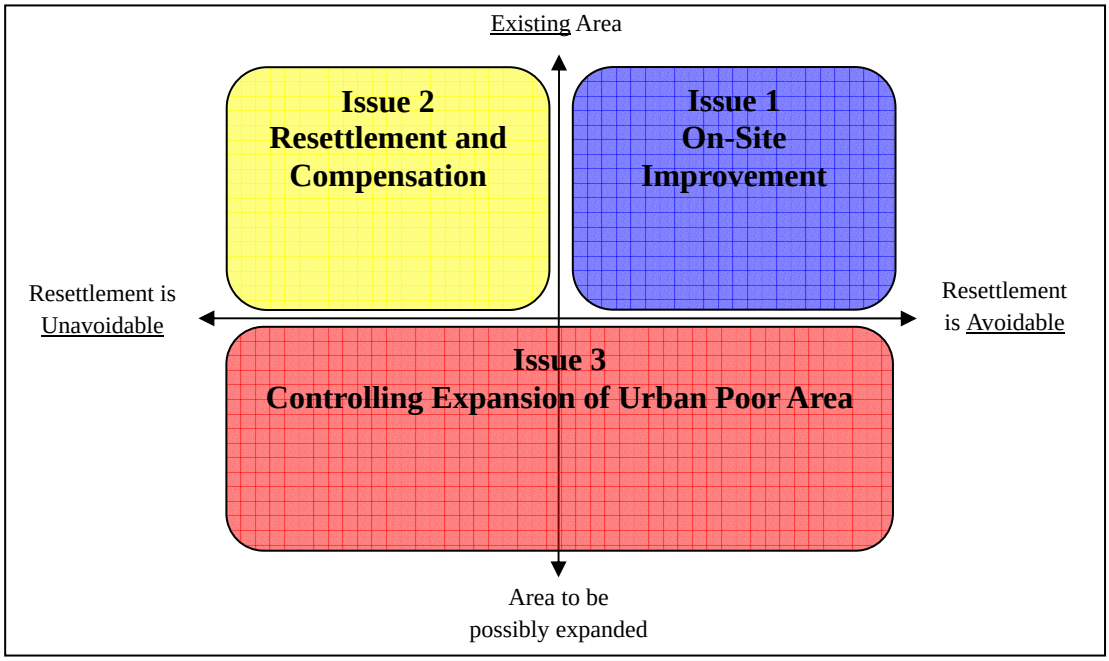
Living environment in Coastal area should be safe and comfortable, as mentioned in Vision 3. All residents in Coastal area including the residents of urban poor areas should enjoy the safe and comfortable living environment. However, there are some difficulties to attain the vision in living environment of urban poor areas. The living environment in urban poor areas is not healthy as observed in the previous chapter. As the population grows in Coastal area, either urban poor areas will be newly formed or existing urban poor areas will be expanded.

To solve the problems in urban poor areas and to attain the vision, three development issues are pointed out. The following table outlines the development issues and approaches to each of the development issues. The first issue is the on-site improvement of urban poor area applicable at urban poor areas where the government does not have any resettlement plans. The second development issue applicable to urban poor areas where the government has resettlement plans and resettlement is inevitable. The third development issue is applied to urban poor areas where influx of migrants from rural areas and other provinces is expected. The relationship between the vision and the development issues and approaches is shown in Figure 5.5.1. The relationship between types of lands and these three development issues are illustrated in Figure 5.5.2.



Source: JICA Study Team

Figure 5.5.1 Relationship between Vision and Development Issues and Approaches



Source: JICA Study Team

Figure 5.5.2 Relationship between land types and development issues

(2) Approach for On-Site Improvement of Urban Poor Area

On-site improvement is to improve living environment on sites of urban poor areas. Establishing community based organizations and constructing networks among community based organizations, government, and NGOs is the key to succeed in the on-site living environment improvement, based on the community development experiences in Phnom Penh and other countries.

1) Establishment of community based organization

Community based organizations should be established to improve the living environment on the sites with the support by the village government and NGOs. To identify the community needs and to share information effectively, community residents should participate in every stage of the improvement process such as planning, implementation, monitoring and evaluation. Community based organizations play an important role in gathering ideas of residents, forming an approach shared by the residents, and seeking assistance from NGOs and governments.

2) Encouraging support by government

The government should support community activities such as establishing a community based organization, introducing available administrative services, allocating budget to necessary improvement, requesting NGO support, etc. The village government in on-site improvement should take initiatives to establish a community based organization, send facilitator from NGOs, and provide necessary support to community activities.

3) Encouraging support by NGO

NGOs have abundant opportunities to help urban poor areas in the on-site improvement. Often NGO staff members know the poor communities better than government staff and have strong mission to help the poor. NGO may work more closely with community organization than the government. NGO should support the on-site improvement in the areas of establishing a community based organization, facilitating workshops, providing vocation trainings, childcare and health care, informal education, etc., and if possible may offer microfinance activities.

(3) Approach for Resettlement and Compensation

Sometimes development projects are planned in some urban poor areas. Some lands of the areas may need to be cleared for the projects and some residents may be resettled. However, all viable project options should be explored so that the resettlement be minimized, to where unavoidable. The followings are approaches for urban poor areas where resettlement is inevitable.

1) Ensuring accountability

The executing agencies of development projects such as the government and developers should ensure accountability through providing necessary information including both the positive and negative effects of the projects in the way that residents to be affected can easily understand. Public consultation, which is a method to ensure accountability, is to be held at each stage of the development projects from planning stage before implementation to monitoring stage after implementation. If successfully done, the affected residents will cooperate to the development project and mutual trust among the concerned stakeholders will be nurtured through the public consultation.

2) Encouraging community participation

The residents in the urban poor areas should be encouraged to participate in public consultation from the planning stage of resettlement. The ideas of the residents should be reflected in resettlement plans in order to meet the needs by the residents. Since all concerned residents cannot be involved in the discussion with executing agencies, a community based organization should be established to gather ideas and form a shared approach.

3) Setting objective compensation criteria

Setting objective and rational criteria for compensation is necessary to ensure fairness, because past troubles in resettlement were mostly related with unfair compensation. Now the Ministry of Economy and Finance is drafting a sub-decree on resettlement. If the sub-decree on resettlement is released and objective criteria for compensation in Cambodia are established, both the government and the community based organizations should follow the criteria and reach mutual agreement more easily. Until the sub-decree is not enacted, Inter-Ministerial Resettlement Committee (IRC) composed of concerned ministries prepares the criteria for compensation. It is important to monitor if the agreed amount of compensation is paid to the affected residents in full.

(4) Approach for Controlling Expansion of Urban Poor Area

To prevent expansion of urban poor area is one of the critical issues for urban development of the cities in Coastal area. To control the expansion of the urban poor areas, the government needs to regulate the migrants from other areas to settle only within the residential areas specified in land use plan. Preparation of a land use plan is the first step to achieve this. In parallel, the number of in-migrant should be reduced through income generation activities in the rural areas with accelerated rural development.

1) Preparing land use plan considering urban poor

In-migrants from other areas should be settled only within the residential areas specified in land use plan. Which residential area accommodates poor migrants from other provinces or rural areas needs to be addressed in land use plan of the core cities. For the residential area accommodating the poor in-migrants, "Sites-and-Services" schemes can be applied. The schemes include the provision of plots of land, either on ownership or land lease tenure, along with minimum of essential infrastructure needed for habitation.

2) Enforcing land use control

Coupled with the above item 1), the local government officials in charge of land management need to patrol and check actual land uses. If they find any land use which is not consistent with the land use plan, they should warn the illegal residents to stop living and move to the designated areas. At the same time, they need to provide the users proper information of available residential areas within the village and necessary arrangement for the settlement.

3) Promoting Rural Development

Rural development with the initiative of Ministry of Rural Development (MRD) and Ministry of Agriculture, Forestry and Fisheries (MAFF) should be accelerated. New settlers in urban poor areas are generally migrants from rural areas. To prevent expansion of urban poor areas, people in rural areas need to earn enough income to live, and to have access to administrative services within rural areas. Rural development such as enhancing productivity of agricultural products and improving access to market through rural infrastructure development should be encouraged in order for the people to stay at the rural areas.

5.6 Infrastructure Development Strategy

Infrastructure development strategy is formulated to attain the vision for coastal development as mentioned in 5.1. The infrastructure is largely divided into three, which are transport infrastructure, waster supply and waste water, and solid waste management. The strategy for transport infrastructure such as road, railway, and port, is to be executed to attain "Vision 1: Strengthening of the Advanced Gateway for National Development." Improving transport infrastructure contributes to strengthen the gateway of Coastal area for national development. The strategy for water supply is to be realized to attain "Vision 3: Conservation of the Safe and Comfortable Living Environment." Without water supply, the residents in Coastal area cannot drink water and keep clean. The strategy for wastewater and solid waste is necessary to achieve both Vision 3 and "Vision 4: Well-managed of Beauty and Heritage of Coastal Resources to Next Generations." It is because both wastewater and solid waste influence water and air pollutions, which are harmful to coastal resources as well as living environment of the residents in Coastal area. The relationship between the vision and the strategies are shown in Figure 5.6.1.

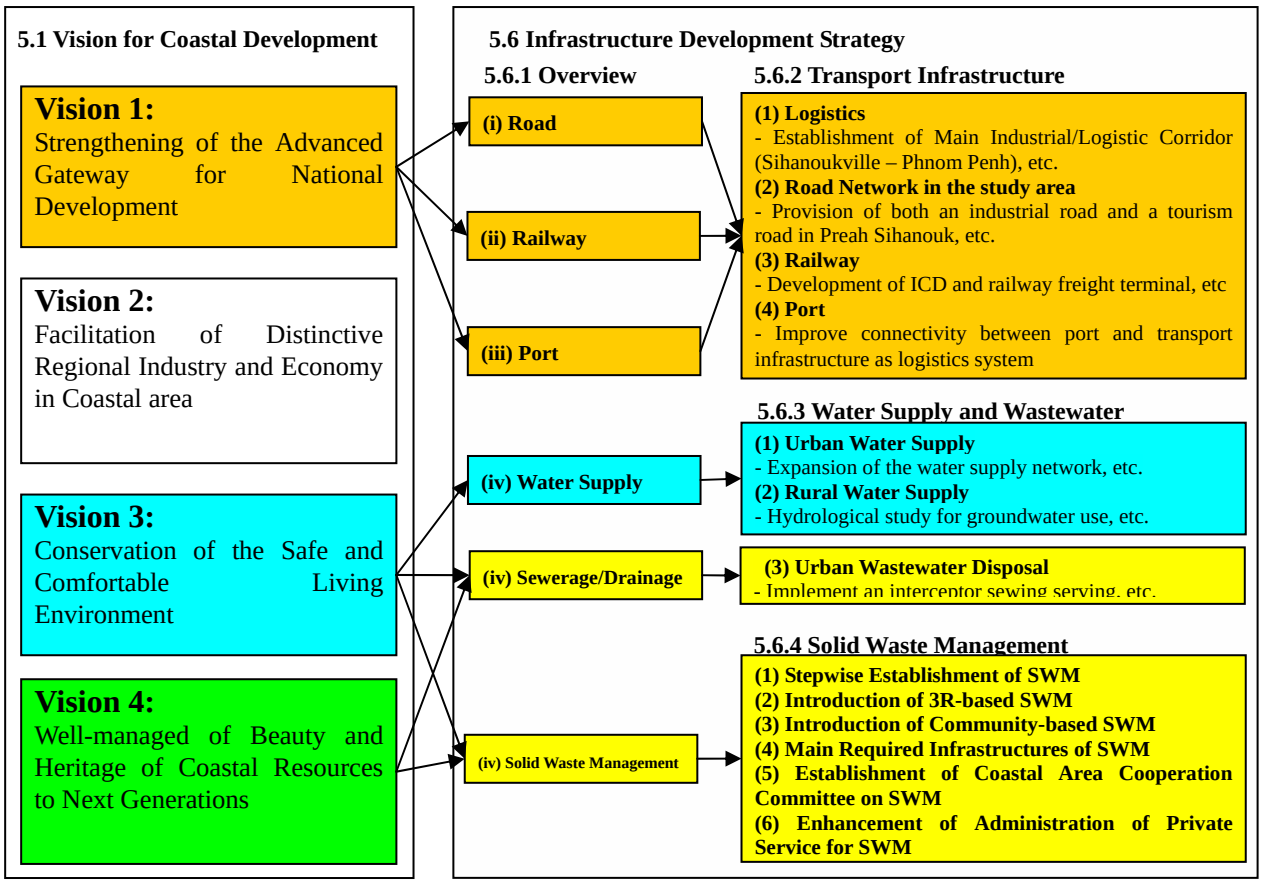


Figure 5.6.1 Relationship between Visions and Infrastructure Development Strategy

5.6.1 Overview

As mentioned in Sub-clause 4.3.1, there are many deficiencies in the availability of infrastructure to achieve the goals in accordance with the visions targeted in 2030. The strategies are needed to resolve the issues and achieve the goals. As the result of analysis of the issues, the strategies are considered by sub-sector in the infrastructure.

