

1.5 Priority Projects/Programs

1.5.1 Old Quarter Area Improvement Project (ID No.U-1, No. U-3 combined)

(1) Project/Program Background

The central urban area is the center of administrative, commercial and tourism center of Siem Reap. The basic infrastructure of the city center, such as the road grid, was established in 1930's under the French Protectorate. Around the central urban area is the peri-urban sprawl area where the infrastructure is generally poor. If no effective measure were taken, the whole area would face the deterioration of urban environment with pollution, congestion and random expansion of housing units without provision of essential urban services.

(2) Project/Program Outline

1) Project/Program Purpose

This project aims at making the Old Quarter area of Siem Reap more attractive for tourists and residents alike, by implementing mostly high priority urban infrastructure improvement needs, based on the visions and framework established under the present study. While the Old Quarter of Siem Reap district has quite a few old buildings built during the French Protectorate in early 20th Century, poor infrastructure is causing various problems such as environmental pollution, traffic congestion and random expansion of housing units with a focus on the improvement of the urban environment as well as enhancing the townscape of the quarter capitalizing on the historical gift.

Tackling these urban problems, development of urban roads together with provision of easy to walk sidewalks with tree lining along major roads is essential and effective measure for urban development.

The project will be a multi-sector urban improvement project managed by the Provincial Government with the participation of relevant ministerial departments and APSARA.

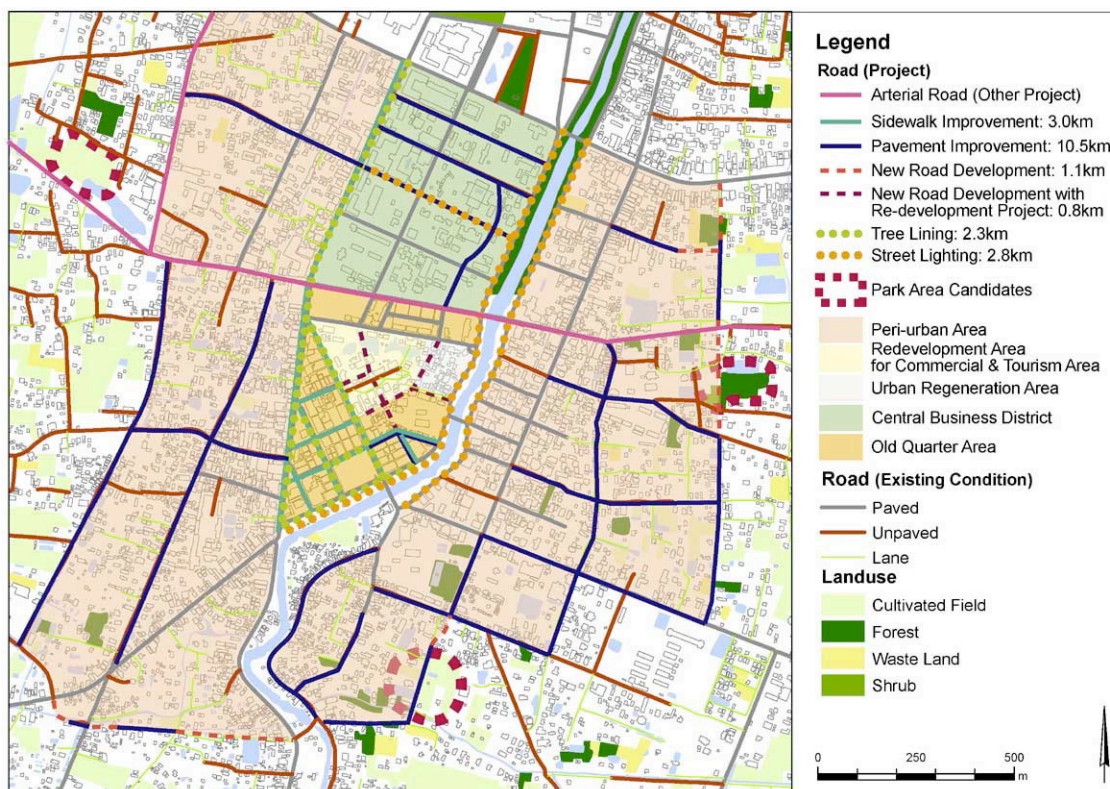
SRAT proposed "Development Committee for Siem Reap", and this will be the coordination body of the multi-sector urban improvement.

2) Target Area/Location

Old Quarter area and peri-urban area in its vicinity are shown in the following map.

3) Prospective Beneficiaries

The expected beneficiaries of the project will be the urban population of Siem Reap (approximately 90,000) and visitors.



Source: JICA Study Team

Figure III.1.20 Overall Plan for Old Quarter Improvement Project

4) Project/Program Components/ Activities

The project will include the following components.

(a) **Component 1: Improvement Designing** **Preparation of Inventory for historical buildings**

There are a number of architectural pieces with the French Colonial atmosphere in the blocks adjacent to the Old Market. There are a few old buildings from the French Protectorate era, and there are some others that were built anew following the French Colonial style. The overall townscape of the Old Market area is relatively well preserved. The urban heritage is a precious resource of Siem Reap that may put additional attractiveness to the Angkor tourism.

This component aims at conducting an inventory survey of the old buildings in Old Market area to clarify the year of construction, stylistic characteristics and value for preservation to provide a basis for future preservation and rehabilitation work.

Basic Design of Urgent Urban Infrastructure Improvement

Following the results above, the basic designs for urgent urban infrastructure improvement shall be developed. The urgent improvement shall be selected so as to be effective in improving the total attractiveness of the Old Quarter area and its vicinity. The items to be studied are listed below under Component 2.

(b) Component 2: Implementation**Improvement of Sidewalks: about 3.0 km (Sivatha Avenue and Streets within Old Quarter Area)**

Poor pavement of sidewalks causes lack of attractiveness of city center area and danger of pedestrians. Sidewalk improvement of Sivatha Avenue and streets within Old Quarter Area where is the center of commercial and tourism is necessary to ameliorate urban amenity and safety for both residents and tourists.

Tree Lining in Old Quarter Area: about 2.3 km (Sivatha Avenue and Streets within Old Quarter Area)

Street trees create comfortable environment in urban area and are indispensable to amenity of pedestrians. In city center area, street trees around royal palace have provided good atmosphere for long time, however, that has not been extended to Old Quarter Area. In order to integrate city center area, tree lining along the streets is effective measure.

Improvement of Street Lighting: about 2.8km (mostly along the Siem Reap River)

In city center area, there exists many streetlights, which is dark, or not working. Basically, streetlights provide convenience and safety for pedestrians. Improvement of street lighting is strongly needed for both residents and tourists to make it possible to walk in the night in safe.

Construction of an Urban Park

Park located in the west side of the French bridge is the only one park that exists in city center and peri-urban area. Regarding the urban population of nearly 90,000 persons, park area is absolutely lacked in this area. Therefore, certain size of park area should be secured when land acquisition for new road construction is started and construction of park should be implemented. The candidate area for park area is indicated in the above figure.



An Artist Image of an Urban Park

Redevelopment of the Provincial Hospital Area

The site of provincial hospital is a large public land area in city center. When it is redeveloped to commercial and tourism area, areas for road, park and parking should be considered.

As this block is located between the Old and Central Market, the



An Artist Image of a Shopping Street

commercial potential is high and a shopping street inside an urban park may be considered here.

Redevelopment of the Crowded Area in City Center

Redevelopment of certain area where has crowded small housings will be needed to create new urban center for commercial and tourism to make city center more active and attractive. When redevelopment will be implemented, development of roads, Public Park and parking area should be considered.

Improvement of Pavement of Urban Roads: about 10.5 km (mostly in Peri-urban Areas)

In peri-urban areas, since there is no paved road with certain width that forms urban frame, random housing development is sprawling out. In order to regulate the urban sprawl and make an efficient grid urban roads in these area, existing road improvement is essential for urban development.

New Construction of Roads: about 1.1 km (for East and South Boundary of Peri-urban Area)

There are some missing links to make grid roads following above concept of the improvement of urban roads. To complete urban road network in peri-urban area, new roads should be constructed.

5) Project/Program Output

The direct output of the project will be creating of a clean, attractive and safe urban environment in the target area. The indirect output is establishment of a coordination system of various ministerial departments under the Provincial leadership, and capacity building required for continuous implementation of similar projects in other locations.

<Present>

<Future>

Old Market Area

<Present>

<Future>

Sivatha Street

An Artist Image of Old Quarter Improvement

6) Project/Program Input

The inputs to this project will be:

1st Year – Inventory Study and Basic Design

- Inventory survey; 4 months
- Basic Design (Consulting service); 4 months

2nd Year - Implementation

- Construction; 10 months
- Soft component

7) Environmental and Social Impact

The project will have little social and environmental impact.

(3) Institutional Arrangement and Implementation Schedule**1) Implementation Organization**

Siem Reap Provincial Government, in collaboration with Department of Land Management, Urban Planning and Construction and APSAR Authority.

2) Operation and Maintenance Organization

Siem Reap Provincial Government, in collaboration with Department of Land Management, Urban Planning and Construction and APSAR Authority.

3) Implementation Schedule

Project preparation: 2006

Project Implementation; 2007 - 2008

(4) Financial Arrangement**1) Preliminary Cost Estimation**

Project Cost

The total cost of the project is estimated to be US\$ 7.6 million.

The details of the project cost are as follows;

1) Direct costs		1,862
2) CAPACITY BUILDING		
3) Physical coat.		186
4) Price Escalation		205
5) Engineering service		186
	sub-total	2,739
6) Land acquisition		4,864
	TOTAL	7,603

Operation and Maintenance Cost

2) Expected Funding Sources

The expected funding source is the grant aid for the official development aid program of Japan, together with the Grant Fund for Overseas Development Study of JICA (for component 1).

1.5.2 Urban Planning Capacity Building (ID No.U-2)

(1) Project/Program Background

Though Cambodia has a law and regulations for urban planning, the implementation system is still in developing stage, due mainly to the lack of experience, insufficient administrative and technical capacity and lack of confidence. Despite the law on Land Management, Urban Planning and Construction, no plan has so far been approved according to this law. Lack of proper urban planning pauses a risk of urban sprawl and deterioration of urban environment in terms of insufficient urban services and essential infrastructure.

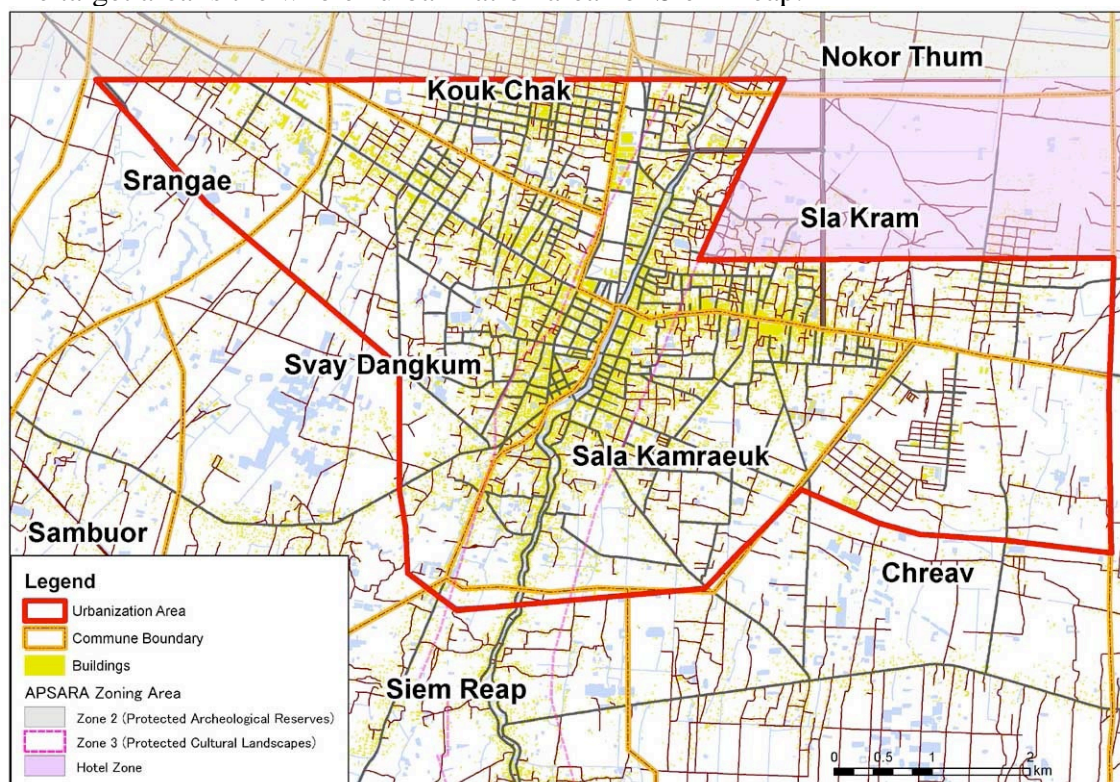
(2) Project/Program Outline

1) Project/Program Purpose

This project aims at assisting the local government to enhance the capacity to formulate and establish the urban development plans, and sustainably enforce the urban planning visions and land use plan by using GIS and other information system.

2) Target Area/Location

The target area is the whole “urbanization area” of Siem Reap.



Source: JICA Study Team

Figure III.1.21 Boundary of the Urbanization Area

3) Prospective Beneficiaries

The expected beneficiaries of the project will be the urban population of Siem Reap (approximately 90,000) and visitors.

4) Project/Program Components/ Activities

The project will include the following components.

Assistance to Formation of Provincial and National Committees

This component relates to Article 3 of the Law. While the Cambodian side shall form the Committees for Land Management, Urban Planning and Construction both on the National and Provincial levels (in Siem Reap), the project will provide assistance and guidance to the institutional setting and frameworks.

Assistance to Use of Geographical Information System

In order to facilitate the urban planning based on the analytical methods, use of the geographical information systems (GIS) is recommendable as a tool to analyze and integrate the present conditions and future prospects. The project will provide assistance to the capacity building with regard to the use of GIS tools for planning procedure.

Assistance to Formulation of Urban Development Master Plan

This component relates to Article 5 of the Law. Following the results of the SRAT report, while the Cambodian side shall prepare the Urban Development Master Plan and Land Use Plan to be considered by the Provincial Committee for Land Management, Urban Planning and Construction, the project will provide assistance and guidance to the technical guidelines and advise as to the contents and methods of the plan.

Assistance to Facilitation of Public Participation to Urban Planning

Urban planning practices shall need to devise participation of general public as stakeholders for development planning. The project shall assist the implementing agency of the project in holding the public hearings and seminars, induction of participation, and reflecting the opinions expressed in these public participation meeting.

Assistance to Enforcement of Urban Planning

The enforcement of the established urban development master plan and land use plan shall depend on the permission for buildings and land development. Coordinating the relevant agencies and organizations by establishing check lists and guidelines for permissions, the project shall assist the Cambodian side to substantiate the regulatory and enforcement capacity.

5) Project/Program Output

The output of the project shall be the first example of the urban development master plan and land use plan as approved by the Law. This shall pave the road for other provinces and municipalities to follow up with their own urban master plans.

6) Project/Program Input

The inputs for the projects are considered to be the following.

Urban Planner/ Tema Leader (4 M/M)

Land Use Planner (4 M/M)

GIS Specialist for Urban Planning (4 M/M)

Public Participation Specialist (3 M/M)

7) Environmental and Social Impact

The project will have little or no social and environmental impact.

(3) Institutional Arrangement and Implementation Schedule

1) Implementation Organization

Siem Reap Provincial Government, in collaboration with Department of Land Management, Urban Planning and Construction and APSAR Authority.

2) Operation and Maintenance Organization

Siem Reap Provincial Government, in collaboration with Department of Land Management, Urban Planning and Construction and APSAR Authority.

3) Implementation Schedule

Project preparation: 2006

Project Implementation; 2007

(4) Financial Arrangement

1) Preliminary Cost Estimation

Project Cost

The total cost of the project is estimated to be US\$50 million.

2) Expected Funding Sources

The expected funding source is the official development aid (grant) for technical cooperation.

