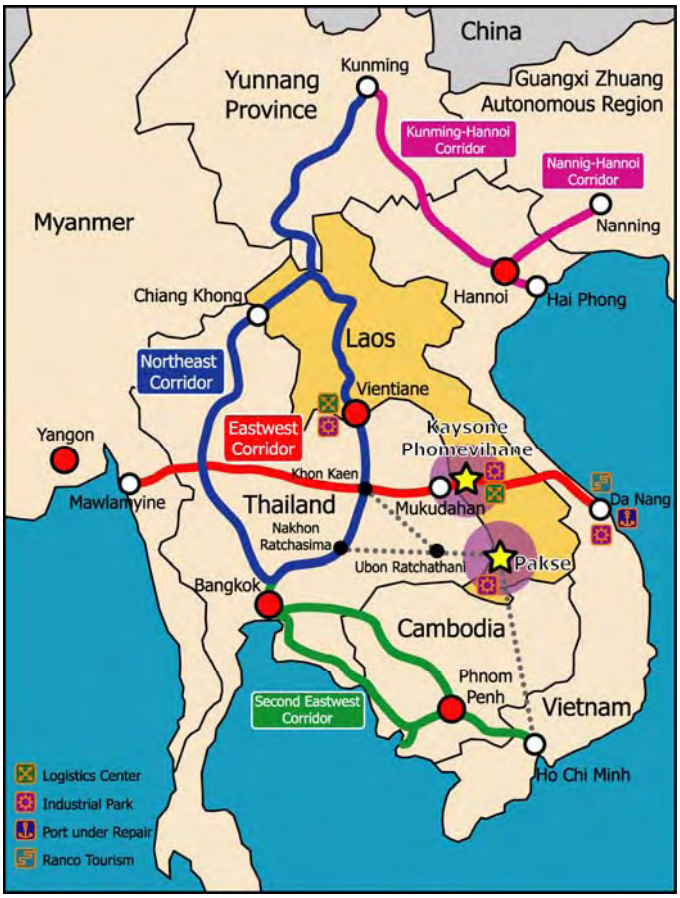
Appendix: Current Situation of Urban Sectors

A-1 Regional Setting

1.1 Geography

Located in the central area of Indochinese Peninsula, the country of Lao PDR occupies 23.7 thousand square kilometers of surface area. The countries in the Peninsula have been enriched in cultures and economies in the long history. Although there had been a series of conflicts after the colonial age, these countries are integrating their economies under the scheme of AFTA (ASEAN Free Trade Area) and GMS (Greater Mekong Sub region) Program.

AFTA is an effort to lower institutional barriers to promote trade and investment within ASEAN countries. GMS Program facilitates infrastructure development and institutional development at multinational and bilateral basis. One of the tools of GMS Program is corridor development, which is based on several designated international routes. EWEC (East West Economic Corridor), the pilot program of this corridor development system, traverses the Indochinese Peninsula as in FigureTable 1.1



Source: JST

Figure 1.1 PDR and Corridor System

The natural geography of Lao PDR is characterized by the Mekong River and Annamese Mountain Range. These formulate national boundaries in many parts of country and all major cities are located along the Mekong. The plain is limited to the area along the Mekong and the almost cities are located in the small area along the Mekong. The largest plain is around Vientiane and the plain in Kaysone Phomvihane follows it.

1.2 Socio-economy

1.2.1 Population

Table 1.1 indicates population and its annual average growth rates in census years. Population of Lao PDR had doubled from 2.9 million to 5.6 million, with the highest population growth rate in the Asian countries during 20 years from 1976 to 2005. However, the growth rate is getting lower gradually, from 2.5% in 1976-85 to 2.0% 1995-2005. According to Statistical Yearbook 2008, population recorded 6 million in 2008.

Table 1.1 Population and Its Annual Average Growth Rate in Census Years

(Unit: 000 persons)

Year	1976	1985	1995	2005
Total Population	2,886	3,618	4,605	5,622
Annual Average Growth Rate (%)		2.5	2.4	2.0

Source: Statistical Yearbook 1975-2005, 2007, Department of Statistics, Ministry of Planning and Investment

Table 1.2 Population by Provinces in 1995 and 2005

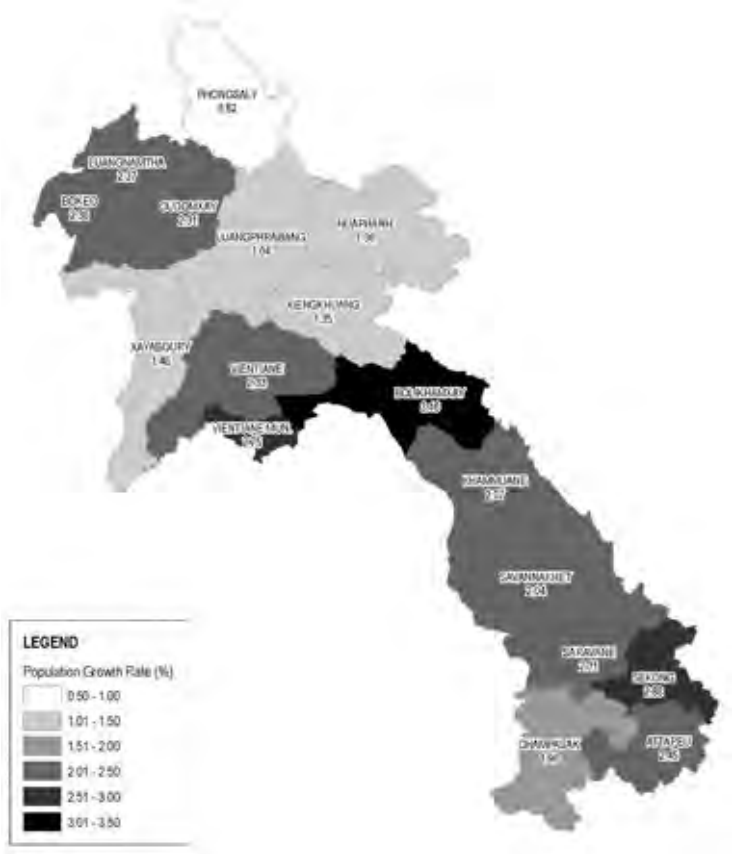
Province	Population (000 persons)		Percentage share (percent)	
	1995	2005	1995	2005
Vientiane Capital	524	698	11.6	12.4
Phongsaly	153	166	3.3	3.0
Luangnamtha	115	145	2.5	2.6
Oudomxay	210	265	4.6	4.7
Bokeo	114	145	2.5	2.6
Luang Prabang	365	407	8.0	7.2
Huaphanh	245	281	5.4	5.0
Xayaboury	292	339	6.4	6.0
Xiengkhuang	201	241	4.4	4.3
Vientiane	287	417	6.2	7.4
Borikhamxay	164	225	3.6	4.0
Khammuane	272	337	6.0	6.0
Savannakhet	672	826	14.7	14.7
Saravane	256	324	5.6	5.8
Sekong	64	85	1.4	1.5
Champasack	501	607	10.9	10.8
Attapeu	87	112	1.9	2.0
Xaysomboon SR	54	-	1.2	0.0
Total	4,575	5,622	100	100

Source: Census 2005 and 1995, Steering Committee of the Population and Housing Census

Table 1.2 indicates change of population and its percentage share in the total national population. Figure 1.2 illustrates annual population growth rate by provinces between 1995 and 2005. The following characters are observed.

In the northern provinces, Luangnamtha (2.4%), Bokeo (2.4%) and Oudomxay (2.3%) recorded higher annual growth rates than national average (2.0%). The growth rates in other provinces are limited.

In central and southern provinces, annual population growth rate is higher than national average except for Champasack Province (1.9%). In particular, Bolikhamxay (3.1%), Secong (2.7%) and Vientiane Capital (2.8%) experienced high growth.



Source: Census 1995 and 2005

Figure 1.2 Population Growth rate by Provinces 1995-2005

The Census 2005 report uses the concept of "Urban", "Rural with Road" and "Rural without Road" to classify villages. The Urban Village has the following characters:

The village must lie in the municipal vicinity where the district or provincial authority is located, and there are more than 600 residents or more than 100 households.

- There is a road for motor vehicles to get access to the village.
- The majority of households in the village are electrified.
- There is a tap water supply in service to the majority of households.
- There is a market in the village.

Table 1.3 indicates population in Urban Villages and Rural Villages in 1995 and 2005. Population of Urban Village was 1,523 thousand, occupied 27% of the total population in 2005. Percentage of population in Urban Village has increased 10 points in 10 years. One of the reasons in such rapid increase comes from transmigration of population from Rural Village to Urban Village. However, the other major reason is transformation of villages from Rural Villages to Urban Villages due to changes of the characters mentioned above.

Table 1.3 Change of Population in Urban Villages and Rural Villages

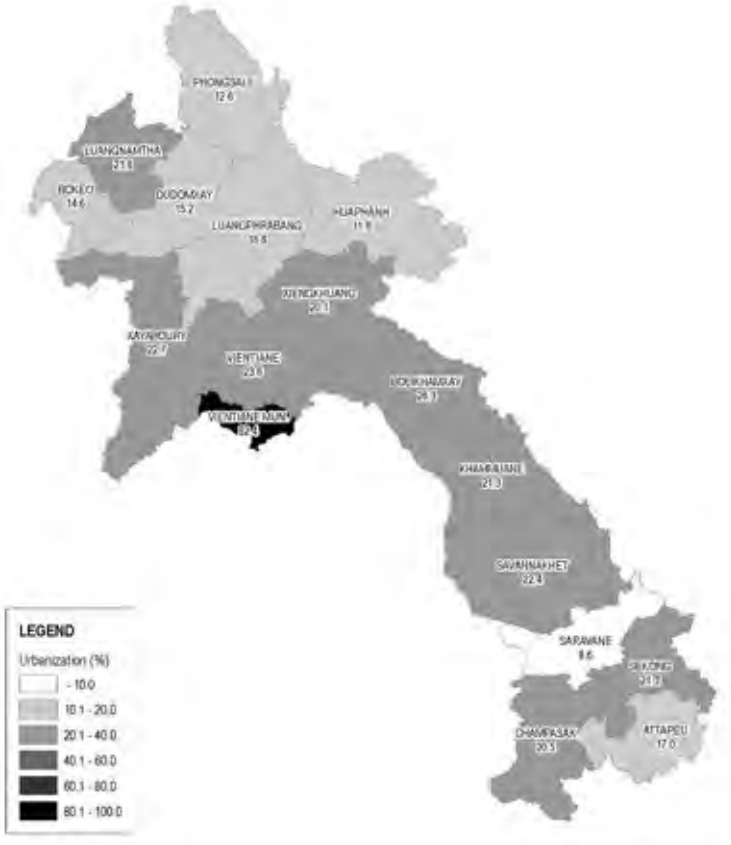
Unit:000 persons

Year	Total	Urban	Rural	Percentage of Population in Urban Village (%)
1995	4,575	782	3,793	17
2005	5,622	1,523	4,092	27

Source: Census 1995 and 2005

Figure 1.3 indicates percentages of population in the Urban Villages to the total population by provinces (referred as to "Urbanization Ratio"). The percentage of Vientiane Provinces recorded 82%. And Bolikhamxay (26%), Vientiane (24%), Savannakhet (22%), Luangnamtha (22%), and Khammuane (21%), and Sekong (21%) followed Vientiane Capital; however, percentages of these provinces were lower than national average.

The urbanization ratio in provincial level shows urbanization is proceeding only in Vientiane Capital, and urbanization of other cities is limited. However, Population Division of the United Nation analyzes that urbanization ratio will increase to 53% due to rapid economic development and population pressure in the rural area in 2030.



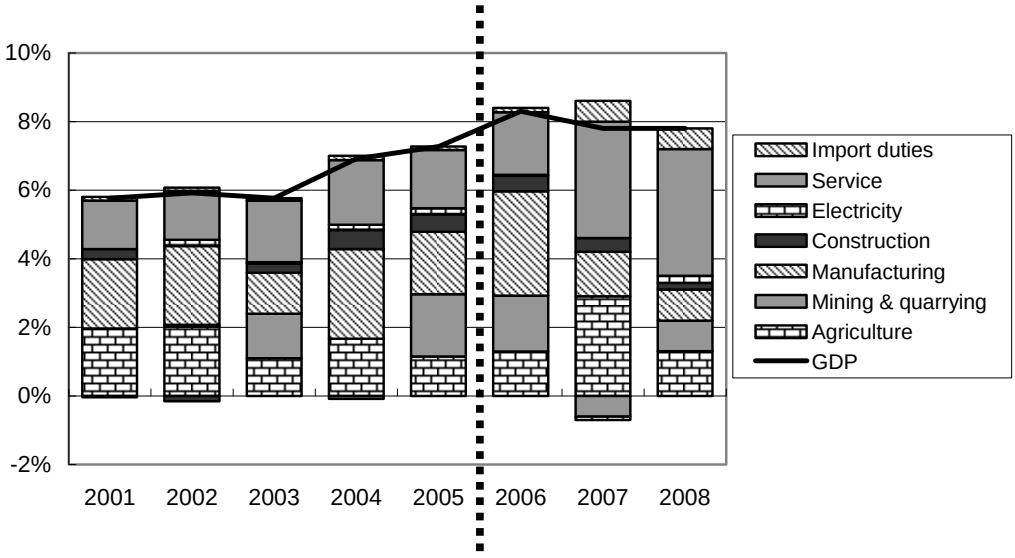
Source: Census 2005

Figure 1.3 Urbanization Ratio in 2005

1.2.2 Economic Development

Figure 1.4 indicates the GDP growth rate and contribution of industries to GDP growth. GDP data since 2006 is not consistent with the previous data because DoS has changed a methodology to calculate GDP since Statistical Yearbook 2007. The graph shows that manufacturing and mining & quarrying is major contributors of the recent rapid growth until 2006. Out of 8.3% GDP growth, the

sum of the manufacturing and the mining & quarrying occupied 4.6% in the year. After 2007, service sector has changed to a major contributor of GDP growth.

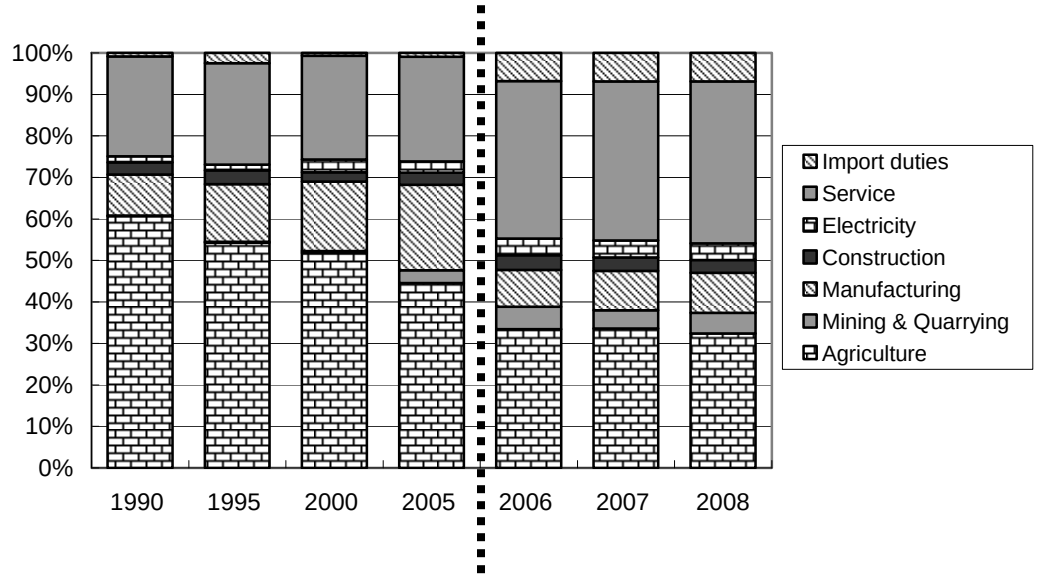


Source: Statistical Yearbook 1975-2005, 2008, DoS

Figure 1.4 GDP Growth Rate and Contribution of Industries

Figure 1.5 indicates composition of industry from 1990 to 2008. The Industrial share has changed in a discontinuous manner since 2006 due to revision of the GDP calculation. Percentage of the primary sector recorded 60% in 1990, but it has dropped gradually and recorded 32% in 2007. On the other hand, manufacturing, mining & quarrying electricity has increased their share during the same period.

Share of the tertiary industry has been increasing gradually from 37.9% in 2006 to 39.0% in 2009, and share of manufacturing industry is also increasing from 8.9% in 2006 to 9.6% in 2008. In general, a tendency that the primary sector has dropped its share and the secondary and tertiary sectors has raised their share, has not changed throughout of the period from 1990 to 2008.

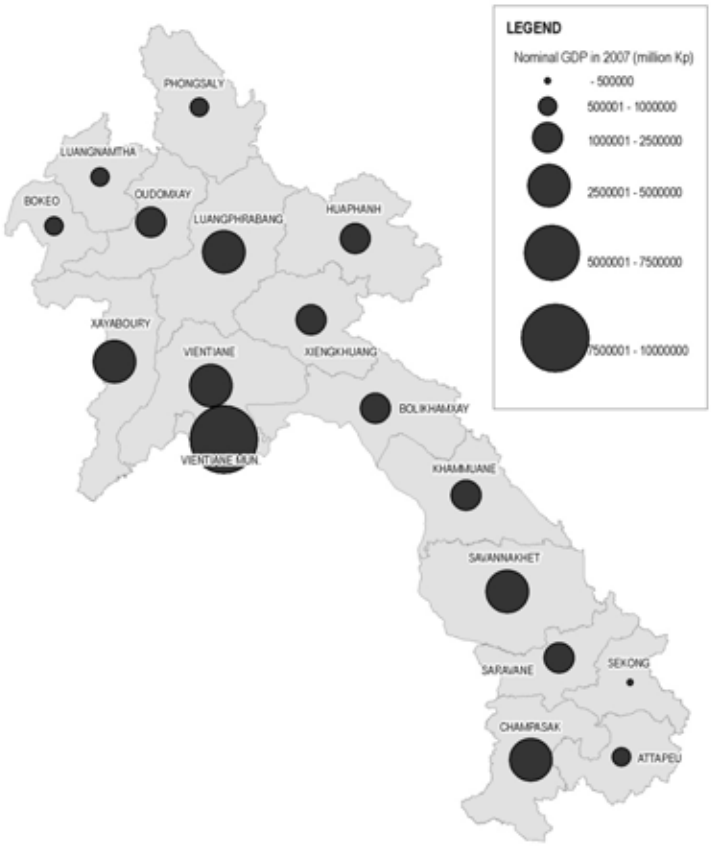


Source: Statistical Yearbook 1975-2005, 2008, DoS

Figure 1.5 Change of Industrial Composition

Figure 1.6 illustrates provincial share of GDP in 2007. Since official data on Gross Domestic Regional

Products (GDRP) is not available, JST estimated the data from household income by provinces which is surveyed in the Laos Expenditure and Consumption Survey 2002-03 (LECS 3) and number of business entities by provinces in the first Economic Survey in 2006.



Source: JST calculated from Statistical Yearbook 2007, Lao Expenditure & Consumption Survey 2002-03 (LECS 3) and Economic Survey in 2006

Figure 1.6 GRDP by Provinces in 2007 (Nominal)

Vientiane Capital Province occupied 23% of the GDP, and followed by Savannakhet Province (12%), Champasack Province (10%) and Vientiane Province. On the other hand, proportion of Sekong Province (1%), Attapeu Province (2%) and the Northern provinces (Phongsary, Luangnamtha, Oudomxay and Bokeo) is very limited.

1.2.3 Public Finance and Public Investment

Table 1.4 indicates Public Finance and Public Investment Program in recent financial years. Fiscal revenue accounted for 11 to 16% of nominal GDP. Around 80% of the fiscal revenue was domestic resource (tax and non-tax revenue), and the other part came from donors' grant aid.

Fiscal expenditure accounted for 20 to 22% except FY 2007/08 (13%). As a result, Lao PDR recorded fiscal deficit which was equal to 3 to 6% of GDP during the period.

Public Investment Program (PIP) accounted for 7 to 11% of GDP. 60 to 90% of financial source of PIP came from donors' grant and loan. Provision of public infrastructure heavily relies on supports from international donors.

Table 1.4 Public Finance and Public Investment Program

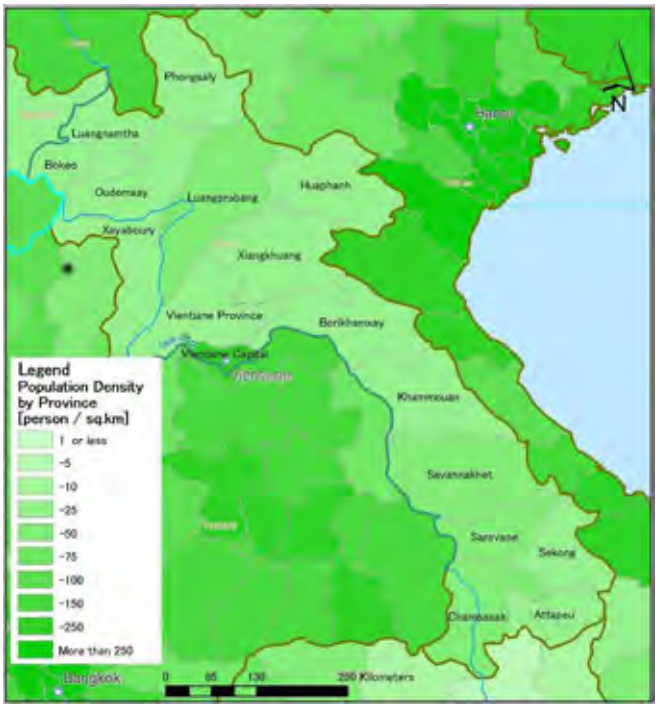
Unit: billion kip

	2005/06	2006/07	2007/08 estimation	2008/09 budget
Nominal GDP	31,847	38,065	44,771	50,791
Fiscal Revenue	5,108	6,134	5,004	8,340
Domestic	4,411	5,460	4,620	7,589
Grant Aid	696	673	384	752
Fiscal Expenditure	6,944	8,100	5,730	10,026
Budget Deficit				
Including grant aid	-1,836	-1,966	-726	-1,685
Excluding Grant Aid	-2,533	-2,640	-1,110	-2,437
Public Investment Program	3,649	2,615	955*	3,330
Public Budget	424	517	372*	1,138
Grant and Loan	3,225	2,098	583*	2,192

Note: * indicates figures of the first 6 months in FY2007/08.
Source: National Socio-Economic Development Plan 2008-2009, MPI

1.2.4 Population Density and its Distribution at Provinces

Figure 1.7 shows the population density at provinces in the Indochinese countries. The population densities in Lao Provinces are sparser compared to adjacent provinces in neighbor countries.



Source: Statistical yearbooks of each country

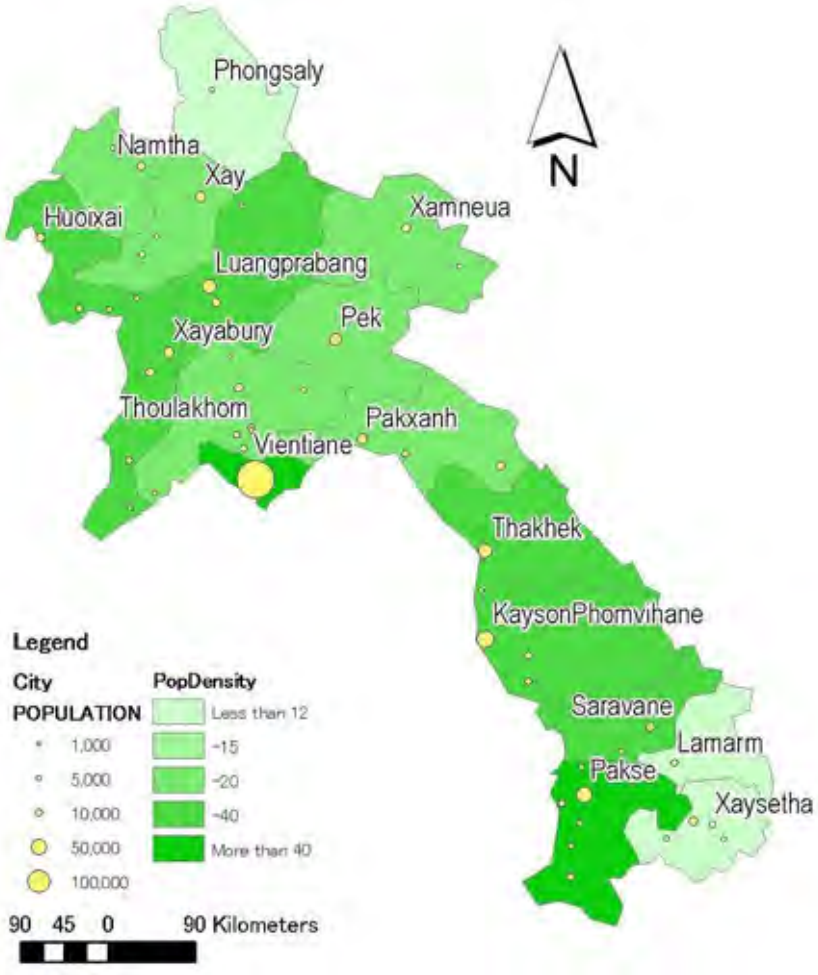
Figure 1.7 Population Density at Provincial Level

1.2.5 Urban Hierarchy

Although the definition of a city or urban population is vague in Lao PDR, a population agglomeration of more than 4,000 persons is generally accepted as an urban area by ADB Lao Urban Data Book (2003). In addition, each village is classified as urban or rural and urban village population will be urban population.

Because the Lao PDR is a long stretched country, it is necessary to establish regional centers to

maintain the level of service. There are some discussions about the hierarchy of urban centers as Table 1.5



Source: Urban Data Book, ADB (2003); Census 2005

Figure 1.8 Provincial Cities

Table 1.5 Cities and its Classification

Province	City	Population		Category	Total Population	Percent
Vientiane	Vientiane	300,804	National Capital	Primary Town	300,804	30%
Savannakhet	Savannakhet	63,634	Provincial Capital	Regional Cities	185,756	19%
Champasack	Pakse	48,218	Provincial Capital			
Luang Prabang	Luang Prabang	40,797	Provincial Capital			
Khammuane	Thakhek	33,107	Provincial Capital			
Xiengkhuang	Pek	29,641	Provincial Capital	Other Provincial Capitals	187,879	19%
Xayabury	Xayabury	22,622	Provincial Capital			
Oudomxay	Xay	22,389	Provincial Capital			
Borikhamxay	Pakxanh	18,660	Provincial Capital			
Luangnamtha	Namtha	16,205	Provincial Capital			
Huaphanh	Xamneua	15,391	Provincial Capital			
Bokeo	Huoixai	13,757	Provincial Capital			
Saravane	Saravane	13,651	Provincial Capital			
Attepeu	Xaysetha	10,809	Provincial Capital			
Vientiane Prov.	Thoulakhom	10,459	Provincial Capital			
Sekong	Lamarm	9,112	Provincial Capital			
Phongsaly	Phongsaly	5,183	Provincial Capital			
Savannakhet	Outhoomphone	19,794	District Town	Other Town	314,739	32%
Luang Prabang	Xieng Ngeun	16,844	District Town			
Attepeu	Samakkhixay	12,961	District Town			
Xayabury	Phiang	12,929	District Town			
Borikhamxay	Khamkeuth	12,774	District Town			
Vientiane Prov.	Vangvieng	11,803	District Town			
Savannakhet	Champhone	10,404	District Town			
Xayabury	Xienghone	10,050	District Town			
Oudomxay	Hoon	9,664	District Town			
Champasack	Phonthong	9,360	District Town			
Xayabury	Parklai	9,358	District Town			
Vientiane Prov.	Viengkham	8,991	District Town			
Xiengkhuang	Kham	8,664	District Town			
Savannakhet	Sonkhone	8,032	District Town			
Borikhamxay	Bolikhanh	7,833	District Town			
Champasack	Moonlapamok	7,116	District Town			
Vientiane Prov.	Km52	6,967	District Town			
Borikhamxay	Pakkading	6,826	District Town			
Champasack	Paksxong	6,564	District Town			
Borikhamxay	Thaphabath	6,293	District Town			
Vientiane Prov.	Keo Oudom	6,216	District Town			
Champasack	Sukhuma	6,160	District Town			
Luangnamtha	Sing	6,158	District Town			
Xayabury	Ngeun	6,053	District Town			
Xaysomboun	Saysomboun	6,009	District Town			
Khammuane	Nongbok	5,832	District Town			
Attepeu	Sanamxay	5,824	District Town			
Vientiane Prov.	Kasy	5,812	District Town			
Luang Prabang	Nan	5,704	District Town			
Luang Prabang	Park Ou	5,668	District Town			
Xayabury	Kenethao	5,526	District Town			
Xayabury	Hongsa	5,490	District Town			
Luang Prabang	Nambak	5,393	District Town			
Vientiane Prov.	Xanakharm	5,350	District Town			
Oudomxay	Beng	5,155	District Town			
Huaphanh	Xamtay	5,150	District Town			
Champasack	Sanasomborn	5,095	District Town			
Attepeu	Phouvong	5,063	District Town			
Champasack	Champasack	4,996	District Town			
Saravane	Lao Ngarm	4,858	District Town			

Source: ADB Lao Urban Data Book (2003)

Table 1.6 Options of Spatial Framework in Lao PDR

	Option 1	Option 2
Capital	Vientiane	Vientiane
Regional (Secondary Towns)	Luang Prabang, Thakhek, Kaysone Phomvihane, and Pakse	Luang Prabang and Pakse
Other Provincial	Other provincial capitals.	Other provincial capitals.
District Towns	District towns	District towns

Source: JST

In addition, these regional cities have been historically functioning as the centers on the north – south axis of the Mekong or Route 13 to serve its rural area. The roles of cities are changing gradually by the opening of east – west axis because the regional cities are located on the intersections of important transportation network in Indochina.

1.3 Review of Current Development Plan

1.3.1 National Socioeconomic Development Plan

(1) Review of 6th 5-year Development Plan (2006-2010)

Lao PDR Government has a vision that the country will graduate from the Least Development Country (LDC) until 2020. The vision was set in the 6th Party Congress in 1996, and was the basis of overall goals in the National Growth and Poverty Eradication Strategy 2001-2010 (NGPES) and the 6th Five-Year National Socio-Economic Development Plan 2006-2010 (the 6th Five-Year Plan). The other major goals of development plans are to achieve targets in the Millennium Development Goals (MDGs) and the Brussels Programme of Action for the Least Development Countries (2001-2010).

The Sixth Five-Year Plan sets the following goals:

- Accelerating economic growth and improve the people's quality of life, restructuring the economy and employment in build a market economy, based on the countries' rich resources and international integration;
- Further build the market economy with a socialist orientation;
- Continue to enlarge and develop effective external economic relations; and
- Continue strengthening the socio-economic infrastructure as fundamentals for development in the 6th Five-Year Plan and for the next (7th) Five-Year Plan.

In order to achieve goals mentioned above, GDP growth rate is set to an average of 7.5 to 8 percent per annum with agriculture and forestry increasing by 3-3.4%, industry by 13-14%, and services by 7.5-8%. In particular, the growth rate in industry will be considerably accelerated, as there will be more industrial opportunities, especially hydropower plants and cement factories, which will begin operation at the end of the 6th Plan. By 2010, the agriculture sector is projected to account for about 36% of GDP, with industry about 36% and services about 28%.

Regarding to social and environmental targets, completing the establishment of compulsory primary education program nationwide, 1.91% of population growth, 652,000 of job creation, reduction of poor households to less than 15%, supply of clean water to 70% of rural communities, raising the ratio of forest cover to more than 50% of the national land are prepared in the 6th five-year development plan.

Description on urban development is not so much in the 6th five-year plan. Regional socio-economic development target is described in "Part VIII. I. Regional Development," and infrastructure at urban area in "Part VIII. G. Urban Development."

Regarding to regional socio-economic development, targets indicated in Table 1.7 is prepared. And the following four cities are development as socio-economic development centers of each region:

- Northern Region: Luangnamtha
- Central Region: Vientiane Capital and Kaysone Phomvihane
- Southern Region: Pakse

Table 1.7 Regional GDP Growth Targets and Investment Needs

Items	Northern Region	Central Region	Southern Region	Total/National Average
Annual GDP Growth (%)	6 to 6.5	8.5 to 9	6.5 to 7	7.5 to 8
Share of GDP (%)	25 to 28	49 to 54	21 to 23	100
Investment Needs (bill kip)	20,698	36,960	16,262	73,920
Public investment (% of total investment needs)	12	9	11	32
Private Investment (% of total investment needs)	16	41	11	68

Source: 6th Five-year Development Plan

As indicated in Table 1.7, the Government estimated total investment needs to achieve GDP growth target was 73,920 billion kip, and 50% of the investment is carried out in the central region. However, the Government expected almost of the investment to the central region would be carried out by private sector. As a result, 28% of total investment needs would be allocated to the northern region and 22% to the southern region, respectively.

Regarding to infrastructure development, the following points are pointed out.

- Provision of integrated urban infrastructure to secure the beauty, cleanliness, greenery of civilized towns.
- Meeting the housing needs for low-income citizens,
- Development of Land Fund to carry out urban infrastructure projects, and
- Increasing the distribution of sanitized water to the population in urban and suburban areas; solving the issue of wastewater and solid waste management in the provincial capital, industrial centers.

(2) Mid-term Review

Ministry of Investment and Planning prepared "MID-TERM REVIREW OF THE SIXTH NATIONAL SOCIO-ECONOMIC DEVELOPMENT PLAN (2006-2010)" (hereinafter referred as "Mid-term Review") in November 2008. The objectives of the Mid-term Review were to assess achievements and progress over the last three years and to identify challenges in implementation. Results and lessons of the Mid-term Review will be reflected in the coming 7th Five-Year Plan from 2011-2015.

Regarding to economic performance, the report pointed out that Lao PDR achieved 8% GDP growth during 2005/06 and 2007/08 against the target of 7.5%. The average GDP per capita has already exceeded the plan target of 700 US dollar two years ahead of schedule, and the economy continued to industrialize and modernize during the period.

Regarding to regional development, significant variance across regions in terms of per capita Public Investment Program (PIP). In the northern region, per capita PIP expenditure is 252,000 kip per person, compared to 144,000 kip per person in the southern region. The Mid-term Review pointed out that this discrepancy is primary caused by the discrepancy in ODA flows to different regions, which again highlights the need for stronger ODA coordination. According to an official of DPWT in Savannakhet, primary target of the DPWT is improvement of infrastructure in the rural area, and priority of infrastructure provision in urban area like Kaysone Phomvihane is set as lower level. From the look of these things, public investment to regional cities is limited compared to their role in economic and social activities.

1.3.2 Provincial Socioeconomic Development Plan

(1) Savannakhet

In the ongoing five-year plan from 2006 to 2010, Savannakhet Province set the following targets.

- Population: 914,965 persons in 2010
- Life expectation: 65 years old in 2010
- School enrollment rate: Primary school is 90%, lower secondary school is 63%, and upper secondary school is 25% in 2010
- Water supply and sanitation: Rate of using clean water is 95%, and rate of using toilet is 70% in 2010
- Poverty reduction: Reducing 2/3 of the existing poorest families (14,408 poorest families in 2001)
- Economy: Target growth rate of GDP is 12% annually, in which agriculture and forestry is 7-8%, industry is 18-19% and service is 13-14%
- Industrial Composition: Agriculture and forestry from 51% in 2005 to 43% in 2010, industry from 23% in 2005 to 31% in 2010, and service from 25% in 2005 to 27% in 2010.
- Public Finance: Increasing annual budget income to 10-13% of GDP
- Investment: Public investment occupies 4-6% of GDP; 48% of GDP by private sector

(2) Champasack

In the ongoing five-year plan from 2006 to 2010, Champasack Province set the following targets.

- Population: 666,000 persons with annual growth rate of 1.9%;
- Economy: 11% of annual growth rate, and 950 USD of GDP per capita in 2010;
- Industrial growth: 4.2% growth of agriculture, 15% growth of industry, and 17% growth of service; 37%, 30%, and 33% of industrial composition in 2010;
- Foreign trade: 12% growth of export and 7% growth of import;
- Investment: 16% of GDP in five years; 14% of total investment from public investment and 7.4% of ODA sources;
- Public finance: 15% growth in revenue and 20% growth in expenditure; 376 billion kip of overbalance in five years; and
- Social services: 92% of enrollment rate in primary education; 95% of access rate to cleaned water; 76% of electricity service ratio.

The province expects higher economic growth than national economic development target (7%), which is leaded by the secondary and tertiary industries. Rapid growth of expects would be an engine of the economic development in the province. Although public expenditure is going to increase rapidly than public expenditure, the province expects fiscal surplus in the planning period.

Champasack Province also prepares development strategy from 2010 to 2015. The following development guidance consistent with ongoing five-year plan is prepared.

- Economy: 11% of annual growth rate, 13 million kip of GDP per capita in 2015;
- Industrial growth: 3.8% growth of agriculture, 15% growth of industry, and 16% growth of service; 27%, 34%, and 39% of industrial composition in 2015;
- Foreign trade: 12% growth of export and 7% growth of import;

- Investment: 44% of GDP in five years; 23% of total investment from public investment and 73% of domestic and foreign investment;
- Public finance: 9% growth in revenue and 15% growth in expenditure; 6% of fiscal revenue in the GDP and 5% of fiscal expenditure in the GDP in 2015.

1.3.3 Urban Development Master Plan

(1) Role and Function of Master Plan

The legal framework of urban planning has been developing since the late 1990s. The Decree 209 Rules and Regulations of Town Planning in 1999 provided solid base of urban plans. Urban Research Institute (URI, current Public Transport Institute, PTI) prepared master plans as in Table 1.8.

Table 1.8 Master Plans for Two Districts

City	Designed Year	Approved Year	Area(ha)
Savannakhet	1998	1999	7,000
Pakse	1999	2001	5,580

Source: PTI and ADB Urban Data Book (2003)

After ten years of plan preparation, it is appropriate time to review and to evaluate these plans. However, some documents, especially for Pakse, are missing and it makes difficult to review plans. Accordingly, the review here is based on the limited documentation.

Here mainly reviews the master plan in terms of population, land use, and road network.

(2) Kaysone Phomvihane

(a) Population

Although the reason is unknown, the master plan set the annual population growth rate as 2.6% for the period from 1997 to 2004. Actual movement was much higher than it and the population reached to 81,401 in 2005. This means the annual population growth rate was 3.7%.

Table 1.9 Population Projection and Actual Growth

Year	1997	2004	2005	Annual Growth Rate
Master Plan	61,013	73,022		2.6%
Actual			81,401	3.7%

Note: population in 2005 is based on the same selection of villages in 1997.
Source: Savannakhet Master Plan (1999) and Population Censes (2005).

(b) Drawings

The master plan consists of documentation and drawings as in Table 1.10.

