4.3.8 Human Resources

(1) Employment in the Study Area

As explained in **Section 4.3.3**, industrial activities are concentrated in the Phnom Penh area. Sihanoukville area ranks second but it is far behind the Phnom Penh area. In other words, there is little opportunity for the industrial sector in provinces other than the Phnom Penh - Kandal area and the Sihanoukville area.

(2) Education/Training Opportunity in the Study Area

The RGC has achieved significant expansion of primary education opportunities in Cambodia as a whole. As described in **Chapter 3**, regional disparities still remain. **Table 4-37** shows the educational attainment and number of various levels of schools in the study area.

Table 4-37 Education Statistics of the Study Area (2001)

		Phnom Penh	Sihanoukville	Kampong Speu	Koh Kong	Kampot	Takeo	Kandal	Study Area
Area	(km^2)	267	868	7,017	11,160	5,209	3,563	3,591	31,675
Population (1998)	(000)	1,000	156	599	132	528	790	1,075	4,280
Population Density		3,448	57	85	12	101	222	301	135
Educational Attainment (1998)									
Primary Completed									
Male	(%)	27.7	28.3	25.8	24.8	23.5	30.0	27.4	26.8
Female	(%)	24.0	15.9	11.4	12.1	12.2	15.0	15.6	15.2
Total	(%)	25.7	21.9	18.0	18.7	17.3	21.7	21.0	20.6
Lower Secondary Completed									
Male	(%)	20.9	14.7	11.4	10.9	10.5	13.2	12.6	13.5
Female	(%)	12.6	5.9	4.6	4.2	4.6	5.2	5.4	6.1
Total	(%)	16.5	10.1	7.6	7.7	7.2	8.7	8.6	9.5
Secondary and Higher Completed									
Male	(%)	22.6	6.8	2.9	4.0	3.2	3.6	4.9	6.9
Female	(%)	7.7	1.7	0.9	1.1	0.9	0.7	1.3	2.0
Total	(%)	14.7	4.2	1.7	2.6	1.9	2.0	2.9	4.3
Number of Schools (2000/2001)									
Primary School		111	52	255	72	255	349	404	1,498
Number of Classroom		3,717	769	3,458	520	3,045	4,608	5,570	21,687
Number of Pupils		170,924	35,248	159,673	23,636	######	203,459	255,282	981,601
Gross Enrollment Ratio (%)		119.0	115.0	132.6	91.4	131.7	133.1	129.5	121.8
Number of Teachers		3,989	631	2,270	292	2,492	3,825	4,610	18,109
Pupils per school		1,539.9	677.8	626.2	328.3	523.1	583.0	631.0	701.3
Classes per School		16.5	14.8	13.6	7.2	11.9	13.2	13.8	13.0
2 - Shift (%)		93.7	92.3	84.7	83.3	92.2	82.2	79.2	86.8
Pupil Teacher Ratio		42.8	55.9	70.3	80.9	53.5	53.2	55.4	58.9
Lower Secondary School		13	5	28	2	22	31	45	146
Number of Pupils		50,996	4,814	16,964	1,377	19,208	25,814	31,899	151,072
Gross Enrollment Ratio (%)		62.5	31.5	29.0	11.9	37.7	44.9	39.5	36.7
Upper Secondary School		15	2	7	2	8	19	14	67
Number of Pupils		27,566	1,463	4,009	361	5,309	8,644	10,628	57,980
Gross Enrollment Ratio (%)		30.8	10.3	7.7	3.5	11.5	14.6	11.6	12.9
Number of Grade 10 Intake		9,197	591	1,525	137	2,101	3,379	3,704	20,634
Number of Vocational Training Institutions (VT		37	12	1	0	7	2	2	61
Number of Students at VTI		13,443	917	80	0	613	364	468	15,885
Number of University		15	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	15
Number of University Students		31,687	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	31,687
Employment structure(1998)									
Primary Sector	(%)	12.5	55.0	89.5	53.2	87.7	90.1	76.8	66.4
Secondary Sector	(%)	17.2	9.7	1.1	7.4	1.7	1.7	6.2	6.4
Service Sector	(%)	70.3	35.3	9.4	39.4	10.7	8.2	17.0	27.2

Source: Education Statistics & Indicators 2001/2002, EMIS Center, Department of Planning, Ministry of Education, Youth and Sport, "Statistics of Officers, Teachers and Students of Public, Private Institutions and NGOs Sectors", 2001-2002, Department of Vocational, Technical Education and Training, National Population Census of Cambodia (1998) Ministry of Planning

* Number of Vocational Training Institutions includes only those listed in MoEYS "Statistics of Officers, Teachers and Students of Public, Private Institutions and NGOs Sectors"

Features of three areas are described below.

Greater Capital Area

In Phnom Penh, educational opportunities have expanded. Primary schools are packed with students. 93.7% of its primary schools are operated in 2 shifts. Pupil teacher ratio is still at 42.8 (nevertheless the lowest in the study area). There exist substantial numbers of over-crowded schools.

Gross enrolment ratio to lower secondary school is the highest in the study area. Likewise its enrolment ratio to upper secondary school is the highest. Once the

students have made the crucial transition from primary to lower secondary school, the chances of retention and completion improve.

There are five public universities, three independent institutes and faculties and a few large-scale private universities in the study area. In 1996 each university was authorized to charge tuition to students. Most universities increased the number of students. Nevertheless there are some faculties where non-fee paying students are common, e.g. humanities, health and sciences. The first private university was established in 1997. Many private universities have been established since then. The number of students rapidly increased in Business Administration including Marketing and Accounting. The number of students in Computer Science and Languages increased as well.

As **Table 4-38** shows, nearly a half (45.5%) of the students are enrolled in Business fields. Computer Science (11.8%) comes second and is followed by Foreign Languages (7.6%). Engineering fields putting civil, Electric & Electronic and Mechanical together constitutes merely 4% of the total number of university students. Until two private universities, - Norton and Build Bright Universities started offering engineering courses three years ago; Cambodia Institute of Technology was the sole provider of engineers in Cambodia (merely 15 students completed the civil engineering course each year). The Royal University of Agriculture has been providing agro-related engineering courses and Preah Kossomak Polytechnic Institute and the National Technical Training Institute started Bachelor level engineering course a year ago.

Table 4-38 Number of University Students by Faculty

	Total	Percentage
Business (including Management, Marketing, Accounting, Finance/Banking)	15, 488	45.5%
Computer Science	4, 013	11.8%
Other Areas	3, 299	9.7%
Foreign Languages	2, 589	7.6%
Economics	2, 287	6.7%
Law	2, 179	6.4%
Tourism	2, 146	6.3%
Engineering	1, 154	3.4%
Civil Engineering	745	2.2%
Electric & Electronical Engineering	334	1.0%
Mechanical Engineering	75	0.2%
Sciences	903	2.7%
Total	34, 058	100.0%

Source: JICA Study Team based on data from Ministry of Education, Youth and Sports and each university

It should be noted that all higher education institutions are located in Phnom Penh except for a few institutions in Bat Dambang and in Prey Veang. Thus it is necessary for bright young boys and girls in rural areas to come to Phnom Penh for studying at higher education institutions. Recent increase of private

universities and fee-paying students at public institutions indicate that the demand for higher education is higher than the current intake.

Many of the vocational training institutions - both public and private - as well are located in Phnom Penh. Except for public training institutions like Preah Kossomak Politechnic and the National Technical Training Institute, many private vocational training schools and schools assisted by NGO provide short-term training courses on computer, foreign languages and handicraft-making type courses.

Sihanoukville

Due to the increasing population, many primary schools have been constructed. Within the academic year 2000 to 2001 alone, ten new primary schools were established. Enrolment ratios to secondary schools is still at a low level compared to Takaev Kandal and Kampot provinces, however they are higher than in Kaoh Kong and Konpong Spueu.

There are two public vocational training institutions offering long-term courses. One is JVC Technical School offering car repairing and welding courses for training durations of 1 to 2 years. The other is the Don Bosco Technical School. Don Bosco offers 5 courses including, welding, electricity, machinery, sewing and computer secretary. Its training period is two years. JVC and Don Bosco Schools are run by NGOs. However these two schools provide certificates recognized by the Department of Education of Sihanoukville. Therefore these schools are classified as public vocational training institutions.

Sihanoukville Vocational Training Center has sewing, electric repairing and masonry courses (4 months). Provincial (or municipal) Vocational Training Centers like the one in Sihanoukville were assisted by ADB through the Basic Skills Project until June 2002.

There are five private language and computer schools. Some 1,000 students attend 3 to 8 month courses there. The most popular language is English followed by Chinese and Thai. Four NGOs are offering vocational training courses. Such training courses include computer, English and French, engine repairing and sewing. Given its relatively smaller population compared to provinces with more inhabitants like Konpong Spueu and Kampot, Sihanoukville offers good learning opportunities.

Build Bright University, A private university in Phnom Penh, has a plan to establish a branch campus in Sihanoukville. The planned courses include Management and Informics (computer science).

The Port Authority of Sihanoukville (PAS) supports its employees' study in the evening and during the weekends. This implies that formal employment

provides good learning opportunities. Likewise, Educated, trained and motivated personnel invite the presence of good employment.

Intermediate Area

Kaoh Kong Province provides poor learning opportunities to the schooling age population. The Gross Enrollment ratio for primary school is 78.9% (the lowest in the study area). The enrolment ratio for lower secondary school is 9.5% and upper secondary school is merely 3.3%, both percentages are the lowest in the study area. There is no vocational training institution in Kaoh Kong. Konpong Spueu and Kampot provinces show similar trends, however the situation is better than in Kaoh Kong.

The pupil teacher ratio in Konpong Spueu is the worst (70.3) in the study area. In Konpong Spueu province, there is a Provincial Training Center (PTC). PTC Konpong Spueu offers electricity, building (carpentry), motorcycle repairing, welding and computer courses. The training period is 4 months for each course. 15 to 20 people attend the training.

Although Takaev province has a bigger population, the enrolment ratio to secondary schools is higher than Kaoh Kong, Konpong Speu and Kampot. Pupil teacher ratio is 53.2 - the second lowest next to Phnom Penh. Provision of primary education has substantially expanded in Takaev. The next agenda will be development of secondary education. Takaev Provincial Training Center provides 9 training courses; Tape recorder repairing, sewing, food processing, small engine repair, television repair, motor repairing, welding, automobile repair and computers. The training period is 3 to 4 months. 15 to 35 people attend the courses each time. Sewing, Food processing and small engine repairing courses are held several times. 1 NGO provides a 3 month welding course. Due to its proximity to Phnom Penh, those who wish to continue their study seem to go to Phnom Penh.

Expansion of basic education facilities is still required in Kampot. Enrolment to secondary schools has been improving. Kampot Provincial Vocational Training Center has five training courses; Automobile Repair, Sewing, Motor Repairing, Weaving and Construction. 15 people attend each course. There are three private schools. They offer computer and accounting courses. 2 NGOs provide vocational training courses. Kampot Industry Technical Education and Training Center has courses on Automotive, Welding, Motorbike Repair, Tape, Radio and T.V. Repair and Electricity. They take 20 to 35 trainees for 4 to 6 months. The Women's Improvement Center has 10 training courses, Sewing, Weaving, Haircutting, Rattan handicraft, Shell handicraft, Khmer and English Typing, English, General Office Skills, and Housekeeping.

As described above, there are provincial training centers (PTC) in Kandal, Takaev, Kampong Spue and Kampot provinces. These PTCs were strengthened

under the ADB Basic Skills initiative. Their training costs were mostly borne by the National Training Fund until the end of 2001. Currently the training costs come from Priority Assistance Program of the MoEYS.

After the 4-months training at the PTCs, micro credit is provided. With this small credit - $100 to $1,000 to a group of three or more trainees, they are supposed to start their own businesses.

The micro credit scheme is called "Self Employment Generation Fund". Large-scale factories and other employment opportunities cannot be expected immediately in the intermediate areas. Thus this scheme seems to be effective in fostering employment. This scheme may also be effective in demonstrating the fact that those who have upgraded their skills (at school) are more likely to increase their income.

4.3.9 Social Dimensions

Among the rural households, the households whose main income source was agriculture had a lower average expenditure than the households with another staple source of income.

The main economic activity in most of the rural areas is agriculture, while fishing is the main one for some locations. The main crop is rice with primitive technology and inputs and without irrigation. Food security is a persistent issue, particularly in the Intermediate Area.

Rural infrastructure is generally weak and has a high potential for development. Rural roads are one type of infrastructure that awaits improvement and rehabilitation. Nevertheless, the necessary date and criteria for specific actions are virtually non-existent[11].

The health status of the people in the rural area requires improvement, but expensive health service costs discourage people from utilizing health services.

Greater Capital Area (Kandal Province)

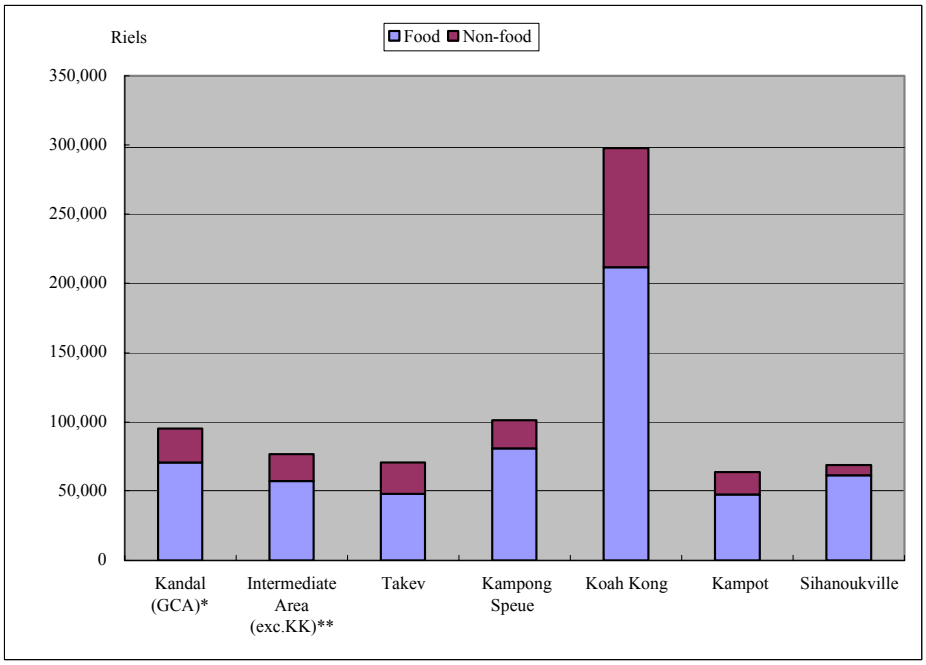
While the population is quickly increasing due to the inflow of people seeking employment, agriculture remains the main industry. Small-sized intensive farms producing vegetables for the Phnom Penh Municipality is growing.

Access to rural infrastructure such as safe-drinking water and sanitation in Kandal Province is better than the national average of the rural area. Rural transportation is said to be accommodated by roads and canals, so that residents in rural areas have access to markets for their products (**Table 4-39**).

11 Data for road rehabilitation exists but criteria of the rehabilitation need further clarification.

Intermediate Area

Among the provinces in the Intermediate Area, the average monthly expenditure for Koah Kong Province was the highest, surpassing those of Kandal Province and Sihanoukville. That of Kampot Province was the lowest (**Figure 4-22**).[12] In Kampot Province, poverty persists in the area surrounded by the National Roads No.3 and 4, where the road access is severely limited. The southern part of Takaev Province often suffers from flood inundation without external access, and the income of the residents is generally low. Kampong Speue Province had suffered from security issues due to the Khmer Rouge until 1996, so that the external supports for development efforts there came in later than most other provinces in the Growth Corridor Study Area.



Note: The value for above "Intermediate Area 1" does not include the value for Koah Kong Province, but that for "Intermediate Area 2" does.

Source: Estimation by the Growth Corridor Study Team based on the database of the CSES 1979.

Figure 4-22 Average monthly expenditure per capita calculated from CSES 1997

The staple crop in this area is rain-fed rice. Plantations have been established along National Road No.4 in the southeast part of Kampong Speue Province where the population is scare, and provided job opportunities to the people living nearby. In Koah Kong Province, people living in mountainous areas along National Road No.4 depended on forests as an income source before the government prohibition against logging.

12 Ranking among these provinces agrees with ranking of the ratios of the poor people in the provinces which were calculated in Cambodia Poverty Analysis by JBIC.

