

5. Sector Development Plan

5.1 Development Plan to Realize Strategies

Under the proposed strategies, a series of measures have to be taken across the individual sectors. This section highlights those measures proposed in the Sector Development Plan under each strategy.

(1) Sector Development Plan under Strategy 1 “Promoting Tourism Focused on Up-market”

The tourism development plan is the major part of this strategy associated with infrastructure such as transportation and power and development administration. Toward making a quality tourism city, tourism development plan is aiming at creating a quality tourism destination in the context of Angkor history and culture. Siem Reap is not developed as ready to attract various types of tourists who can be exposed to a touch of Angkor history and culture. International tourism markets recognize Siem Reap/Angkor Town as not safe enough for individual tourists walking around. One of the factors is weak marketing and promotion by private-public partnership. The following measures are proposed, under the Strategy 1.

1) Developing tourism destination and diversified routing

Making full-utilization of potential tourism resources in Siem Reap/ Angkor Town, four folded destinations have to be developed and incorporated into the tour routing.

- Angkor Heritage Area: An integrated planning and management
- Urban Amenity and Cultural Tourism Area: Improving amenity and atmosphere
- Tonle Sap Lake and Rural Area: eco/village tourism for interactions with the culture
- Distant Angkor Monument Area: incorporated in routing

For developing tourism destination of Angkor Heritage area, transportation developments are proposed in the transportation sector; and access improvement to Angkor Heritages is proposed for distant Angkor Monument area. For Urban Amenity and Cultural Tourism Area, Strategy 2 is mutually associated. Lighting streets as well as Angkor heritages are also proposed in the power sector.

2) Giving tourists a taste of rich Khmer culture, history, art and the nature: theme-specific routing development and mobilization of potential cultural resources such as festival, native houses and local custom

3) Improving services and hospitality for a pleasant stay: tourist information, transport within the district and tour guide

4) Strengthening tourism marketing and promotion

Marketing and promotion have to be undertaken through public-private partnership targeting to up-markets.

(2) Sector Development Plan under Strategy 2 “Maximizing Local Benefits from Tourism Maximizing Local Benefits from Tourism “

Agricultural diversification and local product promotion comes the major place for the Strategy 2 associated with the development administration. Creating Angkor Brand for increasing local supply in the tourism markets is proposed as the objective. As part of this, special attention has to be paid to the rural areas as proposed as integrating rural economy into tourism through One Village One Product and Production Village Development.

- 1) Creating Angkor Brand for larger local supply
- 2) Integrating rural economy into tourism

For creating Angkor Brand, a new type of public-private partnership is necessary. Night market proposed in the tourism development sector is mutually related.

(3) Sector Development Plan under Strategy 3 “Making Town More Attractive to Tourists”

Towards a human-scale city in the Angkor Atmosphere, the urban development plan has a major role supported by infrastructure sectors and the development administration. The followings are approaches in the urban development plan.

- 1) Guiding urbanization to form a compact city
- 2) Center area development as a strategic corridor to enhance tourism attractiveness
- 3) Infrastructure guiding urbanization

For guiding urbanization to form a compact city, urban road networking and drainage improvement can be major tools. For making an attractive city, sidewalk and streetlights are necessary. Urban planning also guides urbanization with enforced land use plan with enough planning capacity. To make urban planning effective, streamlined administration such as development committee is necessary to appraise development project to check the compliance with urban plan. Information management is also required to enforce the land use plan with proper information.

(4) Sector Development Plan under Strategy 4 “Making Town More Sustainable in Environment “

Towards an environment-friendly city, a comprehensive approach is necessary. It comprises environmental management, infrastructure development, administration and finance. Environmental management sector proposes the following approaches for harmonizing with Angkor heritages and nature and reducing resources and energy.

- 1) Institutional capacity building
- 2) Enhancing environmental awareness
- 3) Financing to environmental conservation
- 4) Environment-considered development planning

These approaches cannot stand alone, which has to be incorporated with tourism, urban development, infrastructure development, administration and finance shown below.

	Harmonizing with Angkor heritages and nature	Reducing resources and energy
Tourism	Site management of Angkor monuments (TO-6)	
Urban Development	Green area management by land use plan	
Transportation	Environmental transport in the Angkor Heritage Park (TR-8, 9)	
Water resources/ Drainage and Sewerage	Groundwater intake management (W-1,2)	Wastewater treatment
Solid Waste Management		Solid waste management Sanitary Land fill (SW-3)
Power		Individual generator management (P-9)
Development Administration/ Local Financing	Enforced rules and regulations for groundwater intake and individual generator PPP for solid waste management Strengthening financial base HRD for information management for groundwater pumps and individual generators	
Community Empowerment	Co-exist with Angkor monuments (TR-8, 9)	

Note: The number in the parentheses represents project number mentioned later.

(5) Sector Development Plan under Strategy 5 “Strengthening Infrastructures for Tourists and People “

Infrastructure development covers five sectors: transportation, water resources and water supply, solid waste management, drainage and sewerage, and power. Infrastructure supports tourism, attractive town and environment as mentioned in Strategy 1-3.

(6) Sector Development Plan under Strategy 6 “Strengthening Local Administration and Finance”

Local administration and finance comprises development administration, local financing and community empowerment; these sectors also support tourism, attractive town and environment as mentioned in Strategy 1-3. Major approaches are as follows.

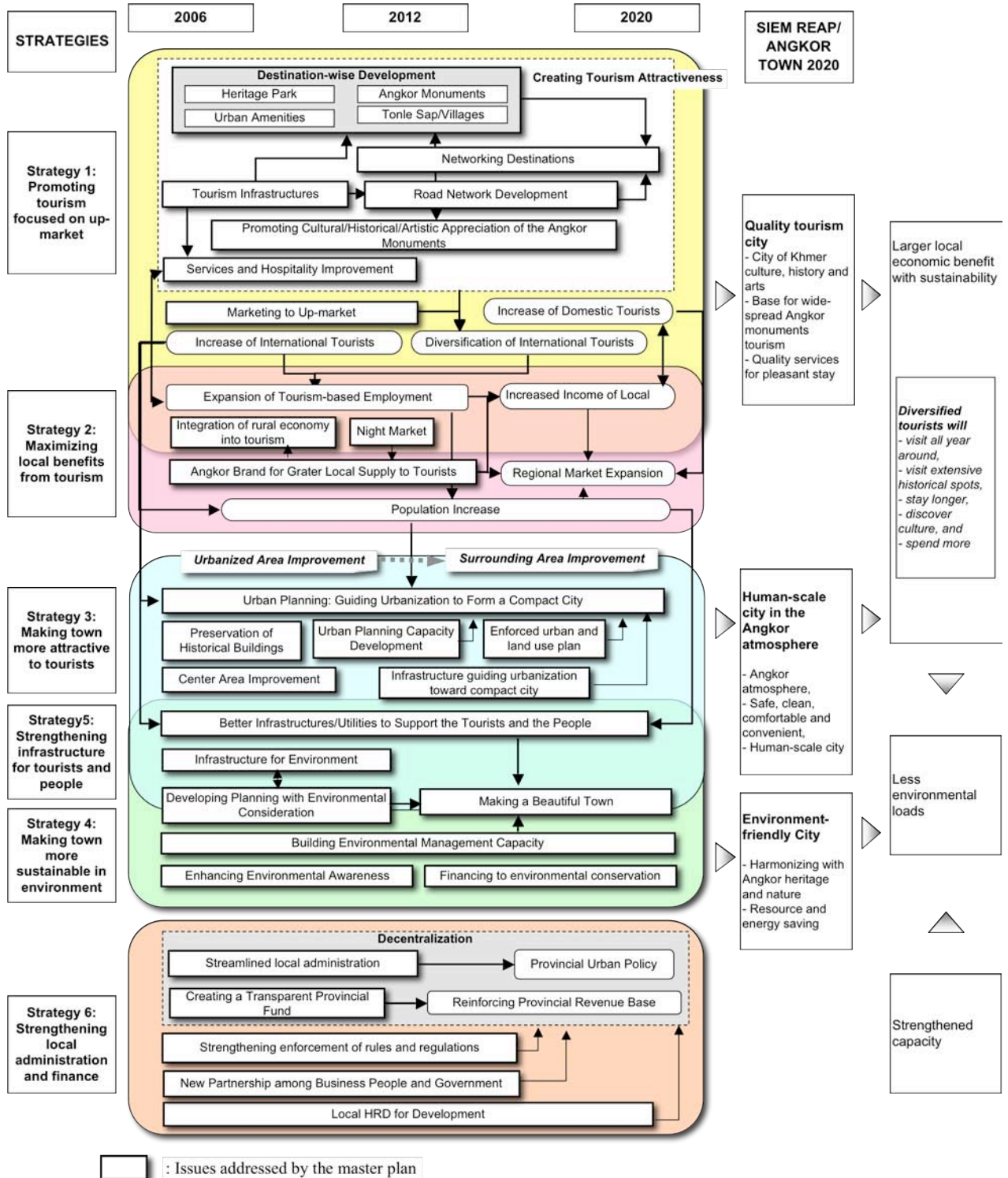
- 1) Streamlined local administration
- 2) New partnership among business, people and government
- 3) Reinforcing local financial base for sustainable development
- 4) Strengthening enforcement of rules and regulations
- 5) Local human resources development

As mentioned above, strategies to sector development plan is summarized the table below.