Table 1.10 Drawing List of Savannakhet Master Plan (1999)

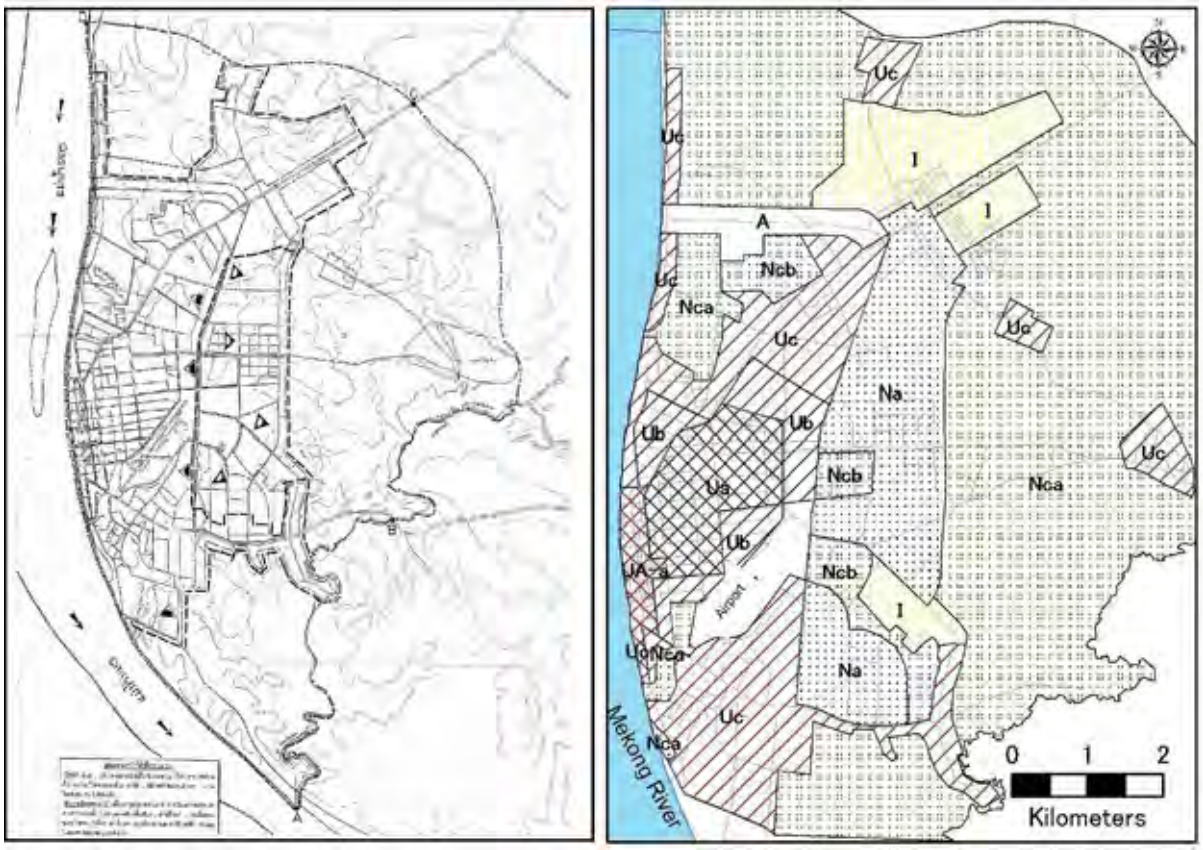
No	Scale	Availability	Topic
1		x	Regional Setting, Historical Change
2	1:10,000	x	Existing Land Use
3	1:10,000	x	Population density by village
4	1:10,000	x	Existing Road Network and Drainage
4/1	1:10,000	x	Location of Public Facilities
4/2	1:10,000	x	Location of School and Temple
4/3	1:10,000	x	Location of Shop, Market, and Factories
4/4	1:10,000	x	Location of Hotels, Guesthouses, Bus Station and Gas Station.
4/5	1:10,000	x	Power Lines and Telephone
4/6	1:10,000	x	Water Supply Network
5	1:10,000	x	Traffic Volume
6	1:10,000	x	Solid Waste Collection Route (existing)
7	1:200,000	x	Tourism Site
8	1:10,000	x	Planning Options
9	1:10,000	x	Priority Projects
10	1:10,000	x	Road Network (current and future)
11	1:10,000	x	Catchment Area and Drainage
12	1:10,000	x	Solid Waste Collection Route (planned)
13			
14	1:10,000	x	Land Use Zoning
15	1:10,000	x	Urban Planning Boundary

Source: Savannakhet Master Plan (1999)

(c) Land Use and Zoning

Land use plan was defined by the phasing and zoning system as in Figure 2.9. The central area is designated to "UA." "UB" and "UC" were laid out around the "UA."

Based on population in 1997 and an assumption that villages are evenly populated within it, population density was calculated as in Table 1.11. The Table indicates that even in UA (Urban Central Zone), the population density is as low as 43 persons per hectare.



Source: Savannakhet Master Plan 1999

Figure 1.9 Development Phasing (left) and Land Use (right)

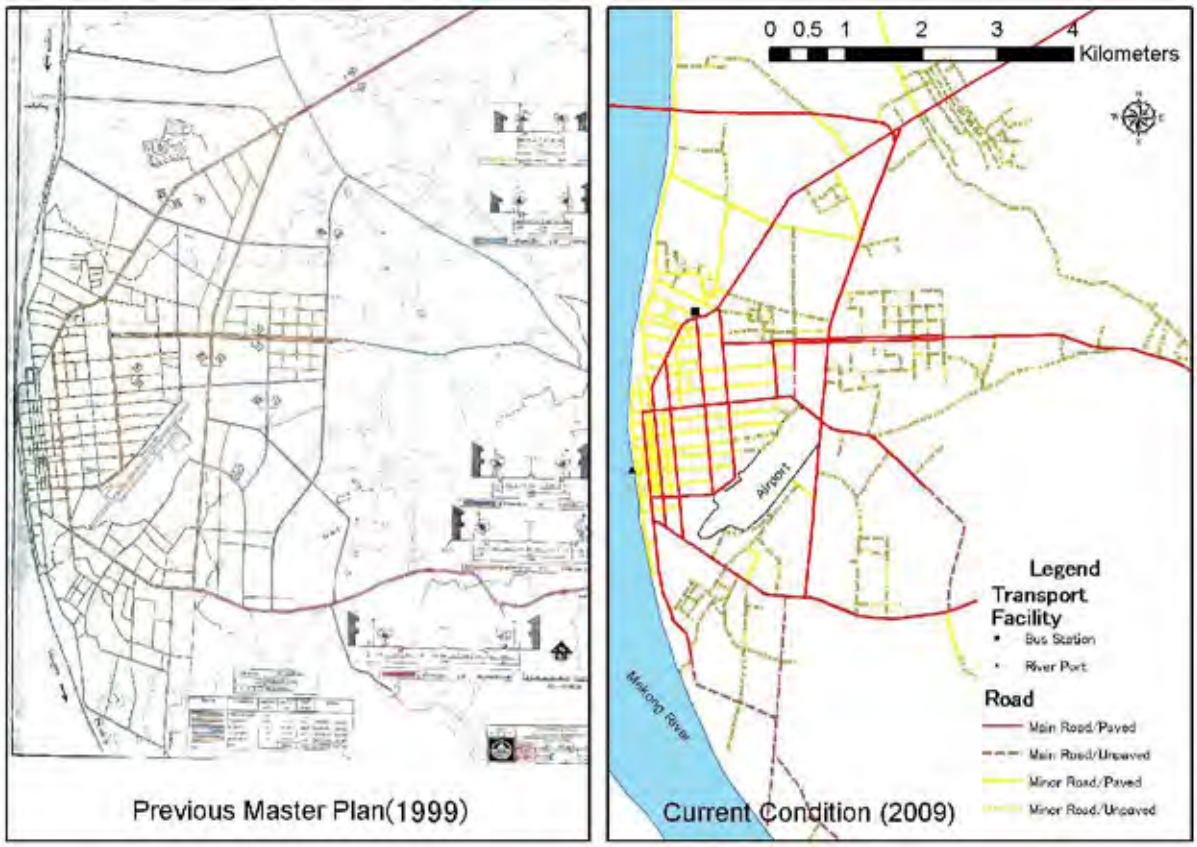
Table 1.11 Population Density by Designated Land Use Classification

Zoning	Code	Kaisone Phomevihane		
		Population (persons)	Area (ha)	Density (persons/ha)
Urban Central Zone	UA	15,339	354	43.3
Urban Inner Zone	UB	10,434	258	40.5
Urban Suburbs Zone	UC	15,746	1089	14.5
Agriculture	NA	2,545	792	3.2
Green Space, Protected Area	NC	10,579	3126	3.4
Public Area	A	2,113	255	8.3
Industrial	I	1,949	456	4.3
Total		58,706	6,329	9.3

Source: Savannakhet Master Plan 1999, recalculated by JST

(d) Road Network

The main road network was prepared to connect the new residential grid to the other part of the city. In addition some smaller roads are planned to fulfill the vacant space. However, completed roads limited to the road between the Second International Mekong Bridge and NR13. Other pavement improvement has been made. On the other hand, several roads have been made not included in the master plan.



Source: Master plan 1999; DPWT Savannakhet

Figure 1.10 Comparison of Road Network in Kaysone Phomvihane

Table 1.12 List of Planned Road and Current Situation

Classification	Width (m)	Length (m)	Area (sq m)	Planned (m)	Completed (m)
National	40				
Arterial	30-70	19,540	622,600	2,900	2,900
Main	20	76,970	1,539,400	7,000	
Collector	15	45,450	681,750	2,350	
Distribution	12	5,400	64,800	7,400	

Source: Master Plan Drawing (except "Completed")

(3) Pakse

(a) Population

Population projection by the master plan was not available because the document itself has not been confirmed.

(b) Drawings

The master plan consists of documentation and drawings as in Table 1.13. Unfortunately, there are many missing drawings. They may include important information. The description of the following part is based on the available drawings.

Table 1.13 Drawing List of Pakse Master Plan (1999)

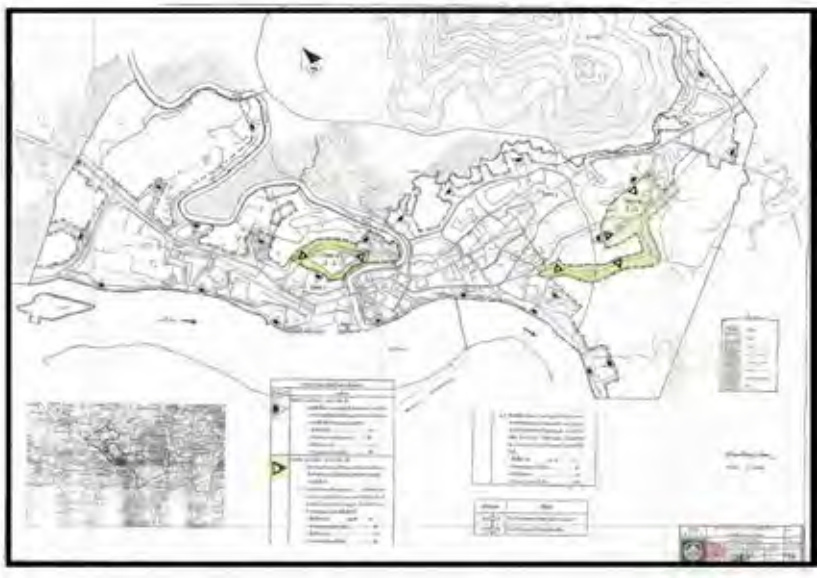
No	Scale	Availability	Topic
1			
2	1:8,000	x	Current Condition (1-3)
3	1:16,000	x	Human Settlement
4			
5			
6			
7			
8			
9	1:16,000	x	Populating density by village
10			
11			
12	1:16,000	x	Water Supply Network
13	1:16,000	x	Catchment Area and Drainage
14	1:16,000	x	Road Network
15			
16	1:16,000	x	
17	1:16,000	x	Road Network (current and future)
18	1:16,000	x	Zoning by UA, UB…
19	1:16,000	x	Transportation
20	1:16,000	x	Catchment Area and Drainage

Source: Pakse Master Plan 2001

(c) Land Use and Zoning

The master plan considers the initial phase of development up to 2005 and the later phase as up to 2010. The selected area for development for Phase 2 is not suitable for development because the area was too low in elevation. At the same time, the area selected for development for Phase 2 was relatively narrow and not grouped for integrated development.

Land use plan was defined by the phasing and zoning system as Figure 2.11 and Figure 2.12. The designated area of UA has two groups. One was in the downtown and the other was in the eastern area. It was not clear how to distinguish the urban function between the two UAs.



Source: Pakse Master Plan 2001

Figure 1.11 Development Phasing

Source: Pakse Master Plan 2001

Figure 1.12 Land Use Zoning

Table 1.14 Population Density by Designated Land Use Classification in Pakse

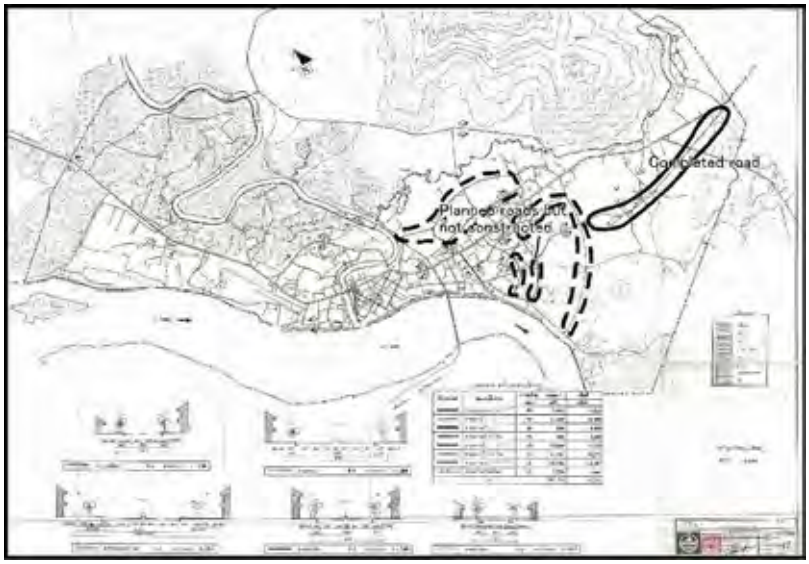
Zoning		Pakse		
		Population (persons)	Area (ha)	Density (persons/ha)
Urban Central Zone	UA	13,154	247	53
Urban Inner Zone	UB	12,450	464	27
Urban Suburbs Zone	UC	15,478	1,501	10
Agriculture	NA	1,105	255	4
Green Space, Protected Area	NC	19,186	3,577	5
Public Area	A	228	97	2
Industrial	I	0	0	0
Total		61,601	6,141	10.0

Source: Pakse Master Plan 2001

(d) Road Network

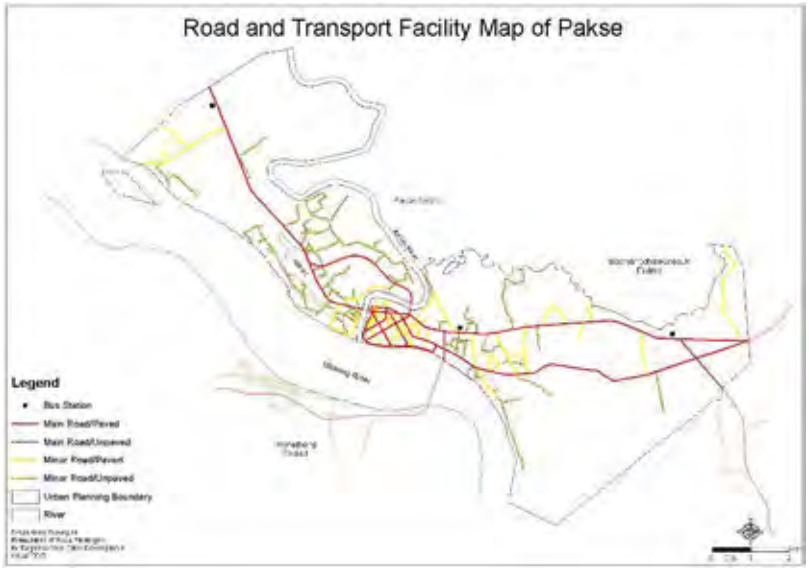
Two figures (Figure 1.13 and Figure 1.14) show the planned and current road networks in Pakse. Although the Master Plan prepared semi-circular road network around the existing urban core, it did not work properly. Instead, the bypass extension was completed and the new urban development appeared along the bypass.

Consequently, two roads, namely NR23 and bypass, were developed. However, the area between the roads is left vacant because the road density is not enough.



Source: Pakse Master Plan 2001

Figure 1.13 Population Density by Designated Land Use Classification in Pakse



Source: Pakse Master Plan 2001

Figure 1.14 Current Road Network in Pakse

Table 1.15 List of Planned Road and Current Situation in Pakse

Classification	Width (m)	Length (m)	Area(sq m)	Planned (m)	Completed (m)
National	50	8.964			
Arterial	30	10600	318,000	800	
Main	20	840	16,800	41,780	3,200(?)
Collecter	15	31820	477,300	2,350	
Distribution	12	10156	121,872	7,220	

Source: Master Plan Drawing (except "Completed")

A-2 Kaysone Phomvihane

2.1 Population

Table 2.1 indicates district population in Savannakhet Province. Savannakhet Province occupies 14.6 to 14.7% of national population, and is the most-populous province in Lao PDR. Population growth rates recorded 2.1% from 1995 to 2005 and 1.9% from 2005 to 2007. The growth rate from 1995 to 2005 is the same level as national population growth rate but the growth rate from 2005 to 2007 is two percentage points lower than national growth rate.

Table 2.1 Change of District Population in Savannakhet Province

	Population			Percentage Share (%)		
	1995	2005	2007	1995	2005	2007
Savannakhet Province	671,758	825,902	857,581	14.7	14.7	14.6
Kayson Phomvihane	124,896	112,915	115,852	18.6	13.7	13.5
Outthoumphon	69,025	80,516	83,151	10.3	9.7	9.7
Atsaphanghtong	48,743	39,102	40,237	7.3	4.7	4.7
Phin	40,994	50,784	53,276	6.1	6.1	6.2
Sepon	35,731	43,046	44,745	5.3	5.2	5.2
Nong	16,723	21,106	22,157	2.5	2.6	2.6
Thapangthong	24,011	31,497	33,037	3.6	3.8	3.9
Songkhon	81,864	82,461	87,944	12.2	10.0	10.3
Champhon	86,550	101,559	105,774	12.9	12.3	12.3
Xonbouri	34,602	51,472	52,894	5.2	6.2	6.2
Xaibouri	42,936	54,441	55,667	6.4	6.6	6.5
Vilabouri	24,560	30,264	31,822	3.7	3.7	3.7
Atsaphon	41,123	50,448	51,883	6.1	6.1	6.0
Xaiphouthong	-	44,557	46,266	-	5.4	5.4
Phalanxai	-	31,734	32,876	-	3.8	3.8
National Population	4,574,858	5,621,982	5,873,616	-	-	-

Source: Census Report 1995 and 2005, Statistical Yearbook of Savannakhet Province 2008

18.6% of provincial population belonged to Kaysone Phomvihane District in 1995, but the percentage dropped to 13.7% because a part of the district is divided to Xaiphouthong District. The percentage dropped 0.2 percentage points from 2005 to 200; otherwise, percentage share has increased in Phin (along NR3) and Songkhon (along NR13).

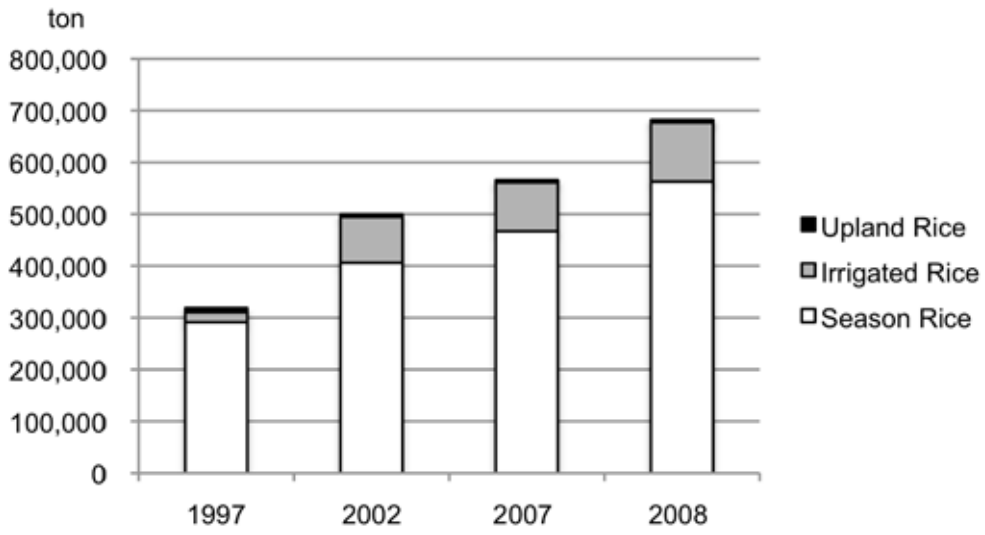
2.2 Economy

2.2.1 Industrial Composition

According to provincial statistics, GRDP of Savannakhet Province was estimated 4,786 billion kip in 2007. It accounted for about 10% of GDP. On the other hand, JST estimated percentage share of GDP was 12% in the same year. And the provincial statistics reported that percentage shares of industries were 48% for the primary industry, 27% for the secondary industry and 25% for the tertiary industry in 2007.

2.2.2 Agriculture

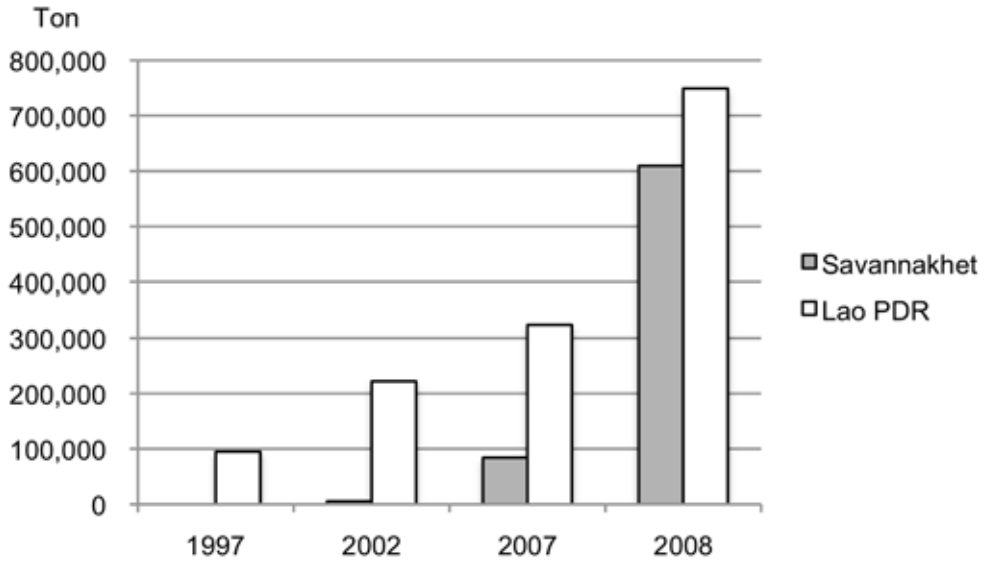
In the primary industry, rice is the most remarkable product in Savannakhet Province. The production occupied about 20% of the national production since 1990s. Since Savannakhet Province has wide flatland all over the province, it has been the first position of rice production. As indicated in Figure 2.1, rice production has increased by twice from 1997 to 2008. However, 80% of the total is season rice which is harvested once a year in rainy season.



Source: Statistical Yearbook 1975-2005 and 2008

Figure 2.1 Change of Rice Production

The other major agricultural product in Savannakhet Province is sugarcane. The production share accounted for 80% of the nation. As indicated in Figure 2.2, the production has increased rapidly due to starting operation of sugar factory along NR13 invested by a Thai company in 2008. The sugar cane production will increase more because the other sugar factory located along NR9 will start operation soon.



Source: Statistical Yearbook 1975-2005 and 2008

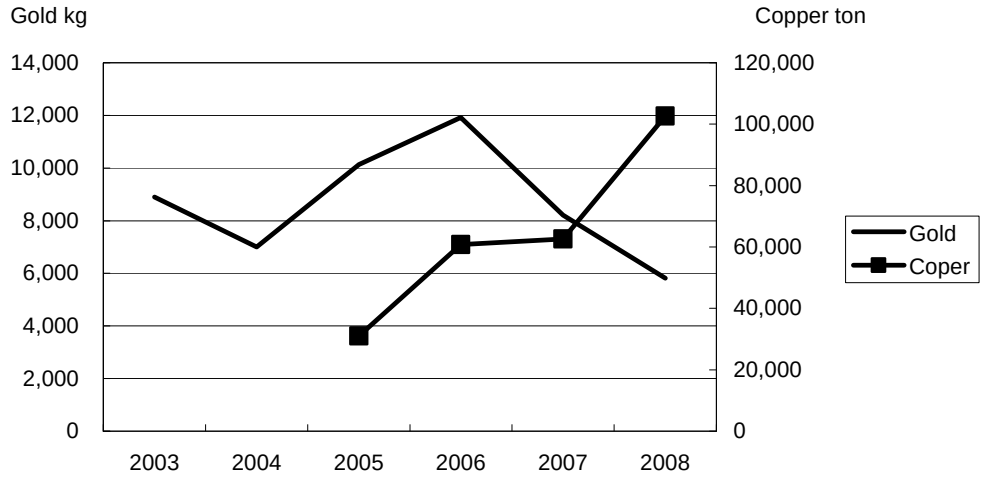
Figure 2.2 Production of Sugarcane

2.2.3 Manufacturing and Mining

The most remarkable activity of the secondary industry is gold and copper mining at Sepon Mine. Gold and copper mining at Sepon has contributed to the recent economic development. Production of gold and copper had started in 2003 and in 2005, respectively. Figure 2.3 indicates production volume

of gold and copper from 2003. Gold production which started to record in the Statistical Yearbook from 2003, recorded between 6 to 12 tons per year. Since estimated deposit amount of gold is 46.7 ton, these mines will continue to produce the same volume of gold for more than 10 years.

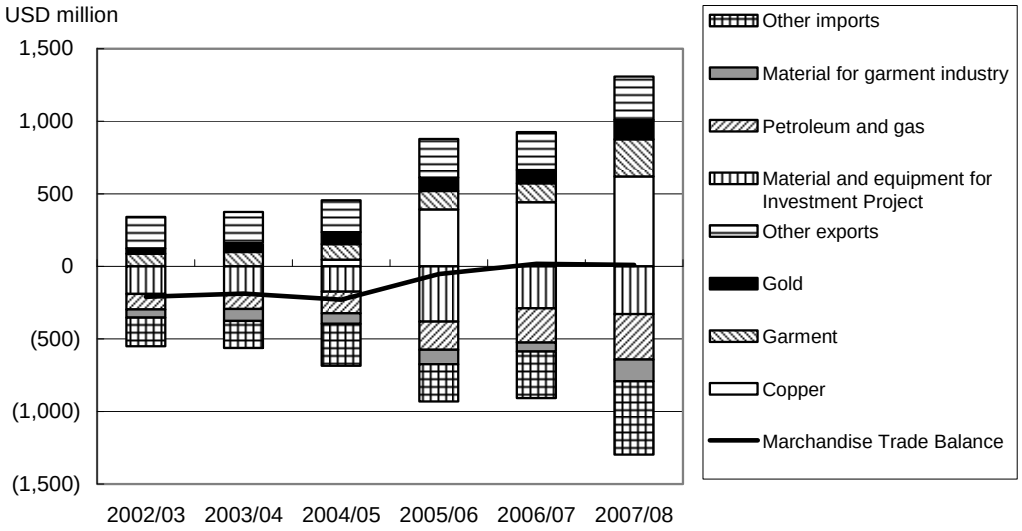
Production of copper at Sepon Mine started in 2005, and the production amount has doubled in 2008 due to starting operation at Phu Bia Mine. As well as gold, copper production in the two mines has been contributing rapid economic growth in recent years. Since deposit amount of copper is 1.7 million ton at Sepon Mine, it will continue produce the same volume of copper for 30 years.



Source: Statistical Yearbook various issues, DoS

Figure 2.3 Production of Gold and Copper

Figure 2.4 illustrates change of merchandise trade in recent years. Lao PDR recorded merchandise trade deficit until FY2005/06 but it turned to surplus since FY2006/07 due to rapid growth of copper export. Copper production in Sepon mine contributes to improvement of trade balance as well as economic growth



Source: Data from Ministry of Industry and Commerce

Figure 2.4 Merchandise Trade and Its Major Items

Comparing to mining industry, development of manufacturing is still limited. Table 2.2 indicates number of business enterprise of the secondary industry in Savannakhet Province. Percentage share of

Small (level 3) and medium (Level 2) scale enterprises occupy 10% of the national total, but the share of large (Level 1) scale enterprise is only five percent. Major industries to which Level 1 and Level 2 enterprises belong are manufacturing of non-metallic mineral products (ISIC 26, 30), manufacturing of fabricated metal products, except machinery & equipment (ISIC 28, 8) and manufacture of food products & beverages (ISIC 15, 7).

Table 2.2 Business Enterprises in Savannakhet Province

	Level 1	Level 2	Level 3
Savannakhet Province	19	48	2,474
Lao PDR	380	467	22,817
Share of Savanakhet (%)	5.0	10.3	10.8

Note: Number of employees are more than 200 for Level 1, 50 to 199 for level 2 and 10 to 49 for Level 3.
Source: Ministry of Information and Commerce

Table 2.3 Foreign Direct Investment in Secondary Industry

	Level 1	Level 2	Level 3
Savannakhet Province	5	5	1
Lao PDR	83	82	80
Share of Savanakhet (%)	6.0	6.1	1.3

Note: Number of employees are more than 200 for Level 1, 50 to 199 for level 2 and 10 to 49 for Level 3.
Source: Ministry of Information and Commerce

Table 2.3 indicates Foreign Direct Investment in the secondary industry in Savannakhet Province. Percentage shares are six percent for large and middle scale (Level 1 and Level 2), and one percent for small scale (Level 3). Major industries are manufactures of wood and of products wood & cork except furniture (ISIC 20, 2) and manufacture of chemical and chemical products (ISIC 24).

2.2.4 Savan-Seno Special Economic Zone

Savan-Seno Special Economic Zone (SEZ) is set by the Decrees of the Prime Minister on Savan-Seno Special Economic Zone (Ref. No. 148/PM, dated 29th September 2003), in order to promote economic development by use of the East-West Economic Corridor (EWEC). According to Savan-Seno SEZ Authority (SEZA), 5km of both sides of NR9 shall be designated as SEZ if investors propose development plan and it is approved. At present, four development sites (Site A, Site B, Site C and Site D) are designated between the Second Friendship Bridge and Seno District by the SEZA. In Kaysone Phomvihane District, Site A, Site C and Site D is included, and these sites are expected to work as centers of economic activities in Kaysone Phomvihane in the future. As of August 2009, development situation of each site was summarized below.

Site A (270 ha): A Thai investor had a concession contract to develop the Site A. The investor is going to develop the Site D to prepare a re-settlement for residents in the Site A at first, and develop the Site A as a commercial activity base. Therefore, any construction works have not started at the Site A yet. The investor prepares a concept of development plan, consisting of duty-free, amusement park, shopping malls, theme parks and medical facility for medical tourism. Investors for duty-free and amusement park are invited but others have not found now. That is why development of Site A would start from the duty-free and the amusement park.

Site C (230 ha): A Malaysian investor had a concession agreement to develop Site C. Site C will be fully developed for industrial purpose. The Malaysian investor is going to do phased development, phase 1 (50 ha), phase 2 (70 ha), phase 3 (60 ha) and phase 4 (50 ha). Land development of phase 1 has already started, and minutes of understanding to start a study for water supply service will be agreed between SEZA and a private company. According to SEZA, some private companies have already decided to enter the Site C.

Site D (120 ha): In Site D, settlement area for sale, international bus terminals, collages (agricultural collage and business & accounting collage), and market will be developed as well as re-settlement area for residents in the Site A. Construction of 60 houses at re-settlement area has already started.

Figure 2.5, Figure 2.6 and Figure 2.6 illustrate site development plan of Site A, C and D.

Site Development Plan: Site C

Source: Concessionaire of Site A and D

Figure 2.5 Site Development Plan: Site A

Source: Concessionaire of Site C

Figure 2.6 Site Development Plan: Site C

Source: Concessionaire of Site A and D

Figure 2.7 Site Development Plan: Site D

2.2.5 Service Industry

After the completion of the Second Friendship Bridge in December 2006, many Thai tourists visit tourist sites (Hue and Danang) of Vietnam though NR9. As indicated in Table 2.4, number of tourist has jumped up after 2006. However, Kaysone Phomvihane District and Savannakhet Province have not developed enough as a tourist destination.

The other commercial activity is wholesale and retail trade. Kaysone Phomvihane works as a center of such commercial activities, and provide commercial service to all over area of the province.

Table 2.4 Major Tourism Statistics of Savannakhet Province in Recent Years

	Unit	2005	2006	2007	2008
Number of Hotels	Units	10	10	13	15
Number of Hotel Rooms	Rooms	380	372	487	1,249
Number of Guesthouse	Units	55	62	68	84
Number of Guesthouse Rooms	Rooms	667	914	1,060	1,508
Number of tourists	Persons	192,560	192,437	323,700	420,809

Source: Statistical Yearbook Savannakhet 2008

2.2.6 Public Finance

Table 2.5 indicates PIP in Savannakhet Province in 2006/07 and 2007/08. Total investment amounts had jumped from 48 billion kip in 2006/07 to 65 billion kip in 2007/08. Foreign financial source (grant aid and loan) is covered only agriculture, public works transport, education and public health, and other areas are covered by domestics financial source. However, two third of the total PIP was financed by foreign financial recourse in both of 2006/07 and 2007/08.

Table 2.5 Public Investment Program in Savannakhet Province

Unit Million kip

	2006/07			2007/08		
	Domestic	Foreign	Total	Domestic	Foreign	Total
Agriculture	1,575.2	19,612.2	21,187.4	2,697.1	6,000.0	8,697.1
Industry	1,312.1	0.0	1,312.1	3,104.8	0.0	3,104.8
Public Works and Transport	3,790.5	5,331.8	9,122.3	3,022.5	9,791.9	12,814.4
Education	2,400.6	3,986.5	6,387.1	2,726.5	8,727.1	11,453.6
Public Health	342.1	2,528.6	2,870.7	1,239.3	19,477.5	20,716.8
Culture	1,010.0	0.0	1,010.0	530.0	0.0	530.0
Social Welfare	0.0	0.0	0.0	200.0	0.0	200.0
Dwelling	5,559.9	0.0	5,559.9	6,364.1	0.0	6,364.1
Trade & tourism	10.0	0.0	10.0	415.7	0.0	415.7
Sports	1,000.0	0.0	1,000.0	700.0	0.0	700.0
	17,000.5	31,459.1	48,459.5	21,000.0	43,996.5	64,996.5

Source: Statistical Yearbook Savannakhet Province 2008

2.3 Land use, Settlement Pattern and Population Density

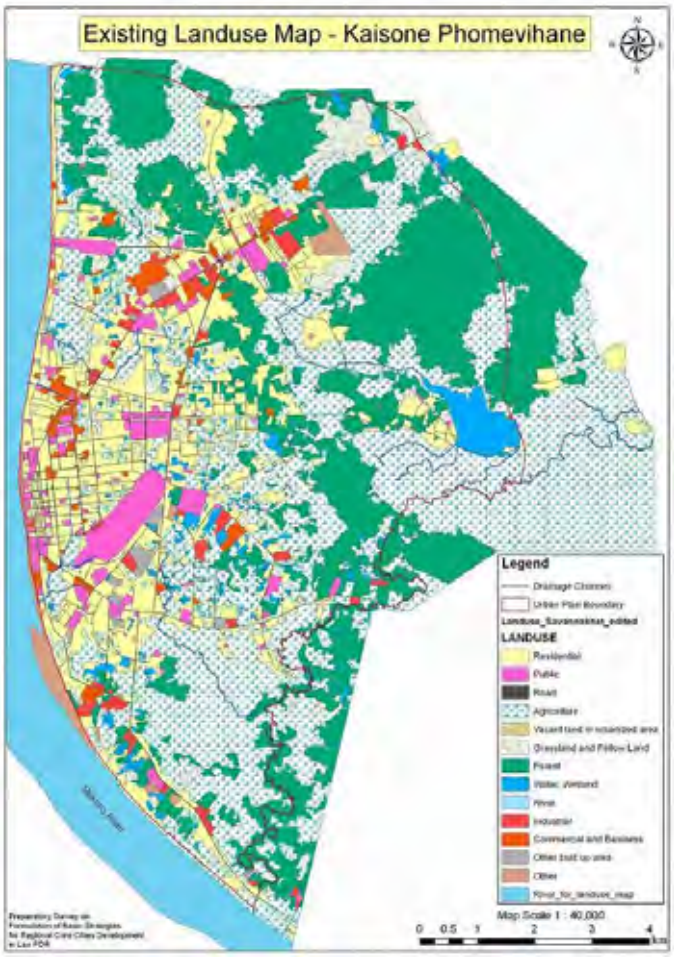
2.3.1 Current Land Use

The current land use map at scale of 1:10,000, was prepared by interpretation of the IKONOS satellite image data (dated on 2009/01/29) and confirmation by ground truth survey which was conducted from 20th April to 1 May 2009.

Figure 2.8 shows the existing land use in Kaysone Phomvihane. The town started from the area facing with the Mekong River and the settlement expanded to east and north. Residents prefer the old quarters and roadside area. Because the suitable land is relatively large, the people do not live densely. In addition, the urban function is not clearly separated and most, or all, area except SEZ is mixed use of residential and commercial.

Consequently, the centricity is vague and low-density land use is widely spread. Most of the area is flat and is free from flooding risk. After the opening of the Mekong International Bridge, the land development along NR9 has been accelerated.

Most of the residential buildings are independent houses and there are few apartment complexes.



Source: GIS by JST

Figure 2.8 Current Land Use

Table 2.6 Existing Land Use Table Kaysone Phomevihane

	Area (ha)	Share *1	Share *2
Residential	1,695	20.7 %	64.4 %
Commercial and Business	162	2.0 %	6.2 %
Industrial	141	1.7 %	5.4 %
Public Facility	358	4.4 %	13.6 %
Road	143	1.7 %	5.4 %
Others	133	1.6 %	1.6 %
(Built-up area)	(2,632)	(32.1 %)	100 %
Agriculture	2,792	34.1 %	
Forest	2,155	26.3 %	
Grassland, Abandonment and Fallow Land	337	4.1 %	
River and Water Surface	279	3.4 %	
Total	8,197	100 %	

Note: *1 percentage in the total area, and *2 percentage in the built-up area
Source: JST

(1) Mixed Use and Vague Centricity

The dominant land use in the urbanized area is residential (around 64 % of the urbanized area) in general. However, many of the ordinal commercial buildings, such as shops and restaurants and small-scale industry buildings have residential space in the upper floors. There is no single land use, like sole

residential area, the most of the urbanized area is mixed use in general. There is also mixed land use policy in the current master plan. The current land use zoning types in the urbanized area are UA (Urban central zone), UB (Urban inner zone), UC (Urban suburbs zone), UD (Future development), I (Industrial) and ZPP (Historical and preservation). There is regulation for land use zone, which specifies allowable land use (allowable types of building function) in above each land use zone.

(2) Urban Sprawl

The built-up area is continuously spread, mainly along NR9 at the north including SEZ Sites, along Fangum Road at the east and along the Mekong River at the south. Although those areas were designated as non-built-up area including protected forest and agriculture areas.