Food security is still an urgent and critical issue in some areas of the Intermediate Area, particularly in Kampong Speue and Kampot Provinces.

Although the conditions of rural roads in this area have been improved in the last few years, mainly by projects by international donors and NGOs, there is still ample room for improvement (**Table 4-39**). Access to safe drinking water in this area was only 18.1 per cent, lower than the national average in 1998. Regarding access to sanitation, the average in this area was similarly lower than the national average.

Approximately 20 per cent of the people in this area needed to borrow money to pay the cost of medical treatments.

Sihanoukville

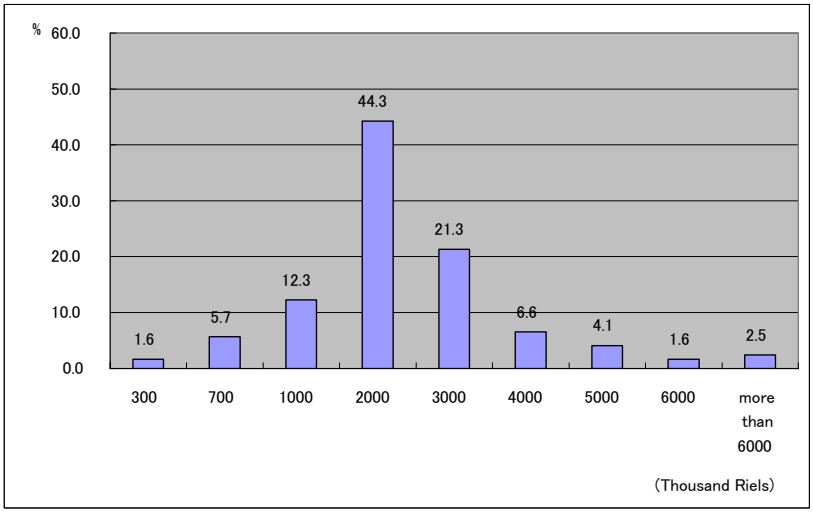
The rural infrastructure around Sihanoukville was better than other rural areas in the Growth Corridor Area (**Table 4-39**). Due to recent rapid increases in its population, however, extensive efforts will be needed to develop infrastructure to catch up with the population increases.

Village level

The socio-economic survey conducted by the Growth Corridor Study[13] revealed that 44.3 per cent of the all households surveyed belong to the annual cash expenditure bracket of more than 1,000,000 to less than 2,000,000 Riels, and 21.3 per cent more than 2,000,000 to less than 3,000,000. The actual annual expenditure should be higher than this, since these Figures do not include the actual value of domestic consumption of domestically produced food.

A large economic disparity exists among surveyed households, as their annual cash expenditures spread over a wide range. The lowest expenditure group covers expenditures at less than 300,000 Riels, and the highest with more than 6,000,000 Riels (**Figure 4-23**).

13 It was conducted in eight villages in the Growth Corridor Area except Phnom Penh Municipality in June of 2002, by applying the methodology of the rapid rural appraisal.

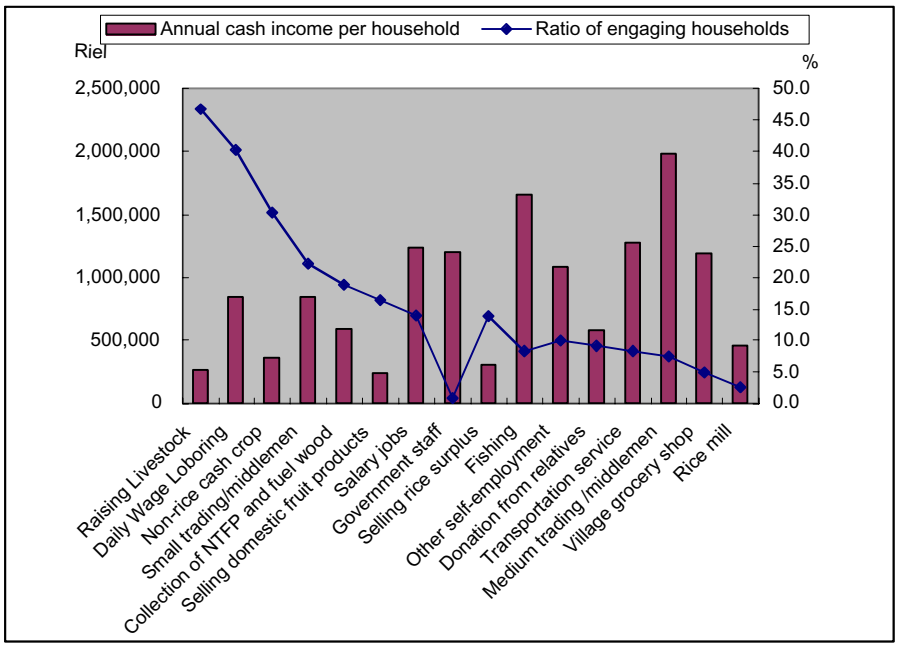


Source: the Socio-economic survey conducted by the Growth Corridor Study Team

Figure 4-23 Ranges of household annual cash expenditure in the surveyed villages

The main industry is agriculture, and most of the farmers cultivate rain-fed rice once a year. There are a number of obstacles to the increase of production above subsistence level, and the farmers remain in poverty. The obstacles include low soil fertilities, unavailability of water, climatic changes, and so forth. Small land holding by the farmers also limits the production. The average total land holding per household of the eight surveyed villages is merely 0.96 ha. Lower level of agricultural inputs by the farmers is another obstacle. Producer groups are not popular and do not exist in the surveyed villages, due mainly to negative experiences under the Pol Pot regime as explained before.

Security of living of rural rice-cropping households depends upon the availability of cash income to compensate for seasonal shortages of rice for their domestic consumption. Among economic activities for earning cash, common rural activities, such as raising livestock, cultivating non-rice crops and selling fruits tend to provide little income, whereas less commonly practiced activities, such as medium trading/middlemen or salaried work tend to earn lots more (**Figure 4-24**).



Source: Growth Corridor Study Team

Figure 4-24 Annual income per household from economic activities and ratios of Engaging households

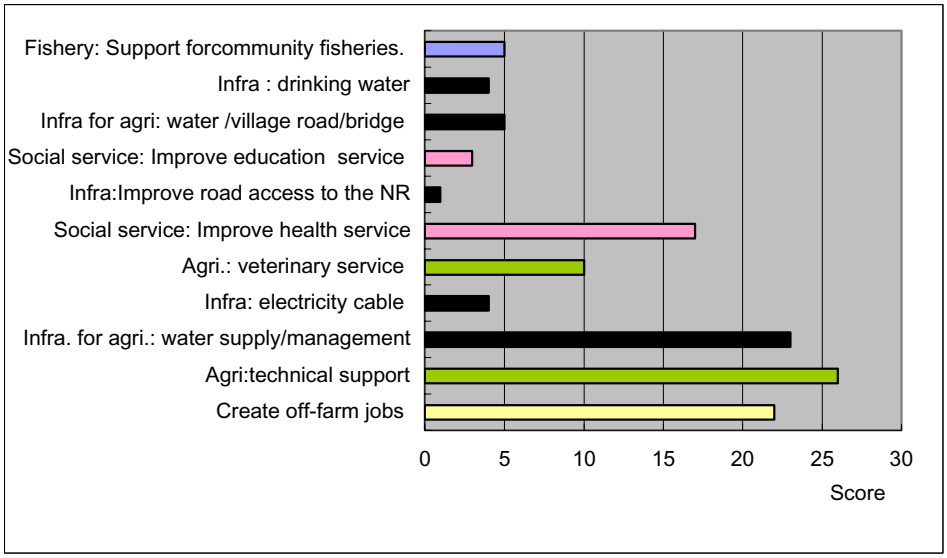
Farmers in the surveyed villages had used Micro-credit established by NGOs. However, the severe affect of flood in 2001 made the borrowers face difficulties in repaying the interest and principle according to strict rules set by the NGOs. As a result, most of them ended up preferring private moneylenders, whose loan interest is about 50% for one cropping season, to whom they could ask to delay repaying the interest and principle.

Larger problems exist in safe drinking water supply (**Table 4-39**). In addition, less than half of the all surveyed villages have a primary school and no village has a health center.

In the surveyed villages, most sicknesses the people got were preventable or vaccine-preventable. The villagers preferred the private health services to the government health services due to the lower level of quality of the service of the latter.

The survey on the villagers priorities on various development wants[14] revealed that a development want of villagers for agricultural technical support and that for infrastructure for agricultural water supply and management are high, reflecting the generally low productivity and water shortage regarding their agriculture (**Figure 4-25**). A development want for creation of off-farm jobs is remarkably high, even in the villages whose staple economic activities are agriculture. In regard to social services, improvement of health services is ranked as having the first to third highest priority in five villages out of the eight.

14 Five prioritized wants, from the first to the fifth, were extracted from the focus group discussions.



Note: The score were calculated by putting on the five priorities one to five points on according to the priorities of the villagers.
Source: Calculated from the results of the Socio-Economic Survey.

Figure 4-25 Scored priorities of development wants of the villagers

Table 4-39 Rural Infrastructure in the Growth Corridor Area at the Provincial Level

Access to driking water	Piped Water (1)	Tube/piped well (2)	Dugwell	Spring, river, stream, lake, pond and rain	Bought(3)	Other	Total	% of households with safe drinking water (1)(2)(3)
Cambodia Rural	2.5	15.1	43.4	30.4	6.1	2.5	100.0	23.7
Growth Corridor Area	2.7	8.3	42.8	34.2	11.4	0.7	100.0	22.4
Kandal	4.1	11.9	11.6	54.0	18.0	0.4	100.0	34.0
Intermediary Area	0.9	8.6	44.9	36.5	8.5	0.6	100.0	18.1
Takaev	0.5	10.5	37.1	49.9	0.9	1.1	100.0	11.9
Kampong Spueu	1.4	17.3	35.3	44.0	1.8	0.2	100.0	20.5
Kaoh Kong	0.8	1.3	62.0	6.5	28.8	0.6	100.0	30.9
Kampot	1.0	5.4	45.1	45.6	2.6	0.3	100.0	9.0
Krong Preah Sihanouk*	8.1	3.2	65.8	5.1	16.5	1.3	100.0	27.8

Number of wells
Latest data from Ministry of Rural Development as of July 2002**

	Pump well		Dug well		Combination well		Ponds	
	Good	Broken	Good	Broken	Good	Broken	Good	Broken
Kandal	4	12	12	54	18	0	100	34
Takaev	1	11	37	50	1	1	100	12
Kampong Spueu	1743	427	825	49	34	17	0	0
Kaoh Kong	1	1	62	7	29	1	100	31
Kampot	445	387	0	0	0	0	165	0
Krong Preah Sihanouk*	8	3	66	5	17	1	100	28

Access to Toilets(% of households)	
Cambodia Rural	8.6
Growth Corridor Area	9.7
Kandal	10.3
Intermediary Area	5.6
Takaev	3.6
Kampong Spueu	2.8
Kaoh Kong	10.4
Kampot	5.6
Krong Preah Sihanouk*	25.2

Electricity	City Power	Generator	Both city power and generator	Kerosene	Battery	Other sources	Total
Cambodia Rural	6.3	0.9	1.4	86.1	3.8	1.5	100.0
Growth Corridor Area	15.2	1.8	2.8	77.3	2.6	0.4	100.0
Kandal	7.1	1.0	2.3	80.2	9.2	0.2	100.0
Intermediary Area	11.7	1.9	3.1	81.6	1.4	0.5	100.0
Takaev	26.8	0.8	1.2	67.5	3.6	0.1	100.0
Kampong Spueu	1.6	0.5	0.4	96.7	0.7	0.1	100.0
Kaoh Kong	16.7	5.3	9.8	66.3	0.6	1.3	100.0
Kampot	1.8	0.8	1.0	95.7	0.7	N/A	100.0
Krong Preah Sihanouk*	37.3	2.4	1.8	57.3	0.5	0.7	100.0

Fuels for cooking	Using Firewood	Charcoal	Kerosene	LPG	Other	Total
Cambodia Rural	94.3	2.3	1.7	0.5	1.2	100.0
Growth Corridor Area						
Kandal	97.3	1.2	0.9	0.4	0.2	100.0
Intermediary Area						
Takaev	96.5	0.7	1.7	0.3	0.8	100.0
Kampong Spueu	97.0	0.8	1.8	0.3	0.1	100.0
Kaoh Kong	74.7	21.7	1.6	1.8	0.2	100.0
Kampot	96.1	1.4	2.0	0.2	0.3	100.0
Krong Preah Sihanouk*	68.7	27.3	1.7	2.1	0.2	100.0

Note: Krong Preah Sihanouk* =categolized to only Urban Area in the Census in 1998.
Source: National Institute of Statistics, Ministry of Planing, General Population Census of Cambodia 1988, Analysis of Census Resuts Report 4, Housing and Household Amenities. **Ministry of Rural Development.

4.4 INFRASTRUCTURE

4.4.1 Transportation

Phnom Penh and Sihanoukville are connected by the NRs.3 and 4. Road transportation is the most important mode in the region. All national roads are under MPWT and financed by the general budget for both development and maintenance. The MPWT has a Five Year Master Plan for National Road Rehabilitation and Reconstruction, which has also been financed by many international donors.

Figure 4-26 shows the road network in the region. Clearly, the road network is dense in the lowland area along NR.3.

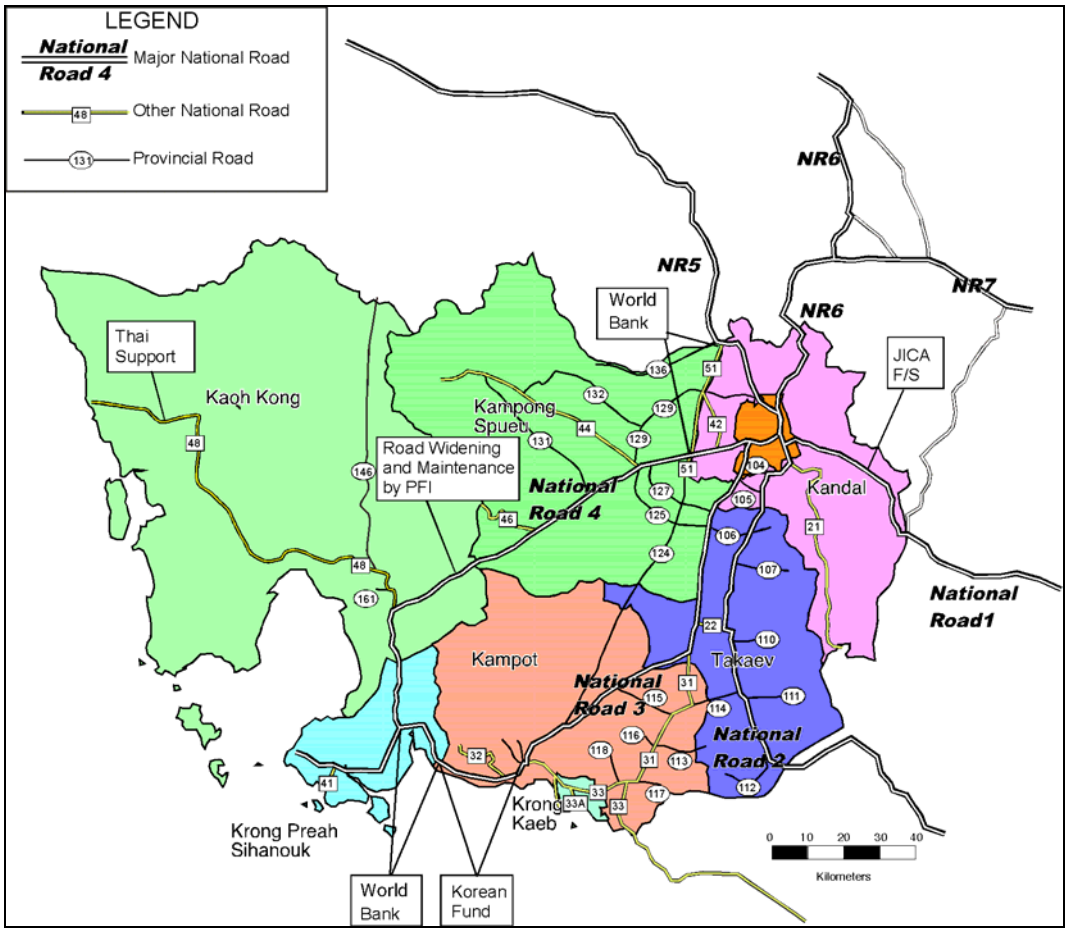


Figure 4-26 Road Network in the Region

(1) National Roads

Table 4-40 indicates all major national roads (single-digit) in Cambodia and other national roads (double-digit) in the Study Area.