JICA - Study on Integrated Master Plan for Sustainable Development of Siem Reap/Angkor Town
Project Brief
Sector: Urban Development

No	Project Title	Beneficiaries and/or Target Group	Assumed Fund	Estimated Cost	Project Priority
U-1	City Center Area Improvement Project	Urban population of Siem Reap (approximately 90,000) and visitors	Foreign Aid (Grant)	7,600 (thousand US\$)	Priority
	Project Site	Department	Contact Person	Telephone	E-mail
	In and around the city center of Siem Reap	Implementation Agency			
	Siem Reap Province, APSARA				
	<p>Background:</p> <p>The city center area is the center of administrative, commercial and tourism center of Siem Reap. The basic infrastructure of the city center, such as the road grid, was established in 1930's under the French Protectorate. Around the city center area are the peri-urban sprawl area where the infrastructure is poor. If no effective measure were taken, the whole area would face the deterioration of urban environment with pollution, congestion and random expansion of housing units.</p> <p>Project Purpose:</p> <p>This project aims at implementing various infrastructure needs with high priority of implementation, based on the visions and framework established under the present study. The project will be a multi-sector urban improvement project managed by the Provincial Government with the participation of relevant ministerial department.</p> <p>This Study proposed "Development Committee for Siem Reap", and this will be the coordination body of the multi-sector urban improvement.</p>	<p>Project and Program Outline/Components:</p> <p>(1) Improvement of sidewalk: about 3.0km (Sivatha Avenue and streets within Old Quarter Area)</p> <p>(2) Tree lining in Old Market area: about 2 km (Sivatha Avenue and streets within Old Market)</p> <p>(3) Improvement of street lighting: to be determined (mostly along the Siem Reap river)</p> <p>(4) Construction of an urban park</p> <p>(5) Redevelopment of the Provincial Hospital Area</p> <p>(6) Redevelopment of the crowded area in city center</p> <p>(7) Improvement of pavement of urban roads: about 10.5km (mostly in peri-urban area)</p> <p>(8) New construction of roads: about 1.1km (for east and south boundary of peri-urban area)</p>			
	<p>Environmental and Social Impact:</p> <p>The project will select infrastructure needs that shall have little social and environmental impact.</p>	<p>Project Output:</p> <p>The direct output of the project will be creating of a clean, attractive and decent urban environment in the target area. The indirect output is establishment of a coordination system of various ministerial departments under the Provincial leadership, and capacity building required for continuous implementation of similar projects in other locations.</p>	<p>Project Cost Breakdown:</p> <p>1) Direct Cost 1,862</p> <p>2) Capacity building 300</p> <p>3) Physical contingency 186</p> <p>4) Price escalation 205</p> <p>5) Engineering service 186</p> <p>6) Land acquisition 4,864</p> <p>Total 7,604</p> <p>(Unit: thousand US\$)</p>		
	<p>Related Projects:</p> <p>Sub-arterial Road Network Project (Phase 1)[TR-2]</p>	<p>Implementation Schedule:</p> <p>1) Land Acquisition Mar 06 - Dec 06</p> <p>2) F/S and D/D Mar 06 - Dec 06</p> <p>3) Funding arrangement Mar 06 - Jun 07</p> <p>4) Tender and award Jul 07 - Dec 07</p> <p>5) Construction Jan 08 - Oct 08</p> <p>6) O&M Capacity Building May 08 - Nov 08</p>			

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Project Brief
Sector: Urban Development

No	Project Title		Beneficiaries and/or Target Group		Assumed Fund	Estimated Cost	Project Priority
U-2	Urban Planning Capacity Building Project		Urban population of Siem Reap (approximately 90,000) and visitors			To be determined	Priority
	Project Site	Implementation Agency	Department	Contact Person	Telephone	E-mail	
	Urban area of Siem Reap (see map)	Siem Reap Province/ APSARA					
<p>Background: Though Cambodia has a law and regulations for urban planning, the enforcement is still in a poor stage, due mainly to the lack of experience and confidence. This project aims at assisting the local government to enhance the capacity to sustainably enforce the urban planning visions and land use plan.</p> <p>Project Purpose: This project aims at enhancing the capacity for effective enforcement of urban management, planning and GIS use as a tool for this purpose. Expatriate experts will conduct day-to-day technology transfer for urban management and planning practices on a multi-sect oral urban improvement format, in parallel with the Project U-1.</p> <p>Project Output: The direct output of the project will be the increased capacity for better urban management and planning enforcement.</p> <p>Implementation Schedule: 2005: Request, appraisal and preparation 2006: Implementation of the 1st phase 2007: Implementation of the 2nd phase 2008: Post-evaluation</p> <p>Project Cost Breakdown: To be determined</p>							
<p>Environmental and Social Impact: The project will have no adverse effects on environment and social sphere.</p> <p>Related Projects: This will be a follow-up of the SRAT master plan project.</p>							

JICA - Study on Integrated Master Plan for Sustainable Development of Siem Reap/Angkor Town
Project Brief
Sector: Urban Development

No	Project Title	Beneficiaries and/or Target Group	Assumed Fund Grant for Overseas Development	Estimated Cost (thousand US\$)	Project Priority
U- 3	Inventory of Historical Architecture with Preservation Value in Siem Reap City	Urban population of Siem Reap (approximately 90,000) and visitors		500	
	Project Site Urban area of Siem Reap (see map)	Department	Contact Person	Telephone	E-mail
	Implementation Agency Siem Reap Province/ APSARA	<p>Project and Program Outline/Components: The following steps are required. (1) Documentation survey (2) Survey and drawing (3) Creation of a database (4) Publishing on a book / web</p> <p>Following experts are required. (1) Expert for historical architecture (team leader) (2) Architectural historian (3) Two surveyors (4) GIS expert</p>			
	<p>Background: There are a number of architectural pieces with the French Colonial atmosphere in the blocks adjacent to the Old Market. There are a few old buildings from the French Protectorate era, and there are some others which were built anew following the French Colonial style. The overall townscape of the Old Market area is relatively well preserved. The urban heritage is a precious resource of Siem Reap that may put additional attractiveness to the Angkor tourism.</p> <p>It should also be noted that few specific researches are available about the French Colonial architecture near the Old Market. Consequently, it is difficult to know which piece of architecture has a historical value for preservation. There is a strong need for a research on the styles, structures and the historical values of old buildings near the Old Market to build a basis for future conservation and rehabilitation.</p> <p>Project Purpose: This project aims at conducting an inventory survey of the old buildings in Old Market area to clarify the year of construction, stylistic characteristics and value for preservation to provide a basis for future preservation and rehabilitation work. The historical heritage to be recorded include not only French styled buildings but also pagodas, Khmer traditional architectures and colonnaded street.</p>	<p>Project Output: The direct output of the inventory of historical buildings in the Old Market area.</p>			
	<p>Environmental and Social Impact: The project will have no adverse effects on environment and social sphere.</p> <p>Related Projects: This will be a follow-up of the SRAT master plan project.</p>	<p>Implementation Schedule: 1) Land Acquisition: None 2) Feasibility study and detailed design: March 06 3) Funding arrangements : March 06- June 06 4) Tender and award : July 06 - Dec 06 5) Survey : Jan 07- Feb 07</p> <p>Project Cost Breakdown: Expertise input US\$150,000 Employment of supporting staff, US\$ 50,000 Total Cost 200,000</p>			

JICA - Study on Integrated Master Plan for Sustainable Development of Siem Reap/Angkor Town


Project Brief

Sector: Urban Development

No	Project Title	Beneficiaries and/or Target Group		Assumed Fund	Estimated Cost	Project Priority
U- 4	Residential Development Promotion Implementation Agency Siem Reap Province	New Residents	Private		(thousand US\$)	
	Project Site Selected area from residential area	Department	Contact Person	Telephone	E-mail	
<p>Background: Urban population is growing rapidly without prepared ness of residential development. Consequently, residential area is encroaching to Zone 2 due to the attractive inexpensive land price. To prevent the conflict between heritage and residents, Siem Reap should absorb new residents on the area without conflict. This project promotes community infrastructure such as clinic, elementary schools and markets.</p>	<p>Project and Program Outline/Components: (1) Designation of residential area by urban plan (2) Involvement of private estate developer for construction and provision (3) Construction of sites and buildings (4) Operation and maintenance.</p>					
<p>Project Purpose: This project aims at creating and providing new clean and orderly residential area with infrastructure for newcomers who does not have any land title as well as current residents in heritage area.</p>						
<p>Environmental and Social Impact: Expansion of residential area reduce the natural coverage of land. Thus, the more runoff is expected. Accordingly, careful design is required for rainwater and wastewater drainage. In addition, the new residents are encouraged to adapt themselves to the new life style.</p> <p>Related Projects: Urban Planning Capacity Development Project (U-2)</p>		<p>Implementation Schedule: 1) Land Acquisition: : Mar 06- 2) Feasibility study and detailed design: Jan 07- : Jan 08- 3) Funding arrangements : Jan 08- : Jan 08- 4) Construction : Jan 08- : Jan 10- 5) O&M : Jan 10-</p>		Project Cost Breakdown: n/a		
						<p>Project Output: The direct output of the project will be creating clean and orderly residential area. The direct output is required for continuous implementation of similar projects in other locations.</p>

**JICA - Study on Integrated Master Plan for Sustainable Development of Siem Reap/Angkor Town
Project Brief**

Sector: Urban Development

No	Project Title	Beneficiaries and/or Target Group	Assumed Fund	Estimated Cost	Project Priority
U-5	<p>Planning and Implementation of Cultural and Tourism Zone for New Angkor Gate</p> <p>Project Site Culture and Tourism Zone</p> <p>Implementation Agency APSARA Authority</p>	<p>Tourists and tourism related industry</p> <p>Department Contact Person</p> <p>Telephone E-mail</p>	<p>APSARA Authority, Private</p> <p>Telephone</p>	<p>To be determined</p>	
<p>Background: Although the Angkor heritages attract tourist from the world, the related facilities such as museums and information center has not been properly developed. In addition, many hotels are located on the western part of National Route 6 because of airport accessibility. APSARA is preparing a base of Cultural and Tourism Zone for the designated new site development for both hotels and other tourist facilities.</p> <p align="center">  (An APSARA Plan for the Zone) </p>		<p>Project and Program Outline/Components: (1) Tourism development plan (2) Site planning (3) Urban infrastructure plan (4) Facility and building plan (5) Construction plan (6) Operation and maintenance.</p>			
<p>Project Purpose: This project aims at supporting APSARA with the current plan of Culture and Tourism Zone.</p>		<p>Project Output: The direct output of the project will be creating attractive and entertaining visitor reception zones without</p>			
<p>Environmental and Social Impact: The project will develop the site and may influence natural conditions.</p>		<p>Implementation Schedule: Land acquisition; mostly finished. Selection of scheme for development and construction. Detailed design: Some are in progress. June 2006- Site development and construction Nov. 2006- Operation and maintenance</p>			
<p>Related Projects: Development of Siem Reap Products Mart / Visitor Information Center for New Angkor Gate.</p>		<p>Project Cost Breakdown: To be determined</p>			

Chapter 2 Environmental Management

2.1 Situation, Prospects and Issues

2.1.1 State of the Environment

A tourism boom in Siem Reap/ Angkor Town brought about construction of many hotels, restaurants and other tourism facilities as well as a rapid population increase, which causes a rapid and unplanned development and urbanization.

However, public services and infrastructure such as water supply, sewerage, drainage, and solid waste treatment are not developed to meet the rapidly expanding demand. Consequently, environmental loads are increasing, giving a threat to the future environment of Siem Reap/ Angkor Town, and reducing a value of tourism destination. The state of environment is summarized below.

(1) Water Quality

Rapid population increase results in a deterioration of water quality. The ambient water is not polluted in up-stream of the Siem Reap River and West Baray Reservoir; however, those of mid-stream and down-stream of the river and Tonle Sap Lake are polluted, as the number of total coliform bacteria is beyond the standard of Ministry of Environment (MOE) according to the results of water quality survey conducted by JICA. This may harm public health conditions of people and pose a negative impact on the natural resources such as fishery resources in Tonle Sap. None of ambient water is polluted by heavy metal contaminants such as As, Cd, Cr, Hg, Pb and Zn. This implies the pollution is caused mostly by an inflow of raw sewage from daily people's life into the ambient water.

Domestic wastewater from households and hotels is a main pollution source. The main pollution source is an inflow of untreated sewage from households into the sewer, drainage and river. More than half of households in town have either septic tank or vault like interception tank. Outflow from discharge flows into sewers, roadside drainage ditch or near by low area. Septic tanks and interceptor vaults are not functioning well in most cases due to no construction code enforced to specify the required design and lack of maintenance and cleaning; only 7% of households desludge every year. Water quality survey shows that even after treatment plant remove pollutants, levels of pollutant such as SS, BOD, COD and total coliform bacteria do not meet the effluent standard. Some households do not have such interceptor tank, and wastewater is discharged directly to the ambient, especially in the southern part of the town, open defecation or over hang latrine prevails. For the Siem Reap River, informal settlement along the river is the main pollution source.

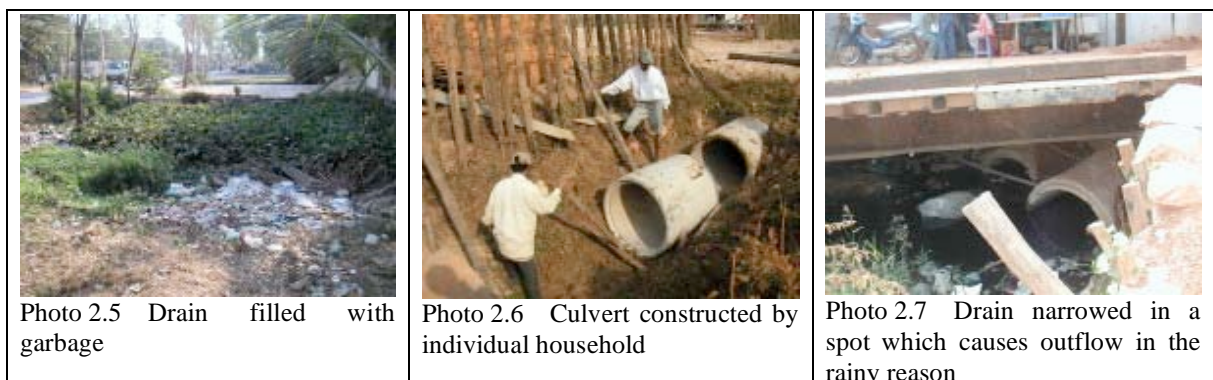
In addition, wastewater infiltrates into groundwater that is a major source of drinking water, especially for the households using shallow well as drinking water source. Some households use vaults where wastewater infiltrates into shallow aquifer, whereas they use shallow wells as a drinking water source that is located only 5 meter from the vaults. This may contaminate the water quality of shallow aquifer as drinking water source. The water quality survey by JICA Study Team shows that the number of total

coliform bacteria of shallow well is beyond the standard of MOE posing serious public health problems. This may harm public health, as 17% of non-town center households depend on shallow well as drinking water sources (Photo 2.1-2.4).



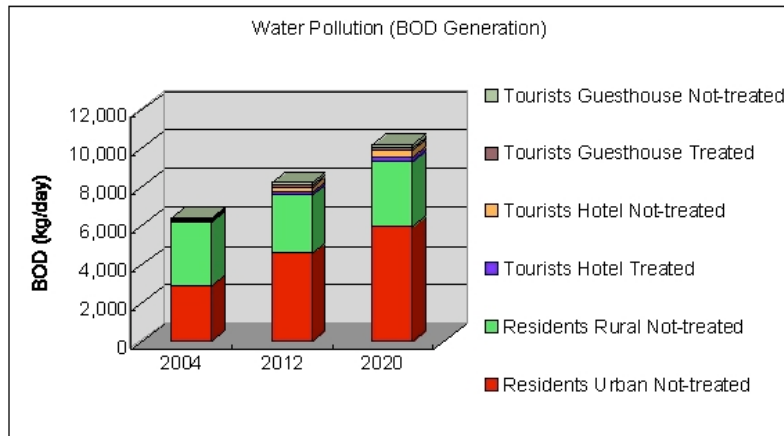
Water qualities of drainages also do not meet the effluent standard. Water quality of the existing drainages in Siem Reap was tested, and results show that DO, SS, BOD, COD and total coliform do not meet the effluent standard. Sewerage and drainage network is not functioning properly by following reasons, which is one of the causes of flood in the rainy season.

- Roadside gutters filled with solid waste and lack of cleaning clogs the canal flow (Photo 2.5).
- Culvert constructed by individual households without any technical background such as proper leveling and gradient (Photo 2.6).
- Huge encroachments and many structures constructed over the canals which narrows the channel in (Photo 2.7)



Water pollution of drainage emits offensive order, furthermore drainage is connected into irrigation canals, which pollutes irrigation water.

Wastewater from local population is the main pollution sources accounting for 96 % in 2004 in terms of BOD generation. An increase of urban population will make water quality deteriorated in the future. It is imperative to introduce effective wastewater treatment for local households to mitigate the worsening situation. The water pollution estimated on BOD generation base is shown in the figure below.



Source: JICA Study Team

Figure III.2.1 Estimation of BOD Generation

(2) Groundwater Intake

Currently, water supply largely depends on groundwater. According to the survey conducted by JICA Study Team in 2004, 87% of hotels, 100% of guesthouses, and 84% of households use groundwater as water sources. Especially, the high-class hotels largely depend on groundwater, as each hotel has a multiple deep well accounting for 3.3 deep wells on average. The groundwater intake is not monitored and controlled at all. The volume of groundwater intake by hotels is estimated as 6,115 m³/day. A number of hotels and guesthouse will be constructed, which will increase the groundwater intake.

The construction of a number of large hotels in town center and their large dependence on groundwater as water sources raises an alarm of a risk of land subsidence in the future, which might damage Angkor heritage. Uncontrolled development will enhance a risk of uncertain incident such as land subsidence. According to the monitoring records of wells, there is slight land fluctuation ranging from 2 mm to 5 mm. The impact of groundwater intake on land subsidence is uncertain, however, it is necessary to reduce a risk of land subsidence for the future. At least, it is necessary to monitor the volume of groundwater intake, groundwater level and level of land subsidence. These are discussed in detail in Chapter 7.

(3) Solid Waste

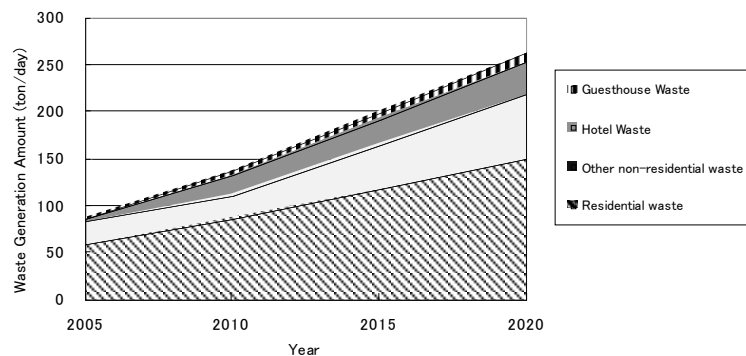
Solid wastes are scattered in Siem Reap Town, while not in Angkor heritage area. In Siem Reap town, MICC, a private company, executes all the solid waste management works under the concession contract. The implementation of solid waste management

works for the Angkor heritage area is under the responsibility of the APSARA Authority that contracts out to HCC, a private company. For the Angkor heritage area solid waste management is functioning well. However, for the Siem Reap town, there are scattered plastic bag in town such as the roadsides, open space, water body such as river, drain, and pond. It deteriorates townscape, function of drainage, and water quality of the river. In addition, the volumes of solid waste treated will exceed the capacity of dumping site in the near future.

The solid waste from households is the main source of them. The factors of solid waste scattered is mainly the management problem with contract with HICC where HICC provides garbage collection services for those who pay collection fee. Those who cannot afford it tend to dump the garbage on open areas.

As the numbers of population and tourist increase, solid waste generation amount increases. Solid waste volume will be increased from 90 ton/day to 270 ton/day in 2020 (See figure below). With economic growth, a recycling rate will be smaller, and at present the amount of packaging waste will increase. This will cause further illegal dumping with the current solid management system. It is imperative to reduce the amount of solid waste and treat it properly.

These are detailed in Chapter 8.



