2 Framework Conditions for Waste Management in Lao PDR, Vietnam, Cambodia and Thailand



Educational objective of the chapter

- General facts about Lao PDR, Vietnam, Cambodia and Thailand
- Different framework conditions: Policies and Strategies, Stakeholders, Economic and Socio-economic framwork conditions

2.1 Cambodia

2.1.1 General Facts



Figure 2.1-1: Map of Cambodia

Table 2.1-1: A summary of general facts of Cambodia (NIS, 2006)

People		Geography and Climate	
Population	14.0 millions	Total land area	181,035 Km^2
Population Growth Rate	2.0%	Land border	2,600 Km
Average Population Density	82 pp/km^2	Coastline	440 Km
Ethnicity: Khmer	96%	Length (North to South) Width (East to West)	440 Km 560 Km
Religion	Buddhism	Average annual temperature	27.7ºC
Language	Khmer	Average annual rainfall ▪ Central lowland regions ▪ Highland areas	 1,400 mm 5,000 mm
Infant Mortality Rate	95/1000	Humidity (daytime) ▪ Dry season ▪ Rainy season	 50% 60%
Maternal Mortality	4/1000	**Government Administration**	
General Fertility Rate	129/1000	Number of provinces/municipalities	24
Life Expectancy	54.4 years	Number of districts	185
Net enrollment Ratio for Primary School	91.9	Number of communes	1,621
Literacy Rate (15-44)	79%	Number of villages	13,886

2.1.2 Policies and Strategies

Current situations of solid waste management in Cambodia

The management, collection and transportation of solid wastes in Cambodia are still weak, as a result of a number of factors, including a low budget, a shortage of all types of equipment needed for the transportation, collection and storage of waste, weak laws and enforcement and no overall management plan. Transportation and collection processes are complicated and the services are slow and unpredictable (Cotter, 2000).



Figure 2.1-2: Truck used to transport waste from a open market (Deum Kor Market) in Phnom Penh



Figure 2.1-3: Waste used to make compost at COMPED

National, regional, future plan

The Office of Solid Waste Management and Pollution Control have proposed measures to improve sanitary conditions and cleanliness in the municipality of Phnom Penh and to reduce the volume of solid waste. The reduction approach includes the following recommended measures:

- Increase education and training for the general population to understand solid waste management and ways to avoid dangers which occur due to their own carelessness.
- Prohibit companies which import materials and equipment which cannot be recycled.
- Decrease the importation of second hand products.
- Offer incentives to attract investment companies to invest in the recycling plants.
- Organize and place public bins in suitable places to make collection easier.
- Introduce clear and enforceable policies and regulations.

Below are the principles that have been set in the Waste Management Program (WMP) to establish liquid and solid waste management in Cambodia (Kokusai Kogyo Co., 2005):

- Political will and financial affordability are prerequisites for adequate management
- Health, economy and environment are equally important factors
- Stepwise approaches are essential to explore alternatives and integrated solutions
- National and local governments are to take responsibility in creating enabling environment for sustainable solutions
- Commitment and involvement of all stakeholders has to be assured from the beginning
- Public and private partnership and other new financial mechanisms are to be explored
- Linking wastewater management systems to other sectors, e.g. industry, agriculture, etc.
- Sustainable solutions for waste management will be built upon pollution prevention and law-cost technologies.

Based on the above key principles, following improvements have been proposed by WMP to establish sustainable solid waste management (SWM) (Kokusai Kogyo Co., 2005):

- To set up waste inventories throughout the country to assess the actual and potential impact of waste on the living environment in provinces and cities
- To review and develop guidelines and standards for waste management in Cambodia in accordance with national and local requirements
- To enforce all pollution sources to implement the guidelines and standards for waste management as well as to raise their awareness of proper waste management
- To disseminate the waste management guidelines and standards to all stakeholders, including local communities, NGO, etc
- To promote the 3Rs (Reduce, Reuse and Recycle)
- To promote cleaner production to minimize or eliminate the use of toxin or hazardous wastes from industries.

Instruments, Laws

The *Law on Environmental Protection and Natural Resource Management, which* was approved in 1999, has 27 articles dealing with general provisions, national and regional environmental plans, environmental impact assessment, natural resource management, environmental protection, monitoring, record-keeping, and inspection, public participation and access to information, environmental endowment fund, interim provisions, and a section on penalties. In addition, the law contains three sub-decrees on water pollution control, solid waste management, and air and noise pollution control (Heisler, 2004).

The Solid Waste Management Sub-Decree:
The sub-decree on Solid Waste Management (SWM), enacted in April, 1999, was established to regulate SWM in a proper technical and safe manner to protect human health and the environment. The sub-decree sets the overall framework for SWM in Cambodia and applies to all activities related to "the disposal, storage, collection, transport, recycling, and dumping of waste.

2.1.3 Stakeholders

Several groups of stakeholders, including waste producers, waste pickers, regulators, legislators, contractors, educators, NGOs, media and the general public, are involved in waste management in Cambodia. Although each of these stakeholders plays a potential role, three groups (municipalities and industry (generators), governments (regulators) and legislators provide the key to effective national waste management policies and strategies that integrate the responsibilities of all stakeholders in making waste management a successful venture.

Ministry of Environment (MOE)
MOE was established by a Royal Decree in 1993 with important missions to protect and upgrade the environmental quality and public health by means of prevention, reduction, and control of pollution, sustainable natural resource management and biodiversity in Cambodia. Solid waste in Cambodia is co-managed by MOE and respective municipal or provincial authority. Under the supervision of MOE, Department of Environment Pollution Control (DEPC) has been established to control and monitor all wastes, toxic and hazardous substances.

Private Sector
Because the government has limited budget for SWM or other environmental management concerns, private companies are encouraged to be involved in the larger provincial towns to collect waste from markets as well as from residential areas surrounding the markets. Indeed, private sector participation in municipal services has witnessed increased interests in recent years to reform the weak performance of public sector, reduce costs, improve efficiency, and ensure environmental protection (Vin et al., 2005).

There are two main private companies responsible for waste management in Phnom Penh. CINTRI (Cambodia) Co., Ltd. is a profit waste management firm responsible for waste collection and transport, as well as for cleansing services for Phnom Penh city. The company now has a monopoly on waste services and a contract of fifty years. Phnom Penh Waste Management, PPWM, which operates under the DPWT, only has the capacity to collect 2.1% of the waste from the city (JICA, 2004). Hence, CINTRI definitely fills an important need in the city. However, CINTRI"s monopoly means that there is no open market for waste services and hence no bidding between competitors working to get the price down (JICA, 2004).

The second company is Sarom Trading Company Co. Ltd, which is a privately owned enterprise that currently collects, transports and disposes of all of Cambodia's hazardous waste at its site, located around 20 km from Phnom Penh in Ang Snoul, Kandal Province. The contract between the industries and Sarom Trading center is a coordinated effort among GMAC—the industry association, the Ministry of Industry, the Ministry of Environment, and the company itself. The individual industries are completely responsible for paying a fee to Sarom Trading center (Heisler, 2004).

Waste Pickers
Currently, there are approximately 3000 waste pickers in Phnom Penh, about 50% of whom are children. They, being poor, make their living by sorting through garbage on the street or in front of people's homes to collect materials such as aluminum, glass, and plastics to sell to waste collectors. In Phnom Penh, most of the waste pickers live on the periphery of the disposal site in Stung Mean Chey, in Phum Prek Tal and Phum Damnak Thom. They work at nigh in public places, sorting solid waste without protection such as gloves or masks because of the lack knowledge on safe waste handing techniques, sanitation and basic health care, thus being vulnerable to dangers such as disease, injury, and assault (MPP & ADB, 2006).

NGOs
There are several NGOs providing various programs to child waste pickers and are also involved in community-based development projects such as micro-credit finance, in cooperation with Village Development Committees (VDC). In Phnom Penh, Community Sanitation and Recycling Organization (SCARO) and Cambodian Education and Waste management Organization (COMPED) are the only specialized NGOs on waste management. The two NGOs are mainly working on:

- Organizing community development and facilitating infrastructure development activities.
- Conducting outreach, education, and health care activities for waste pickers, poor community residents and school children.
- Developing IEC materials to support education and outreach activities

- Organizing waste pickers into self-help groups.
- Producing compost from waste

2.1.4 Economic framework

After almost 30 years of civil war, Cambodia began to rebuild its economy in the early 1990s, with the support of the International Monetary Fund (IMF). Political stability and macroeconomic reforms such as banking systems, government revenue collection, and improved governance have resulted in a rapid increase in economic growth. In the last decade, Cambodia's economy, after being integrated in regional and global economies, has grown well with an average growth rate of more than seven percent per year (Table 2.1-2), as a consequence of export growth (EIC, 2006). The economy grew remarkably in 2005, with estimated nominal GDP being 25,350 billion Riels in current prices (NIS, 2006). Presented in Table 2.1-3 is the growth rate of the GDP by sectors. The industrial sector showed the fastest growth rate with an average of 15 percent per annum, due mainly to a boom in the garment industry; totally, there are 258 garment factories employing 300, 0000 workers as of December, 2005. The service sector, imparted mainly by the tourism sector, grew moderately with a rate of six percent per annum. The growth of agriculture GDP has shown to be erratic, due mainly to a high dependency on weather conditions (EIC, 2006).

Table 2.1-2: Key Macroeconomic indicators, projections for 2006-2010 [RGC, 2006]

	2005	**2006**	**2007**	**2008**	**2009**	**2010**
GDP (constant prices) billion riels	19,294	20,452	21,679	22,936	24,290	25,747
Real GDP-% increase	7.0	6.0	6.0	5.8	5.9	6.0
Inflation in Riels (%)	6.2	3.5	3.0	3.0	3.0	3.0
Foreign Direct Investment (US$ million)	216	227	249	274	302	332
Gross Foreign Reserves (mths of import)	2.5	2.5	2.5	2.6	2.8	3.0
Riels/US$ Parity (exchange rate)	4,128	4,219	4,228	4,278	4,328	4,378
Exports (US$ million)	2,707	2,931	3,172	3,395	3,643	3,918
Imports (US$ million)	3,738	4,169	4,513	4,827	5,172	5,527
Current Account Balance (%GDP) (including official transfer)	-4.1	-5.4	-4.9	-4.0	-3.3	-2.6
Fiscal Sector (% of GDP)						
Budget Revenue	**11.8**	**12.2**	**12.8**	**13.2**	**13.5**	**13.8**
Tax Revenue	8.7	9.4	9.4	9.4	9.3	9.2
Non-Tax Revenue	2.5	2.6	2.6	2.6	2.7	2.7
Budget Expenditure	**14.9**	**17.0**	**17.2**	**17.1**	**16.9**	**16.5**
Capital Expenditure	5.3	6.6	6.6	6.3	6.2	5.9
Current Expenditure	9.6	10.5	10.7	10.7	10.7	10.8
Current Balance	**1.6**	**1.5**	**2.0**	**2.3**	**2.6**	**2.9**

Table 2.1-3: GDP growth rate by sector and total (constant 2000 Prices) [NIS, 2006]

Sector	**Growth rate (%)**											
	1994	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
Agriculture	9.9	3.5	1.2	5.5	5.1	3.7	-1.2	4.5	-2.2	12.1	1.2	16.6
Industry	14.2	18.9	4.4	16.8	6.2	21.2	31.2	11.4	17.3	12.1	16.4	12.1
Services	0.6	8.3	9.2	2.9	5.0	14.6	8.9	8.7	6.3	4.4	11.7	12.1
Taxes less subsidies	80.8	1.8	14.3	5.3	-2.4	39.2	4.5	2.5	12.6	1.8	21.4	11.4
Total	**9.2**	**6.5**	**5.3**	**5.7**	**5.0**	**12.6**	**8.4**	**7.7**	**6.2**	**8.6**	**10.0**	**13.4**

2.1.5 Socio cultural and socio-economic framework

As a result of two decades of war and tragic loss of million lives during the Khmer Rough's regime (1975-79), Cambodia presents the highest poverty rate in Southeast Asia, with 35% of total poverty and 20% of food poverty in 2004. The socio-economic conditions in rural areas were found to be more obvious in rural areas than urban areas (Table 2.1-4). With a Human Development Index score

of 0.543, Cambodia is ranked as 130th out of 173 countries in the world. Access to education and health services is still limited (NIS, 2006).

Table 2.1-4: Comparison of socio-economic indicators between rural and urban population

Indicator	Rural	Urban
Average monthly income (riels)	314,247	1,139,553
Adult literacy (%)	64.9	79.1
Access to drinking water (%)	23.7	60.3
Access to electricity (%)	8.6	53.6
Access to toilet facility (%)	8.6	49.0
Educational levels beyond primary school (%)	12.8	31.4

The total employment increased from 3.9 millions in 1993 to 7.5 millions in 2004, of which agricultural, industry, and services sector accounted for 60.3, 12.5 and 27.2%, respectively (NIS, 2006). Employment status differs greatly between urban and rural areas. In urban areas, 30 per cent of the labor force is paid employees and only 27 per cent is unpaid family workers, whereas only 10 per cent of workers are paid employees and 48 per cent are unpaid family workers in rural areas (NIS, 2005).

The strategies of RGC, as presented in the Second Socio-Economic Development Plan 2001-2005 (SEDPII), are:

- To foster broad-based sustainable economic growth in which private sector plays the leading role to maintain an economic growth of 6-7%.
- To promote social and cultural development by improving the access of the poor to education, health, water and sanitation, power, credit, markets, information and appropriate technology.
- To promote the sustainable management and use of natural resources and the environment.
- To improve the governance environment through effective implementation of the Governance Action Plan (GAP).

2.2 Vietnam

2.2.1 General Facts of Vietnam

Geography

Vietnam lies on the eastern seaboard of the Indochina Penisula, has a total mainland area of 331,690 km^2, bordering China (1,281 km) to the north and Laos (2,130 km) and Cambodia (1.228 km) to the west, the Gulf of Thailand to the South and the Pacific Ocean to the East. The country stretches from latitudes 8°10' to 23°24'N and has an 3,444 km long of coastline, over 3,000 islands. Mountains and hill cover four-fifths of Vietnam's territory with the Truongson range stretching over 1400 km. Mount Fansipan (3,143 m) is the highest peak in Southeast Asia. The country's two main cultivated areas are the Red River Delta (15,000 sq. km) in the north and the Mekong Delta (40,000 sq.km) in the south.