(3) Land Evaluation

In order to determine the land suitable for development, this section evaluates the land condition of Kaysone Phomvihane. Four criteria have been selected and the grading is defined in Table 2.7.

Based on the criteria, the land is evaluated for development suitability. These figures indicate that Kaysone Phomvihane has large areas suitable for development especially in the east side of the current urban area. In addition, the town also has suitable area along NR9. Riverside area is low and unsuitable for development.

Table 2.7 Four Criteria to Evaluate Land Suitability

Not preferable ⟷ Preferable

A Elevation (40point)

Equal or Less than Flood Level	-3	0	12	More
Elevation in Kaysone Phomvihane	135.02	138.02	150.02	
Point	0	10	30	40

Flood Level by MRC
138.02

B Slope (40 Point)

Degree (Equal or less than)	15+	15	12	8	3
Point	0	10	20	30	40

C Current Land Use (20points)

Land Use	Forest	"Paddy Field/ agricultural"	Others
Point	5	15	20

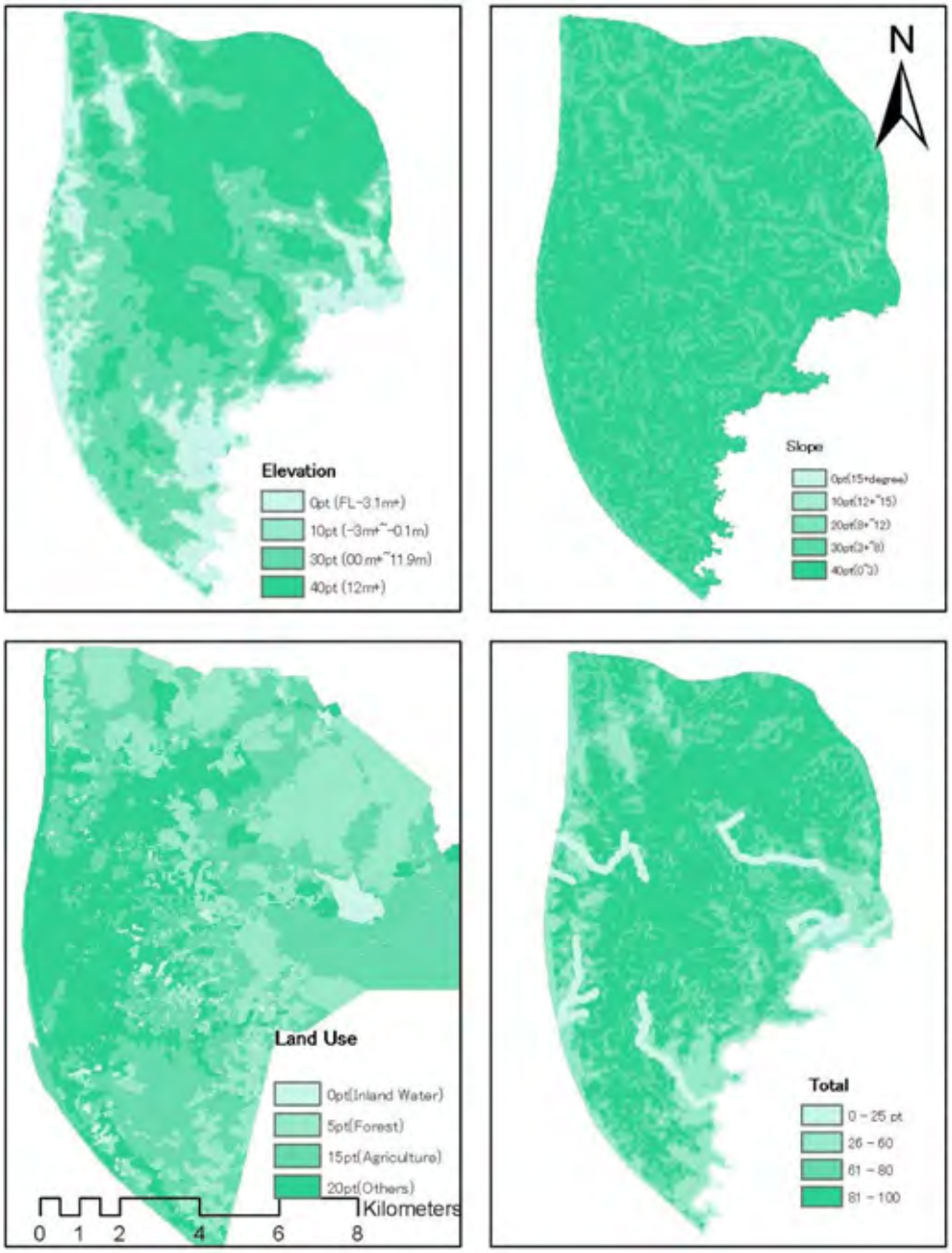
D

Protection Area		
	Yes	No
100 m to drainage	0	1
Legally Protected forest	0	1

Total Point = (A+B+C) x D

Note: Flood level of the Mekong is defined by the Mekong River Commission (MRC). "Flood level" corresponds with the highest level of flood in year 2000.

Source: JST

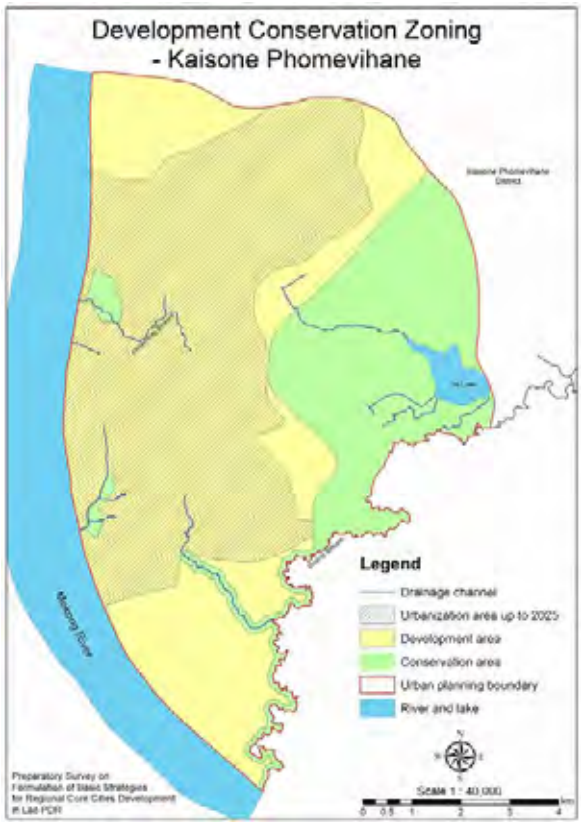


Source: JST

Figure 2.9 Land Suitability Evaluation for Kaysone Phomvihane

(4) Zoning of Developable Land and Conservation Area

Based on the land evaluation in the previous section, developable land and conservation area was classified as Figure 2.9. Eastern side of the city covered with forest is set for preservation area. In addition to that, JST selected suitable area as the "Urbanization Area up to 2025", where urban development activities are permitted until 2025.



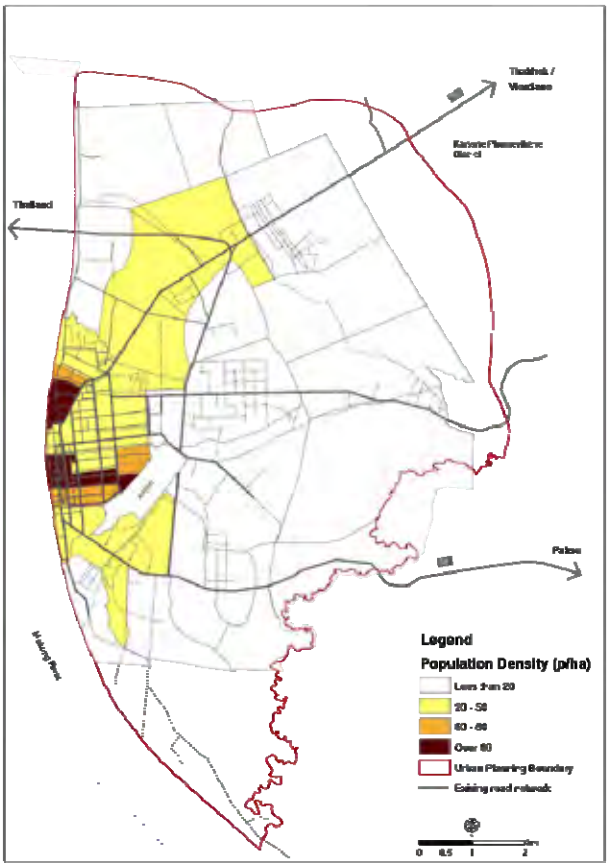
Source: JST

Figure 2.10 Zoning of Developable Land and Conservation Area

2.3.2 Population Density

Population density at village level in 2005 is shown in Figure 2.11. The area which has rather high population density of over 80 persons per hector exists along the Mekong River. This area had been developed very early stage and is very important historically. Many old buildings mainly for residence and public still exist in this area. Population density at surrounding area of the old urban area has low density of from 20 to 80 persons per hector. Remaining area is mostly agriculture land and forest and has population density of less than 20 persons per hector.

An urban area expands to north along NR9. However, population density of an area along NR9 is still low. Average population density within the planning boundary is 11.0 persons per hectare.



Source: JST

Figure 2.11 Population Density by Village in Kaysone Phomvihane

2.4 Infrastructure

This section discusses existing condition of infrastructure such as road, public transport, transport facilities, water supply, sewer and sewerage treatment facility, drainage and flood mitigation, solid waste management in Kaysone Phomvihane are mentioned in here.

2.4.1 Road

According to an existing land use survey conducted at May 2009, the total length and area of roads in the planning area is about 190km. It contains 55km length of paved and 10.5km unpaved main road, and 46.6km paved and 77.4km unpaved minor road. It includes 2.8km length of an access road with two (2) roadways and sidewalks, which had been constructed by Japanese Aid in year 2006 between an intersection located on NR9 and the Friendship Bridge 2.

Some roads and facilities related to road in an urbanized area of Kaysone Phomvihane had been improved and newly constructed by at assistance of ADB implemented from 1997 to 2003. Followings had been implemented;

- Improvement of about 5km length of town roads (minor road with 7m - 12m width);
- Construction of about 630m of town roads;
- Improvement of a intersection;
- Installation of about 220 pieces of traffic signs and one set of traffic signals; and

- Installation of street lighting at 13.3km section of road in an urbanized area;

Though several main roads with 15 to 20m width which form blocks had been newly planned in the urban master plan of year 1997, no road had been constructed except an access road to the Friendship Bridge II.

Roads in an urbanized area, especially the area where old buildings constructed during the French colonial period remain and its surrounding area, run parallel to the Mekong River at intervals of 50m to 150m and perpendicular to the River at intervals of 100m to 200m. These roads form blocks of this area.

Pavement condition of main roads in the planning area is rather good. 84% of the main road has been paved. However, pavement condition of minor roads is not so good. 65% of a minor road has not been paved yet. Holes, cracks and peering off of pavement are found on many minor roads.

Most of roads have a sidewalk at one or both side of a road. However, less streetlight at a roadside have been provided except main roads. Therefore, it is inconvenient and very danger to walk on a street at night, especially roads in residential area.

Table 2.8 Present Road Condition in planning Area of Kaysone Phomvihane

Classification	Surface	Length (km)	%	Remarks
Main Road	Paved	55.10	83.9	Include 2.9km of an access road
	Unpaved	10.54	16.1	
	Sub-total	65.64	100.0	
Minor Road	Paved	46.59	35.6	Include 5km of ADB project
	Unpaved	77.39	64.6	
	Sub-total	123.98	100.0	
Total		189.62		

Source: Existing land use survey conducted by JST in May, 2009

Source: Source: An existing land use survey conducted by JST in May 2009

Figure 2.40 Present Road Nettork and Transport Facilities in Kaysone Phomvihane

Table 2.9 shows number of vehicles registered in Savannakhet Province. Total number of vehicles registered in year 2006 was about 122,000. Number and ratio of motor bicycle and car was around 105,700,86.8% and around 14,200,11.7%r respectively. However, number of vehicles registered in year 2007 drastically decreased to about 95,300. No clear reason of sharp decrease was got from DPWT of Savannakhet. Even though motor bicycle was dominant among registered vehicles and percentage of motor bicycle was about 90%. Registered number of vehicles increased to about 111,000 in year 2008. The biggest number of vehicles registered was 98,400 of motor bicycle.

Table 2.9 Number of Vehicle registered in Savannakhet Province

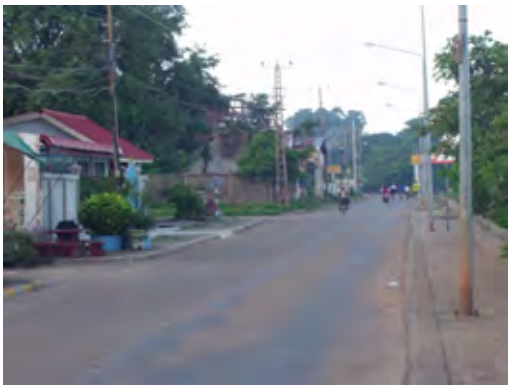
Year	Motor bicycle	Car	Truck/Bus	Total
2006	105,736 (86.8%)	14,200 (11.7%)	1,837 (1.5%)	121,773 (100%)
2007	84,860 (89.0%)	8,596 (9.0%)	1,871 (2.0%)	95,327 (100%)
2008	98,364 (88.7%)	10,429 (9.4%)	2,155 (1.9%)	110,948 (100%)

Source: DPWT Savannakhet

Around 1,800m section of southern part of a road running an old town area along the Mekong River had been improved by assistance of ADB. It included widening of a road (2 lanes 2 direction), construction of a wide sidewalk, installation of lighting poles, and tree plantation. It also included construction of some observation places and installation of benches at the Mekong River side of a road

for recreation and rest for citizens.

About 600m long of remaining part of this road has not been improved yet. Width of the road is narrow (two lanes both direction), and a sidewalk is also very narrow. Present lighting poles at a sidewalk are obstacle for smooth walking because of a narrow width of a sidewalk.



Road along Mekong River - not yet developed

Road along Mekong River - developed

Source: JST

Figure 2.12 Situation of Roads along Mekong River

2.4.2 Public Transport

There is no public transportation service such as a bus on a regular route in Kaysone Phomvihane. Tuk-Tuks and Sonteos, which are operated by individuals and families, are main mass transportation means for people.

2.4.3 Transport facilities

(1) Airport

An airport with a 1,650m long runway is located at the southern part of Kaysone Phomvihane, near an administration center of Savannakhet Province and the Mekong River, surrounded by residential area. Area of the airport is about 104ha.

One international regular flight between Bangkok, Thailand and Savannakhet Airport is operated at three times in a week. Two domestic flight routes exist at this airport. One route is to connect Vientiane and Kaysone Phomvihane and the other is to connect Pakse and Kaysone Phomvihane. One flight is operated three times in a week regularly at each route.

Terminal building with car parking had constructed in 2003 by ADB's support.

Table 2.10 Flight Schedule at Savannakhet Airport

	Country	City	No. of operating day a week	No. of flight a day (to/from)
International	Thailand	Bangkok	3 days	1 flight
Domestic	Laos	Vientiane	3 days	1 flight
		Pakse	3 days	1 flight

Source: Lao Airlines Summer Schedule 2009 from 29 Mar. to 24 Oct 09

Flight shedule

Terminal building

Source: JST

Figure 2.13 Savannakhet Airport in Kaysone Phomvihane

(2) River Port

There had been a cargo ferry port and a passenger port along the Mekong River in Kaysone Phomvihane. Ferryboats connecting Mukdahan, Thailand and Kaysone Phomvihane had been operated. Operation of ferryboats for cargo had been abolished after completion of the friendship bridge II over the Mekong River at the end of year 2006.

At the present, a ferry port with immigration and custom in a terminal building is located at the south of the old buildings area, and only passenger ferry boats are being operated five times a day between a downtown of Mukdahan and Kaysone Phomvihane. Many Lao people who have a border pass to cross the Thai border to get household goods every day.

Vehicles waiting for a ferryboat – year 2006

Friendship Bridge II – year 2009

Passenger Ferry Boats

A Ferry Terminal Building

Source: JST

Figure 2.14 River Port in Kaysone Phomvihane

(3) Bus Station

An international and inter-city bus terminal is located at north of the downtown of Kaysone Phomvihane, near an intersection.

International buses from Kaysone Phomvihane bus station go to Mukdaham, Thailand and Daen Savan, Dong Ha, Hue, Danang and Hanoi, Vietnam. A bus connecting Mukdaham and Kaysone Phomvihane is being operated 12 times a day through the Friendship II like a shuttle bus. There are 3 bus routes between Kaysone Phomvihane and Vietnam. A bus between the bus station and Laobao, a border town of Vietnam, is being operated 3 times a day. A bus going to/from Danang through Dong Ha, Hue in the central region of Vietnam is being operated once a day through Daen Savan – Laobao, a border of Lao PDR and Vietnam, on NR9. Another is route connecting Kaysone Phomvihane and Hanoi, a capital of Vietnam located at northern part of the country. A bus is being operated once a day on this route.

There are two routes of regular inter-city bus service at the bus station. One is to/from Vientiane through Thakek. 7 buses including one VIP bus are operating a day. The other is to/from Pakse located at the southern region and one of core cities in Lao PDR. A bus is being operated twice a day.

Table 2.11 International/Inter City Bus Schedule at Kaysone Phomvihane

	Country	City	No. of Bus Operation a day	Remark and Border Point
International	Thailand	Mukdaharn	12	Friendship Bri. II
	Vietnam	Laobao	3	Daen Savan – Laobao
		Dong Ha, Hue and Danang	1	
		Hanoi	1	
Domestic	Laos	Vientiane	7	Include 1 VIP bus
		Pakse	2	

Source: Lao Airlines Summer Schedule 2009 from 29 Mar. to 24 Oct 09

2.4.4 Water Supply

(1) Nam Papa Savannakhet (State-Owned Water Supply Enterprise) in Kaysone Phomvihane

Nam Papa Savannakhet (Nam Papa Savannakhet) is a state-owned water supply enterprise and one of seventeen (17) state-owned enterprises in Lao PDR. Nam Papa Savannakhet supplies water to the served areas, around 1340 ha, in the Kaysone Phomvihane district. The number of employees are 124 as of 2009, 78 of which are permanent staff and 46 of which are temporary staff like assistant worker or labor, respectively.

(2) Existing Water Supply Facilities of Nam Papa Savannakhet in Kaysone Phomvihane District

Construction of water supply facilities of the state-owned enterprise in the Kaysone Phomvihane district had started in 1974 and completed in 1977 by a French financial assistance and a new water supply organization with a water treatment plant capacity of 15,000m^3/day and a total length of transmission main and distribution pipe of 54 km was established. However after 20 years operation, water supply facilities have been deteriorated and an amount of daily water production became 12,000 m^3/day from 15,000 m^3/day due to under financial difficulties.

Under above condition, the Government of Lao PDR requested to the Government of Japan in order to rehabilitate the water intake and the water treatment plant facilities. Thereafter, these water supply facilities were completely rehabilitated by the Japan's Grant Aid in 2003 and water treatment plant capacity returned to the original capacity, 15,000 m^3/day.

Figure 2.15 Existing Water Treatment Plant and Existing Elevated Water Tank

Table 2.12 Existing Nam Papa SAVANNAKHET Water Supply Facilities

Name of Facility	Detailed Item	Description
Water Intake	Intake Pumps	H 23.5m x Q 330m^3/h x 37 kW x 3 sets (1 set is stand-by); Submersible pump
	Raw Water Conduit Pipe	450 mm
	New Raw Water Flow Meter Chamber	400 mm; Ultra-super sonic type
	New Raw Water Flow Control Valve Chamber	400 mm; Vertical butterfly valve
WTP (Water Treatment Plant)	Mixing and Flocculation	Two trains; capacity of 7500 m^3/day/train x 2 trains = 15,000 m^3/day (Daily maximum)
	Sedimentation Basin	Ditto
	Rapid Sand Filter	Ditto
	Existing Backwash reservoir	V = 1,000 m^3
	New Clear water reservoir	V = 1,500 m^3
Electrical Facility	High Voltage Power Receiving Facility	Capacity; 550 kVA, (Outdoor Type) Voltage; 22kV/380V, 3-Phase
	Power Control Panels	
Pumping Station	Distribution Pumps	H45m x Q6.0 m^3/min x 75 kW x 3 sets; Single suction volute pump;
	Instrumentation equipment for distribution system	Flow meter;
Reservoir	Elevated Water Tank	V = 500 m^3
	New Elevated Water Tank	V = 500 m^3 (Constructed in 2008)
Water Supply Pipeline	Transmission and Distribution pipe	Pipe size; 40 mm – 500 mm Total Length =104,850 m

Source: JST

The following table shows the current existing facilities of Nam Papa Savannakhet and existing water supply system and served area in Kaysone Phomvihane is shown in Figure 2.16. Figure 2.15 shows the existing water treatment plant and elevated water tank.

Source: JST

Figure 2.16 Existing Water Supply System in Kaysone Phomvihane (Nam Papa Savannnakhet)

(3) Numbers of Population, House Connection (Water Meter) and Served Population in Kaysone Phomvihane District

Numbers of population, house connection and served population in the Kaysone Phomvihane district from 2004 to 2008 is shown in the following table;

Table 2.13 Numbers of Population, House Connection and Served Population

Item	Unit	2004	2005	2006	2007	2008
Population in District	person	107,664	110,356	113,114	115,852	118,748
Population in Served Area	person	66,620	68,619	70,677	72,797	74,981
Served Area	ha	1,340	1,340	1,340	1,340	1,340
Number of House Connection (Water Meter)	unit	10,207	10,470	10,766	11,093	11,426
Served Population	person	64,304	65,961	67,826	69,886	71,984
Rate of Served population in District	%	60	60	60	63	61
Rate of Served population in Served Area	%	96.5	96.1	96.0	96.0	96.0

Note: All numbers of population are estimated values by Nam Papa Savannakhet
Source: Nan Papa Savannakhet

(4) Current Water Productions, Water Consumption and Non Revenue Water

Current water productions, water consumption for domestic and non-domestic and non-revenue water (water leakage) from 2004 to 2008 are shown in Table 2.14.

Table 2.14 Current Water Production, Water Consumption and Non Revenue water

Item	Unit	2004	2005	2006	2007	2008
Average Daily Water Production	m³/day	15,443	15,873	14,999	15,166	15,719
Maximum Daily Water Production	m³/day	17,760	19,635	16,738	17,586	18,988
Rate of Loading	%	87	81	90	86	83
Average Daily Water Consumption	m³/day	12,752	12,856	12,518	13,468	13,256
Domestic Water Consumption	m³/day	-	-	9,500	10,085	10,860
Non-Domestic Water Consumption	m³/day	-	-	3,018	3,383	2,396
Rate of Non Revenue water	%	28	19	17	11	16

Source: Nan Papa Savannakhet

(5) Unit Water Consumption (Daily Per Capita Consumption) in Nam Papa Savannakhet

Unit water consumption (litter/cap/day) can be estimated by water consumption divided by served population. The following table shows annual water consumption since 2004.

Table 2.15 Unit Water Consumption

No	Item	Unit	2004	2005	2006	2007	2008
1	Water Consumption	m³/day	12,752	12,856	12,518	13,468	13,256
2	Domestic Consumption	m³/day	-	-	9,500	10,085	10,860
3	Served Population	person	64,304	65,961	67,826	69,886	71,984
4	Unit Water Consumption (= 1/3)	litter/cap/day	198	195	185	193	184
5	Domestic Unit Water Consumption (= 2/3)	litter/cap/day	-	-	140	144	151

Source: Lao PDR Annual Urban Water Sector Performance Report 2007

(6) Financial Condition of Nam Papa Savannakhet

The sales revenue of the Nam Papa Savannakhet comes from water sales, new connections fee and rental fees of water meters. The total expenditure of the Nam Papa Savannakhet consists of the salary, repairing cost, connection fees, electricity expense and so on. Profit and loss statement and key indicators for three years, year of 2005, 2006, and 2007 is shown in Table 2.16.

Table 2.16 Financial Condition of Nam Papa Savannakhet

Unit: billion kip (USD000)

	2005	2006	2007
Sales Revenue (Turnover)	5.02 (591)	7.19 (846)	7.85 (923)
Expenditure (Operating Cost)	4.36 (513)	5.04 (593)	5.72 (673)
Net Income	0.66 (78)	2.15 (253)	2.12 (249)
Depreciation	-5.78 (-680)	-7.91 (-930)	-8.08 (-950)
Return on Capital	-4.2 %	-3.7%	-4.1%

Note: Exchange rate is US$ 1.0 = Kip 8,500
Source: Lao PDR Annual Urban Water Sector Performance Report 2007

Based on the above table net income for three years was surplus, however, return on capital had not been good condition compared with another state-owned water supply enterprise.

(7) Water Supply Plan by Private Sector

The provincial water supply company had minutes of understanding (MOU) with a private investor on 23rd July. According to the MOU, the private investor will conduct a feasibility study to provide water service in three months. The private company intends to formulate a joint venture with the provincial water supply company, and provide the water service to the both of urban area and SEZ sites.

2.4.5 Sewer and Sewerage Treatment Facility

(1) General Condition

The current sewerage treatment system provided in the urban and rural area in Kaysone Phomvihane is the same as normally used in Lao PDR, which is individual treatment in each household or building by using pour-flush or dry latrines and septic tank for black water disposal and soak pits for grey water disposal and overflow to the drainage system nearby. According to the statistics in year 2005, approx. 71.3% of households in Kaysone Phomvihane area have access to proper toilets facilities and increasing to 72.5% for the year 2007 according to Table 2.17. Some households still have no wastewater treatment system at all. Wastewater from other usage such as shower, laundry, food preparation, etc. is mostly directly discharge to the storm water drainage system without any treatment. No grease trap is installed to pretreatment of grease and oil from cooking activity. Small scale industries especially the cottage industry normally discharge the sewerage directly to the drainage system with some simple treatment such as storage tank only. Due to the inefficient installation of the effluent pipe from septic tank, leaked sewer polluting the soil and ground water.

Table 2.17 Information on Types of Toilet in Kaysone Phomvihane in Year 2005 and 2007

District Name Kaysone Phomvihane	Total Household	Type of Toilet					
		Modern	Normal	Dry	Other	None	Total with toilet
Year 2005							
Number	18,467	388	12,022	702	55	5,300	13,167
Percentage		2.1	65.1	3.8	0.3	28.7	71.3
Year 2007							
Number	18,607	879	11,076	1,065	461	5,126	13,481
Percentage		4.7	59.5	5.7	2.5	27.5	72.5

Source: Environmental Monitor Lao PDR 2005, World Bank and STEA & 2007 Statistical Yearbook Savannakhet

From the ADB Assistance through the Secondary Towns Urban Development Project from year 2000 – 2003, there was a sanitation component to provide for improvements in environmental sanitation by replacing all dry pit latrines with pour/flush-type toilets with septic tanks, and replacing poorly designed septic tanks with some numbers of new septic tanks were installed within the project fund. Public campaigns and workshops were also conducted to convince communities in the need to improve the environment through installation of septic tanks. Sanitary Regulation was introduced to the communities with some improvement in public awareness from the ADB Project.

Sewerage in Kaysone Phomvihane area is generated not only from household but also from some commercial developments especially market in urban area. There is one large market, Talat Savanxay, 100 meters to the east of the bus station recently constructed inside the new urban area where all kinds of goods can be purchased. At the same time, this market also generates high volume of wastewater from its activities. Drainage channels around the market are filled with wastewater mixed with rainwater and is discharged directly to the Mekong River.

(2) Current Sewerage Quantity

The number of population in Kaysone Phomvihane District in year 2007-2008 is 115,852 persons in which approximately 14,000 m^3./day of wastewater or sewerage is generated and drained to the public source every day with less than half of them were treated and reduced the pollution load by the current on-site treatment system. The quantity of sewerage will increase upon the increasing of the population and activity inside the urban area; higher pollution load will be dumped to the Mekong River every year.

(3) Responsible Agency

UDAA is the authority which takes care of the building permission process for the building less than

200m^3 area, which includes the type and detail of sewerage treatment to be provided, the permission for the larger building will be controlled by DPWT. Inspection and monitoring in proper construction is also in the responsibility of UDAA and DPWT.

2.4.6 Drainage and Flood Mitigation

(1) General Condition

Kaysone Phomvihane District is mostly flat area with long boundary attached to the Mekong River opposite of Mukdahan Province in Thailand. Crowded community is along the Mekong River and most of the storm water drains via open and covered channel or storm water pipe with manholes along the roads to the natural canal inside the district prior to drain to the Mekong River at the end point. Rainy season in the area starts from May to September in which heavy rain is between July and August with average rainfall 1,500 mm/year. Flood sometimes occurs in the old town area due to high level of the Mekong River and the canal inside the city cannot drain out by gravity, resulting in 2-3 days flooding in low land area along the old market.

(2) Current Drainage Network and Flood Mitigation Component

The drainage system in the urban area consists of roadside drains leading ultimately to natural streams and rivers with final discharge to the Mekong River. The drainage network and flood mitigation system in Kaysone Phomvihane was improved in year 2000 - 2003 from the ADB Assistance under the Secondary Towns Urban Development Project where Savannakhet was one of the five towns in the project. The primary, secondary and tertiary drainage channels in the town area were improved and added with flap gates installation at the outfall to the Mekong River as part of the improvement. Currently there are 3 large discharging points from the inside natural canals to the Mekong River, only 2 locations were provided with flap gates at the discharging points to prevent water from the Mekong River to flow back to the urban area from the ADB Secondary Towns Development Project, but no drainage pump was installed. The gates themselves have not been used or operated since installed due to some mechanical problem. Therefore, during heavy rain and high water level of the Mekong River, flood still occurs.

(3) Responsible Agency

DPWT and UDAA are the authorities which are responsible in drainage and flood mitigation system. The drainage channel is included in the road construction where new or improvement of road is planned. The calculation of drainage capacity is based on 10-year rainfall intensity record.

2.4.7 Solid Waste Management

Urban Development Administration Authority (UDAA) of Kaysone Phomvihane district is responsible for solid waste management at the area within the jurisdiction of UDAA. Management contains collection, haulage and dumping of solid waste. Collection of fee for disposal of solid waste from each household and maintenance of equipments and a landfill site are also included in UDAA's management.

Number of household within jurisdiction of UDAA in year 05-06 and 06-07 was 5,692 and 10,434 respectively. Number of household contracted with UDAA for solid waste collection also increased from 3,883 in year 05-06 to 4,178 in year 06-07. It is because jurisdiction area of UDAA had been extended. However, garbage collection ratio was down from 68% to 40%. It is because of limited staff, equipment and budget, no proper access road to solid waste collection point, and less awareness of inhabitants on solid waste collection. Average volume of solid waste discharged from each household per day was 3.4kg in year 05-06 and 3.3kg in year 06-07 respectively. Average volume of solid waste discharged per person per day was about 500g.

About 11,000kip per month is collected from each household as the solid waste management fee. Hotels, restaurants and other business firms carry their solid waste directly in a landfill site by

themselves. Total of fee collected for solid waste management in year 05-06 and 06-07 was 497.5mill. kip and 473.3mill kip respectively. Total expenditure for the management was 479.5mill. kip in year 05-06 and 480.5mill. kip in year 06-07 respectively.

A solid waste dumping site with surrounded by fencing had been constructed as a sanitary landfill site by assistance of UNDP/NORAD in year 2002. It has a management building and a car washing place within a site. However, no leachate retention ponds and a weighbridge had been provided at the site. Location of the site is at the southeast of an urbanized area of Kaysone Phomvihane, along NR9A, outside a planning area of the urban master plan. Solid waste carried into the site is dumped into a hole and spread out by a backhoe. Solid waste is not covered by soil or clay until a hole is full.

There are one compactor truck and two dump trucks (4t) for collection and haulage of solid waste. Moreover, one dump truck and a backhoe are at the site. However, condition of these vehicles is not so good.

Table 2.18 Solid Waste Service in Kaysone Phomvihane

Year	No. of Household		Collection ration (%)	Solid Waste Volume collected (t)	Solid Waste Volume/house/ day* (kg)	Remarks
	In service area	Contracted				
05-06	5,692	3,883	68.2	4,786.1	3.4	Total of 12 months
06-07	10,434	4,178	40.0	4,514.4	3.3	Total of 11 months

Note: * 30days per month is adopted to calculate solid waste volume per house per month.
Source: Kaysone Phomvihane UDAA (Solid Waste Management Department)

Table 2.19 Income/Expenditure of Solid Waste Management in Kaysone Phomvihane

Year	Contract House No.	Income (mill kip)	Expense (mill kip)	Balance (mill kip)	Collection Fee/house/ month (kip)	Remarks
05-06	3,883	497.5	479.5	18.0	10,700	Total of 12 months
06-07	4,178	473.3	480.5	-7.2	11,300	Total of 10 months

Source: Kaysone Phomvihane UDAA (Solid Waste Management Department)

Solid waste dumping site – open dumping

A truck hauling solid waste

Source: JST

Figure 2.17 Solid Waste Management in Kaysone Phomvihane

2.4.8 Park and Town Beautification

There are two public parks in a survey area of Kaysone Phomvihane. One is the Kaysone Phomvihane, next to the provincial government building. This park is surrounded by fence. There is no facility in this park except a statue, a small museum and some trees, and few people use park. The other is located next to an old stadium near the Mekong River. A few people use this park at morning and evening time.

Lake Va is located about 6km east of the survey area of Kaysone Phomvihane. Here is a recreational place of citizens. There are some bungalows and a small store around the lake. A rich forest is spreading at north of the lake.

Kaysone Phomvihane Park

Bungalows and boats at Va Lake

Source: JST

A-3 Pakse

3.1 Population

Table 3.1 indicates district population in Champasack Province. Champasack Province occupies 10.7 to 11.0% of national population, and the percentage is decreasing gradually. Annual population growth rates recorded 1.9% from 1995 to 2008, which is smaller than national population growth rates (2.1% from 1995 to 2005 and 2.2% from 2005 to 2008).

Table 3.1 Change of District Population in Champasack Province

	Population (Persons)			Percentage Share (%)		
	1995	2005	2008	1995	2005	2008
Champasack Province	501,387	607,370	642,642	11.0	10.8	10.7
Pakse	65,220	78,669	83,239	13.0	13.0	13.0
Xanasoumboun	55,716	62,238	65,853	11.1	10.2	10.2
Bachiangchareusouk	34,354	48,743	51,574	6.9	8.0	8.0
Pakxong	44,518	64,145	67,871	8.9	10.6	10.6
Pathoumphom	43,142	51,370	54,354	8.6	8.5	8.5
Phonthong	73,704	85,188	90,137	14.7	14.0	14.0
Champasack	49,242	55,403	58,612	9.8	9.1	9.1
Soukhouma	38,051	49,670	52,555	7.6	8.2	8.2
Mounlapamok	32,228	38,525	40,763	6.4	6.3	6.3
Khong	65,212	73,419	77,684	13.0	12.1	12.1
National Population	4,574,858	5,621,982	6,000,379	11.0	10.8	10.7

Source: Statistical Yearbook of Champasack Province 2008

13.0% of the provincial population belonged to Pakse District throughout the period. Most populous district is Phonthong, but the percentage share has been decreasing from 14.7% in 1995 to 14.0% in 2008. Percentage share increased in Bachiangchareusouk, Pakxong (Boloven Plateau) and Soukhouma, and it dropped in Xanasoumboun, Pathoumphom, Champasack, Mounlapamok and Khong throughout the period.

3.2 Economy

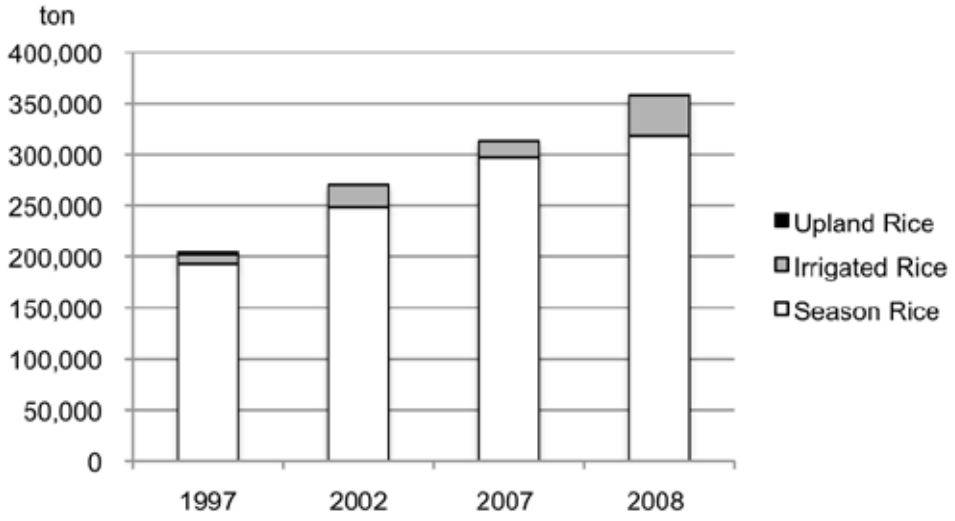
3.2.1 Industrial Composition

According to latest provincial statistics, nominal GRDP of Champasack Province was 4,696 billion kip in 2008. It accounted 10 percent of the national GDP. On the other hand, JST estimated percentage share of GDP was 10% in 2007. Provincial statistics also reported that the percentage shares of industries were 32% for the primary industry, 26% for the secondary industry and 42% for the tertiary industry in 2008.

3.2.2 Agriculture

Champasack Province has abundant agricultural products such as rice, vegetables and coffee bean. Production of forest industry is also high level in Lao PDR.

Figure 3.1 indicates rice production in 1997, 2002, 2007 and 2008. Rice production recorded 360,000 ton in 2008, and it increased 1.5 times in 11 years. Percentage share of the rice production in Lao PDR was 12%, and ranked 3rd position after Savannakhet and Vientiane Capital. 89% of the total is cultivated at seasonal rice, and the percentage is higher than Savannakhet Province (80%).

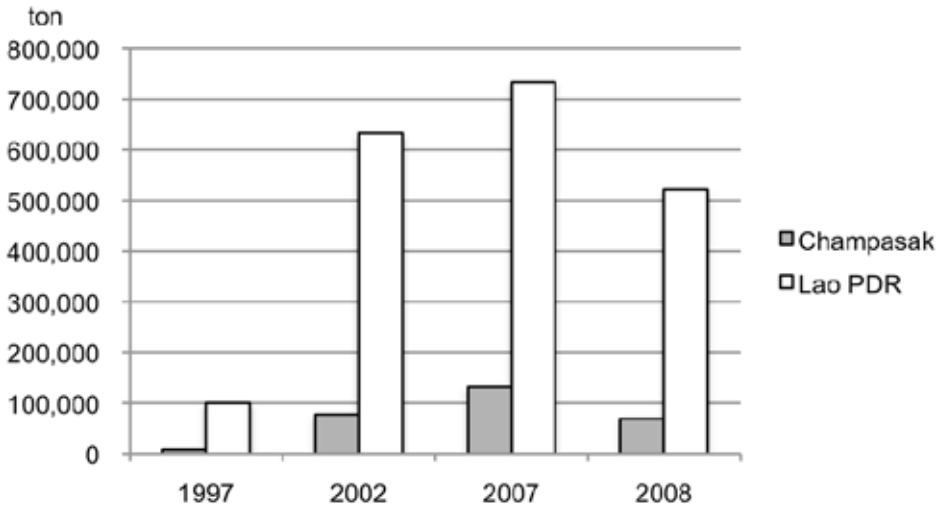


Source: Statistical Yearbook 1975-2005 and 2008

Figure 3.1 Change of Rice Production in Champasack Province

Figure 3.2 indicates vegetable production in Lao PDR and Champasack Province. Vegetable production in Champasack Province recorded 132,000 ton (13% of national production), and ranked 1st position in 2007. The position dropped 3rd after Luang Prabang and Vientiane Capita but still have a production share of 13% in 2008. Vegetables produced in Champasack Province is transported to Vientiane Capital, and is also exported to Thailand under contract farming with Thai private companies.