Table 4-40 National Roads

Major National Roads

No.	Length (km)	Origin - Terminal	Traffic Volume Estimate (AADT in 2001)
1	167	Phnom Penh - Svay Rieng - Bavet (Vietnamese Border)	2,288
2	121	Ta Khmau - Takaev - Phnum Den (Vietnamese Border)	4,106
3	202	Phnom Penh - Kampot - Veal Rinh	3,822
4	214	Chaomchau - Kampong Spueu - Krong Prea Sihanoukville	6,762
5	407	Phnom Penh - Bat Dambang - Serei Saophoan -Paoypet (Thai Border)	1,876
6	416	Phnom Penh - Kampong Thum - Siem Reab - Serei Saophoan	680
7	461	Skun - Kampong Cham -Kracheh -Stueng Traeng - Voeun Kham (Lao Border)	1,418
Total	1,988		

Other National Roads in the Study Area

No.	Length (km)	Origin - Terminal
21	75	Ta Khmau - Chrey Thum
22	10	Takaev - Angk Tasaom
31	55	Kus - Kg. Trach
32	34	Rolouskia -Bouk Kou
33	52	Kampot - Luxsonn
33a	18	PK 163+090 -Dn.chang oeur
41	10	Kangkeng - Ream
42	22	PK14+000 - Batdoeng
44	84	Kampong Spueu - Roleak Kangcheung
46	28	PK87+877 - Kr. Kirirom
48	138	PK142+350 - Kaoh Kong
51	45	Odongk -Kg. Tram
Total	571	

Source: MPWT.
Traffic Volume Estimate: "*Cambodia Transport Sector Strategy Draft Final Report* " June 2002.

1) Route 3

This route connects Phnom Penh and Sihanoukville via the southern cities. The section between the western end and Kampot is under construction by the World Bank fund and Korean fund. The section between Kampot and Takaev is in fair condition. Between Takaev and Phnom Penh, not only Route 3, but also Route 2 is connecting the two cities. The area along the route is mostly flat and used for paddy fields. The drainage system for the road is also incomplete and some sections of the road are also used as small dams that reduced the lifetime of the roads.

2) Route 4

This route is a major transportation route between Phnom Penh and Sihanoukville. The MPWT introduced a PFI scheme for the maintenance and widening works. A passenger car and a heavy truck are paying US$ 1 and US$ 6 respectively at tollgates.

3) Route 48

This road connects Route 4 and Kaoh Kong. The road has been rehabilitated to laterite pavement with Thai army support. There are four missing bridges on the route. The road will be another important route directly leading to the Eastern Seaboard of Thailand.

The Government of Cambodia has requested that the Thai Government resurface the route with asphalt pavement. The answer from Thailand is still pending. If the whole route is paved with asphalt, the Growth Corridor Region will have another international route.

4) Route 51

National Road 51. This route connects Route 4 and Route 5. The completion of this route will provide a by-pass between Routes 4 and 5.

(2) Other Roads

In addition to national roads, the provincial roads (triple-digits) in the Study Area are shown in **Figure 4-26** and **Table 4-41**.

Table 4-41 Provincial Roads

Province	Numbers	Length (km)
Kandal	104,105	16
Takaev	106-114,169,170,204	132
Kampot	113,115-124	151
Kaoh Kong	146,161	90
Kampong Spueu	124	43

1) Provincial and Municipal Roads

Although these roads are under the management of each provincial or municipal government, their actual budgets are provided by the MPWT. The provincial roads are numbered from 100 by MPWT. More than 80% of provincial roads are unpaved.

2) Rural Roads

Smaller roads than provincial roads are classified as rural roads. Rural roads are under the jurisdiction of the Ministry of Rural Development (MRD). No

inventory or maps of the rural roads have been prepared by MRD. Currently, several maintenance projects are in operation in the Region. Especially, the World Food Program (WFP) has been active in Food-for-work type projects.

(3) Railways

The total length of Southern Line, connecting Phnom Penh and Sihanoukville passing through Takeo, Kompong Trach and Kampot, is 262km. The length of Northern Line, connecting Phnom Penh and Thai border through Pouthisat, Batdambang and Sisophon, is 376km. However, 48km long end portion of the Northern line is now out of services due to the destruction during the civil war.

Only 3 to 4 trains (total of both directions) are operating per day on the Southern Line at present. Each train consists of 17 (approx.) number of freight wagons, including open, covered and tank wagons for petroleum. Marine container transport service is not provided now. However, containers loaded on container wagons are used instead of covered wagons. Passenger service is very poor. Most of the passengers are unwillingly traveling by freight wagons due to the shortage of passenger wagons.

The maximum operation speed is 35 km/h approx. The average speed is 25 km/h, depending on the track, bridge and road bed conditions. Speed limitations (5 to 10 km/h) are given at the destructed bridges having temporarily repaired. It takes 10 hours approx. to connect Phnom Penh and Sihanoukville at present.

The main role of the Royal Railways of Cambodia (RRC) at present is to transport heavy cargos, such as containers, petroleum, cement, etc. securely and constantly, even though operating speed is low. Due to the long lasted civil war, facilities and rolling stock of RRC are severely damaged. In these circumstances, in order to achieve the abovementioned basic role, urgent track restoration, as the first step, shall be executed. If heavy cargos can be transported by the restored railway system, it can be expected to reduce maintenance expenses of roads which are damaged by overloaded and heavy trucks.

4.4.2 Water Supply

(1) Urban Water Supply System

In the Study Area, nine towns have access to piped water (**Table 4-42**). Four (4) water supply systems are operated by private companies, which include a BOT (Built-Own-Transfer) project in Kampong Spueu.

Table 4-42 Existing Urban Water Supply Systems in Study Area

No.	Province	District	Name of Water Supply	Management	Established Year	District Population (1998 Census) (nos.)	Poplation of Served Communes (1998) (nos.)	No. of Connec-tions (2001) (HH)	Estimate Household Size (nos/HH)	Estimated Supply Population (2001) (nos.)	Service Ration (2001) (%)
1	Phnom Penh	Peri-Urban	Phnom Penh Water Supply Authority (PPWSA)	Authority	1895, 1991	999,804	999,804	74,945			** 65%
2	Kandal	Ta Khmau (U)	Ta Khmau Water Utility	Public	1942	58,264	41,171	968	8.0	7,744	19%
3	Kandal	Kien Svay	Mekong Water Electric Supply	Private	1998	148,358	59,791	1,105	8.0	8,840	15%
4	Takeo	Doun Kaev (U)	Water Supply Company of Doun Kaev District	Private	1958, 1993	39,186	28,276	634	8.0	5,072	18%
5	Kampong Spueu	Chbar Mon (U)	Kampong Spueu Province Water Supply Company	Private (BOT)	1997	41,478	52,092	1,915	8.0	15,320	29%
6	Kampong Spueu	Odongk	Odongk Water Supply	Private	1983	99,773	6,556	800	5.3	4,240	65%
7	Kampot	Kampong Bay (U)	Kampot	Public	1951	33,126	28,042	1,346	8.0	10,768	38%
8	Kaoh Kong	Smach Mean Chey (U)	Koah Kong Waterworks	Public	1998	29,329	29,329	367	8.0	2,936	10%
9	Krong Preah Sihanouk Ville	Mittak Pheap (U)	Sihanoukville Water Supply Authority (SWSA)	Public	(1959) 1994	67,440	66,723	1,204	8.0	9,632	14%

Source : MIME; PPWSA; JICA Expert Report; Dept. of IME of Kampong Speu Province; SWSA. ** Source: MOWRAM

About 65 percent of the population in the service area of the Phnom Penh and Odonhk, and from 10 to 38 percent of that in other towns have access to piped water supply. A total of 714,425 people are served with piped water. The served population is only 16.7% of total of the Study Area.

As shown in the **Table** below, each existing water supply plant system has a capacity of more than 1,000 m^3/day. Sources of the water supply systems are mostly surface water (rivers, lakes, or reservoirs). All systems, which use surface water, have treatment plants. However, in Kampot, the current treatment facility does not work because it's old and has had poor maintenance. The facility distributes untreated raw water to supply systems.

Table 4-43 Plant Capacity and Other Information of Urban Water Supply Systems

No.	Province	District	Design Capacity (m^3/d)	Present Capacity (2002) (m^3/d)	Daily Average Production (m^3/d)	Rate of Facility Utilization (2002) (%)	Water Tariff (Riel/m^3)	Water Production Cost (Riel/m^3)	Present Water Demand (m^3/d)	Water Source	Capacity of Water Source	Type of Treatment Plant	Distri-bution System	Future Plan: Rehabilitation Plan, Donor	Future Plan: Development Plan
1	Phnom Penh	Peri-Urban	235,000 (2003)	120,000			350			River (Mekong, Tonle Sap, Bassac)	Enough	Sedi	Pump		
2	Kandal	Ta Khmau (U)	1,200	1,200	700	58%	900	888	?	River, GW	Enough (Riv), Limited (GW)	Clarifier	Gravity (TP), Pump(Well)	Social Fund, On going	Requested to JAPAN (2000)
3	Kandal	Kien Svay	1,500	1,500	300	20%	1,200 (Industry) 1,400 (Domestic)	1,050	> 300	River	Enough	Sedi	Gravity		* Extension of pipe lines
4	Takeo	Doun Kaev (U)	1,300	1,300	200	15%	1,800	?	200	Lake	Enough	Sedi	Gravity		* Extension of pipe lines
5	Kampong Spueu	Chbar Mon (U)	1,400	1,300	550	42%	1,500	1,125	> 550	Prek Thnot River	Limited (Dry)	Sedi	Gravity		* Extension of pipe lines
6	Kampong Spueu	Odongk	1,500	1,500	400	27%	1,500	1,200	500	Reservoir	Enough	Sedi	Gravity		* Construction of Reservoir
7	Kampot	Kampong Bay (U)	4,800	4,800	2,500	52%	1,200	1,166	5,000	Kamchay River	Enough	Clarifier (*not use)	Gravity	ADB, (On going)	
8	Kaoh Kong	Smach Mean Chey (U)	>1,000	>1,000	Dry:340, Wet: 0	34%	15B=1,300	?	> 1,000	Reservoir	Limited (Dry)	Clarifier	Gravity		* Provincial Development Plan
9	Krong Preah Sihanouk Ville	Mittak Pheap (U)	8,000 (2003)	3,000	2,500	83%	1 ~ 15 m^3/M : 1,000, 16 ~ 100 m^3/M : 1,400, > 100 m^3/M : 1,540	1,114	> 5,000	Lake, GW	Limited (Dry)	Mechanical Clarifier	Gravity	WB, (On going)	

Source : MIME; PPWSA; JICA Expert Report; Dept. of IME Dry: Dry Season Wet: Wet Season GW: Groundwater *: Not in use Sedi: Flocculation and Sedimentation Basin Type

In Sihanoukville, the existing plant capacity of the water supply system is only 3,000 m^3/day and the service ratio was only 13% of the population in the service area in 2002.

(2) Rural Water Supply

Outside of piped urban water supply, about 3.56 million people (83% of the total) live in rural areas. Although there is no definite data on the coverage of clean water supply in the Study Area, it is estimated that tube wells with hand pumps serve 39.7% (1,697,580 people), assuming that each well serves 180 persons. There are approximate 8,500 water supply wells reported in the Study Area as shown in **Table 4-44**.

Table 4-44 Estimated Coverage Ratio of Drilled (Deep) Wells

No.	Province	Province's Data				TOTAL	Total	Assumed No.	Population	Popuration	Coverage
		Year	Unicef/MRD	NGOs	Private	DRWS (7/01)	PCB (6/00)	of User/Well	Served	(estimated)	Rate (%)
1	Phnom Penh	1983-2001	1,014			1,014	2,511	180	*182,520*	997,967	18.3%
2	Kandal	1985-2001	2,869	244	0	3,113	3,096	180	560,340	1,073,586	52.2%
	Sub-Total (Metropolitan)		**3,883**	**244**	**0**	**4,127**	**5,607**		**742,860**	**2,071,553**	**35.9%**
3	Takeo	1988-2001	1,596	405		2,001	1,962	180	360,180	789,710	45.6%
4	Kompong Speu	1985-2001	269	992		*2,184*	2,170	180	393,120	598,101	65.7%
5	Kampot	1987-2001	641	340		981	832	180	176,580	527,904	33.4%
6	Koh Kong	1992-2001	24	15	2	41	19	180	7,380	131,912	5.6%
	Sub-Total (Mid-Area)		**2,530**	**1,752**	**2**	**4,284**	**6,038**		**937,260**	**2,047,627**	**45.8%**
7	**Sihanoukville**	**1989-2001**	**77**	**20**		**97**	**77**	**180**	**17,460**	**155,376**	**11.2%**
	STUDY AREA TOTAL		**6,490**	**2,016**	**2**	**8,508**	**11,722**		**1,697,580**	**4,274,556**	**39.7%**

Source : Department Rural Water Supply, Ministry of Rural Development (MRD), 2002.

However, this **Figure** is questionable because almost 30% of the existing hand pumps are broken or not utilized because the water produced is high in salinity or iron, etc. (**Table 4-45**). As a result, many people rely on nearby surface water sources, e.g. ponds, rivers and groundwater from hand-dug wells, despite the fact that some of these water sources are depleted in the dry seasons.

Table 4-45 Well Statistic by Province

No.	Province	Pump Well			(Shallow) Dug Well			Combination Well			Ponds		
		Good	Broken	Total	Good	Broken	Total	Good	Broken	Total	Good	Broken	Total
1	Phnom Penh	2,059	452	2,511	998	158	1,156	4	0	4	720	87	807
2	Kandal	1,753	1,343	3,096	460	177	637	541	5	546	593	160	753
	Sub-Total (Metropolitan)	**3,812**	**1,795**	**5,607**	**1,458**	**335**	**1,793**	**545**	**5**	**550**	**1,313**	**247**	**1,560**
3	Takeo	1,597	365	1,962	494	55	549	259	67	326	433	0	433
4	Kompong Speu	1,743	427	2,170	825	49	874	34	17	51	0	0	0
5	Kampot	445	387	832	0	0	0	0	0	0	165	0	165
6	Koh Kong	4	15	19	20	18	38	0	0	0	3	11	14
	Sub-Total (Mid-Area)	**3,789**	**1,194**	**4,983**	**1,339**	**122**	**1,461**	**293**	**84**	**377**	**601**	**11**	**612**
7	**Sihanoukville**	**53**	**24**	**77**	**11**	**9**	**20**	**0**	**0**	**0**	**0**	**0**	**0**
	STUDY AREA TOTAL	**7,654**	**3,013**	**10,667**	**2,808**	**466**	**3,274**	**838**	**89**	**927**	**1,914**	**258**	**2,172**
		71.8%	**28.2%**	**100.0%**	**85.8%**	**14.2%**	**100.0%**	**90.4%**	**9.6%**	**100.0%**	**88.1%**	**11.9%**	**100.0%**

Source : Department Rural Water Supply, Ministry of Rural Development (MRD), 2002.

Water can be secured in the rainy season. However, the sources, e.g. ponds and dug wells, are exposed to human and livestock wastes because they are located near rice fields or ground depression to facilitate intake. Improperly maintained dug wells are common sources of water borne diseases.

According to the result of the study on Groundwater Development in Southern Cambodia (JICA, 2002), most of the villagers in the Study area obtain water from traditional sources such as ponds, rivers and shallow dug wells, which are often unreliable and polluted. In the rainy season, villagers generally use rainwater for drinking and cooking. Aside from these traditional water sources,

there are also deep wells and combined wells constructed by UNICEF, MRD, and NGOs since the 1980s. Many of these wells are not used, however, due to hand pump breakdown or poor water quality.

Villagers use ponds as their main water source in addition to rivers, dug wells and hand pumped deep wells. Two types of ponds exist in the Study area: the public ponds that are constructed by the villagers themselves, and the family ponds that are constructed with the assistance of the Ministry of Agriculture, Forestry and Fisheries (MAFF).