Table I.5 Strategies and Sector Development Plan: An Overview

Strategic Vision		Sector Development Plan			
Objectives	Vision: Siem Reap/Angkor Town 2020	Strategies	Economy, Urban Development and Environment	Infrastructure	Administration and Finance
<p>Sustainable development toward 2020 through:</p> <ul style="list-style-type: none"> Promoting tourism in a sustainable way, Promoting and diversifying local economy related to tourism, Conserving environment, and Strengthening capacity. 	<p>Quality Tourism City</p> <ul style="list-style-type: none"> City of the Khmer culture, history and arts Base for wide-spread Angkor tourism Quality services for pleasant stay 	<p>[1] Promoting tourism focused on up-market</p>	<p>Tourism Development</p> <ul style="list-style-type: none"> Destination-wise development and routing Angkor Heritage Park Area Urban Amenity and Cultural Tourism Area Tonle Sap Lake and Rural Area Distant Angkor Monument Area Promoting cultural appreciation Service improvement Strengthening marketing and promotion 	<p>Transportation</p> <ul style="list-style-type: none"> Access to distant heritages Transport in Angkor Heritage Park <p>Power</p> <ul style="list-style-type: none"> Lighting for Angkor monuments 	<p>Development Administration</p> <ul style="list-style-type: none"> Private-public partnership (PPP) for tourism marketing and promotion
	<p>Human-scale City in the Angkor Atmosphere</p> <ul style="list-style-type: none"> Angkor atmosphere Safe, clean, comfortable and convenient Human-scale city 	<p>[2] Maximizing local benefits from tourism</p>	<p>Agricultural Diversification and Local Product Promotion</p> <ul style="list-style-type: none"> Angkor Brand for larger local supply Integration of rural economy into tourism <p>Tourism Development</p> <ul style="list-style-type: none"> Night Market 		<p>Development Administration</p> <ul style="list-style-type: none"> PPP for APPC
	<p>Environment-friendly City</p> <ul style="list-style-type: none"> Harmonizing with Angkor heritage and nature Resource and energy saving 	<p>[3] Making town more attractive to tourists</p>	<p>Urban Development</p> <ul style="list-style-type: none"> Guiding urbanization to form a compact city Center area improvement Infrastructure development guiding urbanization 	<p>Transportation</p> <ul style="list-style-type: none"> Road network guiding urbanization Sidewalk and road amenity Road safety <p>Sewerage and Drainage: Drainage guiding urbanization</p> <p>Power: Street light</p>	<p>Development Administration</p> <ul style="list-style-type: none"> Development committee for checking the development from the urban planning viewpoints Enforcement of land use plan; vehicle registration and law on road traffic. HRD for information management
	<p>A beautiful and unique city based on a harmony of history, arts and nature of Khmer</p> <ul style="list-style-type: none"> Offering implications of Angkorian wisdom for sustainable development and cultural diversity as a model in 21st century Cultural magnet in Southeast Asia 	<p>[4] Making town more sustainable in environment</p>	<p>Environmental Management</p> <ul style="list-style-type: none"> Institutional capacity of environmental management Enhancing environmental awareness Financing to environment conservation Development planning with environmental consideration 	<p>Transportation: Environmental transport in the Angkor Heritage Park</p> <p>Water Resources and Water Supply</p> <ul style="list-style-type: none"> Groundwater intake management Environmental water <p>Drainage and Sewerage</p> <ul style="list-style-type: none"> Wastewater treatment <p>Solid Waste Management</p> <ul style="list-style-type: none"> Sanitary landfill and reducing solid waste <p>Power: Reducing individual generators</p> <p>Transportation: sufficient road network for tourists and residents</p> <p>Water Resources and Water Supply: sustainable water resource development and water supply</p> <p>Solid Waste Management: making the town lovely</p> <p>Drainage and Sewerage: sustainable drainage and sewerage systems for hygienic and beautiful town</p> <p>Power: reliable power for all with less environmental load</p>	<p>Development Administration</p> <ul style="list-style-type: none"> Development committee for project appraisal from the environmental viewpoints Enforced laws and regulations for environment: groundwater and diesel generator Strengthening finance for environment PPP for solid waste management HRD for information management <p>Community Empowerment</p> <ul style="list-style-type: none"> Co-exist with Angkor monuments
		<p>[5] Strengthening infrastructure for tourists and people</p>			<p>Development Administration</p> <ul style="list-style-type: none"> Project planning, management and monitoring <p>Local Financing</p> <ul style="list-style-type: none"> Siem Reap Development Fund
		<p>[6] Strengthening local administration and finance</p>			<p>Development Administration</p> <ul style="list-style-type: none"> Streamlined local administration with transparency and accountability New partnership among business, peoples and government Strengthening enforcement of rule and regulations Local HRD for development <p>Local Financing: Reinforcing local financial base</p> <p>Community Empowerment: strengthening capacity of people</p>

A series of measures under each strategy, mentioned above, are mutually related toward Siem Reap/ Angkor Town 2020. A flow diagram of development shows this process in line with the master plan as shown below.



Source: JICA Study Team

Figure I.7 A Flow of Diagram of Development

5.2 Urban Development Sector

(1) Present Situation

- Disordered urban expansion
- Low quality of environment, attractions and amenity in city center area
- Low level of sanitation and living environment in local residential areas

(2) Issues

For urbanized area:

- Preservation of French colonial architecture
- Making an attractive city for the visitors
- Improvement of high density residential zone

For urbanizing area:

- Insufficient infrastructure development
- Hotel construction without order

(3) Sector Objective

Making an attractive city

(4) Sector Approaches

- Formation of a compact city with effective enforcement of the urban plan
- Redevelopment and integration of French Quarter area
- Urban roads and infrastructure development

(5) Projects and Programs

- U-1 City Center Area Improvement
- U-2 Urban Planning Capacity Building
- U-3 Inventory of Historical Architecture
- U-4 Residential Area Development
- U-5 Planning and Implementation of Culture and Tourism Zone

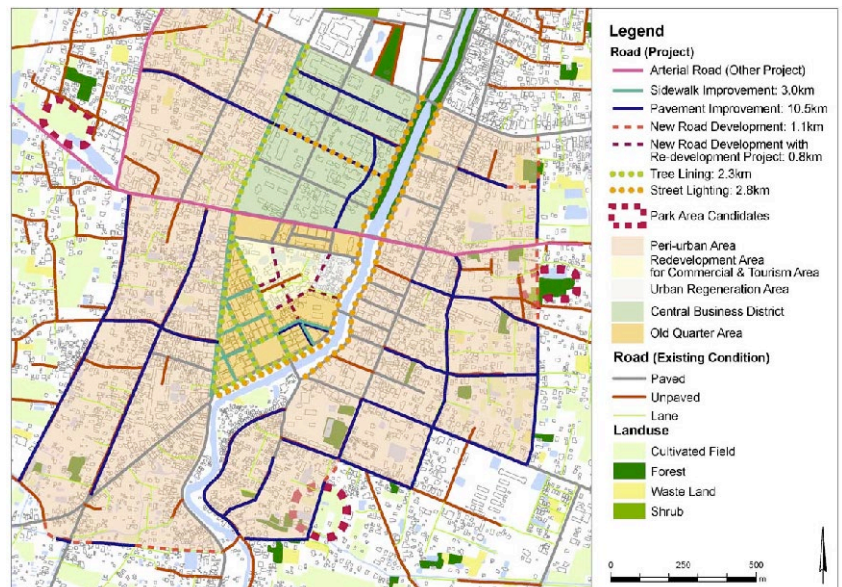


Figure I.8 Overall Plan for U-1 Project

5.3 Environment Management Sector

(1) Present Situation and Issues

- Insufficient mechanism and institutional capacity for environmental problem caused by rapid urbanization and development
- Lack of clear environmental viewpoint in planning
- Behaviors of people and businesses are not environment-friendly
- Public infrastructure investment in environmental conservation cannot catch up with tourism boom

(2) Sector Objectives

Making Siem Reap more 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 %.

