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UESS Assessment Report Hatsady Tai

Outcomes of the HCES project Step 3, Hatdady Tai, Vientiane, Lao PDR

Public Works and Transport Institute (PTI)

2007

dialogue

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List of abbreviations

ADB	Asian Development Bank
AFD	Agence Française de Développement
DCTPC	Department of Communication, Transport, Post and Construction
EPF	Lao Environmental Protection Fund
ERI	Environmental Research Institute
GoL	Government of Laos
HCES	Household Centred Environmental Sanitation
MCTPC	Ministry of Communication, Transport, Post and Construction (new: MPWT)
MDG	Millennium Development Goals
MOPH	Ministry of Public Health
MPWT	The Ministry of Public Works and Transport
NGPES	The National Growth and Poverty Eradication Strategy
NUoL	National University of Lao PDR
PSTEO	Provincial Science, Technology & Environment Offices
PTI	Public Works and Transportation Institute
SFSP	The Sixth Five-year Socioeconomic Plan 2006-2010
STEA	Science, Technology and Environmental Agency
STEO-VTE	Science, Technology & Environment Office Vientiane Capital
SWM	Solid Waste Management
UESS	Urban Environmental Sanitation Services
USSIP	The National Urban Sector Strategy and Investment Plan 2005-2020
UWSIP	Urban Water Sector Investment Plan of Government 2005-2020
VUDAA	Vientiane Urban Development Administration Authority
WASA	Water Supply Authority
WSSCC	Water Supply and Sanitation Collaborative Council

1 Introduction

This report summarises the outcomes of an urban environmental sanitation assessment that was conducted in the period from July to October 2007 in Hatsady Tai, a village in the city of Vientiane, Lao PDR. Hatsady Tai was selected as case study for the testing of the Household Centred Environmental Sanitation (HCES) planning approach (see box 1). Several meetings, workshops and informal discussions with the community and the local authorities have clearly shown that inadequate environmental sanitation services are perceived as a priority issue in the low-income areas of Hatsady Tai village. Given the lack of appropriate infrastructure and management, solid and liquid waste is being discharged within the village boundaries without sound management strategy, thus leading to a deterioration of the living environment and to increased health risks.

Box 1: The HCES planning approach

In an effort to address the neglect of sanitation, and improve guidance on a 'demand-responsive approach' to those planning and implementing sanitation programmes, the Water Supply and Sanitation Collaborative Council (WSSCC) developed an approach to address environmental sanitation services called the Household-Centred Environmental Sanitation (HCES) approach. The HCES approach is a radical departure from past central planning approaches as it places the household and its neighbourhood or the community at the core of the planning process. Using such a household centred approach (HCES) to plan and implement urban environmental sanitation services offers the promise of overcoming the shortcomings often observed in conventional approaches which largely neglect the special situation and the very limited means of the population living in low-income areas. By considering the special characteristics of low-income areas and including their population at an early stage in the planning process will hopefully lead to solutions which are socially as well as economically more sustainable.

During the initial discussions that took place with local authorities and the community of Hatsady Tai, all parties agreed that the problems related to urban environmental sanitation services (UESS) must be tackled urgently. They also agreed to adopt the HCES planning approach, with active participation of all main stakeholders, especially the community, in the planning and decision making process.

The main purpose of this assessment report is to provide practical information to the project design team members, the public, businesses, NGOs and other stakeholders for engaging in an informed discussion regarding the range of technical and management options in the field of UESS that may be feasible in Hatsady Tai. This information is needed in Step 4 and 5 of the HCES planning process for discussions with the community and stakeholders and to identify feasible UESS options, in Step 6 for further analysis of specific technical options and in Step 8 in developing a UESS plan.

2 Background

Lao PDR is a landlocked and mountainous country, which is surrounded by Cambodia, China, Myanmar, Thailand and Vietnam. Natural resource degradation, combined with inadequate provision of environmental services is disproportionately affecting the poor in Lao PDR.

2.1 Urbanization in Lao PDR

The country is essentially rural, but since the mid-1980s the expanded marketing and commercial opportunities following economic liberalization stimulated urban growth. As a result, growing numbers of rural people were drawn to the urban areas in search of better livelihoods. The present urban population of more than 1 million is estimated to increase by more than 100 percent over the next 10 years (UN-HABITAT, 2005). Although the economy is largely rural, with agriculture accounting for some 50 percent of gross domestic product (GDP), the role of the urban sector is growing. During 1996-1998 the industry and services sector components of GDP increased at average annual rates of 11.5 and 7.2 percent, respectively, compared with 4.3 percent for agriculture, implying the productivity and associated opportunities in urban areas.