Boloven Plateau located at the east of Pakse has bountiful soil and potential of agricultural development. Private-based agricultural development projects are starting, and Vietnamese farmers are colonizing in Pakson District, 40km from Pakse.



Source: Statistical Yearbook 1975-2005 and 2008

Figure 3.2 Vegetable Production in Lao PDR and Champasack Province

3.2.3 Manufacturing

Major manufacturing industry in Champasack Province is wood processing and agro/food processing.

Table 3.2 indicates number of business enterprise of the secondary industry in Champasack Province. Percentage share of large (Level 1) and small (Level 3) scale enterprises occupy 8 to 9% of the national total, and middle (Level 2) scale enterprise is five percent. Major industries to which Level 1 enterprises belong are manufacturing of wood and furniture (ISIC 20 and 36, 20), manufacture of food products & beverages (ISIC 15, 5) and Manufacture of other non-metallic mineral products (ISIC 26, 4). The same trend is observed in the Level 2 companies.

Table 3.2 Business Enterprises in Champasack Province

	Level 1	Level 2	Level 3
Champasack Province	33	25	1,821
Lao PDR	380	467	22,817
Share of Champasack (%)	8.7	5.4	8.0

Note: Number of employees are more than 200 for Level 1, 50 to 199 for level 2 and 10 to 49 for Level 3.
Source: Ministry of Information and Commerce

Table 3.3 indicates Foreign Direct Investment in the secondary industry in Champasack Province. Percentage shares are 10 percent for large scale (Level 1), six percent for middle scale (Level 2), and one percent for small scale (Level 3). Major industries are Manufacture of food products & beverages (ISIC 15, 6) and manufacture of chemical and chemical products (ISIC 24, 4).

Table 3.3 Foreign Direct Investment in Secondary Industry

	Level 1	Level 2	Level 3
Champasack Province	8	5	1
Lao PDR	83	82	80
Share of Champasack (%)	9.6	6.1	1.3

Note: Number of employees are more than 200 for Level 1, 50 to 199 for level 2 and 10 to 49 for Level 3.
Source: Ministry of Information and Commerce

3.2.4 Service Industry

Major industry in the tertiary sector is tourism and wholesale and retail trade. Table 3.4 indicates major tourism statistics in Champasack Province. Champasack Province has attractive tourist destinations such as Wat Phou (World Heritage), Siphan Don and Boloven Plateau. In addition to that, Pakse Airport is connected with international tourist destinations such as Bangkok and Siem Reap. Therefore, international tourists are more observed than Savannakhet. However, numbers of tourist, accommodation and accommodation rooms are smaller than Savannakhet Province.

Table 3.4 Major Tourism Statistics in Champasack Province

	Unit	2007	2008
Number of Tourists	Persons	165,750	216,614
Domestic tourists	Persons	28,862	64,171
International tourists	Persons	45,605	66,171
Border tourists	Persons	91,283	87,272
Number of Hotel	Units	5	4
Number of Hotel Rooms	Rooms	97	90
Number of Guesthouse	Units	13	14
No of Guesthouse Rooms	Rooms	104	157

Source: Statistical Yearbook Champasack Province 2008

Regarding to wholesale and retail trade, many kinds of goods such as petroleum, daily goods and construction material are imported from national border with Thailand located 40kilometers west of Pakse. Pakse has two markets, and covers surrounding provinces such as Attapeu, Sekong and Saravane.

3.2.5 Public Investment

Table 3.5 indicates public investment in FY2006/07 and FY2007/08. More than half of investment was disbursed in agricultural sector. Other than agriculture, public health, other administration area received significant level of investment in the both years. Around 80% of total investment amount comes from foreign resource.

Table 3.5 Public Investment in FY2006/07 and FY2007/08

Unit: million kip

Items	2006/07			2007/08		
	Domestic	Foreign	Total	Domestic	Foreign	Total
Agriculture	875.0	33,172.0	34,047.0	1,973.4	33,548.4	35,521.8
Industry & Commerce	328.0	0.0	328.0	240.0	0.0	240.0
Public Works and Transport	0.0	0.0	0.0	2,993.1	6,351.6	9,344.7
Energy & Mining	2,250.0	3,550.0	5,750.0	730.0	0.0	730.0
Education	1,812.0	3,152.4	4,964.4	1,805.0	0.0	1,805.0
Public Health	440.0	8,283.0	8,723.0	680.0	8,484.0	9,164.0
Culture	330.0	0.0	330.0	923.6	0.0	923.6
Labor	110.0	47.0	157.0	382.6	0.0	382.6
Other Administrative Area	6,855.0	1,625.0	8,480.0	5,472.3	350.0	5,822.3
Total	13,000.0	49,829.4	62,779.4	9,727.7	48,734.0	63,934.0

Source: Statistical Yearbook Champasack Province 2008

3.3 Land use, Settlement Pattern and Population Density

3.3.1 Current Land Use

The current land use map at scale of 1:10,000, was prepared by interpretation of the IKONOS satellite image data (dated on 21 October 2006, 3 November 2006) and confirmation by ground truth survey (on 20 April - 1 May 2009).

Source: JST

Figure 3.3 Land Use in Pakse

Figure 3.3 shows the current land use in Pakse. Residential area of Pakse is advancing to the east because of lower risk of flood and easiness of land development. In the town center, which is on the east bank of Xedon, there are medium-rise buildings such as shop houses of four or five stories. Along the Route 13 and its bypass, land parcels are relatively large and used for large buildings. Business and commercial area is limited to the central area or the road side of national highways.

Table 3.6 Existing Land Use in Pakse

	Area (ha)	Share *1	Share *2
Residential	1,613	25.8 %	59.1 %
Commercial and Business	316	5.0 %	11.6 %
Industrial	59	0.9 %	2.2 %
Public Facility	468	7.5 %	17.2 %
Road	105	1.7 %	3.9 %
Others	166	2.7 %	6.1 %
(Built-up area)	(2,727)	(43.6 %)	100 %
Agriculture	2,003	32.0 %	
Forest	979	15.6 %	
Grassland, Abandonment and Fallow Land	446	7.1 %	
River and Water Surface	106	1.7 %	
Total	6,261	100 %	

Note: *1 percentage in the total area, and *2 percentage in the built-up area
Source: JST

The main characteristics of the current land use can be summarized as following sections.

(1) Mixed Use

Except the western and southern parts of the old urban center is dominant for commercial and governmental facilities, providing urban amenity zone, where there are medium-rise buildings such as shop houses and hotel/guest houses of four or five stories, the rest of the urbanized area is mixed use in general. The dominant land use in the urbanized area is residential (around 59 % of the urbanized area) in general. However, many of the ordinal commercial buildings, such as shops and restaurants and small-scale industry buildings have residential space in the upper floors. There is no single land use, like sole residential area, the most of the urbanized area is mixed use in general. There is also mixed land use policy in the current master plan. The current land use zoning types in the urbanized area are UA (Urban central zone), UB (Urban inner zone), UC (Urban suburbs zone), UD (Future development), and I (Industrial). There is regulation for land use zone, which specifies allowable land use (allowable types of building function) in above each land use zone. According to the regulation, the most of types of building function, except large scale business and retail, jail, slaughter house, water treatment plant, large scale industry are allowed in UA and UB zones, where composed central part of the urban area. They selected mixed land use policy in the master plan.

(2) Urban Sprawl

The built-up area is continuously spread, mainly along the NR13 and new NR13 at the east, and along the Gnang Stream in the northern part. Although those areas were designated as non built-up area including protected forest and agriculture areas.

(3) Land Evaluation

Based on the criteria as shown in Table 3.7, the land condition was evaluated as Figure 3.4. The west bank of Xedon River is low in elevation and not suitable for development. Even the Pakse Airport is at risk of flooding in high flood season. On the other hand, the east bank of Xedon River is high in elevation and mostly suitable for development except the area along the drainage channel. This means that new urban development should be regulated on the western side of the city.

Table 3.7 Four Criteria to Evaluate Land Suitability

Not preferable ⟷ Preferable

A Elevation (40point)

Equal or Less than Flood Level	-3	0	12	More
Elevation in Pakse	86.49	89.49	101.49	
Point	0	10	30	40

Flood Level by MRC
98.49

B Slope (40 Point)

Degree (Equal or less than)	15+	15	12	8	3
Point	0	10	20	30	40

C Current Land Use (20points)

Land Use	Forest	"Paddy Field/ agricultural"	Others
Point	5	15	20

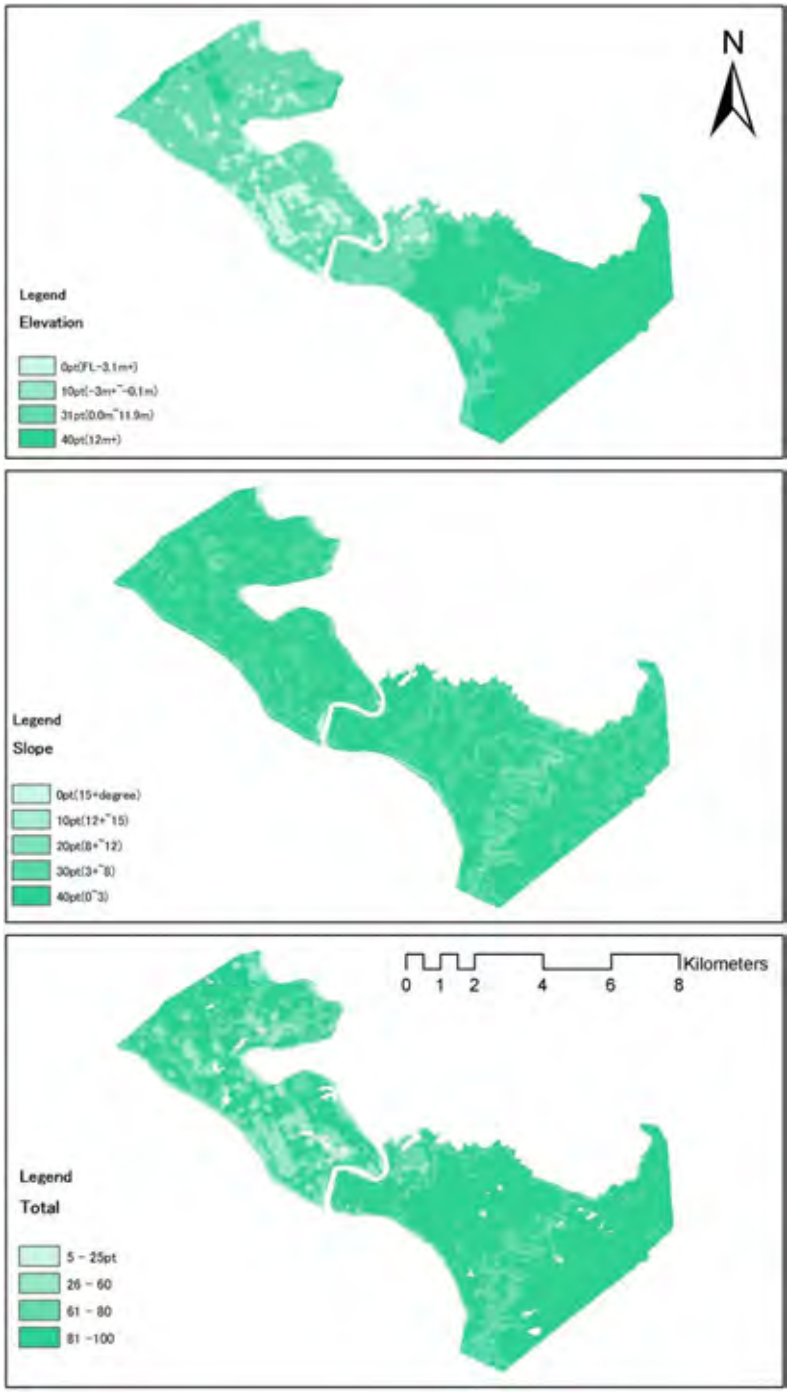
D

Protection Area		
	Yes	No
100 m to drainage	0	1
Legally Protected forest	0	1

Total Point = (A+B+C)xD

Note: Flood level of the Mekong is defined by the Mekong River Commission (MRC). "Flood level" corresponds with the highest level of flood in year 2000.

Source: JST



Source: JST

Figure 3.4 Land Suitability Evaluation for Pakse

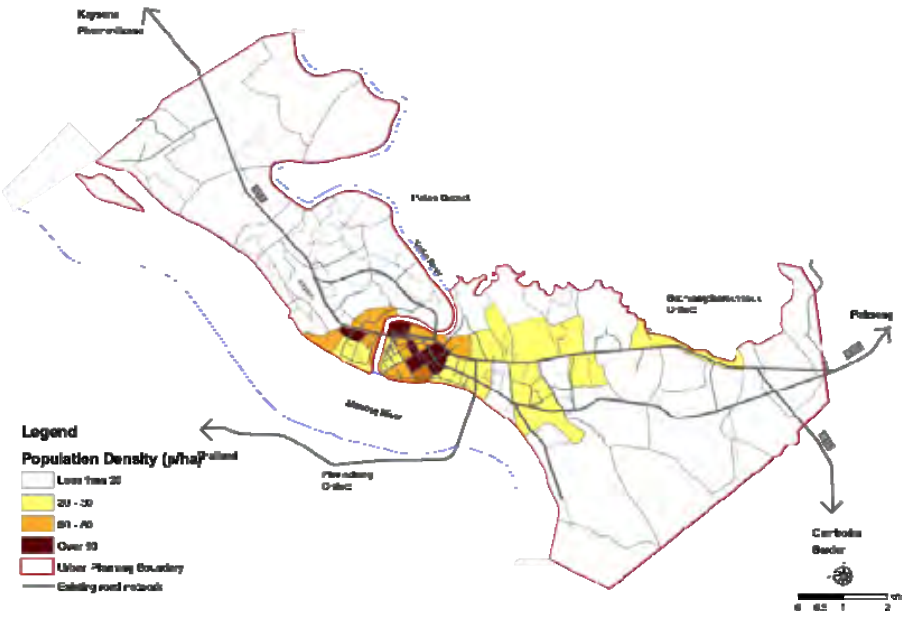
Based on the evaluation above, zoning for developable land and conservation area was set as Figure 3.5. JST also set the additional "Urbanization Area up to 2025," which was mostly found in the eastern side of the city.

Source: JST

Figure 3.5 Zoning of Developable Land and Conservation Area

3.3.2 Population Density

Population density at village level in 2005 is shown in Figure 3.6. Both sides of a mouth of Xedong River to Mekong River have rather high-density areas of over 50 persons per hector. These areas are origin of Pakse and had been developed very early stage. Especially east side of Xedong River forms an old urban center. A village located in this area has very high density of 174 persons per hectare. A surrounding area of an old urban center has low density of from 20 to 50 persons per hector. This area is limited at area along the Mekong River and the area along main roads only. Remaining area is mostly agriculture land and has population density of less than 20 persons per hector.



Source: JST

Figure 3.6 Population Density of Pakse

An urban area expands to east along NR13. Average population density within the planning boundary is 11.0 persons per hectare.

3.4 Infrastructure

Current situation and issue of infrastructure such as road, public transport, transport facilities, water supply, sewer and sewerage treatment facility, drainage and flood mitigation, solid waste management in Pakse are compiled in the following sections.

3.4.1 Road

According to an existing land use survey conducted in May 2009, total length and area of roads in the planning area is about 115km. It contains 41.5km length of paved main road, and 29.7km paved and 43.7km unpaved minor road. It includes about 19.3km length (include 2.3km length of a bypath of NR13 through Russian Bridge over Xedong River) of NR13 with two (2) roadways and no sidewalks, and 6.3km length of Road No. 38 running through a downtown of Pakse and south side of NR13. Road No. 38 has been planned to improve and upgrade in an urban master plan provided by PTI in 1999 and been well developed. It has 2 roadways one direction, a sidewalk and a median.

As a part of road network, there are three bridges in an urban area of Pakse. One is Lao-Japan Friendship Bridge I, which had been constructed over the Mekong River by Japanese ODA at year 2000. This bridge is a part of NR16 and connects a downtown of Pakse and Phonthong District located other side of the Mekong River. Other two bridges, namely French Bridge and Russian Bridge, is a part of NR13 and had been constructed over Xedong River by French and Russian assistance. French Bridge had been constructed with only one roadway of 3m width for both directions. This is one of the bottlenecks of traffic in an urban area. Russian Bridge with one roadway and a sidewalk at one direction, therefore, had been constructed at year 1990 as a part of the bypath of NR13.

Some roads and facilities related to road in an urbanized area of Pakse had been improved and newly constructed by assistance of ADB from 1997 to 2003. Followings had been implemented.

- Construction of about 6.2km length of road with concrete surface
- Improvement of a intersection
- Installation of about 132 pieces of traffic signs and one set of traffic signals
- Installation of street lighting at 11.5km section of road in an urbanized area

Pavement condition of main roads at the survey area is good. 100% of a main road has been paved. However, pavement condition of minor roads is not so good. 60% of a minor road has not been paved yet. Especially almost all minor roads in west bank of Xedong River have not been paved yet. Holes, cracks and peering off of pavement are found on many minor roads.

Table 3.8 Present Road Condition in planning Area of Pakse

Classification	Surface	Length (km)	%	Remarks
Main Road	Paved	41.47	100.0	Include 19.3km of NR 13 and 6.3km of Road No. 38
	Unpaved	0	0	
	Sub-total	41.47	100.0	
Minor Road	Paved	29.70	405	
	Unpaved	43.67	59.5	
	Sub-total	73.37	100.0	
Total		114.84		

Source: Existing land use survey conducted by JST in May, 2009

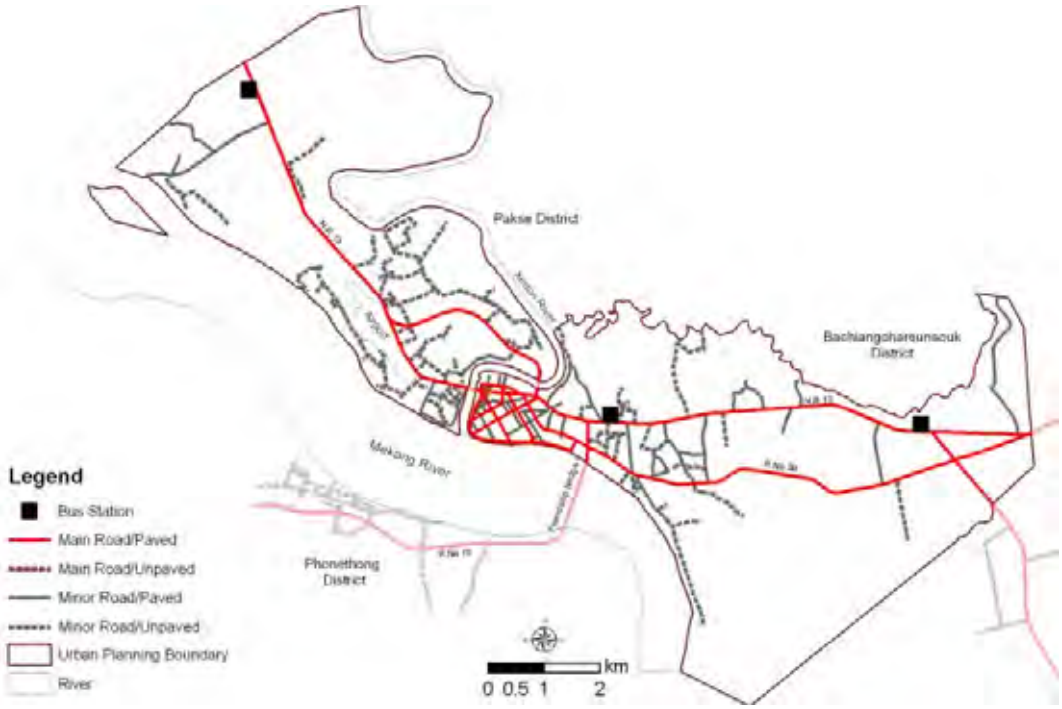


Figure 3.7 Present Road Network and Bus Station In Pakse

Table 3.9 shows number of vehicles registered in Champasack Province. Total number of vehicles registered in year 2006 was about 47,700. Number and ratio of motor bicycle and car was around 41,500 (87.0%) and around 4,595 (9.6%) respectively. Number of vehicles registered increased year by year. Total number of vehicles registered in year 2008 was about 69,400. Of which, number and share of motor bicycle was about 60,600 and 87.2%. Number and share of car was about 7,100 and 10.2%. Motor bicycle was the dominant transportation mode same as other cities.

Table 3.9 No of Vehicle registered in Champasack Province

Year	Motor bicycle	Car	Truck/Bus	Total
2006	41,507 (87.0%)	4,595(9.6%)	1,604 (3.4%)	47,706 (100%)
2007	51,550 (87.3%)	5,779 (9.8%)	1,740 (2.9%)	59,069 (100%)
2008	60,559 (87.2%)	7,060 (10.2%)	1,819 (2.6%)	69,438 (100%)

Source: DPWT of Champasack

Road No38 constructed at the downtown – a southern bank of Xedong River

Main road at the residential area – a northern bank of Xedong River

Lao-Japan Friendship Bridge

French Bridge over Xedong River

Source: JST

Figure 3.8 Road Condition in Pakse

Around 1,000m section of a road running a downtown area along Mekong River at eastern bank of Xedong River had been improved by assistance of ADB. It included widening of a road (2 lanes 2 direction), construction of a sidewalk, installation of lighting poles, and tree plantation. It also included construction of some observation places and installation of benches at the Mekong River side of a road for recreation and rest for citizens.

About 1,100 meters long of remaining part of this road has not been improved yet. Width of the road is narrow (2 lanes both direction), and no sidewalk is developed.

A road along Mekong River - not yet developed

A road along Mekong River - developed

Source: JST

Figure 3.9 Roads along Mekong River at Pakse

3.4.2 Public Transport

There is no public transportation service such as a bus on a regular route in Pakse. Tuk-Tuks and Sonteos, which are operated by individuals and families, are main mass transportation means for people.

3.4.3 Transport Facilities

(1) Airport

Airport with a 1,600 meters long runway is located at southern part of Xedong River, Pakse, surrounded by residential area. Area of an airport is about 83hectares.

Two routes of an international regular flight existed by the end of June. One was between Bangkok, Thailand and Savannakhet Airport, operated at three times in a week. The other was between

Siemreap, Cambodia, operated at one time in a week. Three routes of domestic flights existed at this airport connecting between Vientiane, Kaysone Phomvihane and Luang Prabang and Pakse. Two routes between Vientiane and Pakse and between Kaysone Phomvihane and Pakse were operated 3 days in a week respectively. A route between Luang Prabang and Pakse is operated 2 days a week.

An expansion work of a runway from 1,600m to 2,200m has been started at the beginning of July 2009. All freights operated at this airport were transferred to Savannakhet Airport.

There is a plan of flights to connect Pakse and Ho Chi Mine and Da Nang in Vietnam and Pakse and Phnom Penh in Cambodia in a future.

Table 3.10 Flight Schedule at Pakse Airport

	Country	City	No. of operating day a week	No. of flight a day
International	Thailand	Bangkok	3 days	1 flight
	Cambodia	Siemreap	1 day	1 flight
Domestic	Laos	Vientiane	3 days	1 flight
		Kaysone Phomvihane	3 days	1 flight
		Luang Prabang	2 days	1 flight

Source: Lao Airlines Summer Schedule 2009 from 29 Mar. to 24 Oct 09

A terminal building of Pakse Airport

A plane parked at Pakse Airport

Source: JST

Figure 3.10 Pakse Airport

(2) River Port

Pakse district is not adjacent to the border of any other country. Moreover, there is one bridge constructed by Japan's Aid over the Mekong River and are two bridges constructed by French and Russia's Aid over Xedong River. Therefore, there is no river port for passenger and cargo except for sightseeing in Pakse.

(3) Bus Terminal

There are 3 bus terminals for international, inter-provincial and inner-provincial buses. These are located at the center, eastern part and western part of Pakse, and face to NR13.

International buses are operated at two bus stations located at the center and the eastern part of Pakse respectively. A bus station located at the center of Pakse is for buses bound for Chong Mek and Oubon Ratchatani, Thailand. A bus goes to Chong Mek and Oubon Ratchatani is operated once a day and twice a day respectively. Buses leaving for Lao Bao, Danang, Hue, Dongha, Hanoi, Yalai and Quynhon in Vietnam are operated at a station located at eastern part of Pakse. A bus goes to theses cities is operated once a day.

Table 3.11 International/Inter City Bus Schedule at Pakse

	Country	City	No. of Bus Operation a day	Remark and Border Point
International	Thailand (Central)	Chong Mek	1	Vang Tao
		Ubon Ratchatani	2	
	Vietnam (Eastern)	Lao Bao	1	Daensavan
		Danang	1	
		Hue	1	
		Dongha	1	
		Hanoi	1	
		Yalai	1	
		Quynhon	1	
Domestic	Laos (Inter-Provincial)	Vientiane via Thakhek, Namthone and Paksan	15	Include 7 express and 1 VIP bus
		Kaysone Phomvihane	2	
	(Inner-Provincial)	Muang, Don Khong, 4000 Island, Dondet-Donkone, and Cambodia Border		

Source: Lao Airlines Summer Schedule 2009 from 29 Mar. to 24 Oct 09

Domestic inter-provincial and inner-provincial buses depart from 3 bus stations. Destination of an inter-provincial bus is Vientiane via Thakhek, Namthone and Paksan. These cities are located along NR13. 15 buses are operated in a day.

Domestic inner-provincial buses going Muang, Don Khong, 4,000 islands, Dondet-Donkone and Cambodia Border are also operated.

International bus to Ubonrachathani, Thai at a bus station located at the center of Pakse

Bus station building located at the center of Pakse

Bus station to Vietnam and domestic located at eastern part of Pakse

Time table of domestic route of a bus station located at eastern part of Pakse

Source: JST

Figure 3.11 Bus Station in Pakse

3.4.4 Water Supply

(1) Nam Papa Champasack (State-Owned Water Supply Enterprise) in Pakse

Nam Papa Champasack in Pakse district is a state-owned water supply enterprise and one of seventeen (17) state-owned enterprises in Lao PDR same as Nam Papa Savannakhet. Nam Papa Champasack supplies water to the served area, around 1500 ha, in Pakse District. Number of employees is 76 as of 2009.

(2) Existing Water Supply Facilities of Nam Papa Champasack in Pakse District

Construction of water supply facilities of the state-owned enterprise in Pakse District had started in 1971 and completed in 1973 by the government budget. At that time the water treatment plant capacity was 8,800 m^3/day.

In 1983 the intake pump had been replaced and as a result the capacity of the treatment became smaller than original capacity and was reduced to 85 % of original capacity, to 7,500 m^3/day from 8,800 m^3/day. In 1997 improvement of the treatment plant had been conducted by ADB fund and the treatment capacity increased to 15,000 m^3/day from 7,500 m^3/day. After that Norwegian Government had funded for pipeline expansion in 2001 and the total water supply pipeline length is 113 km. The size of the pipeline ranges from 40 mm to 500 mm.

The following table shows the current existing facilities of Nam Papa Champasack and existing water supply system and served area in Pakse district is shown in Figure 3.12. Figure 3.13 shows the existing water intake tower, water treatment plant and elevated water tank.

Table 3.12 Existing Nam Papa Champasack Water Supply Facilities

Name of Facility	Detailed Item	Description
Water Intake	Intake Pumps	Submersible pump
Water Treatment Plant	Mixing and Flocculation	Four trains; capacity of 3,750 m^3/day/train x 4 trains = 15,000 m^3/day (Daily maximum)
	Sedimentation Basin	ditto
	Rapid Sand Filter	ditto
	Existing Backwash reservoir	V =500 m^3
	Clear water reservoir	Elevated water tank V = 1,000 m^3
	Electrical Facility	High Voltage Power Receiving Facility
	Power Control Panels	
	Distribution Pumps	Single suction volute pump;
Reservoir	Elevated Water Tank	V = 500 m^3 (Ban Thahinh)
		V = 250 m^3 (Ban Km 8)
	Ground Reservoir	V = 300 m^3 (Km4)
Pumping Station	Booster Pumps	Four pumps (One is standby)
Water Supply Pipeline	Transmission and Distribution pipe	Pipe size; 40 mm – 500 mm Total Length =113,410 m

Source: Nam Papa Champasack

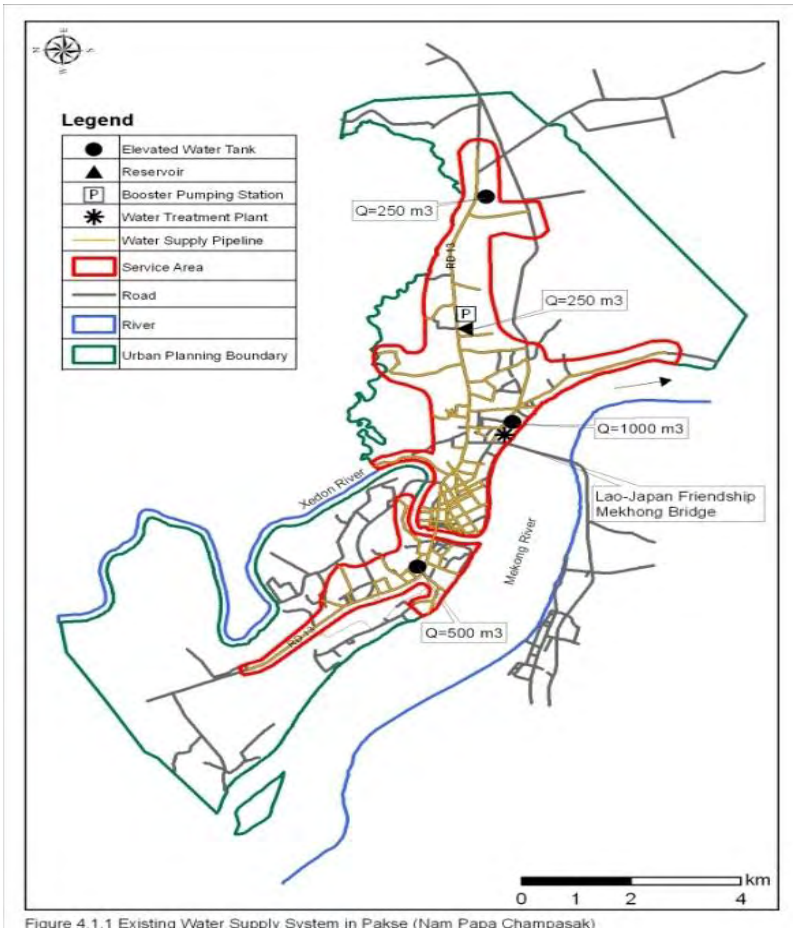


Figure 4.1.1 Existing Water Supply System in Pakse (Nam Papa Champasak)

Source: Nam Papa Champasack

Figure 3.12 Existing Water Supply System and Served Area in Pakse

Figure 3.13 Existing Water Intake Tower, Water Treatment Plant and Elevated Water Tank

(3) Numbers of Population and House Connection (Water Meter) and Served Population in Pakse District

Numbers of population and house connection and served population in Pakse District from 2004 to 2008 is shown in Table 3.13.

Table 3.13 Numbers of Population, House Connection and Served Population

Item	Unit	2004	2005	2006	2007	2008
Population in District	person	74,758	76,179	77,627	78,120	80,605
Population in Served Area	person	56,122	57,188	58,275	59,383	60,511
Served Area	ha					
Number of House Connection (Water Meter)	unit	7,969	8,302	8,642	8,976	9,369
Served Population	person	47,814	49,812	51,852	53,856	56,214
Rate of Served population in District	%	64	65	67	69	70
Rate of Served population in Served Area	%	85	87	89	91	93

Note: All numbers of population are estimated values by Nam Papa Champasack
Source: Nan Papa Champasack

(4) Current Water Productions, Water Consumption and Non Revenue Water

Current water productions, water consumption for domestic and non-domestic and non-revenue water (water leakage) from 2004 to 2008 is shown in Table 3.14.

Table 3.14 Current Water Production, Water Consumption and Non Revenue water

Item	Unit	2004	2005	2006	2007	2008
Average Daily Water Production	m^3/day	11,743	12,261	12,382	12,856	13,170
Maximum Daily Water Production	m^3/day	15,983	17,135	19,135	17,122	17,634
Rate of Loading	Percent	73.5	71.6	64.7	75.1	74.7
Average Daily Water Consumption	m^3/day	9,278	9,687	9,893	10,258	10,340
Domestic Water Consumption	m^3/day	7,764	7,965	8,070	8,329	8,400
Non-Domestic Water Consumption	m^3/day	1,516	1,722	1,823	1,930	1,940
Rate of Non Revenue water	Percent	21	21	20	20	21

Source: Nan Papa Champasack

(5) Unit Water Consumption (Daily Per Capita Consumption) in Nam Papa Champasack

Unit water consumption (litter/cap/day) can be estimated by water consumption divided by served population. The following table shows every year's water consumption since 2004.

Table 3.15 Unit Water Consumption

No	Item	Unit	2004	2005	2006	2007	2008
1	Water Consumption	m^3/day	9,278	9,687	9,893	10,258	10,340
2	Domestic Consumption	m^3/day	7,764	7,965	8,070	8,329	8,400
3	Served Population	person	47,814	49,812	51,852	53,856	56,214
4	Unit Water Consumption (= 1/3)	litter/cap/day	194	194	191	190	184
5	Domestic Unit Water Consumption (= 2/3)	litter/cap/day	162	160	156	155	149

Source: Lao PDR Annual Urban Water Sector Performance Report 2007

(6) Financial Condition of Nam Papa Champasack

The sales revenue of the Nam Papa Champasack comes from water sales, new connections fee and rental fees of water meters. The total expenditure of the Nam Papa Champasack consists of the salary, repairing cost, connection fees, electricity expense and so on. Profit and loss statement and key indicators for three years, year of 2005, 2006, and 2007 is shown in Table 3.16.

Table 3.16 Financial Condition of Nam Papa Champasack

Unit: billion kip (USD 000)

	2005	2006	2007
Sales Revenue (Turnover)	6.59 (775)	7.42 (873)	7.86 (925)
Expenditure (Operating Cost)	4.85 (571)	5.51 (648)	6.21 (731)
Net Income	1.74 (205)	1.91 (225)	1.65 (194)
Depreciation	-1.64 (-193)	-2.30 (-271)	-2.46 (-289)
Return on Capital	-0.0 %	-0.8 %	-1.8 %

Note: Exchange rate is USD1.0 = Kip 8,500
Source: Lao PDR Annual Urban Water Sector Performance Report 2007

Based on the above table net income for three years was surplus. Return on capital shows that financial condition of Nam Papa Champasack is good.

(7) Expansion of Water Supply Facility

Due to addressing limited water supply, Lao PDR government signed with JICA to receive grant aid project on October 2008. Since current location of the existing water intake of the water treatment plant is located at the downstream of discharge spot of wastewater from the new market, it is necessary to examine water quality at the existing intake, or find new water source. The expansion project is still in the preparatory stage as of October 2009.

3.4.5 Sewer and Sewerage Treatment Facility

(1) General Condition

The current sewerage treatment system provided in the urban and rural area in Pakse is the same as normally used in Lao PDR, which is individual treatment in each household or building by using pour-flush or dry latrines and septic tank for black water disposal and soak pits for grey water disposal and overflow to the drainage system nearby. According to the Champasack statistics in year 2005, approx. 78.7% of households in Pakse area have access to proper toilets facilities and the update data in year 2008 indicating that all 100% of households in Pakse urban area have toilets according to Table 3.17. Only some households in rural area have no proper toilets with wastewater treatment system. However, wastewater from other usage such as shower, laundry, food preparation, etc. is mostly still directly discharge to the storm water drainage system without any treatment. No grease trap is installed to pretreatment of grease and oil from cooking activity. Small scale industries especially the cottage industry normally discharge the sewerage directly to the drainage system with some simple treatment such as storage tank only, but large scale have to provide some treatment system according to the wastewater regulation from the Ministry of Industry and Handicraft. Due to the inefficient installation of the effluent pipe from septic tank, leaked sewer polluting the soil and groundwater.

Table 3.17 Information on Types of Toilet in Pakse in Year 2005 and 2008

	Total Household	Type of Toilet					
		Modern	Normal	Dry	Other	None	Total w/toilet
Year 2005							
Number	12,440	249	9,081	398	62	2,662	9,790
Percentage		2.0	73.0	3.2	0.5	21.4	78.7
Year 2008							
Number	12,734	11,633	896	205	-	-	12,734
Percentage		91.4	7.0	1.6	-	-	100

Source: Environmental Monitor Lao PDR 2005, World Bank and STEA & Information from Pakse UDAA

From the ADB Assistance through the Secondary Towns Urban Development Project from year 2000 – 2003, there was a sanitation component to provide for improvements in environmental sanitation by replacing all dry pit latrines with pour/flush-type toilets with septic tanks, and replacing poorly designed septic tanks with some numbers of new septic tanks were installed within the project fund. Public campaigns and workshops were also conducted to convince communities in the need to improve the environment through installation of septic tanks. Sanitary Regulation was introduced to the communities with some improvement in public awareness from the ADB Project.

Sewerage in Pakse area is generated not only from household but also from other commercial developments especially large hotels and market in urban area. There is one large market and commercial complex, Pakse New Market or Dao Heuang Market about 2 km south-east out of town on NR13 near the Lao-Japan Friendship Mekong Bridge, recently constructed inside the new development area where all kinds of goods can be purchased. At the same time this market also generates high volume of wastewater from its activities. Drainage channels around the market are filled with wastewater mixed with rainwater and discharged directly to the Mekong River upstream of the water supply intake point of the Champasack Water Supply Enterprise.

(2) Current Sewerage Quantity

The number of population in Pakse area in year 2007-2008 is 76,368 persons in which approximately 9,200 cu.m./day of wastewater or sewerage is generated and drained to the public source every day with less than half of them were treated and reduced the pollution load by the current on-site treatment system. The quantity of sewerage will increase upon the increasing of the population and activity inside the urban area, higher pollution load will be dumped to the Xedon and the Mekong River every year.

(3) Responsible Agency

UDAA is the authority that takes care of the building permission process for the building less than 200 sq m area, which includes the type and detail of sewerage treatment to be provided, the permission for the larger building will be controlled by DPWT. Inspection and monitoring in proper construction is also in the responsibility of UDAA and DPWT.