(3) Sector Approaches

- Strengthening institutional capacity of environmental management to cope with the problems by the rapid development
- Environmental considerations incorporated in development planning
- Encouraging human behaviors to be environment-friendly
- Creating a financial system for environmental conservation

(4) Projects and Programs

E-1 Institutional Capacity Development

E-2 Enhancing Environmental awareness

E-3 Joint Fee Collection of Public Services

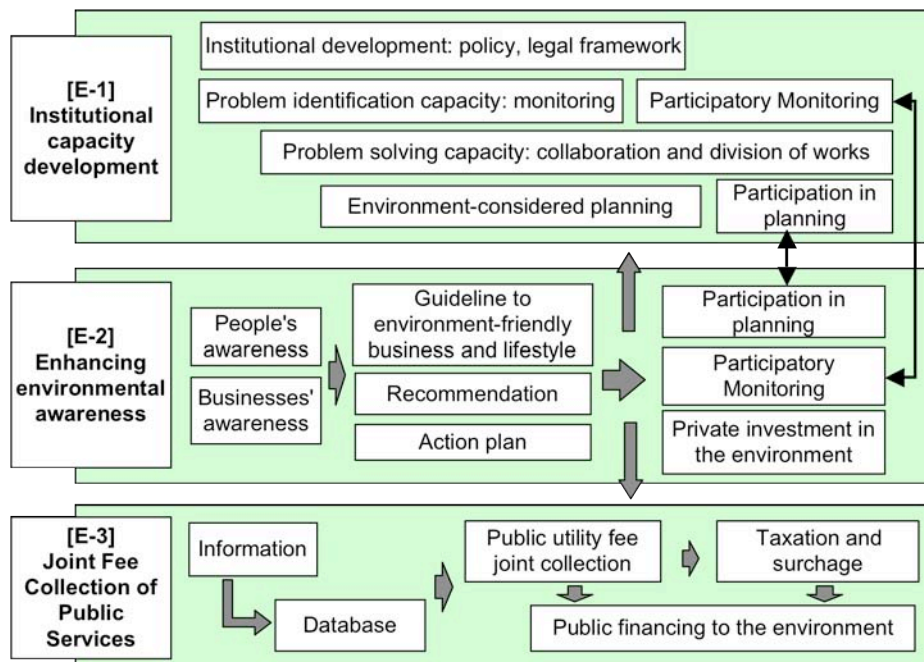


Figure I.9 Program Sequence

5.4 Tourism Development Sector

(1) Present Situation and Issues

- Tourism in Siem Reap is featured by short-stay concentrated tourism in terms of time and space. That is group tourists at middle class rushing the same routing in the peak season staying short.
- This feature is deteriorating the environment and threatening to the sustainability, while giving limited economic benefits on rural people with little cultural interaction.
- Siem Reap is not developed as ready to attract various types of tourists exposed to a touch of Angkor history and culture.
- International tourism markets recognizing Siem Reap/ Angkor Town as an unveiled Angkor Wat tourism destination and not safe enough for individual tourists walking around.
- Weak marketing and promotion by private-public partnership.

(2) Sector Objective

Creating a quality tourism destination in the context of Angkor history and culture
 ~ For making tourists exposed to Khmer culture, history, art, and traditional lifestyle harmonizing with the rich nature ~

(3) Sector Approaches

- Developing tourism destination and diversified routing
- Giving tourists a taste of rich Khmer culture, history, art and the nature
- Improving services and hospitality for a pleasant stay
- Strengthening tourism marketing and promotion by public-private partnership targeting to up-markets.

(4) Projects and Programs

TO-1 Khmer Heritage Tourism Network and Tourism Facility Development

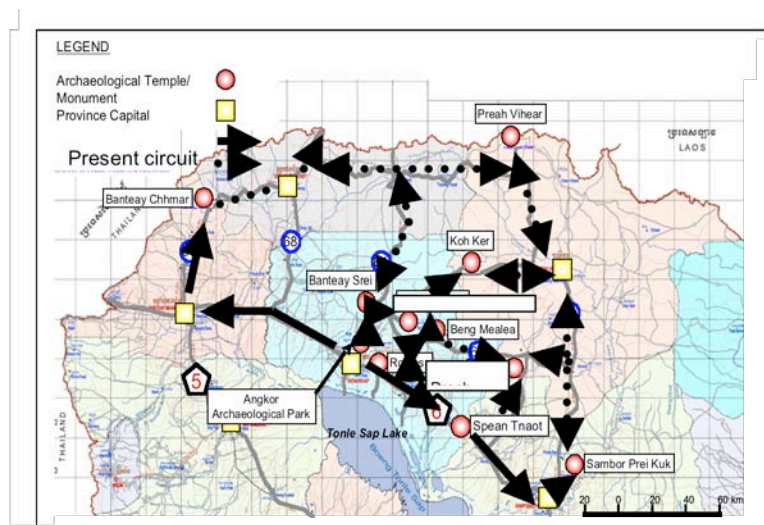
TO-2 Night Market Development

TO-3 Public-Private Partnership Tourism Quality Improvement

TO-4 Development and Promotion of Community-based Eco and Village Tourism

TO-5 Strengthening Tour Guide Training and Introduction of Advanced Tour Guide System

TO-6 Comprehensive Study for Carrying Capacity and Site Management



Source: JICA Study Team.

Figure I.10 Distant Angkor Monument Areas and Their Networking

5.5 Agricultural Diversification and Local Product Promotion Sector

(1) Present Situation and Issues

- Emerging group activities among farmers, especially community business.
- Limited linkage between local products and the tourism sector: small share of local products in the tourism market of Siem Reap
- Diversified agricultural products have a potential in the local and the tourism market, while farmers have constraints of lack of experiences of new agribusiness such as cash crops, livestock and agricultural marketing.
- Locally-made handicraft and souvenir products have the potentials in growing local boutique market and the export market.
- Limited supporting activities by province due to limited information of rural industries, weak human resources, and limited experiences.
- Successful experience of Pilot Project ‘Angkor Products Fair 2005’ revealing a potential of growing local middle ranged market, as well as giving a confidence to counterpart personnel

(2) Sector Objective

Creating Angkor Brand for expanding local products supply in order to increase local economic benefit from tourism

(3) Sector Approaches

Creating a support system for agricultural diversification and local product promotion.

- Targeting the tourism market as well as the growing local middle-ranged market
- Strengthening the linkage between tourism and rural economy
- Strengthening infrastructure for agricultural diversification and local product promotion

(4) Projects and Programs

A-1 Human Resources Development and Establishing Angkor Products Promotion Center (APPC)

A-2 One Village One Product (OVOP)

A-3 Production Village Development

A-4 Angkor Products Fair

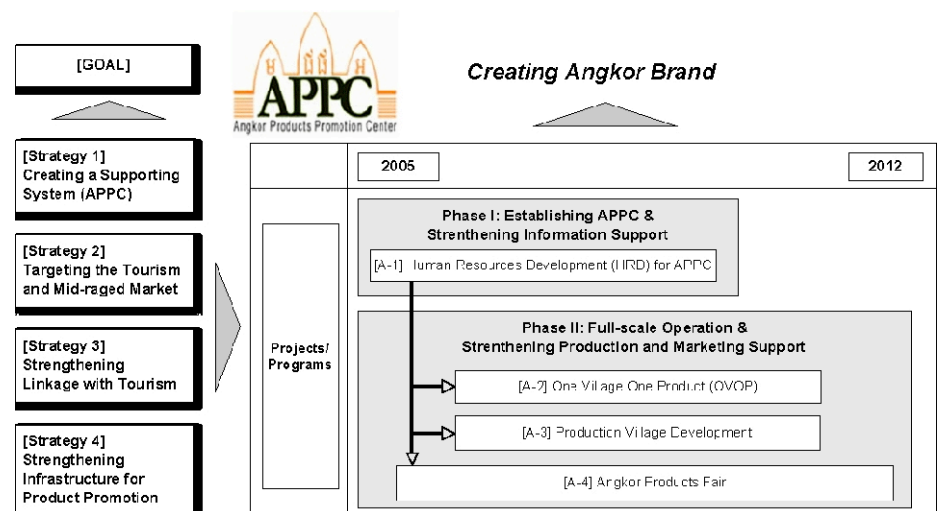


Figure I.11 Structure of the Sector Plan

5.6 Transportation Sector

(1) Present Situation and Issues

- Insufficient trunk road network, and traffic concentration on the NR 6 in the urban area
- Traffic control in Angkor Archeological Park
- Limited accessibility to remote heritage
- Lack of amenity and safety of roads
- Public awareness of legislations on road traffic
- Insufficient road maintenance

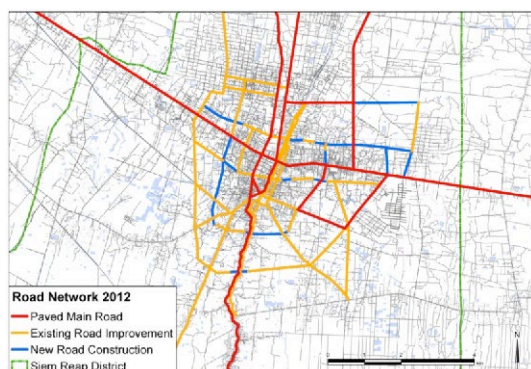
(2) Sector Objectives

- Providing the sufficient road network and function for smooth transportation
- Satisfying tourists in visiting Angkor Heritages and staying in Siem Reap
- Leading urbanization following the urban planning

(3) Sector Approaches

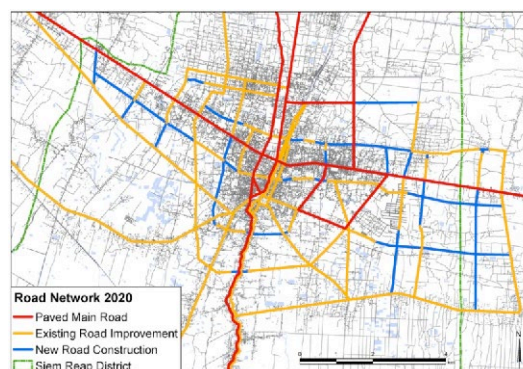
- Improving bottlenecks and developing sub-arterial road network in the urban area
- Improving the road condition and facility in the urban area
- Developing road network for the future urbanization area
- Improving access to Angkor Heritages
- Establishing an efficient road maintenance system