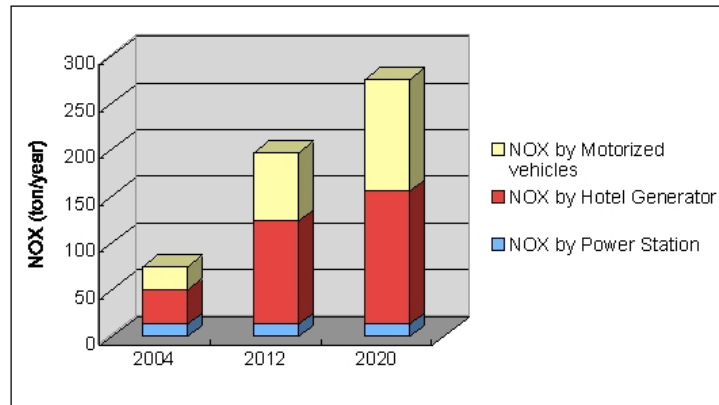
Source: JICA Study Team

Figure III.2.2 Estimation of Solid Waste Generation

(4) Air Pollution

Currently, air pollution is not a serious problem; rather dust from the road might be a problem. However, as economy grows, air pollution could be a problem in future. Currently, air pollution caused by industrialized pollution sources is not significant; the concentrations of SO₂ and NO₂ are much lower than the air quality standard of Cambodia.

Most of the hotels use individual diesel generator as their power sources other than EdC power supply. The total estimated amount of NO_x emission tells that the pollution from motorized vehicles and hotel generator will be increased as the economy grows, as shown in the figure below. Even though, the concentration will be below standard and not significant.



Source: JICA Study Team

Figure III.2.3 Estimation of NOX Generation

However, individual generations by hotel generators emit noise and gases in spot, therefore, reducing diesel generation is preferable. This can be achieved by alternative power supply as discussed in Chapter 10. Traffic lift dusts from unpaved roads, which will be solved with road condition improvement. As the number of motorized vehicles increases rapidly, a series of measures is preferred to be taken to mitigate air pollution in spot from traffic; these are controlling traffic away from residential and tourism areas and introducing emission standard to traffic.

(5) Green Areas

A large part of Siem Reap province is rural area. Ancient Angkor is the capital being with and utilizing the nature such as water and forest. Tourists visiting Siem Reap are expecting a forbidden ancient ruin amongst the deep forest.

Forest resources in the Siem Reap Province were relatively stable until the early 1990s. Deforestation has become a serious problem in the late 1990s. One of the primary concerns is the deforestation in the Kulen Mountains because it is the source of the Siem Reap River. Deforestation has also taken place in the Angkor heritage area (Zone 1 and Zone 2).

A rapid and unplanned urbanization raises a concern about a decreasing green area. A green area will be reduced in size in urban area as well as in rural area due to disordered urbanization. To keep amenity of urban area, green area such as green belt and tree lawn are to be secured. For the suburban area surrounding urban area, unorganized urbanization shall be restricted not to destroy agricultural area.

2.1.2 Environmental Management

(1) Policy and Legislation

The Law of Environmental Protection and Natural Resources Management of 1996 is the supreme legal instrument for the environmental management. This law states the purposes as follows:

- To protect and promote environmental quality and public health through the prevention, reduction, and control point sources and non-point sources pollution;
- To assess the environmental impact of all proposed project prior to the issuance of a decision;

- To ensure the rational and sustainable conservation, development, management and use of the natural resources;
- To encourage and enable the public to participate in environmental protection and natural resource management; and
- To suppress any acts that cause harm to the environment.

This law has eleven chapters: i) general provisions, ii) National and Regional environmental plan, iii) environmental impact assessment, iv) natural resource management, v) environmental protection, vi) monitoring, recording and inspection, vii) public participation and access to information, viii) environmental endowment fund, ix) penalties, x) interim provisions, and xi) final provisions.

(2) Institutional Set-up at National Level

Ministry of Environment (MOE) plays a core role for environmental management. MOE has a responsibility for promoting the environmental protection and conserving natural resources to improve environmental quality, human health, national culture and socio-economy. MOE plays a critical role to facilitate and to implement the development policy, environmental planning, and other legal instruments for sustainable development, in coordination with ministries, private and public sectors.

The sub-decree on the Organization and Functions of MOE of 1997 stipulates the mandate of MOE, organizational structure, roles and responsibility. MOE has three General Department: General Department of Administration and Finance, General Technical Department, and General Inspection Directorate. Under the General Technical Department, there are six departments, i.e., i) Department of Planning and Legal Affairs, ii) Department of Nature Conservation and Protection, iii) Department of Environmental Pollution Control, iv) Department of Natural Resources Assessment and Environmental Data Management, v) Department of Environmental Education and Communications, and vi) Department of Environmental Impact Assessment Review. The Provincial Department of Environmental and District Environmental Office are local entities responsible for the implementation and coordination of MOE activities.

(3) Zone-wise Environmental Management

The environmental management in the Siem Reap Province is divided into three Zones: Angkor heritage zone by APSARA; the Siem Reap Town by DOE; and Protected Area such as Phnom Kulen National Park by DOE.

Protected Area

The Royal Decree on the Creation and Designation of Protected Area of 1993 stipulate s MOE's responsibility to supervise development planning and to manage a National Protected Area. National Protected Area has 4 Categories consisting of 23 areas that cover 3.3 million ha. In Siem Reap, there are Phnom Kulen National Park, Kulen-Promtep Wild life Sanctuary, and Tonle Sap Multiple Use Management Area, as follows.

1. **Natural Parks:** reserved for nature and scenic views to be protected for scientific, educational and entertainment: Phnom Kulen (37,500ha) in Siem Reap
2. **Wildlife Sanctuaries:** conserved or preserved at their natural conditions in order

to protect fauna and flora, and ecological balance: Kulen-Promtep (402,500ha) in Siem Reap and Preah Vihear.

3. **Protected Landscape:** maintained as scenic views for entertainment, recreation and tourism: Angkor (10,800ha)
4. **Multiple Use Management:** necessary for the stability of the water, forestry, wildlife, and fisheries resources for entertainment or tourism, and conservation of long-term existing of natural resources with a view of assuring sustainable economic development: Tonle Sap (316, 250ha) in Kampong Chhang, Kampong Thom, Siem Reap, Battambang, and Pursat.

Protected Cultural Zone in the Siem Reap/ Angkor Region

Especially, in Siem Reap for its cultural importance, the Royal Decree on the Establishment of Protected Cultural Zones in the Siem Reap/Angkor Region and guidelines for their management of 1994 states the zoning in the Siem Reap/Angkor Region for conservation of cultural heritage zone as follows:

- Zone 1: Monumental Sites
- Zone 2: Protected Archaeological Reserve: buffer zone
- Zone 3: Protected Cultural Landscape
- Zone 4: Sites of Archaeological, Anthropological or Historic Interest
- Zone 5: The socio-economic and cultural development zone of the Siem Reap/Angkor

APSARA Authority (The Authority for the Protection and Management of Angkor and the region of Siem Reap) was established by Royal Decree in February of 1995. APSARA has a responsibility of management of these Zones.

APSARA prepared the following environmental management plans.

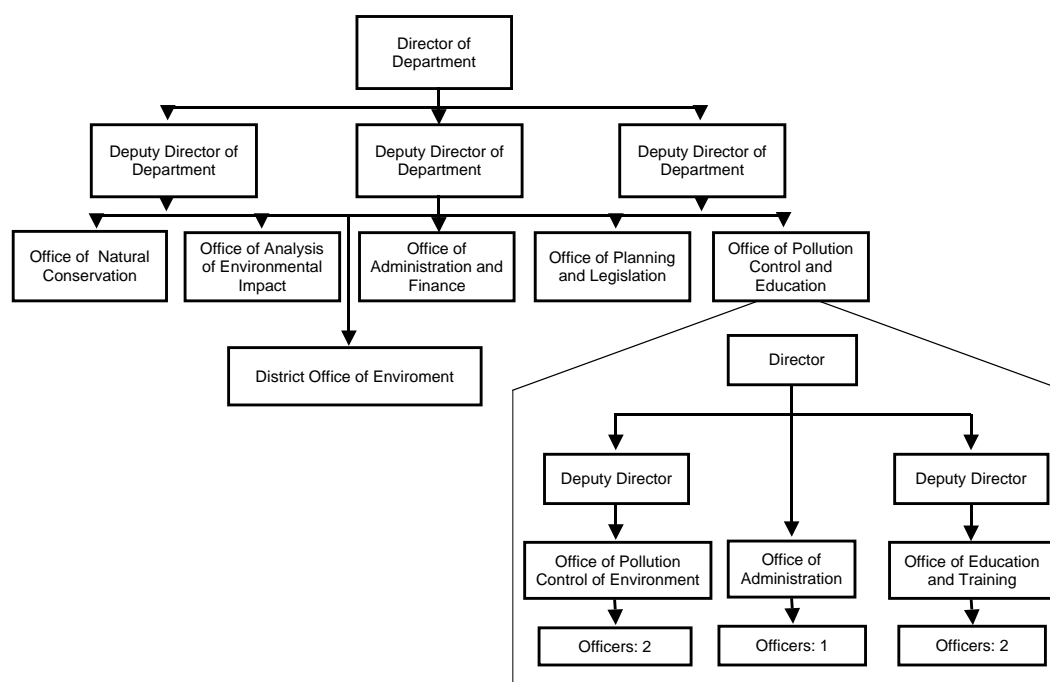
- 1) Zoning and Environmental Management Plan (ZEMP) in 1994
- 2) PUR in 1995
- 3) PUSC in 1999
- 4) PUSC revised in 2002

Out of these PUSC and the revised PUSC are not approved by the Government.

(4) Provincial Department of Environment

1) Institutional Set-up

Provincial Department of Environment in Siem Reap (DOE) has a similar structure to the Ministry of Environment. It consists of five technical offices and one District Office with 30 officials, as shown in the organizational structure of the figure below. This provincial Department is expected to act as actual force to implement and coordinate for the environment management. However, the Office of Pollution Control and Education has 8 officials in which the Office Pollution Control of Environment responsible for monitoring the pollution sources and ensuring the enforcement has only two officials. The Office of Education and Training, a front line to the public participation, has only two officials.



Source: Provincial Department of Environment

Figure III.2.4 Organizational Structure of Provincial Department of Environment

The number of the staff by office and educational background of DOE is shown below.

Table III.2.1 Staff of Provincial Department of Environment of Siem Reap (DOE)

Office	Staff number	Educational Background					
		BA	Technical secondary	Technical primary	Baccalau rreate	Secondary school	Primary school
Director	4	1	3				
Administration and Finance	3				1	3	
Planning and Legislation	4					1	2
Natural Conservation	6	3	2			1	
Analysis of Environmental Impact	3	1			1	1	
Pollution Control and Education	9	2	1		4	1	1
District Office of Environment	8				2	4	2
	37	7	6	0	8	11	5

Source: Strategic Plan of Environment 2005-2007

2) Environmental Plan by Department of Environment

Provincial Department of Environment (DOE) works out the Strategic Plans of Environment from 1997 according to the Law of Environmental Protection and Natural Resources Management of 1996. In October 2004, DOE prepared Strategic Plan of Environment 2005-2007. The brief of the Plan is shown in Table III.2.2.

The plan aims at providing the environment education and natural resource conservation in order to reduce the environmental pollution and to improve natural resources management to sustain the environment. The plan is developed under the recognition that the rapid growth of tourism industries has a negative impact on natural resources and solid waste disposal, which make the Siem Reap Province face threats to harm forest, wild life, floated forest, water resources and environment pollution.

DOE is responsible for improving and protecting the environment and conserving the natural resources in order to improve the environment quality and to support public welfare, national culture, and social economy. DOE has duties to educate and encourage people to protect and maintain the environmental quality to guarantee the natural resources management in reasonable, sustainable manner. To fulfill this mission, DOE cooperates with various governmental and non-governmental institutions, national/ international organizations, and people. The duties of DOE are as follows.

Enforcement

1. Implement action of environmental policy for sustainable development
2. Protection and management of natural resource
3. Analysis and assessment of the environmental impact
4. Participation in implementing the management plan and stop the offending
5. Proposition or improvement of new protected natural zone
6. Monitoring of pollution sources and take measures to stop and reduce the pollution
7. Inspection of sources and activities causing pollution
8. Implementation of transitional fining
9. Stimulation of public participation in protecting and maintaining natural and environmental resources
10. Proposition and implement action of the educational program of the environment
11. Fund raising to support the activities of protecting and conserving the environment

Management

1. Preparation of an inventory confirming sources, type, and quantity of solid and liquid waste, poisonous substance, and hazardous substances.
2. Management of the environmental data and prepare of annual report of the provincial environmental situation.
3. Management of staff, budget, and properties of DOE
4. Training of human resources for DOE
5. Implementation of reporting procedure

Coordination Duty

1. Participate in controlling and recommending on solid waste management work in the framework of the province
2. Strengthen cooperation with institutions
3. Support training project or seminar on the environment

However, only a part of the plan has been implemented due to the limitation of financial and human resources according to the Plan, as follows.

1. Lack of technical human resources in the environment and resource management
2. Lack of budget for technical work operation
3. Law and policy implementation of the environment is not completed.
4. Lack of technical documents, especially, national language
5. Lack of means of media and transport
6. Insufficiency of information and data
7. Low level of participation by public and institutions
8. Low level of sponsor by government and international organizations
9. Low awareness of people on the environment
10. Lack of materials and equipment to implement the work

Table III.2.2 The Plan of DOE (2005-2007)

Summary	Indicators	Means of Verification	Determining Factor
Develop and create knowledge in management, protection, and conservation of environment with participation to ensure the environmental sustainability in order to enhance the quality of the environment, welfare of people, and to reduce poverty.	-Better development - Government employee and people understand and participate in well maintaining, protecting, and managing the environment	Report	- Quality of the environment is improved. - Participation of local authorities and people
Objectives 1. Strengthen the technical capacity of the provincial environmental employees, the environmental agencies of districts, the environmental commission of commune and increase the public education to the people to seek participation, development, and conservation of the environment 2. Formulate community to enhance the living standard of the citizen and participation in managing the natural resource and waste. 3. Reduce impacts and environmental pollution to enhance the quality of the environment 4. Strengthen and better the effectiveness of work	Awareness of the governmental employees People are aware of changing habit and have participative conservations. Participation of people Equipped supplies	Report Report Report of evaluation Report	The environmental employees of the province, district, and commune have real skills in the management. Support of authority and people The environmental impacts have been aware and the environmental pollution has been reduced. Adequate supplies for the implementation
Outputs 1.1. Training course of education of law and law framework to the provincial environmental employees	The number of the environmental employees is 37 people	Report	The environmental employees have skills in the environmental management.
1.2. Training course of education of law and law framework to the provincial employees	The number of related employees in the realm of the province is 120 people.	Report	Having knowledge and ongoing propagation participation.
1.3. Training course of education of law and law framework to the governmental employees in the 12 districts	The number of the district employees is 1440 people	Report	Having knowledge and ongoing propagation participation.
1.4. Training course of education of law and law framework to the secondary school teachers at the provincial level	The number of the secondary school teachers is 120 people.	Report	Having knowledge and ongoing propagation participation.
1.5. Training course of education of law and law framework to the secondary school teachers at the district level in the 12 districts	The number of the secondary school teachers is 1440 people.	Report	Having knowledge and ongoing propagation participation.
1.6. Training course of education of law and law framework to the primary school teachers at the provincial level	The number of the primary school teachers is 120 people.	Report	Having knowledge and ongoing propagation participation.
1.7. Training course of education of law and law framework to the secondary school teachers at the district level in the 12 districts	The number of the primary school teachers is 1440 people.	Report	Having knowledge and ongoing propagation participation.
1.8. Training course of education of law and law framework to the people in the 12 districts	The number of the people is 5400 people.	Report	People changed habits and took part in the environmental maintenance.
1.9. Materials provided for the law education	240 posters, 60 cloth posters, Publishing 2880 books of the environmental education, Publishing 600 books, 1 overhead projector, 3 generator, 1 video camera, 3 cameras, 250 dustbins		There are adequate materials for the work operation.
1.10. World, National Environment and Sanitation Day was celebrated 3 times in the province and the districts.	The governmental employees, Citizen, Students	Report	Having support from authority and citizen
1.11. World, National Environment and Sanitation Day was celebrated 3 times in the province and the district	The governmental employees, Citizen, Students	Report	Having support from authority and citizen
1.12. Cycling Day was celebrated 3 times in the province and the district	The governmental employees, Citizen, Students	Report	Having support from authority and citizen
1.13. Materials used in the celebration of National Environment Day	5000 T-shirts, 5000hats	Report	Having support from various institutions, authority in the place, and participation of people
2.1. Natural resource protection community was created in 3 places	Number of flooded forest area.	Report	Guarantee better uses of the people's living, forest resource, wild animals, and sustainable shelter of the wild animals
2.2. Community of the flooded forest was created in 6 places	Number of flooded forest area.	Report	Conserve the shelter, eggs, and off springs of fish and living creatures
2.3. Community of collection and recycling of waste and litter was created in 6 districts along the National Route 6	Location of waste and litter stock and area of stocking location	Report	Better quality of environment
3.1. Impacts and environment pollution shall be reduced	The environment pollution was studied and evaluated.	Report	Pollution was reduced and the environment will be better.
3.2. Materials and equipments for testing quality of water	Photo meter, Conductivity and P-H meter, Incubator 30 c, 70 c, and 40 c for bacteria	Report	Adequate materials and equipments of environment shall be improved.
4.1. Preparing environment agency office of district	50 locations	Report	Proper work place
4.2. Equipping materials and means and preparing offices in districts and departments	15 tables, 60 chairs, 12 file cabinet, 2 photocopiers, 5 computers, 3 televisions, 5 printers	Report	Being able to carry out work on time

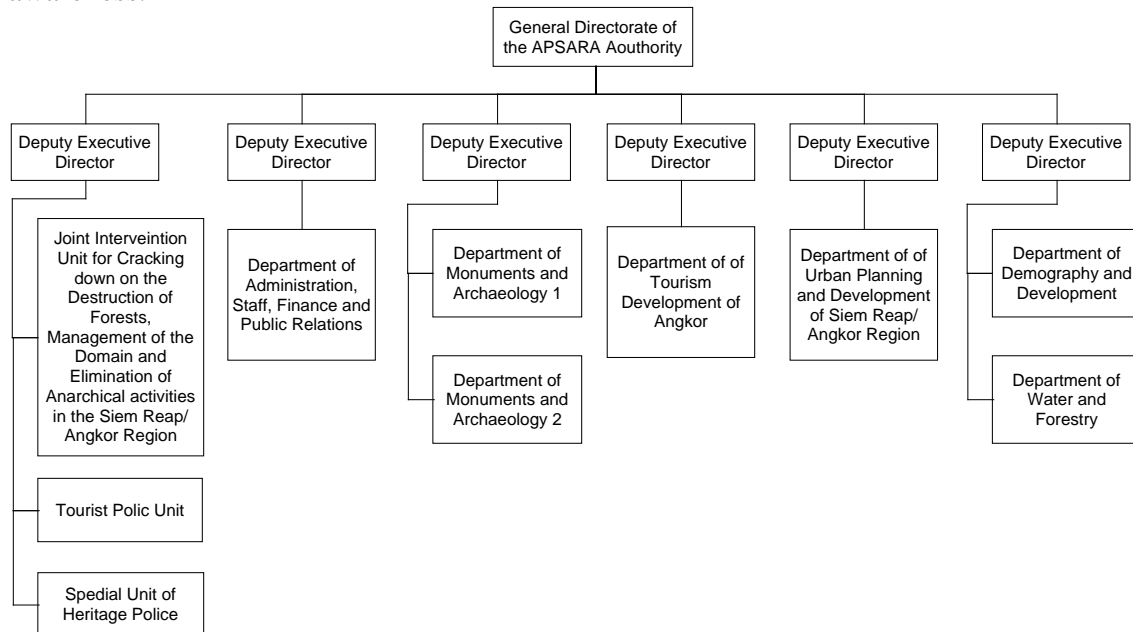
Source: Strategic Plan of Environment 2005-2007

(5) Environmental Management System by APSARA Authority

With understanding the importance of environmental management, APSARA has launched a pioneering project to obtain ISO 14001 as a tool of environmental management of the people, by the people and for the people. APSARA started this project in May 2003 in cooperation with Japan Quality Association and aimed at obtaining ISO in the first half of 2006.