The strategies in the infrastructure are able to be summarized as follows.

(i) Road

Construct an industrial road in consideration of freight transport demands,

Improve or betterment the existing road to support the tourism development

Improve the road management and maintenance system, and

Construct cross border facilities considering cross border trade and transport.

(ii) Railway

Construct an ICD and railway freight terminal in consideration of logistics, and

Provide a signaling system and level crossing in consideration of safe and punctual operation

(iii) Port

Improve connectivity between port and transport infrastructure as logistics system

(iv) Water Supply

Expand the water supply network,

Provide an elevated storage tank to expand the distribution network, and

Replace old facilities like an asbestos cement pipes

(v) Sewerage/Drainage

Implement an interceptor sewer serving,

Strengthen institutional capacity for implementing sewer connections

Extend the existing sewer system, and

Implement water quality monitoring.

(vi) Solid Waste Management

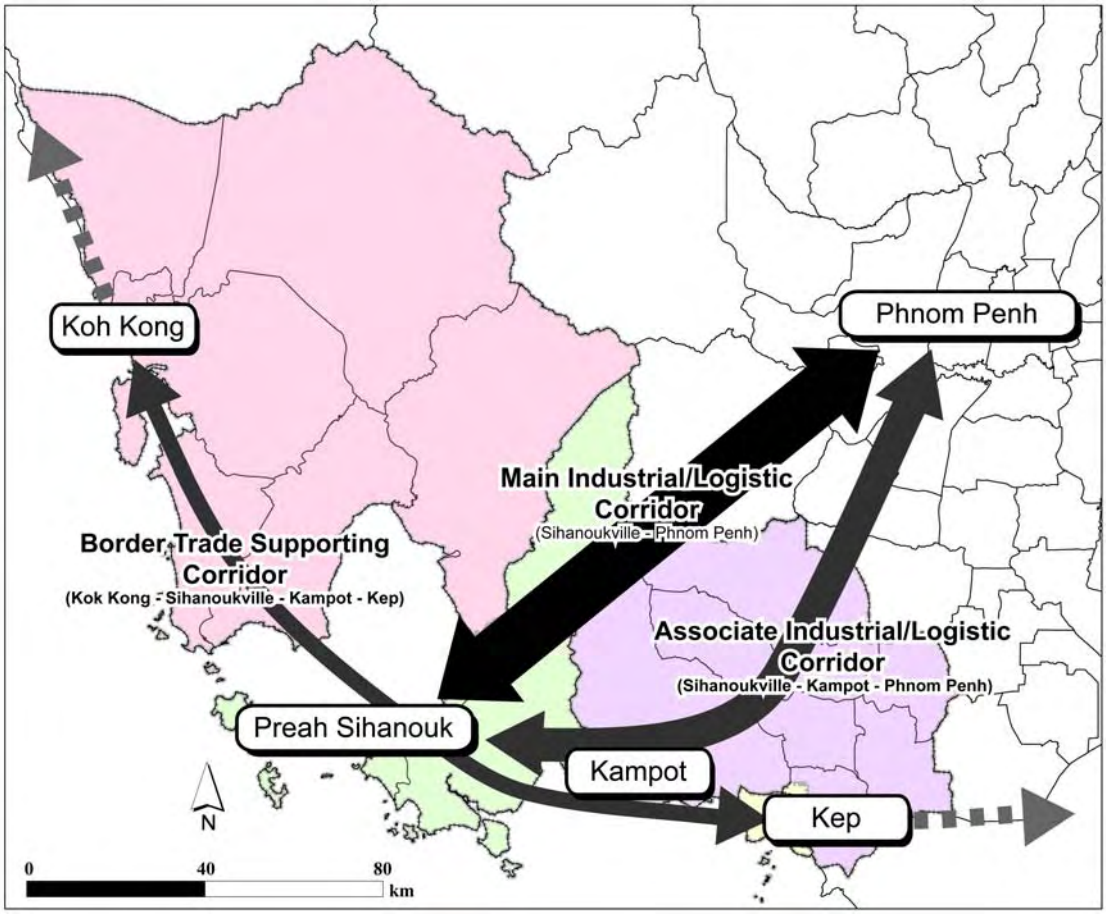
Develop a sanitary landfill and composing plant including operational equipments, and

Provide additional equipments for solid waste management including a garbage collection vehicle, collection container and cart.

5.6.2 Transport Infrastructure

(1) Logistics

In consideration of the foregoing spatial structure of logistic centers and gateways, the axis for logistic movements in the study area will be composed of following three industrial/logistic corridors. (Figure 5.6.1)



Source: JICA Study Team

Figure 5.6.2 Image of Logistic Axis in the Study Area

Main Industrial/Logistic Corridor (Preah Sihanouk - Phnom Penh)

Both strengthening the function of Sihanoukville Port and establishing the stable logistic connection from/to Phnom Penh are indispensable factor for growth of Coastal area.

The cargo transportation volume is estimated to increase remarkably between Preah Sihanouk and Phnom Penh as mentioned above, accordingly the function of existing route, particularly National Road No.4, will remain to be the main transport route in the future. To cope with the increasing demand, expanding the width of the existing road or constructing a new road will be required in order to perform as a main industrial/logistic corridor.

The Logistic Corridor should have high standard quality to bear heavy loaded vehicles such as container trailers and tank trucks. And also to widen the existing NR4 will be face difficulty because of existing building and land use.

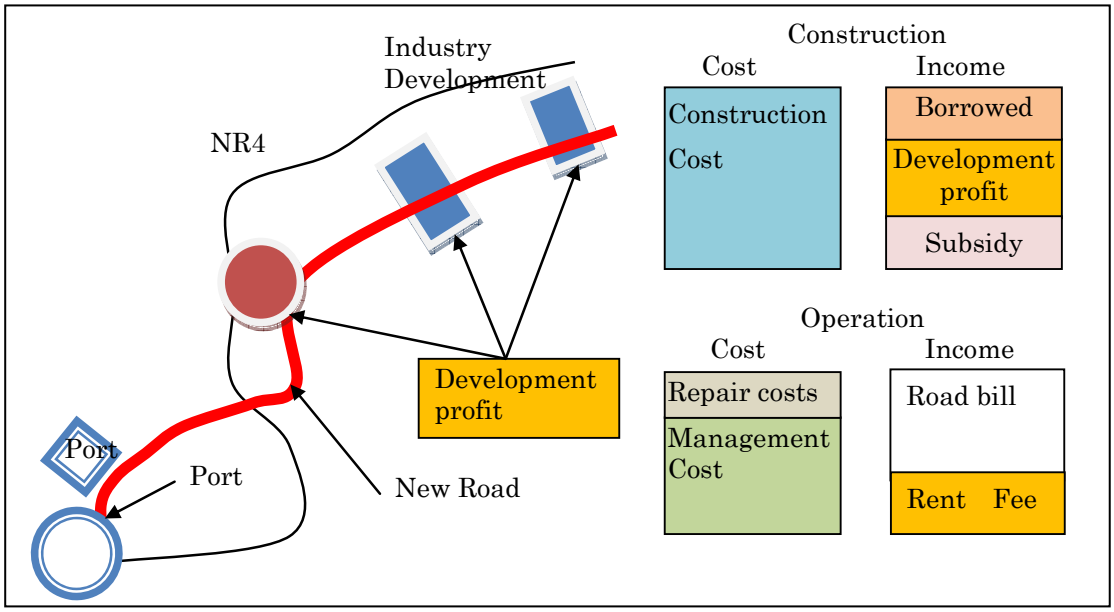
The Study Team recommends to construct new road, called "Phnom Penh – Preah Sihanouk Industrial Highway" running parallel to NR4, instead of to widen and upgrade existing NR4. Existing NR4 will be remained as an arterial road to connect towns and villages along NR4.

Source: JICA Study Team

Figure 5.6.3 Proposed Main Industrial/Logistic Corridor

This "Main Industrial/Logistic Corridor" will be a complex development containing not only construction of the new road but development of the area along the road.

To be brought to realization of the project, the Team recommends a scheme to devote benefit from development projects along the road to initial cost of construction of the new road. At the same time, new preferential treatment should be considered to promote investment on the area along the new road.



Source: JICA Study Team

Figure 5.6.4 Model Scheme of Construction and Operation of the New Road

Associate Industrial/Logistic Corridor (Preah Sihanouk - Kampot - Phnom Penh)

The railway has an important role of transporting liquid, container and bulk cargoes, and it is an environmental-friendly, low carbon emitting transportation mode. The railway is being rehabilitated with an ADB loan, and when this is complete, railway is expected to function as a environmental-friendly and effective alternative to trucking in transportation.

On the other hand, a development of highway, which is Trans Khmer Express Highway No.1 proposed by a private construction company, is planned in the associate industrial/logistic corridor (Preah Sihanouk-Kampot-Phnom Penh). The development plan includes a construction of the highway and logistics facilities along the highway. The government of Cambodia already has approved for the private construction company to implement feasibility study and master plan. As development projects are implemented based on Master Plan of Sihanoukville Development, it is needed to consider the result of the feasibility study and the master plan in order to avoid a redundant investment and contribute to an efficient development.

Border Trade Supporting Corridor (Kok Kong - Preah Sihanouk - Kampot - Kep)

On condition that cross-border agreement between Cambodia and Vietnam/Thailand is successfully enforced, which aim to promote the border trade among the nations, Coastal area of Cambodia will host the cross-border transport between Thailand and Vietnam. Especially the cross-border trade with Thailand in Koh Kong has the potential to grow greatly as well as the cross border trade with Vietnam in Kampot and Kep Provinces, focusing not only on goods trade, but also in tourism.

(2) Road Network in the study area

1) Present situation of the road network in the study area

A number of Specialized Economic Zones (SEZ) and tourist resorts are planned and some have been developed in the Study area. Preah Sihanouk already has been a center of the tourism in the Study area and recently made rapid growth as an industrial area, while some tourists visit Koh Kong due to the improvement of the road condition and the construction of SEZ has been conducted. The following photos show the present condition of the development in Preah Sihanouk and Koh Kong.