(4) Projects and Programs



Source: JICA Study Team

Figure I.12 Principal Road Network (2012)



Source: JICA Study Team

(2020)

TR-1 French Bridge improvement

TR-2 Sub-arterial road parallel to the NR6 (Phase I)

TR-3 Upgrading the Hun Sen Peace Road (Phase II)

TR-4 Completion of sub-arterial road network in the urban area up to 2012 (Phase III)

TR-5 Completion of sub-arterial road network in the urban area up to 2020 (Phase IV)

TR-6 Institutional improvement and campaigns for road safety

TR-7 Rural heritage network rehabilitation project

TR-8 Introduction of environmental public transport in the Angkor Archeological Park

TR-9 Bicycle track construction in the Angkor Archeological Park

TR-10 Institutional improvement for efficient road maintenance

5.7 Water Resources and Water Supply Sector

(1) Present Situation and Issues

- Lack of water resources management: lack of basic information for planning base, monitoring data, management & operation plan, and legal framework
- Concentration of groundwater intake at the town center area may cause groundwater declination and land subsidence.
- Weak public water supply services causing small coverage ratio

(2) Sector Objectives

- Developing water resources for water supply, agriculture and environment
- Increasing capacity and coverage ratio of public water supply service
- Managing and conserving groundwater

(3) Sector Approaches

Water Resources:

- Sustainable water resources development
- Efficient water resources development plan
- Improving river sanitation and water environment of Angkor heritage

Water Supply:

- Providing sufficient water to the people and businesses
- Efficient water supply management for narrowing gap between the peak and off-peak demands
- Improving water supply services to enlarge coverage ratio through customer satisfaction

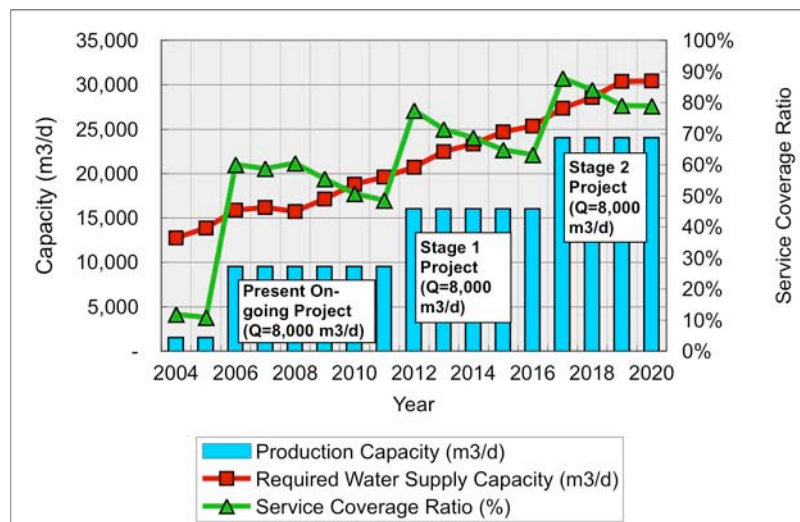


Figure I.13 Proposed Time Frame and Stage-wise Development

(4) Projects and Programs

- W-1 Provincial regulation on registration of commercial well
- W-2 Ministerial sub-decree on groundwater
- W-3 Replacement of old pipeline
- W-4 The strategic study on integrated water resources management for Siem Reap River Basin and Roluos River Basin
- W-5 Water supply system development of Siem Reap City (Stage 1)
- W-6 Water resources development of North East Baray
- W-7 Water supply system development of Siem Reap City (Stage 2)

5.8 Solid Waste Management Sector

(1) Present Situation and Issues

Solid waste scattered in public space giving negative impacts such as:

- Deteriorating the environment such as groundwater pollution, smoking, many vermin, and offensive order,
- Damaging aesthetic views and infrastructures as well as giving serious negative impacts on the tourists,
- Social problems associated with the increase of waste pickers in town, and
- Possibly serious negative environmental impacts on the surroundings of the disposal site in future.

Solid waste scattered because of:

- Lack of people's awareness of waste issue and a change of their lifestyle to 'throwaway',
- Insufficient capacity of the responsible authority for solid waste management
- Low collection rate of residential waste due to high cost of fee collection
- Over reliance on the private sector in solid waste management (SWM)
- Poor financial system for SWM

(2) Sector Objectives

Making the town "lovely" for everybody

- Siem Reap Town Area: Beautification of town
- Angkor Heritage Area: A model of environmental management in Cambodia

Targets of SWM:

- Waste collection coverage: 100% for urban residents and business entities.
- Final disposal system: Sanitary landfill
- Waste discharging amount: Less than 600 g/person/day for residential waste and less than 1,200 g/person/day for total waste
- Recycle target: More than 20% for in-organic recyclables by 3Rs measures
- SWM cost: 30 USD/ton

(3) Sector Approaches

- Strengthening people's awareness of the environment
- Establishing a sound solid waste management system by creating a responsible institution in provincial government and developing their capacity for planning and managing
- Establishing a sound financial system for solid waste management by shouldered by tax or joint billing with other utility fee
- Strengthening public private partnership

(4) Projects and Programs

SW-1 Sound SWM system development

SW-2 Strengthening the waste collection system

SW-3 Sanitary landfill development

5.9 Drainage and Sewerage Sector

(1) Present Situation and Issues

- Frequent flooding in the central commercial and tourist accommodation area
- Flooding causes the sanitation/ health and environmental problems

(2) Sector Objectives

Creating sustainable drainage and sewerage systems for hygienic and beautiful town:

- Improving health and sanitation
- Improving healthiness and urban hygiene at the neighborhood level
- Preventing environmental degradation and improving water quality in Siem Reap river

(3) Sector Approaches

- Introducing integrated waste management
- Stormwater management
- Wastewater management

(4) Projects and Programs

SD-1 Mekong Tourism Development Project Part A1: Drainage and sewerage improvement in West District Zone 1.

SD-2 Urban Development Project Siem Reap-Angkor: Drainage in East District

SD-3 Siem Reap Sewerage Project-Phase I: sewerage and drainage in West District Zone 1

SD-4 Siem Reap Sewerage Project-Phase II: Sewerage East District Zone 1

SD-5 Siem Reap Town Center Stormwater Relief Project: Drainage West District

SD-6 Siem Reap Septage Management Project-Phase I: Septic sludge disposal West District

SD-7 Siem Reap Septage Management Project-Phase II: Septic sludge disposal East District

SD-8 Siem Reap Septic Tank Effluent Disposal Project- Phase 1: Septic tank effluent disposal West District Zone 2

SD-9 Siem Reap Septic Tank Effluent Disposal Project- Phase II: Septic tank effluent disposal East District Zone 2

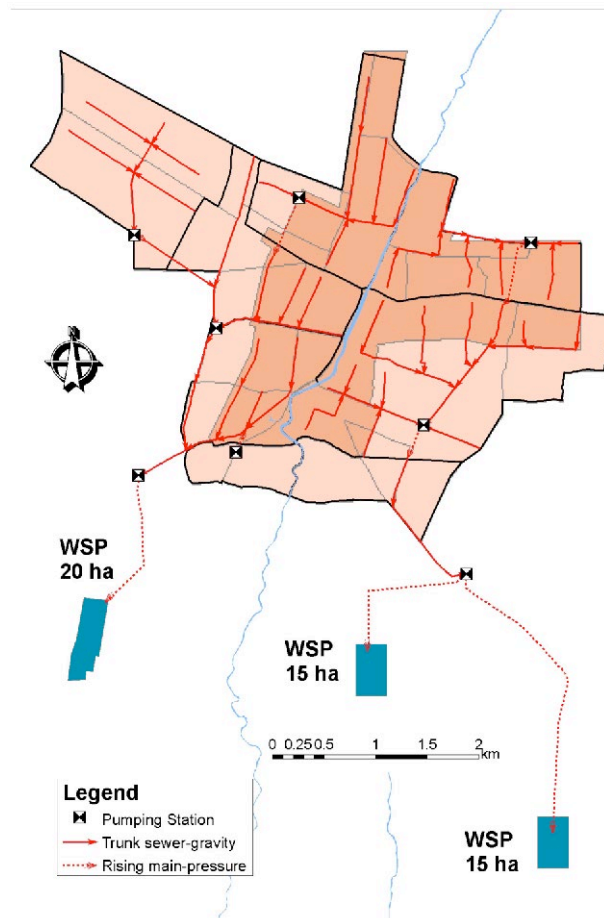


Figure I.14 Wastewater System Layout Plan

5.10 Power Sector

(1) Present Situation and Issues

- Difficult in supplying sufficient and reliable power to consumers
- Limited coverage area of supplying electricity because of a small distribution network
- Single supplying distribution system
- High electricity tariff rate
- Limited maintenance capability