ISO 14001 of 2004 requires respective organizations to manage environment not only within the organization themselves but also in whole covering area that the organizations have a responsibility to manage, as stipulated in their mission. APSARA has to set up the environmental management system of Siem Reap/ Angkor Town where APSARA has a significant influence and carries operation according to the system.

APSARA sets up EMS organization with the Angkor Environmental Management System Unit as a secretariat of this project under the Angkor International Documentation Centre. Environment Management (EM) Representative is assigned by top management, and EM leaders are selected from 6 departments. EMS study meeting is held to foster the environmental awareness within APSARA Authority. APSARA has 50 members of Heritage polices and Forest polices to patrol to control illegal mining and deforestation; those are also beneficiaries of environmental awareness.



Source: APSARA Authority

Figure III.2.5 Organization Chart of APSARA Authority

APSARA also conducted environmental aspect survey such as the condition of air and water with Ministry of Environment to understand the state of the environment. Water and garbage are recognized as issues in this area. Based on these activities, APSARA established environmental policy, as shown in the BOX below. A series of meetings was held to set the environmental objectives; each department also sets its objectives, which identifies its role and responsibilities. One of the examples of the objectives is

fostering environmental awareness among the shop stand sellers in Angkor heritage, students and monks.

Not only setting up the system, APSARA has started taking actions such as environmental education in primary schools in collaboration with the Provincial Department of Environment. At primary schools, pilot programs of environmental management through PDCA (Plan-Do-Check-Action) cycle are conducted where students themselves identify the environmental issues, set the environmental plan, take action according to plan, and check the results. Education to younger generation will give great help for building environmental awareness among people in Siem Reap/Angkor Town.

BOX: APSARA Authority's Environmental Policy and Concept

APSARA, as a government body to manage the Angkor region, will closely with relevant authorities and local residents to conserve and maintain the building of historical significance as well as developing the region. Through these efforts, APSARA will strive to create a society in order to ensure a sustainable development for the next generations in harmony with "nature, temple, and villages", in other words "environment, culture, and the communities".

Six (6) policies are set as:

1. Promote environmental conservation measures based on the above concepts
2. Promote environmental conservation activities with participation of all stakeholders
3. Provide local residents with environmental education
4. Comply with relevant environmental legislation and other requirements
5. Promote continual improvement
6. APSARA will keep the staff well informed of this policy, and announce it to the public.

Source: ISO Management Systems, September-October 2004

APSARA strives to create a society in order to ensure a sustainable development for the next generations in harmony with "nature (environment), temple (culture), and villages (communities)". As of March 2005, APSARA has set environmental objectives for APSARA covering 2005-2007 as shown the table below. The objectives cover natural resources management, urban environment, social and cultural environment, especially it is noted that "beautification of landscape" is included. APSARA has also prepared the three-year programs and on-year programs for each Department setting targets and assigning person in charge.

Table III.2.3 APSARA Environmental Objectives

Environmental Objectives for APSARA	Environmental Objectives for Departments	Department in Charge
1 Improvement of Environmental Awareness	1.1 Vendors in the Monuments area	Dept. of Monuments and Archaeology 1
	1.2 Tourist guides and travel agencies	Dept. of Tourism Development of Angkor
	1.3 National and international tourists	Dept. of Tourism Development of Angkor
	1.4 Local residents, schools, and Pagodas	Dept. of Demography and Development
	1.5 Heritage police and tourism police	Joint Intervention Unit
	1.6 Staff and guards of APSARA Authority	Dept. of Administration, Staff, Finance and Public Relations
2 Solid Waste Management	2.1 Public area of Angkor Park	Dept. of Monuments and Archaeology 1
	2.2 Collecting garbage in Angkor Monuments	Dept. of Monuments and Archaeology 1
	2.3 Establishing the garbage separation system	Dept. of Urban Planning and Development of Siem Reap/ Angkor Region
3 Natural Resource Conservation	3.1 Prevent from illegal logging	Joint Intervention Unit
	3.2 Prevent from illegal quarrying/ gravels	Joint Intervention Unit
	3.3 Conserve natural resources by monitoring and assessing the construction activities by people on in Zone 1 and 2.	Dept. of Monuments and Archaeology 1
	3.4 Protect and preserve forest in the Park	Dept. of Water and Forestry
	3.5 Protect and preserve natural water resource including	Dept. of Water and Forestry

	groundwater	
	3.6 Preserve the quality of agricultural land	Dept. of Demography and Development
4 Beautify natural landscape	4.1 Preserve the natural landscape of Siem Reap River	Dept. of Urban Planning and Development of Siem Reap/ Angkor Region
	4.2 Preserve the green landscape of Siem Reap town area	Dept. of Urban Planning and Development of Siem Reap/ Angkor Region
	4.3 Beautify the natural resources that includes Baray, moats, and ponds	Dept. of Monuments and Archaeology 1
	4.4 Draft construction work in Zone 1 and 2.	Dept. of Monuments and Archaeology 2
	4.5 Eliminate the unauthorized advertisement posters in Angkor park	Dept. of Tourism Development of Angkor
5 Improvement sewage system in the town area	5.1 Install sewage system in the town	Dept. of Urban Planning and Development of Siem Reap/ Angkor Region
	5.2 Install sewage treatment system emerged from tourism services	Dept. of Urban Planning and Development of Siem Reap/ Angkor Region
	5.3 Introduce the sewage treatment system to a new Development Project at Chong Kheas	Dept. of Urban Planning and Development of Siem Reap/ Angkor Region
6 Eliminate bad odor in temples	6.1 Eliminate bad odor bay bad-drops in temples.	Dept. of Monuments and Archaeology 1
7 Preserve air quality	7.1 Preserve and measure air quality in the region of Siem Reap	Dept. of Water and Forestry

Sources: APSARA Authority

(6) Monitoring Activities

Water quality is a major issue of the environment. DOE and APSARA conduct monitoring individually. DOE obtains monitoring data of water quality in Siem Reap River in support of private company.

- Monitoring sites: Angkor Poer, Neak bridge, Wat Damnak Bridge
- Monitoring items: PH, Temperature, Total Suspended Solid, BOD, COD-Cr, Total Nitrogen, Total Phosphorus
- Frequency: every month

APSARA Authority conducts monitoring according to their EMS plan.

Water quality

- Monitoring sites: Angkor Area, Town Area, near Tonle Sap
- Monitoring items: Temperature, PH, EC, Total Suspended Solid, BOD, COD-Cr, Transparency, DO
- Frequency: twice a year (dry and rainy season)

Air quality

- Monitoring sites: Ticket service point, Angkor Wat
- Monitoring items: NO₂ (24 hours average), SO₂ (10 hours average), CO (24 hours average)
- Frequency: twice a year (dry and rainy season)

APSARA tries to conduct monitoring of groundwater level in cooperation with people near West Baray. In addition, APSARA wants to measure water flow of Siem Reap River, however, they are lacking in necessary equipment to measure such as flow meter.

Water quality monitoring conducted by these institutions do not detect pollution problem. However, water quality survey by JICA Study Team indicates the pollution problem by bacteria covering total coliform as monitoring item.

(7) Behaviors of People and Businesses

People live in rural areas basically in resource saving lifestyle; reusing many of resources. Rapid development changes this resource saving lifestyle to resource consuming lifestyle. In addition, people in rural areas litter garbage to the surrounding

environment as organic materials decompose into the nature. They have to adjust their lifestyle into urban life not littering garbage to the nature.

Siem Reap is under the tourism boom that creates a lot of business chance. The businesses come to Siem Reap for making money not for conserving the environment. A limited number of large hotels invest in the wastewater treatment and reuse treated grey water for vegetation, however, these cases are not many.

2.1.3 Issues for Environmental Management

The state of the environment discussed above is summarized in the table below.

Table III.2.4 Summary of the State of Environment

Item	Place		The state of environment	
			Quality	Quantity
Water body	Siem Reap River	(Ambient water)	Deteriorated in the middle and down stream	Not enough to keep water clean
	Drains	(Drainage)	Deteriorated	Overflow causing flood in rainy season
	Groundwater	(Potable water source)	Deteriorated: health risk for shallow well	Fulctuated: future risk of land subsidence
	Tonle Sap	(Ambient water)	Deteriorated	NA
	Irrigation Canals	(Agriculturel water)	Deteriorated	Uncontrolled
	West Baray	(Agriculturel water)	Good	Uncontrolled
Solid Waste	Town		Scattered in town	
	Dumping site		Future risk of health	
Air	Town		Deteriorated in spot in future	
Green Area	Town and rural area		Shrinking in area	

Source: JICA Study Team

The factors causing these environmental problems and effects of the problems are summarized in the table below. These problems, if left, will cause loss of amenity, health problem, enhancing risk of land subsidence, and loss of aquatic environment, which causes loss of value of tourism town and degradation of living environment. These are threats to sustainability of tourism and the environment.

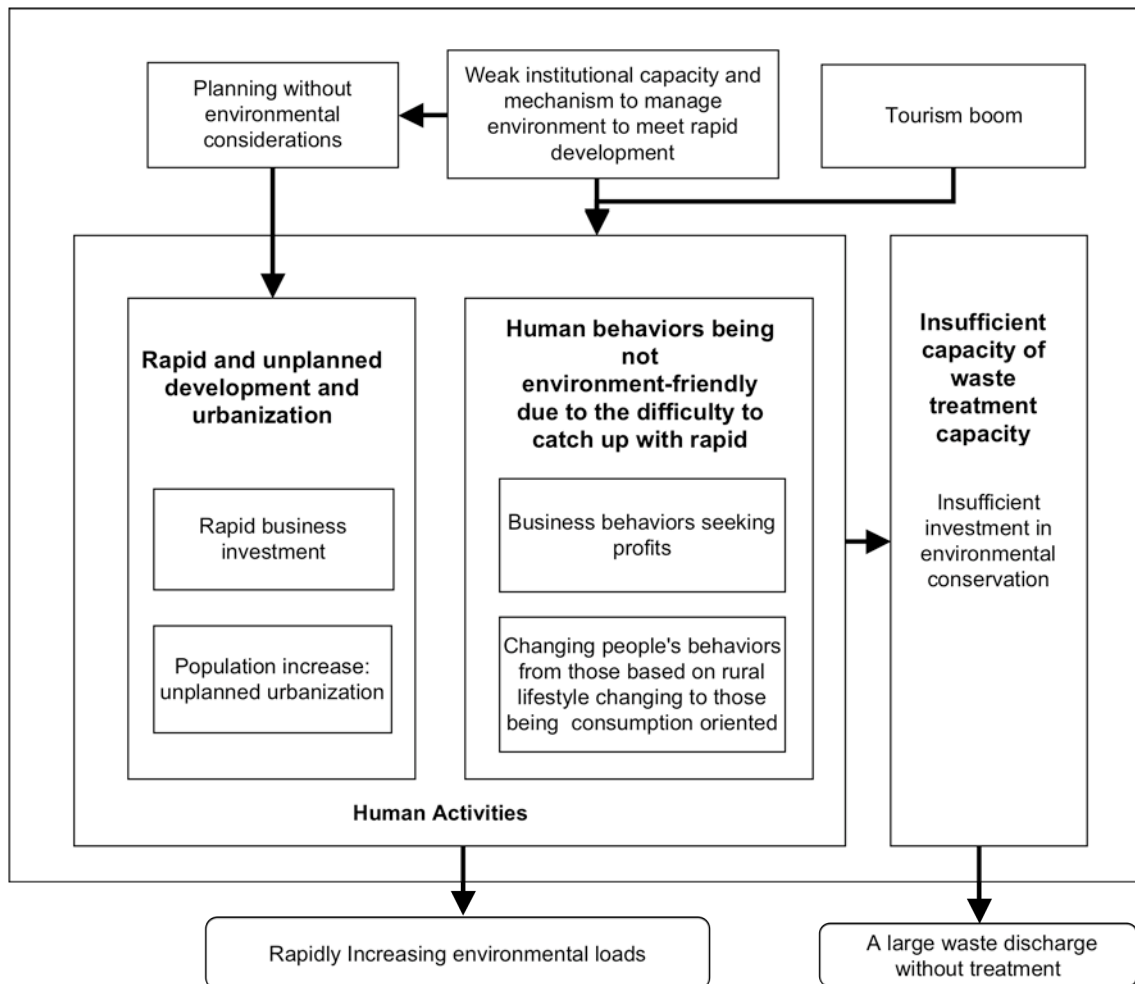
Table III.2.5 Major Factors and Impacts of Environmental Problems

Threats	Impacts	Items	Problems	Major factors	
Loss of value of tourism town and degradation of living environment	Loss of amenity	Siem Reap River (Ambient water)	Water quality deteriorated: bacteria	Informal settlement along the Siem Reap River	
	Offensive odor	Drains (Drainage)	Water quality deteriorated: bacteria	Untreated domestic wastewater discharging into drains	
				Not functioning treatment plant at households	
				Not functioning sewer system	
	Inundation of streets and properties	Groundwater (Potable water)	Water quality deteriorated: bacteria	Flood in spot of the town	Not functioning drainage
	Hygienic problem			Solid waste clogging drains	
	Health problem	Groundwater (Potable water)	Groundwater level: fluctuated and lower	Wastewater infiltrating into shallow well	
	Risk of land subsidence: damaging heritages			Uncontrolled groundwater intake	
	Health problem in future	Irrigation Canals (Agricultural water)	Deterioration of water quality in future	Wastewater from drainage flow into irrigation canals.	
	Loss of aquatic environment	Tonle Sap Lake (Ambient water)	Water quality deteriorated: eutrophication	River and drain flow into Tonle Sap Floating villages	
	Loss of aesthetic view	Solid waste	Solid waste scattered in the town	Management of solid waste not well functioning	
	Health problem in future	Dumping site	Future risk of health	Limited capacity and management	
Health problem and loss of amenity in future	Air	Air quality deteriorated in spot in the future	Motor vehicles and individual diesel power plant increased		
Loss of amenity	Green area	Shrinking green area	Urbanization		

Source: JICA Study Team

From the viewpoints of the environmental management, the problem structure is summarized in the figure below.

A tourism boom without environmental consideration causes rapid tourism business development and unorganized urbanization. Business investment is so rapidly expanding that public investment in the environment and the infrastructure for waste treatment and public utilities cannot meet demands. On the other hand, human behaviors are not environment-friendly. Businesses come to seek profit; therefore the investment in waste treatment is not enough. People from rural areas do not have awareness of urban environment. Development and urbanization cause increasing environmental loads, while treatment capacity is not enough. Above all, the capacity and the mechanism of environmental management are not developed to meet increasing environmental loads.



Source: JICA Study Team

Figure III.2.6 Problem Structure of Environment Management

The issues are summarized as follows:

(1) Insufficient Mechanism and Institutional Capacity to Manage Environmental Problems caused by Rapid Urbanization and Development

Under rapid development and urbanization, a mechanism and institutional capacity should be strengthened to manage environment. However, private business investment is too rapidly expanding that the public entities cannot develop the mechanism and the institutional capacity to catch up with this fast development.

Currently, there are various plans, legal framework and zoning to manage the environment among various institutions, but enforcement is weak. Then, it is necessary to develop the mechanism and the institutional capacity to manage environment.

(2) Lack of Clear Environmental Viewpoints in Planning

People in surrounding areas come to Siem Reap District to find business chance and employment. This causes population increase and sprawl. Not a small number of people live along Siem Reap River, drainage and roads informally without waste treatment. They deteriorate the environment with untreated wastewater and domestic waste. To prevent the further deterioration of environment by rapid urbanization, it is necessary to strengthen environmental consideration in planning not only for environmental sector but also for other sectors.

(3) Behaviors of People and Business are not Environment-friendly

Taking a look at human behaviors, businesses come to Siem Reap for seeking profits. Without any enforceable plan, regulation and guideline, it is difficult for the business to invest in environmental conservation. A mechanism is necessary to encourage business behavior to be environment-friendly.