3.4.6 Drainage and Flood Mitigation

(1) General Condition

Pakse District is mostly flat area with long boundary attached to the Mekong River with Xedon River which is rather large passing in the middle of the city area before joining with the Mekong River. Crowded and old community is in the eastern side of Xedon River and along the Mekong River. Most of the storm water drains via open channel or storm water pipe and manholes along the roads to the natural canal inside the city prior to drain to either the Xedon or Mekhong River at the end point. Rainy season in the area starts from May to September in which heavy rain is between June and August with average rainfall 2,000 mm/year.

(2) Current Drainage Network and Flood Mitigation Component

The drainage system in the urban area consists of roadside drains leading ultimately to natural streams and rivers with final discharge to the Xedon River or the Mekong River. The drainage network and flood mitigation system in Kaysone Phomvihane was improved in year 2000 – 2003 from the ADB Assistance under the Secondary Towns Urban Development Project where Pakse was one of the five towns in the project. The primary, secondary and tertiary drainage channel in the town area were improved and added with flap gates as well as drainage pumps installation at some of the outfall to the Mekong River as part of the improvement. At present there are 6 points to discharge water from internal canal/river to the Mekong and Xedon River. 3 points in central area have been installed with water gates and pumps from the ADB Secondary Town Development Project. Hence fewer floods occur inside the old community area. 2 points in western area have only water gates and 1 point in eastern area has neither gate nor pump. In order to provide flood control to all points, water gates and pumps have to be installed to all discharging points.

(3) Responsible Agency

DPWT and UDAA are the authorities who are responsible in drainage and flood mitigation system. The drainage channel is included in the road construction where new or improvement of road is planned. The calculation of drainage capacity is based on 10 year rainfall intensity record.

3.4.7 Solid Waste Management

Downtown area of Pakse is relatively clean because solid waste at this area is collected regularly. However, scattered solid waste is seen at roadside in rural area.

Urban Development Administration Authority (UDAA) of Pakse district is responsible for solid waste management at the area within the jurisdiction of UDAA. Management contains collection, haulage and dumping of solid waste. Collection of fee for disposal of solid waste from each household and maintenance of equipments and a landfill site are also included in UDAA's management.

Number of household within jurisdiction of UDAA in year 05-06 and 06-07 was 8,897. Number of household contracted with UDAA for solid waste collection was 3,228 in year 05-06 and 3,468 in year 06-07 respectively. Garbage collection ratio of past 2 years was less than 40%. It is because of limited staff, equipment and budget, no proper access road to solid waste collection point, and less awareness of inhabitants on solid waste collection.

Average volume of solid waste discharged from each household per day was 3.7kg in year 05-06 and 3.2kg in year 06-07 respectively. Average volume of solid waste discharged per person per day was about 500g.

Table 3.18 Solid Waste Service in Pakse

Year	No. of Household		Collection ration (%)	Solid Waste Volume collected (t)	Solid Waste Volume/house/day* (kg)
	In service area	Contracted			
05-06	8,897	3,228	36.3	4,286	3.7
06-07	8,897	3,468	39.0	4,000	3.2

Note: * 30days per month is adopted to calculate solid waste volume per house per month.
Source: Champasack UDAA

Total of fee collected for solid waste management in year 05-06 and 06-07 was 435.1million kip and 878.0 million kip respectively. Total expenditure for the management was 478.8million kip in 2005/06 and 708.4 million kip in 2006/07, respectively. Balance of revenue and expenditure was improved. Average solid waste collection fee from each household was jumped up from 11,200 kip in 2005/06 to 21,100kip in 2006/07, drastically.

Table 3.19 Income/Expenditure of Solid Waste Management in Pakse

Year	Contract House No.	Income (mill kip)	Expense (mill kip)	Balance (mill kip)	Collection Fee/house/ month (kip)
05-06	3,228	435.1	478.8	-443.7	11,200
06-07	3,468	878.0	708.4	169.6	21,100

Source: Champasack UDAA

An existing solid waste landfill site is located at wasteland in Xanasomboun District adjacent to Pakse District at north side. Solid waste from these two districts are hauled in and dumped to this landfill site. Same as a solid waste landfill site at Kaysone Phomvihane, this dumping site had also been constructed by assistance of UNDP/NORAD in year 2002. However, no facility such as a management building, a car washing place, leachate retention ponds and a weighbridge had been provided at the dumping site. Solid waste carried in to the site is dumped at a lot surrounded by a dike constructed on wasteland and spread out by a backhoe. Solid waste is not covered by soil or clay until a dumping lot becomes full.

A solid waste collection vehicle

A solid waste landfill site

Source: JST

Figure 3.14 Solid Waste Management in Pakse

3.4.8 Park and Town Beautification

There are two public parks and one forest in a survey area of Pakse. One park, named the Red Square Revolution Place, is located near a stadium along NR13. This park is surrounded by fence and has monuments and a stage.

Source: JST

Figure 3.15 A Road along The Mekong River in Pakse

A-4 Other Core Cities

4.1 Population

Table 4.1 indicates population of Vientiane Capital and other two Regional Cities (Luang Prabang and Thakhek) in 1995, 2005 and 2008. Population in Vientiane Capital increased 1.4 times, from 524 thousand in 1995 to 740 thousand in 2008, and its percentage share also increased from 11.5% in 1995 to 12.3% in 2008. Annual average population growth rate recorded 2.8%, 0.7 points higher than national level.

On the other hand, population growth of other two Regional Cities is the same as national level. Population increased from 64,000 in 1995 to 79,000 in 2005 in Luang Prabang District, and from 68,000 in 1995 to 84,000 in 2005 in Thakhek District, respectively.

Table 4.1 Population of Provinces/Districts

	Population (persons)			Percentage Share in Total Population (%)			Annual Growth Rate 1995 – 2005 (%)
	1995	2005	2008	1995	2005	2008	
Vientiane Capital	524,107	691,721	740,010	11.5	12.3	12.3	2.8
Luang Prabang Province	364,840	407,039	431,439	8.0	7.2	7.2	1.1
Luang Prabang District	63,765	78,516	-	1.4	1.4	-	2.1
Khammuane Province	272,463	337,390	360,304	6.0	6.0	6.0	2.2
Thakhek District	68,432	83,957	-	1.5	1.5	-	2.1
Lao PDR	4,574,858	5,621,982	6,000,379	100.0	100.0	100.0	2.1

Source: Census 1995 and 2005, Statistical Yearbook 2008

4.2 Economy

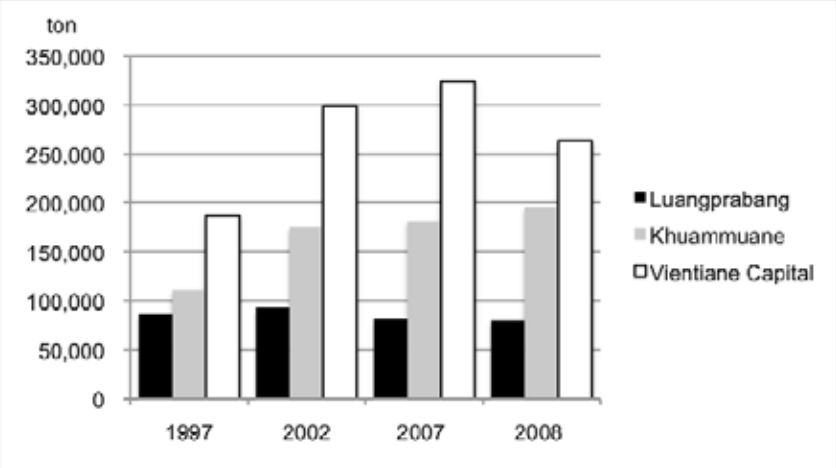
4.2.1 GRDP

GRDP is not listed in provincial statistics unlike Savannakhet and Pakse for Vientiane Capital and Luang Prabang Province, and JST could not collect statistical yearbook for Khammuane Province. According to an estimation of GRDP calculated from expenditure and consumption survey 2002-03 (LECS 3) and economic census 2006, percentage share of GDP in 2007 was 23% for Vientiane Capital, 7% for Luang Prabang and 5% for Thakhek.

4.2.2 Agriculture

Figure 4.1 indicates rice production in Vientiane Capital, Luang Prabang and Khammuane in 1997, 2002, 2007 and 2008. Percentage share of Vientiane Capital in Lao PDR recorded 9% in 1997. It increased to 12% in 2002 and 2007 but dropped to 9% due to decrease of the production by 60,000 ton in 2008. Percentage share of Khammuane Province has been recording 7% during 1997 and 2008. The rice production increased by 60,000 ton between 1997 and 2002, and it has been increasing gradually from 2002 to 2008. Percentage share of Luang Prabang has been decreasing from 5% to 3% during the period.

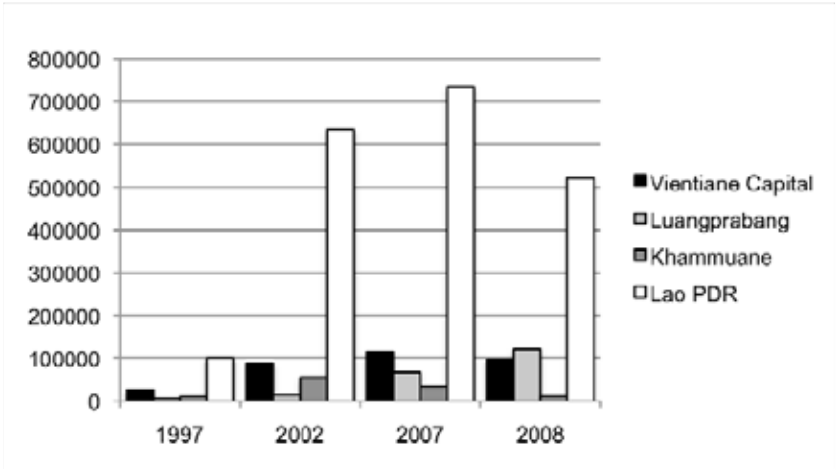
A character of rice production in Vientiane Capital is higher share of irrigated rice. Proportion of season rice in Vientiane Capital to Lao PDR was only 7% but proportion of irrigated rice occupied 23% in 2008. On the other hand, production of upland rice is high level in Luang Prabang Province. Its share in Lao PDR occupied 10% in 2008.



Source: Statistical Yearbook 1975-2005 and 2008

Figure 4.1 Rice Production in Vientiane Capital, Luang Prabang and Khammuane

Figure 4.2 indicates vegetable production in Vientiane Capital, Luang Prabang and Khammuane. In 1997, vegetable production is very limited even in national level but it increased rapidly in accordance with economic development and diversification of foodstuff. Vegetable production in Vientiane Capital ranked 2nd position in 2007 and 2008. The production in Luang Prabang Province ranked 5th position in 2007, and changed to the 1st position in 2008.



Source: Statistical Yearbook 1975-2005 and 2008

Figure 4.2 Vegetable Production in Vientiane Capital, Luang Prabang and Khammuane

4.2.3 Manufacturing

Table 4.2 indicates number of level 1, level 2 and level 3 business enterprises in Vientiane Capital, Luang Prabang and Khammuane. Vientiane Capital has high percentage in level 1 and level 2. One forth level 1 enterprises and one fifth level 2 enterprises are located in Vientiane Capital. Major industries in level 1 and level 2 are manufacture of wearing apparel; dressing and dyeing of fur (ISIC 18, 83), manufacture of food products & beverages (ISIC 15, 39), manufacture of textile (ISIC 17, 17).

In Luang Prabang, major industries in level 1 and level 2 are wood manufacturing and manufacture of furniture (ISIC 20 and 36, 40), manufacture of food (ISIC 15, 18), manufacture of non-metallic mineral products (ISIC 26, 13). In Kuammuane, percentage of level 1 enterprise is the highest in the Regional Cities. Major industries are wood manufacturing and manufacture of furniture (ISIC 20 and 36, 37), manufacture of other non-metallic mineral products (ISIC 26, 24).

Table 4.2 Business Enterprises in Other Cities

	Level 1	Level 2	Level 3
Vientiane Capital	89 (23.4%)	103 (22.1%)	1,503 (6.6%)
Luang Prabang	36 (9.5%)	73 (9.2%)	1,480 (6.5%)
Khammuane	51 (13.4%)	16 (3.4%)	2,236 (9.8%)
Lao PDR	380	467	22,817

Note: No of employee are more than 200 for Level 1, 50 to 199 for level 2 and 10 to 49 for Level 3.
Source: Ministry of Information and Commerce

Table 4.3 indicates Foreign Direct Investment (FDI) in the secondary industry. Vientiane Capital occupies more than 50% in every level of enterprises; on the other hand, percentages of other two provinces are limited in level 2 and level 3. In level 1, percentages of Luang Prabang are the smallest in Regional Cities, and the percentage of Khammuane is the same level as Savannakhet Province.

Table 4.3 Foreign Direct Investment in the Secondary Industry

	Level 1	Level 2	Level 3
Vientiane Capital	49 (59.0%)	44 (53.7%)	41 (51.3%)
Luang Prabang	4 (4.8%)	1 (1.2%)	3 (3.8%)
Khammuane	5 (6.0%)	1 (1.2%)	0 (0.0%)
Lao PDR	83	82	80

Note: No of employee are more than 200 for Level 1, 50 to 199 for level 2 and 10 to 49 for Level 3.
Source: Ministry of Information and Commerce

4.2.4 Service Industry

Table 4.4 indicates tourism statistics in Luang Prabang Province and Vientiane Capital. Number of tourist in Luang Prabang was about 350,000 in 2008. The figure is smaller than Vientiane Capital and Savannakhet Province. However, comparison with the figure without border-pass tourist in these provinces, Luang Prabang Province was the highest number of tourists in the Regional Cities. In comparison with the number of tourist, number of accommodations and accommodation rooms are limited in Luang Prabang. It is necessary to develop more accommodations and/or manage tourists visiting the world heritage site to conserve historical atmosphere.

Table 4.4 Tourism Statistics of Luang Prabang and Vientiane Capital

	Unit	2007	2008
Luang Prabang Province			
Number of Tourists	Persons	311,645	353.028
International tourists	Persons	186,819	242,875
Domestic tourists	Persons	124,826	110,153
Number of hotels	Units	21	36
Number of Hotel Rooms	Rooms	624	924
Number of Guesthouse	Units	203	236
Number of Guesthouse Rooms	Rooms	1,538	1,802
Vientiane Capital			
Number of International Tourists	Persons	761,703	523,051
Border-pass	Persons	558,042	328,789
Others	Persons	203,661	194,262
Number of hotels	Units	79	98
Number of Hotel Rooms	Rooms	3,002	3,773
Number of Guesthouse	Units	169	172
Number of Guesthouse Rooms	Rooms	2,474	2,594

Source: Statistical Yearbook Vientiane Capital and Luang Prabang 2008

Number of the tourists, number of accommodations and number of accommodation rooms are highest

in Vientiane Capital. Vientiane Capital is working as a gateway for international tourists and the most important economic center for Lao PDR.

4.2.5 Public Finance

Table 4.5 indicates public investment in Vientiane Capital. Public investment amount accounted for 174 billion kip, 2.7 times of Savannakhet and Champasack Province. 80 to 90% of the total amount was used for transportation sector in FY2006/07 and FY 2007/08. Like other provinces, around 80% of public investment was financed by foreign resources such as grant aid and loan.

Table 4.5 Public Investment of Vientiane Capital

Unit: million kip

	FY2006/07			FY2007/08		
	Domestic	Foreign	Total	Domestic	Foreign	Total
Agriculture	9,432.2	691.0	10,123.2	8,633.51	691.0	9,324.5
Industry & Commerce	1691.0	0.0	1,691.0	1,905.3	0.0	1,905.3
Public Works and Transport	29,847.9	174,337.1	204,185.0	22,167.4	120,606.5	142,773.9
Energy & Mining	0.0	0.0	0.0	585.6	0.0	585.6
Education	625.5	0.0	625.5	4,098.3	11,410.7	15,509.0
Public Health	458.0	3,704.3	4,162.3	1,516.4	2,500.0	4,016.4
Total	42,054.6	178,732.4	220,787.0	38,906.5	135,208.2	174,114.7

Source: Statistical Yearbook Vientiane Capital 2008

Table 4.6 indicates revenue and expenditure of Vientiane Capital Office. Total revenue in FY2007/08 had dropped a lot due to transfer of two revenue items (tax and "land and houses") to the central government. Total expanse increased from 158 billion kip to 223 billion kip in the same period due to increase of salary and policy support.

Vientiane Capital has its own public investment budget. The amount was 48 billion kip, 28% of public investment by the central government in FY2007/08. Proportion of the public investment by Vientiane Capital to public investment to Savannakhet and Champasack by the central government, was more than 70%. Vientiane Capital conducts a significant level of public investment.

Table 4.7 shows Public investment in Luang Prabang Province. Major investment sector was transportation in both of FY2006/07 and FY2007/08. Education sector received large-scale investment in FY2006/07 most of which came from foreign financial resource. Other than education, agriculture and public health are the major investment sectors.

Table 4.6 Revenue and Expenditure of Vientiane Capital

Unit: million kip

	FY2006/07	FY2007/08
Total Revenue	1,112,297.4	360,800.0
Duty	304,757.0	336,066.0
Tax	771,706.9	-
Land and houses	11,356.5	-
Public Properties	24,477.1	24,733.46
Total Expenses	158,229.0	223,065.0
Salary	62,792.2	102,903.0
Policy Support	26,964.1	36,235.5
Administration	18,493.3	24,260.4
Adjustment and Promotion	8,996.7	8,999.5
Other Coincidental Expenses	3,407.4	999.6
Buy & Rent Fixed Assets	1,396.5	1,694.9
Public Investment	36,178.9	47,972.2

Source: Statistical Yearbook Vientiane Capital 2008

Table 4.7 Public Investment in Luang Prabang Province

Unit Million kip

	2006/07			2007/08		
	Domestic	Foreign	Total	Domestic	Foreign	Total
Agriculture	1,125.3	2,343.2	3,468.5	6,123.8	0.0	6,123.8
Industry	440.0	0.0	440.0	90.0	0.0	90.0
Tourism	300.0	570.0	870.0	0.0	0.0	0.0
Energy & Mines	0.0	0.0	0.0	2,200.0	0.0	2,200.0
Transportation	2,810.0	13,348.9	16,158.9	3,846.2	8,181.1	12,027.3
Education	716.0	11,189.0	11,905.0	1,717.0	263.0	1,980.0
Public Health	666.9	4,285.5	4,952.4	504.7	540.0	1,044.7
Culture	250.0	0.0	250.0	200.0	0.0	200.0
Social Welfare	0.0	150.0	150.0	270.0	0.0	270.0
Other Sectors	5,040.0	0.0	5,040.0	6,205.0	0.0	6,205.0
Total	11,348.2	31,886.6	43,234.8	21,156.7	8,984.1	30,140.8

Source: Statistical Yearbook Luang Prabang Province 2008

4.3 Land Use, Settlement Pattern and Population Density

Table 4.8 shows the profile of existing and planned population and land use of regional cities. Common characteristics of the regional core cities in land use, settlement pattern and population density are described as followings.

- Low urban area ratio: major part of the urban planning area is dominated by agriculture, forest and nature land. The urban area ratio (built-up area per total urban planning area) is lowest in Thakhek (16.8%) and highest in Pakse 29.3%. Even in Pakse, the ratio is not so high in comparison with the other Asian cities.
- Low population density: population density is very low, if compare with other cities in South East Asia Region in general. Vientiane even has the highest population density of 68 persons/ha in built-up area and 14 persons/ha in the total planning area. Other regional core cities show only 30' in built-up area and 10' in the total planning area.
- Small city center area: national capital city of Vientiane has a commercial core in the center of the cities, which covers about 500 ha, with many shops, restaurants, guest houses, and other commercial and service facilities, serving amenity center for both residents and tourists. Similar, but small amenity centers can be seen in Luang Prabang with 150 ha and Pakse with 100 ha. However, there are not distinct amenity centers in Kaysone Phomvihane and Thakhek.
- Most of the residential buildings are independent houses and there are few apartment complexes. The most of the buildings in the country is detached two stories building both in rural and urban area. Even within the central part of the regional core cities, the majority of housing or commercial buildings are same type. There are few 3 stories buildings with commercial floor in the ground and residential floor in the above stories, and 3 to 4 stories buildings of mainly government offices and guesthouses. The highest building such as hotels has 6 to 8 stories sometimes. In Vientiane, there are higher stories hotel buildings, and few apartment complexes such as dormitories, etc.
- Historical quarter: all cities have more or less colonial buildings in the old city quarter. The central part of the Luang Prabang city has many colonial buildings and is listed in the World Heritage of UNESCO, and attract many international tourist. Historical building in Vientiane also attract international tourist. Historical buildings in other cities are not so attractive, because of small number of buildings, bad maintenance and scattered location.
- Limited green area: although they have a plenty of green such as forest, agricultural land, nature in and around cities, the urban type of green, such as park, play ground, sports ground (they have only stadium), botanical garden, flower park, recreational park, are

difficult to find in the regional core cities. Even in Vientiane, they have five parks. However, those park areas are very small (two to three hectares in each) and functioned for just only landscaping.

Table 4.8 Profile of Existing and Planned Population and Land Use of Regional Core Cities

Cities	Population			Urban Area (ha)		Total Area (ha)	Ratio of Urban Area (%)		Population Density (net*)		Population density (gross**)	
	Current	Future	Increase Ratio (%)	Current	Future		Current	Future	Current	Future	Current	Future
Vientiane	296,078 (2004)	394,057 (2015)	2.6	4,335	6,580	20,950	20.7	31.4	68	60	14	19
Kaysone Phomvihane	61,013 (1997)	73,022 (2004)	2.6	1,927	2,318	7,000***	27.5	33.1	32	32	9	10
Pakse	63,383 (1999)	78,792 (2010)	2.0	1,638	2,429	5,580***	29.3	43.5	39	32	11	14
Thalhek	49,379 (2008)	61,384 (2018)	2.2	1,403	2,971	8,334	16.8	35.6	35	21	6	7
Luang Prabang	46,233 (2006)	48,253 (2016)	0.4	NA	1.950	4,740	NA	41.1	NA	25	10	10

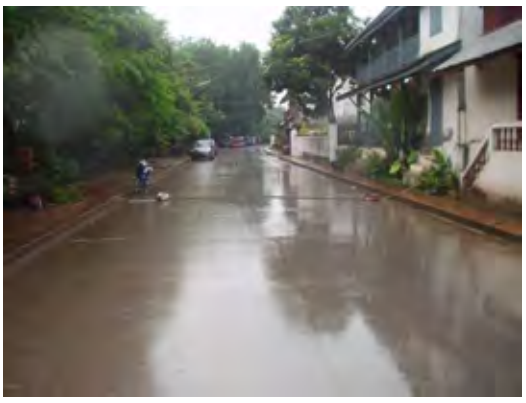
Note: * Net population density is population is divided by urban area. ** Gross population density is population is divided by area of urban planning boundary. *** Areas of the land use plan prepared by PTI are different with the land use plan prepared by the JST in this survey.
Source: PTI

4.4 Infrastructure

4.4.1 Road

(1) Luang Prabang

Luang Prabang urbanized area is divided into east and west parts by Khan River which flows into The Mekong River. Both parts are connected by two bridges constructed on Khan River. One is an old Eiffel bridge. Another one is constructed by ADB assistance in 2003. Total length of road in urbanized area at Luang Prabang is 47.2km. Pavement ratio of road in Luang Prabang is 60%. Ratio of good surface condition of road in Luang Prabang is only 54%.



A road along The Mekong River

Intersection at the downtown

Source: JST

Figure 4.3 Road Condition in Luang Prabang

Some roads and facilities related to road in an urbanized area of Luang Prabang had been improved and newly constructed by assistance of ADB implemented from 1997 to 2003. Followings had been implemented.

- Construction of an 88 meters long two-lane prestressed concrete beam bridge including

riverbank protection, street lighting and 360 meters of approach roads

- Resurfacing of 3,523 meters of town roads
- Reconstruction of 11,273 meters of local access roads
- Junction improvements, 222 pieces of traffic signs, 1,500 square meters of lane markings and 5,566 meters of street lighting

Table 4.9 Present Road Condition in Luang Prabang

Road Surface	Unit	Good	Fair	Poor	Total	Percentage s
Paved	km	25.35	-	2.90	28.25	59.9
Gravel	km	0.32	-	18.63	18.95	40.1
Total	km	25.67	-	21.53	47.2	
Percentages	%	54.4	-	45.6		100

Source: DPWT Luang Prabang

Table 4.10 shows number of vehicles registered in Luang Prabang Province. Total number of vehicles registered in year 2006 was about 27,000. Number and ratio of motor bicycle and car was around 22,500 and 83.5% and around 4,000 and 14.8% respectively. Number of vehicles registered increased year by year. Total number of vehicles registered in year 2008 was about 41,100. Of which, number and share of motor bicycle was about 34,900 and 85.0%. Number and share of car was about 5,600 and 13.6%. Motor bicycle was the dominant transportation mode same as other cities. However, ratio of car was higher than Kaysone Phomvihane and Pakse.

Table 4.10 Number of Vehicle registered in Luang Prabang

Year	Motor bicycle	Car	Truck/Bus	Total
2006	22,512 (83.5%)	4,001 (14.8%)	448 (1.7%)	26,961 (100%)
2007	28,281 (84.4%)	4,742 (14.1%)	500 (1.5%)	33,523 (100%)
2008	34,948 (85.0%)	5,587 (13.6%)	581 (1.4%)	41,116 (100%)

Source: DPWT Luang Prabang

Many temples and historical old buildings exist in an urbanized area of a western bank of Khan River. This area has been designated to a world heritage site by UNESCO. Therefore, design of buildings and roads in this area has been standardized and developed to keep urban landscape as the world heritage site.

Renovated old buildings

An alley that design is standardized

Source: JST

Figure 4.4 Landscape Development along Roads in Luang Prabang

(2) Thakhek

Total length of road in urbanized area at Thakhek is 57.3km. Pavement ratio of road in Thakhek is

51%. 72% of road in Thakhek has good surface condition. Some roads and facilities related to road in an urbanized area of Thakhek had been improved and newly constructed by assistance of ADB implemented from 1997 to 2003. Followings had been implemented.

- A total of 1,925 meters of new main road was built.
- A total of 2,470 meters of road upgrading along the riverbank were built.
- The resurfacing and patching of town centre roads including the badly deformed section of Route 13 was done by others.
- A total of 1,421 meters of new construction of local access roads in designated areas were built.
- Junction improvement, 80 pieces of traffic signs, 1 set of traffic signals and 4,940 meters of street lighting.

New Mekong Bridge construction has started about 4 km north of Thakhek urban center. Thai side is city of Nakhon Phanom.

Road at downtown of Thakhek

Local road under construction

Source: JST

Figure 4.5 Road Condition in Thakhek

Table 4.11 Present Road Condition in Thakhek

Road Surface	Unit	Good	Fair	Poor	Total	Percentages
Paved	km	28.26	0.89	-	29.15	50.8
Gravel	km	8.56	7.72	6.81	23.09	40.3
Earth	km	4.3	-	0.80	5.10	8.9
Total	km	41.12	8.61	7.61	57.34	
Percentages	%	71.7	15.0	13.3		100

Source: DPWT Thakhek

Table 4.12 shows number of vehicles registered in Province. Number of vehicles registered was the smallest among other cities. Total number of vehicles registered in year 2006 was about 21,200. Number and ratio of motor bicycle, car and truck/bus was around 17,400 and 81.9%, around 2,400 and 11.4% and around 1,400 and 6.7% respectively. Number of vehicles registered increased year by year. Total number of vehicles registered in year 2008 was about 28,400. Of which, number and share of motor bicycle was about 21,900 and 77.1%. Number and share of car and truck/bus was about 4,600 and 16.1% and about 1,900 and 6.8% respectively. Motor bicycle was the dominant transportation mode same as other cities. However, ratio of truck/bus was the highest among 5 cities.

Table 4.12 No of Vehicle Registered in Khammuane Province

Year	Motor bicycle	Car	Truck/Bus	Total
2006	17,373 (81.9%)	2,422 (11.4%)	1,416 (6.7%)	21,211 (100%)
2007	20,353 (79.9%)	3,449 (13.6%)	1,666 (6.5%)	25,468 (100%)
2008	21,921 (77.1%)	4,578 (16.1%)	1,929 (6.8%)	28,428 (100%)

Source: DPWT Thakhek

A section of a road running parallel to The Mekong River had been improved. A bank had been protected and a roadway and a sidewalk had been widened. Moreover, trees had been planted on a sidewalk.

Source: JST

Figure 4.6 Landscape Development along Roads in Thakhek

(3) Vientiane

There are 9 bridges and length of each bridge is 12 to 30m. Most of the bridges are located fringe area of Vientiane urban area and 8 out 9 bridges are narrower than 4 m width. There are also 18 RC Box culverts to cross the major drainage streams by major roads in Vientiane.

Many foreign assistance had been supported the urban infrastructure development in capital city of Vientiane, such as Japanese ODA improves major arterial road, French ODA assisted traffic management, Thailand assisted road improvement and railway development, etc.

Lane Xang Street　　Henaboun Street in a downtown

Source: JST

Figure 4.7 Road Condition in Vientiane

Table 4.13 shows number of vehicles registered in Vientiane Capital. Number of vehicles registered was the biggest among other cities. Total number of vehicles registered in year 2006 was about 231,900. Number and ratio of motor bicycle and car was around 171,500 and 74.0%, around 53,300 and 23.0% respectively. Number of vehicles registered increased year by year. Total number of

vehicles registered in year 2008 was about 319,500. Of which, number and share of motor bicycle was about 244,400 and 76.5%. Number and share of car was about 66,700 and 20.9% respectively. Motor bicycle was the dominant transportation mode same as other cities. However, ratio of truck/bus was the highest among 5 cities.

Table 4.13 No of Vehicle Registered in Vientiane

Year	Motor bicycle	Car	Truck/Bus	Total
2006	171,501 (74.0%)	53,255 (23.0%)	7,110 (3.1%)	231,866 (100%)
2007	205,329 (74.5%)	61,559 (22.3%)	8,585 (3.1%)	275,473 (100%)
2008	244,389 (76.5%)	66,675 (20.9%)	8,447 (2.6%)	319,511 (100%)

Source: DPWT of Vientiane Capital

4.4.2 Public Transport

There is no public transportation service such as a bus on a regular route in urban area of Luang Prabang and Thakek. Tuk-Tuks and Sonteos, which are operated by individuals and families, are main mass transportation means for people.

On the other hand there exists The State Bus Company of Vientiane (VSBC) in Vientiane. This company owns 118 buses and operates 10 bus routes by 51 buses within the Vientiane urban area of Vientiane Capital. 97 of 118 buses had been granted by Japan's ODA in year 1988 and year 2000.

4.4.3 Transport Facilities

(1) Airport

There exists one airport at Luang Prabang and Vientiane, respectively, but not in Thakhek.

Luang Prabang Airport has a 2,200m long runway and it is located at eastern part of Khan River. International flights are being operated between Bangkok, Changmai and Udon Thani in Thailand, Hanoi in Vietnam and Siemreap in Cambodia and Luangprabang. There are daily flights between Hanoi and Luang Prabang. Operating day of a flight between Bangkok and Luang Prabang is 5days in a week. Operating day of a flight between Changmai and Luang Prabang and Siemreap and Luang Prabang is 4days a week.

Two routes of a domestic flight exist at this airport connecting between Vientiane and Pakse. Two or three flights are being operated every day between Vientiane and Luang Prabang. There are 2 operating days a week between Pakse and Luang Prabang. Expansion of runway, terminal building, etc is being implemented with Chinese technical assistance.

Table 4.14 Fright Schedule at Luang Prabang Airport

	Country	City	No. of operating day a week	No of flight a day
International	Thailand	Bangkok	5 days	1 flight
		Changmai	4 day	1 flight
		Udon Thani	1 day	1 flight
	Vietnam	Hanoi	Daily	1~2 flights
	Cambodia	Siemreap	4 day	1~2 flights
Domestic	Laos	Vientiane	Daily	2~3 flights
		Pakse	2 days	1 flight

Source: JST

An airport terminal building

Airport improvement plan

Source: JST

Figure 4.8 Luang Prabang Airport

Wattay International airport is located western part of Vientiane urban area with a 3,000m long runway.

Table 4.15 Fright Schedule at Vientiane Airport

	Country	City	No. of operating day a week	No. of flight a day
International	Thailand	Bangkok	Daily	4 flights
	Vietnam	Hanoi	Daily	1 flight
			5 days	1 flight
	Cambodia	Phnompenh	Daily	1 flight
		Siemreap	4 days	1 flight
	China	Kunming	4 days	1 flight
Domestic	Laos	Luang Prabang	Daily	2~3 flights
		Pakse	3~4 days	1~2 flights
		Xieng Khuang	4 days	1 flight
		Oudom Xay	3 days	1 flight
		Houeisay	3 days	1 flight
		Luang Namth	3 days	1 flight
		Kaison Phomevihane	3 days	1 flight

Source: JST

Vientiane is connected 5 cities in 4 countries by plane. These cities and countries are Bangkok in Thailand, Hanoi in Vietnam, Phnompenh and Siemreap in Cambodia, and Kunming in China. 4 flights a day are being operated every day between Bangkok and Vientiane and 2 flights a day between Hanoi and Vientiane. There is a daily flight between Phnompenh and Vientiane. A flight is being operated 4days a week between Siemreap and Vientiane and Kunming and Vientiane. Seven domestic cities are being connected to Vientiane by an airplane. These cities are Luang Prabang, Pakse, Xieng Khuang, Oudom Xay, Houeisay, Luang Namth and Kaysone Phomvihane. Two or three flights are being operated daily between Luang Prabang and Vientiane. A plane or two is being operated three or four days a week between Pakse and Vientiane. A flight is being operated three days a week between other cities and Vientiane.

New Vientiane International Airport development plan is being implemented and a candidate location is Km25 of Highway No.13. Designated area is 2,400ha.

(2) River Port

Louangprabang: Some piers for passenger boats exist near the National Museum facing to The Mekong River in Luang Prabang. Residents use ferryboats for crossing the river and going to the other side of the river, Chomphet district. Tourists also use boats to enjoy going up and down the

Mekong River.

A passenger ferry pier

Passenger and tourist ferry boats

Source: JST

Figure 4.9 Ferry Pier at Luang Prabang

Thakhek: There is a passenger ferry pier at the center of urban area of Thakhek and passenger ferry boats crossing The Mekong River to Mukudahan, Thailand are being operated. Residents in Thakehk use it regularly for shopping of daily goods at Mukudahan. A cargo ferry pier is located next to a passenger ferry pier. Many cargo trucks use this facility to import and export goods at present. However, construction plan of a bridge over The Mekong River and connecting Thakhek, Laos and Mukudahan, Thailand is being implemented. Therefore, when a bridge construction will be finished, Present cargo pier will be closed and all vehicles will use a new bridge.

A passenger ferry pier and a passenger boat

Cargo trucks and a cargo ferryboat

Source: JST

Figure 4.10 Passenger and Cargo Ferry Pier at Thakhek

Vientiane: There are two ports in Vientiane, one is for domestic transport for cargo and passengers, and another is for local community use. After completion of the Mekong Bridge and national roads improvement in Laos, river transport has been minor transport means.

(3) Bus Station

(a) Louangprabang

There are two bus stations for international, inter-provincial and inner-provincial buses at the north-eastern part (Nothern Bus Terminal) and south-western part (Southern Bus Terminal) of Luang Prabang. There is one international bus route to Vinh in Vietnam through Namkanh and one bus is operated 3 days a week. 10 buses in a day are operated at one day between Vientiane and Luang Prabang.

Table 4.16 International/Inter City Bus Schedule at Luang Prabang

	Country	City	No of Bus Operation a day	Remark and Border Point
International	Vietnam	Vinh	1 (3days a week)	Namkanh
Domestic	Laos	Vientiane	10	Include 3 express and 1 VIP bus

Source: Lao Airlines Summer Schedule 2009 from 29 Mar. to 24 Oct 09

A waiting place

Buses at a terminal

Source: JST

Figure 4.11 Bus Terminal at Luang Prabang

(b) Thakhek

Thakhek has one bus station on NR13. There are two international bus routes going to Dong Hoi and Danang via Hue in Vietnam. One bus is operated every day on each route. Five buses connect Thakhek with Vientiane every day.

Table 4.17 International/Inter City Bus Schedule at Thakhek

	Country	City	No of Bus Operation a day	Remark and Border Point
International	Vietnam	Dong Hoi	1	Nampao
		Hue, Danang	1	Daensavan
Domestic	Laos	Vientiane	5	

Source: Lao Airlines Summer Schedule 2009 from 29 Mar. to 24 Oct 09

A terminal building and a bus

A ticket selling office

Source: JST

Figure 4.12 Bus Terminal at Thakhek

(c) Vientiane

There are three bus Terminals for international, inter-provincial and inner-provincial buses. These are Northern Bus Station, Morning Market Bus Station and Southern Bus Station in Vientiane.

Vientiane is connected with 8 foreign cities in 3 neighboring countries by an international bus. These cities are Bangkok, Nongkhai, Oudonthani and Khonkaen in Thailand, Kunming in Chain, and Hanoi, Danang and Ho Chi Minh in Vietnam. An international bus connecting these cities is operated every day except Ho Chi Minh. 26 main cities in Laos are connected with Vientiane, a capital of Laos by an inter-provincial bus. 15 buses are operated between Vientiane and Pakse every day. 10 buses are operated between Vientiane and Luang Prabang, and Vientiane and Bankern every day. A bus is operated every hour between Vientiane and Thalat.

Table 4.18 International/Inter City Bus Schedule at Vientiane

Northern Bus Station

	Country	City	No of Bus Operation a day	Remark and Border Point
International	Thailand	Bangkok	1	Friendship Bri. 1
	China	Kunming	1	Botene
Domestic	Laos	Bokeo	1 (3 days a week)	
		Luangnamtha	1	
		Phongsaly	1	
		Oudomxay	5	Include 2 express
		Xamneua	3	
		Luang Prabang	10	Include 3 express and 1 VIP bus
		Xayabouly	3	Include 2 express
		Xieng Khuang	5	Include 2 VIP bus
		Kasi	2	
		Xaisomeboune	1	
		Vangvieng	3	
		Thalat	Every Hour	
		BanKern	10	

Source: Lao Airlines Summer Schedule 2009 from 29 Mar. to 24 Oct 09

Morning Market Bus Station

	Country	City	No of Bus Operation a day	Remark and Border Point
International	Thailand	Nongkhai	4	Friendship Bridge
		Oudonthani	4	
		Khonkaen	1	
Domestic	Laos	Around Vientiane Cities		
		Friendship Bridge	Every Hour	
		Buddha Park	Every Hour	

Source: Lao Airlines Summer Schedule 2009 from 29 Mar. to 24 Oct 09

Southern Bus Station

	Country	City	No of Bus Operation a day	Remark and Border Point
International	Vietnam	Hanoi	1	Nampao
		Danang	2	Daensavan
		Ho Chi Minh	1 (2 days a week)	
Domestic	Laos	Ban Na	2	
		Paksan	5	
		Laksao	3	
		Thakhek	5	
		Kaison Phomevihane	7	Include 1 VIP bus
		Kengkok	1	
		Pakse	15	Include 7 express and 1 VIP bus
		Salavan	1	
		Sekong	1	
		Attapeu	4	Include 1 VIP bus
		Donekhong	1	
		Donetalat	1	
		Vearnkham	1	

Source: Lao Airlines Summer Schedule 2009 from 29 Mar. to 24 Oct 09

4.4.4 Water Supply

(1) Vientiane Capital City

(a) Nam Papa Nakhoneluang (Vientiane Capital City State-Owned Water Supply Enterprise)

Nam Papa Nakhoneluang (Nam Papa NKL) is a state-owned water supply enterprise and one of seventeen (17) state-owned enterprises in Lao PDR. Nam Papa NKL supplies water to the served area in Vientiane capital city. Served area is around 2,650 km2. Number of employees is 487, 372 of which are permanent employees and 115 of which are temporary employees as of 2009.