Figure 2.2-1: Map of Vietnam

Climate

Vietnam is located in the tropical and temperate zone characterized by high temperature and humidity all year round, especially in rainy season. The annual mean temperature is over 20 degrees Celsius through out the country (Hanoi 23.4^{o}C, Hue 25.1^{o}C, Ho Chi Minh City 26.9^{o}C). Low land areas receive around 1,500 mm of rain per year, while mountainous areas receive 2,000 mm to 3,000 mm. The average air humidity is over 80% and can reach 90% in rainy season.

Vietnam has two seasons: cool and dry from November to April and hot and rainy from May to October. The difference between summer and winter temperature is dramatic in north (varying up to 20 or 30 degrees Celsius). The south is warm all year round, with seasonal variations in temperature averaging just three degrees Celsius.

Inhabitants

According to General Statistic Office, at January 1st, 2006, Vietnam has a population of an estimated 84.156 million people (Table 2.2-1) of which the Viet people comprise 85%. The minority of the population consists of 54 ethnic groups who live mostly in the mountainous areas in the Central Highlands and the North. The urban population ist about 25% and the population growth rate 1,2%. The average density is 242 people/km^2.

Ethnic groups in the North generally live between altitudes of 25m and 2,000m above sea level. The most well known of these are the Tay (also the most populous), the White Tai and Black Tai

(distinguished by the colour of their clothes) and the Hmong (Meo). In the South, geographic locations of ethnic hilltribes are much more distinct with some living in the plains as well as the hills. The most well known of these are Hoa, Khmer, Cham.

Economic, industry

Environmental situation in Vietnam is going to an urgent fact. Main reason is the unsustainable development of the country. The development in economic is not going well with protection of environment. This situation therefore bring for air pollution and polluted water from industrial waste water and solid waste.
Vietnam is a developing, densely-populated country that has had to recover from the ravages of war, the loss of financial support from the old Soviet Bloc, and the rigidities of a centrally-planned economy. Substantial progress was achieved from 1986 to 1996 in moving forward from an extremely low starting point - growth averaged around 9% per year from 1993 to 1997. GDP growth of 8.5% in 1997 fell to 6% in 1998 and 5% in 1999. Growth then rose to 6% to 7% in 2000-2002 even against the background of global recession. Since the Party elected new leadership in 2001, Vietnamese authorities have reaffirmed their commitment to economic liberalization and have moved to implement the structural reforms needed to modernize the economy and to produce more competitive, export-driven industries. The US-Vietnam Bilateral Trade Agreement entered into force near the end of 2001 and is expected to significantly increase Vietnam's exports to the US.

Table 2.2-1: Vietnam inhabitants profiles (January 1st, 2006)

	Population (thousand people)	Area (*) (Km^2)	Population density (people/km^2)
Whole country	84155.8	331211.6	254
Red river delta	18207.9	14862.5	1225
North East	9458.5	64025.2	148
North West	2606.9	37533.8	69
North Central Coast	10668.3	51552	207
South Central Coast	7131.4	33166.1	215
Central Highlands	4868.9	54659.6	89
South East	13798.4	34807.7	396
Mekong River Delta	17415.5	40604.7	429

Data of General statistic Office

Following the conclusion of bilateral negotiations with interested WTO members and completion of multilateral negotiations in 2006, the WTO General Council approved the terms for Vietnam's membership on November 7, 2006. Vietnam formally acceded to the WTO as its 150th member on January 11, 2007. Vietnam was granted unconditional normal trade relations (NTR) status by the United States through a Presidential Proclamation signed by President Bush on December 29, 2006. To meet the obligations of WTO membership, Vietnam revised nearly all of its trade and investment laws and guiding regulations. As a result, foreign investors and those seeking to sell goods and services to the increasingly affluent Vietnamese population will benefit from the improved legislative framework and lower trade barriers. In 2007, Vietnam got an amazing GDP growth rate of around 8.5%.

Land use

After regulation of general department of land management of Vietnam, on using aspect, land is classified into 5 groups: (1) Agricultural land, (2) Forestry land, 3) Land for special use, (4) Residential land, (5) Not yet used land (see Table 2.2-2).

Environment issues

Like many other developing countries, the environment in Vietnam is deteriorating, particularly in densely populated areas, in industrial regions or base, and in sea port.

Various kind of Environment problems have been meet with: logging and slash-and-burn agricultural practices contribute to deforestation and soil degradation; water pollution by industrial refuse or waste; overfishing threaten marine life populations; groundwater contamination limits potable water supply; growing urban industrialization and population migration are rapidly degrading environment in Hanoi and Ho Chi Minh City (air pollution, noise pollution and water pollution); acid rains have also detected, toxic chemical pollution too; the use of chemical fertilizers and insecticides in agriculture certainly affects the surface and underground water, but its consequences are still not clearly understood.

Table 2.2-2: Vietnam land use profile in 2006 (at January 1st, 2006)

	Total area (thousand hectare)	In which			
		Agricultural land	Forestry land	Land for special use	Residential land
Whole country	33121.2	9412.2	14437.3	1401.0	602.7
Red river delta	1486.2	760.3	123.3	230.5	116.5
North East	6402.4	978.8	3551.0	202.7	79.9
North West	3753.4	499.5	1773.6	42.3	32.7
North Central Coast	5155.2	804.9	2854.0	194.1	97.9
South Central Coast	3316.7	583.8	1459.8	193.8	54.2
Central Highlands	5466.0	1597.1	3067.8	124.5	41.6
South East	3480.9	1611.9	1251.6	193.6	71.4
Mekong River Delta	4060.4	2575.9	356.2	219.5	108.5

Data of General statistic Office

There are three main types of solid waste: municipal solid waste, healthcare solid waste and industrial waste. Waste generation estimated around 15 million tons per year (2004), but the number will be soon bigger in the next decade, according to this development. The urbanization and the rapid development in industry as well as modernization in healthcare will bring a big amount in hazardous waste. If there is no suitable solution damage in people health and environment is foreseen [VEaSM 2005].

The environmental situation of Vietnam was for the first time stated in the National Report in 1994, from then exists every year the Annual Report on “Environmental Status”.

Waste problem is increased rapidly. There are three main reasons:

- Vietnam is on the way of industrialize and urbanization. Industry rate of development is about 12 - 15 % / year since continuously two recent decades.
- Many production processes equipped by old technologies therefore material consumption must be 2 - 3 times higher based on one product, corespondent with higher waste generation.
- People have less care about environmental protection.

It is to noticed that waste management is the integration of “waste” into the economic allocation problems, concerning legal aspect, connecting to social and economic condition, especially doing waste management need to understand well the waste characteristic in particular and the domestic waste situation in general.

Natural resources

Vietnam’s most valuable natural resource is its land, particularly the fertile, alluvial soils in the Red and Mekong deltas. Some 26 percent of the land is currently being cultivated Most mining activities take place in the northern provinces of the country, where anthracite coal, phosphate rock, gypsum, tin, zinc, iron, antimony, and chromite are extracted. Coal and apatite are mined extensively. The total coal production in 2001 was 10 million metric tons.

In recent years, large petroleum and natural gas deposits have been discovered along the continental shelf in the South China Sea. With assistance from the Soviet Union, Vietnam began extracting oil

from its first oil field in the mid-1980s. Additional oil fields have since become productive. In the late 1990s petroleum accounted for nearly one third of Vietnam's export revenues.

2.2.2 Introduction to the Mekong Delta

The Mekong delta (MD), Vietnam, is the most downstream part of the Mekong river basin. With a population of 17.4 million inhabitants living in 4 million hectares of land (data of General Statistic Office – on 1/1/2006), MD has great potentials for agricultural production. MD is the most important agricultural production region for the whole country, Vietnam. It supplies for more than 50 % of staple food and 60% of fish production and accounts for 27% of the total GDP of Vietnam. Rice and fishery products contribute significantly to the nation's export earning.

The MD is divided into 13 administrative units. It comprise 12 provinces: Long An, Tien Giang, Ben Tre, Tra Vinh, Vinh Long, Dong Thap, An Giang, Hau Giang, Kien Giang, Soc Trang, Bac Lieu, Ca Mau provinces and one city: Cantho City.



Figure 2.2-2: Map of the Mekong delta

2.2.3 Legal frame work for solid waste management in Vietnam

2.2.3.1 Legal frame work, policies and strategies

Policy on solid waste management in urban and industrial areas of Vietnam is issued in 10/07/1999, demonstrated in Decision 152/1999/QD-TTG of Prime Minister.

The National Environmental Action Plan 2001 - 2005 (NEAP) is focusing on five programs, among them Program 2 concerning: Improve solid waste management capacity, especially hazardous waste management in densely populated urban areas and industrial zones.

This program includes the following action:

Develop a national strategy for solid and hazardous waste management

The strategy will include the development of sanitary landfills, improved urban planning regulations and hazardous waste management guidelines. It will identify institutional relationships and administrative requirements, financial requirements for addressing priorities and HRD implications.

Develop sanitary landfills

Main population centres will develop sanitary landfills, according to the following time schedule:

- 2002: Hue, Haiphong, Danang
- 2003: Dongnai, Quinhon
- 2004: Baria-Vungtau, Nhatrang, Halong
- 2005: Thainguyen, Thudaumot

In addition, waste separation will be promoted throughout the country in an attempt to reduce the necessity for new landfills and expensive treatment facilities. By the year 2005, waste separation will be in place in at least 20 major centres in the country.

Recycling, re-use and reclamation of waste products will be promoted and private sector involvement will be encouraged. At least ten private sector enterprises will be in operation by the end of the plan period.

Improve hazardous waste management

Vietnam is still predominantly an agricultural society. However, hazardous waste is becoming a major problem. The main source for hazardous waste in industrial production, in particular metallurgy and chemical industry. Hazardous waste treatment facilities will be developed in Hanoi, Danang and Ho Chi Minh City, to act as collection and treatment locations for the three major development zones of the country.

Improve hospital waste management

There are currently 815 state-owned hospitals in operation and three private hospitals, but few of these have adequate waste treatment facilities. Not all hospital waste is hazardous, and it is estimated that only 16% of their solid waste needs special treatment. Before the end of 2005, environmental management systems will be introduced in all hospitals, as well as in the private health clinics. This will include waste separation guidelines and training and awareness about sanitation and environmental issues.

Incinerators will be installed at twenty main hospitals during the plan period, especially those that deal with infectious diseases. This will include 3 hospitals in Hanoi and Ho Chi Minh City respectively, and 12 general hospitals in rural provinces. The cost of the actual plants was covered through ODA, but Government will ensure that the running costs of the facilities are included in the budget of respective hospitals. By 2005, at least forty hospitals will have effective wastewater treatment facilities.

Raise awareness

During the period 2001 - 2005, programs have been implemented in the following cities and rural areas:

- By 2003: Hanoi, Dong Thap
- From 2002 to 2004: Ho Chi Minh city, Quang Ninh
- From 2003 to 2005: Hai Phong, Quang Ngai

This program will require financial incentives. A list of economic policy instruments was prepared in 2002 that was used to promote private sector involvement. Studies were carried out in 2002 and 2003 to determine opportunities to increase cost recovery associated with collection and disposal of solid waste. There are a short term proposal (to 2005) and a long one (to 2020) [2].

For 2005 it was stated for complete the waste management plan in every urban and industrial area. Segregating hazardous waste all from source and occasional for municipal waste in some selected places. Collection, transportation and treatment of 75 - 90 % amount of generated waste, suitable for each municipality. Healthcare waste is mostly treated in incinerator in big cities.

The Vietnamese government has issued a series of legal texts for solid waste management from the environmental protection law to the decree, circular, joint circular and standards as listed in the following.

Environmental protection legislation

Law on Environmental protection passed on November 29, 2005, took into effect from July 1st, 2006. This law replaced the Environmental protection law 1993.

Decree No 80/2006/NĐ-CP on August 09, 2006 of the Government detailing the implementation of the law on environmental protection.

Decree No 81/2006/NĐ-CP on August 09, 2006 of the Government promulgating the Regulation on sanction against Administrative violation in the field of protection of the environment. This decree replace the decree No 121/2004/NĐ-CP.

Decree No 59/2007/NĐ-CP of the Government promulgating the Regulation on the solid waste management activities, the right and duty of the person related to solid waste management.

Decision No 256/2003/QĐ-TTg, issue on August 7, 2004 by the Prime Minister on approving the National strategy on Environmental Protection up to year 2010 and Vision to 2020.

Decision No 153/2004/QĐ-TTg, issue on April 2nd, 2003 by the Prime Minister on provision sustainable development in Vietnam.

Decision No 64/2003/QĐ-TTg, issue on April 22nd, 2003 by the Prime Minister approving the plan for managing the establishments causing seriously environmental pollution.

Solid and hazardous waste legislation

Anouncement No 50/TB-VPCP dated on March 19, 2007 on the conclusion of the Prime Minister at the seminar on Applying Solid waste treatment technologies that were studied in Vietnam.

Decision 23/2006/QĐ-BTNMT dated on December 26, 2006 of Ministry of Natural Resource and Environment on promulgating the list of hazardous waste.

Circular No. 12/2006/TT-BTNMT dated on December 26, 2006 of Ministry of Natural Resource and Environment on the instruction of the condition, documentation, registration and code of hazardous waste management.

Decree No 23/2005/CT-TTg on June 21, 2005 of the Prime Minister on strengthening the activities on solid waste mangement in urban areas and industrial zones.

Decree No 13/2003/NĐ-CP on February 19, 2003 of the Government providing the provisions for the commodities prescribed as being dangerous/toxic and their transportation via roads.

Circular No 02/2001/TT-BKHCNMT dated on February 15, 2001 by Ministry of Science Technology and Environment on instruction the treatment of waste of special encourage investment.

Decision No 155/1999/QĐ-TTg issued on July 16 1999 of the Prime Minister promulgating the regulation on hazardous waste management.

Directive No. 199/TTg on April 3rd, 1997 of the Prime Minister on urgent measures to manage solid waste in urban areas and industrial zones.

Decision No 152/1999/QĐ-TTg issued on July 10, 1999 of the Prime Minister approving the National strategy for solid waste management in Industrial and urban Areas until 2020.

Inter-ministerial circular No 1590/1997/TTLT/BKHCNMT-BXD, October 17, 1997 of the Ministry of Construction, and Ministry of Science, Technology and Environment giving instruction to implement Directive 199/TTg by the Prime Minister on urgent measure on management solid waste in urban areas and industrial zones.