Vientiane, the capital city of the Lao PDR, is by far the largest urban area. The current population of the Vientiane urban area is estimated at 162,000, while the greater Vientiane urban area, within the boundaries of the master plan, has a population of 325,000 and is growing at a rate of 3.3 percent per annum.

2.2 Poverty, poverty reduction strategy

With a per capita income of about $300, the Lao PDR is one of the least developed countries in Asia. Poverty incidence is estimated at 38.6 percent. The United Nations human development index places the country in the bottom fifth of the world's nations. The long-term objective of the Government of Lao (GoL) is to free the country from the status of least developed by 2020, which requires the eradication of poverty in a sustainable manner. In its Sixth National Socio Economic Development Plan (2006–2010), the Government engages to help enlarge the economic opportunities, enable the provision of basic social and essential economic services, ensure security and facilitate the participation and empowerment of the poor in economic, social, political and other arenas (Committee for Planning and Investment, 2006). Proposed initiatives within the Plan include the rehabilitation and construction of infrastructure (e.g. irrigation systems, roads, markets and electricity), and the provision and effective use of basic social services (such as education, healthcare, safe water and sanitation).

2.3 Health status

The health care system has improved and gradually expanded over the past 10 years to form a complete network from the central level to the districts and villages (Committee for Planning and Investment, 2006). Investments were made to upgrade treatment in the central and regional hospitals and expand access to medical services. The private health network has also developed since 2001. In 2006, there were 484 private clinics, 244 of which were located in Vientiane

(Committee for Planning and Investment, 2006). Throughout Lao PDR there is a high incidence of gastrointestinal diseases, such as diarrhea and dysentery, caused by inadequate water supply, poor sanitation and sewerage, and poor hygiene (World Bank, 2005).

2.4 Basic urban infrastructure in Vientiane

While infrastructure and services in Vientiane have improved significantly over the last few years with major investments in primary roads and drainage, a focus on primary infrastructure constrained the ability of the newly constructed infrastructure to realize its full potential benefits. There remains a need for further development to (a) maximize the utility of the existing primary networks and allow a greater share of population, especially the poor, to benefit from environmental improvements; and (b) control future environmental degradation.

2.4.1 Drainage

Storm-water drainage is a key infrastructure development issue. Storm water drainage in most urban areas consists of roadside drains leading ultimately to natural streams or rivers. Drains are generally not adequately interconnected and do not form a network. Flooding continues to occur away from the main drainage network developed with recent investments, and stagnant polluted wastewater still lies in open roadside channels because the primary network is incomplete and the secondary and tertiary networks are largely unimproved. There are almost 300 kilometers (km) of drainage channels within the urban area, of which about 162 km are either in poor or very poor condition. Moreover, lack of routine cleaning, maintenance, and rehabilitation constrains the proper functioning of the existing systems.

There are three main drainage channel systems in Vientiane:

- Hong Xeng mainly drains water from Sikhottabong district and some parts of Chanthaboury district, through Nong Duang marsh and Pasak stream.

- Hong Ke drain is the main channel, which is connected to Hong Thong and Nong Chanh swamp, draining water from Chanthaboury and Sisattanak district through the Morning market.

- Hong Khoua Khao is a drainage system for draining water from Nong Chanh to Thatluang wetland through Hong Ke drainage channel.

2.4.2 Sanitation

In 1998, more than 75% of the urban households in Vientiane had access to satisfactory sanitation facilities such as cistern flush or pour flush toilets. However, the methods adopted for treatment and disposal of wastewater are generally not satisfactory. According to the environmental protection law, all buildings are supposed to have on-site wastewater disposal and treatment facilities such as septic tanks. Most households rely on soak pits for wastewater disposal.