In Preah Sihanouk and Koh Kong area, some congestion seems to occur involving heavy vehicles for the industry and light vehicles for the tourism. Under the traffic situation, there could be many traffic accidents. The industry sites including SEZ are located in mostly in the northern part of Preah Sihanouk while the tourism resorts are located in the southern part. To prevent traffic accidents due to the congestion and provide efficient road services, the route from the Preah Sihanouk port via the Stung Hav port to NR. 4 should be considered as an industrial road.

Neang Kok Koh Kong SEZ

Stueng Hav SEZ

Sihanoukville 2 SEZ

O'Chheuteal Resort Development Project

Hawai Beach Sihanoukville Development Project

Pearl City Development Project

Source: JICA Study Team

Figure 5.6.5 Development of SEZ, Tourist Resort and Residence in the Study Area

On the other hand, Kampot and Kep area coupled with southeastern part of Preah Sihanouk will be the major tourism resort in the Study area. As mentioned above, the rehabilitation of NR 3 and NR 33 is in preparation. Once the road improvement is completed, more tourists would come from Phnom Penh as well as from the Vietnamese border. Moreover, Kien Giang province in Vietnam which is located next to Kampot province has been selected as one of the high priority areas of economical development in southern area of Vietnam, and there is a plan to develop tourist facilities in Ha Tien and Phu Quoc Island as summarized below.

i) Vietnam – Cambodia – Thailand Sightseeng Boat (Vietnam, Cambodia and Thailand made the agreement in 2007.)

ii) Ha Tien – Phu Quoc Island High Speed Boat (The service of High Speed Boat has been started in 2008.)

iii) Hai Tack Islands Tourist Resort Development (People's Committee of Kien Giang province agreed the development plan in 2009.)

iv) Phu Quoc Special Administrative Area Development (Master plan of the development project was submitted to Prime Minister in 2008.)

v) Phu Quoc Island Tourist Resort Development (The development plan was agreed in 2009.)

From Kampot and Kep area, access could be made not only to tourist attractions in Cambodia such as Bokor National Park and Kep coastal resort, but also tourist resorts which have been planned in Vietnam in the future.

In addition, there are a few cement factories in Kampot province producing cement mainly to Phnom Penh by rail. Some of them have a production capacity of 1 million tons per year of cement. In Kien Gian province of Vietnam, as the development of the Thuan Yen industrial estate has been conducted from 2008 and other industrial estates also are planned to construct, there is potentially large demand for cement. It is considered that cement factories in Cambodia can provide cement in accordance with demand for Vietnam. In consideration of the present condition, it is considered that NR 33 and NR 31 are developed as the industrial road.

2) Strategy and action plan for the development of road network in Coastal area

The strategies and action plans to provide the road network and the related infrastructures are mentioned by province as follows.

i) Koh Kong

Strategy: Improvement of the road surface condition on NR48 and the cross border facility at the border of Thailand.

Action Plan: As the detail design study on improvement of the cross border facility has been conducted by ADB, the improvement should be implemented based on the result of the study. Though NR48 was rehabilitated by the support of Thailand on 2007, the road surface condition was deteriorated due to the pavement with DBST. Periodical road maintenance by DPWT, PRRO and City/Provincial engineering or pavement with asphalt concrete should be provided to improve the road surface condition.

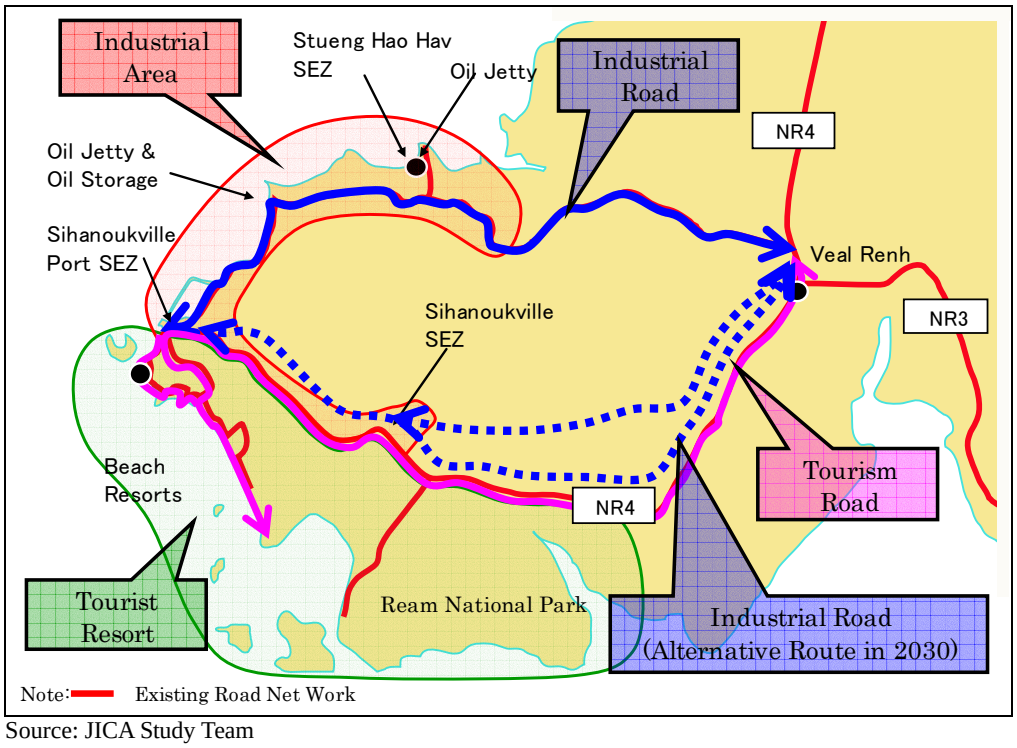
Notice: Though the rehabilitation/maintenance of NR48 has been conducted, it is estimated to take much time to complete it considering the ability of maintenance of DPWT, PRRO and City/Provincial engineering. An asphalt concrete is suitable for the rehabilitation of the pavement.

ii) Preah Sihanouk

Strategy: Provision of both of an industrial road and a tourism road and improvement of NR4 and NR3.

Action Plan: To prevent traffic accidents due to the congestion and provide efficient road services on NR4, the route from the Preah Sihanouk port via the Stung Hav port to NR. 4 should be considered as an industrial road while NR4 should be maintained as a tourism road. In addition, the development of the access roads to the center of Preah Sihanouk is needed in consideration of the traffic volume in the future. Moreover, a widening of NR.4 or an alternative to NR.4 should be considered in accordance with an increase of traffic volume expected in 2030. The concept of the road network is shown in the figure 5.6.5.

Notice: Though the road connecting Preah Sihanouk and Stung Hav has existed, there is not enough capacity for heavy vehicle to passage. To provide the industrial road in northern area of Preah Sihanouk, the new access road to Stung Hav is needed to develop in consideration of an incline and width of the road for heavy vehicles. At the present, NR.4 is only one access road to the center of Preah Sihanouk and beach resorts. Considering the present condition, the growth of tourism and open of Preah Sihanouk airport, a few of the access route from NR.4 or the airport to the center of the city should be provided. Though NR. 4 is estimated to be main corridor of logistics in 2030, the railway have to be considered as the competition to transport container freights. The improvement of NR.4 should be implemented in consideration of an increase of a traffic volume occurred by the growth of industry and tourism, a situation of traffic accidents and a competition with other transportation.



Source: JICA Study Team

Figure 5.6.6 Concept of Road Network in Preah Sihanouk (Industrial & Tourism Road)

iii) Kampot

Strategy: Improvement of the cross border facility at the border of Vietnam and provision of both the access road to Kampot port and the road network of Kampot city

which is junction for three routes, NR3 (from Phnom Penh to Kampot), NR3 (from Preah Sihanouk to Kampot) and NR33 (from Kep to Kampot).

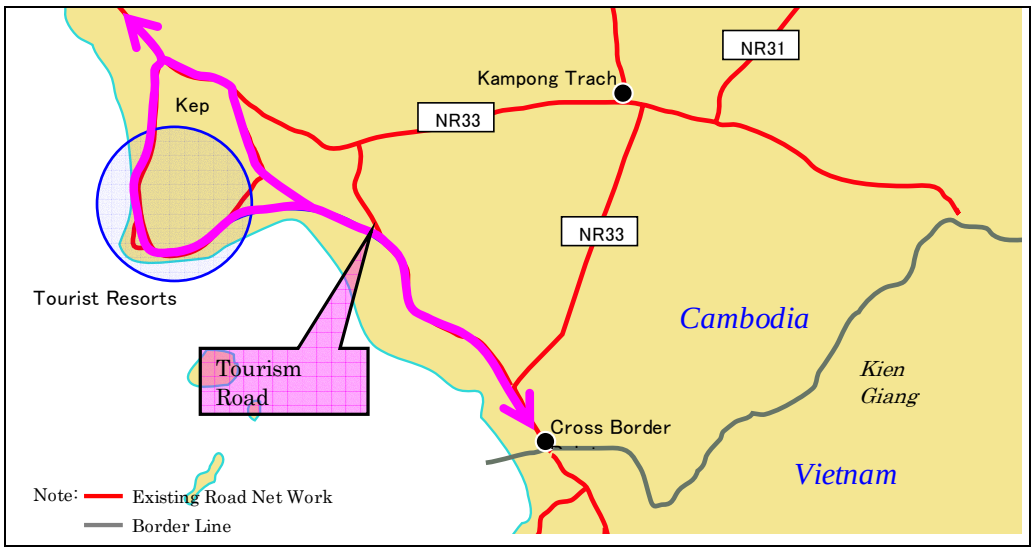
Action Plan: As the detail design study on improvement of the cross border facility has been conducted by ADB, the improvement should be implemented based on the result of the study. In consideration of heavy vehicles which come to Kampot port, the pavement of the existing access road should be implemented and the ring road should be developed in order to prevent heavy vehicles from passing through the center of the city.

Notice: The access road to Kampot port and the ring road are needed to develop in coordination with the master plan on the development of Kampot city.

iv) Kep

Strategy: Development of a coastal road from the border of Vietnam to Kep.

Action Plan: As the development of the tourist resort in Cambodia and Vietnam, a number of tourists across the border from Vietnam to Kampot and Kep area. In the present condition, tourists have to make a detour passing through Kampong Trach and it is not possible to come directly to Kampot and Kep. In consideration of time reduction to visit Kampot and Kep, a straight line connection between the Vietnamese border and Kep is convenient for the tourists. The route should be provided as a tourist road as follows.



Source: JICA Study Team

Figure 5.6.7 Concept of Road Network in Kep (Tourism Road)

Notice: The coastal road from the border of Vietnam to Kep is needed to develop considering an influence on mangroves, agriculture and fishery.

(3) Railway

1) Expected impacts of the railway in the study area

The result of the project would be approximately 650 km of the rehabilitated railway system in Cambodia with stations and terminals; railway traveling at speeds of 50 km/h; and an axle load of 15 tons on the Northern Line which is equivalent to the axle load standard in Thailand, and 20 tons on the Southern Line which is equivalent to the original design axle load for the line which is applied to operate bulk cement trains and other heavy loads. Expected impacts and outcome brought by the project are shown as follows.

i) To increase the efficiency of the overall transport sector by increasing the competitiveness of the railway,

ii) To secure the long-term sustainability of the railway sub-sector through improved productivity and efficiency and adoption of a market based tariff,

iii) To reduce road damage and road traffic risks associated with the movement of heavy and dangerous goods,

iv) To facilitate economic growth in Cambodia by providing cost-effective and efficient railway transport,

v) To facilitate sub-regional trade and economic growth in Thailand

vi) To pave the way for proposed future construction of a new railway line between Cambodia and Vietnam,

vii) To reduce wear and tear from heavy cargo transport on road network in Cambodia,

viii) To improve road safety by diverting heavy and hazardous cargo from the roads to safer railway transport and

ix) To reduce public sector losses

2) Strategy and action plan for the development of railway in Coastal area

The strategies and action plans to provide the railway infrastructures are mentioned as follows.

i) Development of ICD and railway freight terminal

Strategy: Development of ICD and railway freight terminal as a series of the associate industrial/logistic corridor (Preah Sihanouk - Kampot - Phnom Penh)

Action Plan: The development plan of the ICD and the railway freight terminal should be prepared based on a discussion with Toll company. At the same time, the operation in the railway freight terminal of Sihanoukville Port should be discussed between Toll company and PAS. On the other hand, in order to establish and operate the ICD, it is needed to consider functions and facilities of an ICD as follows.