Existing Water Supply Facilities of Nam Papa Nakhoneluang in Vientiane Capital City:

Construction of Kaolieo water treatment plant of the state-owned enterprise in Vientiane capital city had started in 1964 by Japan's Grant Aid and after completion of this project Vientiane water supply system had been established. After this, Kaolieo WTP was rehabilitated in 1983 and expanded from 20,000 m^3/day to 60,000 m^3/day between 2007 to 2008 by Japanese Grant Aid.

Chinaimo water treatment plant with a capacity of 40,000 m^3/day was constructed in 1980 funded by ADB and rehabilitation and expansion of Chinaimo WTP was conducted by Japan's Gran Aid from 1992 to 1996. After this project the treatment capacity of Chinaimo became 80,000 m^3/day.

There are another three (3) treatment plants, Dongmakkai treatment plant, Thadeua treatment plant and Thangon treatment plant, in Vientiane capital city. The production capacity of each treatment plant is 20,000 m^3/day for Dongmakkai, 500 m^3/day for Thadeua and 900 m^3/day for Thangon, respectively.

AFD (French Development Agency), ADB, WB and others (Norway and Kingdom of Belgium) are foreign donor organizations/institutions and countries for Nam Papa Nakhoneluang.

The total water supply pipeline length is 706.0 km. The size of the pipeline ranges from 40 mm to 1000 mm. Table 4.19 shows existing facilities of Nam Papa Nakhoneluang.

Table 4.19 Existing Nam Papa Nakhoneluang Water Supply Facilities

Facility	Detailed Item	Description
WTP (Water Treatment Plant)	Kaolieo water treatment plant	Production Capacity, Q = 60,000 m^3/day
	Chinaimo water treatment plant	Production Capacity, Q = 80,000 m^3/day
	Dongmakkai treatment plant	Production Capacity, Q = 20,000 m^3/day
	Thadeua treatment plant	Production Capacity, Q = 500 m^3/day
	Thangon treatment plant	Production Capacity, Q = 900 m^3/day
	Total	Q = 161,400 m^3/day
Reservoir	Elevated Water Tank	V = 1,500 m^3 (Phonethane)
	Ditto	V = 2,000 m^3 (Phonekheng)
	Ditto	V = 2,000 m^3 (Xamkhe)
	Ditto	V = 1,500 m^3 (Phonetong)
	Ditto	V = 660 m^3 (Dongdok)
	Ditto	V = 1,000 m^3 (Navaythong)
	Ground Reservoir	V = 15,000 m^3 (Kaolieo WTP)
	Ditto	V = 12,600 m^3 (Chinaimo WTP)
	Ditto	V = 1,500 m^3 (Salakham)
	Ditto	V = 1,000 m^3 (Nongteng))
	Ditto	V = 1,000 m^3 (Dongdok))
	Total	V = 40,000 (39,760) m^3
Pumping Station	Booster Pumping Station	Km6 P/S
	Ditto	Km12 P/S
	Ditto	Nongteng P/S
	Lifting Pumping Station	Dongdok
Pipeline	Transmission and Distribution pipe	Pipe size; 40 mm – 1000 mm Total Length =705,613 m

Source: Nam Papa Nakhoneluang

Figure 4.13 shows existing Kaolie WTP and water intake. Figure 4.14 shows Chinaimo WTP and water intake of Nam Papa Nakhoneluang water supply system.

Figure 4.13 Existing Kaolie WTP and Water Intake

Figure 4.14 Existing Chinaimo WTP and Water Intake

Numbers of Population and House Connection (Water Meter) and Served Population in Vientiane Capital City:

Numbers of population and house connection and served population in Vientiane capital city from 2004 to 2008 are shown in Table 4.20.

Table 4.20 Numbers of Population, House Connection and Served Population

Item	Unit	2004	2005	2006	2007	2008
Population in District	Persons	669,467	698,318	718,569	725,820	746,143
Population in Served Area	Persons	603,773	625,560	643,701	648,856	667,024
Served Area	Km2	2,652	2,652	2,652	2,652	2,652
Number of House Connection (Water Meter)	Unit	45,971	50,081	54,320	58,750	62,851
Served Population	Persons	285,678	286,935	308,347	328,895	343,640
Rate of Served population in District	%	43	41	43	45	46
Rate of Served population in Served Area	%	47	46	48	51	52

Note: All numbers of population are estimated values by Nam Papa Nakhoneluang
Source: Nan Papa Nakhoneluang

(b) Current Water Productions, Water Consumption and Non Revenue Water

Current water productions, water consumption for domestic and non-domestic and non-revenue water (water leakage) from 2004 to 2008 is shown in the following table:

Table 4.21 Current Water Production, Water Consumption and Non Revenue water

Item	Unit	2004	2005	2006	2007	2008
Average Daily Water Production	m^3/day	118,400	120,200	119,020	134,800	136,400
Maximum Daily Water Production	m^3/day	-	-	-	-	-
Rate of Loading	%	-	-	-	-	-
Average Daily Water Consumption	m^3/day	83,520	86,330	86,790	97,430	99,120
Domestic Water Consumption	m^3/day	47,360	50,230	51,000	58,330	59,890
Non-Domestic Water Consumption	m^3/day	36,160	36,100	35,790	39,100	39,230
Rate of Non Revenue water	%	29	28	27	28	27

Source: Nan Papa Nakhoneluang

Unit Water Consumption (Daily Per Capita Consumption) in Nam Papa Nakhoneluang:

Unit water consumption (litter/cap/day) can be estimated by water consumption divided by served population. The following table shows water consumption for every year since 2004.

Table 4.22 Unit Water Consumption

No	Item	Unit	2004	2005	2006	2007	2008
1	Water Consumption	m^3/day	83,520	86,330	86,790	97,430	99,120
2	Domestic Consumption	m^3/day	47,360	50,230	51,000	58,330	59,890
3	Served Population	person	285,678	286,935	308,347	328,895	343,640
4	Unit Water Consumption (= 1/3)	litter/cap/day	292	300	281	296	288
5	Domestic Unit Water Consumption (= 2/3)	litter/cap/day	166	175	165	177	174

Source: Lao PDR Annual Urban Water Sector Performance Report 2007

Financial Condition of Nam Papa Nakhoneluang:

The sales revenue of the Nam Papa NKL comes from water sales, new connections fee and rental fees of water meters. The total expenditure of the Nam Papa NKL consists of the salary, repairing cost, connection fees, electricity expense and so on. Profit and loss statement and key indicators for three years, year of 2005, 2006, and 2007 is shown in Table 4.23.

Table 4.23 Financial Condition of Nam Papa Nakhoneluang

Unit: billion kip (USD000)

	2005	2006	2007
Sales Revenue (Turnover)	34.76 (4,090)	41.48 (4,880)	49.45 (5,820)
Expenditure (Operating Cost)	29.69 (3,490)	32.29 (3,800)	34.00 (4,000)
Net Income	5.08 (598)	9.19 (1,080)	15.45 (1,820)
Depreciation	-13.5 (-1,590)	-15.10 (-1,780)	-15.4 (-1,810)
Return on Capital	-3.1 %	-1.7 %	0.0 %

Note: Exchange rate is USD1.0 = Kip 8,500
Source: Lao PDR Annual Urban Water Sector Performance Report 2007

Based on the above table net income for three years was surplus. Return on capital shows that financial condition of Nam Papa Nakhoneluang is good.

(2) Luang Prabang

Nam Papa Luang Prabang (Luang Prabang State-Owned Water Supply Enterprise):

Nam Papa Luang Prabang (LP) is one of seventeen (17) state-owned water supply enterprises in Lao PDR. Nam Papa Luang Prabang supplies water to the served area in Luang Prabang District. Served area is around 16,600 ha. Number of employee is 68 as of 2009.

Existing Water Supply Facilities of Nam Papa Luang Prabang:

Water supply system in Luang Prabang was established in early 1930's financed by French Government. At this moment water source was a spring on Phou Phueng. In 1969 a new Phou Phueng water treatment plant with a capacity of 6,000 m^3/day was constructed financed by Germany Government and its water source was also spring. In 1990 expansion of WTP was conducted by German's Grand Aid and the capacity of WTP became to 9,000 m^3/day from 6,000 m^3/day. In 2001 a new Nam Khan WTP with a capacity of 6,000 m^3/day was constructed by German's Grant Aid and which water source was surface water, Nam Khan River. At the same time a new Phou Khoua Ti Nueng reservoir with a capacity of 1,570 m^3, new transmission line and distribution main were also constructed by same fund, German's Grant Aid. The total water supply pipeline length is around 74.0 km. The size of the pipeline ranges from 50 mm to 350 mm. Table 4.24 shows the current existing facilities of Nam Papa Luang Prabang.

Table 4.24 Existing Nam Papa Luang Prabang Water Supply Facilities

Name of Facility	Detailed Item	Description
WTP (Water Treatment Plant)	Phou Phueng water treatment plant	Production Capacity, Q = 9,000 m^3/day, Three springs
	Nam Khan water treatment plant	Production Capacity, Q = 6,000 m^3/day
	Total	Q = 15,000 m^3/day
Reservoir	Ground Reservoir	V = 1,400 m^3 (Phou Si)
	ditto	V = 1,570 m^3 (Phou Khoua Ti Nueng)
	ditto	V = 375 m^3 (Nam Khan WTP)
	Total	V = 3,345 m^3
Water Supply Pipeline	Transmission and Distribution pipe	Pipe size; 50 mm – 350 mm Total Length =74,000 m

Source: Nam Papa Luang Prabang

Figure 4.15 shows existing Nam Khan WTP and water intake of Nam Papa Luang Prabang.


Figure 4.15 Luang Prabang WTP and Water Intake

Numbers of Population and House Connection (Water Meter) and Served Population in Luang Prabang District:

Numbers of population and house connection and served population in Luang Prabang district from 2004 to 2008 is shown in Table 4.25.

Table 4.25 Numbers of Population, House Connection and Served Population

Item	Unit	2004	2005	2006	2007	2008
Population in District	Persons	68,061	69,686	72,525	75,063	77,315
Population in Served Area	Persons	47,800	48,750	49,200	50,880	51,829
Served Area	ha	10,000	12,500	13,600	14,500	16,600
Number of House Connection (Water Meter)	Unit	6,538	6,843	7,250	7,649	8,158
Served Population	Persons	39,600	40,500	41,200	43,000	44,259
Rate of Served population in District	%	58	58	57	57	57
Rate of Served population in Served Area	%	83	83	84	85	85

Note All numbers of population are estimated values by Nam Papa Luang Prabang
Source: Nam Papa Luang Prabang

Current Water Productions, Water Consumption and Non Revenue Water:

Current water productions, water consumption for domestic and non-domestic and non-revenue water (water leakage) from 2004 to 2008 is shown in Table 4.26.

Table 4.26 Current Water Production, Water Consumption and Non Revenue water

Item	Unit	2004	2005	2006	2007	2008
Average Daily Water Production	m^3/day	12,274	13,053	14,442	15,085	16,290
Maximum Daily Water Production	m^3/day	13,500	13,800	15,000	16,000	16,500
Rate of Loading	%	91	95	96	94	99
Average Daily Water Consumption	m^3/day	10,067	10,485	11,679	12,152	12,991
Domestic Water Consumption	m^3/day	7,877	8,245	8,470	7,505	7,822
Non-Domestic Water Consumption	m^3/day	2,190	2,240	3,208	4,647	5,169
Rate of Non Revenue water	%	18	20	19	19	20

Source: Nan Papa Luang Prabang

Unit Water Consumption (Daily Per Capita Consumption) in Nam Papa Luang Prabang

Unit water consumption (litter/cap/day) can be estimated by water consumption divided by served population. The following table shows water consumption for every year since 2004.

Table 4.27 Unit Water Consumption

No	Item	Unit	2004	2005	2006	2007	2008
1	Water Consumption	m^3/day	10,067	10,485	11,679	12,152	12,991
2	Domestic Consumption	m^3/day	7,877	8,245	8,470	7,505	7,822
3	Served Population	person	39,600	40,500	41,200	43,000	44,259
4	Unit Water Consumption (= 1/3)	litter/cap/day	254	259	283	283	294
5	Domestic Unit Water Consumption (= 2/3)	litter/cap/day	199	204	206	175	177

Source: Lao PDR Annual Urban Water Sector Performance Report 2007

Financial Condition of Nam Papa Luang Prabang:

The sales revenue of the Nam Papa Luang Prabang comes from water sales, new connections fee and rental fees of water meters. The total expenditure of the Nam Papa Luang Prabang consists of the salary, repairing cost, connection fees, and electricity expense and so on. Profit and loss statement and key indicators for three years, year of 2005, 2006, and 2007 is shown in the following table,

Table 4.28 Financial Condition of Nam Papa Luang Prabang

Unit: billion kip (USD000)

	2005	2006	2007
Sales Revenue (Turnover)	3.58 (421)	4.58 (539)	5.92 (696)
Expenditure (Operating Cost)	2.81 (330)	3.34 (393)	3.77 (444)
Net Income	0.8 (94)	1.24 (146)	2.15 (253)
Depreciation	-0.92 (-108)	-1.69 (-199)	-1.62 (-191)
Return on Capital	-0.8 %	-1.3 %	+1.1 %

Note: Exchange rate is USD 1.0 = Kip 8,500
Source: Lao PDR Annual Urban Water Sector Performance Report 2007

Based on the above table net income for three years was surplus. Return on capital shows that financial condition of Nam Papa Luang Prabang is good

(3) Thakhek

Nam Papa Khammuane (Khammuane State-Owned Water Supply Enterprise):

Nam Papa Khammuane (KM) is one of seventeen (17) state-owned water supply enterprises in Lao PDR. Nam Papa Khammuane supplies water to the served area in Thakhek district. Served area is around 14,400 ha and number of employee is 57 as of 2009.

Existing Water Supply Facilities of Nam Papa Khammuane:

Water supply system in Thakhek district was established in 1995 financed by EU. Water source is three deep wells located at 3 km from the city center. Original water supply facilities were three deep wells, raw water transmission pipeline which length is 6,445 m with pipe size of 400 mm, distribution pipe and reservoir with capacity of 1,650 m^3. The designed amount of water from the deep wells was 4,000 m^3/day, however, amount of pump discharge water from the wells was only 2,000 m^3/day during the dry season. In 2001 the Government of Thakhek had contracted with the local contractor to construct the temporary water treatment facility including intake facilities at the Mekong River with water production capacity of 2,500 m^3/day. It was financed by local government budget. The location of the water treatment plant is just beside the existing reservoir around 4.5 km from the Mekong River hence the length of raw water transmission pipeline is 4.5 km. Water intake facilities like intake pumps were set on the temporary boat. The total water supply pipeline length including raw water transmission pipeline is around 63.5 km. The size of the pipeline ranges from 50 mm to 400 mm. The following table shows the current existing facilities of Nam Papa Khammuane.

Table 4.29 Existing Nam Papa Khammuane Water Supply Facilities

Name of Facility	Detailed Item	Description
WTP (Water Treatment Plant)	Three deep wells	Production Capacity, Q = 4,000 m^3/day during rainy season and 2,000 m^3/day in dry season, Three springs
	Temporary water treatment plant	Production Capacity, Q = 2,500 m^3/day
	Total	Q = 4,500 – 6,500 m^3/day
Reservoir	Ground Reservoir	V = 1,650 m^3
	Total	V = 1,650 m^3
Water Supply Pipeline	Transmission and Distribution pipe	Pipe size; 50 mm –400 mm Total Length =63,500 m

Source: Nam Papa Khammuane

Figure 4.16 shows existing WTP and water intake of Nam Papa Khammuane.

Figure 4.16 Existing WTP and Water Intake of Nam Papa Khammuane

(a) Numbers of Population and House Connection (Water Meter) and Served Population in Thakhek District

Numbers of population and house connection and served population in Thakhek District from 2004 to 2008 is shown in Table 4.30.

Table 4.30 Numbers of Population, House Connection and Served Population

Item	Unit	2004	2005	2006	2007	2008
Population in District	Persons	81,109	83,957	86,056	88,207	90,412
Population in Served Area	Persons	36,161	37,222	38,176	39,155	40,134
Served Area	ha	14,400	14,400	14,400	14,400	14,400
Number of House Connection (Water Meter)	Unit	3,745	3,999	4,240	4,508	4,815
Served Population	Persons	22,470	23,994	25,440	27,048	28,890
Rate of Served population in District	%	28	29	30	31	32
Rate of Served population in Served Area	%	62	64	67	69	72

Note: All numbers of population are estimated values by Nam Papa Khammuane
Source: Nan Papa Khammuane

Current Water Productions, Water Consumption and Non Revenue Water:

Current water productions, water consumption for domestic and non-domestic and non-revenue water (water leakage) from 2004 to 2008 is shown in Table 4.31.

Table 4.31 Current Water Production, Water Consumption and Non Revenue water

Item	Unit	2004	2005	2006	2007	2008
Average Daily Water Production	m^3/day	4,993	5,277	5,896	6,898	6,469
Maximum Daily Water Production	m^3/day	6,504	5,500	6,200	7,200	6,469
Rate of Loading	percenmt	78	96	95	96	100
Average Daily Water Consumption	m^3/day	3,752	4,126	4,582	5,265	5,110
Domestic Water Consumption	m^3/day	2,733	2,826	3,137	3,638	3,770
Non-Domestic Water Consumption	m^3/day	1,019	1,300	1,445	1627	1,340
Rate of Non Revenue water	percent	25	22	22	24	21

Source: Nan Papa Khammuane

(b) Unit Water Consumption (Daily Per Capita Consumption) in Nam Papa Khammuane

Unit water consumption (litter/cap/day) can be estimated by water consumption divided by served population. The following table shows water consumption for every year since 2004.

Table 4.32 Unit Water Consumption

No	Item	Unit	2004	2005	2006	2007	2008
1	Water Consumption	m^3/day	3,752	4,126	4,582	5,265	5,110
2	Domestic Consumption	m^3/day	2,733	2,826	3,137	3,638	3,770
3	Served Population	person	22,470	23,994	25,440	27,048	28,890
4	Unit Water Consumption (= 1/3)	litter/cap/day	167	171	180	195	177
5	Domestic Unit Water Consumption (= 2/3)	litter/cap/day	122	118	123	135	130

Source: Lao PDR Annual Urban Water Sector Performance Report 2007

(c) Financial Condition of Nam Papa Khammuane

The sales revenue of the Nam Papa Khammuane comes from water sales, new connections fee and rental fees of water meters. The total expenditure of the Nam Papa Khammuane consists of the salary, repairing cost, connection fees, electricity expense and so on. Profit and loss statement and key indicators for three years, year of 2005, 2006, and 2007 is shown in the following table,

Table 4.33 Financial Condition of Nam Papa Khammuane

Unit: billion kip (USD 000)

Item	2005	2006	2007
Sales Revenue (Turnover)	2.87 (338)	2.92 (344)	3.70 (435)
Expenditure (Operating Cost)	2.32 (273)	1.78 (209)	2.45 (288)
Net Income	0.5 (59)	1.14 (134)	1.24 (146)
Depreciation	-1.59 (-187)	-1.54 (-181)	-1.67 (-196)
Return on Capital	-2.6 %	-0.9 %	+1.0 %

Note: Exchange rate is USD1.0 = Kip 8,500
Source: Lao PDR Annual Urban Water Sector Performance Report 2007

Based on the above table net income for three years was surplus. Return on capital shows that financial condition of Nam Papa Khammuane is good.

4.4.5 Drainage and Flood Mitigation

(1) Vientiane

(a) General Condition

Vientiane city is located in the alluvial plain of the Mekong River which flows along the international border between Lao PDR and Thailand. There are several marches or swamps in the inner land which were used as drainage retention ponds prior to discharging to the Mekong River. The meteo-hydrological characteristics over the Vientiane are mainly governed by seasonal monsoons. The

rainy season, which is influenced by the southwestern monsoon, starts in mid-May and ends in mid-October in which heavy rain is between August and September with average annual rainfall 1,600 mm/year.

In Vientiane city, storm water drainage consists of roadside drains leading ultimately to natural streams or rivers. Drains are generally not adequately interconnected and do not form a network. Drains are lined in the center area, and covered in front of commercial establishments. Water in the drainage system is invariably contaminated with fecal matter from latrines and E. coli form septic tank effluent, presenting health risks. The absence of overall urban drainage plans with a functioning integrated network combined with lack of clear arrangements for maintenance causes flooding and stagnant water pools over large parts of the urban center. Sanitation system in VCC entails an on-site disposal of human waste without any introduction of full water-based sewerage with treatment facility and safe disposal arrangements. Such a system continues to have a detrimental impact on the public health by mixing sewage in the storm drainage system, polluting the natural water courses in the medium and the long term.

The drainage system in Vientiane has improved a lot as a result of the assistance projects from ADB through the Vientiane Urban Infrastructure and Services Project where several primary, secondary and tertiary drainage channels were improved and added. Several assistant projects have been provided also from JICA from year 1990 to present to improve the drainage system in Vientiane. These assistances have greatly mitigated perennial flooding and led to better environmental sanitation and community health to Vientiane people especially in the inner core city area. In urban areas of the Vientiane, flood depth is generally not so deep, but frequent flooding causes damage to the assets of the people and interrupts transportation. The people living in the flood-prone areas apply several flood proofing measures to protect from flooding by themselves such as construction of high-floor houses and construction of walls.

(b) Responsible Agency

VUDAA is the main responsible agency in the drainage and flood mitigation activity in Vientiane. Their role is also on solid waste management, issuing permission for small housing and maintenance of road and street lighting in Vientiane.

(2) Luang Prabang

(a) General Condition

Luang Prabang is located on the confluence of the Mekong and Nam Khan rivers, about 500 kilometers from Vientiane and 200 meters above sea level. Most of the storm water drains via open and covered channel along the roads to the natural river inside prior to drain to the Namkan and the Mekong River at the end point. Rainy season in the area starts from May to October in which heavy rain is between July and August with average annual rainfall 1,300 mm./year.

The drainage system in the urban area consists of roadside drains leading ultimately to natural streams and rivers with final discharge to the Namkan or the Mekong River. The drainage network and flood mitigation system in Luang Prabang was improved in year 2000 – 2003 from the ADB Assistance under the Secondary Towns Urban Development Project where Luang Prabang was one of the five towns in the project. The main, secondary and tertiary drainage channel in the town area were greatly improved resulting in less flood occurs. In the ADB Secondary Towns Project, some sections of the tertiary channels were changed from trapezoidal to rectangular (some covered) to minimize land acquisition, to conform to United Nations Educational, Scientific, and Cultural Organization (UNESCO). The improvement and lining of 19 drainage outlets to the Mekong River was reduced due to the objections from UNESCO since it might disturb the conservation area.

Some part of the riverbank protection was constructed to prevent erosion for the Namkan River from the ADB Secondary Town Project but the protection for the Mekong River bank was cancelled.

(b) Responsible Agency

UDAA is responsible for urban planning, infrastructure, and urban services provision, including solid waste management, water and sanitation, drainage, roads and riverbank maintenance and improvements, and the management of public parks. In Luang Prabang there is a special committee establishing for the World Heritage Conservation Activity called Provincial Committee for Preservation of Historical, Cultural and Natural Heritage. This Committee is chaired by the Chair of District 1 of Luang Prabang (equivalent to mayor) and additionally composed of directors from the Department of Communication, Transport, Post and Construction (CTPC), the Department of Information and Culture (DIC), and the Department of Tourism, among others, who bring expertise concerning urban codes, construction monitoring, cultural heritage policy, tourism, and other social concerns. The Provincial Committee of Preservation is an advisory body of principal provincial government departments that meet in order to integrate conservation efforts with town development. Recent activity of this Committee is also on drainage and sewage works, as well as river bank consolidation.

The UDAA in Luang Prabang is trying to provide the information available in the database to resolve village conflicts, such as disputes caused by drainage, wastewater, and noise levels in the future.

(3) Thakhek

Thakhek is the capital city of Khammouane Province located in the mid-south of Lao PDR on the way to Savannakhet. Thakhek District is mostly flat area with long boundary attached to the Mekong River. The urban area is along the Mekong River bank with low density housing and commercial buildings. Most of the storm water drains via open channel or storm water pipe and manholes along the roads to the natural canal inside the district prior to drain to the Mekhong River at the end point. Rainy season in the area starts from May to September in which heavy rain is between June and August with average annual rainfall approximately 2,300 mm/year which is the highest in the secondary towns.

The drainage system in the urban area consists of roadside drains leading ultimately to natural streams and rivers which are main drainage channel and final discharge to the Mekong River. The drainage network and flood mitigation system in Thakhek was improved in year 2000 – 2003 from the ADB Assistance under the Secondary Towns Urban Development Project where Thakhek was one of the five towns in the project. The main, secondary and tertiary drainage channel in the town area were improved and added with 3 locations of flap gates and sliding gates at the outlets along the Mekong River and 3 flap gates only at the box culverts for the mainstream, but all with no pumps. Rising of the elevation of some road embankments along the Mekong River along the Mekong River was also included in the ADB Secondary Town Project. But without drainage pumps floods frequently occur inside the community area.

4.4.6 Sewer and Sewerage Treatment Facility

(1) Vientiane

(a) Current Situation

In Vientiane, water and sanitation management in the urban area is experiencing stagnant pollution. Unsanitary conditions and threat of seasonal pollution in selected spots is likely to occur and increase with the growing urban population. The sanitation system entails an on–site disposal of human waste without introduction of full water-borne sewerage with treatment facility and safe disposal arrangement. The majorities of households rely on water flush latrines and are connected to a pit or chamber for containment of excreta. However, due to the low permeability of the soil and the high groundwater table around Vientiane, many soak-a-ways fail to operate effectively resulting in discharge of sewage from tanks into drainage channels or low lying areas. This results in polluted effluent overflows, environmental degradation and health hazards. The urban area of Vientiane is located between the Mekong River and a hinterland of swamps and ponds. The wastewater from

individual households in Vientiane is discharged into open drains along the roads and into the natural wetlands in and around the city.

According to the National statistics in year 2005, approximately 90% of households in Vientiane Capital have access to proper toilets facilities which is increasing every year. This shows that coverage is relatively good, but methods adopted for treatment and disposal of wastewater are generally not satisfactory and maintenance is poor. This is in certain areas exaggerated by flat terrain, high water table and low soil permeability, lack of maintenance, resulting in failure of the systems, overflow of effluent and pollution of surface waters and drains. Most households rely on pour-flush or dry latrines for black water disposal and soak pits for grey water disposal. Wastewater from other usage such as shower, laundry, food preparation, etc. is generally direct discharge to the storm water drainage system without any treatment. No grease trap is installed to pretreatment of grease and oil from cooking activity.

There are no wastewater transportation (sewerage) systems in Lao PDR except the 2.8 km interceptor and associated wastewater stabilization pond in That Luang March in Vientiane Capital City assisted by EU in year 1993 but the plant is now stopped operation due to the complaints in offensive odor from the neighboring residents and the march is managed as aquaculture pond instead.

The Lao Government have requested to several agencies to assist in studying and implementing on wastewater management in Vientiane. The recent study is "the Study on Improvement of Water Environment in Vientiane City" from JICA which is on going to formulate the Master Plan for Water Environment Management in Vientiane City. This will concern not only in sewerage or wastewater management but also in drainage improvement which is directly related for the area that combined drainage and sewerage is provided.

The number of population in Vientiane Province in year 2007-2008 is approximately 430,000 persons in which approximately 51,600 cubic meters/day of wastewater or sewerage is generated and drained to the public source every day with about half of them were treated and reduced the pollution load by the current on-site treatment system. The quantity of sewerage will increase upon the increasing of the population and activity inside the urban area, and higher pollution load will be dumped to the Mekong River every year.

(b) Responsible Agency

The infrastructure development of Vientiane is generally managed by the Vientiane Urban Development Administrative Authority (VUDAA). However, in this case for the planning and implementation of the sanitation network system, the responsibility was assigned directly to the Vientiane Municipalities such as DPWT and other related agencies to support in future implementation.

(2) Luang Prabang

(a) Current Situation

The current sewerage treatment system provided in the urban and rural area in Luangprabang is the same as normally used in Lao PDR. In most cases the sewage disposal is carried out properly by way of latrines or cesspools and via drainage ditches for individual treatment in each household or building. According to the statistics in year 2005, approximately 80.6% of households in Luang Prabang area have access to proper toilets facilities which is increasing every year from more public awareness and regulations relating to environmental situation as the World Heritage Site from UNESCO. Wastewater from other usage such as shower, laundry, food preparation, etc. is still mostly directly discharge to the storm water drainage system without any treatment. No grease trap is installed to pretreatment of grease and oil from cooking activity. New development buildings such as large or luxurious hotels provide proper sewerage treatment according to their standard. However there are still some problems on inefficient installation of the effluent pipe from septic tank, leaked sewer polluting the soil and natural river especially the Namkan and the Mekong River.

From the ADB Assistance through the Secondary Towns Urban Development Project from year 2000 – 2003, there was a sanitation component to provide for improvements in environmental sanitation by replacing all dry pit latrines with pour/flush-type toilets with septic tanks, and replacing poorly designed septic tanks with some numbers of new septic tanks were installed within the project fund. Public campaigns and workshops were also conducted to convince communities in the need to improve the environment through installation of septic tanks. Sanitary Regulation was introduced to the communities with some improvement in public awareness from the ADB Project.

The number of population in the Luang Prabang area in year 2007-2008 is 75,164 persons in which approximately 9,000 – 9,500 cu.m./day of wastewater or sewerage is generated from households as well as tourists and drained to the public source every day with approximately half of them were treated and reduced the pollution load by the current on-site treatment system. The quantity of sewerage will not increase much since the expansion of urban area is limited from the UNESCO regulation.

(b) Responsible Agency

UDAA is responsible for urban planning, infrastructure, and urban services provision, including solid waste management, water and sanitation, drainage, roads and riverbank maintenance and improvements, and the management of public parks. The body also issues construction permits, which all new built and renovation projects need to obtain. But in case the construction in the conservative area, approval from World Heritage Committee will also be needed. Inspection and monitoring in proper construction is also in the responsibility of UDAA and DPWT.

(3) Thakhek

(a) Current Situation

The current sewerage treatment system provided in the urban and rural area in Thakhek is the same as normally used in Lao PDR, which is individual treatment in each household or building by using pour-flush or dry latrines and septic tank for black water disposal, and soak pits for grey water disposal and overflow to the drainage system nearby. According to the statistics in year 2005, approximately 63% of households in Thakhek area have access to proper toilets facilities which is gradually increasing every year. Some households in rural area still have no wastewater treatment system at all. Wastewater from other usage such as shower, laundry, food preparation, etc. is mostly directly discharge to the storm water drainage system without any treatment. No grease trap is installed to pretreatment of grease and oil from cooking activity. Small scale industries especially the cottage industry normally discharge the sewerage directly to the drainage system whereas large scale have some type of treatment system. Due to the inefficient installation of the effluent pipe from septic tank, leaked sewer polluting the soil and groundwater.

From the ADB Assistance through the Secondary Towns Urban Development Project from year 2000 – 2003, there was a sanitation component to provide for improvements in environmental sanitation by replacing all dry pit latrines with pour/flush-type toilets with septic tanks, and replacing poorly designed septic tanks with some numbers of new septic tanks were installed within the project fund. Public campaigns and workshops were also conducted to convince communities in the need to improve the environment through installation of septic tanks. Sanitary Regulation was introduced to the communities with some improvement in public awareness from the ADB Project.

The number of population in Thakhek in year 2007-2008 is 85,441 persons in which approximately 10,000 cum/day of wastewater or sewerage is generated and drained to the public source every day with less than half of them were treated and reduced the pollution load by the current on-site treatment system. The quantity of sewerage will increase upon the increasing of the population and activity inside the urban area, and higher pollution load will be dumped to the Mekong River every year.

(b) Responsible Agency

UDAA is the authority which takes care of the building permission process for the building, which includes the type and detail of sewerage treatment to be provided. Inspection and monitoring in proper construction is also in the responsibility of UDAA.

4.4.7 Solid Waste Management

(1) Luang Prabang

UDAA of Luang Prabang district collected solid waste from 36 villages by the year 2007. UDAA has commissioned a private company to collect and haul solid waste discharged from 24 villages existed at a central area of Luang Prabang in year 2008. A private company also collect fee from each household and business firm. UDAA collect solid waste only from 12 villages existed out of a central of Luang Prabang at present. Number of household contracted with UDAA for collection of solid waste has been increased year by year. Around 4,200 households had contracted in year 2007. Number of household contracted with UDAA after commissioned to a private company in 2008 was 1,540.

Solid waste is collected twice a week. Total volume of solid waste collected was 10,080 ton in 2005 and 17,640 ton in 2008. Average volume of solid waste discharged per household per day was 10.2kg in year 2007. Fee for solid waste collection and haulage is collected 10,000kip per household per month and 15,000kip to 30,000kip from a business household. A business firm pays 200,000kip to 250,000kip every time. Total fee collected was 540million kip in year 2007.

Table 4.34 Solid Waste Service in Luang Prabang

Item	Unit	2005	2006	2007	2008
No of Village		36	36	36	12*
No of Household		3,917	4,113	4,210	1,540
Volume of Solid Waste	ton	10,080	11,880	15,480	17,640
Solid Waste/Household	kg/household/day	7.15	8.02	10.21	-

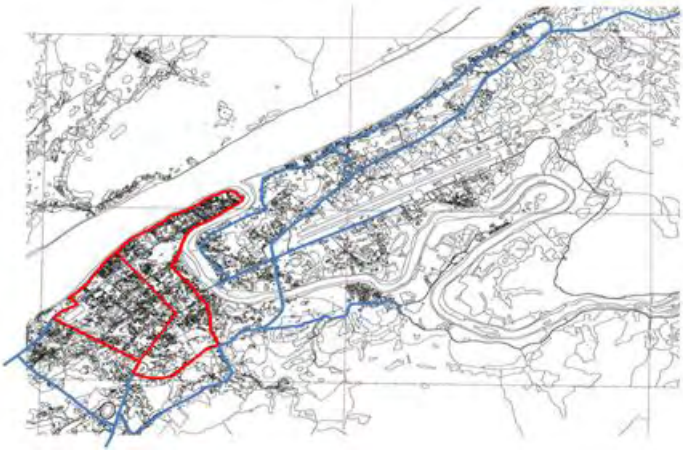
Note: * Solid waste in 24 villages were collected by a private company.
Source: UDAA Luang Prabang

Table 4.35 Number of Household and Income

Item	Unit	2005	2006	2007	2008
No of Household	Households	3,917	4,113	4,210	1,540
Income	mill kip	420	444	540	420

Source: UDAA Luang Prabang

One solid waste dumping site is located on the way to a water fall 8km from Luang Prabang. The site had been constructed for 10 years operation at year 2000 and started operation at year 2001. The site is becoming almost full. There is a vacant land near the site that UDAA has for a new site, however, no expansion plan exists at present. The areas delineated with the red lines are managed by a private contractor. The routes with the blue lines are managed directly by UDAA.



Source: UDAA Luang Prabang

Figure 4.17 Solid Waste Collection Areas

The district of Luang Prabang planned an expansion of a dumping site to meet the increasing volume. A person in charge in UDAA expressed a need for additional trucks for solid waste collection. UDAA has contacted JICA to conduct a study on dumping site capacity expansion. There is an idea of outsourcing management of dumping site to the private sector.

Source: UDAA Luang Prabang

Figure 4.18 Expansion Plan of the Existing Dumping Site

(2) Thakhek

UDAA of Thakhek district is responsible for solid waste management at the area within the jurisdiction of UDAA. Duty of UDAA of Thakhek on a solid waste management is same as UDAA at Lao's other core cities. There are 7 staffs, 4 drivers and 12 workers for solid waste management in UDAA at present. UDAA has one container truck, 2 dump trucks and one excavator for solid waste management. There are 35 villages in urban area of Thakhek. Of which, 30 villages are in solid waste collection service area and 2,610 households contract with UDAA for garbage collection in year 2009. 130 business firms such as hotels, restaurants, public offices also contract with UDAA. Total income of collection fee and dumping fee of solid waste has been increased year by year. 280million kip had been collected for solid waste management in year 2005. In year 2008, about 414million kip had been collected. Total of income in year 2008 had become almost 1.5 times larger than amount in year 2005. No information on expenditure was given by UDAA.

One container truck collects and hauls solid waste to a dumping site 4 times a day. 2 dump trucks also collect and haul solid waste to a dumping site 5 times a day. Total volume of 14,300m^3 of solid waste had been collected and hauled to a dumping site in year 2008. Total weight of solid waste dumped at a landfill site in year 2008 was about 6,020ton. Average volume of solid waste discharged per household per day was 6.4kg.

Table 4.36 Income and Expenditure of Solid Waste Management at Thakhek

Item	Unit	2005	2006	2007	2008
Income	kip	280,000,000	380,784,000	397,896,000	413,640,000
Expenditure	kip	NA	NA	NA	NA

Source: Thakhek UDAA

A landfill site is located 10km south of urban area of Thakhek, along NR13. This dumping site had also been constructed by assistance of UNDP/NORAD in year 2000. Area of a landfill site is around 9.6ha. There is a management office in a site, but no wastewater treatment facility. Solid waste dumped at the site is not covered.

Dumping site 1

Dumping site 2

Source: JST

Figure 4.19 Dumping Site at Thakhek

(3) Vientiane

Vientiane Urban Development Administration Authority (VUDAA) is responsible for solid waste management at 7 districts in Vientiane Capital. VUDAA contracts with 5 private companies for collection and haulage of solid waste, and conducts collection and haulage of solid waste together with private companies. Districts which 6 companies including VUDAA collect and haul solid waste are Sikhottabong, Chanthabouri, Xaisettha, Sisattanak and Hatxayfong. There are 19 management staffs, 71 workers for collection and 25 persons at a dumping site in solid waste management division of VUDAA. VUDAA has 45 vehicles for collection and hauling of garbage. About 120 persons attend to solid waste collection business at 5 private companies.

There are 63,312 households within area of solid waste collection. However, only 23,500 households contract with 6 companies for garbage collection. Contract ratio is only 37%. Reasons of low contract ratio are no awareness, no willing to pay, limited number of staff and bad condition of road access to garbage collection point. 24,000kip/household/month is collected from each household as a solid waste collection fee, and 15,000kip/ton is collected from each private company's truck at a dumping site as fee for operation of a dumping site. About 770million kip per month has been collected in year 2008.

One solid waste landfill site is located at km.32 in Vientiane Province, 2.5 km away from the NR13 South with total reserved area of 748 ha and approximately 100 ha are now being used. The present landfill site is the new one start using in February 2008 prepared by Lao Government budget and local design. The previous landfill site had been located at km.18 near the SEAGAME Stadium with total

reserved area of 100 ha, but had been used approx. 62 ha before it was closed. The area is now being used as part of the golf course.

There is an electronic weighing machine behind the office which was provided by JICA since year 1998 and transferred from the previous site. All the equipment used is from the previous site supported by JICA and has been used since 1998. Most of them are not in good condition and need frequent repair and budget.