Table 1: Toilet facilities in Vientiane Capital, Status 1995 (World Bank, 2006)

Cistern flush	*Pour-flush*	*Dry latrines*	*Other*	*None*
5.9%	71.6%	11.4%	0.6%	10.5%

A 1996 survey by the Vientiane Integrated Urban Development Project (VIUDP) found 63 % of the households with such a sanitation system. In the same survey, 34 % of the households used a septic tank for excreta disposal, and 2 % discharged human waste directly into the drainage system. Due to the low absorption capacity of the soil and the high ground water table in Vientiane, many soak pits fail to operate effectively, causing discharge of sewage from pits and tanks into road side drains, drainage channels and low-lying areas (UN-HABITAT, 2001). It is common practice to dispose of greywater in surface drains and drainage channels. The storm-water drainage system is generally contaminated by wastewater that ends up in wetlands and marshes, contributing further to environmental degradation. Lack of an effective system for maintenance and enforcement of sanitation regulations compounds these problems (ADB, 2001).

Re-use of wastewater for other water usage (e.g. irrigation) is not yet being applied in Lao PDR (World Bank, 2006).

2.4.3 Water supply

In Lao PDR, surface water is the major water source for urban water supply, while groundwater is usually a main source for the rural population in lowland areas, particularly in the central and southern parts of the country, where the groundwater table is sufficiently high and of sufficient quality (World Bank, 2006)

In Vientiane, the situation with respect to potable water supply is generally good. The city draws its water from two intakes on the Mekong River both upstream and downstream of Vientiane. It is treated before distribution. Within the urban districts of the Vientiane Prefecture, 81.2 per cent of the urban households had access to potable water in 1998 (UN-HABITAT, 2001). The average per capita consumption was estimated at 150 liters per day, but for poor urban households average per capita consumption was estimated at only 80 liters per day. The quality and reliability of the supply is good. Piped water is available continuously over the full 24 hours in most parts of the city, although water pressure can be low during periods of peak demand.

2.4.4 Solid waste management

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 groundwater. Expanding urban populations, combined with poor collection and largely inadequate disposal facilities, are compounding the level of pollution.

Table 2: Domestic solid waste composition, generation rate in Vientiane Capital (World Bank, 2006)

Organic material	*Plastic*	*Glass, cans and metal*	*Paper*	*Total*
30 %	30 %	25 %	15 %	0.8 kg/p/d

The average daily urban waste production is 0.75 kg per capita. Vientiane Capital City accounts for 0.8 kg per capita per day (World Bank, 2006). Solid waste in Lao PDR comprises mainly of organic material, plastic, paper, and glass, cans and other metals. 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.

Only Vientiane and the four secondary towns have landfills, but the disposal areas are small, and have no leachate collection or monitoring wells. Over two thirds of municipal waste could be recycled, but the current scale of recycling in Lao PDR is still very modest.

Despite the existence of the landfill 18km outside of the city centre of Vientiane, collection services are limited to accessible areas and profitable target groups such as markets and high-income households. In 2003, the average solid waste collection ratio for urban households in Vientiane was 48% (World Bank, 2006). The landfill accepts domestic, construction, industrial and hospital waste, and provides separation for hospital waste within fenced compound. Half of the waste remains uncollected and is left on road corners or is openly burnt or disposed of improperly.

According to the environment protection law, authority to manage solid waste lies with STENO at the national level and with environmental management and monitoring units at the ministerial, provincial, special zone, municipal, district, and village levels. The Ministry of Communications, Transport, Posts and Construction (MCTPC) is responsible for SWM; the Department of Communications, Transports, Posts and Construction represent MCTPC at the provincial level; and municipal administrations are responsible for SWM at the local level.

In 1995, SWM (collection, transportation, and disposal) was handed over to Vientiane Municipality, specifically to the Vientiane Urban Development Administrative Agency (VUDAA) that was established by Prime Ministerial decree in 1999. According to the decree, the VUDAA has responsibilities for planning, operating, managing, and maintaining local government infrastructure services and environmental management programs. VUDAA consists of five divisions including the Technical and Urban Planning Division and the Environmental and Sanitation Division. The latter is responsible for SW collection, for transportation, for septic effluent, for sludge collection, for treatment programs, for inspecting licensed premises, for care of parks, for street cleaning, and for monitoring implemented programs. Currently, UCSC (Urban Cleansing Service Center established under VUDAA administration), the Lao Garbage Company (private), and Chanthabouly Cleansing Pvt. Company (private) are jointly handling city waste in Vientiane.