<ICD functions>

- Receipt and dispatch/delivery of cargo,
- Stuffing and stripping of containers,
- Transit operations by rail/road to and from serving ports,

- Customs clearance,
- Consolidation and desegregation of LCL cargo,
- Temporary storage of cargo and containers,
- Reworking of containers, and
- Maintenance and repair of container units.

<ICD facilities>

- Rail Siding: The place where container trains are received, dispatched and handled in a terminal. Similarly, the containers are loaded on and unloaded from rail wagons at the siding through overhead cranes and / or other lifting equipments.

- Container yard: Container yard occupies the largest area in the ICD. It is stacking area were the export containers are aggregated prior to dispatch to port, import containers are stored till Customs clearance and where empties await onward movement. Likewise, some stacking areas are earmarked for keeping special containers such as refrigerated, hazardous, overweight/over-length, etc.

- Warehouse: A covered space/shed where export cargo is received and import cargo stored/delivered; containers are stuffed/stripped or reworked; LCL exports are consolidated and import LCLs are unpacked; and cargo is physically examined by Customs. Export and import consignments are generally handled either at separate areas in a warehouse or in different nominated warehouses/sheds.

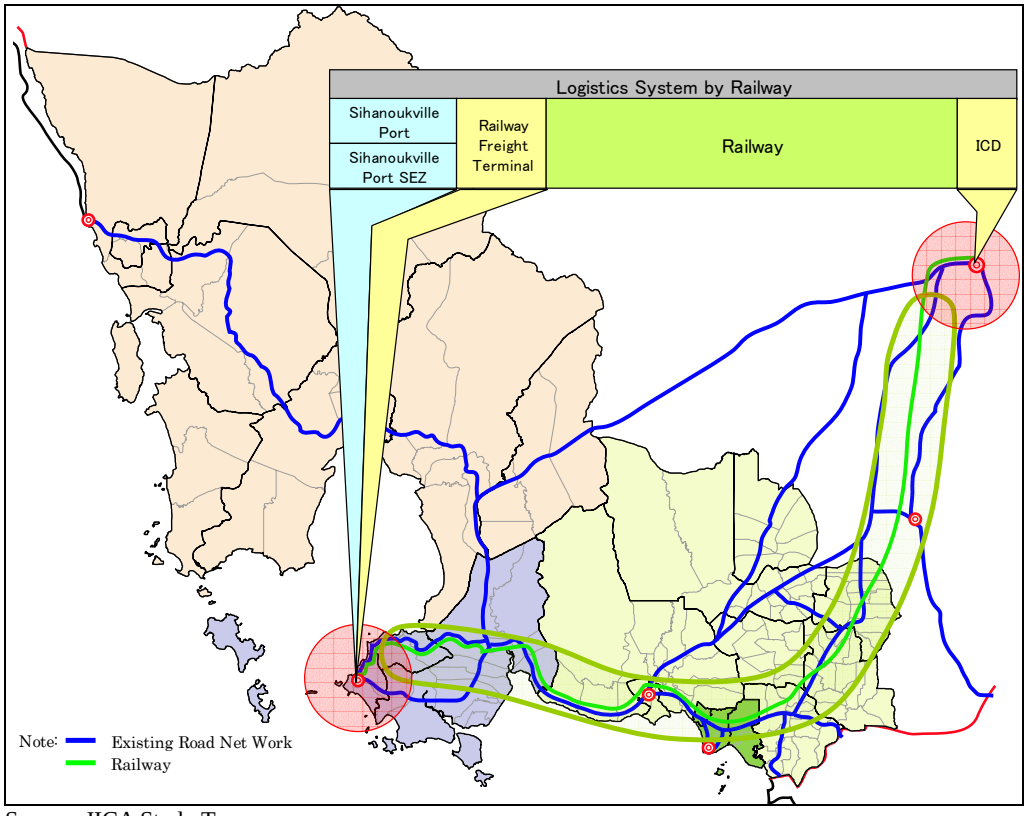
- Gate complex: The gate complex regulates the entry and exists of road vehicles carrying cargo and containers through the terminal. It is place where documentation, security and container inspection procedures are undertaken.

Notice: It is needed to consider to what extent that the government of Cambodia provided the facilities while there is what the private company expects to do.

ii) Acquisition of safety and reliance

Strategy: Establishment of the railway system with safety and reliance based on the concept of the associate industrial/logistic corridor (Preah Sihanouk - Kampot - Phnom Penh)

Action Plan: In order to acquire safety and reliance in the railway system, it is needed that the logistic corridor from Sihanoukville Port to Phnom Penh is established and the railway system is managed efficiently. At the first step, it is needed that the rehabilitation project of the railway is completed based on the latest schedule. During the rehabilitation stage, the provision of the development plan of the ICD/the railway freight terminal also is needed as the related facilities to establish the railway system. Besides, the provision of the signaling system and the exchange of the deteriorated rail are designed.



Source: JICA Study Team

Figure 5.6.8 Concept of Logistics System by Railway

Notice: It is needed to include not only Sihanoukville Port but Sihanoukville Port SEZ in a series of the logistics system. As the result, the efficient transport system will be provided between Preah Sihanouk and Phnom Penh. The coordination among the railway, the port and the SEZ is considered to contribute to acquire the safety and reliance of the railway. The concept of developing the logistics system by railway is as follows.

(4) Port

Table 5.6.1 shows the category (role) of ports in the study area based on current port conditions, future development plans, contribution to regional economy, situation of port related industry and cargo flow.

Table 5.6.1 Category (Role) of Ports in the Study Area

Name of Port	Category (Role)	Present Condition	Future Plan
Sihanoukville Port (including Oil Terminals)	National Main Port	Existing	Multipurpose Terminal Expansion of Container Terminal
Oknha Mong Port	Ancillary Port	Existing	
Kampot Port	Regional Port for Import	Existing	Additional Berth (under Construction)
Tomnop Rolok Port		Existing	None
Sre Ambel Port		Existing	None
Stueng Hav Port	Commercial Port to Support SEZ Activities	Existing	SEZ Area (under Construction)
Kampot SEZ Port	Commercial Port to Support SEZ Activities		
Kirisakor Koh Kong SEZ Port	Commercial Port to Support SEZ Activities Industrial Port		

Source: JICA Study Team

Stueng Hav Port, Kampot SEZ Port and Kirisakor Koh Kong SEZ Port are planned as deep seaports to support SEZ activities. As to procurement of fund to construct deep seaport in other countries, fundamental port facilities such as navigation channel and breakwater have been generally constructed by national budget because these facilities require huge construction and maintenance cost, however above mentioned ports are planned to be constructed by private fund only. It could be recommended that detailed feasibility study will be executed. The study should include investigation of national condition, cost estimation, competitiveness against neighboring ports, trend of container shipping route, demand forecast and financial analysis.

Oknha Mong Port has sharply increased the cargo throughput since operation began in 2004 as the first private port in Cambodia. Cement and coal, which were handled at Sihanoukville Port ever, has partially shifted to Oknha Mong Port due to the fact that handling tariff is cheaper than Sihanoukville Port. Oknha Mong Port will grow in competition with Sihanoukville Port, although its water depth is limited to 5.5 m.

Kampot Port, Tomnop Rolok Port and Sre Ambel Port have mainly imported consumer goods and construction materials from Thailand. Sea and land transportation network has been formed and well-functioned corresponded with cargo demand. These ports play a role as regional port and will keep current situation.

Sihanoukville Port is the only international deep seaport and plays a role of national gateway. Multipurpose terminal within the port area is scheduled to be constructed with a Japanese ODA loan, and furthermore, PAS intends to expand the container terminal to cater to the growing future container cargo demand. Sihanoukville Port will maintain and strengthen the important role of the national gateway and logistics center, taking advantage of natural condition (the depth of channel, area of turning basin), Port SEZ (under construction by Japanese ODA loan) and integrated port-related business, although Stueng Hav Port, Kampot SEZ Port and Kirisakor Koh Kong SEZ Port are also planned as deep seaport.

5.6.3 Water Supply and Wastewater

(1) Urban Water Supply

The demand for water in urban areas is likely to grow at a rapid pace; the present imbalance between production and distribution must be redressed if the water supply system is to extend services to the population, particularly to the poor, and improve its financial performance.

The RGC's millennium goal is to provide service to 80% of the urban population by the year 2015. This goal is considered unachievable because there isn't enough time to implement the massive amount of infrastructure required. Master plans developed in this study will assume that service coverage will increase gradually to 80% by the year 2030 to represent a more realistic implementation scenario.

Water supply systems have been established in all provincial capitals with the exception of Kep where construction is in progress. Existing systems must be renewed and expanded to keep pace with population growth.

The most pressing needs for improvement of urban water supply in order of priority are:

i) Hydrological studies and monitoring to confirm the safe yield of available surface water resources.

ii) Hydro-geological studies to confirm groundwater potential for urban water supply.

iii) Regulations and structural measures to protect water supply sources from urban development

iv) Replacement of old water mains to reduce leakage, improve water quality and provide more capacity for increased demands

v) Extension of the distribution network to serve more people and improve revenue

vi) Construction of storage facilities to improve performance of the water distribution network

vii) Continued strengthening of O&M capacity for management, leakage detection and correction, repair and replacement of water mains.

(2) Rural Water Supply

The RGC should continue with efforts to improve water supply and sanitation conditions throughout Coastal area. Development of water supply in most rural areas has a positive effect on health. Most rural water supply schemes are dependant on groundwater sources however there is a lack of supporting information on groundwater potential and quality. Hydro-geological studies are required throughout Coastal area to support the development of rural water supply.

(3) Urban Wastewater Disposal

Pollution from untreated wastewater will quickly become a problem that could adversely affect public health, tourism potential and fisheries.

Preah Sihanouk has the only wastewater disposal system in Coastal area. The most pressing needs for Preah Sihanouk in order of priority are:

i) Mandatory connection of all households, hotels and commercial establishments in the existing sewer service area

ii) Extension of the collection system along Ochheutal beach

iii) Implementation of a water quality monitoring program

iv) Extension of the planned collection system in the Sokha beach catchment.

v) Implementation of wastewater disposal schemes to improve water quality along Hawai beach and Victory beach

The priority for establishing wastewater collection and treatment systems in the other three (3) coastal cities can be based on population size, impacts on water quality and impacts on tourism. Development should proceed in the following order of priority:

i) Kampot: because it has the largest population and largest pollutant load, and there are plans to expand the water supply network.

ii) Kep: to protect its beaches and marine environment because wastewater generation and pollutant loads will increase significantly when the new water supply system is implemented.

iii) Koh Kong: put in last place because water quality is still relatively good and the population is relatively small. Its position in the rankings could change if it becomes an important tourism destination.