Decision No 60/2002/QĐ-BKHCNMT dated August 8, 2002, of Ministry of Science, Technology and Environment guiding the implementation of hazardous waste burying technique.

Toxic subtances legislations

Decision No 23/2006/QĐ-BTNMT by Minister of Ministry of Natural resource and environment promulgating the list of hazardous waste.

Directive No 29/1998/CT-TTg dated August 25, 1998 of The Prime Minister on strengthening the management of the use of plant protection chemicals and persistent organic pollutants.

Decision 1970/1999/QĐ-BKHCNMT issued on November 10, 1999 by the Minister of ministry of Science, Technology and Environment on the technological procedures applied to disposal of banned plant protection chemicals that content the phosphorous organic compounds.

Decision 1971/1999/QĐ-BKHCNMT issued on November 10, 1999 by the Minister of ministry of Science, Technology and Environment on the technological procedures applied to disposal and reuse of cyanide.

Decision 1972/1999/QĐ-BKHCNMT issued on November 10, 1999 by the Minister of ministry of Science, Technology and Environment on the technological procedures applied to disposal of banned plant protection chemicals that content the chlorinated organic compounds.

Medical waste legislation

Decision No. 62/2001/QĐ-BKHCNMT, November 21, 2001, promulgating the technical requirements for incinerators of medical waste.

Inter-ministerial circular No. 2237/1999/TTLT/BKHCNMT-BYT, December 28, 1999, guiding the implementation of the regulations on safe application of radioactive techniques in medical services.

Decision No. 2575/1999/QĐ-BYT, August 27, 1999, of the Minister of Health promulgating the regulations on medical waste management.

Official letter No. 4527-ĐTg, June 8, 1996,of the Ministry of Health guiding the treatment of solid waste from hospitals.

Legislation on Recycling

Official letter No. 1146/BKHCNMT-MTg dated on May 6, 2002, of Minister for Science, Technology and Environment approving the National Action Plan for Cleaner Production.

Decision 03/2004/QD-BTNMT, April 2, 2004, of MONRE on importing waste as materials for domestic production.

Legislation on Waste Management Infrastructure facilities

Inter-ministerial circular No. 01/2001/TTLT- BKHCNMT-BXD, January 18, 2001, guiding the regulations and environmental protection applied for the space planning of the siting, construction, and operation of landfills.

Inter-ministerial circular No. 10/2000/TTBXD, August 8, 2000, guiding the preparation of EIA reports for the planning of construction projects, including solid waste management during and after construction.

Inter-ministerial circular No. 29/1999/QD-BXD, October 22, 1999, promulgating the regulations of environmental protection applied for the construction sector.

Fees and Charges

Ordinance No. 38/2001/PL-UBTVQH, August 28, 2001, of the Standing Committee of the National Assembly on prescribing Fees and Charges. This is generally supported by local regulations issues by People's Councils or Committees.

Governmental Decree No. 57/2002/ND-CP dated on June 3, 2002, providing the details on the implementation of the Ordinance No. 38/2001/PL-UBTVQH on prescribing Fees and Charges.

Circular No. 63/2002/TT-BTC dated on July 24, 2002, of Ministry of Finance guiding the implementation of provisions on Fees and Charges.

Circular No. 45/2006/TT-BTC dated on May 25th 2006 of Ministry of Finance to change and complement the circular 63/2002/TT-BTC on fee and charges.

Circular No. 71/2003/TT-BTC dated on July 30, 2003, of Ministry of Finance guiding the implementation of the provisions on the fees and charges for solid waste collection and treatment (prescribed as one of “Hygienic services”).

Decision No 13/2007/QĐ-BXD of the Minister of Ministry of construction issued on April 23, 2007 on “Norm of collection, transportation, treatment, landfilling municipal solid waste”.

Standards

TCVN 6696-2000 requirements for environmental protection for sanitary landfills.

TCVN 6705-2000 non-hazardous solid waste - Classification.

TCVN 6706-2000 hazardous solid wastes - Classification.

TCVN 6707-2000 prevention and warning signs for hazardous waste.

TCVN 7241:2003 Health care solid waste incinerators - Determination method of dusts concentration in fluegas.

TCXDVN 261:2001 - Landfill - Standard for designing.

TCXDVN 320:2004 – Hazardous waste Landfill - Standard for designing.

International Conventions

Vietnam is a signatory to a number of major international conventions, of which at least there are three relating to waste management.

Kyoto Protocol and the Clean Development Mechanism (CDM). Vietnam ratified the Kyoto Protocol in 2002 and has prepared a National Strategy Study for the CDM that allows industrialized countries to purchase “carbon credits” from projects in developing countries and count those emissions reductions against their commitments. Collection and use of landfill methane is one of the technologies that can financially benefit most under the CDM as it can increase the financial internal rate of return of these types of projects between 5% and 10%.

Basel Convention on the Control of Trans-boundary Movement of Hazardous Waste and Their disposal. The Basel Convention entered into force in 1992 with Vietnam ratifying it in 1995. The Convention focuses on the transport and treatment of hazardous waste. The Competent Authority and Focal Point to the Basel Convention is VEPA. Vietnam has undertaken many activities to implement the convention, including training, waste inventories, strategies, legal reform, technical guidelines, and promulgating a hazardous waste management classification system.

Stockholm Convention on Persistent Organic Pollutants (POPs). This convention has been adopted in response to the need to manage, reduce, and eliminate POPs, which are posing health and environmental concerns. Vietnam signed the POPs convention in 2001 and ratified it in 2002. The Ministry of Natural Resources and Environment (MONRE) is currently developing a National Implementation Plan.

Circular No 10/2006/TT-BTNMT issued on December 12, 2006 by Ministry of Natural resource and Environment instruction on the development of proposal on clean development mechanism (CDM) in the framework of Kyoto protocol.

2.2.3.2 Institutional frame work

The main Ministry responsible for the environment affairs in Vietnam is the Ministry of Natural Resources and Environment (MoNRE). There are three main administrative units of MoNRE that play key roles in waste management. Additionally, five other ministries and the provincial People Committees (PC) are also directly involved in waste management activities. Some other ministries have specific roles to play in SWM.

2.2.3.3 Agencies at national level

Ministry of Natural Resources and Environment (MoNRE): a central agency in charge of environmental management and protection in Vietnam. Its role in waste management is to issue guidelines, regulations, and standards on waste management in coordination with other ministries, compile annual and long-term waste management plans, formulate policies and strategies, plan and allocate budgets for research and development relating to waste treatment projects (specific task of Department of the Environment (DoE) - an administrative unit of MoNRE), and appraise and approve EIAs for waste treatment projects (specific task of Department of the Environmental Impacts Assessment and Appraisal - EIA Department), inspect the operation of waste treatment facilities, supervise waste management activities, raise public awareness, approve recycling and treatment technologies (Vietnam Environmental Protection Agency – VEPA). It is noteworthy that this ministry has just been formed recently in August 2002. Its precursor is the Ministry of Science, Technology and Environment (MOSTE). The former MOSTE was separated into two new ministries: Ministry of Natural Resources and Environment, and Ministry of Science and Technology.

Ministry of Construction (MOC): a central ministry with the highest authority in municipal solid waste management and landfill siting. Its responsibilities and jurisdiction in solid waste management are diverse as follows:

- Formulating policy and legislation, planning and construction of solid waste facilities.

- Developing and managing plans for the construction of waste-related infrastructure nationally and provincially

Ministry of Industry (MOI): with respect to waste management, this ministry is concerned mostly with industrial waste. Its responsibilities are: direct, inspect, supervise, and take measures to force businesses and establishments to strictly comply with regulations on industrial waste managements; and coordinate with waste disposal units in disposal of industrial waste (Directive No.199/TTg, 1997).

Ministry of Health (MOH): similar to MOI, MOH involves in only hospital waste. Its responsibilities in terms of waste management are basically assessing the impacts of solid waste on human health, inspecting and supervising hospital waste treatment activities (Directive No.199/TTg, 1997).

Ministry of Planning and Investment (MPI): the most influential policy maker at the ministry level because its main task is to propose to the Government for approval of the overall national allocation of state budget. Regarding waste management, MPI together with MOF consider and provide funding and financial sources for other ministries, government agencies, and localities to implement waste management plans based on their annual and long-term waste management plans (Directive No.199/TTg, 1997). Furthermore, MPI in coordination with MOF also issue economic incentives to facilitate waste management activities.

Ministry of Finance (MOF): together with MPI allocate budgets for waste management activities. However, it focuses more specifically on financial and pricing issues (Directive No.199, 1997).

Ministry of Culture and Information (MCI): direct the dissemination and popularization of legal documents on waste management in order to raise awareness and responsibility of the public (Directive No.199, 1997).

Ministry of transportation (MOT): its responsibilities are planning and managing infrastructure for air, land, railway and maritime transport nationally and provincially; overseeing the URENCOs.

Ministry of Finance (MOF): together with MPI allocate budgets for waste management activities. However, it focuses more specifically on financial and pricing issues (Directive No.199/TTg, 1997).
Ministry of Culture and Information (MCI): direct the dissemination and popularization of legal documents on waste management in order to raise awareness and responsibility of the public (Directive No.199, 1997).

2.2.3.4 Agencies at local level

People's Council: the local representative of state authority. It is elected by local people and has highest authority at local levels.

People's Committee (PPC): the executive branch of the People's Council, responsible for state administration at the local level. PPC directly exercise their environmental management function under the national government. Its responsibilities in waste management are as follows:

- Implement state management regulations on environmental protection in their respective localities, direct their functional agencies in organizing, coordinating with the functional agencies of the central level in working out annual and long-term plans for waste management, and taking measures to help their localities well perform their tasks for environmental hygiene (Directive No.199, 1997).

- Make approval of waste treatment projects in their localities based on demographic, socio-economic, and industrial conditions of each locality (Inter-ministerial Circular No.1590, 1997).

- Mobilize investment capital from various sources for the construction of landfills and work out mechanisms to encourage non-governmental organizations to take part in waste management activities (Inter-ministerial Circular No.1590, 1997).

- Direct the provincial/municipal DNRE and DOC in carrying out waste treatment projects in terms of design, construction, monitoring, EIA, etc., according to Vietnam's environmental and construction standards (Inter-ministerial Circular No.1590, 1997).

- Direct the provincial/municipal TUPWS and URENCO in organizing waste collection, transport, and treatment activities and make approval of waste collection and treatment fees based on recommendations of provincial/municipal DFP (Inter-ministerial Circular No.1590, 1997).

Chief Architect Office (CAO): the main agency responsible for spatial planning in the two largest cities in Vietnam: Hanoi and Hochiminh City. There are currently only 2 CAOs in the country, namely Hanoi Chief Architect Office and Hochiminh City Architect Office. Other provinces and cities do not have this kind of office. Instead, they have Institutes for Urban and Rural Planning (IURP) operating under Departments of Construction (DOC), which are responsible for spatial planning of the province or city. Under Hanoi and Hochiminh City CAOs, there are also IURPs operating as the consultants for CAOs in drawing up urban master plans that should help to avoid or reduce urban environmental problems. Such urban master plans should indicate locations of waste treatment projects such as waste transfer stations and landfill sites. Apart from CAO and IURP under it, Hanoi and Hochiminh City also have their DOCs. These DOCs work independently from CAOs in terms of spatial planning and focus more specifically on housing and construction issues.

Department of Construction (DOC): an agency at the provincial level, operating under influences of both PPC and MOC. Its responsibilities in waste management and landfill siting are: supervising the implementation of urban master plans of the province or city that have been carried out by NIURP and approved by the Prime Minister, organizing the designing and construction of landfill projects according to environmental and construction standards, supporting PPC in making decisions on waste treatment facility projects, and reporting and proposing appropriate landfill sites to PPC for approval in coordination with DNRE.

Institute for Urban and Rural Planning (IURP): a planning arm of DOC, focuses specifically on spatial planning of the province or city. It has responsibilities for drawing up detailed plans for areas in the province or city. However, urban master plans, which indicate proposed landfill sites, are often carried out by NIURP with approval of the national government.

Department of Natural Resources and Environment (DoNRE): similar to DOC, it also operates under the influences of both parties: PPC in terms of administrative and political relations and MNRE in terms of collaboration, support, and technical guidance. DNRE plays an important role in waste management with respect to monitoring environmental quality, managing and implementing waste management policies and regulations issued by MNRE and PPC, appraising EIAs for waste treatment projects, and coordinating with DOC and URENCO in considering and choosing candidate landfill sites, all of which are then proposed to PPC for approval of the most appropriate site.

Urban Environment Company (URENCO): the main company in charge of waste collection, transport, and treatment in the province or city. The name URENCO varies from province to province and from city to city. For example, in Hanoi, its official name is URENCO; in Viettri (Phutho Province), it is called Urban Environment Services Company; in Hochiminh City, it is named Waste Disposal Company, in some provinces in the Mekong delta, it is named Urban Public Work Company. However, no matter how the name of the company varies, it is always the only company directly responsible for waste management activities. For this reason, the term URENCO will be used to refer to the same agency in different provinces or cities throughout this report. It is worth noting that in Hanoi and Hochiminh city, URENCO operates under and agency named Transport and Urban Public Works Service (TUPWS). In other provinces and cities, URENCO is an independent agency. Regarding landfill projects, URENCO is often assigned to be the only agency being the owner of the landfill project, who then also manages and operates the landfill over its operation life. Besides URENCO is also in charge of solid waste collecting, keeping hygiene for public place, public lighting, planting and taking care of trees along the street.