Many villagers use surface water (pond water) and groundwater (shallow or deep wells) at the same time. The former is used for drinking, while the latter is used for laundry and bathing. Some villages also use water from nearby rivers and canals.

Groundwater is being utilized through the construction of dug and deep wells. Dug wells are generally less than 10 m deep, from 0.5 to 2.0 m in diameter, and are built manually. They are either lined with a casing of wood staves, brick or concrete, and are generally without hand pumps.

Deep wells, mostly constructed by UNICEF and MRD, are generally 30 to 50 m deep with 100 mm PVC pipe casing. The deep well drilling operation is usually stopped after the first aquifer is encountered. Because the water quality is not analyzed, many produce inferior water quality, i.e. high in salinity or iron. Many tube wells have been also constructed by NGOs. In many villages, tube wells producing water of poor quality are not being used or if they are, the usage is limited to laundry, gardening, and livestock raising.

Combined wells were initially constructed by the *Groupe de Recherche et d'Enchanges Technologique* (GRET) followed by NGOs. This well type is a combination of a shallow dug well and a deep well, and is constructed as follows: a deep well is drilled, after which a hole is manually dug all the way to a depth deemed suitable. The tube is cut at the bottom of the excavated hole, and then the water is made to flow into the hole from the tube well. The hole is lined with a concrete ring and covered by a concrete slab (platform). Usually, the well is capped and equipped with a suction hand pump.

As various types of hand pumps have been used in rural water supply projects in this country, UNICEF and MRD are recommending the standardization of hand pumps based on lift capacity, availability of spare parts, and ease of maintenance.

Using the above Figures, the total coverage ratio of access to safe dinking water by piped water supply systems and deep wells in the Study Area is estimated to be only 56.4% at present **(Table 4-46**).

Table 4-46 Estimated Coverage Ratio of Safe Water Supplied

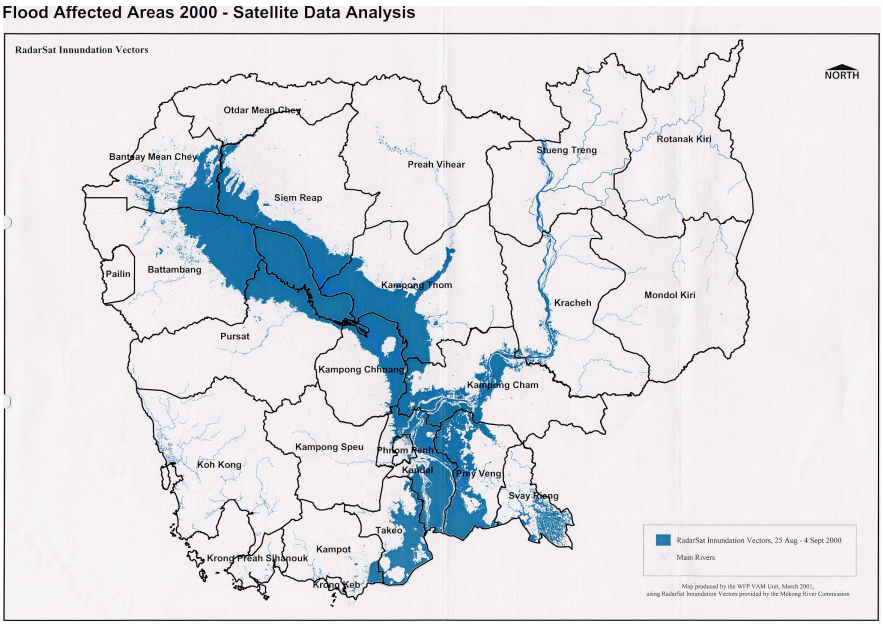
No.	Province	Province's Popuration (nos.)	Estimated Served Population by Water Supply System and Wells			Coverage Rate (%)
			by Pipe W.	by Well	TOTAL	
1	Phnom Penh	999,800	649,873	*182,520*	832,393	83.3%
2	Kandal	1,075,100	16,584	560,340	576,924	53.7%
	Sub-Total (Metropolitan)	**2,071,553**	**666,457**	**742,860**	**1409316.6**	**68.0%**
3	Takeo	790,200	5,072	360,180	365252	46.2%
4	Kompong Speu	598,900	19,560	393,120	412680	68.9%
5	Kampot	528,400	10,768	176,580	187348	35.5%
6	Koh Kong	132,100	2,936	7,380	10316	7.8%
	Sub-Total (Mid-Area)	**2,047,627**	**38,336**	**937,260**	**975596**	**47.6%**
7	**Sihanoukville**	**156,000**	**9,632**	**17,460**	**27092**	**17.4%**
	STUDY AREA TOTAL	**4,274,556**	**714,425**	**1,697,580**	**2412004.6**	**56.4%**
			16.7%	**39.7%**	**56.4%**	

Source : based on data from MIME and MRD

4.4.3 Flood Control and Drainage

(1) Flood and its Damage

Infrastructures for flood control and drainage are especially of importance in the cities along the Mekong. In the year 2000, Cambodia experienced the worst flooding in 70 years. The National Committee for Disaster Management (NCDM) reported the death tolls at 347 (80% of whom were children) in its official report on November 16, 2000. Of the 750,000 families (3,448,629 individuals) affected by flooding, about 85,000 families (387,000 individuals) had to be temporarily evacuated. Furthermore, 317,975 houses were damaged, while 7,068 were destroyed. Based on the NCDM report, the Council of Ministers estimated total physical and direct damage at US$ 150 million. The inundated area of the 2000 Flood is shown in the **Figure 4-27**.



Source: WFP VAM Unit, March 2001. Using Rader Sat Inundation Vectors Provided by MRC.

Figure 4-27 Area Inundated by Flood in September 2000

The 2000 Flood was more serious than previous ones recorded in Cambodia, which had severe flooding in 1961, 1966, 1978, 1984, 1991, and 1996. There is also serious concern that rural to urban migration, changes in land use, environmental degradation and the increasing frequency of the extreme climate event called "La Niña" (cold episode) will result in more severe and more frequent floods in Cambodia.

(2) Flood Control and Drainage System in Phnom Penh

The major area of the Municipality of Phnom Penh is bordered in the east end by the Sap - Mekong - Bassac River system and surrounded by roads and outer ring dikes in the north, west and south. There are a total of nine drainage-pumping stations to drain water to the outside of the dikes.

Major drainage open channels in the City Core are Trabek, Toul Sen and Salang channels. These channels are clogged with debris and sediments in many parts. As a result, the flow capacities are remarkably restricted. The channels have been, from time to time, cleaned up by Department of Public Works and Transport (DPWT) using their own equipment or by subcontracted local firms. The problems, however, have not been solved. The clogging ratio is reportedly 70 to 80% of the original flow areas.

A combined sewer network system was under construction until the end of 1960s with city development. The sewers are mainly round-shaped concrete pipes ranging from 300 to 1,500 mm in diameter and the longitude gradients range from 1/500 to 1/2,000. The pipes are buried with coverings of 0.5 to 3 m, on one side of narrow to medium streets and on both sides of wide streets. A greater part of the sewer pipes are choked with sediment and solid waste generated mainly by inhabitants neighboring. The choke rate is reported as 50 to 90% of their original flow capacities. Along the riverfront of Sap and Bassac rivers, sewer out-falls are found at 17 locations. Some are completely broken and the others are clogged with sediment and wastes.

(3) Ta Khmau (Kandal Province)

Ta Khmau City is located on the right bank of the Chrouy River, a tributary of Tonle Bassac in Kandal Province. Flooding from the Chrouy River occurs in the northwest and southwest areas of the city with an inundation depth of 50 cm to 3 m and a maximum inundation period of 3 months. The drainage and sewerage system is so limited that it causes inundation by local rainfall every year. Inundating water is sometimes drained by movable pumps to nearby areas where another inundation occurs. Water in the drainage channel is heavily contaminated due to the discharge of domestic wastewater.

This flooding, inundation and contaminated water are the constraints that hinder the development of the town. Ta Khmau City is located within the proposed

outer ring road of Phnom Penh and accordingly infrastructure development is an important issue.

(4) Kampong Spueu

Kampong Spueu is located on the banks of Prek Thnot with a catchment area of 5, 200 km^2, and flood water from Prek Thnot often inundates the city area and cause serious damage. Flow of the Prek Thnot often rises after a long spell of rain produced by the influence of typhoons. Large floods happened in 1991, 1993, 1994, and 2000. During the 1991 Flood, inundation depth was 1 to 1.5 m in the lower area of the city. No measures have been taken against flooding.

Drainage and sewerage facilities are not adequate to drain to local rainfall and often cause inundation. Existing drainage facilities in the city are drainage pipes with a total length of 500 m laid around the market and a 300 m-long open channel connecting the drainage pipe to a nearby river. The inundation condition is becoming worse due to the low capacity of these existing facilities and due to the absence of drainage and sewerage facilities in the residential areas extending outside.

(5) Sihanoukville

A combined sewerage system network with a total pipe length of 300 m, which was constructed under the French rule, has insufficient capacity to drain storm water and domestic water due to progressing urbanization. During the rainy season, water sometimes overflows, spilling sewage into the streets and around houses, destroying pavement of the road surface, and thus the water environment is deteriorated. Destroying of sewerage pipes by illegal housing has become another problem recently.

4.4.4 Electricity

(1) Energy Generation and Peak Demand

Energy generation in the study area for the period of 1997 to 2001 is shown in **Table 4-47**. The annual growth rate of total energy generation for this period is 10.8 % in average. In the year 2001, the energy generation of all Cambodia achieved in 484 GWh, out of which 427 GWh (88%) was produced in Phnom Penh (including Takhmao the provincial center of Kandal province).

Table 4-47 Energy Generation in the Study Area

(Unit: MWh)

City/Province	1997	1998	1999	2000	2001
Phnom Penh and Takhmao	286.6	341.5	358.2	380.0	427.0
Sihanoukville	11.6	11.5	14.0	15.9	17.1
Takaev	0.6	0.7	1.2	1.7	1.8
Kampot	2.2	2.5	2.5	2.4	2.7
Kampong Spueu	0.2	0.2	0.2	0.9	0.8
Kaoh Kong	1.6	1.7	3.3	3.6	4.8
Subtotal	4.6	5.1	7.1	8.6	10.1
Total for the Study area	302.8	358.1	379.3	404.4	454.2
Total for all Cambodia	322.1	380.2	404.9	453.6	483.8

Source: MIME and EDC annual report 2001

The peak power demand for the period of 1997 to 2001 in the capital area and Sihanoukville is shown in **Table 4-48**.

Table 4-48 Peak Power Demand in the Study area

(Unit: MW)

City/Province	1997	1998	1999	2000	2001
Phnom Penh (and Takhmao)	52.0	61.0	64.0	70.3	77.6
Sihanoukville	2.4	2.3	2.9	3.0	3.5

Source: EDC annual report 2001

(2) Current Situation of Power Supply Facilities

1) Generation Facilities

The present installed generation capacity of MIME and EDC in the Study Area is 138.9 MW in total as of September 2002, as shown in **Table 4-49**.

Table 4-49 Generation Facilities in the Study Area as of September 2002

(Unit: MW)

Sl. No	Name of Generation Plant	No. of Units x Capacity	Commencement Year	Installed Capacity	Available Capacity
Phnom Penh & Takhmao (in Kandal Province)					
1	C2	3 x 6.0	1967	18.0	15.0
2	C3	2 x 2.1 +4 x 2.8	1973, 1996	15.4	14.0
3	C5	2 x 5.0	1995, 1996	10.0	10.0
4	C6	3 x 6.2	1996	18.6	16.5
5	IPP-1	5 x 7.0	1996-1998	35.0	30.0
6	IPP-Jupiter	10 x 1.5	2000	15.0	15.0
7	Kirirom (Hydro)	2 x 6.0	2002	12.0	12.0
Subtotal				124.0	112.5
Sihanoukville					
1	EDC	2 x 2.5 and others	1998	10.4	6.8
Takaev					
1	Rental	0.625 + 2 x 2.5	-	1.1	0.9
Kampong Spueu					
1	Rental	-	-	0.6	0.6
Kaoh Kong					
1	Power import form Thailand			1.8	1.8
Kampot					
1	Rental	-	-	1.0	0.8
Total				138.9	123.4

In the Phnom Penh area, the total installed generation capacity is 124 MW at present, out of which 62 MW is owned by the Independent Power Producers (IPPs). Although several rehabilitation projects for generating plants have been implemented with the assistance of international institutions after the end of the civil war, EDC has still been facing difficulty in meeting the peak demand in Phnom Penh. The available generation capacity has barely caught up the demand in past years, and EDC is often forced to fully operate all generators at the peak time. Such insufficient generation facilities affect reliability and may cause voltage drops, frequency fluctuation and power failures.

Sihanoukville's generation capacity is 10 MW, consisting of 5 MW (2 units x 2.5 MW) new diesel generators installed under ADB project in 1998 and aged unreliable Russian-made diesel generators. Since the peak demand is 4 MW, only new generators are normally being operated, and the other old generators are kept on standby for maintenance or emergency. The fuel cost of overage generators is so expensive that EDC plans to replace these aged generators with new ones for meeting the growth of power demand in future.

Takev's electricity supply has been managed by EDC since the year 2000 with diesel generators of 1.12 MW on a rental basis. EDC plans to install new diesel generators with a total capacity of 1.5 MW (3 x 0.5 MW) through an ADB Provincial Power Supply Project in 2004.

In Kampot, the power supply system is handled by MIME with diesel generators of 0.86 MW, which are operated and maintained by a private company. Since the existing generation facility cannot meet the actual peak demand of 1.5 MW in the provincial center, a scheduled power cut (power shedding) is being imposed in the town. By 2004, new diesel generators of 2.0 MW are planned to be installed through an ADB project, and the electricity supply to this town will also be managed by EDC from that time.

In Kampong Spueu, the existing generators and distribution facilities were still owned and operated by some private companies in 2002. However, since April 2002 the management of electricity supply in the provincial center has been transferred from MIME to EDC. A new 115/22kV substation began to supply to the private distributors in 2002. EDC intends to construct its own 22kV distribution network in the provincial center and connect it to the grid substation in 2003 or 2004 under an ADB loan, so as to terminate using the private generators and distribution lines.

Kaoh Kong, the provincial center is located at the border with Thailand. The electricity required for this region has been purchased from Thailand through 22kV sub-transmission line with a peak load of 1.8 MW as of the year 2001.

2) Transmission

In Phnom Penh, there was only one 115kV single circuit transmission line connecting substations GS-1, GS-2 and GS-3. Since May 2002, another single-circuit 115kV transmission line has commenced feeding the power from Kirirom Hydro Power Station to Phnom Penh.

There was no interconnection transmission line except as mentioned above in the whole country in 2002. In the other cities and provincial centers, power supply is made through isolated distribution networks under the current situation.

3) Rural Electrification

The household electrification rate is only 8.6% in rural areas, compared with 53.6% in urban area according to the Census of Cambodia 1998 (15.1% in all Cambodia). The electricity supply in rural areas is managed by small-scale rural electrification enterprises (REEs). It is estimated that some 600 REEs are currently existing for supplying to approximately 55,000 consumers in rural areas in all Cambodia.

Small diesel generators, w an average capacity of 105 kVA, are normally operated by REE. The diesel fuel cost, which accounts for 70 to 90 % of generation cost, has doubled in the most recent 2 to 3 years. This remarkable increase of fuel cost has caused many REE operations to get into financial difficulty.