5.6.4 Solid Waste Management

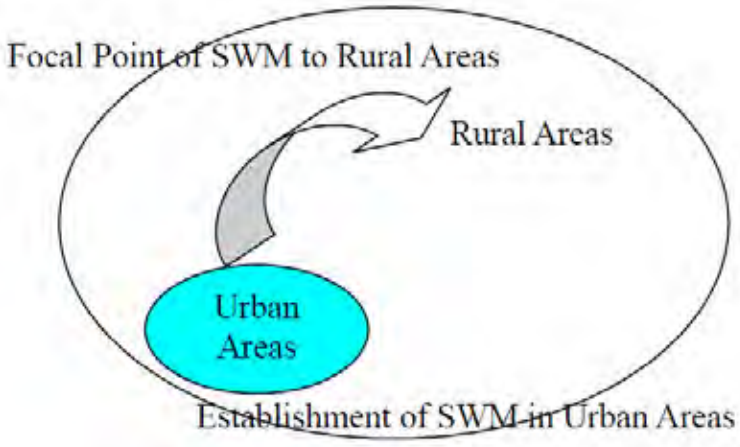
(1) Stepwise Establishment of SWM

SWM would be stepwise established from urban areas to rural areas under the limitation of financial sources because of the following reasons.

- Sanitary conditions in urban areas would be more serious than rural areas according to economic development because of high density of population and building

- To establish SWM in urban areas is easier than it in rural areas because garbage collection service in urban areas has been provided even insufficient.

Accordingly, infrastructures as sanitary landfills would be established in urban areas prior to rural areas. After the establishment of SWM in urban areas, the focal point of SWM should be moved to rural areas according to economic development.



Source: JICA Study Team

Figure 5.6.9 Stepwise Establishment of SWM from Urban Areas to Rural Areas

The following table shows the present and future amount of municipal waste, generated and collected waste. It could be a basis to consider the planning on future activities and infrastructures of SWM.

(2) Restructuring Project Procurement of SWM based on Public-Private Partnerships

Practically collection system by private sector does not function well because of low capability of private sector, difficulties of collection of garbage collection fee from households and insufficient administration of local authorities as discussed in the present conditions and key issues of SWM in area. National government would be required to enhance administration by local authorities and develop capacity of private sector. However, most important thing is to restructure project procurement of SWM in consideration of marketability of SWM. Especially risks of responsibilities shared between public sector and private sector should be reconsidered based on the concept of Public-Private Partnerships (PPP).

Table 5.6.2 Present and Future Estimated Amount of Municipal Waste

Unit: ton/day

			Generated Waste						Collected Waste					
			2008	2010	2015	2020	2025	2030	2008	2010	2015	2020	2025	2030
Total			502	521	583	654	730	806	65	95	173	251	340	496
	Urban		110	118	144	172	202	232	0	95	130	155	181	209
		Household	89	93	106	121	138	156	0	74	95	109	124	141
		Commercial	21	25	38	51	63	76	0	20	34	46	57	69
	Rural	Household	392	402	439	483	528	573	0	0	44	97	158	287
Kampot			299	308	335	368	402	435	23	27	66	107	154	243
	Urban		30	33	40	48	56	63	-	27	36	43	50	57
		Household	24	25	28	32	36	40	-	20	25	29	32	36
		Commercial	6	8	12	16	20	24	-	7	11	14	18	21
	Rural	Household	269	275	295	321	347	371	-	0	30	64	104	186
Kep			21	22	26	30	35	39	5	5	8	12	17	24
	Urban		6	6	7	9	10	12	-	5	7	8	9	11
		Household	2	2	3	3	4	4	-	2	3	3	4	4
		Commercial	3	3	4	5	6	8	-	3	4	5	6	7
	Rural	Household	16	16	19	21	24	27	-	0	2	4	7	14
Preah Sihanouk			122	129	155	181	209	239	32	48	75	100	127	169
	Urban		56	60	75	91	107	125	-	48	68	82	97	112
		Household	45	47	56	64	74	85	-	38	50	58	67	76
		Commercial	11	12	19	26	33	40	-	10	17	24	30	36
	Rural	Household	66	69	80	90	102	115	-	0	8	18	31	57
Koh Kong			60	61	67	75	84	93	5	16	24	32	42	59
	Urban		19	19	21	25	28	32	-	16	19	22	25	29
		Household	18	18	19	21	24	27	-	14	17	19	22	25
		Commercial	1	1	2	3	4	5	-	1	2	3	4	4
	Rural	Household	41	42	45	50	55	60	-	0	5	10	17	30

Source: JICA study team

Note 1: Generated waste of household is estimated on condition that unit generation is 0.5 kg per capita per day.

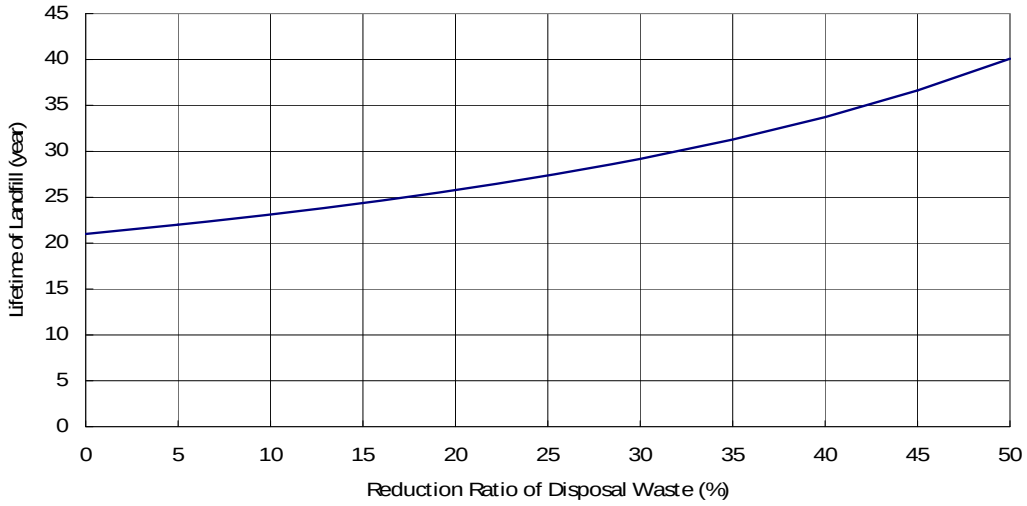
Note 2: Generated waste of commercial sector is estimated based on the estimated number of tourism and unit generation.

Note 3: Industrial waste is discharged in Preah Sihanouk Province but it is not included in the above estimation.

Note 4: Collected waste of household in 2008 is grasped or estimated based on information from each province. Collected waste of household and commercial sector in 2010 to 2030 is estimated assuming that future coverage ratios of collection service in urban areas is 80% in 2010, 90 % from 2015 to 2030, and it in urban and rural areas is 0% in 2010, 10% in 2015, 20% in 2020, 30% in 2025 and 50% in 2030.

(3) Introducing 3R-based SWM

Establishment of sanitary landfills is urgent. However, it is essential to promote waste reduction in order to use it as long as possible because it is not easy to find land for sanitary landfill one after another. The following figure shows the relationship between reduction ratio of disposal waste and lifetime of landfill site. Through the figure, it could be considered that lifetime of landfill site can be extended to around 6 years more by 25% of reduction of disposal waste assuming that landfill with capacity to receive collected waste during the planning term, 21 years in the costal areas is prepared.

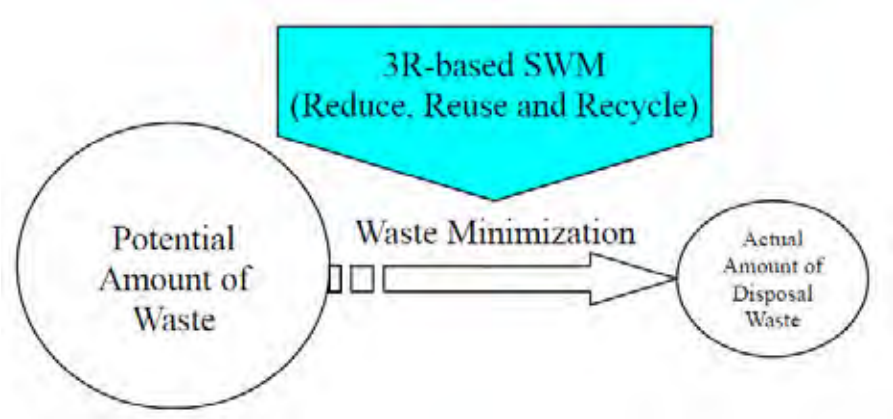


Source: JICA study team

Note: Extension of lifetime of landfill site by reduction of disposal waste is estimated assuming that ratio of daily soil cover to volume of disposal waste is 10%.

Figure 5.6.10 Relationship between Reduction Ratio of Disposal Waste and Lifetime of Landfill

Based on the 3R (Reduce, Reuse and Recycle) concept that national government introduces, activities of waste reduction should be implemented. One of the activities would be composting in consideration of high ratio of organic waste of the waste composition and potential demand of compost. 3R requires activities to reduce and separate waste at source, households and business establishments, which means that involvement of stakeholders as households and business establishments are very important to introduce 3R. 3R is a new concept for some of local authorities and therefore need supports from national government and/ or international organizations when they introduce 3R.



Source: JICA study team

Figure 5.6.11 3R-based SWM for Waste Minimization

(4) Introducing Community-based SWM

Community-based SWM would be introduced and disseminated in order to improve the status of collection of garbage collection fee and encourage communities to implement self-sustaining activities. This kind of activity has been practiced in a village of Preah Sihanouk Province. The community implements primary collection service by its self and succeeds in raising collection rate of garbage

collection service and improving sanitary conditions in the community. The model could be more developed by combining it with waste reduction programs, including home-made compost.

The following could be considered as a model of Community-based SWM which is developed based on the challenge by a village in Preah Sihanouk Province. It is a model that combines primary collection service and waste reduction activities by community. Key point of the model is to motivate each concerned body to play their role under incentive systems. Consequently it would influence a financial flow related to SWM.

A Model of Community-based SWM

<Setting Unit Price and Sharing Percentage by Province>

Province sets unit price for the service charge for SWM in consideration of expected collection ratio of garbage collection and disposal fee. It also sets sharing percentage of the fee for community and private company to share the collected fee. The unit price and the sharing percentage should be carefully decided in consideration of profitability of private company, affordability of residents and costs of the activities by community. Surveys and studies are necessary to decide it.

To set the unit price, the following formula could be applied on condition that incentive system is introduced to promote waste reduction, and only disposal waste (residual waste) for landfill is then charged for. The full costs of SWM should be reflected in the price. It should include costs for not only disposal waste (residual waste) but also compostable waste, and should include costs for not only collection of waste but also disposal of waste. The following formulation could be applied to calculate the unit price. To promote waste reduction at source and separation of organic waste (compostable waste) and recyclables at source, the full costs of SWM should be charged depending on amount of disposal waste (residual waste) that communities discharge or number of collection containers for residual waste that communities require.

$$UP = \frac{\sum_{i=1}^{n} FC_i}{\sum_{i=1}^{n} RW_i}$$

UP: Unit Price of the Service Charge
FC_i: Full Costs of SWM
RW_i: Amount of Residual Waste from a Community; it could be measured by size and number of collection containers.
n: Number of Communities to Join the Program

Based on the set unit price, the following formula could be applied to calculate service charge for collection and disposal of waste on communities. By charging for only residual waste, it is expected that community make effort to reduce residual waste by waste reduction at source and source separation of organic waste (compostable waste) and recyclables.

$$SC_i = UP * RW_i$$

SC_i: Service Charge for Collection and Disposal of Waste on a Community
UP: Unit Price of the Service Charge
RW_i: Amount of Residual Waste from a Community

<Fee Collection by Community>

Community (Commune/ Songkat or Village) collects the fee from residents by itself. The collection ratio is a minimum requirement for community to collect the fee. Excess amount of the fee over the minimum requirement which a community collects is returned to the community. It is appropriated to a portion of

SWM costs of the community.