(2) Sector Objectives

Supplying reliable electric power for all with less environmental load

- Extending electricity network to the urban and sub-urban area by 2012
- Realizing 100% electrification in all Siem Reap district by EdC by 2020

(3) Sector Approaches

- Upgrading and expanding power facility
- Reinforcement of EdC
- Control under law, ordinance and decree for reduction of environmental load

(4) Projects and Programs

- P-1 Urgent installation of diesel generator
- P-2 Project for expansion of existing diesel power station
- P-3 Project for extension and expansion of distribution networking
- P-4 Project for installation and repair of street light
- P-5 Planning of effective use of the electricity for Angkor Wat and other temples
- P-6 Planning for electrification for unelectrified area
- P-7 Assistance to capacity building for EdC
- P-8 Assistance to reviewing of power tariff rate
- P-9 Project for revision and/or set up law, ordinance and decree on the electrical power supply to reduce environmental load
- P-10 Project to find a sustainable power sources for the Siem Reap district

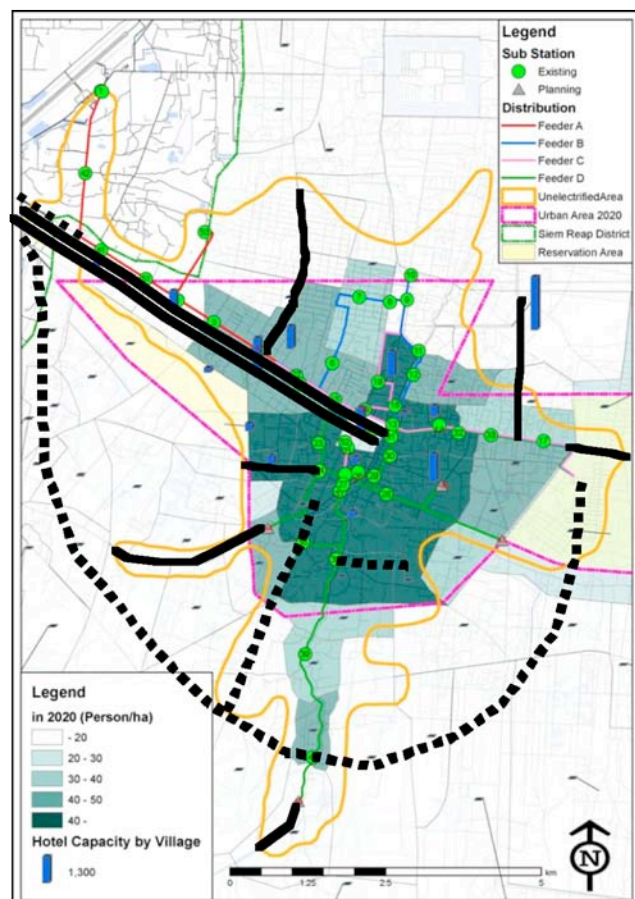


Figure I.15 Power Distribution Plan in 2020

6. Projects and Programs

The Master Plan proposes 69 projects and programs in wide-ranging fields as shown below.

Table I.6 Projects and Programs Proposed (1/2)

NO	Corresponding Strategy	Sector	Proj. ID	Title	Brief Description	Implementing Agency	Priority	Cost (1000 US\$)	Schedule		
									2006	2012	2020
1	3,4,5	Urban	U-1	City center area improvement	Various urgent infrastructure and landscaping.	Province, with relevant ministerial departments.	Priority	7,600			
2	3,5,6		U-2	Urban planning capacity building	Capacity development of urban planning visions and land use plan.	DLMUPC, District, APSARA and Province.	Priority	500			
3	3		U-3	Inventory for historical architectures	Making an inventory of French colonial architectures.	APSARA / Siem Reap Province		200			
4	3,5		U-4	Residential development promotion	Provision of quality living environment for new residents.	DLMUPC, District, and Private Sector		n/a			
5	1,3,4,5		U-5	Cultural and Tourism Zone development	Development of the Zone for cultural attractions and high-graded hotels.	APSARA and Private investors		n/a			
6	4,6	Environment	E-1	Institutional capacity development	Improvement of institutional capacity of public sector.	Province, DPWT, DOE and Residents		310			
7	3,4		E-2	Environmental awareness enhancement	Environmental campaign mainly targeted for school children.	Elementary Schools	Priority	330			
8	4,5,6		E-3	Joint fee collection on public services	Joint collection of service charges of water, waste water and solid waste.	Siem Reap Waterworks, DPWT, MICC		310			
9	1,2,3,5,6	Tourism	TO-1	Khmer heritage tourism network and tourism facility development	Promotion of new tourism destinations around Siem Reap.	MOT, SRTO, APSARA, MPWT and MOCFA	Priority	26,550			
10	2,3		TO-2	Night market development	Creation of attractions and optional tours at night.	private sector		260			
11	1,2,3		TO-3	Public-private partnership tourism quality improvement	Public and private partnership in marketing and promotion.	To be determined	Priority	n/a			
12	1,2,6		TO-4	Dev and promotion of community-based eco and village tourism	Field survey, F/S for pilot projects and selection of tourism products, etc.	NGO, APSARA		158			
13	1,2		TO-5	Tour guide training and advanced tour guide system	Strengthening of tour guide training programs and upgrade its license system.	SRTO, MOT, APSARA		211			
14	1,5		TO-6	Study for carrying capacity and site management	Survey/ analysis on tourists movement, capacity of sites and site management.	APSARA		163			
15	1,2,6	Agricultural Diversification and Local Product	A-1	HRD and local product promotion center	HRD of provincial staff and establishment of local products promotion center.	Province, APPC	Priority	80			
16	1,2,6		A-2	One Village and One Product Movement (OVOP)	Promotion of OVOP	Province, APPC		60			
17	1,2,6		A-3	Production village development	Collective village people activities and its linkage with tourism.	Province, APPC		36			
18	1,2,3		A-4	Angkor Products Fair	Hold the APF following the pilot project.	APPC		108			
19	3,5	Transportation	TR-1	French Bridge improvement	Construction of an additional bridge over the SR River.	MPWT	Priority	957			
20	3,5		TR-2	Sub-arterial road network (Phase 1)	Development of 3 routes in urban area.	DPWT, Province	Priority	10,839			
21	3,5		TR-3	Sub-arterial road network (Phase 2)	Completion of Southern Semicircular Road (Hun Sen Piece Road)	MPWT		6,817			
22	3,5		TR-4	Sub-arterial road network (Phase 3)	Development of inner semicircular road.	DPWT, Province		16,736			
23	3,5		TR-5	Sub-arterial road network (Phase 4)	Development of trunk roads in current peri-urban area.	Province		14,921			
24	3,6		TR-6	Institutional improvement for road safety	Traffic law enforcement in licensing, safety and helmet-wearing.	Police, DPWT and Province		7,000			
25	2,3,5		TR-7	Rural heritage road network rehabilitation	Improve roads to the remote Angkor monuments.	MPWT, MRD	Priority	33,150			
26	3,4,5		TR-8	Environmental public transport	Low emission bus system in Archaeological Park	APSARA		7,104			
27	3,4,5		TR-9	Bicycle track construction	Development of exclusive bike lanes in archaeological park.	APSARA		1,417			
28	3,5,6		TR-10	Institutional improvement for efficient road maintenance	Preparation of road inventory/ establishment of monitoring system on road condition.	DPWT, PDRD		1,800			

Table I.7 Projects and Programs Proposed (2/2)