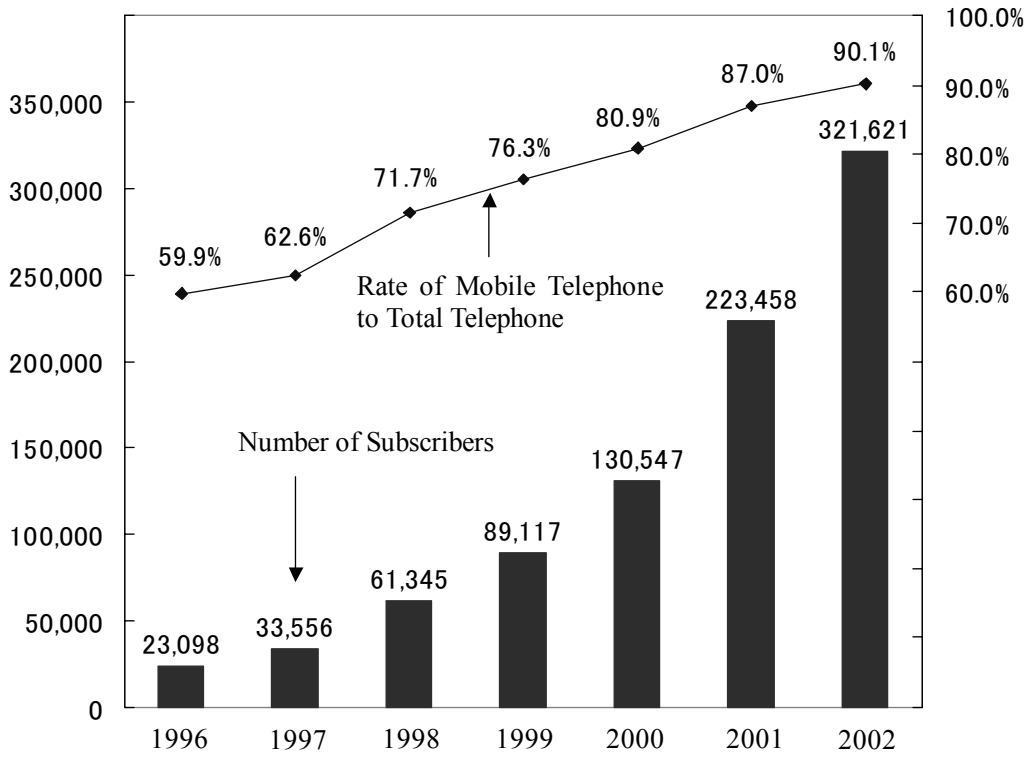
4.4.5 Telecommunication

(1) Present Situation of Telephone Services

1) Whole Country

The fixed phone (including WLL) services in Cambodia are provided to 18 out of 24 provinces however there are only 33,494 lines, therefore the telephone density (the number of the fixed phone per 100 inhabitants) remains quite low. In addition, 84% of the total or 28,207 subscribers are concentrated in Phnom Penh (2001).

During a past decade, the number of mobile telephone subscribers has been increasing dramatically. There were 23 thousand subscribers in 1996 (the end year of the analogue services era), then 89 thousand subscribers in 1999 (the initial year of the "quinquepartite" era). The increase in the number of subscribers continues to accelerate and exceeded 100 thousand subscribers in 2000 and 223 thousand in 2001 then 321 thousand subscribers in 2002. The rate of mobile telephone subscribers to the total exceeded 90% in 2002 and is the highest rate in the world.



Source: MPTC

Figure 4-28 Trend of Mobile Telephone Subscribers

2) Study Area

In Sihanoukville, the CAMSHIN and CAMINTEL provide the fixed phone services and there are 581 lines. The tele-density is 0.3 slightly exceeding the National average. Mobile phone services are provided in Sihanoukville.

All the fixed phone providers (the MPTC, CAMINTEL, and CAMSHIN) provide services for Phnom Penh Municipality. The 84 % of the total of fixed phone subscribers are concentrated into Phnom Penh Municipality as aforementioned. On the other hand, there is no fixed phone service provision in Kandal. The MPTC plans to provide fixed phone services in Kandal by using the Rutel System for 360 subscribers in 2005. The mobile phone services are provided to almost all areas in the Greater Capital Area.

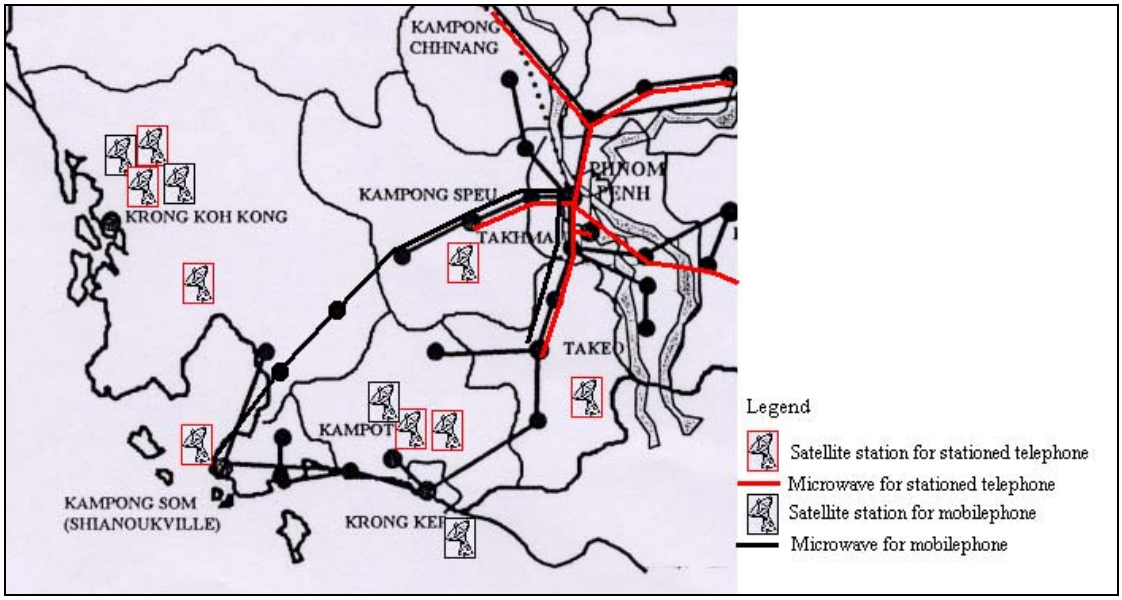
A major player in the fixed phone services in the Intermediate Area has been the CAMINTEL. The CAMSHIN launched services in Takaev in the year 2000. The number of subscribers in the Area is 774 lines and its tele-density (the number of main lines per 100 habitants) remained low at 0.03 in 2001. Mobile phone services are provided in the Areas along National Road Numbers 2, 3, and 4 and in Koah Kong.

Table 4-50 Trend of Fixed Telephone Lines in Study Area

	1997	1998	1999	2000	2001
Greater Capital Area	**18,200**	**21,615**	**24,253**	**24,448**	**26,185**
Phnom Penh	18,200	21,615	24,253	24,448	26,185
Kandal	0	0	0	0	0
Intermediate Area	**313**	**357**	**585**	**747**	**774**
Kampong Spueu	38	43	86	114	130
Kampot	58	91	193	193	195
Kaoh Kong	100	95	129	154	165
Takaev	117	128	177	286	284
Sihanoukville	**174**	**441**	**561**	**585**	**581**
TOTAL	**18,687**	**22,413**	**25,399**	**25,780**	**27,540**

Source: MPTC

The present situation of the telecommunication facilities in the Study Area (such as MW and the satellite station) is illustrated as follows.



Source: MPTC

Figure 4-29 Present Situation of Telecommunication Facilities

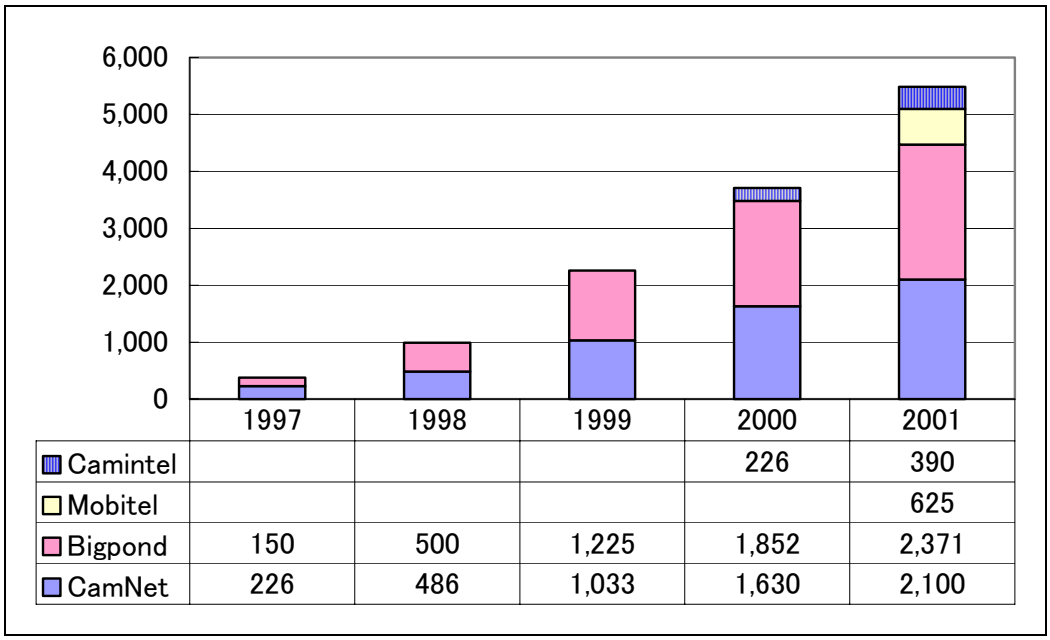
(2) Internet Services

In 1997, Internet services began to be provided in Cambodia. The CAMNET under the MPTC was the first ISP (Internet Service Provider) in Cambodia and launched the services assisted technically and financially by the International Development Research Center (IDRC, Canada). At the same time, the Bigpond under Telstra started to provide Internet services. These two ISPs were the only ones providing services until 2001. The number of subscribers in 1997 was estimated as 376.

In 2001, there were 4 ISPs in Cambodia; the Telesurf under Mobitel and the CAMINTEL[15] were newly issued licenses. The total number of Internet subscribers remained low, 5, 486 subscribers, but it expanded around 15 times during the period from 1997 to 2001.

The contents of services are e-mail services, Internet access services, web-hosting services, etc. Before the year 2000, the provision of services was limited to the Phnom Penh area. Since then the service area has been expanded to several major cities. The CAMINTEL, with 390 subscribers in 2001, mainly provides its services for provinces such as Siem Reap (111 subscribers), Bat Dambang (87 subscribers), Sihanoukville (62 subscribers).

15 The CAMINTEL started to provide the services in 2000 as a second-tier service provider.



	1997	1998	1999	2000	2001
Camintel				226	390
Mobitel					625
Bigpond	150	500	1,225	1,852	2,371
CamNet	226	486	1,033	1,630	2,100

Source: MPTC

Figure 4-30 Number of Internet Subscribers

4.5 ISSUES TO BE ADDRESSED IN THE MASTER PLAN

4.5.1 Primary Industry

(1) Small and Complex Landholding (Overall Study Area)

Landholding is small in Cambodia with 0.9ha/household including a paddy field of 0.7ha. A single rain-fed paddy cultivation per year is the most commonly practiced in the Study Area with no irrigation systems. Rice yield is as low as 2-2.4 ton/ha. In the dry season, farmland is left fallow in most cases. Lack of appropriate cadastral maps causes growing land conflicts. Land concessions are often given without proper consultation with villagers. Land titles are sometimes given to farmers by their communal heads, not by the Government, which have limited power against formal claims. Land titling needs to be accelerated so that the farmers could secure their land. In addition, more intensive use of land should be considered as mention in "(5) Development of Rural Communities".

(2) Poor Agricultural Supports (Overall Study Area)

There is little systematic technology support for farmers by the government, which is part of the reason for limited adoption of modern agriculture practices and poor development of multiple income sources. In addition, farmers have little access to credit, as there is no government program for this purpose. Farmers often have to sell paddy just after harvest to pay for urgent necessities or borrow money from commercial lenders or relatives.

(3) Barriers to Access to Agricultural Markets: (Overall Study Area, especially Phnom Penh and Suburban Areas)

The government claims that the agricultural market is liberalized, government's subsidies abolished, most inputs are supplied by the private sector and that prices of producers and farm inputs such as fertilizers and chemicals, are determined through the market mechanism. Nonetheless the public sector still plays a substantial role in the market. It is also noted that road conditions are very poor in rural areas and, accordingly, farmers cannot bring their products to sell in the market. Therefore, the accessibility to agricultural markets should be improved thorough elimination of public sector intervention in marketing and also improvement of rural roads.

(4) Untapped Potential of Commercial Agriculture: (Phnom Penh and Suburban Areas)

The Phnom Penh and its suburban areas have easy access to the markets of Phnom Penh City with a large demand for vegetables and fruits as well as processed products. However, the area cannot fully harness the potential for

commercial agriculture due to: i) non-availability of improved varieties/hybrid seeds and plant materials; ii) lack of knowledge of improved technology including crop maintenance, insect and pest control, irrigation water management; and iii) limited or insufficient post harvest and agro-processing facilities for commercial crops. Therefore, commercial agricultural development should be planned to fully cater to the market potential.

(5) Need for Development of Rural Communities: (Intermediate Area)

Rural communities are generally poor, since agricultural productivity is conspicuously low with little surplus for marketing to earn cash income. It is noted that there is persistent food shortage in the rural areas for a duration of 1-2 months. In order to raise the rural communities above the subsistent level and increase the surplus for trading, more effective use of farm land should be considered. The farm development will materialize through an introduction and/or rehabilitation of irrigation systems, more use of fertilizers and crop diversification with proper technical support. It should also be considered to increase market value of products through introduction of agro-processing and improvement of post harvesting works in rural communities to earn more cash income.

(6) Deforestation (Intermediate Area)

Rapid depletion of forests is in progress as a result of extensive agricultural land development, harvesting of fuel wood (for charcoal) and shifting cultivation. The deforestation causes a decrease in cash income for local people through selling fuel wood and non-timber forest products. Insufficient replanting and insufficient involvement of local people for forest maintenance are the main problems in the forestry sector. Therefore, a community management system for forestry with an incentive should be formulated to properly maintain forest resources.

(7) Difficulties of Livestock Development (Intermediate Area)

Raising of animals such as pigs and cattle is a very important source of the primary sector development in the Study Area. The methods of raising, however, are inappropriate, with poor genetic resources of animals, prevalence of diseases such as new-castle and foot-and-mouth diseases, poor medication such as lack of vaccine, poor supply of feeds, insufficient veterinary services and a small domestic market. As cattle raising is a prospective source of farm income, the problems in cattle raising need to be addressed properly.

(8) Difficulties of Fishery Development (Intermediate Area and Sihanoukville)

Inland and marine fishery in the Study Area is underdeveloped due to excessive government regulations and inadequate support in terms of technical and financial aspects. Resources of water bodies are considered to be under the control of RGC, and development by the private sector is restricted. Better use of fishery resources is necessary with substantial reduction of regulations and restrictions. Although many farmers intended to establish inland fisheries, they could not do so due to a lack of funds to construct fishponds, no access to fish flies and no knowledge of maintenance of fish. Therefore, proper technical and financial supports are also highly required. For development of ocean fisheries, the fish farming should be developed, since cash income from excess fish is widely observed possible in the coast area.

4.5.2 Secondary Industry

The Growth Corridor is suffering from the following problems that will continue to hinder the further industrial development, unless effective counter-measures are taken.

(1) Complex and Time-Consuming Administrative Procedures

Investors argue that the present administrative procedures for various applications and permits with regard to export and import, registration etc. are complex and time consuming. This issue results in potential corruption and excessive interference of the government, which should be improved urgently. The Growth Corridor has the only international trading port Sihanoukville, and shares the boarder with Thailand and Vietnam, improvement of the application and approval process for export and import and customs clearance is essential for the further development of the area. In particular, a positive decision is imperative for the proposed SPZ in Sihanoukville.

(2) Inadequate Labor Quality

Though a sizable number of unskilled laborers are available in the Growth Corridor due to underemployment in the agriculture sector, the manpower needed for industrial development such as skilled labor and those with knowledge in engineering and business administration is in a critical shortage, except probably for Phnom Penh. Almost all the academic institutions are located in Phnom Penh and no university is established elsewhere in the Growth Corridor.

The central issue arising from this is the inadequacy of middle level Cambodian managers in charge of production at manufacturing facilities. Expatriates

without the knowledge of the language are in charge instead, and this factor is said to contribute to unstable labor relations, and abrupt strikes.

Inadequate supply of the young with good understanding of engineering disciplines is another issue weakening the potential growth of the existing industries and hampering the introduction of new industries.

(3) Poor Infrastructures

In the Growth Corridor area, industrial infrastructures including water, electricity and telecommunications are all inadequate, unstable and expensive, similar to the country as a whole. The situation is more serious in the areas other than Phnom Penh. In the Intermediate Areas, effective industrial infrastructure is almost non-existent. Though Sihanoukville houses a number of investors, in particular FDI, investors have to secure essential infrastructure such as water and electricity themselves. This imposes an extra financial burden to potential FDI to invest in Cambodia.