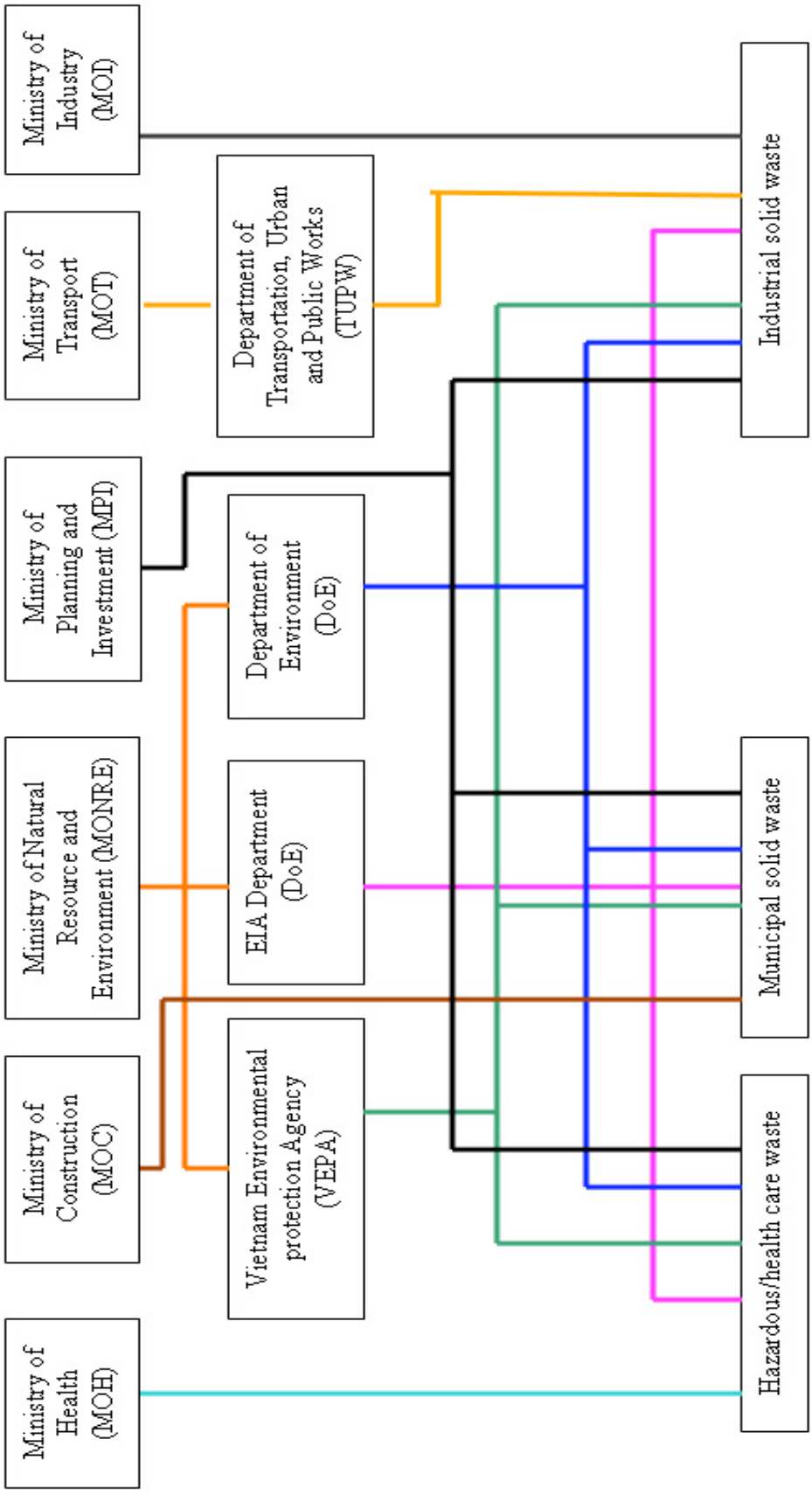


Figure 2.2-3: Structure of waste policy

2.2.3.5 Stakeholders

Responsibilities on waste management in Vietnam are declared for [Trang, 2008]:

The Ministry of Natural Resources and Environment

- Directive and responsibility on policy and strategy for environmental protection
- Issue the permission on hazardous waste processing for the allowed and suitable organizations over country
- Issue the policy on using ground for waste processing.

The Ministry of Construction

- In cooperation with the Ministry of Resource and Environment but chair for preparing the national plan on collection, recycle, disposal and treatment of municipal solid waste and hazardous waste
- Chair and cooperate with the municipalities on waste management plan of areas, provinces, cities and industrial parks
- Chair and cooperate with the Ministry of Resource and Environment for preparing documents relate to technical standards of waste treatment, processing, recycling, disposal and land filling for both municipal and hazardous waste

The Ministry of Planning and Investment, Ministry of Finance

- Finance source construction according to the national plan
- Establish the guideline for using the financial source for waste management.

The Ministry of Health

- All aspect concerning health's influence from municipal solid waste
- Guideline on policy and implementation concerning the management of hazardous health care waste
- Take care on working condition concerning environmental safe

The Ministry of Industry: Guideline on policy concerning the management of industrial waste

- Take care the activity of industrial park and area also in waste aspect
- Take care and support the industrial park on waste management.

The Ministry of Transport: Guideline on policy concerning the management of municipal solid waste

- Take care the aspect of waste transportation route (roads, railways, shifts, …)
- Take care the activity of the Urban Environment Companies (URENCOs).

The Province People's Committee / Municipalities

- Take care the aspect of waste management at city / province level
- Issue permission on waste processing at city / province level.

Urban Environment Company, Department of Transportation, Department of Construction

Collection and disposal the municipal solid waste and hazardous health care waste. Collection and disposal the industrial waste according to contracts related to industrial waste.

Director board of industrial zone

Take care the aspect of industrial waste management of their own.

2.2.3.6 Development of environmental law by national agencies

Environmental law was passed by the national assembly on November 29th, 2005 and took into effect from July 1st, 2006. With 15 chapters and 136 articles, this law detailed some regulations that could apply directly without any instruction. However, there are still many articles need to be detailed by national agencies. The task in development of the law by agencies was divided as shown in table 2.1.

Table 2.2-3: Task of national agencies in development legal text related to implementation of Environmental law

No	Legal text needed to be developed	Agency in charge
1	Decree of the Government detailing the implementation of the law on environmental protection.	**Ministry of natural resource and environment (MoNRE)**
2	Decree of the Government promulgating the Regulation on sanction against Administrative violation in the field of protection of the environment	
3	Decree of the government promulgating the organization and activities of the agencies in charge of environmental protection.	**Ministry of Internal Affair**
4	Decree of the Government on prescribing Fees and Charges on environmental protection	**Ministry of Finance**
5	Decree of the Government to favour the environmental protection activities and to determine the lost due to environmental pollution and degradation.	**MoNRE**
6	Decision of the prime Minister on production, importation, transportation trade and use of firework.	**Ministry of Defense**
7	Decision of the prime Minister to pay a security for improvement, recovery the environment on natural resource exploitation.	**MoNRE**
8	Decision of the prime Minister on water environment protection at river valley	**MoNRE**
9	Decision of the prime Minister on approval the general plan on hazardous waste and domestic waste management.	**Ministry of construction (MoC)**
10	Item 2 article 74: technical standard, guiding on verify, determine the hazardous waste treatment facilities.	**MoC**
11	Item 2 article 75: technical standard, guiding on verify, determine the hazardous waste landfill sites.	
12	Item 3 article 79: technical standard, guiding on verify, determine the domestic waste recycling, treatment facilities and landfill sites.	
13	Item 2 article 41: guiding on verify, determine the motor, vehicle and other car that meet the environmental standard.	**Ministry of transportation**
14	Item 8 article 121: implementation of environmental law and related regulation on transportation infrastructure and transportation activity.	
15	Item 5 article 42: implementation of environmental protection measure on importation and transit of goods	**Ministry of Trade**
16	Item 5 article 43: standard, condition of organization, individual that import scraps	

17	Item 5 article 46: implementation of environmental protection measure on agricultural production.	**Ministry of Agriculture and rural development**
18	Item 8 article 121: implementation of environmental law and related regulation on production, use of agricultural chemicals, fertilizer, waste on agricultural production; management of plant varieties, transgenesis domestic animal, irrigation, forest protection area and clean water for rural area.	
19	Item 6 article 47: implementation and verifying of the implementation of environmental protection law and related regulation on aquaculture production.	**Ministry of Aquaculture**
20	Item 6 article 121: implementation of environmental protection measure and related regulations on production, exploitation, processing aqua-cultural product; transgenesis aqua-creature nad their products; marine protection area.	
21	Item 4 article 107: developing and implementation of environmental education program and training the human resource to serve for environmental protection activities	**Ministry of Education and Training**
22	Item 4 article 108: developing technologies on environmental protection.	**Ministry of Science and Technology**
23	Item 5 article 121: implementation of environmental protection law and related regulations in the field of industry; handling the facilities that create serious environmental pollution; developing the environmental protection industry.	**Ministry of Industry**
24	Item 5 article 39: verifying of the implementation of environmental protection law at hospital and health care center.	**Ministry of Health**
25	Item 9 article 121: management of medical waste; environmental protection at health care center, hygiene and safety of food and burial activities.	
26	Item 3 article 45: implementation of environmental protection law in tourism activities	**General Office of Tourism**

2.2.4 Economic framework for renewable energy

Recently, due to natural resource depletion and global climate change the recovery energy from organic solid waste by anaerobic digestion is getting highest priority in most countries. Therefore, this section gives the information on economic framework for renewable energy (RE) from waste.

2.2.4.1 Macroeconomic considerations

Rapid economic growth

Vietnam is a country of rapid economic growth. This growth needs an expansion of the electricity production. Currently energy consumption is rather low. Increasing industrialization and foreign industry investment will need more electricity production in next time.

Changes in agriculture sector

Agriculture is under change. There is e.g. a program to increase rice quality in Mekong delta. There will be investment in more modern technologies for rice processing.

With this structural change it is also possible to introduce biomass using energy production technologies more.

Livestock farming is currently done by very small farmers. It can be expected that this situation will change. Under pressure of competition farming size has to increase and farming has to become more intensive. But bigger scale livestock farming will create bigger problems with the manure.

2.2.4.2 The electricity sector

Main target in the electricity sector: extension of the electricity grid

Main target of the electricity sector in Vietnam is to improve and to extend the electricity network. This goal is formulated in the “Rural Electrification Master Plan". The role of RE is mentioned there but it is not given an extra strong position. This attitude to RE seems to change slowly. So in the Prime Minister’s Decree No.102/2003/ND-CP about Energy Conservation from September 2003 was stated that it is necessary to conserve fossil fuels (coal, oil, natural gas) through the promotion of renewable energy.

But there is not yet an official special detailed plan for promotion of RE. A first step did World Bank together with EVN, Ministry of Industry and some other participants with start of implementation of "Renewable Energy Action Plan" (REAP) (see ASTAE 1999 and REAP 1999). But until now it seems that this plan does not show much effect. Currently there is a need for a legal framework and funding. This plan does not see energy from biomass as a priority instead it expect more from hydro and wind energy.

There are some Research & Development programs initiated from the Ministry of Science, Technology and Environment which also focus on the development of small scale furnaces/boilers using agricultural wastes and agro-industries residues as fuel.

2.2.5 Solid waste management in the Mekong delta

2.2.5.1 Waste generation

The data on waste generation rate of the provinces in the Mekong delta is very poor, most of available data is for the domestic solid waste at the big town, very few or none data for suburban or rural area.

Moreover these data are hardly comparable because of the method of separation is difference from province to province.

The per capita solid waste generation rate is vary from province to province in accordance to the economic development level but the quantity is rather low in comparison to those of developed provinces and cities in Vietnam and the difference is not much. It varies from 0.3 kg/capita*day (for the whole province including rural area) to 1.2 kg/capita*day (for the urban area only).

Like the other regions in Vietnam the solid waste concentrated in urban area due to the higher income, difference lifestyles, larger quantity of commercial activities, and more intense industrialization found in urban areas. The solid waste generation rate is around 1 - 1.2 kg/capita*day at urban area (Soctrang town) in comparison to more or less 0.3 kg/capita*day at rural area.
The municipal solid waste component is also different between urban and rural area. The hazardous waste (such as batteries and household solvents) and non-degradable waste (such as plastic, metal, and glass) was found more in urban waste. In contrast, most of domestic waste at rural area (99% of cultivation waste and 65% of domestic waste) is easily degradable organic waste. However, due to low awareness about the environmental pollution the pesticide containers are threatening the environment.



Figure 2.2-4: The pesticide containers were discharged without control

Industrial waste is concentrated in economic zones, industrial parks, and urban area. Because of the level of industrialization the industrial waste in Hochiminh city and its surrounding provinces shared nearly 50% of the total quantity of industrial waste of the whole country, while the industrial waste in the Mekong delta is only 10%.

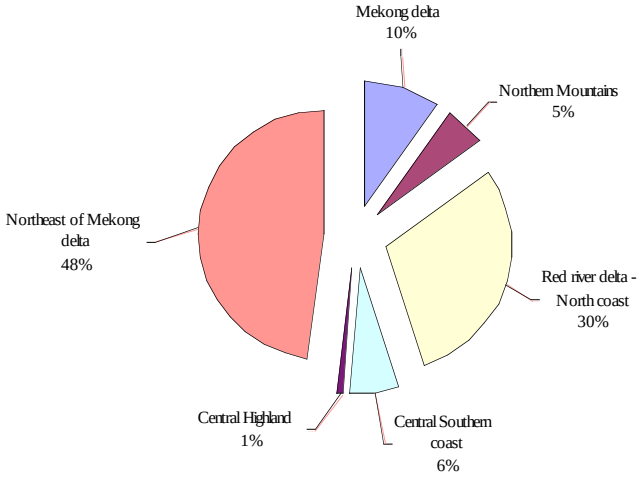


Figure 2.2-5: Industrial waste generation by region (MOI, survey 2000-2003)

The hazardous waste in the Mekong delta could be divided into three main categories: industrial hazardous waste (concentrated in urban area); agricultural hazardous waste (mainly pesticides and pesticide containers – concentrated in rural area); healthcare hazardous waste. Among which agricultural hazardous waste shares a biggest percentage of total agricultural hazardous waste of the whole country due to this is the largest agricultural production area.

2.2.5.2 Projection for solid waste generation rate in the Mekong delta

The solid waste generation rate is affected by many factors including: population growth, income and consumption growth, urbanization rate, industrialization rate and the policy of the Government…

Gathering these factors the waste generation rate in the Mekong delta continues to increase but the composition may change.

The population growth rate in the Mekong delta is high in comparison to some regions in the country, therefore the total solid waste quantity will increase more rapidly.

The Mekong delta is the largest agricultural and aqua-cultural production area with contributes significantly in the exportation of the whole country. Therefore, the Government gives the favor conditions to develop this region. As a result this region will develop quickly in the next few years leading to the increase the quantity of domestic solid waste, industrial waste and healthcare waste.