2.4.5 Main challenges in UESS

Proper solid waste management is only functional in certain urban areas. Wastewater treatment is still new to the country, and to cope with the increasing need for environmental services, local governments and VUDAA (with support from the National Government) are under pressure to further implement and operationalize these services in Vientiane. This would encompass:

- improving solid waste collection, recycling and disposal;
- expanding access to safe sanitation;
- protecting water sources from pollution;
- involving the private sector to partner with local government to deliver these services;
- effectively applying VUDAA's 2002 cost recovery regulation to partially recover operation and maintenance costs from service users; and
- intensifying capacity building efforts of local governments.

3 Enabling Environment

An enabling environment can be seen as the set of interrelated conditions that impact on the potential to bring about sustained and effective change. This includes the political, legal, institutional, financial and economic, educational, technical and social conditions that are created to encourage and support certain activities.

To develop an enabling environment for the successful application of the HCES approach, the collective preconditions to be addresses include:

- Government support, in terms of political support and favourable national policies and strategies
- The legal framework, with appropriate standards and codes at national and municipal levels
- Institutional arrangements that suit the highly decentralized and zone-by-zone approach used in HCES
- Effective training and communications, ensuring that all participants understand and accept the concepts through possessing the required skills
- Credit and other financial arrangements that facilitate household participation and community involvement
- Information and knowledge management, providing access to relevant information, sharing of experiences, training and resource materials, the development of new approaches and the dissemination of findings

The following sections review the current environment of Lao PDR in general, and for Vientiane Capital in particular, and discuss to which extend this environment is enabling or hindering the application of the HCES approach in Hatsady Tai Village.

3.1 Government support

3.1.1 Political support

Political support at all levels for an innovative, participatory and bottom-up approach in environmental sanitation service provision is essential. This political support to the proposed project in Hatsady Tai Village is given. The Government of Lao (GoL) has committed itself to implement the Millennium Development Goals (MDG). The Ministry of Communication, Transport, Post and Construction (MCTPC) officially approved the project and confirmed that the objectives of the project are in line with the Government of Lao PDR's commitment to achieve sustainable access to safe drinking water and improved sanitation systems, as defined

in its National Growth and Poverty Eradication Strategy (NGPES). Increased access to safe water supply and sanitation is recognized by the GoL as an important element for socio-economic development and is highlighted as a priority intervention in the government's poverty eradication strategy. Support to the project by ministerial and provincial authorities was confirmed at the HCES project launching workshop, held on July 11th 2007 in Vientiane. The Department for Housing and Urban Planning (DHUP) and the Urban Research Institute (URI), both under the MCTPC, officially approved the project and its underlying principles. Basic support was also confirmed from the Ministry of Health (MoH), which in its National Strategy for the rural water supply and environmental health sector follows a very similar strategic direction.

Political support to the project is also given on provincial and city level: The Department of Communication, Transport, Post and Construction (DCTPC) of Vientiane and the Vientiane Urban Development Administration Authority (VUDAA), in charge of urban planning, infrastructure development and service delivery in Vientiane urban area, approved the basic principles of the HCES planning approach, as expressed at the launching workshop mentioned earlier.

Table 3: Political support to HCES project on national, provincial, district and village level

Authority	*Support (Y/N)*	*Comments*
On national level		
MCTPC	Y	Officially approved the project idea (signed LOI), mandated URI to be main national partner
DHUP	Y	Showed great interest in the HCES planning approach, and might include it in their policy if successful.
URI	Y	Are willing to take the lead in the project management. Contract signed with Swiss project partners
WASA	Y	Same as DHUP
MOPH	(Y)	Basic support, but no commitment and involvement to be expected, since focused on rural areas.
STEA	(Y)	Basic support
On local level (province, district, village)		
VUDAA	(Y)	Agreed with the planning approach, but showed little interest to actively participate in the planning process.
DCTPC-VCC	(Y)	Showed interest in the planning approach, but project area does not belong to their responsibility.
Planning Office VCC	(Y)	Basic support (confirmed at HCES launching workshop)
DCTPC District	(Y)	Basic support (confirmed at HCES launching workshop)
Mayor's Office	Y	Support the project idea and the planning approach (confirmed at HCES launching workshop)

Planning Office District	Y	Support the project idea and the planning approach (confirmed at HCES launching workshop)
Naiban	Y	Interested in the HCES planning approach, willing to participate in the project coordination team.

Note: Y–full support; (Y)–basic support; N–no support

3.1.2 National laws, policies and strategies

Legislation related to environmental management has evolved quickly in Lao PDR over the past decade. Inconsistencies have surfaced in different legislation as a result of different ministries leading the development of sectoral legislation. Principal inconsistencies include conflicting provisions, overlapping mandates given to different ministries, and lack of implementing regulations and supporting standards. The Government is working to address these issues, and to formulate a national system for standardizing and enforcing environmental regulations (World Bank, 2006).