(4) Lack of Clearly Defined Category Targets for New Industries

Although most people agree that Cambodia needs to introduce new export oriented industries, there are no clearly defined category targets of promotion. As there are various types of potential industries from which Cambodia could benefit, Cambodia's competitive edge would be different depending on the category. It is essential to clearly define the category targets for the industries for which Cambodia endeavors to attract.

(5) Lack of Effective Support for SMEs

While most of the large manufactures are owned and operated by foreign investors, most of the domestic industries are SMEs. SMEs are providing substantial employment in Cambodia, although the level of outputs are generally low. For Cambodia to develop its own industrial accumulation, effective system to support the SMEs is imperative. Most SMEs have little access to long-term finance, and consequently are not capable of improving the production facilities to a level required by FDI manufacturers. This is partly because the managerial skills of SMEs are weak. A comprehensive measure to improve the business environment for SMEs is an urgent task

4.5.3 Tertiary Industry

(1) Tourism Sector

1) Overall Growth Corridor Area

Poor Roads Connecting Major Tourism Sites

The condition of National Roads No 2, 3, 33 and 48 in the Study Area are still poor due to lack of proper maintenance and damage by overloaded vehicles. Access roads to major tourism sites in Takaev and Kampot along NR 2 and 3 are not yet paved and in a poor condition, which makes it difficult for tourists to visit the area by car or bus. NR.4 constitutes a main road network connecting two tourism destinations (Phnom Penh - Sihanoukville) in the Study Area, and is paved in all its length and is in an exceptionally good condition.

Limited Transportation for Accessing Tourism Destinations

Only two routes, Phnom Penh - Sihanoukville and Sihanoukville - Kaoh Kong have scheduled bus and ferry services, respectively. No regular flights fly to the airport in Sihanoukville, nor to the airport in Kaoh Kong. The railway is in service between Phnom Penh and Sihanoukville via Takaev, Kampot and Kaep, but due to the great age of the system it takes a whole day from Phnom Penh to Sihanoukville.

Limited Tourist Information and Facilities

Tourist information facilities and related services are very limited. There is a small tourist information counter near the arrival gate of the Pochenton International Airport. A tourist information space is located at the Department of Phnom Penh Tourism near the Tonle Sap riverfront area staffed by a small number of service staff and it provides pamphlets to serve foreign tourists. Sihanoukville and other provincial tourism offices are utterly inadequate. In the Study Area, only the National Parks (Kirirom, Ream and Bokor) have a visitor center.

Lack of Guide Plates at Tourism Destinations

Guide plates are lacking at most tourism destinations in the Study Area. Some of the tourist sites visited by foreign tourists provide guide plates with explanations and signage only in the Khmer language. Destination signs to tourist sites are not sufficiently provided.

Limited Financial Resources and Budget Allocation for Tourism Development

Despite the fact that international tourism earns sizable foreign exchange in Cambodia, financial resources and government budgets are limited for

improvement and development of tourism facilities and related infrastructure, and resources are scarce for human resources development in the tourism sector.

Lack of Sufficient Tourist Guides

Complaints regarding tourist guides are often made to MOT and private tour operators by foreign tourists, as the guides have a limited tour guiding and language communication capacity. The underlying problem is the present license system and training programs for tour guides provided by MOT. Despite a recent increase in eco-tourism demand at national parks in the Study Area, there is no official licensing system yet for eco-tourism guides. Currently, a park ranger at each national park is in charge of eco-tourism guidance.

Lack of Attractive Tourism Products (Handicrafts and Souvenirs)

The variety of Cambodian tourism products such as handicrafts and souvenirs available in the markets and souvenir shops at hotels in Phnom Penh are limited, and attractive indigenous products in terms of designs, styles and colors are difficult to find, except in a few NGO outlets with expatriate guidance. It is increasingly important to design to the tastes of modern international tourists while utilizing locally available materials and traditional craftsmanship.

Remaining Negative Image of Cambodia

For a number of foreign tourism markets, a negative image of Cambodia including genocide and landmines still persists, limiting the development and promotion of international tourism in Cambodia, as well as in the Study Area. Propagation of images of the positive aspects of Cambodia will be imperative. It should also be reminded that foreign tourists are very sensitive to safety and security as well, and a recent incident in Phnom Penh against Thai nationals must not be repeated.

Creation of Tour Circuits with Various Tourism Sites and Activities

Most tourist resources and sites are located near NR No. 2, 3 and 4. After road rehabilitation work is complete, various tour circuits encompassing the sites and activities appealing to international tourists can be promoted as follows.

Table 4-51 Examples of Tourist Circuits

Name	Tour circuit route
Growth Corridor Tourism Circuit by road (NR 2, 3 and 4)*	Phnom Penh – Kirirom National Park-Sihanoukville (Beaches – Kbal Chhay – Offshore islands – Ream National Park) – Bokor National Park – Kampot Town – Preak Anpil Beach - Phnom Chisou- Neang Khmau Temple - Phnom Ta Mau – Ton Le Bati – Phnom Penh.
Major Tourism Destinations including Siem Reap by air	The tour circuit route is Phnom Penh – Sihanoukville – Kaoh Kong – Siem Reap – Phnom Penh.

* Remark: Koh Kong is included as an optional tour destination using NR 48 in the tour circuit program.

2) Greater Capital Area

Tourism Resources in Phnom Penh

Phnom Penh is a main gateway for tourists and connects to major cities in neighboring countries by air. It also has good access from Ho Chin Min, Vietnam and Sihanoukville by road. Moreover, Phnom Penh is designated as one of the priority areas for tourism development in Cambodia. Phnom Penh offers a mixture of cultural, historical and shopping attractions as the commercial, cultural, and political capital in Cambodia. Tourists can enjoy a Mekong River cruise.

Yet the appeal of Phnom Penh to international tourists is limited, and an increasing number of tourists fly directly to and from Siem Reap via Bangkok and Ho Chi Minh, bypassing Phnom Penh.

French style old buildings in Phnom Penh have cultural and historical value but have been damaged with little preservation work. The Central (Grand) Market in Phnom Penh, for example, is a unique colonial style structure with a cultural and historical value. Those assets need to be preserved and rehabilitated as a tourism resource.

Phnom Penh Requires an Additional International Standard Hotels and Services

Phnom Penh has various types of international standard hotels accommodating a large number of tourists and business conventions. As the number of visitors for sightseeing and business in Phnom Penh increase, additional hotel development will be needed to expand the capacity and diversify the type of services.

3) Intermediate Area

Lack of Accommodation and Limited Tourism Service Facilities

The Intermediate Area lacks in basic infrastructure for tourism. Decent hotels are limited to Kampot and Kok Kaoh in the Intermediate Area, and elsewhere are only guesthouses, most of which are sub-standard for international tourists. There is no tourist information center for foreign tourists. Existing rest areas need to be improved in terms of service level and facilities to serve foreign tourists.

Enhancement of Appeal at National Parks

Kirirom National Park in Kampong Spueu Province has natural pine forests with wildlife and trekking routes, endowed with waterfalls. The park has a potential for eco-tourism for international tourists. Peam Krasaop Wildlife Sanctuary in

Kaoh Kong has a vast area of mangrove and fishing villages with a potential for eco-tourism.

Bokor National Park is a very popular tourist site in Kampot, but an access road to the Bokor Mountain area is severely damaged and needs to be rehabilitated. An old abandoned hotel and church located at Bokor National Park in Kampot Province is a historical asset. The building has deteriorated and been damaged by graffiti on the wall, and needs to be preserved.

4) Sihanoukville Area

Potential Marine/Beach Resort Destination for Foreign Market

Sihanoukville is designated as one of the priority areas for tourism development in Cambodia along with Phnom Penh and Siem Reap. Sihanoukville Municipal Government accordingly gives a high priority to promoting the tourism industry.

Sihanoukville has undeveloped white sandy beaches along the coastline and unspoiled beaches on offshore islands. Marine areas for diving and fishing are plenty. Sihanoukville has a potential as a weekend resort for local and foreign residents in Phnom Penh in the short run, and should continue to improve and develop hotels and necessary infrastructure. In the long term, the possibility should be investigated to promote Sihanoukville as an international marine/beach resort destination with various tourism activities and attractions.

Limited Number of International Standard Hotels and Lack of Quality Service in Sihanoukville

In Cambodia, Siem Reap and Phnom Penh are the primary tourist destinations for foreign visitors. While Sihanoukville is still a domestic tourist destination, it is not yet ready to promote for foreign tourists due to the limited tourism facilities and infrastructure.

Hotels in Sihanoukville are mostly in the low to medium price range with often a lack of quality service. It is necessary to promote the establishment of medium to high standard hotels to serve the growing number of foreign visitors for business and tourism in the future.

(2) Commercial and Other Service Sector

1) Overall Growth Corridor Area

A wholesale market has not been established in Cambodia. As a wholesale market is effective to control market price and fair trade for agriculture and fishery products, urgent establishment needs to be considered.

Banks are limited in number and only exist in Phnom Penh and a few of the provincial centers. Public confidence in banks is generally low, and they only provide short-term loans and credit. There is limited financial and training

support for small and medium-sized enterprises. MPDF (Mekong Project Development Facilities) has been assisting to improve the business environment for SMEs in Cambodia, by strengthening the capacity of local finance and facilitate training, and offering technical assistance. The program of MPDF will be effective in improving and supporting SMEs financially and improving their managerial quality of operation.

2) Greater Capital Area

Phnom Penh is the capital of Cambodia with growing demand of economic and financial activities. It is expected that tertiary industry will be a leading industry to support the regional economy and provide ample employment opportunity.

The Greater Capital Area will be expected to develop into a center of tourism and financial industry. In this regard, an information technology and communication (ITC) system will be essential to serve further improvement and development of the service sector.

3) Intermediate Area

Transportation for goods and passengers has not been sufficiently developed in the Intermediate Area. Improvement of the transportation system will be indispensable to support any commercial and trading business operation.

Likewise, the telecommunication system has not been promoted in the Intermediate Area. Accordingly, people who need a means of communication are heavily dependent on handy phones.

Financial institutions such as banks have only been established in a limited number of provincial centers. In rural areas, about 90 NGO supported programs have been providing micro-finance to rural farmers in Cambodia.

4) Sihanoukville Area

Sihanoukville has a great demand for improvement and development for the commercial and service sectors in order to accommodate the Special Promotion Zone and Export Processing Zone.

If Sihanoukville houses FDI primarily for export processing, various enterprises both foreign and domestic will be required, which could provide various services including logistics, transportation, maintenance, carpentry, printing, office supplies, repair, tuning, skills training and education.

4.5.4 Legal and Institutional Frameworks

(1) Private Sector Investment

1) LOI and SPZ

The RGC has amended the 1994 LOI in an effort to improve the overall investment climate of the country. The Amended LOI[16] aims to implement simpler and more transparent, non-discretionary and predictable principles to regulate FDI and private investments as a whole, with hopes to promote these investments in Cambodia. In order to raise the tax revenue simultaneously, the Amended LOI also proposes to limit and reduce the fiscal incentives, which includes the limitation of incentives to the SPZ.

Under cut-throat competition among the ASEAN countries and China for attracting FDI, Cambodia must provide more favorable conditions for FDI to win the race. More incentives, better administrative procedures, freer environment for business activities and better provision of infrastructures would be needed for this purpose. If it is difficult to realize and provide such conditions on the national level, it may be worthwhile to introduce them in a closed area, multi-functioned special zone.

2) Restructuring and reshuffle of the CIB's organization, procedures and assignment

Since the CIB is responsible for regulating and promoting the private sector investments in Cambodia, it is given a wide range of authorities and rights, starting from the approvals of the investment projects, provision of incentives, assurance of compliance with the requirements for duty-free imports and monitoring activities of the enterprises. With the Amended LOI, the organization of the CIB has to be restructured, and the role and assignment of each department has to be reshuffled. At the same time, some of the administrative procedures have to be improved in order to comply with the principles of the Amended LOI.

(2) Restrictions on exports

To promote trading activities in Cambodian, restrictions on exports have to be improved. Typical restrictions are found in the following.

- Garment export procedures
- Restrictions on fish exports (Although the monopolized export rights of a state-owned company were cancelled, an export tax of 10% remains)
- Lengthy and costly customs clearance procedures

16 At the time of this writing, the Amended LOI has been passed by the National Assembly, but the details of the law have not be made available to the Study Team.

These restrictions create obstacles for the smooth flow of goods, an increase in total cost and opportunities for claiming unofficial charges or fees and, consequently, weaken the competitiveness of Cambodian export industries.

In order to improve these situations and promote trading activities, legal and institutional reform in the troubled areas is urgently needed.

(3) Improvement of the business environment

In the taxation area, the following initiatives are conspicuous.

- LTU (Large Taxpayers Unit) is being strengthened to widen the tax base and raise the tax revenue.
- import duties will keep decreasing due to the implementation of CEPT,
- the share of VAT in the total revenue has been increasing and is expected to keep rising,
- corporate tax and salary tax still remain as a minor source of tax revenue, and
- the administrative cost for collecting import duties in some areas is too high and would not be justifiable.

Together with the problems of refunding VAT for exporters, a more efficient and reasonable taxation system has to be sought.

The current Law on Labor provides a wide range of protective measures for laborers and less liberty to employers. Unions are free to form and the Law protects them. With the absence of a labor court, together they became the causes for frequent labor disputes. USA applies the improvement of conditions in the labor environment as a tool for deciding the bonus increase in the garment export quota, which surely gives an advantage to the labor side. Such labor practice may create in the future a serious obstacle in attracting the FDI in the fields other than the garment industry.

This gives strong powers to Labor Inspectors while the scope of authority of the Labor Inspectors tends to be wide. Although a firm control and guidance in the labor field is necessary, the provision of dominating power to the Labor Inspectors may create too much interference in the business activities.

(4) Business Environment

1) Import duties

As reviewed earlier, Cambodia reduced tariff bands down to four, namely 0%, 7%, 15% and 35%, and the weighted average rate came to 14.2% in 2001. Among them, a moderate rate of 7% is applied to the inputs for domestic production including the materials for garment industry. In 2000,

duty-exempted and dutiable imports of textiles were about US$ 280 million and less than US$ 8 million respectively, and the collected import duty from textile imports was only slightly over a mere US$ 0.5 million. It does not appear reasonable or appropriate to maintain such intricate bureaucratic procedures in order to collect such a small amount of import duty. The monitoring and control system on duty-exempt import of textiles starts from the import approvals by the Monitoring Department to complicated and time-consuming customs clearance. All of them consequently work to raise the institutional costs of the government and weaken the competitiveness of the Cambodian garment industry by forcing them to bear such institutional costs by paying formal or informal fees and charges.

The other problem of the import duty scheme of Cambodia is that the RGC puts priority on the use of the pre-determined dutiable values, which are often higher than the market values for calculating import duties, excise taxes and VAT. This is not consistent with WTO rules, which require use of invoice values or actual paid-values as the basis for such calculations. When this mechanism was applied to gasoline, for example, the retail price of gasoline was pushed up significantly. This leads to encouraging smuggling, and around 70% of the gasoline consumed in Cambodia is presumably smuggled in from Thailand.

2) Taxation

One of the immediate defects in Cambodia's tax scheme is the lack of a double taxation preventive agreement. Without such agreement, the FDI either have to pay the taxes in their home country on the profit distributed on a tax exempt base in Cambodia, or may not be able to deduct the paid taxes in Cambodia from the tax amount payable in their home country.

The second problem is in the reimbursement procedures of VAT for exporters. The exporters are not supposed to bear VAT on their imported materials to be used in the their production of export commodities, exporting products and other materials to be purchased from domestic markets. According to the regulations of the RGC, VAT, once paid upon purchasing the domestic products, is to be refunded when the final products containing such domestic products are exported. In practice, however, receiving a refund of those VAT is a time-consuming process of awaiting the decision of the Tax Department, which may not come at all. This can be a serious obstacle when the RGC intends to promote the SPZ scheme, which will be a different customs territory. Every time the goods cross the border of such Zones, except for the case of direct export, payment of VAT would be required with a promise of refunding upon the export of final products. If the goods have to come in and out of the SPZ for processing to final products, the whole operation would be very complicated and might incur the problem of

double taxation. The refund, in any case, should be settled at the earliest convenience for lessening the capital loads.