NO	Corresponding Strategy	Sector	Proj. ID	Title	Brief Description	Implementing Agency	Priority	Cost (1000 US\$)	Schedule		
									2006	2012	2020
29	4,5,6	Water	W-1	Provincial regulation on registration of commercial Well	Registration of commercial users and installment of water meters.	Province		0			
30	5,6		W-2	Ministerial Sub-decree on groundwater charges for commercial well use.	Establishment of sub-decree on commercial well use.	Province		0			
31	4,5		W-3	Replacement of old pipeline	Replacement of obsolete pipeline (6.5km) in the city center	MIME	Priority	450			
32	4,5		W-4	Strategic study on integrated water resources management	Preparation of integrated water resources management.	MOWRAM	Priority	7,282			
33	4,5		W-5	Water supply system development of Siem Reap (stage-1)	Establishment of new water supply system.	MIME		13,716			
34	4,5		W-6	Water resources development of North East Baray	Improving North East Baray function as water resource.	MOWRAM		8,320			
35	4,5		W-7	Water supply system development of Siem Reap (stage-2)	Development of water treatment plant and distribution network system.	MIME		12,310			
36	3,4,5,6	Solid Waste	SW-1	Sound solid waste management system development	Institutional and financial system development for solid waste	MICC, Province		1,000			
37	3,4,5,6		SW-2	Strengthening of waste collection system	Improve solid waste collection up to 100% coverage	MICC, Province		300			
38	4,5,6		SW-3	Sanitary landfill	Improvement of current operation at landfill and plan of new landfills.	MICC, Province		2,000			
39	3,4,5	Sewerage/ Drainage	SD-1	Mekong Tourism Dev Proj (A1)	Improvement of town center drainage	MPWT, DPWT (ADB funded)		11,988			
40	3,4,5		SD-2	Urban Dev Proj SR	Drainage and sewerage pipe installment in city center area	Province, DPWT (AFD funded)	Priority	4,800			
41	3,4,5		SD-3	Sewerage (Phase I)	Wastewater collection system in City Center West (Zone 1)	DPWT, MPWT		18,326			
42	3,4,5		SD-4	Sewerage (Phase II)	Wastewater collection system in City Center East and treatment plant.	DPWT, MPWT		17,271			
43	3,4,5		SD-5	Stormwater relief	New western drain in town center.	DPWT, MPWT		10,935			
44	3,4,5		SD-6	Septage management (Phase I)	Septage collection vehicle and septage treatment facility for SD-1.	DPWT, MPWT		1,614			
45	3,4,5		SD-7	Septage management (Phase II)	Septage collection vehicle and septage treatment facility for SD-4.	DPWT, MPWT		1,027			
46	3,4,5		SD-8	Tank effluent disposal (Phase I)	Simplified pipe system for collecting and conveying septic tank by SD-3.	DPWT, MPWT		13,137			
47	3,4,5		SD-9	Tank effluent disposal (Phase II)	Simplified pipe system for collecting and conveying septic tank by SD-4.	DPWT, MPWT		7,634			
48	5,6	Power	P-1	Urgent installation of diesel generators	Installation of new diesel generators of 7MW on EdC site.	EdC	Priority	2,090			
49	5		P-2	Expansion of existing diesel power station	Increase of 10MW diesel power station.	EdC		20,800			
50	5		P-3	Extension and expansion of distribution networks	High and low voltage line extension, installment of new substations and watt-hour meter	EdC		7,800			
51	3,5		P-4	Installation and repair of street light	Improvement of street light for tourists.	District		780			
52	1,3,6		P-5	Effective use of the electricity for Angkor Wat and other temples	Light-up of Angkor monuments by public power source.	APSARA and/or other relevant organization		330			
53	2,5		P-6	Planning for electrification for unelectrified area	Expansion of electrified area as city grows.	EdC		275			
54	5,6		P-7	Assistance to capacity building for EdC	Training of engineers of Siem Reap EdC.	EdC		550			
55	5,6		P-8	Assistance to reviewing of power tariff rate	Revision of tariff by user classification.	EdC/EAC		990			
56	5,6		P-9	Revision of law, ordinances and decree for power to reduce environmental load	Review, revision and setup to reduce environmental load by power sector.	Municipality, EAC, EdC		1,800			
57	5,6		P-10	Sustainable power source development	Alternative power sources exploration.	EdC, MIME		660			
58	6	Local Administration	(Recommendation)								
			L-1	Development committee for project approval	Establish of a committee for integrated operation in the Province.	Province,		0			
59	6		L-2	Human resources development of Province	Human resources development for provincial officers	Province		1,600			
60	6		L-3	Organizational reform of Provincial Government of Siem Reap	Streamlining of organizational structure of the Provincial Government.	Siem Reap Province					
61	6		L-4	Development and efficient operation of laws and regulations	Preparation of legal framework for unified administration.	Province, Ministry of Interior					
62	6	L-5	Financial budget reform for unified administration	Strengthening financial resources of Siem Reap province.	Ministry of Finance and National Assembly						
63	3,6	Community Empowerment	C-1	Land use mapping	Preparation of local maps by workshops	Province, Commune, Local stakeholders		10			
64	3,6		C-2	Community planning	Planning by workshops of local stakeholders	Province, Commune, Local stakeholders		10			
65	3,6		C-3	Community association	A community association to implement a project	Province, Commune, Local stakeholders		10			
66	2,3,6		C-4	Community application	Introduction of bottom-up approach for project planning.	Province, Commune, Local stakeholders		100			
67	2,3,6		C-5	Regulation on co-existing zone	Plan for APSARA Zone 1&2 for coexistence with heritages	APSARA, Commune, Local stakeholders		100			
68	2,3,6		C-6	Angkor management plan and community development	To promote people in poverty to live with heritages	APSARA, Commune, Local stakeholders		3,000			
69	3,6		C-7	People's needs collection	To incorporate people's voices by various medias	Province		1			

Priority Projects and Programs

The projects and programs proposed above are prioritized by following criteria.

Selection Criteria

This Study adopts two criteria to select priority projects as follows:

1) Short-term Importance

A project should be given priority, because it meets pressing needs and can be effective in short-term.

2) Long-term Importance

A project should be given priority because:

- It reflects a core concept of the master plan,
- It is essential to realizing the master plan in long-term, and
- It needs early undertaking in view of a long preparation period.

Priority Projects

The following table lists the selected priority projects.

Table I.8 Priority Projects (1/2)

Sector	Proj. ID	Title	Schedule	Importance		Reasoning
				Short-term	Long-term	
Urban	U-1	City center area improvement	2006-2007	X		A breakthrough to upgrade vividly urban/tourism environment of the city center, with a target on the vicinity of Old Market.
Urban	U-2	Urban planning capacity building	2006-2007		X	Strategic to incorporate and to strengthen urban policy/management in the provincial administration. A priority topic is streamlining of land use planning/ management and a more effective provincial committee for city planning.
Environment	E-2	Environmental awareness enhancement	2006-2012		X	Important to let the pilot project "A More Beautiful Siem Reap" more sustainable and more broad-based
Tourism	TO-1	Khmer heritage tourism network and tourism facility development	2007-2012	X		Important to redescover the value of Khmer culture.
Tourism	TO-3	Public-private partnership tourism quality improvement	2006-2020	X	X	An essential program to coordinate, specifically for the tourists, various projects, to regulate private sector in advance and to promote the target tourism market.
Agricultural Diversification and Local Product	A-1	HRD and local product promotion center	2006-2008	X		Important to let the pilot project "Angkor Product Fair" sustainable by strengthening Angkor Products Promotion Center (APPC).

Table I.9 Priority Projects (2/2)

Sector	Proj. ID	Title	Schedule	Importance		Reasoning
				Short-term	Long-term	
Transportation	TR-1	French Bridge improvement	2006-2012	X	X	Essential to reinforcing substantially a major East-west access of the city with preserved current Bridge.
Transportation	TR-2	Sub-arterial road network (Phase 1)	2006-2008	X	X	Essential to debottleneck the NR6 urgently
Transportation	TR-7	Rural heritage road network rehabilitation	2006-2009	X	X	Indispensable to promote diversification of tourism attractions and ensuring easy access scattered historical monuments.
Water	W-3	Replacement of old pipeline	2006-2007	X		Unavoidable to replace the old pipes used in the existing system for enabling the full fledged operation of a new water supply project as an integral part of the whole urban water supply system.
Water	W-4	Strategic study on integrated water resources management	2007-2011	X	X	Strategic and urgent to determine the realistic ways and means to substitute unorganized individual groundwater drawing by public water supply on step-by-step basis and ensuring the long-term water management for different beneficiaries and places in Siem Reap.
Sewerage/ Drainage	SD-2	Urban Dev Proj SR	2006-2020	X		Essential to improve sanitation and environment of the central part of city where both tourism facilities and population concentrate. An ADB-assisted project plans to develop a treatment plant in this connection.
Power	P-1	Urgent installation of diesel generators	2006-2007	X	X	Effective and easily implementable as an immediate measure to largely alleviate chronic black-out.

Total Project Cost

The following table shows the preliminary cost estimation by sectors.

Table I.10 Project Cost Estimate

Sector		Priority Projects		Other Projects		Total	
		Count	Proj. Cost (thousand \$)	Count	Proj. Cost (thousand \$)	Count	Proj. Cost (thousand \$)
Urban Development	U-1 to 5	2	8,100	3	200	5	8,300
Environment Management	E-1 to 3	1	330	2	620	3	950
Tourism	TO-1 to 6	2	26,550	4	792	6	27,342
Agricultural Diversification and Local Product	A-1 to 4	1	80	3	204	4	284
Transportation	TR-1 to 10	3	44,946	7	55,795	10	100,741
Water	W-1 to 7	2	7,732	5	34,346	7	42,078
Solid Waste	SW-1 to 3			3	3,300	3	3,300
Sewerage/ Drainage	SD-1 to 9	1	4,800	8	81,932	9	86,732
Power	P-1 to 10	1	2,090	9	33,985	10	36,075
Local Administration	L-1 to 5			5	1,600	5	1,600
Community Empowerment	C-1 to 7			7	3,231	7	3,231
Total		13	94,628	56	216,205	69	310,633

7. Institutional and Financial Arrangements

In order to realize the proposed sector plan that incorporate projects/ programs, a series of recommendations are made with reference to institutional and financial arrangements. The recommendations comprise (1) those for the government organizations at the provincial level and (2) those for the government organizations at the national level.

(1) Recommendations for the government organizations at the provincial level

A key is to strengthen, step-by-step, the initiative and authority of the provincial governor. Particularly important recommendations are as follows:

A. Securing common information and understanding among provincial hall, line departments and APSARA Authority regarding policies, plans, budget and projects in the district.