The main **Laws and Prime Ministerial Decisions** with specific regulations regarding urban environmental sanitation service provision are listed in the table below. While most of these legislative texts regulate the responsibilities of the different line ministries and related agencies in the field of water supply, environmental sanitation and urban planning, they also include laws and regulations aiming at strengthening the village as administrative unit and promoting community participation in activities related to environmental protection.

Table 4: National laws, PM decrees and decisions of relevance for the HCES project

Laws and PM Decrees	*+ / - / n*	*Comment*
Environmental Protection Law (No 02/99/NA)	+	Defines the village as the administrative level where plans for environmental protection have to be developed and implemented. Promotes participation of community in activities related to protection, mitigation and restoration of the village environment.
Water and Water Resources Law (No 02-96/NA)	+	The discharge of water or dumping of waste into a water source is prohibited if such discharge or dumping will lower the quality of the water source. Wastewater may be reused after treatment.
Hygiene, Decease Prevention and Health Promotion Law (No 01-01/NA)	n	The provincial and municipality health departments and the district health offices are the agencies in charge of managing and supervising the law. Although there are few specifics about sanitation; the law is a good starting point for developing more detailed regulations.
The Law on Urban Planning (No xx-99/NA)	+	Recognizes the importance of community participation in the planning, implementation and monitoring of physical improvements and other interventions.

		Development planning processes must apply a bottom-up approach where submissions from villagers are integrated into District Development Plans which are again integrated into the Provincial Development Plan.
Prime Ministerial Decision on Management and Development of Water Supply Sector (No 37/PM)	+	Enforces full involvement by beneficiary communities in the development of water supply and wastewater management systems from inception to the operational stage. On site treatment of wastewater will be pursued and the implementation and management of the facilities shall be the responsibility of the individual owner.
Decree on Regulation of Urban Water Supply Operations (2005)	n	The Provincial Governor is the water supply tariff approval authority. WASA is the water supply tariff policy development authority.
Decree 40/FAMC and Decree 14/PM	n	Decentralization of responsibilities for urban development from the ministerial departments at provincial and prefecture level to the level of an urban local authority. The responsibility for urban planning and management was transferred from the DCTPC (under MCTPC) to VUDAA.

Note: + supporting HCES planning principles; - hindering HCES planning principles; n neutral, but relevant.

Although national laws are partly inconsistent, they basically support a participatory, bottom-up, pro-poor approach for planning urban environmental sanitation services.

National policies, and the strategies adopted to implement them, support the basic principles of the HCES approach. This was also confirmed by the authority representatives participating at the official HCES project launching workshop on July 11th 2007. Increased access to safe water and sanitation is recognised by the government as an important element for socio-economic development. The GoL also recons that water supply projects alone are not efficient but must include appropriate drainage and sanitation measures, an appropriate community participation, consultation and health awareness component.

The overarching national development goal of the Government of the Lao PDR is to quit LDC status by the year 2020 through a strategy of sustainable economic growth and people-centred equitable development. The Government puts increased emphasis on regional economic development, infrastructure development, and implementing the government's decentralisation policy, all of which should have a direct poverty reduction impact. To reach these objectives, the Government has formulated a number of policies and strategies. The most relevant to environmental sanitation are listed below.

One of the most relevant policies of the GoL is the policy of decentralization (signed in 2000) which aims to build up the province as the strategic unit, the district as the planning and budgetary unit, and the village as the implementing unit. This decentralization of responsibilities for

the urban development sector as well as the water supply and sanitation sector from the ministerial departments to lower level authorities, favours the zonal approach of the HCES planning process.

Of special concern is the location of the project site, which does not belong to the priority areas of several governmental strategies, such as the NGPES, the UWSIP or the SFSP. Indeed, the implementation of the national sector policy has shifted the focus on the environmental health and water supply program, with a shift in focus from rapid increase of access in easily accessible areas to less accessible, more vulnerable and poverty ridden zones.