Most of the people from rural areas have rural lifestyle. They easily litter plastic bags to the roadsides. In addition, those who have been talking resource saving lifestyle in rural areas are changing their lifestyle to be resource consuming. These people need to enhance environmental awareness.

(4) Public Infrastructure Investment in Environmental Conservation Cannot Catch up with Tourism Boom

Hotels and guesthouses invest in groundwater development for water supply due to the lack of tap water supply. This causes the over-exploitation of groundwater with a possible risk of land subsidence. Only some large hotels invest in water treatment system that enable wastewater to be reused for gardening. However, most of hotels, guesthouses and restaurants do not invest in water treatment enough. Untreated wastewater flows into sewerage and drainage. There is no mechanism to finance to improve the environment from the fruits of business development.

2.2 Sector Approach

(1) Objective

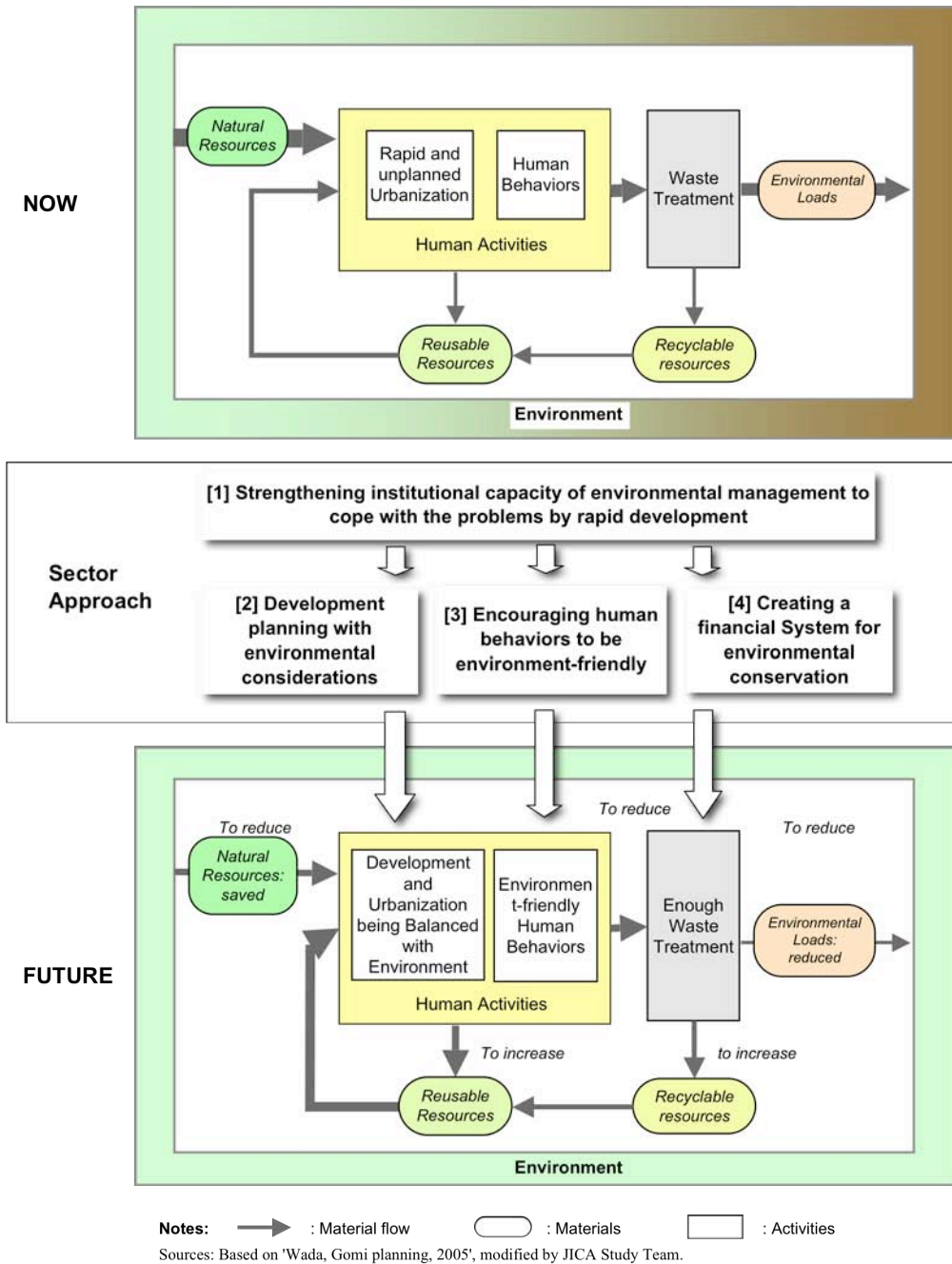
The objective of environmental management in Siem Reap is to make Siem Reap beautiful and sustainable in environment:

- Making a beautiful town in harmony with nature and Angkor heritage, targeting

- the town center and Angkor Heritage Park, and
- Making resource saving town, reducing environmental loads by 10 %.

(2) Sector Approach

To achieve the objective of environmental management, a system should be created to induce the state of the environment. The figure below shows the approaches addressing to the issues discussed above and the environmental management of present and in the future.



Source: JICA Study Team

Figure III.2.7 Approaches and the Environment Management at Present and in the Future

Four approaches are proposed aiming at the resource saving, environment-friendly and beautiful town which is harmonized with nature and heritages. These are the environmental considerations as incorporated in planning, strengthening investment in environment, encouraging human behaviors to change, and developing the institutional capacity to manage environment by local authorities.

Sector Approach 1: Strengthening Institutional Capacity of Environmental Management

First of all, management capacity has to be strengthened. It has three major factors: the institutional capacity to make policy, legal framework, and plan; the capacity to monitor and identify problems; and problem solving capacity. The environmental problems cannot be solved by sole organization, but solution need collaboration among various organizations.

Once target environmental issues are identified, one needs to build a management system. This process includes developing policy and legal framework, identifying main pollution sources, and organizing collaboration and division of tasks among sectoral departments against the main pollution sources.

Sector Approach 2: Environmental Considerations Incorporated in Development Planning

Currently, there are environment plans of DOE and APSARA and other sectoral plans independently. These are not integrated for common objectives; environment plan alone cannot achieve environmental objectives. This master plan itself is the first step to the planning with environmental consideration across sectors. The Master Plan has urban planning and infrastructure planning with environmental consideration for proper development and urbanization. In revising this master plan, environmental consideration shall be incorporated. Participatory planning shall be introduced in the revising process for the purpose of enhancing environmental awareness of people.

Sector Approach 3: Encouraging Human Behaviors to be Environment-friendly

There are two major target groups: people and businesses. Environmental awareness among people will be enhanced to encourage their behaviors to be environment-friendly. For people, education and technical advice are main instruments. These instruments includes information dissemination and participation in environmental committee; education and awareness building such as public campaign, technical advice on low cost environmental conservation technique, and cleaning of river sides; fostering environmental leaders; identification of the activities which give impact over environment; participatory monitoring; public environmental meeting; introducing guideline and action plan to promote environment-friendly lifestyle.

Of course, environmental awareness is to be built from childhood, as practiced in our pilot project. For making resource saving lifestyle and reducing pollution, enhancing environmental awareness of children is a shortcut way. It is effective to enhance environmental awareness of parents (younger generation), through their communication

with children, schools and communities.

For changing behaviors of businesses, creating an incentive is the main instruments combined with education and other legal frameworks. These are information dissemination and sharing; education; and introducing sound incentive packages and mobilizing possible instruments such as grading, eco-labeling, awarding and ranking, a business environment association, environment reporting, self-monitoring, and environment management system.

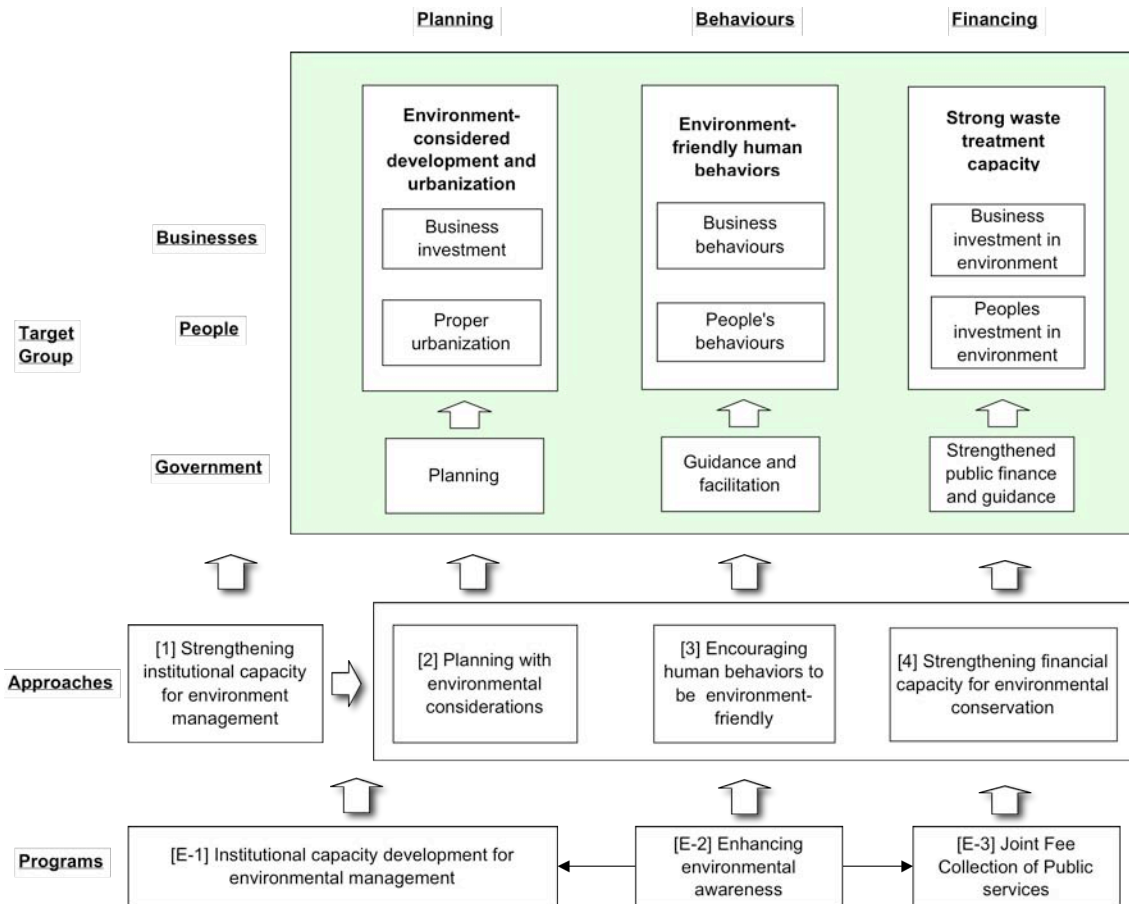
Sector Approach 4: Creating a Financial System for Environment Conservation

Financing to develop the facilities such as waste treatment to improve environment is limited. There are two ways to invest in environment; strengthening public investment capacity and inducing private investment. Sustainable environment needs financial sources to support it. Collecting fee for environment is difficult as shown in the case of solid waste collection and wastewater treatment. Aiming at the joint fee collection of environmental services and utilities, one should introduce database for information collection and fee collection. Furthermore, collection tax and other surcharge will be introduced as democratic decentralization introduced and economic growth makes people affordable.

Mobilizing funds for environmental management needs a comprehensive mechanism incorporating policy, legal framework, monitoring, guidance, economic incentives and education.

2.3 Projects/Programs

According to the approaches above, three programs are proposed as shown below. These programs are aiming at strengthening environmental management addressed to cross cutting environmental issues. The relationship among programs, approaches and target groups and issues are shown in the Figure III.2.8.



Source: JICA Study Team

Figure III.2.8 Issues, Target Groups, Approaches, and Programs

E-1 Institutional Capacity Development for Environmental Management

- (1) Background: Weak institution and capacity cannot meet increasing demand
- (2) Purpose: to strengthen institution and capacity of environmental management
- (3) Beneficiaries: government officials
- (4) Outputs:
 - 1) Strengthened institution: legal framework, policies, and enforcement instruments packages
 - 2) Strengthened capacity to manage environment:
 - Problem identification: monitoring and utilization of the results
 - Problem solving
 - 3) Strengthened planning capacity
- (5) Outline and components:
 - 1) Institutional development
 - 2) Capacity development for:
 - Problem identification (monitoring, analyzing and publication of results) and
 - Problem solving (collaboration and division of works towards the objectives)
 - 3) Capacity development of detail planning of environmental management across the sectors

Cross-sectoral Environmental Management Plan

Various institutions shall be involved to manage environment. To manage environment, a prime responsible body is necessary, and various stakeholders are to be involved toward the objectives, and coordination and collaboration are necessary among them such as:

- Setting objectives with common understanding of stakeholders: DOE
- Identifying the main pollution source: DOE, Communes
- Various measures have to be taken towards objectives by respective departments, institutions and people: Sectors
- Constructing viable legal framework to achieve the objectives: Sectors
- Enhancing awareness of people and businesses for the environment: DOE
- Providing technical advices to the businesses and people: Sectors, DOE
- Monitoring the environment and enforcing the rule: DOE, Commune

Good examples of coordination and collaboration work are seen in Siem Reap. APSARA tries to introduce the Environmental ISO system, which aims at behaving towards the objectives across their organization that used to be section-oriented. Another example is seen on the process of this Study project. This study organized an cross-organizational counterpart team comprising members of Siem Reap Province, provincial departments and APSARA Authority. The counterpart team works in an organized way on step by step basis, to hold stakeholder meeting, undertake environmental campaign despite that Siem Reap Province and APSARA closely work together for the first time.

A cross-sectoral environmental management plan is proposed in Table III.2.6.

Table III.2.6 Cross-sectoral Environmental Management Plan

Items	Problems	Major factors	Objectives	Indicators	Projects/programs by sectors
Water quality	Low water quality of Siem Reap River (Ambient water)	Unlawful settlements along the Siem Reap River	To improve water quality	Water quality of monitoring sites meet ambient standard	<ul style="list-style-type: none"> Urban planning and enforcement for unlawful settlements: DUPLP Environmental education in the unlawful settlements: DOE Setting the target: DOE Monitoring of water quality, information dissemination: DOE Introduction of technically viable septic tank to households: DPWT, Commune Introduction of grey water treatment system to households: DPWT, Commune Improvement of sewerage system: DPWT (Chapter 9) River bank improvement to improve water quality: DPWT
	Low water quality of drains	<ul style="list-style-type: none"> Untreated domestic wastewater flowing into drains Not functioning treatment plant at households Not functioning sewer system 	To improve water quality	Water quality of drains to meet emission standard	<ul style="list-style-type: none"> Sewerage and drainage network improvement (SW): DPWT (Chapter 9) Cleaning of drainages: DPWT, Commune Education for people not to litter garbage to drains: DOE Education and guidance of wastewater treatment of households: DPWT Legal framework and enforcement of wastewater treatment of hotels: DPWT Encouraging environment-friendly hotels:grading, awarding, eco-laveling to progressive hotels such as reutilization of greywater, rain water utilization, rain water infiltration, energy saving designing: DOE
Flood (Chapter 9)	Low water quality of groundwater (Potable water)	Wastewater infiltrating into shallow well	To improve water quality	Water quality of monitoring well meet health standard	<ul style="list-style-type: none"> Sewerage improvement: DPWT (Chapter 9) Technical guidance to people: wastewater treatment: DPWT Health education to people (sanitation): DOH
	Deterioration of irrigation water quality in future (Agricultural water)	Wastewater from drainage flows into irrigation canals.	To improve water quality	Water quality to meet ambient standard	<ul style="list-style-type: none"> Drainage water quality improvement (above) Monitoring: DOE, DAFF
Groundwater level (Chapter 7)	Low water quality of Tonle Sap Lake: eutrophication (Ambient water)	<ul style="list-style-type: none"> River and drain flow into Tonle Sap Floating villages 	To improve water quality	Water quality of monitoring sites meet ambient standard	<ul style="list-style-type: none"> Drainage water quality improvement (above) Siem Reap River water quality improvement (above) Education and guidance of wastewater treatment in floating villages: DOE, Commune
	Overflow of storm water from drain: flood in spot of the town	<ul style="list-style-type: none"> Not functioning drainage Solid waste clogging drains 	To stop flooding and water staying in the town	Frequency of flooding	<ul style="list-style-type: none"> Drainage improvement: DPWT (Chapter 9) Cleaning of road side ditch: DPWT Road side green belt and infiltration of rainwater (Urban planning)
Solid waste (Chapter 8)	Fluctuating and declining groundwater level	Uncontrolled groundwater intake	To control groundwater intake	Water level of monitoring well stable	<ul style="list-style-type: none"> Legal framework and enforcement to control groundwater intake: recording and reporting obligation to hotels and guesthouses: DPWT Introduction of construction code for reusing grey water for vegetation, infiltration of rainwater into the ground, and utilizing rainwater: DPWT, DOE Monitoring of groundwater level: DPWT, APSARA
	Solid waste being scattered in the town	<ul style="list-style-type: none"> Management of solid waste being not well functioning Limited capacity and management 	To make the town LOVELY	<ul style="list-style-type: none"> Reduce waste amount Collection coverage 100% 	<ul style="list-style-type: none"> Sound solid waste management system development (Chapter 8) Strengthening waste collection system (Chapter 8) Sanitary landfill development (Chapter 8)
Air	Deterioration of air quality in future	Motor vehicles and individual diesel power plant increased	To maintain air quality	Meeting the standard	<ul style="list-style-type: none"> Reducing use of individual diesel generators Regulations over vehicles at the town center Automobile registration
Green area	Shrinking green area	Urbanization	To keep green area	Green area	<ul style="list-style-type: none"> Urban planning (Chapter 1)