B. Ensuring overriding authority to permit/prohibit private activities in such priority areas as:

- Land use and building control.
- Environmental monitoring, and
- Use of water resources, both underground and surface.

C. Strengthening the functions of urban policy-making and urban management:

Economy and society of Siem Reap are led largely by urban and tourism development; stronger initiative should be taken at the provincial level for urban policy and urban management.

D. Strengthening government initiative to ensure effective participation of private sector:

Due to limited capacity of the government at the provincial level, it is inevitable to make use of private participation. However, the hands-off reliance on private participation as observed at present causes the misuse of public resources for private interests and a declining quality of services, possibly with a loss of public interests and a fail in sustainable development.

For these recommendations to be realized, it is crucial in the first place to strengthen the provincial institutional basis through the following measures:

1) Strengthen the provincial administration with special stress on:

- Human resources in technical and managerial aspect,
- Financial basis especially for recurrent cost, and
- Database to facilitate effective monitoring of land use, environment, water use and public utility services

2) Improve private participation arrangements

Arrangements of private participation should be made on a more transparent and competitive basis for securing fairness, accountability and efficiency of the entrusted services in line with the planned sustainable development.

3) Recommended fields of private participation

Private participation is recommended in selected fields such as solid waste collection, local product promotion, awareness building in environmental improvement and tourism promotion.

(2) Recommendations for the government organizations at the national level

A key is to strengthen legislative and technical capacities of line ministries to support the provincial initiative and authority mentioned above. Particularly important recommendations are as follows:

A. Establishing and elaborating the laws, regulations and procedures in the priority areas, including land use control and environmental monitoring, water management. In this connection it is also important to review and streamline division of responsibility among concerned ministries and departments in these priority areas.

B Strengthening technical capacity of line ministries and departments to enable the provincial governor to effectively use its initiative and authority, with a stress on the management of land, environment and water.

C tax reform should be expedited in favor of local developments including those in Siem reap. Ongoing effort such as hotel tax should be realized at the earliest possible time.

In view of the recommendations above on one hand and an inevitably substantial need for external inputs on the other, we focus on two major subjects for in-depth analysis and proposals: (1) Development administration particularly at the provincial level and (2) Local financing.

7.1 Development Administration

(1) Present Situation and Issues

- Duplication of duties and responsibilities among governmental organizations
- Lack of integration in organizational structure of the provincial government
- Insufficient revenue resources for local administration
- Weak management capability of local administration
- Lack of streamlined legal framework and its enforcement

(2) Sector Objective

"Establish Autonomous and Unified Local Administration for Siem Reap to Ensure Transparency and Accountability."

(3) Sector Approach

- Introduction of autonomous and unified administration following the decentralization and de-concentration reform at national level
- Strengthening Siem Reap Provincial Government as an autonomous body for proper local administration
- Ensuring local tax revenue for unified administration
- Establishment of local assembly system for transparency and accountability

- Formation of legal framework to support unified administration

(4) Recommendations

- Establishing a Provincial Development Committee
- Organizational reform of provincial government
- Human resource development for provincial government
- Development and efficient operation of laws and regulation
- Financial and budget reform for unified administration

Table I.11 Capacity Building Program for Provincial Government

Expected Public Services	Recommendation of Capacity Building (Training) Programs	Target of Capacity Building
1. Planning Urban MP and Planning Projects	- Planning of Projects based on MP	- Governors and Chiefs of Offices in Provincial Government (PG)
2. Implementation and Management of Public Works (projects)	- Project Management and Monitoring Method, - Project Evaluation	- Management Officers for Public Works in PG - All Provincial Departments Officers
	- Method of Settlement for Land Conflict	- Land Management, Planning and Development, and Investment Officers in PG - Provincial Department Officers of Land Management, Urban Planning, Construction and Land Title

7.2 Local Financing

(1) Present Situation and Issues

- Insufficient Financial Resources
- Inadequate Budget Planning and Implementation
- Inadequate Human Resources
- Low levels of transparency

(2) Sector Objectives

Short-term: "Government provides adequate financial resources to sustain economic and social development of Siem Reap."

Long-term: "Fiscal revenues in Siem Reap contribute to sustainable economic and social development of Cambodia."

(3) Sector Approach

1) Increase Financial Resources of the Provincial Government

Increasing financial resources of the provincial government is necessary, especially for urban infrastructure development because of its effects on the Siem Reap economy by means of tourism development.

Measures to increase financial resources of the provincial government include:

- Strengthen tax collection
- Re-allocate existing revenue to the provincial government
- Introduce a new tax/charge and change tax rates

2) Improve Budget Planning / Implementation and Human Resources

A more effective sharing of information and coordination across provincial government and line departments needs to be established.

3) Enhance Transparency Associated with Government Financing

It is important for the government to be transparent on financial matters.

8. Environmental and Social Considerations

This section describes the results of Initial Examination of Environmental and Social Impact (IEE) of the Master Plan in accordance with “Guidelines for Environmental and Social Considerations of JICA (2004)” and Cambodian legal framework.

8.1 Adverse Environmental and Social Impacts Predicted

The predicted environmental and social impacts of the study at this stage are scoped. The summary of the predicted environmental and social impacts as a result of scoping and the assumed mitigation measures as Initial Examination of Environmental and Social Impact (IEE) of the study at this stage is summarized in the following table.

Table I.12 Summary of Impacts (For all Projects)

Name of Cooperation Project		The Study on Integrated Master Plan for Sustainable Development of Siem Reap/Angkor Town in the Kingdom of Cambodia		
Likely Impacts	Rating	Impact Severity (e.g. magnitude, area extent, duration, frequency, reversibility, likelihood of occurrence)	Methods Used to Predict	Assumed Mitigation Measures
Involuntary Resettlement	C	<ul style="list-style-type: none"> Construction of roads, water/wastewater treatment plants, landfill requires land acquisition. The water/wastewater treatments and landfill are planned to locate in the cultivated land. Therefore, the occurrence of resettlement is expected to be low. 	<ul style="list-style-type: none"> Check on magnified map with planned locations of the projects Field survey 	<ul style="list-style-type: none"> Careful site selection/setting for the relevant projects to prevent resettlement as much as possible If the resettlement is not avoidable, resettlement plan with the agreement from stakeholders need to be set to avoid involuntary resettlement
Local Economy	B	<ul style="list-style-type: none"> Farm land on the border between Chreav and Siem Reap communes is a site proposed for the 15ha wastewater treatment plant though accurate location has not been set 	<ul style="list-style-type: none"> Survey on income of farmers and landownership in the proposed area 	<ul style="list-style-type: none"> Careful consideration for the site setting to minimize the impact. Consideration and implementation of appropriate compensation, and securing employment for the relevant residents
Cultural Heritage	B	<ul style="list-style-type: none"> The possibility of causing impact is low, but the construction activities for the proposed projects may affect unearthed cultural heritages. 	<ul style="list-style-type: none"> Field survey Archaeological investigation 	<ul style="list-style-type: none"> Conducting an archaeological investigation prior to the commencement of construction. (see the figure below for zoning)
Local Conflict of Interests	B	<ul style="list-style-type: none"> The conflict of interests on land ownership is expected in the area relating to the suggested land use plan 	<ul style="list-style-type: none"> Meeting with stakeholders 	<ul style="list-style-type: none"> Sufficient meetings and discussion with stakeholders should be held before the master plan is finalized.
Water Usage or Water Rights and Rights of Common	B	<ul style="list-style-type: none"> If the coordination were not made among administrative offices, the impact would be serious and difficult to reverse. 	<ul style="list-style-type: none"> Meeting with stakeholders 	<ul style="list-style-type: none"> Careful coordination needs to be accomplished regarding the projects for water resource development in the master plan.
Groundwater	B	<ul style="list-style-type: none"> Groundwater may be contaminated by turbid water at the construction stage of the proposed projects. Leachate from the proposed landfill may intrude into groundwater. 	<ul style="list-style-type: none"> Hydro-geological survey and pumping test 	<ul style="list-style-type: none"> Appropriate measures for preventing groundwater contamination at the construction stage
Hydrological Situation	B	<ul style="list-style-type: none"> Dredging and installation of water gates will affect the hydrology of the Siem Reap River. 	<ul style="list-style-type: none"> Hydrological survey and simulation 	<ul style="list-style-type: none"> Appropriate measures need to be considered to minimize the impact on hydrological situation.
Flora, Fauna and Biodiversity	B	<ul style="list-style-type: none"> No endangered species have been reported in the study area (excluding the Tonle Sap Lake). In addition, the locations of proposed facilities will be on the cultivated land. Therefore, the impact is limited. 	<ul style="list-style-type: none"> Information collection In-depth field survey 	<ul style="list-style-type: none"> If the proposed project was proved to have serious impacts on flora, fauna and biodiversity, it should be stopped and reconsidered. Careful consideration should be taken for the impact on the ecosystem of the Tonle Sap Lake.