<Fund Manage by SWM-Association of Community>

It is desired that an association consisted of communities at level of the central town/ districts or Communes/ Songkats manages the collected fee as a common fund because primary collection service and waste reduction activities are conducted by communities. The association which could be called "SWM-Association of Community (WAC)".

<Sharing Collected Fee among Community based on Efforts of Waste Reduction Activities>

WAC decides a distribution amount of collected fee of community-share to each community based on efforts of waste reduction activities. Both of efforts of source separation of organic waste and waste reduction at source could be considered as factors to measure the efforts of each community because source separation of organic waste (compostable waste) contributes to reduction of disposal waste on condition that a common facility is prepared for composting and, waste reduction at source contributes to not only reduction of disposal waste but also reduction of collected waste. The following here is shown as an example of the formula to measure only the efforts of source separation of organic waste (compostable waste), and to decide a distribution amount of collected fee of community-share to each community.

$$CS_i = \sum_{i=1}^{n} SC_i * qt * CW_i$$

CS_i: Community Share for Primary Collection service and 3R activities by a Community
SC_i: Service Charge for Collection and Disposal of Waste on a Community
CW_i: Amount of Compostable Waste from a community
n: Number of Communities to Join the Program
qt: Quotient for Community Share for Primary Collection service and 3R activities by a Community

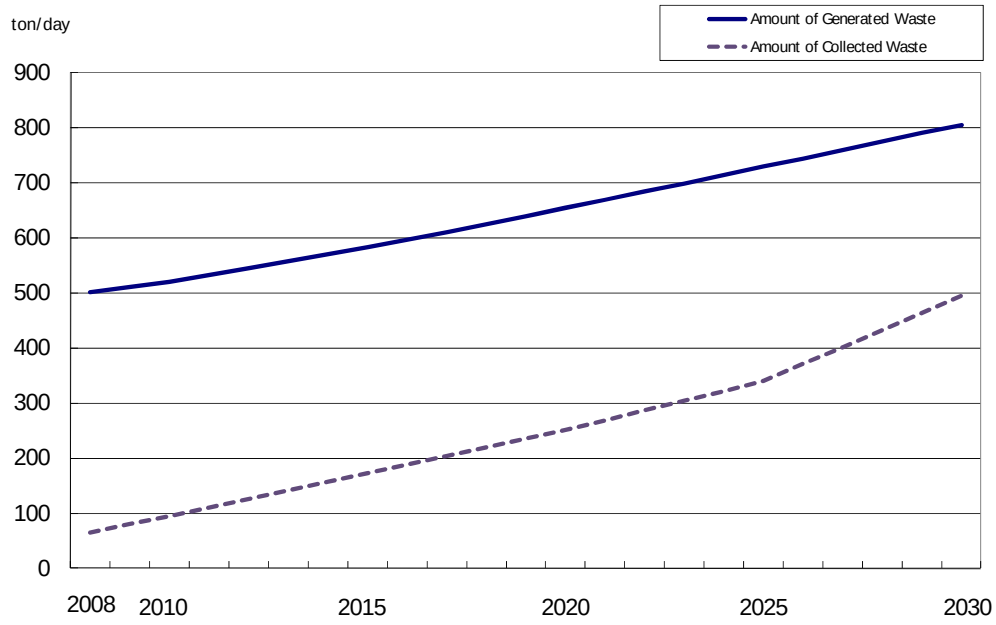
<Payment for Secondary Collection and Disposal Service based on the Monitoring and the Performance>

WAC disburses the collected fee of private company-share for secondary collection and disposal service based on the report on actual service and performance and from each community. Communities should monitor service provided by a private company. In case that any services are not properly done by the private company, a portion of company-share is not paid to the private company, but it is transferred to community-share.

Source: JICA study team

(5) Procuring Main Required Infrastructures of SWM

The following figure shows present and future estimated amount of generated waste and collected waste based on the above-mentioned table. At present capacity of collection and disposal of waste in the Costal Area is under 100 tons/ day, but it would be expected to develop the capacity up to 500 tons/ day by 2030 by raising coverage ratio of collection service in urban areas and rural areas up to 90% and 50% respectively by 2030.



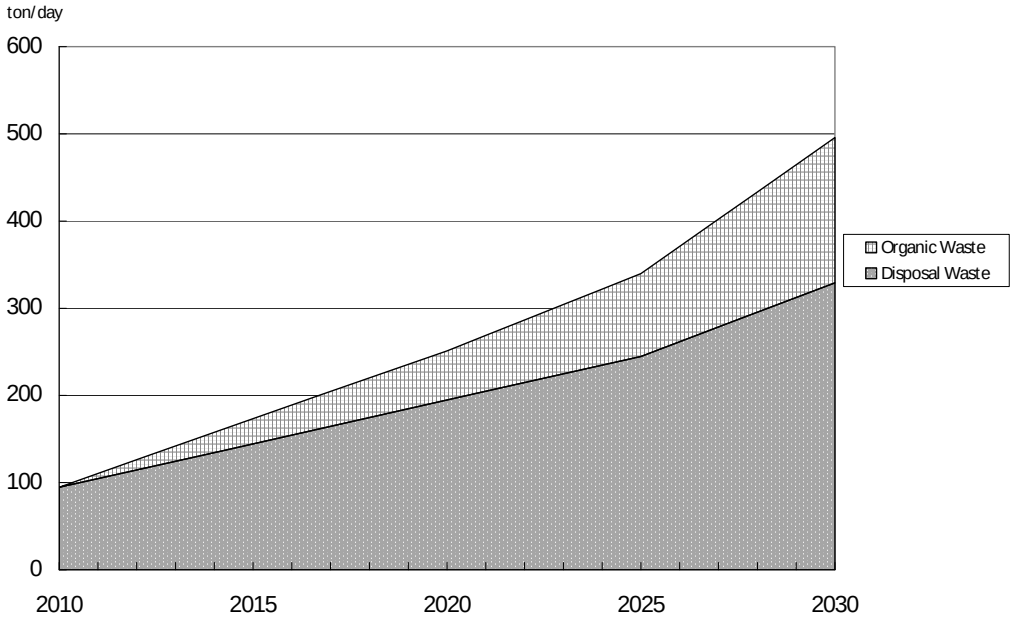
Source: JICA study team

Figure 5.6.12 Present and Future Estimated Amount of Municipal Waste

The following infrastructure facilities related to SWM should be constructed in consideration of the above-mentioned amount of collected waste.

- Sanitary landfill, including operational equipments
- Composting plant, including operational equipments

25% of reduction of disposal waste in total during planning term could be expected by introduction of source separation of organic waste and composting according to extension of coverage area of collection service in urban and rural areas. Composting could be considered one of ways to reduce disposal waste in consideration of potential demanding of compost in costal areas and in line with the drafted national 3R strategy. However, market development is necessary to realize the potential demanding of compost. The following figure and table show the details of amount of collected waste.



Source: JICA study team
Note 1: Amount of organic waste is estimated on condition that composition of organic waste, ratio of organic waste unsuitable for composting and maximum ratio of cooperation ratio for source separation are 70%, 20% and 60% respectively.
Note 2: Amount of disposal waste is calculated by amount of collected waste minus amount of organic waste.

Figure 5.6.13 Projected Amount of Organic Waste for Composting and Disposal Waste for Landfill

Table 5.6.3 Projected Amount of Organic Waste for Composting and Disposal Waste for Landfill

ton/day

			Organic Waste						Disposal Waste					
			2008	2010	2015	2020	2025	2030	2008	2010	2015	2020	2025	2030
Total			0	0	29	56	95	167	65	95	144	195	245	329
	Urban		0	0	22	35	51	70	0	95	108	120	131	139
		Household	0	0	16	24	35	47	0	74	79	85	90	93
		Commercial	0	0	6	10	16	23	0	20	29	35	41	45
	Rural	Household	0	0	7	22	44	96	0	0	37	75	114	190
Kampot			0	0	11	24	43	82	23	27	55	83	111	161
	Urban		0	0	6	10	14	19	-	27	30	33	36	38
		Household	0	0	4	6	9	12	-	20	21	22	23	24
		Commercial	0	0	2	3	5	7	-	7	9	11	13	14
	Rural	Household	0	0	5	14	29	62	-	0	25	50	75	123
Kep			0	0	1	3	5	8	5	5	7	9	12	16
	Urban		0	0	1	2	3	4	-	5	5	6	7	7
		Household	0	0	0	1	1	1	-	2	2	2	3	3
		Commercial	0	0	1	1	2	2	-	3	3	4	4	4
	Rural	Household	0	0	0	1	2	5	-	0	2	3	5	9
Preah Shanouk			0	0	13	22	36	57	32	48	63	77	92	113
	Urban		0	0	11	18	27	38	-	48	56	63	70	75
		Household	0	0	8	13	19	26	-	38	42	45	48	51
		Commercial	0	0	3	5	8	12	-	10	14	18	21	24
	Rural	Household	0	0	1	4	9	19	-	0	7	14	22	38
Koh Kong			0	0	4	7	12	20	5	16	20	25	30	39
	Urban		0	0	3	5	7	10	-	16	16	17	18	19
		Household	0	0	3	4	6	8	-	14	14	15	16	16
		Commercial	0	0	0	1	1	1	-	1	2	2	3	3
	Rural	Household	0	0	1	2	5	10	-	0	4	8	12	20

Source: JICA study team

Note 1: Amount of organic waste is estimated on condition that composition of organic waste, ratio of organic waste unsuitable for composting and maximum ratio of cooperation ratio for source separation are 70%, 20% and 60% respectively.

Note 2: Amount of disposal waste is calculated by amount of collected waste minus amount of organic waste.

Additionally the following equipments will be required to establish comprehensively SWM.

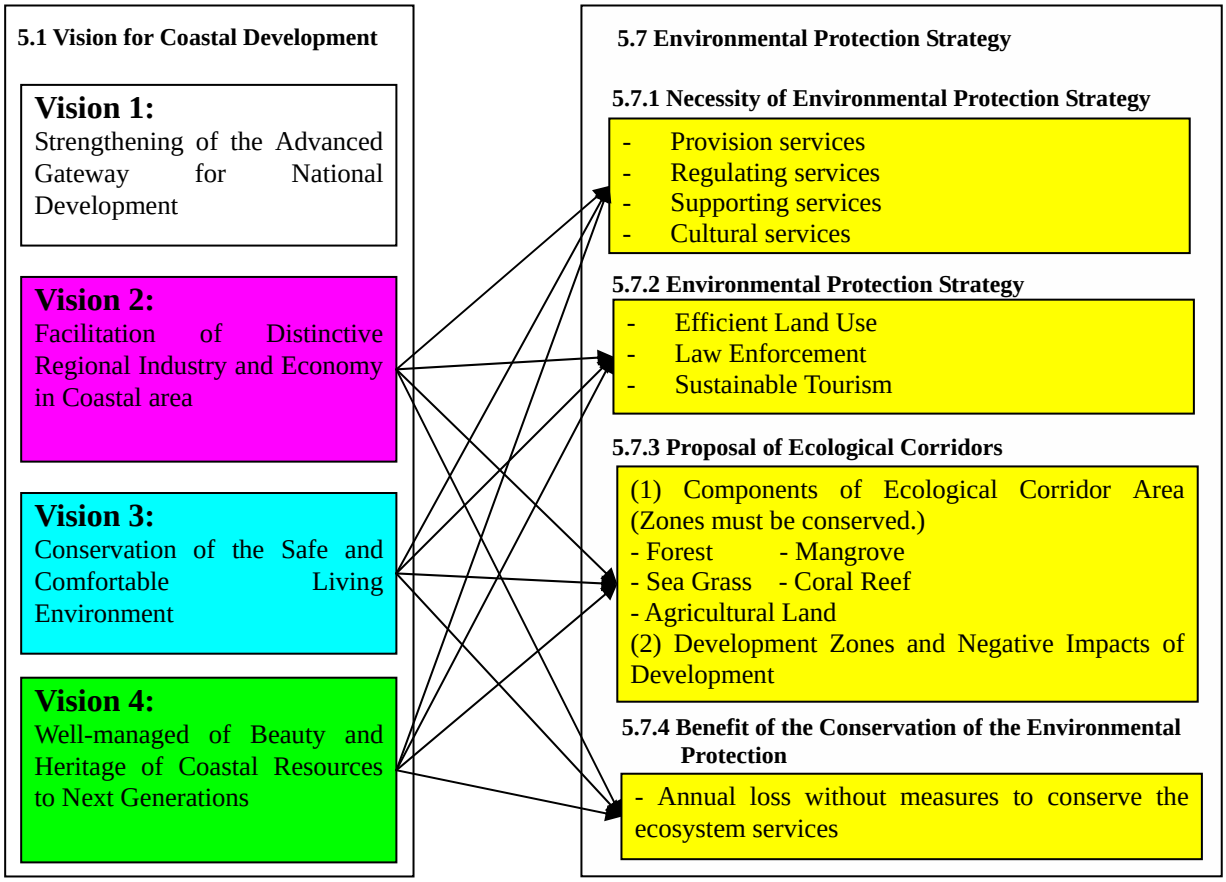
- Garbage collection vehicles
- Collection containers
- Carts for Primary collection
- Equipments for home-made compost