Recently the farmer in the Mekong delta applied many advanced agricultural production methods, if this trend would continue and enlarge the consumption of agricultural chemicals will decrease significantly leading to the fall in agricultural hazardous waste quantity.

Solid waste generated from agricultural cultivation was estimated as total amount of waste generated from cultivation of main crops in each zone. The amount was calculated by multiplying the total area of cultivated land per crop type by average biomass post-harvest residue per crop type per hectare. As a result of the trend of shifting from mono-crop cultivation (2 - 3 rice crops annually) to rotational cultivation (rice and vegetation) and the use of rice straw for mushroom production, the solid waste generated from agricultural cultivation may decrease.

The ratio of biodegradable component is expected to decrease because of the change in using package (from leaves to plastic bag and can).

Table 2.2-4: Summary of some solid waste components in the Mekong Delta

Province (source)	Biodegradable	Waste paper	Metals	Glass	Textile	Plastic, rubber	Brick, ceramic	Hazardous components	Miscellanous
Cantho (5)	79.65	2.79	0.70	1.52	1.86	9.57	3.10	0.03	0.76
CaMau (14)	57.3	4.5	0.1	0.5	1.4	6.1	2.1	-	28
SocTrang (10)	70.35	4.12	0.78	0.66	3.11	7.24	9.63	-	4.11
DongThap	NA	NA	NA	NA	NA	NA	NA	NA	NA
AnGiang	NA	NA	NA	NA	NA	NA	NA	NA	NA
TienGiang (7)	77.53	3.89	0.23	0.21	-	6.37	2.14	0.06	9.57
LongAn (4)	76.3	5.1	0.37	0.7	-	13.63	2.68	0.15	4.08
BenTre (9)	73.85	6.5	1.75	0.85	-	5.2	1.6	0.3	9.95
TraVinh (12)	87.25	2.05	0.45	-	-	3.16	2.04	-	5.05
VinhLong (8)	66.25	11.5	0.55	4	6.5	9.45	0.75	-	1
BacLieu (11)	53.34	4.51	4.59	4.91	-	4.44	10.81	2.78	14.62
HauGiang (6)	82.6	1.8	0.4	0.9	1.5	5.7	1.6	4	1.5
KienGiang (13)	72.52	6.38	1.27	1.64	1.29	7.69	7.49		1.72

As mentioned above there is no standard procedure for determining the solid components. There for each province has their own way to separate the solid waste components. As a result their data are hardly comparable. In addition, in their data we could not find the explanation for the term (organic waste, miscellanous…). The biodegradable components in solid waste of the province is rather high (from 53.34% to 87.35%), therefore the most suitable methods for treating it is composting or producing biogas for energy recovery. The components such as waste paper, metals, glass shared a

low portion due to they are collected by householder, solid waste collector and solid waste picker to sell for the recyclying industries. In addition the construction waste such as brick, ceramic… also low due to they are used for making the floor for the new building or street construction.

2.3 Laos

2.3.1 General facts on Laos

Lao PDR has a remarkable range of natural resources and environmental riches, despite being categorized as a 'least developed country'. With almost half of the country under forest cover and abundance of water and a low population density, Lao PDR has a diversity of species that is found in few other countries in the region. The country's economic development is largely dependent on its natural resources, mainly water (for hydropower), forests and minerals.

Once the Land of a Million Elephant, Lao PDR is now confronted with numerous environmental challenges. The unsustainable exploitation of resources has resulted in degradation of land and loss of natural habitats. This degradation, combined with declining water quality and increasing threats to air quality, is disproportionately impacting the poorest groups in the country.

According to World Bank & STEA, one of the main challenging Laos has been facing is on the urban environmental management aiming to improve, through local governments and Urban Development and Administration Authorities, sewage systems, solid waste collection, recycling and disposal. As it is the fact that the generation of solid waste in urban areas in Lao PDR is on the rise, and poses an emerging threat to the quality of surface and ground water. Expanding urban populations, combined with poor collection and largely inadequate disposal facilities, are compounding the level of pollution. The average daily urban waste production is 0.75 kg per capita. Vientiane Capital City and the four secondary towns (Luangprabang, Thakhek, Savannakhet and Pakse) account for 0.8-1.4 kg per capita per day (0.8 kg, 1.0 kg, 0.8 kg, 1.0 kg, 1.4 kg respectively), consisting of 30% organic material, 30% plastic, 25% glass cans and metals and 15% paper.

Hazardous and toxic wastes such as batteries, old paint cans, aerosols and other refuse are also mixed with these wastes. The comparatively low content of organic material in municipal solid waste is mainly due to the fact that a large proportion of food waste is recycled as animal feed even in urban areas. According to a recent survey in 57 urban areas, only Vientiane City and the four secondary towns (Luangprabang, Thakhek, Savannakhet and Pakse) use landfills for solid waste disposal with the site area of 15 ha, 9 ha, 13.5 ha and 13.5 ha respectively for four secondary towns.

Hazardous chemicals of concern include heavy metals such as mercury, lead, cadmium, arsenic, chromium, copper, and zinc as well as persistent organic pollutants such as dioxins and furans, polychlorinated biphenyls, and various pesticides and herbicides that are now banned globally. At present their environmental impact is still poorly understood in Lao PDR. STEA[1] (currently it is called WREA[2]) initiated an inventory of Hazardous chemicals in December 2003, and the National Hazardous Chemicals Strategy and Action Plan is currently being revised.

Despite the existence of landfills in Vientiane and the four secondary towns, collection services are limited to accessible areas and profitable target groups such as markets and high-income households. The average collection ratio for urban households in the five larger urban areas is 45 percent. Only in Luang Prabang does the collection ratio reach more than 50 percent. In smaller towns, solid waste collection is often limited to commercial establishments in the town centre and the market place.

In Vientiane 1997, only 5 percent of urban households were served by a solid waste collection system and only 10 percent of the solid waste generated was estimated to be collected.

Today, with improvements in the solid waste management system, 48 percent of the urban households in Vientiane are now served by solid waste collection services. About half of the solid waste generated is now collected and disposed of at the sanitary landfill facility located 18 kilometers from the city center. It accepts domestic, construction, industrial and hospital waste, and provides separation for hospital waste within fenced compound. The waste is collected by Vientiane Municipal Services.

[1] Science Technology and Environment Agency
[2] The Water Resources and Environment Administration

There are limited environmental and social safeguards concerning handling of waste, no regular covering with soil, no leachate control, and the site is adjacent to agricultural land. The landfill is accessible to scavengers and animals. Rudimentary recycling is undertaken for plastics, paper, and scrap metals. At the recycling area and unpleasant smell is produced.

In response to declining environmental conditions, the country has made important strides in instituting changes in partnership with local communicates and international organizations. Over the past five years, the country has invested millions of dollars in improving environmental management, focusing on building capacity among Government agencies and raising awareness more broadly, establishing protocols for monitoring and managing environment indicators and in Lao PDR are many and varied, requiring a more strategic approach.

Approximately 70 percent of municipal solid waste consists of plastic, paper, glass, cans and metals, which have the potential to be recycled commercially, and reused in various manufacturing and industrial activities. However, the current scale of recycling in Lao PDR is still very modest.

Hard rubbish will be collected at segregated points and purchased by Lao Chareon (the only one company in Laos who run business on waste). Glass, paper and plastics will be collected. Organic refuse will also be gathered and used to make compost, which besides being sold will also improve farming yields in the local area.

Schools and villagers are being encouraged to collect and recycle rubbish through a system supported by local NGO, PADETC[3], UNDP and the government. A private company, Lao Chareon Recycling Center has agreed to buy all the rubbish that villagers can bring to any of the 60 recycling centers.

2.3.2 Policies and strategies

National Policies

According to World Bank & STEA, Since the 1992 Earth Summit, Lao PDR has formulated several National Policies and Strategies on the environment, of which the key documents are outlined in Table 1.

The Government has approved its 2020 vision in the form of the National Environment Strategy (NES), which also includes the second National Environmental Action Plan (NEAP) for 2006-2010. The key components focus on:

1. Sustainable management of natural resources
2. Improved environmental management of industries and infrastructure, urban development, tourism, and special economic sectors
3. Strengthening of the institutional framework for environmental management and capacity building
4. Improved private sector involvement in environment management
5. Promoting appropriate financing instruments and mechanisms
6. Improved international cooperation

National strategies

According to the country report 2001, the Government has adopted the 2020 Development Strategy consisting of three stages of development efforts:

1. Implementation of the New Economic Mechanism. This stage of the strategy is nearly completed.
2. Structural transformation and capacity building. Government efforts are currently focused on this stage. They include the construction of physical infrastructure and the establishment of enabling policy and institutional frameworks that improve the capacity within the country. The completion of this stage will allow the success of the next stage.
3. People-centred development

Instruments and Laws

[3] The Participatory Development Training Center

The government has formulated a wide array of legislation and regulations for environmental conservation and protection (Table 2). The Environmental Protection Law of 1999, supported by its Implementing Decree (2002), is the principal environmental legislation in the country. It includes responsibilities of national environmental agencies, measures for the protection, mitigation and restoration of the environment as well as guidelines for environmental management and monitoring. Apart from that Lao PDR has joined a number of multilateral environmental agreements, and has delegated their implementation among the various ministries and agencies (Table 3)

Environmental legislation has evolved quickly in Lao PDR Inconsistencies have surfaced in different legislation as a result of different ministries leading the development of sectoral legislation. Principal inconsistencies included conflicting provisions, overlapping mandates given to different ministries, and lack of implementing regulations and supporting environmental standards. The Government is working to address these issues, and to formulate a national system for standardizing and enforcing environmental regulations.

Table 2.3-1: Summary of Current Key Environment Policies and Strategies

Year	Title	Agency
1994	First National Environmental Action Plan	STEA
1997	Draft National Resettlement Policy for Major Projects	CPI, STEA
	Draft Public Involvement Guidelines	CPI, STEA
	Sector Strategy & Guideline National Framework - Rural Water Supply & Environmental Health Sector	MoH
1998	Water Sector Strategy and Action Plan 1999-2004	WRCC/ PMO
1999	The Government Strategic Vision for the Agricultural Sector	DoP/MAF
2000	Draft Policy on Water & Water Resources Law	WRCC/ PMO
	Lao PDR Food Security Strategy in the period of 2001-2010	MAF
	Forest Vision for 2020	MAF
	Hydropower Development Strategy	MEM
2001	5th National Socio-Economic Development Plan	CPI
	Master Plan Study Integrated Agricultural Development Lao PDR	MAF
	Power Sector Environment Policy	MEM
	Social Impact Statement for Electricity Projects	MEM
	Agriculture and Forestry Sector Development Plan	MAF
2003	Draft National Environmental Quality Monitoring Program (NEQMP) 2003-2010. Final Consultation Workshop, Vientiane, March 24, 2003.	STEA
	Draft Policy on Resettlement	STEA
	National Public Involvement Guidelines	STEA
2004	National Biodiversity Strategy and Action Plan, years 2010 and 2020. June 2004.	STEA
	National Strategy on Environment Education and Awareness to the years 2020 and Action Plan for the years 2006-2010. June 2004	STEA
	National Environmental Strategy years up to the year 2020 , and the Environment Action Plan, 2006-2010	STEA
	National Growth and Poverty Eradication Strategy (NGPES)	
2005	National Policy on Environmental and Social Sustainability of the Hydropower Sector in Lao PDR	MEM/ STEA
	Decree 197 on Compensation and Resettlement - 7 July 2005	Prime Minister
	Implementing Regulations and Technical Guidelines on Compensation and Resettlement on 11 November 2005	STEA
	Adopted Implementing Regulations and Technical Guidelines on Compensation and Resettlement on 18 November 2005	MEM

Table 2.3-2: Key Environment Laws and Regulations

Law	Regulated Activities	Key Contents	Responsible Ministries
Forestry Law (1996)	States principles, regulations and standards for the use of forest lands and resources. Promotes the conservation and rehabilitation of forest resources. Defines roles and authorities of forest management and inspection organizations.	• Specified procedures for getting approvals from authorized agency is required for individuals and organizations to possess and use natural forests • Individuals and organizations have obligation to preserve forest resources including water sources, marine animals and wildlife	MAF
Water and Water Resource Law (1996)	Regulates the management, exploitation, development, protection and sustainable use of water and water resources	• MAF is responsible for the survey and inventory of water resources • Classifies scale of water use into small, medium and large, the latter two require permits.	WRCC
Land Law (1997)	Provides rules on management, protection and use of land.	• All individuals and organizations have obligation to protect the land to ensure that there is no soil erosion, land slip, soil degradation and negative impact on the natural or social environment	MAF, MEM, MCTPC, MIC, MND, MoInt, MF
Mining Law (1997)	Provides a system of management for the conservation, exploration, mining and processing of minerals for local consumption and export	• Licensees are required to preserve and restore the land utilized during mining and to rehabilitate the land after mine closure and to guarantee that the project shall have no serious negative impacts. • Any person or entity licensed to develop mineral resources shall utilize procedures to limit adverse environmental impacts	MEM / DGM
	Specifies principles, rules and measures to manage, monitor, restore and protect the environment, natural resources and biodiversity Ensure the sustainable socio-economic development.	• All persons and organizations residing in Lao PDR have an obligation to protect the environment • STEA is responsible for overall environmental oversight and coordination • Each sector responsible for development projects shall issue its own regulations for EIA, based on general EIA regulation issued by STEA	STEA / DoE
Industrial Law (1999)	Regulates the establishment and management of business in industry and handicraft sector	• All businesses shall ensure the protection of the environment in accordance with EPL • Wastes shall be treated in accordance with the relevant waste discharge regulations	MEM / DOI
	Establishes uniform environmental assessment requirements and procedures for all development projects	• Organizational responsibilities are specified • Procedures and methods for the EA. • Requirements for the Environmental Management Plans, Environmental Monitoring and Evaluation, and Public Involvement.	STEA / DoE
Implementing Decree of the EPL (2001)	Outlines requirements for the preparation of detailed sector regulations, and provides assistance in achieving the goals of the National Socio-Economic Development Plan (NSEDP).	• Ministries and ministerial equivalents shall: • Issue and implement sectoral regulations • Prepare technical standards and regulations on construction, operation, maintenance, repair, innovation and expansion • Issue regulations to protect and control pollution • Establish or Improve the EMMUs.	STEA / DoE
Electricity Law (1997)	Provides a framework to manage all electricity activities (generation, transmission and distribution)	• The planning and execution of power projectsmust take into account social and environmental impact, including those upon ecosystems and wildlife habitats, as well as ensuring economic returns.	MEM/DoE