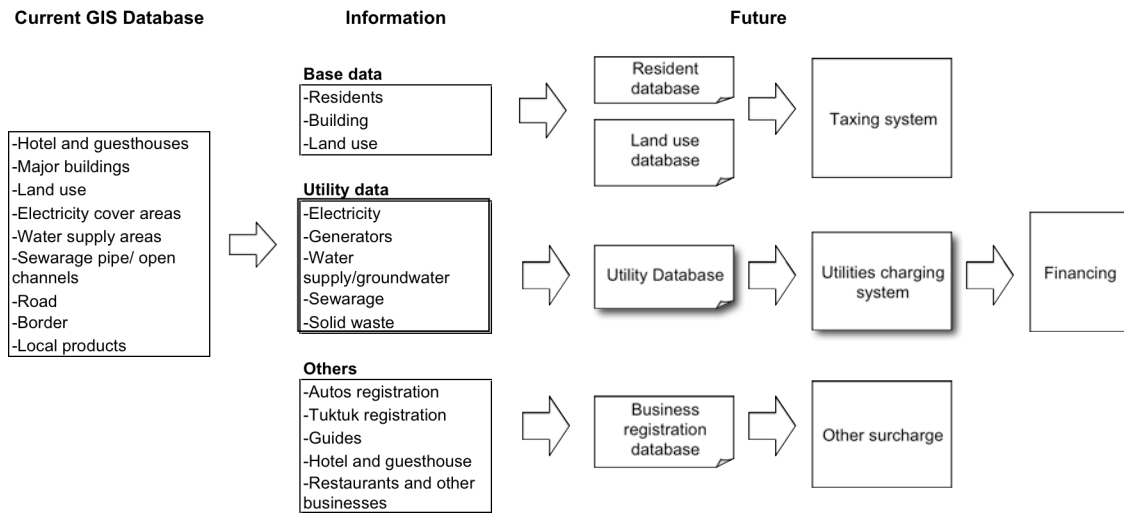
E-2 Enhancing Environmental Awareness

- (1) Background: Behaviors of people and businesses are not environment-friendly
- (2) Purpose: to enhance environmental awareness so as to encourage people's behaviors to be environment-friendly
- (3) Beneficiaries: People and businesses
- (4) Outputs:
 - 1) Enhanced people's awareness
 - 2) People's behavior to be changed from consumption oriented to environmental friendly
 - 3) Enhanced businesses awareness
 - 4) Businesses' behavior to be environment-friendly
 - 5) Guideline of environment-friendly lifestyle and business
 - 6) Recommendation from people and businesses to government
 - 7) Action plan
 - 8) Participation in planning
- (5) Outline and components:
 - 1) Strengthening education material and equipment and education capacity
 - 2) Awareness building to beneficiary groups through information sharing and participation, people and business: hotels and other beneficiaries
 - 3) Introducing environmental management to businesses
 - 4) Preparing instrument packages to encourage people's behaviors to be environment-friendly
 - 5) Preparing guideline of environment-friendly lifestyle and business
 - 6) Preparing recommendation
 - 7) Preparing action plan

E-3 Joint Fee Collection System of Public Services

- (1) Background: Weak capacity to finance for improving environment
- (2) Purpose: to strengthen capacity to finance for improving environment
- (3) Beneficiaries: government, people, and businesses
- (4) Outputs:
 - 1) Strengthened financing capacity for public investment in the environment
 - 2) Strengthened financing capacity for private investment in the environment
- (5) Outline and components:
 - 1) Information collection
 - 2) Database development
 - 3) Introducing joint fee collection system
 - 4) Studying the future possibility for taxation and surcharging

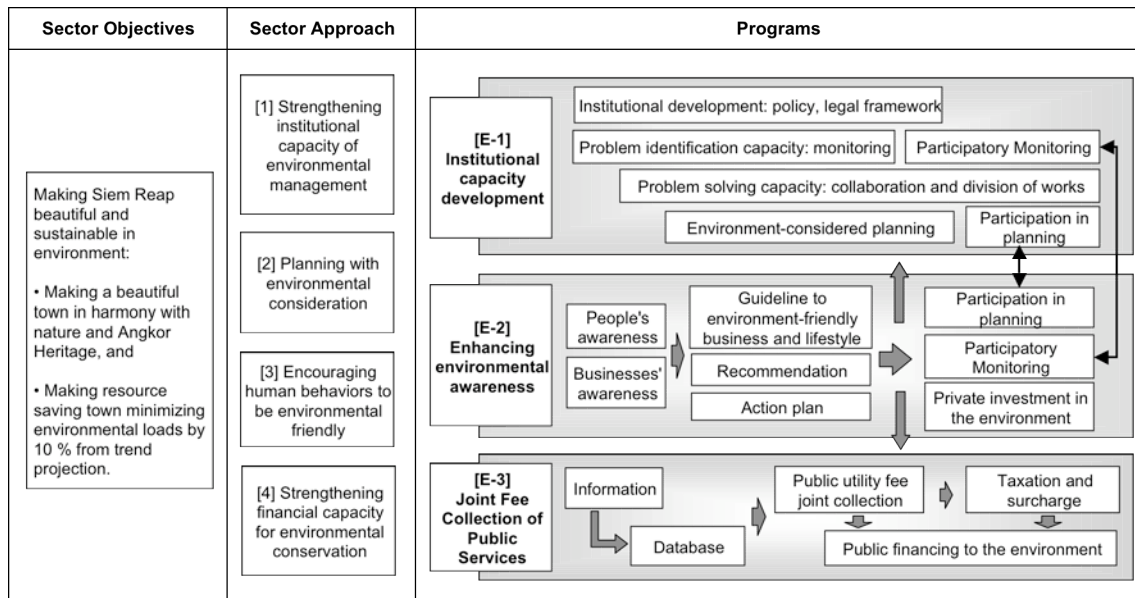
The program design is shown in Figure III.2.9.



Source: JICA Study Team

Figure III.2.9 Joint Fee Collection System to Strengthen Finance to the Environment

The overall framework that shows objective, approaches and program sequence are shown in figure below.



Source: JICA Study Team

Figure III.2.10 Objective, Approaches and Program Sequence

2.4 Priority Program: Enhancing Environmental Awareness (ID No. E-2)

2.4.1 Project/Program Background

The current rapid economic development and the population growth are rapidly deteriorating the environment in Siem Reap town and its surroundings. Without taking any countermeasures, environmental would be deteriorated to the extent that natural destoration no longer works. In order to avoid such serious case, the Master Plan has proposed the conservation and protection of the environment as one of its main objectives.

There are two kinds of measures to achieve this; one is the improvement of the necessary infrastructures and the other is to change the economic activities and people's way of life to be environment-friendly. The former measure is the actions to reduce pollution loads just before being improved on environment, and the latter is to minimize the pollution loads at the generation sources. Both of them are very important and essential. However, the latter should be prior to the former because the latter measure require a less expense and reduce capacity of necessary infrastructures.

Many of the citizens have perceived that the importance of the education approach for the waste issues. Therefore, a pilot project was carried out to enhance people's environmental awareness with a focus on the waste collection. The evaluation report of the pilot project recommended to continue and even to expand the activities to enhance the people's awareness of environment.

In addition, because sources of pollution are not only solid waste but also water supply, wastewater, electricity, etc., the project should target to enhance people's awareness of all these aspects. This project is, therefore, one of essential projects to materialize the Master Plan.

2.4.2 Project/Program Outline

(1) Project/Program Purpose

The overall objective is to change the behaviors of people and businesses to be more environment-friendly.

The detailed objectives are as follows.

- 1) To reduce water demand, electricity demand and use of natural resources.
- 2) To reduce waste discharge amount and a total cost of infrastructure management.
- 3) To minimize tourism investment by reducing demand fluctuations.
- 4) To develop people's mind to maintain town more environment-friendly and beautiful.

(2) Target Area/Location

Siem Reap Province

(3) Prospective Beneficiaries

All citizens in Siem Reap Province, especially people and businesses

(4) Project/Program Components/ Activities

- 1) Strengthening the education equipment and materials.
 - Procurement of equipment for publicity and education
 - Preparation of education materials such as posters, textbooks, etc.
- 2) Developing the government authorities (DOE, SRWSA and EdC) education capacity
 - Establishing a task force team consisting of DOE, SRWSA, EdC and Provincial government.
 - Formulation of an action plan
 - Seminar and workshop
 - On-the-job training
- 3) Conducting public awareness building by beneficiary group (Public and Hotel Association)
 - Preparation of education programs for each target group
 - Implementation of the education activities for each target group
 - Enforcing hotels and restaurants to prepare and to execute the energy minimization action plan.
- 4) Preparing instruments packages to induce their behavior change
 - People: education
 - Business: incentives and information such as
 - Encouraging environment-friendly hotels: grading, awarding, eco-laveling to progressive hotels such as reutilization of greywater, rain water utilization, rain water infiltration, energy saving designing, and
 - Introducing environmental management to businesses
- 5) Preparing guideline to environment-friendly lifestyle and business
- 6) Preparing recommendation to government from people and businesses
- 7) Preparing action plan

Table III.2.7 Program for Environment-friendly Business

Education	<ul style="list-style-type: none"> ▪ Education and training 								
Information	<ul style="list-style-type: none"> ▪ Information dissemination ▪ Information sharing ▪ Participation in environmental committee 								
Instruments to encourage	<ul style="list-style-type: none"> ▪ Rating, grading and awarding to environment-friendly business practice by the following rating: <table border="1" style="margin-left: 20px;"> <thead> <tr> <th style="text-align: center;">Sector</th> <th style="text-align: center;">Environment-friendly Measures</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Water</td> <td> <ul style="list-style-type: none"> • Reducing groundwater intake • Saving water <ul style="list-style-type: none"> ➢ Reusing wastewater for gardening ➢ Rainwater utilization ➢ Infiltration of rain water into ground by vegetation ➢ Water saving practice • Wastewater treatment </td> </tr> <tr> <td style="text-align: center;">Power</td> <td> <ul style="list-style-type: none"> • Energy saving practice • Energy saving designing • Reducing utilization of generators </td> </tr> <tr> <td style="text-align: center;">Solid waste</td> <td> <ul style="list-style-type: none"> • Reducing solid waste </td> </tr> </tbody> </table> ▪ Introducing Environmental Management System 	Sector	Environment-friendly Measures	Water	<ul style="list-style-type: none"> • Reducing groundwater intake • Saving water <ul style="list-style-type: none"> ➢ Reusing wastewater for gardening ➢ Rainwater utilization ➢ Infiltration of rain water into ground by vegetation ➢ Water saving practice • Wastewater treatment 	Power	<ul style="list-style-type: none"> • Energy saving practice • Energy saving designing • Reducing utilization of generators 	Solid waste	<ul style="list-style-type: none"> • Reducing solid waste
Sector	Environment-friendly Measures								
Water	<ul style="list-style-type: none"> • Reducing groundwater intake • Saving water <ul style="list-style-type: none"> ➢ Reusing wastewater for gardening ➢ Rainwater utilization ➢ Infiltration of rain water into ground by vegetation ➢ Water saving practice • Wastewater treatment 								
Power	<ul style="list-style-type: none"> • Energy saving practice • Energy saving designing • Reducing utilization of generators 								
Solid waste	<ul style="list-style-type: none"> • Reducing solid waste 								
Guideline to environment-friendly practice	<ul style="list-style-type: none"> ▪ Resource/ energy saving designing ▪ Environment-friendly business model 								
Recommendation	<ul style="list-style-type: none"> ▪ Necessary framework by public sector: legal framework, introducing surcharge in future, monitoring and enforcement ▪ Environment-friendly urban planning guideline and construction code 								
Action plan	<ul style="list-style-type: none"> ▪ Promotion plan of environment-friendly business practice 								

Source: JICA Study Team

(5) Project/Program Output

- 1) Enhanced people and businesses' awareness
- 2) Change of people and businesses behaviors from the material consumption oriented to the environmental-friendly.
- 3) Minimized waste discharge amount, water consumption, wastewater amount, and electricity consumption.
- 4) Minimized future investment in the infrastructure due to reduced waste
- 5) Minimized tariff for each user charges due to reduced waste
- 6) Promoted beautifying the town
- 7) Guideline of environment-friendly lifestyle and business
- 8) Recommendation to government from people and businesses
- 9) Action plan
- 10) Participation in planning

(6) Project/Program Input

1) Procurement

- Audio equipment (computer, printer, projector, photocopier, digital camera, TV, etc.)
- A vehicle for education and publicity

- Posters
- Leaflets
- Stickers
- Textbooks
- Uniforms

2) Dispatching Experts

- An expert for the solid waste education 1 mm
- An expert for the water supply education 1 mm
- An expert for the wastewater education 1 mm
- An expert for the electricity education 1 mm
- An expert for the environmental administration 4 mm

3) Seminar, workshop

(7) Environmental and Social Impact

- 5) Reduced water consumption and reduced costs for water supply and treatment
- 6) Reduced wastewater quantity and reduced costs for treatment
- 7) Reduction in the amount of the solid waste collected and disposed
- 8) Reduction of electric consumption, the electric tariff and future investment cost
- 9) Reduced environmental impact and more sustainable development

2.4.3 Institutional Arrangement and Implementation Schedule

(1) Implementation Organization

The task force team headed by the Department of Environment and involving the relevant authorities is established.

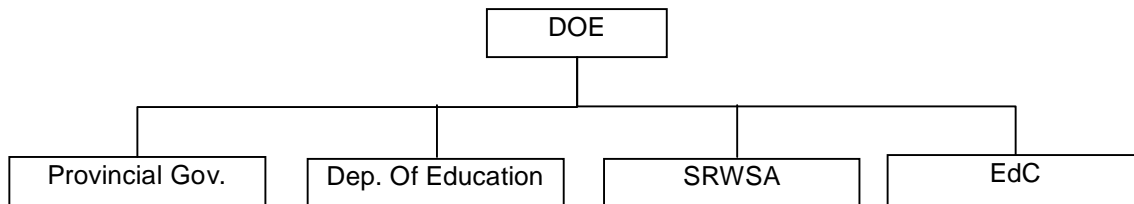


Figure III.2.11 Implementing Organization

(2) Operation and Maintenance Organization

The task force team will prepare the action plan including the operation and maintenance system. The responsible operation and maintenance organization will be different by the target fields.

(3) Implementation Schedule

Because the education effect takes time to be appeared, the program should start as soon as possible, and continuous effort is necessary so that an environment-friendly idea takes roots among people and businesses. The proposed schedule is starting in 2006 and lasting at least five years. Reviewing the results, the program should continue by stepping up to the advanced stage by local initiative.

(1) Preliminary Cost Estimation

1) Project cost

Category	Items	unit	Quantity	Unit rate (1000 USD)	Amount (1000 USD)
Procurement	Audio equipment (computer, printer, projector, photocopier, digital camera, TV, etc.)	L.S.	1	10	10
	A vehicle for education and publicity	L.S.	1	25	30
	Posters, Leaflets, Stickers, Textbooks, Uniforms	L.S.	1	50	60
Dispatching Experts	An expert for the solid waste education	Mm	1	25	25
	An expert for the water supply education	Mm	1	25	25
	An expert for the wastewater education	Mm	1	25	25
	An expert for the electricity education	Mm	1	25	25
	An expert for the environmental administration	Mm	4	25	100
Seminar	Seminar, workshop, etc.	L.S.	1	20	20
Salary	Local staff (5 person)	Mm	60	0.16	10
Total					330

2) O&M cost

Category	Items	unit	Quantity	Unit rate (1000 USD)	Amount (1000 USD)
Salary	Local staff (5 person)	Mm	60	0.16	10
Material	Leaflets, poster, etc.	L.S.	1	20	20
Miscellaneous	Office, petrol, stationary, electricity, etc.	L.S.	1	10	10
Total			-	-	40

Annual O&M cost is 40,000 USD.

(2) Expected Funding Sources

International

JICA - Study on Integrated Master Plan for Sustainable Development of Siem Reap/Angkor Town
Project Brief
Sector: Environmental Management

No.	Project Title	Beneficiaries and/or Target Group	Assumed Fund	Estimated Cost	Project Priority
E-1	Institutional Capacity Development of Environment Management	Department of Environment	International	310 (thousand US\$)	
	Project Site	Department	Contact Person	Telephone	E-mail
	Siem Reap District	Department of Environment			
Background:	<p>A rapid development and urbanization cause the environmental deterioration, however, weak institutional capacity of environmental management cannot cope with increasing problems. To strengthen the institutional capacity to manage environment.</p>	<p>Project and Program Outline/Components:</p> <ol style="list-style-type: none"> 1. Institutional development for legal framework 2. Capacity development for <ol style="list-style-type: none"> (1) Problem identification: monitoring, analysis (2) Problem solving (3) Planning 3. Detail action plan 			
Project Purpose:	<p>The objective of the project is to strengthen the institutional capacity for environmental management.</p>				
		<p>Project Output:</p> <ol style="list-style-type: none"> 1. Legal framework for environmental management 2. Strengthened capacity for problem identification and solving, and planning. 3. Detail environmental management action plan 			
Environmental and Social Impact:	<p>I. Improvement of the environment through the enhanced capacity</p>	<p>Implementation Schedule:</p> <p>Capacity development 2006-2012</p>		<p>Project Cost: ('000 USD)</p> <p>Capacity development 310</p> <p>TOTAL 310</p>	
Related Projects:					

JICA - Study on Integrated Master Plan for Sustainable Development of Siem Reap/Angkor Town