(6) Exchanging Information and Experiences

Coastal Area Cooperation Campaign Committee on SWM would be established in order to exchange information and experiences, make sure progress and promote each related activity of SWM among four provinces in Coastal area. MOE would also join the committee in order to provide related information and feedback the results of the committee to national policies or regulations.

5.7 Environmental Protection Strategy

Environmental Protection Strategy is also formulated as a strategy to attain the visions for Coastal development. Mainly the strategy aims to attain "Vision 4: Well-managed of Beauty and Heritage of Coastal Resources to Next Generations" because Coastal area has abundant of valuable natural, environmental resources which should be properly managed. In addition, the strategy is also related with "Vision 2: Facilitation of Distinctive Regional Industry and Economy in Coastal area" and "Vision 3: Conservation of the Safe and Comfortable Living Environment." It is because economic and industrial activities in Coastal area generally use locally available resources such as forestry and marine products. In this sense, the strategy is conducive to attain Vision 2. As seen in landslide due to deforestation, environmental protection is also connected to the safety in living environment of the residents. The strategy is also conducive to attain Vision 3. The relationship between the visions and the strategies are shown in Figure 5.7.1



Source: JICA Study Team

Figure 5.7.1 Relationship between Visions and Environmental Protection Strategy

5.7.1 Necessity of Environmental Protection Strategy

Most of the inhabitants in Coastal area make a living within the existing ecosystem. Development activities also need to make use part of the ecosystem services. Samples of ecosystem services are listed as follows (Millennium Ecosystem Assessment (MEA). 2005. Ecosystems and Human Well-Being).

Provisioning services
Food (including seafood and game), crops, wild foods, spices, water, pharmaceuticals, biochemicals, industrial products, and energy (hydropower, biomass fuels)

Regulating services
Carbon sequestration and climate regulation, waste decomposition and detoxification, purification of water and air, crop pollination, pest and disease control

Supporting services
Nutrient dispersal and cycling, seed dispersal, primary production

Cultural services
Cultural, intellectual and spiritual inspiration, recreational experiences (including ecotourism), scientific discovery

It could be estimated conservatively that we are losing the ecosystem services with a value equivalent to around USD 70 billion from land-based ecosystem alone each year throughout the glove. Losses of our natural capital stock are felt not only in the year of the loss, but continue over time, and are added to by losses in subsequent years of more biodiversity. These cumulative welfare losses could be equivalent to 7% of annual consumption by 2050 (European Communities, 2008, The Economics of Ecosystems & Biodiversity Phase I). If uncontrolled developments should continue in Coastal area that supports diverse and rich ecology, the ecosystem services would decline causing substantial economic losses. To be specific, the losses include decrease in marine stock with mangrove clearance and degradation of sea grass beds, loss of genetic resources, loss of climate stabilization and dysfunction of water retention with deforestation, and water deterioration and degradation as tourism resources with improper treatment of effluents and mismanagement of solid waste. These losses would cause a decline in ecosystem services in Coastal area which would give negative impact particularly to the poor.

RGC already recognizes the importance of environmental protection to maintain the ecosystem services. The National Strategic Development Plan (2006-2010) mentioned that the goal of environmental protection was not only to conserve the unique nature but also to enhance integrated environmental conservation for the sustainable economic growth. Therefore, strategic environmental protection strategy should be adopted, when the development strategy is settled for Coastal area.

5.7.2 Environmental Protection Strategy

As written in section 4.4, natural resources are decreasing as a result of the human pressures such as industrial development, mass tourism development, population growth, and illegal fishing, logging and poaching. It is necessary to integrate the environmental protection within the development strategy, and achieve the co-existence between natural resources preservation and development.

DANIDA has proceeded with the coastal environmental conservation project, and along with the project, Royal Government established the National Coastal Steering Committee (NCSC) in 2001 whose secretariat is Coastal Coordinating Unit (CCU) in the MOE to monitor and support pilot

projects. However the project yet reiterates the necessity of improvement of following issues in order for RGC to achieve country's goal. Those are;

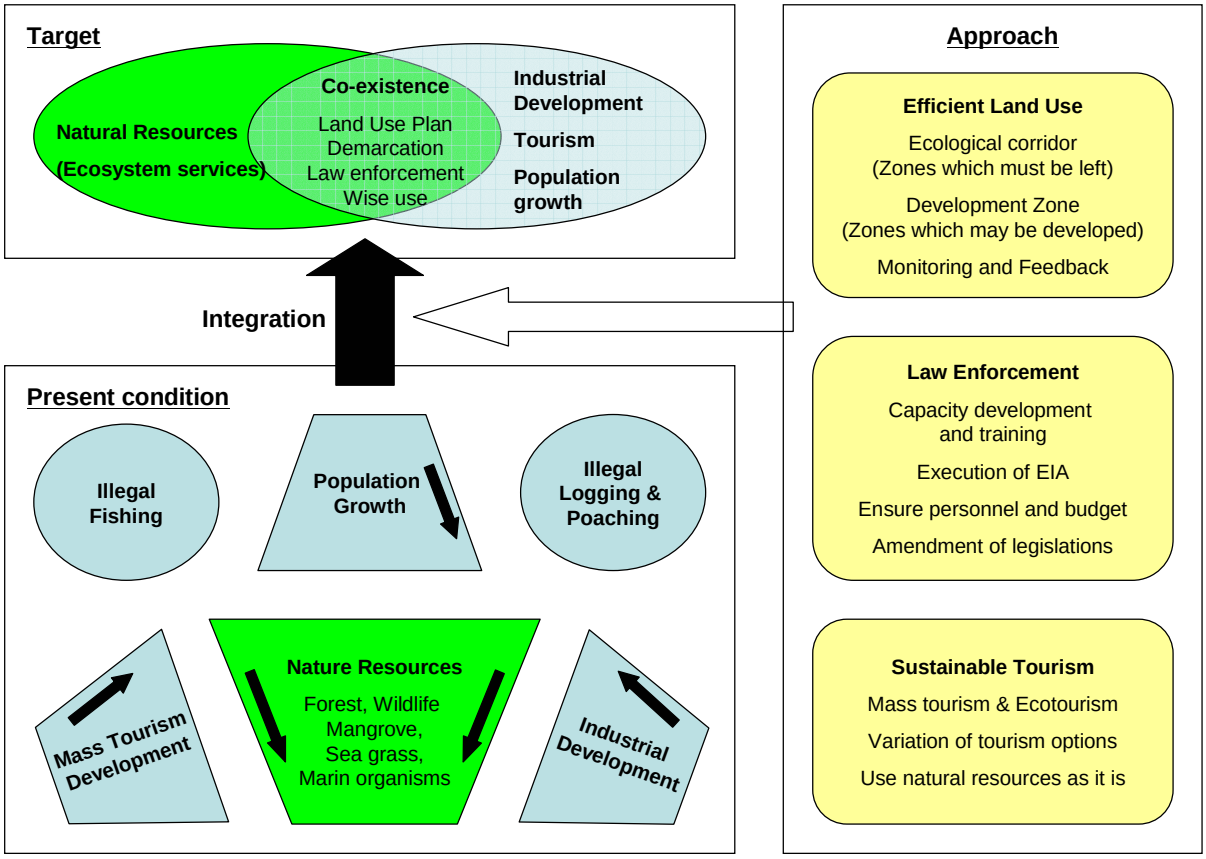
- Efficient land use
- Law enforcement
- Sustainable tourism

While Coastal area in Cambodia is limited physically, several roles are expected of the area, such as an international commercial/logistic base, a tourism destination, international transport hub and marine products catch. Thus an efficient land use must be established so that Coastal area could carry out the roles. A specific spatial planning for environmental protection under the concept of ecological corridor area will be expressed in Figure 5.7.3. The zones that must be protected and the zones that may be developed must be delineated with the evaluation of specific areas. The plan should be finalized by NCSC and approved by RGC. After the approval, the plan needs to be reviewed periodically with the results of environmental and economical monitoring, as it is difficult to predict the change of natural environment. It is necessary to maintain balance between environmental conservation and economical development, considering the change of natural condition. The thought of adaptive management and co-management should be carried out by NCSC.

Adequate law enforcement is the basic condition to realize the co-existence between natural resources and development. Enforcement of EIA regulation must be implemented. A director of EIA depart mentioned that EIA has not been carried out in provincial level, though EIA report must be received by Provincial Environmental Departments and approved by Provincial Investment Sub-Committee. EIA is sometimes ignored by the project owner with the investment capital over two million USD whose EIA must be received by MOE and approved by CDC. Execution of EIA must be incorporated in the process of project approval (Final Registration Certificate for QIP should be issued after the approval of EIA) and enforced by the responsible authorities. Other environmental relevant legislation must be exactly enforced. In order to realize the law enforcement, capacity development with preparation of insufficient sub-decree such as zoning of protected areas and trainings is indispensable.

Sustainable development of tourism in Coastal area is of the national importance. Necessary and essential natural resources for tourism must be protected to enhance the value of the coastal tourism. In order to attract more foreign and domestic tourist and bring Coastal area up to an international tourism destination, providing a variety of tourism options is important. Plain tourism menus composed of a beach, marine sports and casino would not attract a large number of high-end tourists. Coastal area is endowed with good beaches, mangrove, attractive forests, mountains, appealing seafood, and beautiful landscape. These diverse resources should be made efficient and sustainable use. With connection to Siem Reap and Phnom Penh, Coastal area could provide for international resort areas in which foreigners who stays for a long period would be satisfied.

The target of environmental strategy is co-existence between natural resources that provide the ecosystem services and development activities. It is achieved the integration of present conditions with above three measures that Royal Government should take the responsibility. The concept is described in Figure 5.7.1.



Source: JICA Study Team

Figure 5.7.2 Concept of Environmental Protection Strategy

Above concept is described for decision makers in central and provincial levels as the national coastal environmental strategy. To achieve the target, grass root measures are also necessary. So far several donors and NGOs have implemented environmental education, livelihood improvement, and so on in village and commune levels. Those activities must be continued. The environmental protection strategy and commune level measures should be interacted and produce synergy effects.