Table 2.3-3: Lao PDR International Agreement

Year	Convention	Focal Points	Remarks and Status in Lao PDR
1985	ASEAN Agreement on the Conservation of Nature and Natural Resources	MAF, ASEAN	Lao PDR became a full member of the 'Association of Southeast Asian Nations' (ASEAN) in 1997. The government has been engaged in implementing the 'Hanoi Action Plan' and its environmental strategic plan and is considering a number of agreements with significant influences on the national development and environmental protection.
1987	Protection of the World Cultural and Natural Heritage	MIC	The Government accepted accession to the 'Convention for the Protection of the World Cultural and Natural Heritage' on 20 March 1987 and is taking the legal, scientific, technical, administrative and financial measures necessary for identification, protection, conservation, and rehabilitation of designated heritage sites in the country. Luang Prabang town was designated as the first site and others are being proposed.
1995	Agreement on the Cooperation for the Sustainable Development of the Mekong River Basin	LNMC	The Government signed the 'Agreement on the Cooperation for Sustainable Development of Mekong River Basin' together with other members of the Mekong River Commission on 5 April 1995 and is implementing the 'Mekong River Programs'.
1995	United Nations Convention to Combat Desertification (CCD)	STEA	The Government has been a signatory of the 'United Nations Convention to Combat Desertification' (CCD) since 30 August 1995 and accepted accession to the Convention on 20 September 1996. The Government adopted the 'National Action Plan' (NAP) to combat desertification in 1999 and is revising it.
1995	United Nations Framework Convention for Climate Change (UNFCCC)	STEA	The Government has accepted accession to the 'United Nations Framework Convention on Climate Change' (UNFCC) on 4 April 1995. The first 'National Communication' was issued in 2000.
1996	Convention on Biological Diversity (CBD)	STEA	The Government has accepted accession to the 'Convention on Biological Diversity' (CBD) on 20 September 1996 and has finalized its 'National Biodiversity Strategy and Action Plan' (NBSAP) for conservation and sustainable use of the nation's biodiversity in 2004. In 2004, the Government signed the convention.
1998	Montreal Protocol	STEA	The Montreal Protocol on Substances that Deplete the Ozone Layer was adopted in September 1987. The Protocol was adjusted to accelerate the phase out schedules, and has also been amended to introduce other kinds of control measures and to add new controlled substances to the list. Governments are not legally bound until they ratify the Protocol as well as the Amendment. Lao PDR has ratified the Protocol, but not yet the amendment.
1998	Vienna Convention on the Protocol of the Ozone Layer	STEA	The Government accepted accession to the 'Vienna Convention for the protection of the Ozone Layer and the Montreal Protocol on Substances that Deplete the Ozone Layer' on 21 August 1998 and has finalized the 'National Action Plan' to deal with this issue in the beginning of 2004.
2000	Millennium Declaration	MOFA	In September 2000, Lao PDR adopted the Millennium Declaration. The Declaration includes the Millennium Development Goals (MDG), a set of development goals related to peace, security and development concerns, including environment, human rights, and governance. The MDG incorporate most of the goals and targets set at the global conferences and world summits of the 1990s.
2004	Convention on International Trade in Endangered Species of Flora and Fauna (CITES)	MAF and STEA	Lao PDR has sign the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) in May 2004. CITES entered into force in July 1975 and now has more than 115 member countries. These countries act by banning commercial international trade in an agreed list of endangered species and by regulating and monitoring trade in others that might become endangered.
-	Stockholm Convention on Persistent Organic Pollutants	STEA	Signed but not yet ratified.
-	Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar Convention)	MAF	Under preparation.

Laos has many laws. However, environmental law is mainly on forest, water, mining, land, industries and electricity. This can be indicated that specific law on waste management required to be amended and here are some examples of the law on solid waste management in Laos

1. Environmental Law (Article 22)
2. Environmental Decree (Article 9.4)
3. Governor's Speeching on Solid Waste Management
4. Some Rules and Guidelines for Vientiane Urban Cleaning
5. Project Activities in Solid Waste Management (Raise Awareness on Participatory in SWM)

Article: 22

All kinds of littering are forbidden. Waste disposal sites required. Waste Separation before its disposal. Reuse must be supported.

Decree on the implementation of the EPL (No. 102/PM, 04/06/2001)

Article 9.4

> The Ministry of Public Health shall issue regulations…related to the treatment of solid waste…and to define disposal sites or treatment facilities by using appropriate methods to protect the health of humans and natural environment.

2.3.3 Stakeholders

The institutional structure for environmental management in Lao PDR consists of:

1. National committees that guide inter-sectoral coordination among agencies
2. STEA (WREA) as the main manager, monitor and coordinator of environment matters at the national level, and other relevant ministries with the mandate to mitigate environment and social issues arising from their sectoral development activities
3. Provincial and district entities that have developed responsibility for environmental protection at the local level; and
4. Mass organizations which support the government in promoting participation and awareness.

Besides the institutions dealing with all affairs on environmental management, there are some organizations working on waste management in particular

Public sector

1. Vientiane Urban Development Authority (VUDA)
2. Educational Institution

Private Sector

1. Lao Chaleon Recycling Center
2. Vientiane Garbage company

   The two companies are the private companies which buy recycle waste from small retailers and from households which collect own waste to sell.

3. Village community

   Each community especially in urban area is supposed to keep their own areas clean and compile to the environmental laws.

NGOs

1. PDETC focusing on solid waste in community
2. JPFR[4]

Schools and villagers are being encouraged to collect and recycle rubbish through a system supported by local NGO, PADETC[5], UNDP and the government. A private company, Lao Chareon Recycling Center has agreed to buy all the rubbish that villagers can bring to any of the 60 recycling centers.

2.3.4 Economic framework

Lao PDR economic performance has continued to improve. In the year 2005 to 2006 the real GDP grew from 7.0 to 7.3 percent. This growth is in large part due to foreign investment inflows in mining and hydro-power and growing mineral exports, but the share of non-mining contributions increased in the year 2005 reaching 4.9 out of 7.3 percent. Agriculture, manufacturing and services sectors are expected to sustain growth, due to rising FDI in agriculture, manufacturing, and increasing trend in

[4] Japan Fund and Poverty Reduction
[5] The Participatory Development Training Center

services (especially tourism). Inflation (of Consumer Price Index) has continued to remain in single digits. For example, after rising early in 2005, it dropped remarkably during the last few months, to 5.5 percent in September and 3.7 percent in October 2006. Implementation of reforms in various areas continued during the period under review, even if at a somewhat uneven pace. More steps have been taken towards creating a better investment and business environment and a more open trade regime; the trade reform action matrix has been finalized, and it is expected that donor coordination in trade-related areas will take place around this program. The program of strengthening public expenditure management has sustained momentum and actions to increase transparency in the State-Owned Enterprise (SOE) sector have continued. Implementation of the National Growth and Poverty-Eradication Strategy (NGPES) progressed further with the Government completing the final draft of the next National Socioeconomic Development Plan (NSEDP, 2006-2010), the successor to the NGPES. The Plan was presented to donors at a Pre-Round Table Meeting in October 2006. The RTM meeting was scheduled to take place in late November. Though official development assistance (ODA) inflows as a share of GDP have been declining for a couple of years (mainly due to fast economic growth), there is new momentum in donor support for policy reform implementation, side by side with continued strong support for health and education sectors. Budget support is on the rise, with Japan Bank for International Cooperation (JBIC) and European Commission (EC) joining the poverty reduction support operation (PRSO) co-financing, as are initiatives for setting up multi-donor trust funds (MDTFs) in two key reform areas, adding to the technical assistance support that is already being provided. The Government is also seeking greater donor coordination and harmonization of foreign assistance through more organized joint Government donor working groups, in support of policy reform as well as investments in health, education, infrastructure and agriculture.

In the 1990s, Lao PDR grew at an annual average rate of 6.3 percent, and the incidence of poverty fell from 45 percent to 39 percent of the population in 1997-98 and to 33.5 percent in 2002-03. The crisis years of 1998 and 1999 saw inflation climb to an annual average of 110 percent and growth fall to 4 percent, but the resolution of the regional crisis and Lao’s own policies stabilized the economy and resumed growth of around 6 percent. The adoption of a stabilization program since 2000 and the implementation of a phased program of reforms since 2001 – in public expenditure management, banking, state-owned enterprises, forestry, trade and private sector – has contributed to this improvement. During 2000-03, inflation has averaged 15 percent and real GDP growth averaged around 5.6 percent annually. The approval of Nam Theun 2 hydro-power project by the World Bank Board on March 31, 2005 and by the Asian Development Bank Board on April 4, 2005 means that various financing partners have committed a total of US$ 1,450 million to Lao PDR to finance US$1,250 million of project cost and US$200 million of contingency. This investment is expected to occur between now and 2009. The resulting annual inflow is very large relative to the size of the Lao PDR economy, and will have significant growth effects during that period, even though most of this will be comprised of imports. (The World Bank 2006)

2.3.4.1 Socio Cultural framework

The Lao People's Democratic Republic, a land-locked country in the South-East Asia, borders with the People's Republic of China (North), Viet-Nam (East), Kampuchea (South), Thailand (West) and Burma (North-West). Laos was formerly a part of the French Indo-China.

Community life is generally centered in two main areas: the Buddhist temple and the animist spiritual house. "Pagodas" are known to be a sacred cultural center for the people. The great importance is attached to the literature (The Institute for Cultural Democracy 1998)

General Directions of Cultural Policy

The decisive turnpoint in cultural activities occurred in 1975 with the liberation of whole country. The Government and the People's Revolutionary Party adopted attitudes towards cultural and educational policies by stressing the cultural identity and the use of national language. According to these attitudes, the purpose of cultural policy is to mobilize the people to take more active part in all cultural fields. Thus, the cultural activities like other social and economic activities have been affected by the "spirit of masses."

The "cultural dimension" has been determined as one of the most important factors in overall development plan. In this way, the Government faces with the following tasks:

- To preserve and revitalize cultural heritage by integrating vernacular cultures - folk tales and folk songs, handicrafts and art, museums and archaeological sites - into every day life;
- To draw upon innovation and eradicate inappropriate traditions;
- To train competent staff in the field of culture and education;
- To encourage the area of cultural services (*e.g.,* participation in the art);
- To stimulate creativity

Administrative and Institutional Structures

Public and Semi-public Bodies

The Ministry of Information and Culture is responsible for cultural policy. There is a little co-ordination between different ministries and institutes which deal with cultural affairs.

Cultural Development

In relation to the book development, particular attention is paid to providing books of functional nature for "neo-literates" and the masses outside the school system. Within the goals of the World Decade for Cultural Development, the mobilization of public for participation in cultural development includes the following national characteristics:

- Building and improving facilities and infrastructure;
- Esthetic education;
- Promoting creativity among artists;
- Reviving cultural industries.

It is expected that cultural tourism will contribute to the activities of craftsmen, and consequently to the income increase of the communities.

International Cultural Cooperation

Laos participates in the programmes of UNESCO and Asian Cultural Centers for Unesco (ACCU), and within the latter, particularly in the field of book development.

2.3.4.2 Socio-economic framework

According to the Sixth National Socio Economic Development Plan (2006-2010) , 2006, the overall Development strategy are as the following

The Sixth Plan is based on:

1. The Long-Term Strategy of Socio Economic Development to the Year 2020;
2. The Strategy on Industrialization and Modernization;
3. The National Growth and Poverty Eradication Strategy (NGPES);
4. The Regional Development Strategy;
5. The analysis of the international and domestic contexts for the development of the Lao PDR.

A. Development Context

1. International context

It is hoped that the general trends of peace, stability and cooperation for development in today's world will continue over the next five-year period (2006-2010). The world economy has been recovering and advancing, with the growth rate in the period 2006-2010 likely to be slightly higher than that during the preceding five years (2001-2005). Official development assistance (ODA) has been growing and is expected to rise significantly during the next five years. The international financial markets are likely to be more active, with foreign direct investment (FDI) and indirect investment flows recovering and expanding. However, the rapid, sustained and large increases (more then doubling) in petroleum (oil) prices in the past 18 months continue to have adverse impacts on the global economy in general, and particularly the low-income oil-importing countries and the lives of the poor people in these countries (including the Lao PDR).

The 2005 World Summit in September at the UN Headquarters in New York has reiterated the commitment of the community of nations to eradicate poverty and achieve the Millennium Development Goals (MDGs). The Summit also emphasized the need to increase aid to the least developed countries (LDCs) and Assist them in implementing the Brussels Program of Action for LDCs (2001-2010). Accordingly, bilateral and multilateral relations would widen and strengthen among nations, and between nations and international organizations. Theses developments in the international arena will help the Lao PDR take advantage of increased opportunities to push forward its development, reduce poverty and successfully implement the industrialization and modernization strategy, narrowing the gap with neighboring countries in the region, while improving the country's status in the global community of nations.

2. Domestic context

Significant progress has been made in such aspects as democracy, human rights and ethnic peoples. Not withstanding, there is a risk that some external reactionary forces might try to provoke these and other issues and support extremist groups within the country to destabilize the socio-economic situation. The government and the people of the Lao PDR need to be ready to face such eventualities.

By the end of the Fifth Plan (2001-2005), the production capacity and ability of many industries increased substantially, and the economic structure changed significantly. The quality of growth in many industries and regions has improved somewhat, with the enterprises and the national economy adapted better to the international markets. The market-economy mechanism has been established gradually and is operating effectively. New and more radical policies introduced in the recent five years had positive impacts; attracting more investment from the society, especially utilizing internal resources for targeted investments and bringing about structural changes in the economy.

The country has been recognized in the region and globally as having a dynamic economy within a stable political situation, and a safe destination for investment. Socio-political stability is an important foundation and the most positive element for socio-economic development, which is an advantage that he Lao PDR enjoys at this juncture. Increased regional and global integration including the accession to (full membership of) the WTO should boost the dynamism of the economy and accelerate the country's development.