Project Brief

Sector: Environmental Management

ID No.	Project Title	Beneficiaries and/or Target Group	Assumed Fund	Estimated Cost	Project Priority												
E-2	Enhancing Environmental Awareness	Residents, tourists, hotels and commercial businesses		330 (thousand US\$)	Priority												
	Project Site Siem Reap District	Department	Contact Person	Telephone	E-mail												
<p>Background: The economic development and the increase of population are rapidly deteriorating the environment, both for natural resources and living environment in Siem Reap. The wastes, water and electric demand made a heavy load to natural resources and to public infrastructure management, such as investment cost for required treatment plant development. One of the essential measures to make the development sustainable is to refrain the people's demand of natural resources by educating people, hotels on the relation and effects on living environment and natural resources.</p> <p>Project Purpose: The overall objective is to change the people's attitude to more environmental friendly. The detailed objectives are as follows: 1. To decrease required water and electric demand and reduce effect on natural resources. 2. To decrease waste discharge amount and reduce the total public infrastructure management cost. 3. To minimize future investment by suppliers by curving and leveling the demand. 4. To maintain town more sustainable develop, environmental friendly and beautiful.</p>		<p>Project and Program Outline/Components: 1. Provision of the material and equipment for the public awareness. 2. Conducting seminar for the empowerment of government authorities (DOE, SRWSA and EdC) 3. Conducting public awareness by beneficiary group (Public and Hotel Association) 4. Preparing guideline of environment-friendly lifestyle and businesses 5. Action plan for the future</p>															
<p>Environmental and Social Impact: 1. Reduced water consumption and reduced costs for water supply and treatment 2. Reduced wastewater quantity and reduced costs for treatment 3. Reduction in the amount of the solid waste collected and disposed 4. Reduction of electric consumption, the electric tariff and future investment cost 5. Reduced environmental impact and more sustainable development</p> <p>Related Projects: 1. Enhancing People's Awareness for "A More Beautiful Siem Reap" which is the pilot project promoted by JICA</p>		<p>Project Output: 1. Education on sanitation and living environment 2. Promotion of 3R life style (Reduce, Reuse and Recycle of water, energy/electricity and solid waste) 3. Minimization of future investment, and the tariff 4. Promotion of beautifying the town 5. Guideline of environment-friendly lifestyle and business 6. Action plan</p>															
		<p>Implementation Schedule:</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">1. Procurement</td> <td style="width: 50%; text-align: center;">Oct-06</td> </tr> <tr> <td>2. Capacity development</td> <td style="text-align: center;">Jun-06 Mar-07</td> </tr> <tr> <td>3. Public relation</td> <td style="text-align: center;">2007-2012</td> </tr> </table>		1. Procurement	Oct-06	2. Capacity development	Jun-06 Mar-07	3. Public relation	2007-2012	<p>Project Cost: ('000 USD)</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">1. Direct costs</td> <td style="width: 50%; text-align: right;">30</td> </tr> <tr> <td>2. Capacity development</td> <td style="text-align: right;">300</td> </tr> <tr> <td style="text-align: right;">TOTAL</td> <td style="text-align: right;">330</td> </tr> </table>		1. Direct costs	30	2. Capacity development	300	TOTAL	330
1. Procurement	Oct-06																
2. Capacity development	Jun-06 Mar-07																
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TOTAL	330																

JICA - Study on Integrated Master Plan for Sustainable Development of Siem Reap/Angkor Town
Project Brief
Sector: Environmental Management

ID No.	Project Title	Beneficiaries and/or Target Group	Assumed Fund	Estimated Cost	Project Priority
E-3	Joint Fee Collection of Public Services	Residents, tourists, hotels and commercial businesses	International	310 (thousand US\$)	
	Project Site	Department	Contact Person	Telephone	E-mail
	Siem Reap District	Department of Environment and other line departments			
	<p>Background: As compared with rapid business investment, public investment and finance to the environmental conservation is too slow to cope with the problems. It is necessary to strengthen the financial system to invest in the environment.</p>	<p>Project and Program Outline/Components: 1. Developing data base of utilities based on GIS database developed. Public services include water supply, waste collection, sewerage treatment, and electricity. 2. Introducing joint fee collection utilizing the data base, based on a trial at the model area</p>			
	<p>Project Purpose: The objective of the program is to strengthening financing capacity through introducing joint fee collection system of public services.</p>				
	<p>Project Output: 1. Data base of public services 2. Strengthened financial base for environmental management by joint fee collection system</p>				
	<p>Environmental and Social Impact: 1. Reduction of the negative impacts to the environment 2. Improve the sanitary condition to the surrounding.</p>	<p>Implementation Schedule: Database development 2006-2010 Coordination 2008-2012 Trial 2008-2010 Introduction 2012-2020</p>		<p>Project Cost: (000 USD) Database development 150 On-the-job training 50 Trial 50 Introduction 60 <hr/> TOTAL 310</p>	
	<p>Related Projects: 1. Solid waste management study for Phnom Penh Municipality by JICA</p>				

Chapter 3 Tourism Development

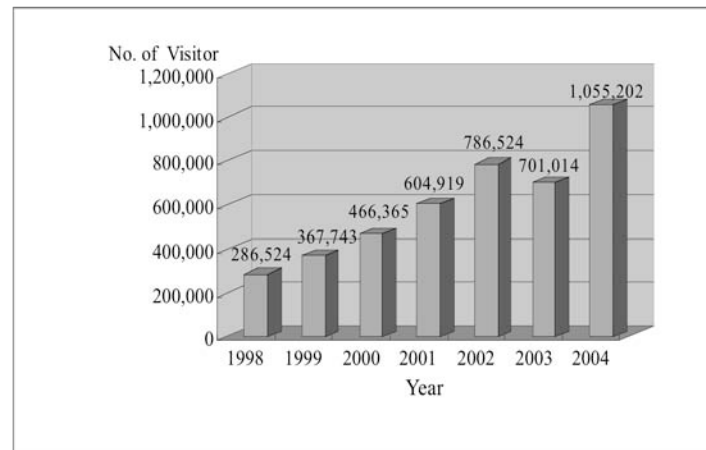
3.1 Situation, Prospects and Issues

3.1.1 Situation of Tourism Sector in Cambodia

The government's revenue from the tourism sector increased from US\$252 million in 1998 to US \$525 million in 2003¹ and the tourism national revenue in 2003 was approximately 12 % of the total Gross Domestic Products (GDP) according to MOT. Tourism is becoming one of the most important industries for the Government of Cambodia to obtain foreign currency.

(1) Tourist Arrivals

Since the domestic situation has settled down, the number of international tourists visiting Cambodia has started to augment as seen in the following figure.



Source: Tourism Statistical Report Year Book 2004, Ministry of Tourism

Figure III.3.1 Foreign Visitor Arrivals to Cambodia (By All Means of Transport)

The reason why the number drops in 2003 is the worldwide threat of the SARS and the fear to the Iraqi War that heavily damaged the international tourism industry. In 2004, the number of foreign visitor arrivals has recovered and increased to over 1 million. The growth of number of flights to Siem Reap and Phnom Penh, low-priced package tours to Cambodia and the publication of Angkor Wat through various media are the other factors that promote Cambodia as a growing international tourism destination.

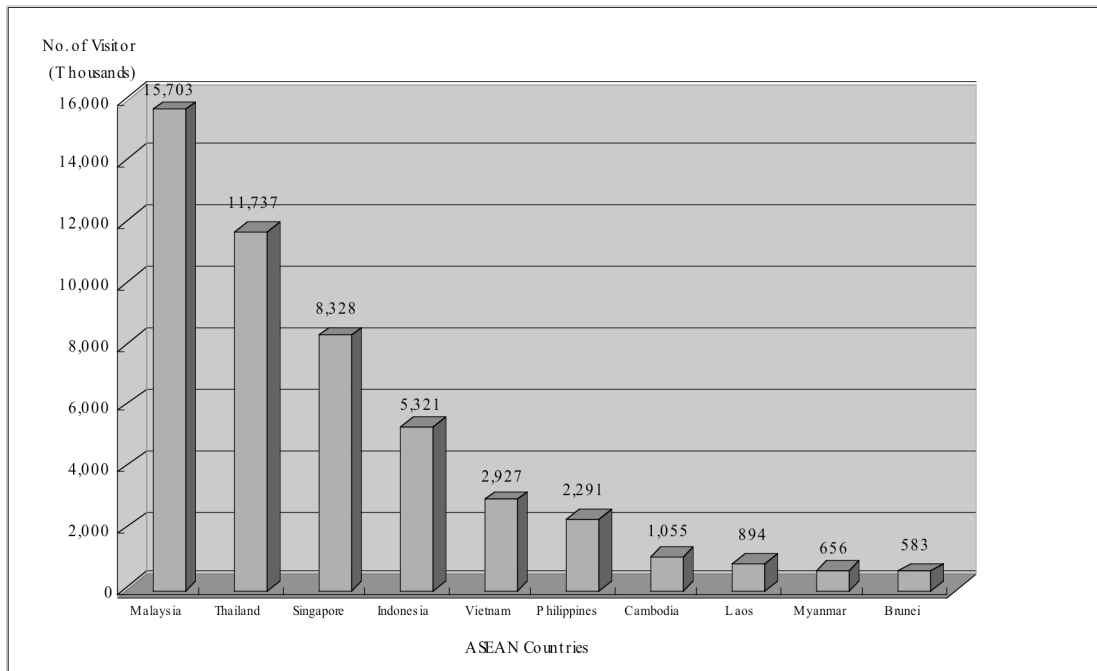
1) Foreign Tourist Arrivals in ASEAN Countries

Cambodia has a great potential as an international tourism destination because of its location in the middle of ASEAN countries, which are the popular tourism destinations.

Comparing foreign tourist arrivals in ASEAN countries, Malaysia is the most popular tourism destination among ASEAN countries with the total tourist arrival of 15,703 million in 2004 as shown in Figure III.3.2. Cambodia is the seventh largest in the

¹ It is calculated based on foreign tourist expenditure, an average length of stay and visitor arrivals.

number of foreign tourist arrivals in ASEAN countries in the same year with 1,055,000 following after the Philippines with 2,291,000 tourist arrivals. Cambodia has the highly developed regional market that is interested in ASEAN countries.



Source: Respective National Tourism Offices in ASEAN Countries

Note: Data of foreign tourist arrivals in Brunei is in 2001.

Figure III.3.2 Foreign Tourist Arrivals in ASEAN Countries (2004)

2) Foreign Visitor Arrivals by Region of Origin

Cambodia has a lot of tourists from ASEAN and other Asian/ Oceania countries because of its location. The increasing international flights from many Asian cities encourage their visit to Cambodia.

All regions of visitor arrivals in 2003 decreased compared with visitor arrivals in 2002 due to the incidents of the SARS and the Iraqi War. The number of visitor arrivals from Middle East and Africa is very small compared with that from other regions.

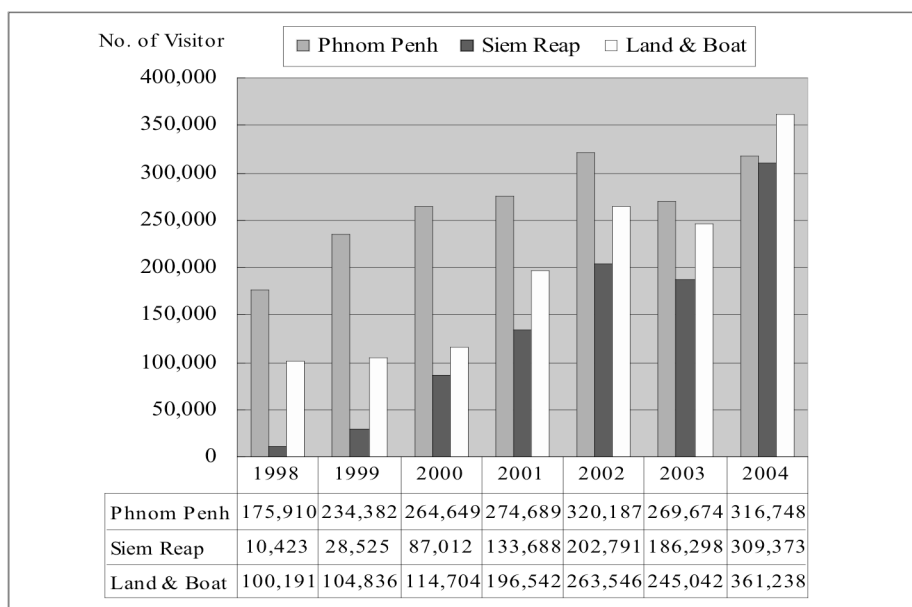
Table III.3.1 Foreign Visitor Arrivals at Pochentong International Airport (Phnom Penh) by Region (1998 – 2004)

	ASEAN	Asia/ Oceania	Europe	America	Middle East/ Africa	Total	Growth over previous year (%)
1998	38,046	69,375	46,165	21,773	551	175,910	-
1999	48,791	88,263	60,031	36,233	1,064	234,382	33.24
2000	55,684	99,666	65,657	42,156	1,486	264,649	12.91
2001	58,363	104,734	66,089	43,905	1,598	274,689	3.79
2002	55,465	127,101	79,246	56,194	2,181	320,187	16.56
2003	52,864	114,630	60,668	39,945	1,567	269,674	-15.78
2004	59,476	126,155	73,065	55,546	2,506	316,748	17.46

Source: Tourism Statistical Report Year Book 2003, 2004 Ministry of Tourism

3) Foreign Visitor Arrivals to Cambodia by Mode of Transportation

Figure III.3.3 shows foreign visitor arrivals to Cambodia by three gateways of transportation; Phnom Penh Airport, Siem Reap Airport, and surface (crossing the borders by road or waterways).



Source: Tourism Statistical Report Year Book 2002, 2003, Ministry of Tourism

Figure III.3.3 Foreign Visitor Arrivals to Cambodia by Mode of Transportation (1998-2004)

Since international flights started to fly directly into Siem Reap Airport from Bangkok, Ho Chi Minh and Singapore in accordance with the government's "Open Skies" policy, the visitor arrivals at Siem Reap Airport increased drastically. In 2005, the number of visitor arrivals at Siem Reap Airport exceeds that at Phnom Penh Airport.

Arrivals on surface (road and waterway) are through international border checkpoints. Poipet (Banteay Meanchey Province), Phnom Den (Takeo Province), and Cham Yeam (Koh Kong Province) are gateways. 67% of foreign visitors (242,456) on surface in 2004 entered through Poipet, which is the closest to Siem Reap among the three gateways.

4) Top Ten Markets of Visitors Arrival to Cambodia by Air

Top 10 markets of visitor arrivals are shown in Table III.3.2. Japan, South Korea, U.S.A, Taiwan and France are the top five markets in 2004 in term of tourist arrival by air. Comparing growth rates and relative magnitude of these markets the arrivals from South Korea drastically increased from 25,861 or only 4.9% of the total in 2002 to 98,144 or 15.7% in 2004, which follows Japan. The statistics clearly show South Korea has already become the largest tourism market for Cambodia and is expected to overtake Japan in 2005.

Table III.3.2 Top Ten Markets of Visitors to Cambodia by Nationality: Arrivals at Pochentong and Siem Reap International Airports (2002-2004)

	2004			2003			2002	
	No. of Visitors	Share (%)	Growth rate (%) 2004/03	No. of Visitors	Share (%)	Growth rate (%) 2003/02	No. of Visitor	Share (%)
1. Japan	104,012	16.6	49.1	69,763	15.3	-27.9	96,796	18.5
2. South Korea	98,144	15.7	158.2	38,006	8.3	47.0	25,861	4.9
3. U.S.A	73,899	11.8	43.5	51,508	11.3	-35.1	79,363	15.2
4. Taiwan	51,319	8.2	41.9	36,171	7.9	12.5	32,149	6.1
5. France	44,317	7.1	24.8	35,510	7.8	-27.8	49,164	9.4
6. China	42,694	6.8	16.0	36,798	8.1	11.7	32,958	6.3
7. United Kingdom	30,007	4.8	20.0	25,006	5.5	1.8	24,565	4.7
8. Australia	26,470	4.2	38.8	19,065	4.2	-14.3	22,240	4.3
9. Thailand	24,207	3.9	25.2	19,328	4.2	-25.9	26,099	5.0
10. Malaysia	21,922	3.5	36.8	16,019	3.5	4.2	15,368	2.9

Source: Tourism Statistical Report Year Book 2002, 2003, 2004, Ministry of Tourism

(2) Tourism Resources

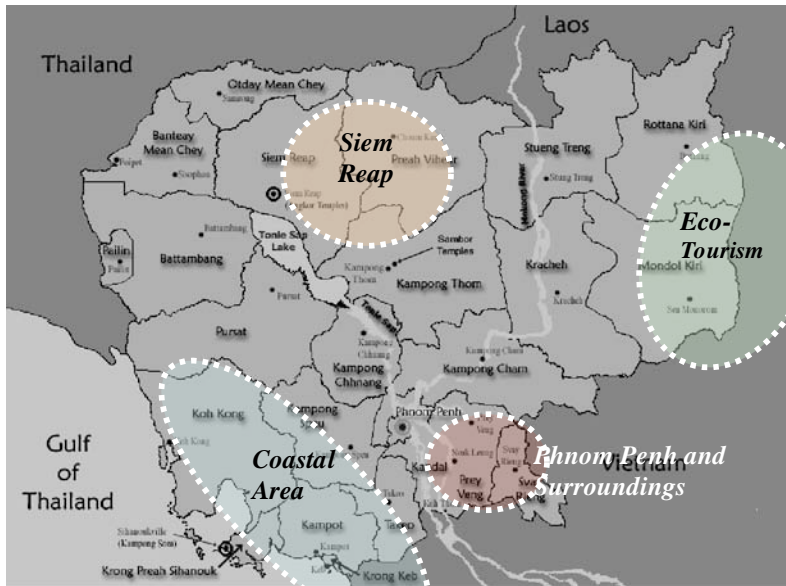
Cambodia holds excellent tourism resources such as archeological, historical and cultural heritages and nature. Angkor Wat temple complex and the other temples around Siem Reap are the world's most magnificent historical monuments, which attract many tourists from all over the world. Angkor Wat temple complex was inscribed on the UNESCO's World Heritage List in 1992.

Other archeological and historical resources can be found around the capital city of Phnom Penh. In Preah Vihear, located close to the border to Thailand, Preah Vihear Temple complex is famous for archeological monument, which is accessible only from Thailand.

Marine and natural resources are mostly found in Sihanoukville, Kep, Kampot and Koh Kong along the coastal area facing to the Gulf of Thailand. Other attractive natural resources are in the area surrounding the Tonle Sap Lake, along the Mekong River and the natural protected areas.

Rattanakiri province is known for its isolated hill tribes. The capital of the province, Ban Lung is a place for trekking. In recent years, Rattanakiri has been gradually developed and promoted as an eco-tourism destination in Cambodia by Ministry of Tourism in cooperation with private sector.

Mondulkiri province, located in the lower Mekong River basin, has many waterfalls and four national parks, where are suitable for eco-tourism development.