The third problem arises from taxation on large companies. The tax relevant sections of the RGC have formed the Large Taxpayer Unit (LTU) and are trying to strengthen tax collection from the large companies. This is partly because the tax collecting ability of the RGC is limited and the efforts tend to concentrate on easier targets, which are larger companies. Heavily dependent on the declining import duties under AFTA, the RGC has to exploit other taxable areas to increase its revenue so that they can meet the condition of expenditure/revenue ratio set by the IMF. Nevertheless, it would not be fair if only the larger firms will be the targets of stringent tax collection, while others firms may escape from such tax obligations, nor most individual persons bear taxes. This trial of strengthening LTU may inflict a negative effect to FDI promotion.

Under Article 28 of the currently effective Law on Tax, the real regime taxpayers have obligation to make prepayment of the Tax on Profit. A large part of the Investment Enterprises, mostly FDI providers that have been registered and granted investment incentives with and by the CDC, fall in this regime. On the other hand, even if they are entitled to a tax exemption period, it only starts from the first year when they record profits from their operation. Hence, Investment Enterprises would be subject to the prepayment of Tax on Profit until such tax exemption period commences. Besides the prepayment of Tax on Profit, there is a Minimum Tax of 1% on the turnover amount, of which the rate of tax is the same as the prepayment of Tax on Profit, to be levied on the real regime firms. As a consequence, Investment Enterprises have to pay monthly an amount equal to 1% of the previous month's turnover as prepayment of Tax on Profit and, at the end of the year, such paid amount will be converted to a Minimum Tax and goes to the national treasury. Many have been pointing out that this practice was quite contradictory to the spirit of LOI but, to date, the Tax Department has not changed their idea and kept collecting prepayment of Tax on Profit. If Investment Enterprises refuse the prepayment, the Tax Department would claim that such Investment Enterprises are not compliant with the requirement for the investment license and may appeal to cancel the privileges previously provided.

Under the Draft LOI and Draft amendment of the Law on Tax, the tax obligations of QIPs for Minimum Tax and Prepayment of Tax on Profit would be deleted.

3) Labor Relations

The Cambodian Labor Law is very generous to workers. Such provisions include:

- Maximum 48 working hours per week
- Limitation of work shifts to two per day

- 50% overtime allowance, 100% night-work allowance ("night" represents a period of at least eleven consecutive hours that includes the interval between 2200 and 0500 hours.)
- Paid annual leave accruing at the rate of one and a half days per month of continuous service. The length of paid annual leave available increases at the rate of one day per three years of service.
- Workers are free to form labor unions, which are given strong rights.

One of the issues accruing from this is that the Law requires time-consuming administrative procedures, which may not have significant effects.

- Every employer must make a declaration to the Ministry in charge of Labor each time when hiring or dismissing a worker. This declaration must be made in writing within fifteen days at the latest after the date of hiring or dismissal.
- The internal regulations shall be visaed by the Labor Inspector. The visa shall be issued within a period of sixty days.
- Every Cambodian national working as a worker for any employer is required to possess an employment card. The employment card is drawn up and issued by the Labor Inspectors. The issuance of an employment card shall be subject to a fee.
- Before being used, all the pages of the payroll ledger must be numbered and initialed by the Labor Inspector.

Under the quota agreement, Cambodia tries to comply with the labor standards to earn a higher quota percentage in the garment exports to the U.S. The U.S.A. will decide at its discretion regarding increasing the ratio, following the assessment of the Cambodian labor conditions. Such an assessment is carried forwards by an on-site inspection in Cambodia. To clear such assessment, the RGC set out relatively higher minimum wages compared to the neighboring countries for the workers in garment and footwear factories, and offered generous working conditions as seen above.

The governmental actions in line with the preferential scheme of trade such as the US Quota may work to improve the trading environment of Cambodia in the short term but, in the longer term, may work adversely with a high and rigid manpower cost structure.

4.5.5 Urban Planning

(1) Weak Urban Planning and Enforcement Mechanism

The urban planning and enforcement mechanism in Cambodia is generally weak. Although the Law on Land Use Planning, Urbanization and Construction

recognizes the need for development master plans and land use plans as instruments for urban planning, the substance and methodology of the planning remain to be established. The lack of approved development master plans and land use plans hinders or even nullifies the enforcement of the urban planning process.

Enforcement of the master plans and land use plans depends on the means of instrumentation. The Law provides "construction permission" as a regulatory instrument. The procedure of construction permission is not substantiated in the Law, nor are any guidelines in effect. Without clearly stipulated procedures and guidelines, the construction permission mechanism only fosters room for uncertainty and unpredictability for developers and investors.

The lack of an approved urban plan inflicts the following problems in the cities in Cambodia:

- Uncontrolled and sporadic urbanization, particularly in the outskirts of the cities, creates communities with little essential infrastructure, such as safe water, electricity, drainage and sewerage, and few essential social services such as schools, waste collection and hygiene,
- Residents in such communities as above often suffer from limited livelihood, poverty and a poor living condition,
- The lack of an approved land use plan inflicts difficulty in securing land for essential urban infrastructure such as roads and public facilities, particularly when land titles are issued to land owners, and
- The lack of a development plan inflicts difficulty in controlling specific construction activities when permits are submitted, which may cause mixing of conflicting land use functions in close vicinity, such as industrial and residential.

(2) Lack of Pilot Model in Development Plan and Land Use Plan

The aforementioned issue of a weak urban planning and enforcement mechanism relates to the lack of a pilot model. As the urban planning involves a wide range of factors pertaining to the livelihood, culture, tradition and social dimensions, simple introduction of a foreign model often fails. Efforts need to be made to establish an indigenous model capable of dealing with various issues pertaining to the cities of Cambodia.

The lack of a pilot model of urban planning restrains the development of appropriate methodologies and capacity building towards the nationwide implementation of a Cambodian version of urban planning. This lack would

enhance the basis for urban sprawl, aggravation of urban poverty and deterioration of living environment in the cities.

(3) Need for Greater Capital Area Development Plan and Land Use Plan

The Greater Capital Area encompassing Phnom Penh Municipality and Kandal Province is the largest urban center of Cambodia, where the staple of the nation's economic activities take place. Although the Law provides that Phnom Penh Committee be established, chaired by a National Committee Chairperson, to formulate the Phnom Penh Development Master Plan, the committee has not yet been formed nor the plan prepared. Lack of an approved master plan for the area not only hinders a sound and harmonized expansion of the city, but also induces aggravation of the urban environment, hampers economic activities and weakens the strength of the metropolitan area, and thereby the nation.

(4) Need for Decentralization of Planning Functions and Capacity Building

Urban planning does not pertain only to large cities. Medium and small cities often provide gateways to larger cities, and thus activate the rural hinterland. There need to be models appropriate for medium and small cities, probably more practical and straightforward than the model for larger cities, capable of addressing the issues of medium and small cities. Considering that most of the provincial cities have a population between 10,000 and 100,000, the planning of these cities needs to be decentralized.

The Law provides that the planning initiatives start on the municipal and provincial levels, submitting draft plans to the National Committee for approval, but neither the regional offices of MLMUPC nor the Municipality/Provinces have the capacity and resources for formulating the master plans.

4.5.6 Human Resources

Currently some 130,000 people in the study area turn 15 years of age each year[17]. Of these, 20,000 continue their study at upper secondary schools. The rest find jobs in their family businesses including small enterprises, and the service sector. The garment and footwear industries employ 20,000 people (mostly girls) as factory workers. The remainder leaves school prematurely (dropouts) or repeat the grades. These dropouts neither qualify for further study at higher education institutions nor for any of the formal vocational training opportunities. Some of these people are left as surplus agricultural workers or irregular/casual employees with low pay.

17 Estimate based on school going population "Education Statistics & Indicators 2001/2002" MoEYS

1) Greater Capital Area

Shortage of Skilled Workers and Technicians

There are many garment and footwear factories operating in the suburbs of Phnom Penh where a number of unskilled female Cambodian nationals work. At supervisory level, however, most positions are filled with expatriates recruited overseas. This practice is not unique to the quota-protected industries such as garments and footwear, but seen commonly also in construction and hotel industries financed with foreign capital. This leads to a vicious cycle; a shortage of qualified Cambodian labor force, and expatriates take positions and thus under employment occurs in the Cambodian labor force.

It is important to replace these supervisory level expatriates with Cambodian nationals.

Example 1. Garment sector supervisor

One of the noteworthy examples is the Garment Training Center (GTC) in Phnom Penh, which was established in 1999 to develop supervisors at garment factories. A four-week training is provided to candidates for supervisor positions. The training expense is borne by the employer of the trainees. Two Japanese instructors together with Cambodian instructors teach classes on production management including machine layout and quality control.

Another example is the Don Bosco Technical School in Sihanoukville, which offers a 2-year Sewing course. This course has proved effective. Some graduates of the course were recruited in garment factories in Sihanoukville, and were soon promoted to supervisory level jobs.

Example 2. Construction (Project) Management

There are a number of foreign construction companies operating in Cambodia. These foreign companies are mostly involved in large-scale donor assisted projects, whereas most Cambodian construction companies with 50 or fewer employees are subcontractors to the foreign companies. It is generally difficult for foreign companies to find qualified Cambodian workers for project managers. Given the high market demand for construction in the Greater Capital Area, it would be important to provide training on construction management. The National Technical Training Institute started offering a two-week course on project management targeting Cambodian construction employees in 2002.

Lack of Career Guidance and Career Counseling at Secondary Schools

There are five public universities, three independent institutes or faculties, and a few private universities in the study area. Since 1996 when the university was authorized to charge tuition to students, most universities increased the enrollments especially in practical courses such as the business administration, marketing and accounting, computer science and languages.

Private universities put an emphasis on business administration, but not in engineering because that requires a large investment for laboratories and equipment. This created a wide gap in the balance of enrollments, and perhaps

in a few years there will be a large number of the unemployed or underemployed among business administration graduates. Industrializing and harnessing Cambodia to be competitive will require more engineers including civil, mechanical, electric, electronic, and IT.

Providing adequate career guidance and counseling is necessary to help the youth for choosing jobs according to their job aptitudes. For the same purpose, the so-called internship at prospective employers (enterprises) is currently promoted at some universities and institutes. Guidance on life skills and perception of work at secondary schools will also be effective in enabling students to find an appropriate career path.

2) Sihanoukville

Lack of Suitable Human Resources Development Programs

Except for public vocational training institutions, most private and informal vocational training institutions provide computer and language skills, because they constitute basic skills for any clerical jobs.

In contrast, there has been little private initiative in training for skilled workers, thus the specific needs of the private sector have not been sufficiently reflected in the subjects and contents of the current vocational courses. Development of partnerships between training institutions and enterprises will thus be important for ensuring the relevance of training course to the market needs.

As shown in Example 3 "Partnership in Training", current vocational training programs do not correspond to the increasing demand in urban sector such as clerical, administrative jobs and other jobs like construction works. Supply of trained personnel should follow market needs.

Example 3. Partnership in Training

Most public vocational training institutions provide traditional vocational training skills like welding, repairing of auto and electric appliances but little effort has been made to develop brick laying, plumbing and carpentry.

Thus, there are unofficially immigrated Vietnamese workers in construction sites, conducting specific types of jobs. Although providing basic skills training for construction workers is often cost effective, private construction companies, particularly Cambodian companies do not provide such basic training due to the financial burden.

It will therefore be important to flexibly adjust the contents offered at the public vocational training institutions, such as the proposed Sihanoukville Vocational Training Center. With a view to sustain and enhance competitiveness of the garment industry in Sihanoukville, training programs similar to those offered at the Garment Training Center in Phnom Penh will be effective. Both the central and provincial governments should be involved in the provision of training until the private sector can take over.

3) Intermediate Area

Lack of Opportunities for Skills Development of the Marginalized and Disadvantaged

In Intermediate Area, an improvement of enrolment and retention in basic education and assistance for the development of their life skills are important.

Less than a third of the children of school age enroll in the lower secondary school in Intermediate Area, but many children are unable to attend schools because of a need to support their families. Non-formal vocational training provides an alternative route for those who have not completed primary level education and assistance to help them make a stable living.

Private training providers are not active in the Intermediate Area due to a small population and limited local economic scale. A short-term (less than 1 year) training course under a public initiative organized at the Provincial Vocational Training Center (PTC) will provide the dropout youths with necessary skills. A micro credit scheme called the "Self-Employment Generation Fund" is open to those who have completed the training program at PTC. With those skills acquired at the institutions, the marginalized and disadvantaged may be able to start up their own businesses.

4.5.7 Social Dimensions

1) Greater Capital Area

Need for Enhancing Income Generation Activities

The proximity of this province to the urban center in Phnom Penh has been providing the residents with an advantage for economic opportunities such as employment in factories. This advantage should be utilized further as an income generation opportunity for farmers.

Need for Attention on The Vulnerable People

The vulnerable refer to a group of people vulnerable to poverty and social changes, such as female-heads of households and people with disabilities, who receive little or no public support and are inadequately equipped with means to earn an income. Real situations of the vulnerable people have not been grasped fully or documented satisfactorily. Official supports for the vulnerable people are utterly limited due to a lack of financial and human resources in the public sector. The ongoing economic development in Kandal province in the suburb of Phnom Penh Municipality would bring about rapid socio-economic changes. The vulnerable people would be the last and the least to benefit from the economic development. No benefit would accrue to them, unless they gain skills to utilize opportunities for increasing their income.

The socio-economic changes may also generate an increasing number of marginalize people such as street children. Those people should also be provided with the skills and opportunities.

2) Intermediate Area

Inadequate Rural Infrastructure Development

Inadequate rural infrastructure is depriving the villagers of opportunities to improve their economic situation and quality of life. Most of the essential infrastructure is inadequate in rural areas, such as the rural roads, small scale irrigation systems, and drinking water supply facilities. Improvement of the essential infrastructure would accrue an immediate development effect.

Low Level Agricultural Technology

The level of technology applied to agriculture by rural farmers is generally low. This is part of the reason for a low yield in the production and failure to prevent damages by pests and diseases of livestock. Efforts by the government to extend agricultural technology to rural areas are inadequate, reaching only a limited number of farmers. New technologies and concepts introduced by donors and NGOs for increasing agricultural production have often exceeded the farmers' capacity for application and incur a sustainability issue.

Need for Health Education

Access to health services in the rural area has not been secured due mainly to a lack of sufficient facilities, low quality and a high cost of health services. While the improvement of the supply side issues continues to require extensive efforts by the government, donors, and NGOs, insufficient knowledge of villagers on health issues and the resultant lack of appropriate actions deprive them of preventive measures for diseases.

Need for Attention on The Vulnerable People

The rate of female-headed households is 18.1 per cent on average. The ratio of the people with disabilities was about 3 per cent. These are the people who often suffer from poverty and unemployment. Official supports seldom reach these vulnerable people, forcing them to rely on their relatives, friends, and neighbors.

3) Sihanoukville

Need for Focus on the Gender Issue

Garment factories employ a number of young girls who come to work from poor rural families around the country. They earn at least US$30 to US$45 per

month, which is often enough to make poor rural households to encourage their daughters to be garment factory workers.

Factory workers in Cambodia sometimes conduct strikes, requesting improvement of their working conditions. ILO has inspected the working conditions in some of the factories and recommended further improvement of the working conditions.

While the life and working conditions of such workers are not known in detail, reports regarding about factory workers including those in EPZ/SEZ in an early stage of industrialization such as in Thailand, the Philippines, Hong Kong, and southern China indicate that a large number of young, female, unskilled workers sometimes experience poor working conditions.

In order to materialize the proposed SPZ in a successful and sustainable manner, yet further studies will be necessary to focus on the working conditions therein, and new regulations and incentives for investors in the SPZ should be established in this regard.

Expanding Informal Settlements by Newly Immigrated Population

Sihanoukville has been experiencing a rapid inflow of population, particularly in the urban area. Recently, job opportunities for ship port building, fishery, construction and in factories, induced an influx of new comers. The increase in population is projected to continue at a high rate until 2015. Development of economic and social infrastructure is thus urgently needed. In parallel, strengthening of education and health administration and services is also urgently required.

The new comers are chiefly poor farmers from poor neighboring provinces, and some of them bring along their families. It often happens that some new comers become poorly paid, daily wageworkers or fishermen. New comers often have to settle in informal settlements, where the basic infrastructure, such as roads, facilities for water supply and sanitation is inadequate and social services poor. These are some of the essential causes for the dispersion of diseases and crimes and pervasiveness of poverty.