However, the country faces many challenges in the coming five years. These include the moderate size of the economy and the small-scale of much of the domestic production; low GDP per capita; insufficient domestic income, savings and investment to increase production and accelerate development; and weak financial and monetary systems. Economic and social infrastructure is not yet adequate to meet the growing development needs. The technological base is low and far behind that in other countries in the region. The ability of Lao enterprises for regional and international economic integration is below required standards. But implementation schedules of commitments under AFTA, WTO and other international agreements will put increased pressures on enterprises to adapt. The services sector is still growing slowly. The quality of human resources is inadequate to achieve the development goals in the new Plan period, without substantial strengthening. The effectiveness of state administration is still limited. Erratic weather and climate changes, widespread diseases such as SARS and bird flu could reappear.

B. Overall Development Strategy

1. Background

The 7th Party Congress has set out the Ten-Year Socio-Economic Development Strategy (2001–2010) for the country, which includes improving and building the economic infrastructure to ensure fast and sustainable economic growth, with emphasis on agricultural production, eliminating forest fires and deforestation, reducing the number of poor households, promoting industrialization and modernization. The country's human resources are to be developed step-by-step both in quality and quantity to cater to the emerging needs and make the country a regional centre of services of exchange. The strategy encourages socialist-oriented industrialization and modernization with infrastructure development to prepare the nation for graduation from the Least Developed Country (LDC) status by 2020 and to achieve improved well-being for all the Lao peoples. The objectives set out in the Strategy support the achievement of the MDGs and the implementation of the Brussels Program of Action for Least Developed Countries. The Sixth National Socio Economic Development Plan (NSEDP) covering the five-year period 2006-2010 plays a crucial role in implementing the socio-economic development policy guidelines set out by the 7th Party Congress. It is the vehicle for facilitating the implementation of the second half of the Socio-Economic Development Strategy (2001–2010) approved by the Congress. Thus, the Sixth Plan institutionalizes and concretizes

directives and tasks that will be carried out further during the five-year period 2006–2010, to ensure that the overall targets outlined in the Ten-Year Strategy (2001–2010) are achieved.

2. Overall Goals of the Plan

The main goals of the Sixth Plan (2006-2010) are to translate all the policies and targets of the Ten-Year Development Strategy (2001-2010). The goals are:

- Accelerate and sustain rapid economic growth and improve people's quality of life;
- Further develop the market economy with a socialist orientation;
- Restructure the economy and the employment pattern through a market economy based on the country's rich natural resources and international integration;
- Continue to enlarge and develop effectively external economic relations including international integration;
- Create a breakthrough in human resources with changes in education and training both in terms of quality and quantity;
- Harness the advances/achievements in science and technology for the country's development;
- Utilize human, science and technology factors as key resources for development;
- Continue poverty reduction, creating jobs and eliminating social evils;
- Manage the natural resources in a sustainable way and protect the environment;
- Develop the culture and society synchronously with economic growth;
- Continue strengthening socio-economic infrastructure as fundamental for development in the Plan to build a stronger base for the next five-year plan;
- Maintain political stability and social cohesion; and
- Protect the sovereignty, territorial integrity and national security.

The overall directions for the Sixth Plan (2006-2010) include transforming the multi-sectoral economy from uneven performance to fast and stable development within the market mechanisms guided by the State. It will include comprehensive reform and swift restructuring of the economy to best utilize its strengths and advantages, producing high value-added goods and services to meet the domestic demand step-by step and increase exports. It will require the mobilization of all resources including a renewed drive for internal resources to take full advantage of the opportunities.

3. Development Approaches

The main approaches are to:

- Promote economic development, with human development as a key vehicle, connecting with fast, effective and sustainable development;
- Increase the competitiveness and utilize the comparative advantages to implement effectively international economic commitments in the framework of the ASEAN and other bilateral and multilateral commitments, including WTO;
- Strengthen the positive linkages between economic growth and social development, in addressing social issues such as poverty and other social evils, and help keep the socio-political situation stable. Economic growth should be accompanied by social progress and equity, as well as environmental protection; and
- Accelerate the building of a comprehensive socio-economic infrastructure and further developing the market-oriented economy with a socialist orientation, to form the basis for industrialization and modernization.

Thus, the Sixth Plan (2006-2010) is seen to be a break-through plan for creating a fast but firm and qualitatively enhanced development, lifting the society to new heights both in material and moral wellbeing, significantly improving the quality of life of all the people and boosting the nation's status in the international arena. The goals coincide with the MDGs and those in the Brussels Program of Action for Least Developed Countries.

C. Plan Targets and Tasks

1. Targets

The 7 th Party Congress has also set some specific targets, including an average annual GDP growth rate of more than 7 percent during the first decade of the new millennium (2001 to 2010), with the population growth rate slowing down to an annual average of about 2.4 percent by 2010 and GDP per capita reaching USD 700-750 by the end of the decade. The Sixth Plan (2006-2010) will maintain and build on these targets as follows:

(a) Economic Targets

- Total GDP in 2010 (in 2000 prices) is projected to be about twice that in 2000. The GDP 6 annual average growth rate in the Sixth Plan period (2006-2010) would reach 7.5 percent (main scenario), with agriculture, forestry and fisheries growing at 4 percent, industry and construction at 12.6 percent and services at 8.0 percent. In particular, the growth rate in industry will be accelerated because many of the electricity and cement plants under construction should start production by the end of the Plan. Therefore, the GDP growth will be accelerated from 7.2 percent in 2006 to 8.2-9.0 percent in 2010.
- The structure of the economy will shift with the share of agriculture, forestry and fisheries in GDP declining to 38.5 percent, while those of industry and construction rising to 34.5 percent and services to 27.0 percent.
- Exports for the five years are predicted to be USD 3.13 billion, growing at an annual average of 11.9 percent; while imports are projected to grow at an annual average of 9.4 percent.
- The rise in consumer prices (inflation) will be kept around 6-6.5 percent per annum.
- GDP at current prices in 2010 is projected to be 59,500 billion Kip, or USD 4.97 billion (the exchange rate is corrected at 2 percent each year allowing for a modest depreciation of the Kip). GDP per capita is estimated to reach USD 806, higher than the target (USD 700-750) set in the Socio-Economic Development Strategy (2001-2010).

2. Tasks

As indicated earlier under the Overall Goals, the main tasks for the Sixth Plan are:

1 Restructuring the economy and employment and accelerating in the direction of improving effectiveness and bringing into play the comparative advantages of goods, sectors and regions. This is to be accomplished through improvements in quality, effectiveness and competitiveness of each commodity and enterprise, and the economy as a whole;
2 Intensifying the multi-faceted economy, with the public sector playing a decisive role in formulating and developing businesses such as domestic, international, collective and individual (household) enterprises to improve the market economic mechanism with a socialist orientation. This will include the creation of a fair, transparent, stable, open and highly competitive environment for private investment and business;
3 The network of small and medium enterprises will be intensively developed. This will gradually restore the health of corporate finances, and help reorganize and resolve the debts in the corporate system;
4 Investment in socio-economic development will be rigorously increased. An optimal investment structure will be built to make the economic mechanism work effectively and be competitive. It is also visualized to improve the infrastructure, investing appropriately in the main economic areas, and providing more investment to distressed areas;
5 Foreign trade will be expanded and improved, with a favorable environment created for the growth of exports, and attracting investment and technology from abroad. The country intends to actively integrate into the international economy, on a cautious but effective schedule, implementing bilateral and multilateral commitments at national, local and business levels;
6 Reforms will be continued to make the financial and monetary systems healthy, improving the national capacity, financial resources, and economic performance in all areas. The stability of all macro-economic indicators will be maintained, controlling inflation and the

budget deficit, and gradually building and expanding the credit market to meet the socio-economic development needs;

7 Reforms will be continued to make basic and comprehensive changes in education and training, science and technology, to improve the quality of human resources with optimal structure; to provide elementary education for all; and utilize modern technology in the more advanced areas such as economic centers and urban areas;

8 The economy will be developed in harmony with social development and environmental protection, creating jobs, decreasing the number of unemployed people, solving effectively social issues, including reducing significantly the number of poor households, caring for credited people, fighting the social evils, and improving the quality of life and morals of the people;

9 Administrative reforms will be speeded up in the direction of reforming and improving effectiveness, and making relations with residents and businesses public and transparent. Bureaucracy and corruption will be reduced. A fundamental reform of the civil service salaries system will be implemented; and

10 The socio-political situation will be kept stable to maintain an environment conducive to national defense and security.

2.4 Thailand

2.4.1 General Facts

Geography

Location: Southeastern Asia,
bordering the Andaman Sea and the Gulf of Thailand,
southeast of Myanmar

Area: *total:* 514,000 sq km
Land: 511,770 sq km
Water: 2,230 sq km

The kingdom of Thailand, lying off the southeast coast of Asia, is a gateway to Indochina, Myanmar and Southern China. The country comprises 76 provinces that are further divided into districts, sub-districts and villages. Bangkok is the capital city and centre of political, commercial, industrial and cultural activities. Its shape and geography divide into four natural regions -- the North, the Central Plains, the Northeast plateau, and the peninsula South. Each of the four geographical regions differs from the others in population, basic resources, natural features, and level of social and economic development.

Climate

Thailand has a tropical monsoon climate with three distinct seasons-hot and dry from February to May (average temperature 34 degrees Celsius and 75% humidity); rainy with plenty of sunshine from June to October (average day temperature 29 degrees Celsius and 87% humidity); and cool from November to January (temperatures range from 32 degrees Celsius to below 20 degrees Celsius with a drop in humidity).

Population

Since 1911, Thailand has taken frequent national censuses organized by the National Statistical Office. A large majority of the population (80%) are ethic Thai, along with strong communities whose ethnic origins lie in China (10%), Malay (3%), India and the rest (Mons, Khmers, hilltribes). About 6 million people reside in the capital city of Bangkok.

From the 2000 National censuses, Thailand had in 2000 about 61 million people. This total was divided about equally between males and females. The regional breakdown was approximately 20.5 million in the Center (which included the Bangkok metropolitan area), 20.8 million in the Northeast, 11.4 million in the North, and 8.1 million in the South. As in most Southeast Asian nations, the population was youthful and agrarian; approximately 25 percent of the population was between the ages of 15 and 29.

Religion: Buddhism (93.8%), Muslim (4.6%), Christian (0.8%), and others (0.8%)

Language

Thailand's official language is Thai. The core Thai--the Central Thai, the Northeastern Thai (Thai-Lao), the Northern Thai, and the Southern Thai--spoke dialects of one of the languages of the Tai language family.

Government

Thailand has had a constitutional monarchy with His Majesty King Bhumibol Adulyadej, or King Rama IX, the ninth king of the Chakri Dynasty, the present king. Parliament is composed of 2 houses, The House of Representatives and the Senate. Both representatives and senators are elected by the people. A prime minister elected from among the representatives leads the government.

Environment

The 1997-1998 Asian financial crisis brought an end to Thailand's economic boom and turned the spotlight on to the effects of rapid industrialization on the country's environment. One of the most visible environmental side effect of Thailand's industrial development is the growing problem of air pollution, where thick smoke often chokes city streets in Bangkok. Although traffic congestion has proven to be a difficult problem to tackle, the Thai government has instituted a number of measures to address urban air pollution problems, including phasing out leaded gasoline. In addition, the country suffers from increased levels of industrial wastewater, a dramatic rise in domestic sewage and hazardous wastes, and severe degradation of its water and coastal resources. Marine pollution is another threat, with increased risks if an offshore gas pipeline linking Thailand and Malaysia proceeds as planned.

2.4.2 Policies and Strategies

2.4.2.1 Solid Waste

Solid Waste Generation

The amount of solid waste has increased every year, particularly the proportion of waste that is difficult to reprocess. Total solid waste throughout the country was 13.5 million tons in 1997, of which 24 percent came from Bangkok, 35 percent from other urban areas and the remaining 41 percent from rural areas.
Thailand's current solid waste management strategy focuses on bulk collection and mass disposal. Recently, Thai government is trying to implement an 'integrated waste management system" that includes waste sorting, composting, and incineration. The government also set up a national policy to (1) improve solid waste disposal and processing procedures through privatization of waste eliminating works, (2) support and encourage proper solid waste separation, (3) encourage recycling and reuse, and (4) support local government to build up capacities for waste management.

Solid Waste Law and Regulations

The Environmental Quality Promotion Act, promulgated in 1992, has been the main framework for integrating Thailand's decentralized domestic waste management scheme into a more systematic approach. Several solid waste management regulations have been promulgated and waste disposal areas have been declared. All hospitals have to separate contaminated wastes from domestic wastes and appropriate waste treatment facilities have been established. Municipalities are encouraged to set up waste management action plans. Areas declared as environmental conservation or pollution control zones are being managed intensively. In 1995, a public enterprise called the "Waste Water Management Organization" was established to run a comprehensive waste water management system in the BMR and other areas designated by the Government. During the first half of the 7th National Plan, Thailand finished constructing 40 projects, valued at more than 60 billion baht, of domestic waste water treatment plants in priority urban centers. By the year 1998, the BMR will be able to treat 50% of domestic wastewater, and other urban areas will be able to treat 25%. Investment in 45 hospital waste treatment plants is underway.
Thailand has promoted solid waste management efficiency by improving existing solid waste management systems and promoting the private sector's involvement in solid waste management. The BMA has expanded its organic fertilizer plant capacity and contracted the private sector to collect and sanitarily dump solid wastes. The private sector, in cooperation with the Ministry of Industry, operates a pioneer industrial solid waste treatment plant. Another four plants are scheduled by the year 1997. In 1996, 333 hospital contaminated solid waste treatment plants were operational. This number accounts for about 40% of total hospitals in the country.

2.4.2.2 Industrial Waste and Animal Waste

Expansion of the industrial and economic sectors has resulted in the increase of industrial waste. Thai law related to the industrial waste management and recycling contains three Acts, namely the National Environmental Quality Act B.E. 2535, the Factory Act B.E> 2535, and the Hazardous Substance Act B.E. 2535.

2.4.2.3 Legislation

Thailand has an intact environmental legislation framework. Compliaces with legislations are vital to companies existed in Thailand. The hierarchy of Thai laws is as follows:

- The Constitution, the most recent being the 1997 Constitution;
- "Acts" passed by the Parliament;
- "Regulations" and "Notifications" enacted by the respective Ministries.

The following list is laws and regulations related to the handling of oil contaminated water.