The present landfill site has not been properly designed or prepared to be the "Sanitary Landfill" i.e. no master plan for the area reserved, no phasing of cell or pit provided, no lining at the bottom before dumping, no proper drainage system provided in the cell resulting in rain water stored in the pit, the wastewater treatment is only natural pond with a lot of water hyacinth inside.

Daily solid waste carried in to the site is 180 – 200 tons with approximately 200 truck-trip. However, solid waste dumped at the site is not covered. Plastic bags can be seen as primary type of solid waste in the site.

There is a pit to discharge and store night soil inside the landfill area. However, no water treatment facility is provided. The hazardous waste from hospital is also dumped in separate pit inside the landfill area without any additional treatment.

Several scavengers are living near a landfill site and select recycle materials at the site. Materials collected are sold to brokers.

Uncovered solid waste at the landfill site

A management office at the landfill site

A pit for night soil

Weighbridge which JICA provided in 1998

Source: JST

Figure 4.20 Dumping Site at Vientiane

4.4.8 Park and Town Beautification

Same as Kaysone Phomvihane and Pakse, only a few developed public parks and green area exist in an urban area in Luang Prabang and Thakhek. Very few people use public parks and green area except Vientiane.

Patu Xay Park

Green Area along Mekong River

Source: JST

Figure 4.21 Public Park and Green Area

In Vientiane, There is a well-developed public park, named a Patu Xay Park, near a Victory Gate. This is one of tourist spots in Vientiane and not only Vientiane citizen but also many tourists visit here.

A well-developed and beautiful green area exists between Fa Ngum road and the Mekong River in downtown area of Vientiane. Many people use here as a place of recreation, rest, enjoying the cool and watching sunset.

A-5 Urban Management

5.1 Legal and Institutional Setting

5.1.1 Constitution

The amendment to the Constitution was promulgated in 2003. Article 4 was added to establish the National Assembly. Provisions for investment promotion were added as Article 14 and Article 15 as well as property rights (Article 17) and emphasis on introducing market mechanism (Article 18). Law on the Promotion of Foreign Investment (2004) has more details regarding foreign investment. Article 21 states significance of human resource development for social and cultural development.

Entire Chapter 8 is dedicated to local administration stating rights and duties of the governors and mayors. Addition of Chapter 8, the Local Administration can be considered as an administrative decentralization movement along with the promulgation of Law on Local Administration.

5.1.2 Law on Urban Plans[1]

Law on Urban Plans states requirement of hierarchical planning:

Article 6. Urban Planning

Urban Planning in Lao PDR [is concerned with plans at] four levels:

1. *Urban plans at national level;*
2. *Urban plans at regional level;*
3. *Urban plans at provincial level;*
4. *Urban plans at district level.*

Current planning effort is limited to urban plans at district level—urban master plans.

5.1.3 Law on Local Administration

Law on Local Administration specifies functions of local governments. The criteria of creating new unit of public administration are as in Table 5.1.

Table 5.1 Selected Criteria of Local Administration Unit

Local Government	Minimum Population	Requirement
Province	120,000	Minimum of five districts
City	80,000	Large urban area
District	30,000	Suitable geographic location for administration
Municipality	10,000	Infrastructure and base economy

Source: Law on Local Administration

5.1.4 Law on Public Roads

Article 33 Rights and Duties of Communication, Transport, Post and Construction Office at each District and Municipality states the duties and rights as:

1. *To encourage and monitor the construction, maintenance and repair of public roads under its responsibility;*
2. *To manage public roads within the district or municipality under its responsibility;*
3. *To administer statistics and regularly report on the status of public road under its responsibility to the communication, transport, post and construction division at the relevant*

[1] "Urban Planning Act" may be an appropriate translation; however, the term of the official translation by Lao PDR is used.

province, prefecture or special zone;

4. *To exercise such other rights and perform such other duties as assigned buy the communication, transport, post and construction division at the relevant province, prefecture or special zone.*

According the Law on Public Roads, the district governments are the ones that develop and maintain their district roads.

5.1.5 Law on State Budget

Article 38 Sources of Budget Revenues Belonging to Local Budgets states:

Budget revenues belonging one hundred percent (100%) to the local budgets are from the sources controlled by the local authorities as follow:

1. Fees charge on land use (land tax), land rental, assignment and transfer of land use rights, tax license issuance fee, and income tax from individuals;
2. Revenue from natural resources, such as: sale of gravel, sand, soil, and laterite, and rental of State assets, such as buildings, land and other assets;
3. Revenue from State Funds;
4. Revenue from administrative technical units;
5. Revenue from the collection of charges and service fees;
6. Proceeds from fines and the auction of seized objects;
7. Funds raised from the contribution of individuals and organizations;
8. Foreign grants received;
9. Other revenues stipulated by the laws and regulations.

Form interviews conducted, Article 38 seemed to be neglected in the process of empowering the state level financing system; recentralization of finance has been practiced to reorganize financial flow from the central government to local governments.

5.1.6 Law on Tax

Article 60 Income Tax Rates shows a progressive tax system. The tax rates of Table 5.2 apply to persons with an income not more than one million five and hundred thought Kip. Table 5.3applies to persons with an income of more than one million and five hundred thousand Kip[2].

Table 5.2 Tax Rates 1

Levels	Taxable Salary48 at each Level	Basis of Calculation	Tax Rates	Salary Tax at each Level
1	300,000 Kip and below	300,000	0%	0
2	300,001 [Kip] to 1,500,000 [Kip]	1,200,000	5%	60,000

Source: Article 60, Law on Tax

Table 5.3 Tax Rates 2

Levels	Taxable Salary at Each Level	Basis of Calculation	Tax Rates	Salary Tax at each Level
1	From 1 [Kip] to 1,500,000 Kip	1,500,000	5%	75,000
2	1,500,001 [Kip] to 4,000,000 [Kip]	2,500,000	10%	250,000
3	4,000,001 [Kip] to 8,000,000 [Kip]	4,000,000	15%	600,000
4	8,000,001 [Kip] to 15,000,000 [Kip]	7,000,000	20%	1,400,000
5	15,000,000 Kip and up.....	.....	25%	.....

Source: Article 60, Law on Tax

[2] Article 60, Law on Tax

The rates is planned to be applicable to the land transfer tax (capital gains tax) in the future.

5.1.7 Law on Tourism

Article 51 Levels of Tourism Development Plans states that there would be five levels of tourism development plans:

- National Strategic Tourism Development Plan;
- Regional Tourism Development Plan;
- Provincial Tourism Development Plan;
- District Tourism Development Plan; and
- Development Plans for Tourism Sites.

Article 53 The Contents of Tourism Development Plans states the contents as:

> Purposes; Objectives; Development Goals; Assessments and Analyses of Potential Resources; Conditions of the Tourism Market; and the outcomes and impacts on the economy, society, culture and the environment, including the history of tourism sites.

5.1.8 Law on National Heritage

Article 43. Protected Area of Heritage Sites states:

The protected area of heritage sites is generally divided into three zones:

- Zone 1 is the central area, where the heritage is located, which must be protected in its original circumstances and where no construction is permitted;
- Zone 2 is the area surrounding the central area, where some activities are permitted to increase the value of zone 1, provided that no damage shall be caused to that surrounding area;
- Zone 3 is the administrative area where construction is permitted to serve zones 1 and 2 for the accommodation of tourists.

In conjunction with the requirements stated in Law on Tourism, heritage sites will have to maintained and managed.

5.1.9 Legislation Related to Urban Planning

Other legislation related to urban planning is summarized in Table 5.4.

Table 5.4 Legislation Related to Urban Planning

Legislative Article	Date Issued	General Purpose	Specific Provisions Relating to Planning and Development Control
Decree 209	Feb.5 1996	Rules and Regulations of Town Planning	Planning to be coordinated by prefectural and provincial Construction Management Committee
Decree 177/PM	Dec. 22. 97	Establishment of UDAs[3]	UDAs to plan, implement, manage and control urban development. VDAs to manage and control implementation of standards for land use
Decree 14/PM	Feb. 23 1999	Establishment of VUDAA	VUDAA to plan, implement, manage and control urban development activities. VUDAA to provide data and other technical information to facilitate urban development and rehabilitation in line with Vientiane

[3] UDA means UDAA; the expression of the original source is used.

			Urban Development Plan
Urban Planning Law	April 3, 1999	To set out principles, regulations and actions regarding land use and management	MCTPC/DCTPC responsible for planning in cities of national significance (i.e. Vientiane)
PM Instruction 01/PM	March 11, 2000	Decentralization of planning and budgeting	Not specific on urban planning, but districts given responsibility for five-year planning and budgeting, and participation in planning at village level.

Source: Vientiane Urban Infrastructure and Services TA No 3333-LAO VUISP Draft Final Report Land Use Planning & Development Control p.43

5.1.10 Guidelines relating to Urban Development Planning

There are some guide lines and regulations relating to urban planning. Following two guideline and decree is one of the key elements for land use planning.

Urban Planning Manual was prepared by MPWT and NMLA with ODA of GTZ (Germany). This manual includes the methodology of Urban Planning methodology step by step base. Although the document is in the Draft status and haven't authorized yet, it is quite useful to understand the urban planning process in Lao PDR. Regulation for land use zones is included in this manual as shown Table 5.5.

Land use zoning for the master plan is required to designate 6 zoning categories, and in detail land use should be designated in detail urban development plan. At this moment Building possible to construct in each type of Urban Area within an Urban Master Plan Area shown in this table is under evaluation and discussion for the final approval by the MPWT.

Another guideline is "Ministerial Order on Urban Planning Regulations (No.1366/MCTPC, 2006)". This guideline included "Building Area Ratio & Floor Area Ratio by Land Use Category". Table 5.6 shows the guideline.

The land use regulation in Lao PDR is basically designation of development density. Most of the buildings are possible to build if you get special permission. In many cases special permission issued if investor wants to build a building which requires a special permission. Sometimes even not permitted type of buildings can get permission with special arrangement. Clear and transparent permission system has not been settled yet and more over, in many cases the people do not know the land use designation and regulation either.

For development density point of view, the building density or maximum floor area to be constructed is rather low for all categories comparing to the other ASEAN countries. It is assumed that Lao people are basically favored to live with low density and large open space. Therefore the guideline set the figures to achieve the urban area with rather low density and low height buildings.

Regarding the building types permitted and land use zone, some large scale business and retail is not permitted other than UA and Industrial area. In many cases large shopping centers locate in the suburbs which might be UB or UC.

Table 5.5 Land Use/Building possible to construct in each type of Urban Area within Urban Master Plan Area

	Land Use/Building possible to construct	Type of Urban Area within An Urban Master Plan Area					
		Urban Central Zone (UA)	Urban Inner Zone (UB)	Urban Suburb/ Future Develop. Zone (UC/D)	Industri. Zone (I)	Agricul./Forestry Zone (A/F)	Natural Protection Zone (N)
1	Residential	P	P	P	SP	SP	NP
2	Commercial						
	Small scale business and retail	P	P	P	SP	NP	NP
	Large scale business and retail	P	NP	NP	P	NP	NP
3	Administration						
	Governmental Departments	P	SP	SP	SP	NP	NP
	Public Offices	P	P	P	P	SP	NP
	Private Offices	P	P	P	P	NP	NP
4	Hotel, Restaurant, Bar						
	Restaurant, Bar	P	P	P	P	SP	SP
	Hotel, Lodge	P	SP	SP	SP	NP	NP
5	Recreation, Amusement and Entertainment						
	Cinema	P	SP	NP	P	NP	NP
	Stadium, Sport Building	SP	SP	NP	P	SP	NP
	Recreation Areas	P	P	SP	P	P	SP
	Social Clubs, Associations	P	P	SP	P	SP	NP
6	Educational, Cultural and Religious						
	Schools	P	P	P	P	NP	NP
	College, University	SP	SP	NP	NP	NP	NP
	Temples	P	P	P	P	SP	SP
7	Services						
	Hospitals	P	SP	SP	NP	NP	NP
	Medical Clinics	P	P	P	P	NP	NP
	Jail	NP	SP	SP	NP	SP	NP
	Emergency Services	P	P	SP	P	NP	NP
	Central Market	SP	SP	NP	SP	NP	NP
8	Transportation						
	Bus Park, Motor Park	SP	SP	NP	SP	NP	NP
	Motor Vehicle Services	P	P	NP	P	NP	NP
	Petro Stations	SP	SP	NP	P	NP	NP
9	Public Utilities						
	Slaughter House	NP	NP	NP	SP	NP	NP
	Water Treatment Plant	NP	NP	NP	SP	SP	SP
10	Storage and Warehouse	SP	SP	NP	P	NP	NP
11	Industry						
	Small Scale Activities	P	P	SP	P	NP	NP
	Large Scale Activities	NP	NP	NP	P	NP	NP
12	Nature						
	Parks	P	P	P	P	P	SP
	Kitchen Gardens	P	P	P	P	P	NP
	Animal Husbandry	NP	SP	SP	SP	P	NP
	Agriculture	P	P	P	P	P	NP
	Forestry	NP	SP	NP	SP	P	NP
	Fishery	NP	SP	NP	SP	P	SP

Note: **P** - Permitted, **NP** - Not Permitted, and **SP** – Special Permission
Source: Urban Planning Manual, Department of Housing and Urban Planning, MPWT

Table 5.6 Building Area Ratio & Floor Area Ratio by Land Use Category

Building Area Ratio and Floor Area Ratio by Land Use Category		Building Area Ratio (%)			Floor Area Ratio			Maximum Building Height		
		Level of Urban			Level of urban			Level of Urban		
		1	2	3	1	2	3	1	2	3
UA	Urban Center Zone	75	70	60	2.5	2.0	1.8	26m	23m	18m
UB	Urban Inner Zone	60	50	-	1.5	1.2	-	20m	15m	-
UC	Urban Suburb Zone	50	40	-	1.0	0.8	-	15m	12m	-
UD	Future Development Zone	70	60	50	2.0	1.8	1.5	23m	18m	15m

Note: Level of Urban 1: Vientiane Capital, 2: Secondary Towns (Generally Provincial Center), 3: Tertiary Center (Generally District Center)
Permitted maximum floor area permission = land area of site x coefficient shown above
Source: Ministerial Order on Urban Planning Regulation (No. 1366/MCTPC, 2006)

5.2 Capacity Development Projects

The direct link to urban planning and implementation is the urban master planning—Urban Planning Manual prepared by GTZ. The manual has full of graphics and photographs for novice planners to understand the master planning processes. Planners in PTI use the manual in every day work, and they are attempting updating the manual by themselves.

For the road sector, Lao-Swedish Road Sector Project 2 has contributed for preparation of manuals on road inventory, contract management, and maintenance planning and budgeting. The manuals have been prepared, but their level of usage has not been clear without leadership of domestic trainers.

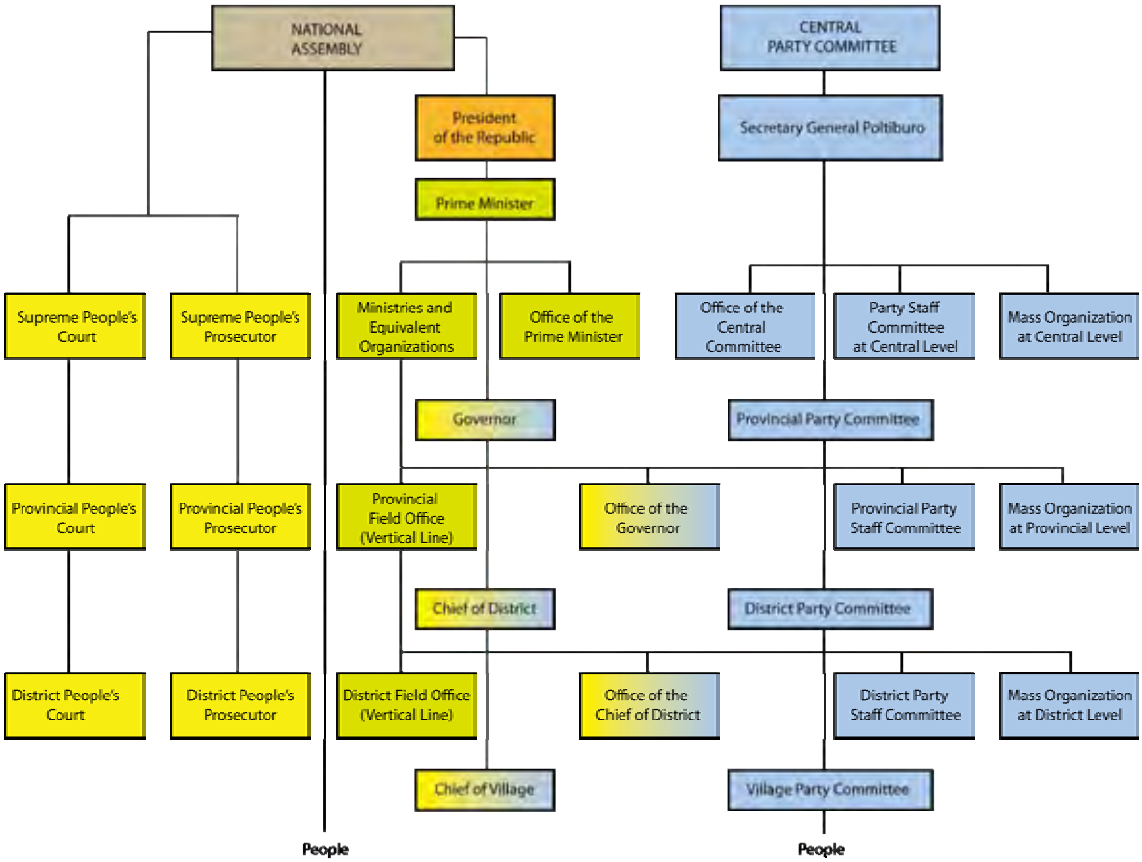
Creation of UDAA was a major event for capacity development for urban service management. Discontinuity of the loan has incapacitated UDAA both in Kaysone Phomvihane and Pakse. Allocation of budget is a policy of the central government, namely the Department of Budget; however, the conditions of the offices of UDAA show the impact of the termination of the Secondary Towns Project.

AFD (French Development Agency) has conducted a capacity development project to VUDAA. For infrastructure management, volumes of manuals were prepared. The status of the project has not been confirmed; however, it was the major effort by AFD.

5.3 Urban Management Organizations

5.3.1 The State Structure

The structure of Lao PDR has two sections: the Central Party Committee and the National Assembly. The National Assembly has 109 representatives. All the governors are party members who have direct negotiation authority to the Prime Minister as representatives of the Party.



Source: United Nations, Lao People's Democratic Republic Public Administration Country Profile, January 2005. p.8

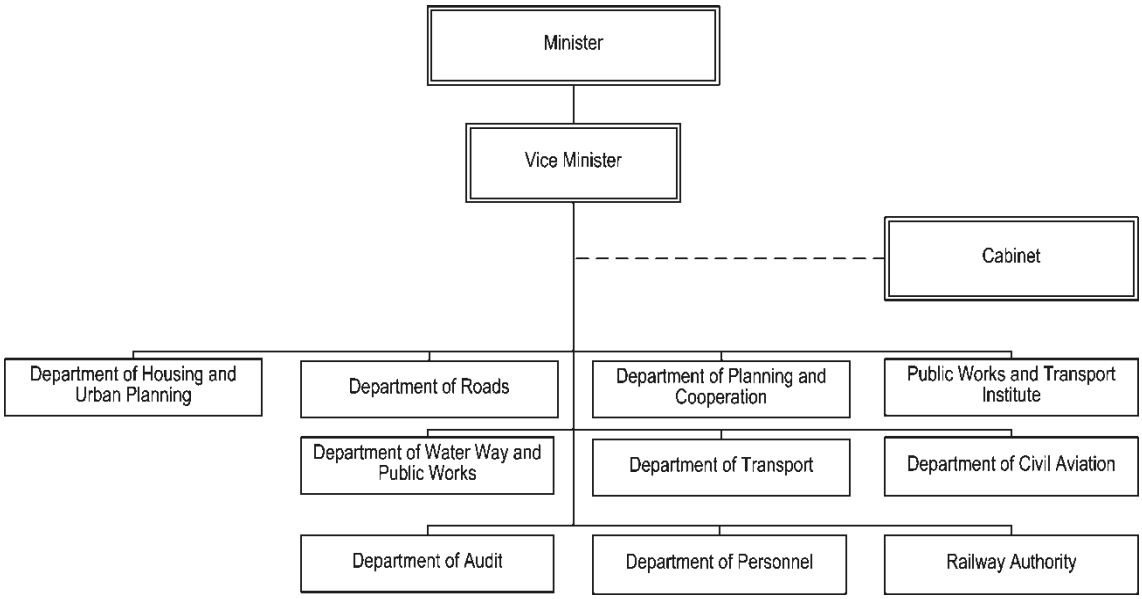
Figure 5.1 State Structure of Lao PDR

At the national level, the National Assembly has the legislative function, but at the provincial level, because of absence of provincial councils, no legislative function exists. The absence of provincial legislature makes local governance difficult without autonomy of local legislation including the power of local taxation.

There are one capital city, 16 provinces, one special zone, 141 districts and 8955 villages for local administration. A couple of districts are added and the number of villages tends to decrease because of annexation.

5.3.2 Ministry of Public Works and Transport

The Ministry of Public Works and Transport has a three tier structure: central; provincial; and district. Figure 5.2 shows the first tier structure in the central government. The departments of Road, Housing and Urban Planning and Transport have respective authorities at the provincial level; Department of Road and Bridges; Department of Housing and Urban Planning; and Department of Transport. At the district level, the ones, which deal with infrastructure and transport, are Office of Public Works and Transport.



Source: MPWT

Figure 5.2 Organization Structure of MPWT

5.3.3 Public Works and Transport Institute

The Public Works and Transport Institute (PTI) is the only institute of planning in Lao PDR where actual work of master planning takes place. The Survey Team has requested interviews with the division heads, but they are unwilling to cooperate. Only the division accepted the interview requests; therefore, the real working situations in other divisions are not known, since annual activities are not documented in any of the divisions even in the Lao language. The organizational structure has been changed recently and restructured as in the following chart.

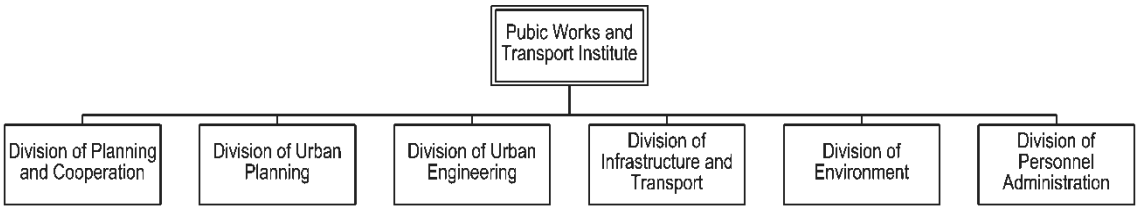


Figure 5.3 Organization Structure of PTI

The out of six divisions the divisions of Infrastructure and Transport, Environment and Planning and Coordination have been established in 2009.

Table 5.7 Major Functions of PTI

Division	Major Function	No of Staff	Note
Urban Engineering	Subcontract Management Administrative Support Land Survey	15	The division supports Town Planning Division for subcontracting land surveyors and temporary workers for plan preparation.
Town Planning	Master Planning Support for Districts	11	Town Planning Division of PTI has been in operation with thirty staff. The major tasks of the division are to prepare master plans for districts and provinces. The major role of the division is to prepare master plans for local governments. Since 1991, PTI has prepared more than 100 master plans. The list of the plans is included in the appendix of the Master Plan Manual. The capacity of master planning within the internal resources reported to be about four per year.
Planning and Coordination	Budgeting Project planning and evaluation Training Meeting and conference coordination	6 (two are on-leave for training)	The major functions of the division is to plan activities and budgeting for the institute. The other activities include proposal writing, providing training, conference coordination, research regarding urban environmental management. The division newly established April 2009 and has still seeking ways to manage their division. The areas to be capacitated are budgeting and annual activity planning, evaluation of projects conducted by other divisions. Two of the staffs have been sent for training in AIT, Thailand with a funding support from CIDA. The division keeps all the records of activities conducted by other department including the Town Planning Division.
Environment	Environmental monitoring of urban and rural roads Resettlement	10	The division became independent from Department of Road to monitor environmental conditions related to road development in both urban and rural areas. Another important work was to deal with resettlement stipulated in PM192.
Infrastructure and Transport	Road Management System	7	Infrastructure and Transport Division recently installed the pavement management system which can monitor conditions of roads for cost effective road repair.
Personnel Administration	Administration of PTI	12	The division handles all the administrative matters related to personnel and procurement.

Source: JST

5.3.4 DPWT

DPWT is a line agency of MPWT at the provincial level. DPWTs in the Regional Core Cities Lao PDR have a similar organizational structure. There is one director in a department; under a director there are two to four deputy directors. Under deputy directors there are the office heads. The major offices within DPWT are: Administration; Road and Bridge; Housing and Urban Planning; and Transport. Office of Public Works and Transport has the administration function at the district level. In each OPWT, two to three persons are assigned.

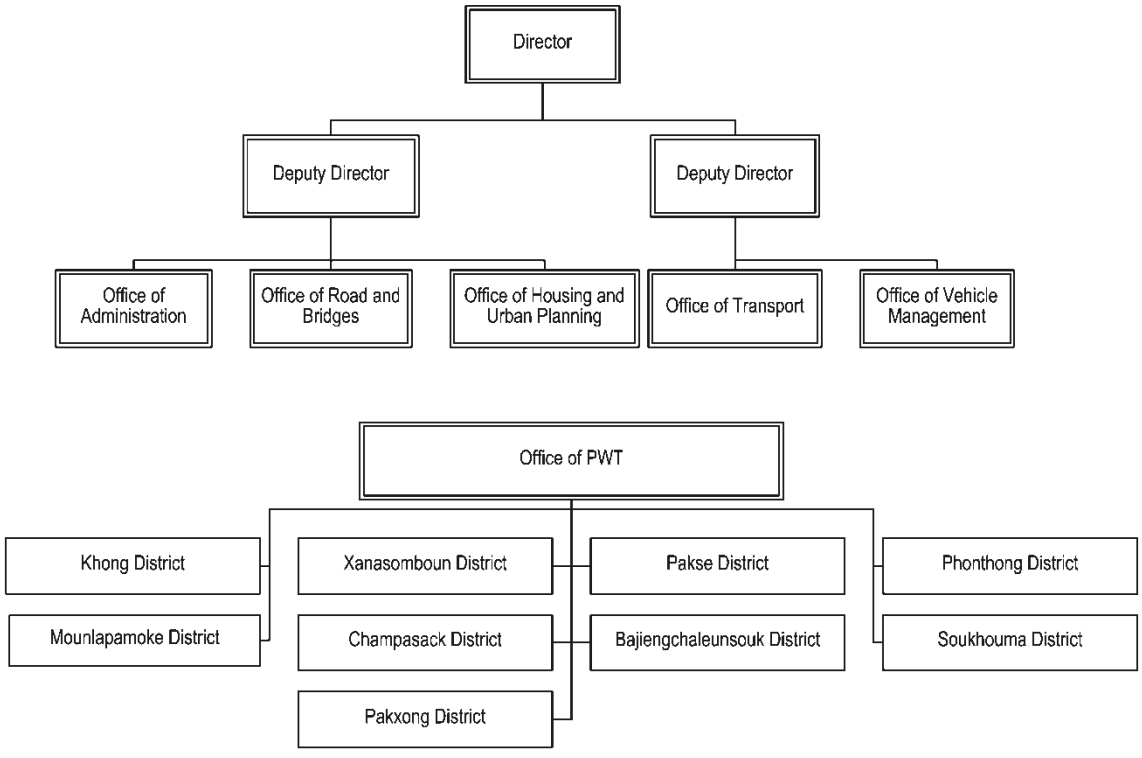
The department has a jurisdiction over areas outside of urban areas within a provincial boundary. As far as riverbank protection, because of its continuous linear configuration, the demarcation has not been clear.

Table 5.8 DPWT in Secondary Towns

	Deputy Directors	Note	No of OPWT
Savannakhet	Four	The Second Bridge Management Unit is added. Equipment management has an independent unit. Compared with Champasack, management and administration capacity are low because of availability of equipment.	15
Champasack	Two	The Office of Vehicle Management is added to deal with increasing number of vehicles. The Champasack Road Development Project financed by ADB has contributed to capacity development of the department.	9
Luang Prabang	Two	The growing province started preparing a provincial structure plan. The staff has requested a GIS system for planning and management.	11
Thakhek	Two	The capacity of road management is weak as the department lacks survey equipment such as total station or GPS.	9

Source: PTI and each DPWT Office

The Road and Bridge Office mainly conducts infrastructure development and maintenance work including drainage. The Housing and Urban Planning Office has major roles in development control and urban planning support. The Transport Office has vehicle registration and promotion of public safety. The following chart shows DPWT in Champasack.



Source: DPWT Champasack

Figure 5.4 Organization Chart of DPWT Champasack

5.3.5 DHUP

DHUP's main functions are planning and development control. The urban master planning has been

lead by PTI; the DHUP's role of urban master planning has been auxiliary. DHUP in cooperation with PTI prepares a detailed plan - a large-scale public project. Internal standards in PTI exists on subdivisions; however, the standards are have not be legalized for a private sector to take part in. Land subdivision is solely conducted by the National Land Management Authority without being checked from planning perspective. The administration for development control includes processing development application outside of the urban areas and inspection. OPWT, a line agency at the district level, is in charge of processing development application with a total floor area less than 200 square meters; however, due to its limited technical capacity, DHUP provides technical assistances. As for large-scale development, the political intervention from governors is, reportedly, strong—the zoning regulation can be over ruled by discretion of the governors.

5.3.6 UDAA

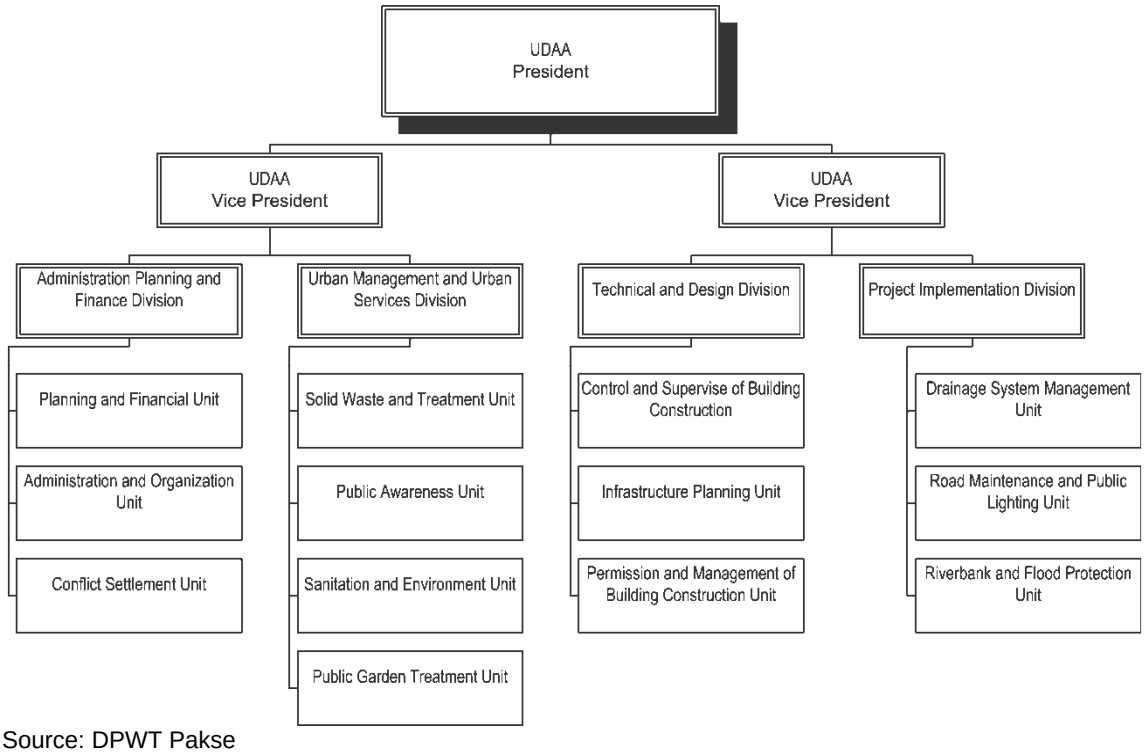
In 1997, Urban Development Administration Authority was created under the Prime Minister's Decree 177 to support the urban management function which had been conducted by DPWT. The creation of the district equivalent authority was supported with a loan project-- the Secondary Towns Project--provided by ADB. The management areas of UDAA were defined in the secondary towns--regional core cities; infrastructure development and management in the areas became a duty of UDAA.

Table 5.9 Duties and Rights of UDAA

Duties and Rights	Contents
Duties (Article 3)	1. Plan, implement, manage, and monitoring the development urban; in the first period will focus the priority activities development project that are in the management area of UDAA, and then develop those activities to become the completed Urban Development Administration Authority. 2. Construct, improve and repair the infrastructure and the service in the urban area that will include: Road, Drainage, Keep and eliminate the garbage, Protect the landslide of bank and protect the flooding, Clean and keep the environment, The light for public, Park 3. Manage and control the implementation of construction work and other developments in the scope of UDAA that are defined by cooperation with the concerned sectors. 4. Supply information and necessary technique document that are relevant to urban development in the scope of UDAA, to give poser to provincial public administration, district, village and mass organization to mobilize and repair with the plan for development urban 5. To have the duty to create income that is defined in Chapter V and using the fund with the target that is defined in article 3 of this decree. 6. Other duties that are necessary to approve and assigned by the Governor.
Rights (Article 4)	1. To cooperate, negotiate and signing contract, semi contract and obligation for loan or free grant assistant with the concerned sectors in domestic and foreign and international organization in accordance with the law. 2. Own and using the vehicle machine and equipment with other properties. Include the right for land use with the assignment of financial sector. 3. Have to right to hold an account, collect income as defined in Chapter V of this agreement and using the fund from domestic and foreign with the approval from national assembly. 4. Propose for improve the component of organization, appointment, promotion, remove, dismiss, compliment and implement the regulation to civil servant under their responsibility. 5. Create the regulation and rules and fine the one that is breaks the state rules and urban development administration authority on the unanimous agreement of the concerned governor. 6. To cooperate and collaboration with all concerned sectors for implementation their duties to be achieved.

Source: Decree on the implementation and activities of Urban Development Administration Authority No. 177/PM, dated: 22nd December 1997 (Original document is only Lao.)

Each UDAA has the following divisions: Administration and Planning, Urban Management and Urban Services, Technical and Design, Project Implementation. Under the president or two vice presidents organize the four divisions.



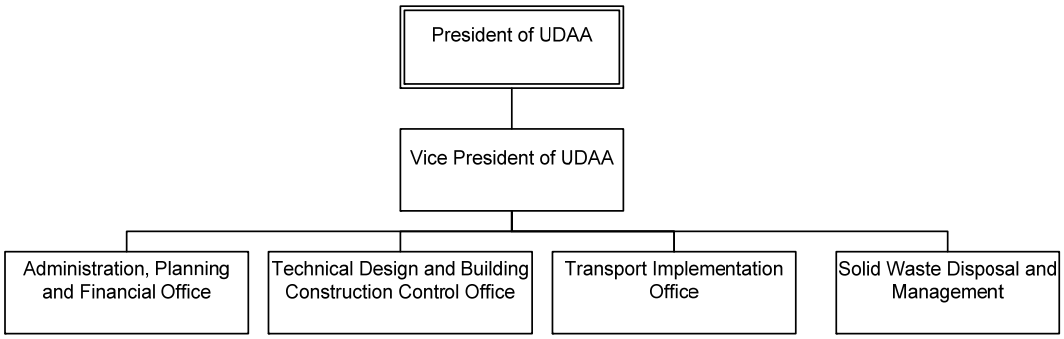
Source: DPWT Pakse

Figure 5.5 Organization Structure of Pakse UDAA

UDAA in Kaysone Phomvihane has 29 fulltime staff with 89 temporary staff to manage its operation. From observation and interview, financial capacity of the Project Implementation Division is low. Other divisions function well in their domains with limited resources especially for equipment and materials.

UDAA in Paske has 47 staff. The structure is the same as UDAA in Kaysone Phomvihan. The number of building application, according to the division chief was ten; it is suspected that there are some unregistered activities in the Pakse district, just by the number of building application submitted to Technical Design Division in Pakse.

UDAA in other core cities has the same function as in Kaysone Phomvihane and Pakse. UDAA in Luang Prabang has four Offices: Administration, Planning and Financial; Technical Design and Construction Control; Transport Implementation; and Solid Waste Disposal and Management under Vice President lead by President.



Source: Luang Prabang UDAA

Figure 5.6 Organizational Structure of Luang Prabang UDAA

The jurisdiction of UDAA, Luang Prabang, covers thirty-three villages. Out of thirty-three villages, twenty-four villages are designated as the world heritage areas. Because of the designation, urban

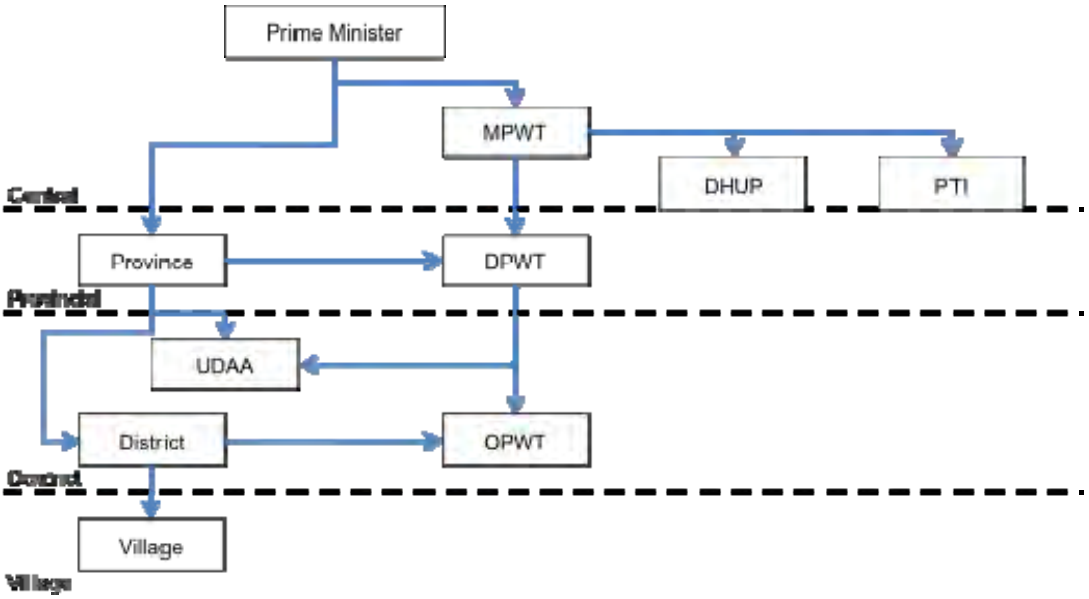
area management In Luang Prabang is different from other regional core cities. In 1994, a Heritage Protection Zone (ZPP) was established. From 1995, the Urban Master Plan was revised and a Plan de Sauvegarde et de Mise en Valeur (PSMV) was established and officially adopted in 1999 by the Lao Government, according to a UN report.[4] Heritage House was created to oversee the activities of the local government. The involvement of UNESCO and creation of Heritage House added a development application review process by the application review unit. UDAA in Thakhek functions the same as in Kaysone Phomvihane and Pakse.