5.7.3 Proposal of Ecological Corridors

Coastal area is regarded as a set of ecological corridor areas. These areas comprise natural zones such as forests, rivers, agriculture lands, mangrove forests, sea grass areas, coral reefs, and sea, and those components are mutually related. Once a component was lost, the ecological condition of other interrelated components would be degraded and restoration could hardly be done. Forest area was decreasing from 1992 to 2002 (local people are still using firewood and charcoal), but it has been slightly getting back after 2002 (Table 5.7.1). It is assumed that the regulations in 2004 and 2006 (see section 2.2.3) enforced by FoA in collaboration with NGOs have caused this. However, as mentioned in section 3.4.1, mangrove forests, sea grass areas and coral reefs are decreasing. Several development activities are on-going in protected areas. This indicates that there are significant issues in maintaining the ecological corridor area, It is necessary to delineate a zone that must be conserved and a zone that may be developed.

Table 5.7.1 Forest Proportions in Coastal Area

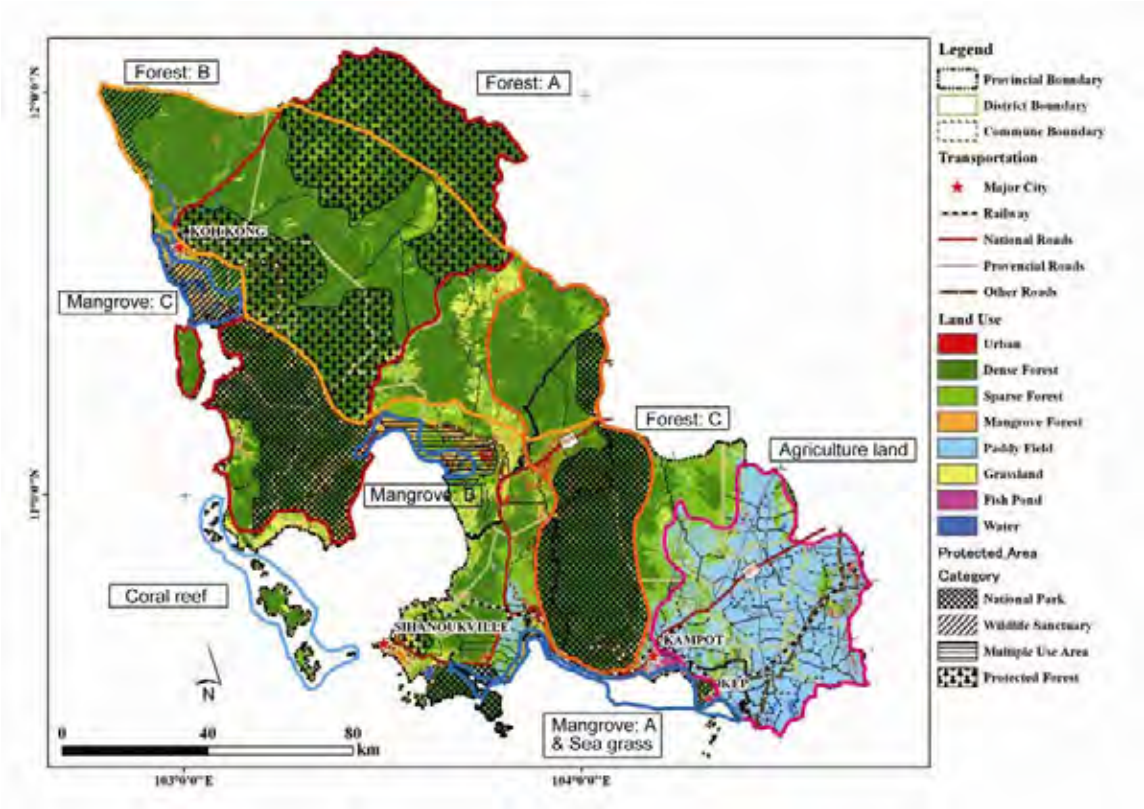
Province	1992	1997	2002	2006
Kep	22%	22%	20%	22%
Kampot	52%	50%	50%	48%
Sihanouk	63%	62%	55%	56%
Koh Kong	87%	85%	80%	82%

Source: Forest Administration, Forest Statistics, Cambodia, 2002, 2004 and 2006

In order to consider the environmental protection division, the components of ecological corridor area should be evaluated to clarify a zone for conservation and zone for development on a map, and impact of development should be discussed, and economic benefit of the maintenance of ecological corridor area should be estimated. In this report, the outlines of those are described below.

(1) Components of Ecological Corridor Area (Zones must be conserved[1])

The components and locations are shown in Figure 5.7.3.

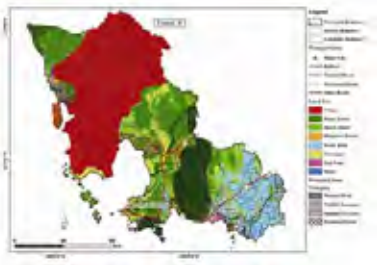


Source: JICA Study Team

Figure 5.7.3 Components of Ecological Corridor Area

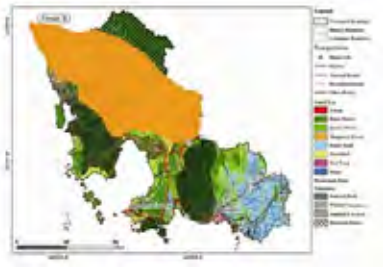
[1] Conservation is not the complete preservation. It is possible to use sustainably e.g. community forestry and establishment of appropriate size of sustainable use zone in the zones.

1) Forest A



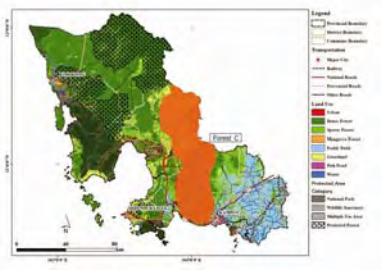
This corridor is the core for the biodiversity conservation in Coastal area. Cardamom mountain and Botum Sakor national park are a set of habitat for a variety of tropical species including some endangered species. Large mammals such as Asian elephant and Indochines tiger move in the habitat. Preserving continuous movement between the mountain and the coastline / sea is essential to keep the present rich biodiversity.

2) Forest B



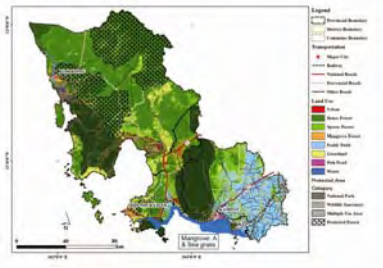
This corridor connects Phnom Samkos wildlife sanctuary, Cardamom mountain, Kirirom national park and Phnom Bokor national park. The corridor exchanges the species among wildlife sanctuaries and national parks and improves the biodiversity of each area. The corridor includes two large watersheds, Koh Kong – Cardamon and Dong Peng - Cardamom. Therefore, the corridor also has important role to maintain the conditions of mangrove areas in Peam Krasop wildlife sanctuary and Dong Peng multiple use area.

3) Forest C



The corridor includes Kirirom and Phnom Bokor national park. Forest condition of central and north part of Phnom Bokor national park is still intact. Preaek Tuek Chhu River flows from north part to Mangrove and sea grass areas through central and south parts of the national park. Several birds, fish, reptile, amphibian and insects can move along the river and the condition of national park affects the development of littoral mangrove and offshore sea grass.

4) Mangrove A and sea grass



Mangrove forest has rapidly decreased in this zone due to the expansion of salt farm and related land clearance. However, the littoral condition is still suitable for the growth of mangrove, and recently Fishery Administration cantonment, commune and fishery community started replanting mangrove. As for sea grass, the area in Kampot is 25,241 ha, and exclusive in Coastal area. The combination between the sea grass zone and mangrove forest is important for fishery. What is remarkable is that Dugong lives in sea grass area in particular in Kampot province in Cambodia.

5) Mangrove B

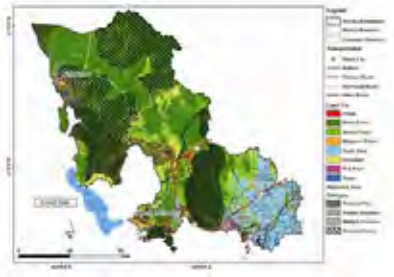
This mangrove zone is Preaek Piphot river mouth and connected to Cardamom mountain. Although it is endangered with economic development, it is important for the fishery from southern Koh Kong to Preah Sihanouk.

6) Mangrove C

The mangrove zone in Koh Kong (Peam Krasop wildlife sanctuary) maintains more than 10,000 ha of the area. Mangrove trees whose diameter of breast height (DBH) is more than 30 cm are often found in the forest. Mangrove trees grow in the tributaries of the delta. The forest functions for the disaster management and important resource for ecotourism as well as fishery.

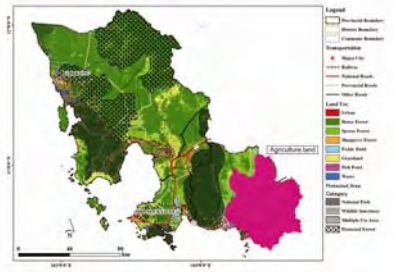
7) Coral reef

Coral reefs develop in shallow sea area in particular surrounding islands in Coastal area. Intact coral reef communities are found around the islands such as Koh Tang island and Kaoh Rung island. Coral species themselves are threatened species listed in the Red List of IUCN, and furthermore some threatened species such as Humphead Wrasse and Hawksbill Turtle. Coral reefs are also important for sustainable tourism. Those make beautiful scenery with attracted colorful fish for tourists especially for divers.



8) Agriculture land

Agriculture land mainly distributes in Kampot. The land is next to Phnom Bokor national park, and birds, reptiles, amphibian and insects move between national park and agriculture land. The land contains the characteristic living organisms and improves the biodiversity in the in Coastal area. The area is of course important for the local economy. Paddy field and plantation produce the income for local people (e.g. green pepper in Kampot is popular among European people).



(2) Development Zones and Negative Impacts of Development

Development zones are expanding in Coastal area in particular rapidly in Preah Sihanouk city. In the case of development, integrated development plan is necessary taking the whole land use plan of Coastal area into consideration. Uncontrolled development will obviously make some social and environmental negative impacts such as deterioration of water quality and decrease of fish catch. If adequate sustainable development plan that incorporates environmental protection strategy is prepared and carried out, the impact to the whole coastal area is expected not to be significant.

5.7.4 Benefit of the Conservation of the Environmental Protection

It is very difficult to estimate the economic value of nature. European Commition presented 'the economics of ecosystems and biodiversity (TEEB) phase I' during Ninth Conference of the parties (COP9) of the Convention on Biological Diversity in 2008, and stipulated the negative impact to the poverty people in developing countries by the degradation of ecosystem services. Specific policy tool is currently discussed and the result will be published in COP10 (2010) as phase II.

The phase I report mentioned that the annual economic loss without measures to conserve the ecosystem services was approximately 6% of world annual GDP. Cambodia depends on the ecosystem services exactly higher than the world average. Therefore, the loss without measures would be more than 6% of Cambodian GDP and probably more than the GDP growth of Cambodia.

The trial calculation of the loss in the country and Coastal area is as follows.

Estimated GDP of RGC in 2010 is approximately 10 billion USD, therefore,

Loss in the country > 10 billion USD * 0.06 = 600 million USD (It is equivalent to the annual growth.)

The area of Coastal area is about 10% of the whole country, therefore

Loss in Coastal area > 10 billion USD * 0.06 * 0.1 = 60 million USD

Most of the loss is caused by the development activities. It is contradiction that development activities cause the loss of similar amount of money (though the loss is just trial calculation). It is the significant reason why we have to take the balance between development and environmental protection.