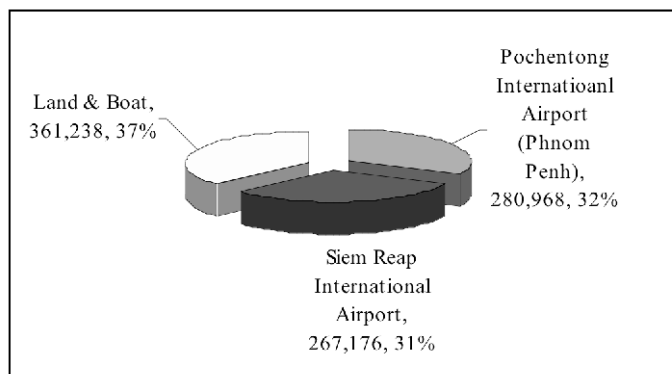


Source: JICA Study Team

Figure III.3.4 Areas for Tourism Resources Development in Cambodia

According to the tourism resource data and information prepared by Ministry of Tourism (MOT), major tourism resources and attractions were classified into three categories as summarized in Table III.3.3. The relative proportion of cultural/historical and natural resources are 45% (88 resources) and 43% (84 resources) respectively. Tonle Sap Lake Region has the most concentrated cultural/historical resources in Cambodia with 37 resources. Natural type of resource such as mountain, beach, waterfalls and national park are mainly concentrated in Coastal, and Plateau and Mountain Regions.

Though Cambodia is abundant in tourism resources, there is little transportation connecting these resources. The details of transportation network are to be discussed in Chapter 3.1.3 (6).



Source: Statistics and Tourism Information Department, Ministry of Tourism

Figure III.3.5 Foreign Visitor Arrivals to Cambodia by Mode of Transportation in 2004

Table III.3.3 Major Tourism Resources in Cambodia

Region Province/City	Cultural/ Historical	Natural (Mountain/ Beach)	Manmade	Accessibility	
				Foreign and domestic Visitor	Limited for domestic Visitor
Plain Region	28	8	8	27	16
Phnom Penh	7		2	9	
Kandal	9	2	2	6	7
Takeo	6	1	3	8	2
Prey Veng	3	1			3
Kampong Cham	3	4		4	3
Svay Rieng			1		1
Tonle Sap Lake Region	37	17	13	44	29
Siem Reap	14	3	5	22	
Battambang	4	6		7	3
Banteay Meangchey	3	4	2	4	5
Kampong Thom	11	3	6	3	17
Pousat	2	3		2	3
Kampong Chhnang	3	4		6	1
Coastal Region	5	25	3	33	
Preah Sihanouk City		6		6	
Kampot	3	5		8	
Koh Kong		10	2	12	
Kep City	2	4	1	7	
Plateau and Mountain	18	34	1	36	16
Kratie	6	7		4	8
Kampong Speou	1	2	1	4	
Stung Treng	2	5		7	
Pailin		5		2	3
Udor Meanchey	4			1	3
Preah Vihear	5			4	1
Rattanakiri		9		9	
Mondul Kiri		6		5	1
Cambodia	88	84	25	140	61

Source: International and Domestic Tourists can access to Tourist Resort Targeted in Cambodia, P77-86, Report on Recapitulation of Tourism Year 1998-2002 and Action Plan 2003, Ministry of Tourism

(3) Tourism Product

Handicrafts and souvenirs are important tourism products in Cambodia. Cambodia's souvenir industry is mostly undertaken by small family-run businesses although there are some private enterprises specialized in weaving and tailoring (silk sampot and sarongs, the Cambodian national dress). The small manufactures of these products grew rapidly. In Phnom Penh and Siem Reap, there are several types of handicraft shops such as NGO managed, Government/international agencies funded, and private handicraft shops. In a rapid growth of tourist number and booming of tourism business in Cambodia, the number of handicraft and souvenir shops has been increasing in Phnom Penh and Siem Reap. Various types of handicrafts can be found at handicraft and souvenir shops. Major handicrafts and souvenirs are summarized in Table III.3.4.

Table III.3.4 Major Handicrafts and Souvenir in Cambodia

Silk Weaving	The most popular souvenir in Cambodia is the <i>kroma</i> – a unique checkered silk scarf. It is hand made using traditional ikat methods and styles. The pattern is dyed into the threads before the silk is woven. The process of dyeing and weaving a single piece takes weeks. Most Cambodian silk is hand woven. Products are available at many places such as family-run shops in a small village to high standard hotels.
Silver Craft	Silver Boxes, often animal shaped, are popular as traditional souvenirs. These pounded silver containers were once used in ceremonies and everyday life to hold betel leaves. Nowadays the boxes are made for souvenirs but these are still hands made by local artisans.
Carvings and Statues	Carvings and statues are popular products in Cambodia, though weighty souvenirs. Bronze busts of 'The Leper King' are carved wood Apsara are most popular items. The quality of the carved wood varies considerably. High qualities furniture carvings, antique, Chinese furniture and art decorative furniture are sold at some boutiques.
Gems	Gems are tempting souvenirs. Western part of Cambodia is a fertile source of colored stones, especially rubies, sapphires and emeralds, as these were the main financial source for Khmer Rouge. There are plenty of gem dealers at the Central Market and Russian Market in Phnom Penh. Rattanakiri is famous for its "Rattanakiri Blue".
Local Spice Products	Various types of spice used for cooking are packed and bottled sold at souvenir shops. Cambodian pepper grown form Kampot are popular local product for tourist.
Coffee and Ginger Tea	Ratanakiri area is suitable location for growing fine coffee. Domestic coffee, grown at Ratanakiri is promoted as Cambodian coffee, is sold at major souvenir shops in Phnom Penh and Siem Reap. Ginger flavor tea is produces marked for foreign tourist.

Source: JICA Study Team

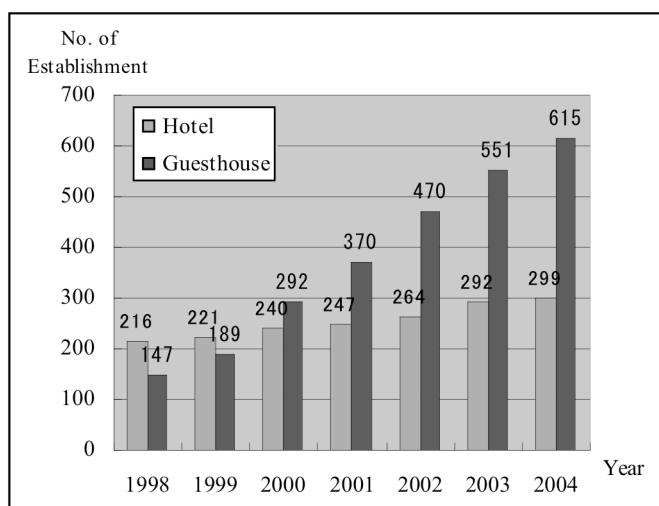
Expansion of the handicraft industry should be encouraged because it can be an important source of income for local people, especially in rural villages. However, the quality of handicrafts is still below the international standard. Improvement of quality and design is required to meet the demands of international tourists. The details of local products are discussed in Chapter 5.

(4) Accommodation, Travel Agency and Tour Guide Service

1) Accommodation

Since 1998, the number of hotel and guesthouse has been increasing every year. Especially the annual growth rate of the number of guesthouses is much higher than that of hotels for the past six years from 1998 to 2004. According to the statistics of MOT, an average hotel occupancy rate in Cambodia increased from 40% in 1998 to 52% in 2004.

In Cambodia, hotels and guesthouses are concentrated in Phnom Penh and Siem Reap. In 2003, the number of licensed hotels in Phnom Penh and Siem Reap was 125 with 6,645 rooms and 68 with 4,312 rooms, respectively. Except in Phnom Penh and Siem Reap, accommodations are limited and low standard to serve foreign tourists.



Source: Tourism Statistical Report Year Book 2004, Ministry of Tourism

Figure III.3.6 Number of Hotels and Guesthouses in Cambodia: 1998 to 2004

Table III.3.5 Hotels and Guesthouses in Cambodia (2004)

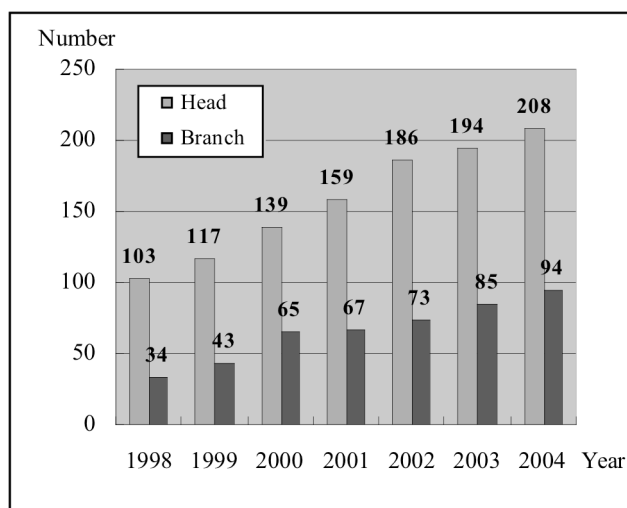
Location (Province/City)	Hotel			Guesthouse		
	Number	Room	Share (%)	Number	Room	Share (%)
Phnom Penh	125	6,645	46.6	141	2,211	28.8
Siem Reap	68	4,312	30.2	153	1,965	25.6
Sihanoukville	44	1,518	10.6	84	933	12.1
Other	62	1,796	12.6	237	2,575	33.5
Total	299	14,271	100.0	615	7,684	100.0

Source: Tourism Statistical Report Year Book 2004, Ministry of Tourism

2) Travel Agency

In Cambodia, there are 302 travel agents consisting of 208 head offices and 94 branch offices. In the last seven years, the number of travel agents increased every year and it was more than double in 2004 compared with 1998 as shown in Figure III.3.7.

The travel agents in Cambodia are mostly located in Phnom Penh and Siem Reap because they are the major tourist destinations. The head offices are mostly located and operated in Phnom Penh with 69.7% of the total in 2004. 76.6% of travel agents in Siem Reap are branch offices.



Source: Tourism Statistical Report Year Book 2004, Ministry of Tourism

Figure III.3.7 Number of Travel Agents (Head and Branch Office) in Cambodia

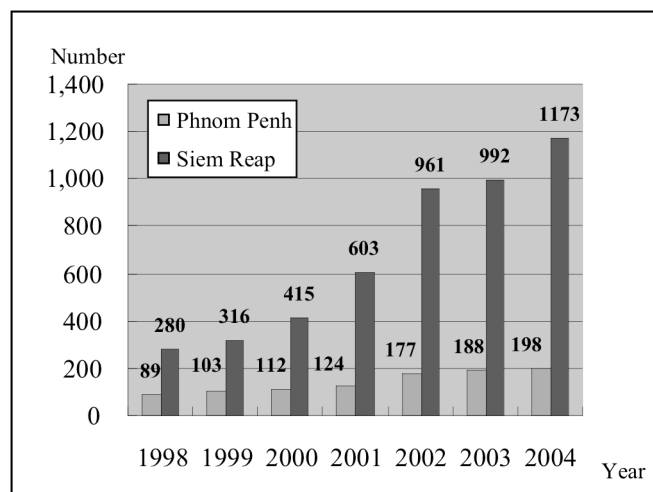
Table III.3.6 Number of Travel Agents in Cambodia by Location in 2004

Location	Head	Share (%)	Branch	Share (%)	Total	Share (%)
Phnom Penh	145	69.7	11	11.7	156	51.7
Siem Reap	52	25.0	72	76.6	124	41.1
Sihanoukville	1	0.5	1	1.1	2	0.7
Other	10	4.8	10	10.6	20	6.6
Total	208	100.0	94	100.0	302	100.0

Source: Tourism Statistical Report Year Book 2004, Ministry of Tourism

3) Tour Guide Service

Tour guide licensing is under the control of Ministry of Tourism. MOT provides official tour guide training courses in different languages for three weeks. There are two types of tour guide licenses, national and regional tour guides. However, only regional tour guide training and license are offered by MOT at present.



Source: Tourism Industry Department, Ministry of Tourism

Figure III.3.8 Number of Licensed Tour Guides in Phnom Penh and Siem Reap (1998-2004)

4) Restaurant

According to Tourism Industry Department, MOT, there are 713 restaurants in Cambodia in 2004, of which 268 are located in Phnom Penh. The number of restaurant in Phnom Penh, Siem Reap and Sihanoukville increased more than double in 2004 compared with the number in 2000. In Phnom Penh and Siem Reap, foreign tourists can easily find variety of restaurants with the service at international standard level.

Table III.3.7 Number of Restaurant in Cambodia from 2000 to 2004

Location	2000	2001	2002	2003	2004
Phnom Penh	100	139	266	245	268
Siem Reap	33	50	59	72	76
Sihanoukville	22	22	47	47	49
Others	253	294	252	261	320
Total	408	505	624	660	713

Source: Tourism Industry Department, Ministry of Tourism

(5) Tourism Revenue

The Government's revenue from the tourism sector increased from US\$252 million in 1998 to US\$525 million in 2003. These figures were calculated based on foreign tourist expenditure, an average length of stay and visitor arrivals. According to MOT, the tourism national revenue in 2003 was approximately 12% of the total Gross Domestic Products (GDP). The average length of stay for foreign tourist in Cambodia is 5.5 days. It is expected that the tourism national revenue will continue to increase in line with the growth of visitor arrival to Cambodia.

Table III.3.8 Tourist's Average Length of Stay and Tourism Revenue

	1998	1999	2000	2001	2002	2003
Ave. Length of Stay (day)	5.2	5.5	5.5	5.5	5.8	5.5
Tourism Direct Income (Million US\$)	166	190	228	304	379	346
Tourism National Revenue (Million US\$)	252	289	347	462	540	525

Note: Tourism direct income equates to tourist expenditure. Tourism national revenue equates to tourism direct income by multiplying 1.52%.

Source: Tourism Statistical Report Year Book 2003, Ministry of Tourism

(6) Policy and Strategy of Tourism Development in Cambodia**1) The Second Five Year Socio-economic Development Plan (2001-2005) (SEDP II)**

Tourism development is described in the Second Five Year Socio-economic Development Plan (SEDP II) since it is an important industry to obtain foreign currency for Cambodian government.

(a) Issues for Sustainable Tourism Development

Cambodia is in a favorable position to take advantage of its location in a highly developed regional market. The country has a significant and internationally recognized cultural heritage such as Angkor Wat complex and other Khmer monuments, which need to be conserved and developed for domestic and foreign tourists. For sustainable tourism development, protection and succession of cultural and religious traditions, protection of natural parks and management of temples and archaeological sites are major issues to be addressed in SEDP II. In addition to the preservation and management of tourist attractions, it is necessary to improve infrastructure, utilities, effective regulatory framework and marketing. Both the public and the private sectors have major roles to play in the sustainable tourism development.

(b) Tourism Development Potential

In the SEDP II, Cambodia's tourism development potential is recognized in the eight areas as follows:

Table III.3.9 Tourism Development Potential under SEDP II

Tourism development potential area	Tourism potential resource and type of tourism development
Siem Reap and Angkor Archaeological Park Area	One of the world's major archaeological sites and tourist attractions and the foreseeable future. It is recognized as a symbol of Cambodia.
North/North East Area	Cultural tourism including village-based accommodation, nature-based tourism, adventure tourism, and river-based tourism.
North Area	Archaeological and religious interest in built cultural heritage sites, especially at Preah Vihear; nature-based tourism, adventure tourism, and village-based accommodation.
Middle Plain Area	Nature and river-based tourism on Tonle Sap and the Mekong, rural exploration, wildlife, fishing; floating villages, and temples and archaeological sites.
Middle Mekong Delta Area	River-based tourism, rural exploration and wildlife.
Western Coastal Area	Mountaineering and trekking; wildlife and adventure tourism
Eastern Coastal Area (Sihanukville, Kampot, Kep and surrounding areas)	Beach holiday resort development, island cruises, and nature-based tourism, especially in Bokor National Park
Phnom Penh and Surroundings	Major tourist attractions in the form of the Royal Palace and Silver Pagoda, the National Museum, the French-influenced built environment, the scenic attractions of the Mekong and Tonle Sap rivers and the Tuol Sleng Museum.

Source: Second Five Year Socio-Economic Development Plan (2001-2005), the Government of Cambodia

(c) Tourism Development Strategy

The tourism development strategies in SEDP II put their focus on:

- Diversifying into new products and services to cater for the varying demands and interests of international and domestic tourists.
- Ensuring more effective promotion and marketing for both the international and

domestic markets.

- Encouraging private sector investment and participation in innovative tourism products as well as special projects and events.
- Increasing the involvement of the local population, especially small entrepreneurs, in the development of district and localized tourism products and services.
- Improving and facilitating access into and within the country.
- Providing the requisite infrastructure and amenities at designated tourist sites.
- Focusing on formal as well as on-the-job skills training in order to meet the rising demands for skilled human resources.
- Ensuring that tourism growth is regulated and managed so that it does not undermine the natural, built and cultural assets that attract tourists.

2) 2005-2010 Action Plan (5-Year Plan) by Ministry of Tourism

2005-2010 Action Plan was prepared by Ministry of Tourism, the objectives of which are listed as follows;

- To implement sound tourism policy and strategic development plan in a sustainable manner to alleviate poverty,
- To let Cambodia's tourism be a quality and intraregional prime tourism destination,
- To increase international tourists by 20%-30% per annum till year 2010, so that Cambodia shall receive 10 million international visitors as planned,
- To stimulate domestic visitors (approximately 4 million by 2010) to expand national tourism revenue to reach approximately US\$2 billion, which is equivalent to 360,000 job opportunities.

(a) Tourism Forecast

In the Action Plan, Ministry of Tourism forecasted the number of international and domestic visitors, tourism employment, and tourism revenue up to 2010 as shown below.

Table III.3.10 Tourism Sector Forecast (2004-2010)

Year	2004	2006	2008	2010
No. of International Visitors	1,045,000	1,500,000	2,200,000	3,120,000
No. of Domestic Visitors	2,500,000	3,000,000	3,500,000	4,000,000
No. of Tourism Employees	180,000	225,000	285,000	365,000
National Tourism Revenue (US\$ Million)	777	1,119	1,611	2,324

Source: Ministry of Tourism

3) Strategic Regional Areas for Tourism Development

According to the current tourism development policy by Ministry of Tourism, the tourism development for Cambodia is focusing on four strategic regional areas as follows:

- Siem Reap and Angkor Archaeological Area (Cultural tourism)
- Phnom Penh and Surrounding Areas
- Coastal Area (Sihanoukville)
- Ratanakiri (Eco-tourism)