5.4 Urban Planning and Implantation

5.4.1 Infrastructure Planning and Implementation

Urban Master Plans are the basis of infrastructure planning. In Kaysone Phomvihane and Pakse, the plans were both approved by MPWT in 2001, covering areas of 7,000 hectares and 5,580 hectares, respectively. In other areas, the master plans have been prepared since 1991; the total number of master plans in Lao PDR is 116 as of 2006.

According to Laws on Urban Plans, plans are to be prepared at national, regional, provincial and district levels. Current urban master plans cover only urbanized areas in districts; outside of the urbanized areas are not included.



Source: Master Plan Manual p.7

Figure 5.7 Flow and Role of Urban Master Planning

The process of urban master plan is initiated by the provincial government. The requests of provincial governments are then prioritized in DHUP, and actual planning work in conducted by PTI.

[4] World Heritage Committee. United Nations Educational, Scientific and Cultural Organization. Convention Concerning the Protection of the World Cultural and Natural Heritage. *Mission Report*. July 2008, p.10

Table 5.10 Responsibility of Master Planning

Initiation			Budget			Preparation			Approval		
Level 1	Level 2	Level 3	Level 1	Level 2	Level 3	Level 1	Level 2	Level 3	Level 1	Level 2	Level 3
Governor of the Province		Head of District	MPWT/ DPWT	MPWT/D PWT	DPWT	PTI & DPWT and private planning agencies including internal and external consultants			Governor of the Province		Head of District

Source: Master Plan Manual p. 9

The period of plan preparation is about six months. The team of planners, architects, and engineers work together in PTI contact with mainly provincial government for plan preparation. The general flow of work is: data collection and organization; draft preparation; coordination at the sites; and finalization.

Table 5.11 Budget Estimate and Time Taken to Prepare Urban Plans

	Urban Master Plan			Detailed Plan
	Thakhek (revision)	Hin Heup	Med	National Stadium
Estimated budget (in million LAK)	120	135	175	146
Period for Preparation	8 months	6 months	5 months	3 months
Level of town	Level 2	Level 3	Level 3	Special
Year budget prepared	2007	2007	2007	On-going

Source: Master Plan Manual, P88

DPWT and UDAA are the implementation units that deal with infrastructure development and maintenance depending on areas.

Table 5.12 Infrastructure Management Entities

Infra-category	Sub-category	Responsible Organization	
		Urban Area	Outside of Urban Area
Road and Bridge	National Road	UDAA	MPWT
	Provincial Road	UDAA	DPWT
	District Road	UDAA	District
Water Supply		Water Supply Company	-
Sewer and Sewerage Treatment		UDAA	-
Drainage		UDAA	DPWT
Solid Waste Management		UDAA	-
Riverbank Protection		UDAA	DPWT
Disaster Prevention		EMMU	EMMU

Source: Master Plan Manual; PTI; UDAA

All types of infrastructure in urban areas are managed by UDAA and outside of urban areas are managed by DPWT.

UDAA and DPWT share Infrastructure management roles: urban areas are managed by UDAA, outside of the urban areas are managed by DPWT within the provincial areas. Except for the national roads, infrastructure development and maintenance are financed by the provincial governments. From observation, the conditions of national and provincial roads are intact, while the of district roads (local roads) need maintenance work in both Kaysone Phomvihan and Pakse.

5.4.2 District Planning

Even though the urban plans are limited to urban areas of districts, an attempt for district level structure plan was prepared in Luang Prabang, showing development direction of the district.

Source: DPWT Luang Prabang

Photo 5.1 Development Opportunity of Luang Prabang (Territorial Development Plan 2004)

5.4.3 Provincial Planning

Activities of provincial planning are divided by each department without a coordinated spatial plan even though the provincial investment plans have been prepared by each province. The following plan is such an independent plan showing a road network prepared by DPWT Champasack.

Source: DPWT Champasack

Figure 5.8 Provincial Road Network in Champasack Province

5.4.4 Administration for Development Control

(1) Land Titling

Even though cadastral mapping has not been completed, land titles or land use rights have been administered adequately. The conversion from one use to another, such as agriculture to residential or commercial requires fees.

In the urban areas in Kaysone Phomvihane and Pakse, land titling, reportedly, has been completed. Whenever land is developed, a land owner needs to submit a development application form with a copy of land title or certificate of land use right.

(2) Development Control

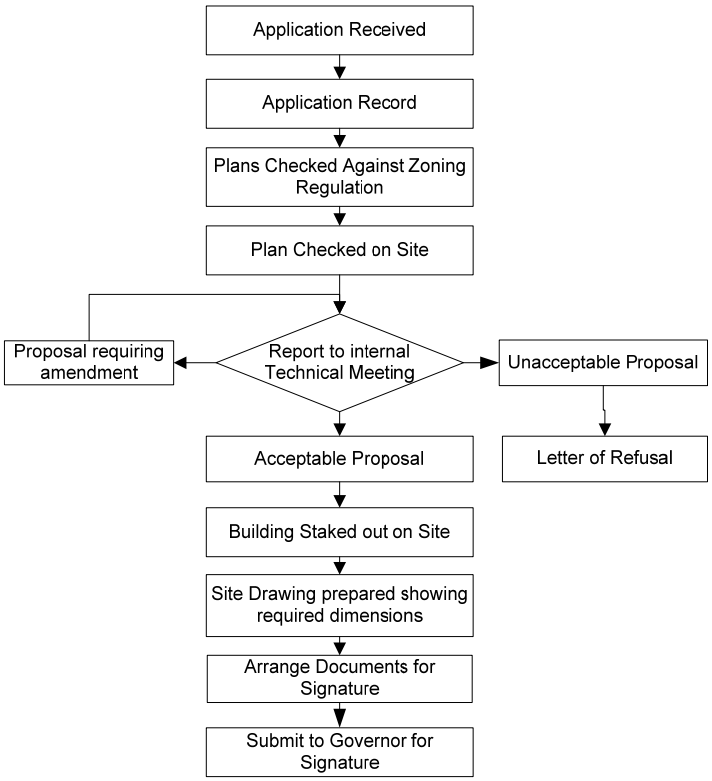
The development control administration has been conducted by both DPWT and UDAA depending on an area and scale of development. When an application is outside of urban areas with a site 200 square meters of smaller, the application is processed at OPWT.

The internal application processing takes from two weeks to one month. In VUDAA, it takes longer than Paske and Kaysone Phomvihane.

A development application with a floor area less than 200 square meters is processed in UDAA within the UDAA areas. A development application with a floor area more 200 square meters or larger is processed in DPWT regardless of an area of application.

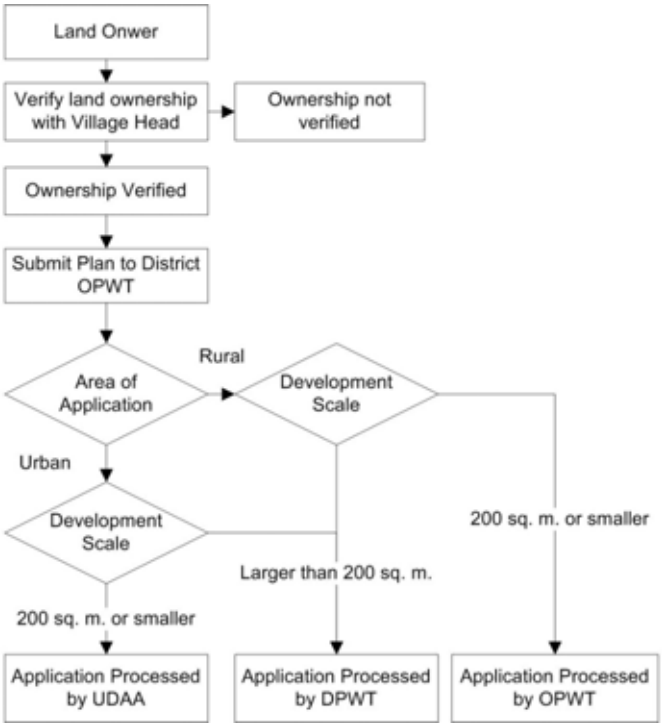
In Luang Prabang, UDAA processes a development application within the UDAA area regardless of development scale with an additional process of Historic Preservation Commission.

The development control procedure within the world heritage areas. The procedure of development application is different from other secondary towns. The Local World Heritage Committee has the full power of accept or deny a development application.



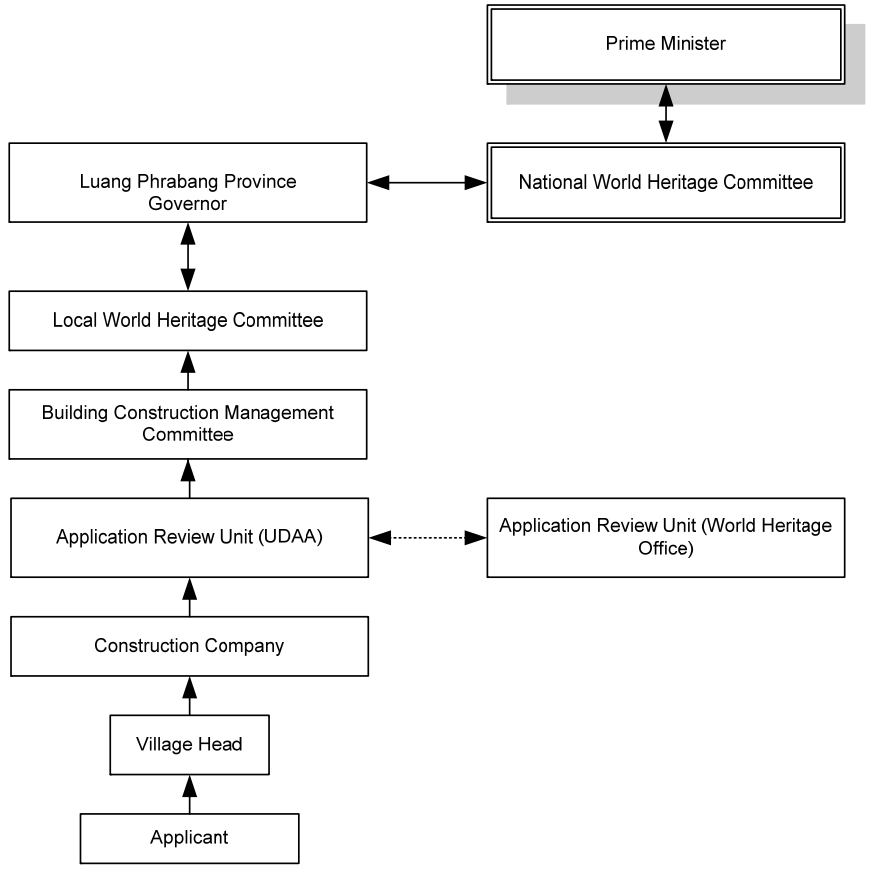
Source: Information from PTI, DPWTs and UDAAs

Figure 5.9 Development Application Submission



Source: Information from UDAAs

Figure 5.10 Internal Development Application Processing at UDAA



Source: Luang Prabang UDAA

Figure 5.11 Development Application Procedure in Luang Prabang

In Kaysone Phomvihane the annual number of application is reported as about 30. In Pakse, the number was reported as 10. Others are minor renovation applications. The numbers of applications are relatively small due mainly to limited development activities of Kaysone Phomvihane and Pakse. Another unconfirmed reason may be in the absence of the loophole avoidance in the development control administration system.

The UDAA staff conducts regular inspection. The item of inspection is mainly on setback requirement. When a violation is found, the staff of UDAA writes a letter to the violator to collect the violation. Both UDAA and DPWT do not have the enforcement power; the power of demolition has not been granted to neither of the entities. The inspection capacity has been limited in the UDAA management areas. In remote areas, development inspection has hard to reach because of accessibility and mobility of DPWT (OPWT).

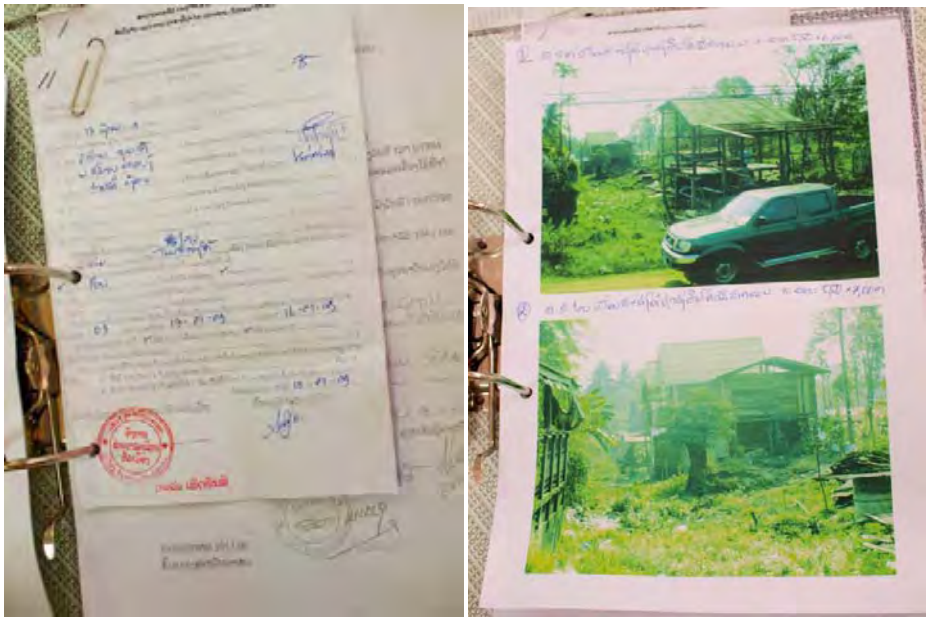


Photo 5.2 Zoning Violation Recording (Violation Notice and Photos of the Site)

5.4.5 Spatial Data Management

Mainly the National Geographic Department and National Land Management Authority have prepared the spatial data other than project-based surveys conducted by PTI, DPWT and Water Supply State Enterprise.

(1) Digital Cadastral Maps

The National Land Management Authority has produced cadastral maps that cover the urban areas of Vientiane Capital City. The background images are ortho-photographs with a spatial precision equivalent to 1/1,000.

Source: National Land Management Authority

Photo 5.3 Cadastral Mapping Project in Vientiane

1/100,000 scale maps are already in a digital format for land classification mapping.

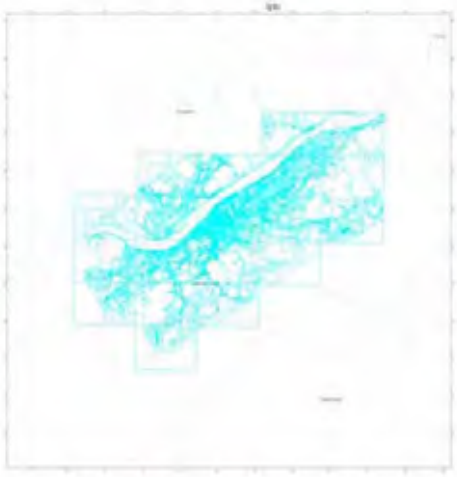
(2) Digital Geographic Data

The National Geographic Department has digital maps at a scale of 1/5,000 which cover urban areas of Kaysone Phomvihane and Pakse. In other Secondary Towns, including the Vientiane Capital City, the digital data are available.

Kaysone Phomvihane

Pakse

Thakhek



Luang Prabang

Vientiane Capital City

Figure 5.12 Digital Data Coverage (1/5,000 level)

5.5 Human Resources

A professional organization related to infrastructure planning and development is the Association of Architects and Engineers. At university level, the Faculty of Architecture, Lao National University is the only education of higher learning which offers planning related education.

There is no comprehensive human resource development program available for infrastructure planning and development in DPWT or UDAA.

Activities such as seminars and workshops are held when such budget is allocated or project associated programs at a time of project implementation by international organizations.

The major achievement of capacity development was the preparation of the Urban Planning Manual and associated training conducted by GTZ in 2007.

PTI, which has a function of training planning professionals, has conducted only one seminar in the fiscal year of 2009. Some staff of PTI involves in planning education as lecturers for the planning program in the Lao National University.

In DPWT, Savannakhet, training has been conducted by different international cooperation agencies such as ADB and SIDA. Manuals for training have been prepared, but the training was discontinued because of budgetary reasons.

The Champasack Road improvement Project was conducted to rehabilitate and to improve a 200 km section of road in the Lao PDR in the southern region. The total project cost was $50.1 million with the ADB loan amounting to $48 million and the balance was financed by the Lao government[5]. The procurement and implantation was decentralized to DPWT, Champasack. The experience of conducting the ADB project raised the technical capacity of DPWT, Champasack. All the roads drawings are stored in a digital format, and the extensions and conditions are managed using a GIS system.

5 Asian Development Bank, Operations Evaluation Department, Project Performance Evaluation Report for the Lao People's Democratic Republic

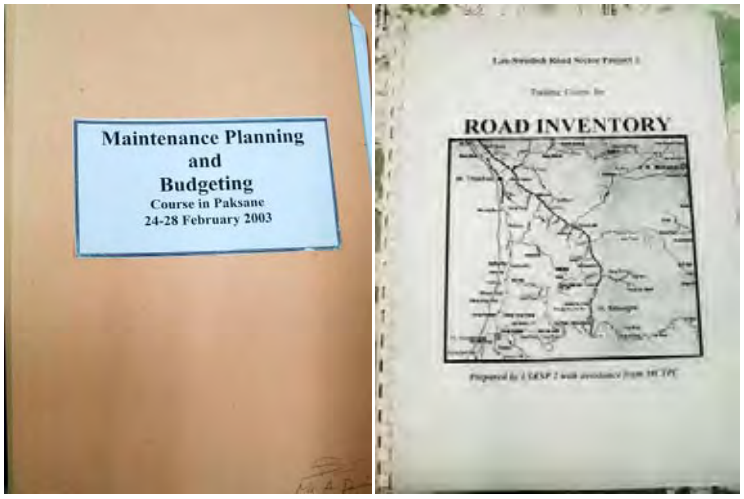


Photo 5.4 Training Manuals Used in DPWT, Savannakhet

A-6 Environment

This section compiles sate of the environment in Lao PDR and the regional core cities; and institutional and legal framework of the environmental management in Lao PDR.

6.1 State of the Environment in Laos PDR and the Regional Core Cities

The increasing pace of the economic activities in Lao PDR during the last decade has inevitably has an impact on the natural environment. The Environment Monitor 2006 highlights deterioration of key environmental issues such as natural environment, i.e., forest cover, biodiversity, and urban environmental issues.

6.1.1 Natural environment

The forest cover area is 41.5% of total land area in 2004. The annual rate of deforestation averaged about 0.4% of the total country land area for the period between 1990 and 2000. The geography and topography of Lao PDR creates wide variations of biodiversity.

The government tries to protect the biodiversity by the National Protected Area. Since 1993, the government of Lao PDR has established 22 National Protected Areas (NPA), covering 14.3% of the total national land. In NPA, exploiting activities are prohibited unless specific exemption by government, such as logging, collecting forest products, excavation or mining, expansion of shifting cultivation, exploitation of cultural or historical assets, use of explosives, chemicals or poisons, and burning. In addition, there are 15 Provincial Conservation Areas and 144 District Conservation Areas; 23 Provincial Protected Forest and 52 District Protected Areas. In total, 5.3 million ha covers 22.6% of the land area.

In Savannakhet and Champasack provinces, there are four national protected areas as shown in the table below. None of these NPA in the project area is in Kaysone Phomvihane and Pakse. However, Dong Am Pham NPA in Champasack is adjacent to Pakse city. In Savannakhet, Dong Nat'at and Dong Beung Va provincial conservation forests are adjacent to Kaysone Phomvihane city.

Table 6.1 National Protected Area in Savannakhet and Pakse Provinces

Province	Name	Area (ha)	Location
Savannakhet	Phou Xang He	109,900	Atsapon, Palansai, Phin, Xepon, Vilabouri
	Xe Bang Nouan	150,000	Songkhon, Tha Pang Thong, Salavan, Toumlan, Vapi, Lakhonpheng
	Dong Phou Vieng	197,000	Phin, Xepon, Nong
Champasack	Dong Am Pham	200,000	Patoumphon, Paksong, Bachiang

Source: Environmental Monitor 2006.

Water resources are one of the principal assets with a potential to support socio-economic development. Lao PDR has abundant water resources, estimated for 35% of all water in the Mekong River from watersheds within Lao PDR (MRC, 2003). Despite the abundance, unusual rainfall patterns cause flood and droughts. Flooding in 2002 affected 1,845 person (3% of population) and 351 ha in Kaysone Phomvihane and 5,705 person (12 % of the population) and 783 ha in Pakse.

6.1.2 Urban environment

A high proportion of the population suffers from diseases related to deficiencies in water supply and sanitation. 64% of the total population has access to safe drinking water: 75% for urban and 60% for rural households in 2004. The water access rate in the urban areas once decreased since a lot of population migrated into the urban areas from the rural areas. 44% of households have access to satisfactory sanitation facilities: 70% for urban households in contrast with 36% for rural households. Those rates for Kaysone Phomvihane and Pakse are shown in Table 6.2.

Table 6.2 Access to Safe Water and Sanitation

Indicator	Savannakhet Province	Champasack Province	Kaysone Phomvihane	Pakse
Percentage of households access to safe water	40.6%	49.3%	72%	74%
Percentage of households having modern and normal toilet	22.5%	27.7%	63%	80%

Source: The Population and housing census 2005: Whole country, Savannakhet and Pakse provinces.

The generation of solid waste in urban areas is rising and posing an emerging threat to the quality of surface and groundwater. The annual waste generation is 270,000 tons of which most of the waste is the domestic waste. The average urban waste production is 0.75kg per capita. The waste comprises of 30% for plastic, 30% for organic materials, 25% for glass, cans and metals, and 15% for papers. The collection rate is 45% in five urban areas. Only Vientiane city and 4 secondary towns (Luang Prabang, Thakek, Kison Phomvihane and Pakse) have sanitary landfills. The landfill facilities are inadequate with no leachate collection or monitoring well.

Table 6.3 Solid Waste Management in Major Cities

		Vientiane city	Luang Prabang	Thakhek	Kaysone Phomvihane	Pakse
Average per capita solid waste production (2002) *	Kg/capita/day	0.8	1.0	0.8	1.0	1.4
(2006-2007) **	Kg/HH/day				3.3	3.2
Landfills *	Started	Old: 1998 New: Feb.2008	June 2002	Aug 2000	Aug 2000	July 2000
	Site area	Old: 62 ha New: 100ha	15ha	9ha	13.5ha	13.5ha
	Lifespan		10 years and more	10 years and more	5-10 years	5 years

Source: * ADB, Lao Urban Data Book, 2003; ** DPWT of provinces.

Air pollution in Lao PDR is at a safe level. Air quality is expected to worsen if adequate mitigation measures are not taken where the number of vehicles has been growing.

6.1.3 Social environment

Major socio-economic indicators are shown in the following table. The population of the country is growing at a rate of 2.6% per annum. About 79% lived in rural areas, while 21% lived in urban areas. Poverty incidence occurs mainly in rural areas. Therefore, socio-economic indicators such as poverty rate in Kaysone Phomvihane and Pakse are fairly good as compared with the national average.

Lao PDR has 46 ethnic minority groups. They can be grouped into three general classifications based on topographical origins. These are Lao Loum from the lowland areas, Lao Theung from the middle and upland areas, and Lao Soung from the highest areas. For Kaysone Pohomvihane and Pakse, about 90% are Lao Loum. Minority is not a significant issue for these two cities as those are centered in the rural areas.

Lao PDR has many places of cultural and historical value. Above all, Lao PDR has two cultural heritages on World Heritage List. These are *"Vat Phou and Associated Ancient Settlements within the Champasack Cultural Landscape"* and *"Town of Luang Prabang"*. The former locates out of the Study area of Pakse. The latter Luang Prabang town itself has a cultural value for the remarkably well-preserved townscape of the fusion of traditional architecture and Lao urban structures with those built by the European colonial authorities in the 19th and 20th centuries. The town of Luang Prabang makes an effort to preserve historical townscape by introducing strict urban planning and building codes. In Luang Prabang, those who want to renovate or build buildings have to report their plans to the World Heritage Office in the province subject to their inspections. By strictly preserving townscape, Luang Prabang attracts many tourists over the world. However, it costs residents to comply with the strict urban planning and building codes. For its strictness, some local people who

cannot afford to comply with these codes cannot help moving out of the town.

Table 6.4 Major Socio-Economic Indicators

Indicators	year	National	Savannakhet province	Champasack province	Kaysone Phomvihane	Pakse
Basic indicators and population						
Area (km2)		236,800	21,774	15,415	521.4	15.35
Population	2005 *1	5,621,982	825,902	607,370	112,915	78,669
Population urban (%)	2005 *1	1,522,137 (27.1%)	185,308 (22.4%)	124,438 (20.5%)	81,401 (72.1%)	57,669 (73.3%)
Population rural (%)	2005 *1	4,093,248 (72.8%)	640,594 (77.6%)	482,932 (79.5%)	31,514 (27.9%)	21,000 (26.7%)
Migrate out Migrate in	2005 *1 2005 *1	181,451 181,451	9,469 5,548	11,773 7,423		
Households Urban households	2005 *1 2005 *1	958,955 268,182	131,216 30,485	105,093 20,582	18,607 13,143	12,570 9,186
Social indicators						
Ethnic group	1995 *4					
Lao Loum					94%	87.7%
Lao Theung					1.3%	1.2%
Lao Soung					0.1%	0.1%
Others					4.6%	11.1%
Poverty rate	2004 *2	33.6%	43.3%	18.4%		
Poor village	2003 *3				4 (4.3%)	0 (0%)
Poor HH	2003 *3				1,569 (9.5%)	85 (0.7%)
Literacy rates 15 years and above	2005	72.7%	68.5%	81.8%	88.4%	91.7%
Total fertility rate		4.5	4.4	4.2		
Infant mortality		68	67.5	67.5		
% of HH with electricity	2005 *1	49.7%	53.3%	49.7%	88.9%	92.5%
Number of accidents	2008 *2	5,198	327	352		
Economic activities						
Unemployment rate (%)	2005 *1	1.4%	1.0%	1.1%	3.2%	3.4%
Household operating agricultural land	2005 *1	67.6%	76.4%	65.7%	40.6%	16.5%
Average size of agricultural land (ha)	2005 *1	2.11	2.42	2.1	2.78	3.17
Season rice production Season rice harvested area	2007 *2 2007 *2	2,193,400 604,147	466,875 135,449	297,360 93,504	43,359 12,651	
Number of hotels	2007 *2	211	13	31		

Source: *1 The Population and housing census 2005: Whole country, Savannakhet and Pakse provinces.
*2.Ministry of Planning and Investment, Statistical yearbook 2007, June 2008. Provincial Statistical Yearbook 2008. 3 ADB, Lao Urban Data Book, 2003. 4 The Population and housing census 1995.

6.2 Environmental Management Framework

6.2.1 Institutional Arrangements

Environmental Protection Law of 1999 (EPL) is a guiding law in the environmental management. The law specifies necessary principles, rules and measures for managing, monitoring, restoring and protecting the environment in order to protect human health, natural resources and the richness of the nature, and to ensure the sustainable socio-economic development of the nation.

(1) Environmental Management at Various Level

Environmental Protection Law of 1999 stipulates the environmental management and monitoring agencies as follows:

- Water Resources and Environment Administration (WREA);
- Environmental management and monitoring units (EMMU) at the ministerial level;
- Environmental management and monitoring units (EMMU) at the provincial, municipal or special zone level;

- Environmental management and monitoring units (EMMU) at the district levels; and
- The village administrations.

(a) National Level

At the national level, Water Resources and Environmental Administration (WREA) who is the main manager, monitor and coordinator of the environment matter, has a mandate focusing on the coordination and oversight of environmental affairs. WREA was established in 1997 following reorganization of the Science, Technology and Environment Agency (STEA). Line ministries such as Ministry of Agriculture and Forestry (MAF), Ministry of Public Works and Transport (MPWT), Ministry of Energy and Mines (MEM), and Ministry of Public Health (MOH) are responsible for sectional environmental matters.

(b) Decentralized entities

Government of Lao PDR is implementing its decentralization policy. The government aims to transform the province into the strategic unit, the district into the planning and budgetary unit, and the village into the implementing unit. WREA has Provincial Water and Environment Offices (WREO).

(c) Inter-sectional coordination

As a cross-sectional nature of the environment issues, inter-sectional coordination is necessary. There are multiple coordination bodies to facilitate inter-agency and provincial coordination. There are the National Environment Committee (NEC), the Water Resources Coordination Committee (WRCC), and the Lao National Mekong Committee (LNMC).

(2) Environmental Management in the Urban Development Sector

In the urban planning sector, MPWT is responsible for management of road projects, transport, housing and urban planning, urban water supply, and urban wastewater and sanitation, riverbank erosion control. In MPWT, Environmental and Technical Division (ETD) of Department of Roads is in charge of the environmental issues in the road sector. Public Works and Transport Institute (PTI) recently established an Environmental and Social Division (ESD) that is responsible for the environmental issues in the urban development sector not only the road sector. There institutions are the EMMU at the ministerial level; those are under the process of streamlining functions.

Environmental management in the urban sector is done by the following three ways:

- Management of the development project: by Environmental Assessment (EA)
- Emission control at pollution sources: setting emission standards, monitoring and penalties.
- Ambient monitoring: periodical monitoring the environment such as air quality and river water quality.

Currently, environmental management in the urban development sector is centered in Environmental Assessment since the development is the major national concern in Lao PDR. Emission control and ambient monitoring are undertaken in only Vientiane Capital, and these are not in case in the regional core cities such as Kaysone Phomvihane and Pakse where relevant authorities make instructions to polluters only if claims arisen. Provincial Water and Environment Offices (WREO) are set up recently; they do not have enough capacities to control the pollution sources and monitor the environment.

Strengthening Environmental Management II (SEMII) assisted by Swedish International Development Agency (SIDA) tries to strengthening the capacities of WREA at the state level as well as provincial level. Under this cooperation several regulations are under revising, including Environmental Protection Law of 1999 and the Regulation on Environmental Assessment of 2000. In Champasack province, SEM II project supports to prepare Integrated Spatial Plan (ISP).

6.2.2 Legal Framework

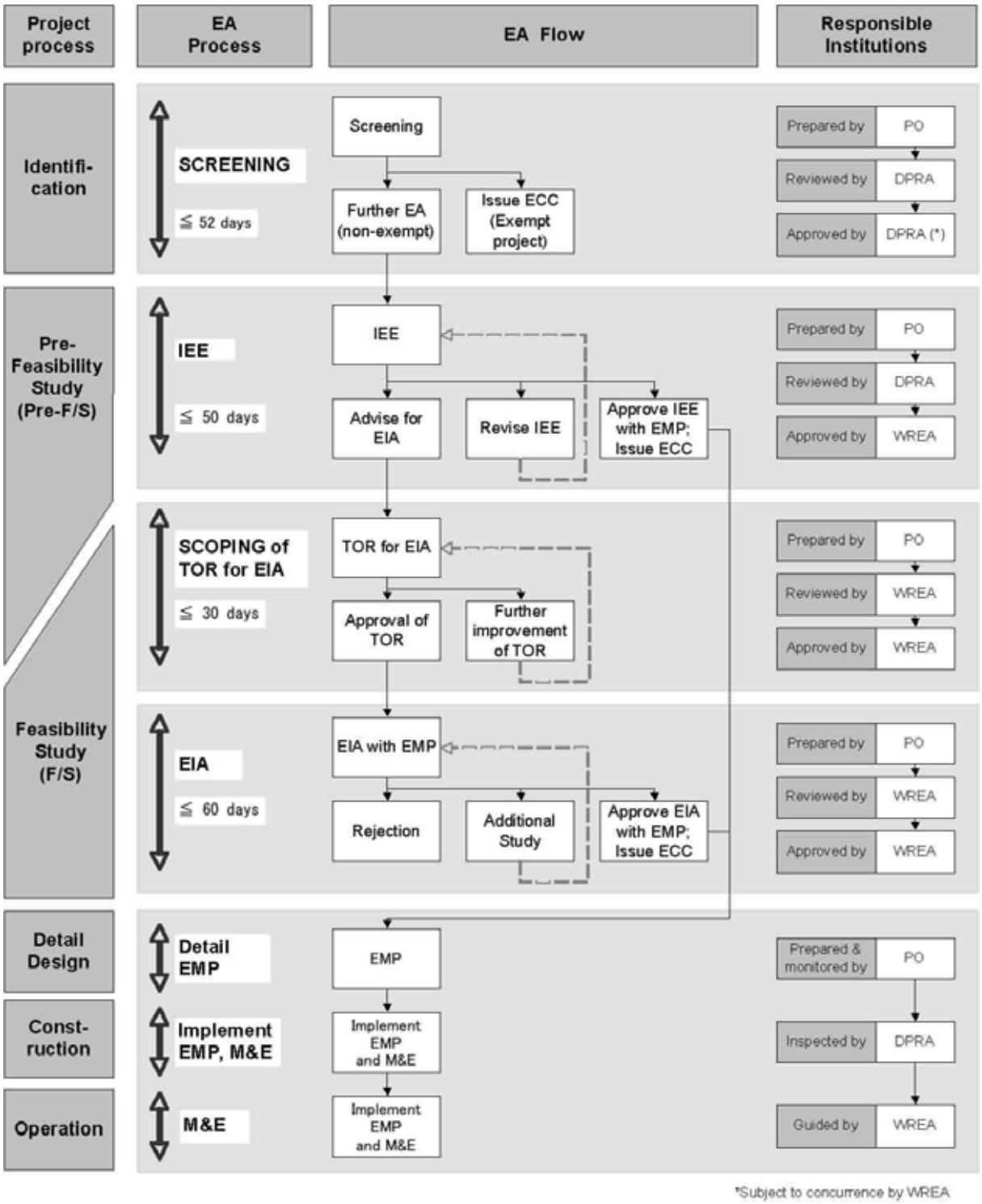
Based on the Environmental Protection Law, the Regulation on Environmental Assessment in 2000 (EA Regulation), as a general environmental assessment regulation, establishes the uniform environmental assessment (EA) requirements and procedures for all development projects. Based on this general regulation, each sector ministry issues sector specific regulation on procedures and methods of EA.

(1) EA Procedures

According to these regulations, each Development Project Responsible Agency (DPRA) must ensure that any development project is subject to environmental assessment (EA) in accordance with the regulations on EA and any regulation of responsive line ministry. The procedure of environmental assessment is as follows.

- **Screening:** A project owner (PO) must submit a project description to the DPRA for screening the project for potential environmental impact. For the projects found to be exempt from further environmental assessment, Water Resources and Environmental Agency (WREA) issues an environmental compliance certificate (ECC), with or without conditions. For those project determined to be non-exempt from environmental assessment must proceed to conduct an Initial Environmental Examination (IEE).
- **IEE:** The project owner must prepare an IEE. If the IEE report concludes that no EIA is required, an Environmental Management Plan (EMP) must be developed within the IEE. If the IEE determines that an EIA is required, the IEE should include the TOR for the EIA. DPRA, in consultation with other agencies and general public reviews the IEE and determines whether to require an EIA or not. WREA approves the decision by DPRA and issues an environmental compliance certificate.
- **Scoping the TOR for the EIA:** TOR for the EIA is prepared by PO. WREA, in consultation with line ministries, reviews and decide whether TOR is sufficient or further improvement required.
- **EIA:** The project owner conducts the EIA. WREA reviews and approves EIA reports, and coordinates the review with relevant line ministries and other government agencies, in consultation with affected parties.
- **EMP and M&E:** Once the project is approved, PO has to prepare detailed EMP and implement it. PO is also responsible for monitoring and evaluation (M&E) of the project environment. DPRA is responsible for the inspection of M&E. WREA gives general guidance to DPRA and has a right of inspection.

This EA flow is shown in Figure 6.1.



Notes: PO: Project Owner; DPRA: Development Project Responsible Agency;
WREA: Water Resources and Environment Administration;
ECC: Environmental Compliance Certificate; EA: Environmental Assessment; IEE: Initial Environmental Examination;
EIA: Environmental Impact Assessment; EMP: Environmental Management Plan; M&E: Monitoring and Evaluation

Source: Based on Regulations on Environment Assessment in the Lao PDR 2000,

Figure 6.1 Frame of EA Process, EA Flow and Responsible Institutions

(2) Social Assessment

A development project having social impacts, especially involuntary resettlement, requires conducting social assessment based on *Land Law of 1997*, *Decree 192 on Resettlement and Compensation of July 7th 2005*, *Regulations for Implementing Decree 192 on Compensation and Resettlement on November 11th 2005*, and *Technical Guidelines for Compensation and Resettlement in November 2005*.

The procedure of the Social Assessment is similar to Environmental Assessment as shown the table below.

Table 6.5 Social Assessment Process

Project Process	Social Assessment Process	Criteria	Contents
Project identify-cation	Screening and Initial Social Assessment (ISA)		Identify social issues and types and groups of affected people. TOR for subsequent studies if an significant impacts
Pre-F/S	Social Assessment (SA)	Social impacts on population	Identify the types and scale of social impacts, stakeholders affected
	Land Acquisition and Compensation Report (LACR)	Marginal impact: Less than 200 persons (40-50 HH)	Identify the impacts on affected people (AP) and detail inventory of affected assets
F/S	Resettlement Plan (RP)	Significant impact: 200 persons (40-50 HH) and more	Identify the impacts on affected people (AP) and detail inventory of affected assets
	Ethnic Minority Development Plan (EMDP)	ISA identifies major impacts on ethnic minority groups	
Implemen-tation	Implement LACR, RP, SA, EMDP		

Source: Based on Technical Guidelines on Compensation and Resettlement in Development Projects in November 2005.

(3) EA in the Urban Development Sector

In the urban development sector, the road sector is in advance in the progress of legal arrangements. MPWT issues the Regulation on Environmental Impact Assessment of Road Projects in Lao PDR in 2004 and Manual of Environmental Impact Assessment Procedures for Road Projects in the Lao PDR 1998.

Table 6.6 Category of Road Projects

Category	Procedure	Criteria
Category I	Exempted Road Project	No/ minimum environmental impacts such as: Routine road maintenance Periodic and emergency road maintenance No resumption of property No major change in the volume or type of the road No opening of new quarries or significant areas of borrow pits No resettlement
Category II	EIA Required Road Project	Have environmental impact such as: New construction or major rehabilitation within the Right of Way (ROW) New construction or construction outside the original ROW Construction in environmentally sensitive areas: human settlement, protected forest, areas and historical and cultural heritage preservation. Resettlement of more than 10 families

Source: Based on Regulation on Environmental Impact Assessment of Road Projects in Lao PDR in 2004 and Manual of Environmental Impact Assessment Procedures for Road Projects in the Lao PDR 1998,

Environmental and Social Division (ESD) is preparing an Environmental and Social Operations Manual (ESOM) of the Road Sector. ESD is also planning to prepare these regulations in the other

sector than the road.

(4) Revising Legislation

WREA is in the process of revising regulations including EPL and EA Regulations and preparing Environmental Standards. Revised EPL will be comprehensive including a concept of strategic environmental assessment and environment and social impact assessment. A new EA regulation will include a concept of ESIA (Environmental and Social impact assessment) where the social assessment and environmental assessment are incorporated. Environmental Standard tries to combine various standards those were set by sectoral ministries.