Law and Regulations related to Ministry of Industrial Works

- Factory of Act B.E.2535
- Hazardous Substance Act B.E. 2535

- Hazardous Substance Act (2nd Issue) B.E. 2544
- The Ministerial Regulation No. 15 (B.E. 2544) Issued Pursuant to the Factory Act B.E. 2535
- The Ministerial Regulation No. 11 (B.E. 2539) Issued Pursuant to the Factory Act B.E. 2535
- The Ministerial Regulation, No. 2 (B.E. 2535) Issued Pursuant to the Factory Act B.E. 2535
- The Ministry of Industry Notice Subject: The Support Measure for the Target Industries
- The Ministry of Industry Notice, Subject: Prescription of the Content Values of Contaminants in Air Emitted from the Factory in Case of Use of Processed Used-oiland Synthetic Fuel as Fuel in Industrial Furnaces B.E. 2548
- The Ministry of Industry Notice Subject: Prescription of the Content Values of Air Contaminants Emitted from the Factory B.E. 2548

Law and Regulations related to Ministry of Natural Resources and Environment

- Enhancement and Conservation of the National Environmental Quality Act 1992
- Notification of MOSTE on Types and Sizes of Projects or Activities of Government Agencies, State Enterprises or Private Persons Required to Prepare an Environmental Impact Assessment Report 1992 (24 August 1992)
- Groundwater Act 1977
- Groundwater Act (No. 2) 1992
- Regulations on Prevention and Combating of Oil Pollution

Law and Regulations related to Industrial Estates and Land Use and Planning

- Industrial Estate Authority of Thailand Act (No. 3) 1996
- Construction Building Control Act 1979
- City Planning Act 1975
- Land Reform for Agriculture Act 1975
- Investment Promotion Act 1977

2.4.3 Stakeholders

Many groups are directly and indirectly involved in the waste management issues. Stakeholders can be local government and authorities, environmental organizations, residents, producers of wastes, Environmental management is conducted on a national basis by the Ministry of Science, Technology and Environment (MOSTE). The main departments under MOSTE are the Office of Environmental Policy and Planning (OEPP), the Pollution Control Department (PCD) and the Department of Environmental Quality Promotion (DEQP). These are further divided into several divisions and regional offices which take charge of specific environmental concerns at the national and provincial levels.

The OEPP is the main body tasked with policy formulation and the development of environmental management plans. It coordinates with other national and provincial agencies in the development and implementation of these plans. The OEPP also coordinates the implementation of the Environmental Impact Assessment (EIA) system in Thailand, and is responsible for international cooperation. The PCD, as its name suggests, takes charge of pollution issues, and is the body charged specifically with implementing pollution control laws and emission standards. The DEQP is responsible for promoting public education on the environment, and takes charge of environmental information, public and media relations, research and training as well as NGO liaison.

Apart from these three agencies, there exist a myriad of other bodies operating under the aegis of MOSTE which take charge of specific environmental issues. These include the Department of Energy Development and Promotion, the Department of Science Service, the Office of the National Research Council of Thailand (NRCT), the Office of Atomic Energy for Peace, the Thailand Institute of Scientific and Technological Research (TISTR), the National Science and Technology Development Agency (NSTDA) and the Waste Water Management Authority (WMA).

In Thailand, the responsibility over natural resource management resides primarily with the sectoral ministries. In particular, the Ministry of Agriculture and Cooperatives and the Ministry of Interior, together with their constituent departments, enjoy broad jurisdiction over numerous natural resource sectors. The following is a list of competences:

2.4.4 Economic Framework

Thailand's economy is heavily agricultural, with rice by far the leading crop. Other commercial crops include rubber, corn, tapioca, cotton, tobacco, and sugarcane. Marine and freshwater fisheries are

important, and some of the deep-sea catches (mackerel, shrimp, and crab) are exported. In addition, Thailand is a major exporter of farmed shrimp. Tin, tungsten, lead, zinc, and antimony are mined for export. Industries are centered mainly in the processing of agricultural products, such as rice milling, followed by sugar refining, textile spinning and weaving, and the processing of rubber, tobacco, and forest products. During the 1980s and 1990s, electronics became important, causing a substantial rise in the per capita GDP. Thailand also has a small steel mill, oil refineries, tin smelters, and vehicle and machine assembly plants.

The economy has experienced strong growth over the past 3 years. The country's real gross domestic product (GDP) grew 5.3% in 2002, up from only 1.9% in 2001. Real GDP growth for 2003 is projected at 6.4%. Longer-term annual growth rates in 2004 and beyond are projected in the range of 5.8% - 6.6%.

Thailand's key trading partners are the US, EU, Japan, ASEAN, and China.
In the last three decades Thailand has been quite successful in improving its economy. It has been increasing its role in the world economy. Thailand's international trade has increased from US $56113 million in 1990 to US $156331 million in 2003. However, Thailand is moderately indebted as debt service ratio was 59 percent of export of goods and services. The GDP of Thailand has increased rapidly. It has increased from US $85,345 million in1990 to US $142,953 million in 2003 with average annual economic growth estimated as of 2004 is 7 percent.

Thailand has successfully reformed and improved in its administration in various sections, including that of public health due to which the quality of life of Thailand's people has partially improved. It can be seen that the Human Development Index (HDI) of the year 1990 was found to be 0.715, ranking medium at 76 from 177 countries worldwide; which has improved in terms of HDI value as 0.784 with ranking as 74 among 177 countries in 2004.

Similarly, Thailand has performed well in terms of Gender Development as Gender Development Index was 0.781 ranking at 58 among 177 countries in 2004 (Human Development Report, 2006).

Thailand's labour force is abundant. It has been able to export some of its labour force, but it is not much. (Annual Thailand Statistics of the Bureau of National Statistics, Books 40, 45, 49). In the year 1990, Thailand had a total workforce of 31,749,600 persons of which 710,000 were unemployed i.e. about 2.24 percent of the total workforce. In the year 1998, within the period of the Financial Crisis, there were 33,352,900 working persons, of them 1,137,900 were unemployed, or about 3.41 percent of unemployment rate. However, in 2002 when the economy started to recover, the unemployment rate has declined to 1.76 percent with 616,000 unemployed out of 34,969,600 working persons.

3.5 percent of population are living on less than US$ 1-/day in Thailand (Thailand Health Profile 2001-04).

The living standard in Thailand has been much improved, as one can see that 57 percent of the population living in poverty in year 1962 has gone down to 11.4 percent in the year 1996. However, in the year 1997, the financial crisis also hit Thailand, like other economies around the world. The economic growth has slowed down; as a result, unemployment increased, and so did the amount of people living in poverty due to lowered incomes. The rising inflation, which was as high as 8.1 percent, also hit the economy. Consequently, the percentage of population living in poverty increased to 15.9 percent. In the year 1999, the number of households having income below the line of poverty which is set at 20,000 baths per household per year, was 3,917,717 (data from the Household Social Welfare Census under the Project of Hiring the Volunteer Students and Financial Professionals for Strengthening Social Welfare in Villages, 1999). Later on, as the economy improved, the percentage of population living in abject poverty has decreased to 14.2 percent in the year 2000 i.e. 8.9 million people. This suggests that the economic condition has significant impact at the grass-root level. During the period from 2000 to 2002, the economic growth has sustained and the income level of Thai people has increased, the percentage of population living in poverty was 13.1 percent (8.2 million people) in year 2001, and 9.8 percent (6.2 million people) in year 2002. Among the population living in poverty, 86.2 percent were in rural areas. About 2 in 3 of them lived in the North Eastern region of Thailand.

2.4.5 Socio-cultural and Socio-Economic Framework

Poverty data from the latest Socio-economic Survey shows that the majority of the poor reside in the agricultural sector in the rural areas of the Northeast. Poverty maps by district, which are being developed by the National Statistics Office, could help identify poor households at the district level. Poverty fell between 2004 and 2006, but at a relatively slow pace. The poverty headcount ratio fell from 11.2 in 2004 to 9.6 in 2006, leaving 6.1 million people living below the national poverty line of

1,386 Baht/person/month. Apart from the increase in poverty during 1997-2000 as a result of the crisis, the recent reduction in the poverty rate of 1.6 percentage point in 2004-06 was the lowest since 1990. Part of the reason was low crop production, especially in main crops such as rice.

Table 2.4-1: Thailand Poverty Headcount Ratio Classified by Region, 1996-2006 (Percent of total population) [NESDB, 2006]

	1996	2000	2004	2006
Thailand	14.8	21.0	11.2	9.6
Northeast	24.5	35.3	18.6	16.8
North	17.8	23.1	15.7	12.0
South	10.3	16.6	6.0	5.5
Central	6.1	9.0	4.5	3.3
Bangkok	1.2	1.7	0.8	0.5
Urban	9.9	8.6	4.6	3.6
Rural	22.9	26.5	14.2	12.0

*2006 National Poverty Line is 1,386 Baht/head/month

Poverty continues to be concentrated in the households engaged in agricultural activities in the rural areas of the North and Northeastern regions. Poverty remains highest in the North East, with a poverty headcount rate of 16.8 percent, although this is down from 24.5 percent in 2006. Poverty in the rural areas is down to 12 percent of the population almost half the rate in 1996 although this is still over 3 times that of the urban areas (3.6 percent). Almost half of poor households derive their incomes from agriculture, fishing and forestry (Figure 6). Another important group among the poor is the elderly the age of the head of household is highly correlated with poverty, especially in the rural areas.

Learning outcome:

By completing this section you should be aware ot the waste management legislative and policy structures of Cambodia, Lao PDR, Vietnam and Thailand and also the current waste situation in these countries. You should understand the issues waste is causing.

Self-assessment

- What are the differences in national strategies?
- Outline the role of the private sector!
- What kind of instruments and laws are equal in all countries?
- Outline the varieties of economic framework conditions!

2.5 References

- Cotter, S. (2000). Solid Waste (Chapter 24). *In Environment: Concepts and Issues. A focus on Cambodia*, Ed., Noelle O'Brien. Ministry of Environment, Phnom Penh, Cambodia.
- Heisler, T. (2004). Lessons from Experience: A Comparative Look at Solid Waste Management Policies in Cambodia, India, The Philippines and Sri Lanka. The Waste-Econ Programme.
- Kham Kimsour (2008). Strategies for improving waste management in Meanchey District, Phnom Penh. MSc. Thesis. Royal University of Agriculture, Phnom Penh, Cambodia.
- Kokusai Kogyo CO., Ltd. (2005). The study on solid waste management in the Municipality of Phnom Penh in the Kingdom of Cambodia. Draft Final Report (2), Municipality of Phnom Penh, Cambodia.
- Municipality of Phnom Penh (MPP) and Asian Development Bank (ADB) (2006). Partnerships for a cleaner city: Lessons on managing the urban environment. Phnom Penh, Cambodia.
- National Institute of Statistics (NIS) (2005). Cambodia inter-censal population survey 2004. Ministry of Planning, Kingdom of Cambodia.
- Royal Government of Cambodia (RGC) (2001) Second Five Year Socio-economic Development Plan 2001-2005. Ministry of Planning, Phnom Penh, Cambodia.
- Royal Government of Cambodia (RGC) (2006) National Strategic Development Plan 2006-2010. Ministry of Planning, Phnom Penh, Cambodia.
- Vin, S., Nitivattananon, V. and Amin, A.T.M. N. (2005)**.** Assessment of solid waste contracted services: Case study of waste collection in Siem Reap town, Cambodia. International Conference on Integrated Solid Waste Management in Southeast Asian Cities. Siem Reap, Cambodia. Nowarat Coowanitwong, Prajapati Shapkota, and Peachie Ann Aquino, Asian Institute of Technology, Thailand.
- Socialist Republic of Vietnam – The Government website. http://www.chinhphu.vn/portal/page?_pageid=439,1090503&_dad=portal&_schema=PORTAL
- General Statistic Office of Vietnam. http://www.gso.gov.vn/
- World Bank; MONRE; CIDA. (2004). Vietnam Environmental Monitor 2004.
- Dinh Xuan Thang (2001). Surveying, Evaluating and Sugessting measure for managing the solid waste problem in Long An province. Institute of Environment and resource – HCM city.
- Cantho Environmental Monitoring station (2006). Cantho environmental monitor 2006. Department of Natural Resource and Environment of Cantho city.
- Department of Natural Resource and Environment of Haugiang province (2007). Haugiang environmental monitor 2007. Department of Natural Resource and Environment of Haugiang province.
- Environmental protection center (1996). Environmental impact assessment of landfill construction project of Mytho city – Tiengiang province. Environmental protection center.
- Institute of Environment and sustainable development (2003). Report on Environmental pollution and source of pollutant at Vinhlong province. Department of Science – Technolgy and environment of Vinhlong province.
- Department of Natural Resource and Environment of Bentre province (2005). Environmental situation of Bentre province 2005. Department of Natural Resource and Environment of Bentre province.
- Soctrang URENCO (2005). Annual Report 2005. Soctrang URENCO.
- Cantho Environmental Monitoring station (2007). Report on Environmental situation of Baclieu province 2007. Department of Natural Resource and Environment of Baclieu province.
- Travinh URENCO (2006). Annual Report 2006. Travinh URENCO.
- Rachgia URENCO (2002). Report on Solid waste component analysis. Rachgia URENCO.
- Camau Design Consultant Company (2000). Report on Feasibility study of project on collection, transportation and treatment of solid waste at Camau city. Department of Construction Camau province.
- Committee for Planning and Investment 2006, *Sixth National Socio Economic Development Plan (2006-2010)*, p I, II, III, IV, 39, 40, 41, 42, 43, 44.
- Country Report 2001, *the implementation of the habitat agenda in the Lao People's Democratic Republic,* P. 5.
- FONGKHAMDENG Bounnao, *Actions Implication for Waste Recycling and Waste Separation Demonstrations*, Urban Planning Division, DHUP, MCTPC.
- The Institute for Cultural Democracy 1998, *Cultural Policy in the Lao People's Democratic Republic*, Viewed 1/12/2008
  URL: http://www.wwcd.org/policy/clink/Laos.html
- The World Bank & STEA, no date, *Lao PDR Environment Monitor,* p V, IX, 38,39,40,46,47,48,50.
- The World Bank 2006, *Economic framework*, Lao PDR Economic Monitor.

- VEaSM - Vietnam Environment and Science Magazine, maithanhtuyet@khoahoc.net, 21/4/2005
- Nguyen Trung Thang, Institute for Resource and Environment Policy and Strategy, Hanoi Workshop, 4/2008
- Nguyen Danh Son, Institute of Sustainable Development in North's area Vietnam, Hanoi Workshop, 4/2008
- Vietnam Environment Law, 2005