There is no formal mechanism to facilitate the local residents to positively participate in the development projects related to their living conditions. The participation and local initiative are imperative for sustainable development of their communities. Without urgent implementation of participatory community development programs, the condition of informal settlements would be further deteriorated with a continued influx of population.

Complexity of Land Issues

Given the nature of Sihanoukville having a deep sea port, a national road in good condition, and many factories, large scale of industrial development are expected in near future. Besides the proposed development of the FZ near the Port of Sihanoukville, the Port Authority has a separate future plan to extend the port area with related development. The area for this extension plan overlaps with two villages, Tonob Rolok and Tamei Villages. The number of families therein is said to be about 2,000 in total, if the development is executed according to the original plan. Due to the complexity of the land registration system in Cambodia, early stakeholder consultation will be required to settle the land issue in an early stage of development.

4.5.8 Environment and Natural Resource Management

1) Overall

Weak Enforcement of Environmental Legislation

The enforcement system for the environmental legislation is not sufficient in Cambodia. Although the basic legislation related to the environment has been established step by step since 1996, the enforcement system itself does not catch up with the purpose of the laws. With insufficient enforcement capacity, the law would have little effect on prevention of environmental degradation.

Effective enforcement of the environmental legislation requires institutional capacity building both in the Ministry of Environment (MOE) and the provincial/municipal departments of environment, enactment of procedures and guidelines for law obedience, a standardized pollution control system which covers a wide range of pollution sources, and a sufficient number of trained experts. It will not be until the above-mentioned factors are satisfied that the effective enforcement of law becomes practicable.

To effectively and efficiently formulate and implement an environmental policy, the present management system with vertical division needs to be unified with the Ministry of Environment as the leading, responsible agency.

Insufficient Solid Waste and Wastewater Management

The volume of solid waste has been rapidly increasing in the provincial/municipal centers not only in Sihanoukville and the Grater Capital Area, but also in the Intermediate Area to a lesser extent. The volume from the market place is especially large. The sub-decree on solid waste management covers all aspects of solid waste management, and requires the local authorities to establish a short to long term waste management plan, though in reality no local level waste management plans have been completed. To avoid adverse

impacts on public health, effective and proper waste management systems urgently needs to be established.

Sewage treatment systems have rarely been constructed except in the provincial/municipal centers, and consequently domestic sewage is often discharged directly to nearby drains or water bodies with no treatment. As a result, the sanitary condition is deteriorating, causing water-borne diseases in the rural areas. To improve the situation, an effective sewage treatment system needs to be established.

2) Sihanoukville

Necessity of Concurrent Attainment of Industrial Development/Urbanization and Environment/Natural Resource Conservation

As extensive industrial development and the subsequent population increase and urbanization are anticipated in Sihanoukville, it is predicted that the municipality will face both increased risk of industrial pollution and degradation of the living environment, such as an increase of domestic wastewater and solid waste discharge. Sihanoukville has beautiful coastal beaches and the Ream National Park with various natural habitats for a range of rare and endangered species of plants and animals. Anticipated industrial development and advancement of urbanization have a risk to affect the rich tourism resource and valuable tropical biodiversity.

Attaining both industrial development and environment/natural resource conservation is an unflinching challenge. Establishment of an effective environmental management system is imperative, but this is not enough to prevent negative impacts from industrialization and urbanization. To tackle this challenging task, waste reduction activities with the participation of all the stakeholders are required.

3) Greater Capital Area

Degradation of Urban Environmental Quality

In the Greater Capital Area, degradation of environmental quality is in progress. The volume of solid waste tends to increase, and consequently the water quality in water bodies receiving wastewater is lower than the acceptable standard in many cases. Industrial development along with a population increase are considered to be the main factors causing the quality degradation. As industrial development and progress of urbanization are predicted to continue in the Greater Capital Area, the urban environment will be further at risk for deterioration, if no effective environmental measures were enacted.

Building capacity for effective enforcement of environment related legislation is imperative in preventing further degradation of the urban environmental quality.

In addition, an environmental policy, which gives an incentive for reducing discharge of pollutants both from industrial pollution sources and households needs to be established.

4) Intermediate Area

Unsustainable Resource Utilization in the Protected Areas

The Intermediate Area has five protected areas. These protected areas embrace large forest areas and provide various natural habitats for a range of rare and endangered species of plants and animals. These natural lands are at risk, however, and the pressure for exploitation is high, as the communities in the vicinity of the forests are heavily dependent on the natural resources in the protected areas as a source of income and subsistence. In addition, illegal capture by wildlife dealers has not been completely eliminated. Deterioration and loss of the protected areas leads to a reduction of the economic value of the protected areas.

Although the law on Environmental Protection and Natural Resource Management affirmed the mandate of the MOE on the protected areas, the institutional capacity to effectively manage and control protected areas is weak because of skill limitations and the budget constraints. Lack of a proper management system with participation of local residents is another factor to accelerate the pressure for excessive exploitation.

Lack of an Effective Management System for Coastal Resource Conservation

The coastal zone encompasses two provinces and two municipalities in the Study Area. Mangrove forests, sea grass beds and coral reefs are found along the coastline, and this marine ecosystem supports coastal fishing grounds. Local fishermen make a living by selling marine products caught in the fishing grounds. In other words, local people can continuously count on the marine ecosystem if it is properly preserved.

Preservation of the marine ecosystem and sustainable utilization of marine resources largely depend on proper management, but the present management system is not sufficient to prevent excessive exploitation of marine resources. In addition, the importance of marine ecosystem preservation is not widely recognized among local people. The lack of an adequate management system leads to degradation of the marine ecosystem and exhaustion of fishery resources. To prevent the situation from worsening, a proper management system needs to be established with the participation of local people, especially in Sihanoukville where development of agro-fishery industry is expected.

4.5.9 Infrastructure

(1) Common Issues

1) Decrease of Utility and Transportation Costs

High utility and transportation costs often disappoint FDI that have come to locate their facilities in Cambodia, attracted primarily by competitive wages. This issue has been one of the major issues discussed among the public and private sector people in recent years. Especially, the electricity tariff and the container exporting charge are concerns of foreign investors.

2) Better Partnership between Private and Public Sectors

The Government of Cambodia has been introducing various Private Finance Initiative (PFI) schemes such as one for concessionaires under a BOT contract for infrastructure development. Currently, several schemes such as road maintenance and airport management are in progress. In general, the PFI schemes are working successfully in the specified scope, if proper assessment of the contract arrangement is done, including appropriate sharing of the relevant risks by the private and public sectors.

3) Prioritization to Support Exporting Activities

The most important function of infrastructure development in the Growth Corridor Region is to support the nation's industrial development and export promotion activities. Accordingly, the Port of Sihanoukville, and areas along National Route 4 have been prioritized.

4) Expansion of Services to Rural Areas

The expansion of infrastructure services to rural areas does not have a promising future. Currently, there are few schemes for rural infrastructure provision. It is necessary to introduce an effective and sustainable institutional setup for infrastructure provision to the rural areas.

(2) Transportation

1) Adaptation to Containerization and Diversified Flow

Most imported containers from Sihanoukville Port are transported to Phnom Penh on the road. More than 300 TEU containers per day are transported between Sihanoukville Port and Phnom Penh. All container trailers use National Route 4. There are several Inland Container Depots (ICDs) around Phnom Penh, both public and private. The following measures are conceivable for smoother container operations:

- Better services for container trailers along Route 4 (Improvement of the road, provision of a service area, etc.),

- Provision of a sophisticated ICD operation on the Phnom Penh side, and
- Preserving an option for rail transportation of containers (as a future plan)

In addition to using the Sihanoukville gateway, it is also possible to transport containers to Ho Chi Minh City on the Mekong River or on the road. A container liner launched between Phnom Penh and Ho Chi Minh Port will be an in-transit cargo, they are required to pay additional charges such as transit fees to pass through the Vietnamese territory. In the long run, the progress of AFTA and implementation of protocols under the "Agreement for Facilitating the Cross-Border Movement of Goods and People" will smooth the land transportation of containers to Ho Chi Minh.

2) Effective Road Maintenance

Full implementation of the current Five Year Master Plan of Road Rehabilitation will require a large expenditure, which will only be possible with the assistance of international development partners. It is necessary to prepare for financing the immediate needs for the maintenance of roads. In the Growth Corridor region, the necessary expenses to provide for the maintenance of Route 4 has been agreed upon with a PFI type of scheme, in which the toll fee from users will be allocated for the maintenance.

On the other hand, the outlook for maintenance of other roads is not bright. Especially, Route 3 is vulnerable to natural disasters such as flooding. Route 48 is prone to erosion and sliding. In addition to countermeasures for disaster prevention, routine and periodical maintenance are required for the routes. It is appropriate to install water drainage facilities for the road bases and provide proper revetment on the embankment slopes.

Furthermore, a considerable input will be required to establish a sustainable and effective maintenance system for the provincial and rural roads. The required inputs are not only financial resources but also a sustainable institution based on the participation of local residents.

3）Effective Use of Railway Infrastructure

As stipulated in 4.4.1, very limited number of train are operated on the existing Southern Railway Line. This low utilization of the railway system is due to the extremely poor condition of the existing railway facilities including deterioration of wooden sleepers and bridge structure. The existing railway condition can be esteem to be so poor that the train operation is no longer done if no urgent remedial measure is provided.

On the other hand, if the suitable remedial works are made to the extent so that the railway system can transport heavy cargos reliably even at slow speed, it can

be expected to reduce maintenance expenses of roads which are damaged by overloaded and heavy trucks.

Therefore it is recommended to execute urgent railway restoration works.

(3) Water Supply

1) Strengthening of Institutional Base

Institutional issues relate to water resources management are described in the "National Water Resources Strategy" (MOWRAM, 2001) as follows:

The existing policies and strategies are merely sectoral, and there are no mechanisms for coordination. Likewise, the water-related legislation in force takes into consideration sectoral aspects of water resources management, mainly relating to the functions of sectoral institutions. Important aspects, such as those relating to the use of water resources, are not regulated.

Before 1999, when the Ministry of Water Resources and Meteorology (MOWRAM) was created, water management functions were scattered among various ministries and agencies. So were the data and information on water resources. The MOWRAM's predecessor was the General Directorate of Irrigation, Meteorology and Hydrology of the Ministry of Agriculture, Forestry and Fisheries. Although at present those water-related functions are centralized in the MOWRAM, data and information on water resources are still in possession of different ministries and agencies. Efforts were made at the MOWRAM to strengthen the data and information systems available and strengthening the existing institutional capacity. All the water-related data including those on groundwater and on water quality should be made available at or at least accessible to the MOWRAM, as it is the legitimate authority responsible for water resources management nationwide. This would enable a concurrent assessment of the quantity and the quality of available water resources.

The Draft Law on Water Resources Management stipulates that all data and information related with water must be submitted to MOWRAM.

2) Long Term Source Development

One of the key issues of industrial development in Sihanoukville is securing a stable and sustainable water source both for municipal and industrial uses. Because the current water sources are limited in the Sihanoukville area, it is necessary to prepare for the development of new water sources carefully on a long-term perspective. This Study will make a few proposals later in this report, which should be examined in detail in accordance with the water demand of industrial sector around the Sihanoukville area, and from technical perspectives.

(4) Flood Control and Mitigation

1) Preparation of master plan and its implementation

The damage by flooding is been unexpectedly getting more intense in recent years. Flood control and mitigation require long-term countermeasures. While Phnom Penh has formulated a master plan with the assistance of JICA, other cities need to prepare a master plan for flood control and mitigation. Once the master plans are complete, the step by step implementation of component projects proposed in master plans will be important.

2) Rehabilitation of Existing Facilities

The civil war left the urban drainage system unattended for a number of years. The existing sewers and drainage systems require extensive rehabilitation. It is necessary to establish a system for regular cleaning at each municipality.

(5) Electricity

1) Reduction in Electricity Rate

Electricity prices are extremely high in Cambodia, as stated earlier. **Table 4-52** shows the electricity tariff in the Study Area.

Table 4-52 Electricity Tariff as of the year 2001

City/Province and Category	Riels/kWh	USD/kWh
Phnom Penh and Kandal		
Residential		
0-50 kWh	350	0.09
51-100 kWh	550	0.14
>100 kWh	650	0.16
Industrial and Handicraft		
0-45,000 kWh	600	0.15
45,000-80,000 kWh	550	0.14
80,000-130,00 kWh	550	0.14
>130,000 kWh	500	0.13
Medium Voltage	480	0.12
Commercial & Services Sectors		
0-45,000 kWh	650	0.16
45,000-80,000 kWh	600	0.15
80,000-130,00 kWh	600	0.15
>130,000 kWh	500	0.13
Medium Voltage	480	0.12
Hotel & Guest Houses		
0-45,000 kWh	650	0.16
45,000-80,000 kWh	600	0.15
80,000-130,00 kWh	600	0.15
>130,000 kWh	500	0.13
Medium Voltage	480	0.12
Embassy, Foreigners'House, NGO, OI	800	0.20
Government Institutions	700	0.18
Sihanoukville		
Residential	500	0.13
Industrial and Handicraft		
<20 000 kWh	686	0.17
20 000-50 000 kWh	690	0.17
50 000-110 000 kWh	568	0.14
>130 000 kWh	529	0.13
Commercial		
<20 000 kWh	764	0.19
20 000-50 000 kWh	706	0.18
50 000-110 000 kWh	643	0.16
>130 000 kWh	588	0.15
Hotel & Guest Houses		
<20 000 kWh	784	0.20
20 000-50 000 kWh	721	0.18
50 000-110 000 kWh	666	0.17
>130 000 kWh	627	0.16
Embassy, Government Institutions	760	0.19
Takaev		
Overall Sector	900	0.23
Kampot		
Overall Sector	1200	0.30
Kompong Spueu		
Urban area	1500	0.38
Suburb area	1700	0.43
Kaoh Kong		
Overall Sector	500/600	0.13/0.15

The high price of electricity is a great concern in the power sector in Cambodia. The electricity price is 14.6 cent/kWh on average, and is much higher than that of neighboring countries. For instance, electricity tariff for residential consumers is 2.72 cent/kWh on average in Lao PDR. Among the causes for the high electricity price are use of imported fuels, deteriorated power supply facilities, and large distribution losses. Such expensive electricity cost has an adverse

impact not only on growth of the electricity consumption but also on the economic growth in the country.

2) Improvement of the Reliability of the Power Supply

The generating capacity in most urban area is not enough to cover the drastic recent growth of power demand. The insufficient generation capacity has affected the electricity reliability, causing voltage drops, frequency fluctuation and sometimes power failures. Most of the large scaled consumers such as factories, hotels, and shopping centers, use their own generators even though they have access to the pubic electricity supply. This captive generation has hindered the growth of power demand of the grid for a long period, and there is apparently a huge demand in the country, untapped by the public utilities.

3) More Electrification to Rural Areas

Since the electrification of rural areas has not been launched in Cambodia, the national household electrification rate remains as low as 15.1 % in all Cambodia[18]. The electrification rate in rural areas is extremely low at 8.6%, compared with 53.6% in urban areas. This low electrification rate is one of the causes for the poverty in the rural area.

(6) Telecommunication

Ministry of Posts and Telecommunications (MPTC) launched the Five Year Master Plan for Telecommunication Development with the target year of 2005. The present, telecommunication subscriber rates are 2.08 per 100 population and is forecast to reach 3.18 subscribers per 100 population in 2005, covering almost all cities throughout the country.

In the Study Area, MPTC has a plan to lay optical fiber cables between Phnom Penh and Sihanoukville along the Route 3 and 4. The city and towns along the routes including Sihanoukville will be provided with the best telecommunication service, which will also cover the industrial users in Sihanoukville.

Concerning the IT development, MPTC plans to implement *e-government* and the national IT infrastructure such as a computer center and high-speed network in Phnom Penh.

In this context, the following are conceived as the issues to be addressed for the improvement of the telecommunication environment in the Study Area.

[18] Census of Cambodia, 1998.

1) Provision of Telecommunication services to cope with growing demand

The development of the optical fiber cable (F/O) along Routes 3 and 4, defined as the national backbone telecommunication project, should be realized to improve the telecommunication service quality in the Study Area.

2) Provision of IT Services and Human Resources Development

The acceleration of IT infrastructure development in Sihanoukville will contribute to the promotion of FDI and industrial development. Concurrently, qualified IT engineers and experts should be nourished in response to the demand by FDI enterprises for human resources with high IT skills.