Likely Impacts	Rating	Impact Severity (e.g. magnitude, area extent, duration, frequency, reversibility, likelihood of occurrence)	Methods Used to Predict	Assumed Mitigation Measures
Global Warming	B	<ul style="list-style-type: none"> The impact is limited judging from the scale of the projects. Some of the projects will contribute to improve energy efficiency in the study area. 	<ul style="list-style-type: none"> Estimation on volume of greenhouse gas emission 	<ul style="list-style-type: none"> Appropriate measures should be considered for the power supply projects in the master plan to minimize greenhouse gases emission. Energy efficiency and utilization of natural energy should be considered for power supply projects.
Air Pollution	B	<ul style="list-style-type: none"> The impact is limited judging from the current air quality and the predicted volume increase of air pollutants emission. 	<ul style="list-style-type: none"> Estimation of pollution intensity 	<ul style="list-style-type: none"> Daily coverage of landfill soil to minimize landfill fire occurrences. Proper covering of construction materials and sprinkling of roads will be required at the construction stage of the proposed projects. Appropriate maintenance of construction equipments and vehicles, and evenly scheduled construction.
Water Pollution	B	<ul style="list-style-type: none"> The wastewater treatment projects may deteriorate water quality of the Siem Reap River when the operational problems occurred Leachate from the landfill site may contaminate nearby water body if it is not appropriately treated. 	<ul style="list-style-type: none"> Field survey (including topographical survey) 	<ul style="list-style-type: none"> Appropriate control of turbid water control during construction period. Treatment of the leachate from the landfill site. Periodical monitoring and inspection of the wastewater treatment facilities.
Soil Contamination	B	<ul style="list-style-type: none"> Soil might be contaminated by construction materials and construction waste. Leachate from the proposed landfill might infiltrate into ground and contaminate soil at the operation stage. 	<ul style="list-style-type: none"> Geological survey 	<ul style="list-style-type: none"> Inspection of construction materials in advance. Treatment of the leachate from the landfill site, and establishment of separate treatment system for infectious or hazardous wastes.
Waste	B	<ul style="list-style-type: none"> Certain volume of construction waste will be generated if the proposed projects will be implemented. Effluent and sludge will be generated from the proposed wastewater treatment facilities. 	<ul style="list-style-type: none"> Review of the capacity of the existing landfill and waste collection system 	<ul style="list-style-type: none"> Establishment of appropriate construction waste collection system. Securing appropriate disposal site.
Noise and Vibration	B	<ul style="list-style-type: none"> The degree of noise and vibration will increase to some extent in some portion of the study area if the proposed projects on transportation and facility construction are implemented. 	<ul style="list-style-type: none"> Survey on project locations 	<ul style="list-style-type: none"> Assure the construction equipment in good condition to minimize noise and vibration. Appropriate construction schedule/planning/management.
Ground Subsidence	C	<ul style="list-style-type: none"> The impact on ground subsidence is not clear at this stage. Once the groundwater development started, the reversibility of the negative impact is very low. 	<ul style="list-style-type: none"> Hydro-geological survey Simulation of groundwater drawdown Pumping test 	<ul style="list-style-type: none"> If negative impact is anticipated, the project should be stopped and reconsidered.
Offensive Odor	B	<ul style="list-style-type: none"> Offensive odor might be generated from decomposed organic wastes in the proposed landfill. Offensive odor might be generated from sludge and effluent generated in the proposed wastewater treatment facilities if appropriate maintenance is not taken. 	<ul style="list-style-type: none"> Survey on project location 	<ul style="list-style-type: none"> Location of landfill or wastewater treatment facilities should be carefully considered. Soil cover should be done in the landfill on daily basis Periodical maintenance of wastewater treatment.

Note: Rating Criteria:

A: Serious impact is expected.

B: Some impact is expected.

C: Extent of impact is unknown (Examination is needed. Impacts may become clear as study progresses).

8.2 Mitigation Measures of Predicted Impacts of Master Plan

(1) Pre-Construction Period

- Consultation with Stakeholders
- Careful Site Selection for Each Project
- Archaeological Investigation
- Securing Alternative Jobs for Landowners of the Project Sites
- Groundwater Quality Test
- Hydro-geological Survey
- Inter-Ministerial Coordination on Water Usage
- Geological Survey on Soil
- Atmospheric Survey

(2) Construction Period

1) Mitigation Measures for Impact from Construction Activities

- Appropriate Control of Construction Materials
- Sprinkling of Roads
- Appropriate Maintenance of Construction Equipment and Vehicles
- Turbid Water Control
- Establishment of Construction Waste Collection System
- Appropriate Construction Schedule/Planning/Management
- Installation of Acoustic Wall or Buffer Zone

2) Appropriate Procedures for Archaeological Discovery

The construction contractor needs to stop construction activities immediately if archaeological finding is reported. The findings need to be investigated by archaeologists if necessary, and an appropriate measure needs to be taken to recover it.

3) Return of Construction Affected Areas to Original Condition

All the areas affected by the project implementation needs to be recovered to original condition after the construction completion. All equipment, machinery and vehicles for construction should be removed, and construction waste, unused materials and contaminated earth need to be properly disposed.

(3) Operation Period

Various measures need to be considered and implemented during the operation period. These measures need to be studied at a sectoral master plan or a feasibility study level. The mitigation measures considered at this stage are described below.

- Landfill: removing landfill gas; covering soil daily to protect offensive odor and minimize the landfill fire occurrence; and treatment ponds for leachate treatment.
- Waste treatment ponds: periodical maintenance to protect offensive odor.
- Diesel generators: installation of equipment to reduce emission.
- Groundwater pumping: periodical monitoring on ground subsidence.

9. Recommendations

1. Siem Reap has so far experienced a tourism rush. The rush has taken place with few destinations and contents to enjoy other than Angkor Wat Complex. Basic public services cannot catch up with rapid hotel development. The city is still hardly safe, clean or convenient for individual family tourists. Policy makers should realize that the tourism and urban development in this pattern is not sustainable in the future. It should be shifted from quantity-oriented to quality-oriented and made compatible with natural environmental conditions. The government should seriously tackle with intensifying environmental and urban problems in Siem Reap. Otherwise, environmental degradation and possible damage to the image of the city may force tourists away from Siem Reap under fierce competition among tourist destinations in the world.

2. Among other things, the most critical element is the water for tourists, people and the agricultural lands as green belt. Individual pumping of groundwater for commercial purpose should be registered, monitored and charged when necessary. This is now possible with a full-scale urban water supply system being available. A province-wide plan should be prepared as soon as possible to manage existing and potential water resources and to coordinate different water uses in long term.

3. Land use control is another critical element. Urban development should be allowed only within the urbanization area as proposed. With this control, urban infrastructures can efficiently be provided. The historical sites and agricultural lands can be protected from uncontrolled urban spill over as well. For timely development of infrastructures, public space should be secured from unlawful building construction, settlements and land occupancy with full consideration of socially vulnerable people. Currently complicated administrative set-up for land use planning should be streamlined for the land use control to be effective.

4. This long-term master plan is a living document. It should be reviewed and revised in response to changing circumstances particularly by Siem Reap Province, APSARA Authority, Committee for the Development of Cambodia and Office of the Council of the Ministers. The proposed priority projects should fully be reviewed for their timely preparation and implementation. Together with these attempts, the provincial government should strengthen its function to monitor investments, land use, environment government projects and thus to revise the master plan.

5. Pilot projects entitled "A More Beautiful Siem Reap" and "Angkor Products Fair 2005" have been successful because of strong local initiative and wide-ranging national support. They should be a new step toward continued actions for upgrading urban environment and diversifying local economic benefits and local amenities. The local initiative taken by the provincial governor in particular, should keep being supported by concerned national ministries, private sector and the local people.

6. Capacity building of the government administration at the local level is the most crucial to sustainable development of Siem Reap. Of important is the provincial government. The provincial government should urgently strengthen its planning staff

with wide technical knowledge. It should promote sharing of developmental information among different departments and authorities at the provincial level by organizing a provincial development committee. It will eventually be something like a provincial CDC or a governor's board. There should be a basket fund at the provincial level specifically for the maintenance of strategic public services such as streets, waste collection and drainage. A deserved and viable source of the fund would be a part of the entrance fees to the Angkor monuments.

7. Unlike most other provinces in Cambodia, the provincial of Siem Reap is dependent largely on tourism and urban sectors. The provincial government of Siem Reap should, therefore, substantially strengthen its authority and technical capacity to plan, monitor and maintain urban environment. The provincial authority and technical capacity should be made effective by technical and legislative support from relevant line ministries and departments as well as APSARA Authority.

8. The Angkor monuments are a symbol of the national identity, a world cultural heritage and a major source of foreign exchange. Siem Reap should thus be a model city of sustainable development in Cambodia. It will not just be sustainable in itself but will offer implications of the Angkorian wisdom for sustainable development and cultural diversity and people participation in the 21st century. It is not just the seat of physical monument either, but the source of universal spirit being conveyed to the rest of the world. It will also be a cultural magnet in Southeast Asia. Toward this end, all the ministries, authorities and councils of the national government should share a common understanding that it is worth to financially and technically support Siem Reap especially in urban and environmental improvement.