Table 5: National policies and strategies of relevance for the HCES project

Policies and strategies	*+ / - / n*	*Comments*
The National Growth and Poverty Eradication Strategy (NGPES)	+	Focuses on health, including water supply and sanitation, as one of four priority sectors for poverty reduction.
The Sixth Five-year Socioeconomic Plan 2006-2010 (SFSP)	+	Spells out a coherent approach to poverty reduction, with improving economic opportunities and access to basic services (hereunder water supply and sanitation) for the population, ensuring food security, and promoting people's participation, including the poor and other vulnerable groups in the development process.
Decree 40/FAMC and Decree 14/PM (2000)	+	Decentralization of responsibilities for urban development from the ministerial departments at provincial and prefecture level to the level of an urban local authority. The responsibility for urban planning and management is transferred from the DCTPC (under MCTPC) to VUDAA.
The Urban Water Sector Investment Plan (UWSIP) of Government 2005-2020	-	The plan aims to guide development for the period 2005-2020. The plan, which is estimated at $266 million, will serve an additional 1.95 million urban inhabitants, and is mainly focused on small- to medium-sized towns.
Decree on Regulation of Urban Water Supply Operations (2005)	n	The Provincial Governor is the water supply tariff approval authority. WASA is the water supply tariff policy development authority.
The National Urban Sector Strategy and Investment Plan 2005-2020 (USSIP)	?	Relevance for project not clear
The Urban Wastewater Strategy and Investment Plan (UWSIP)	?	Relevance for project not clear
Water Tariff Policy (2004)	n	Sets foundations for determination of water tariffs in the form of guidelines and recommendations.

		NPSE must employ a uniform tariff throughout their areas of supply. The Policy discourages the use of the rising block tariff structure. Fixed charges and connection fees shall be eliminated and subsidized by a higher volumetric unit tariff. Tariffs must reflect the level of service, but not exceed 3–5% of disposable household income.
National Strategy on Environment to the years 2020 and Action Plan for the years 2006-2010	+	Defines the village as the administrative level where plans for environmental protection have to be developed and implemented. Promotes participation of community in activities related to protection, mitigation and restoration of the village environment."

3.2 Standards and codes

A decree for promulgating laws on Hygiene, Prevention and Health Promotion was officially issued in April 2001. Article 12 covers the sourcing and consumption of clean water for daily use and states that such water must originate from safe supplies such as piped water systems, wells, rainwater, gravity fed water systems, rivers, streams and others sources where hygienic conditions are secured.

A revised land use regulation has been issued in October 2007 for Vientiane CC. Article 5 of this regulation defines that every residential area should be connected to basic infrastructure including: electricity, water supply, drainage system, domestic wastewater management, and solid waste management.

A regulation on building construction was attached to this regulation. Article 4 defines that building permits are required to construct a house, and that these permits are issued only if full proposal are submitted including: (a) living certificate, (b) land title, (c) architecture drawing, (d) wastewater management system and drainage including location of septic tack.

The regulation on building construction defines that building permits are required to construct a house, and that these permits are issued only if full proposal are submitted including: (a) living certificate, (b) land title, (c) architecture drawing, (d) wastewater management system and drainage including location of septic tack. To obtain water supply connection to the land where a building will be constructed, the applicant must get the building permit or a correct construction certificate (a correct construction certificate means a certificate issued by the CMC to certify that the construction is compliance with the regulation)

3.3 Financial arrangements

The Government of Laos has limited financial resources for environmental management. In the past, investments related to environmental sanitation upgrading were linked to donour funded infrastructure projects (mainly JICA, ADB, AFD and UN organisations). Governmental agencies have insufficient resources to properly implement their mandates. Some financing mechanisms and policies have been introduced to reduce the dependency on the Government budget, such as:

- **The Lao Environmental Protection Fund (EPF)**. The EPF is a financially and administratively autonomous, non-profit organization established as a source of financing to support environmental management, protection and conservation. It was established by Prime Ministerial decree in June 2005.

- **Principle of cost recovery of environmental sanitation service provision**. UESS providers must operate on commercial principles. They must generate (through user fees) sufficient revenue to meet the cost recovery for all water supply, wastewater and solid waste management systems.

- **Micro-credit schemes.** The microfinance sector in the Lao PDR is currently undergoing a period of rapid growth and change. Increasingly, microfinance provision is being employed by both the governmental and non-governmental sector as a poverty alleviation strategy. The Government of the Lao PDR is committed to the development of a sustainable microfinance sector as outlined in the National Growth and Poverty Eradication Strategy; in addition, the Government of Lao PDR has also endorsed the first Microfinance Regulation (Regulation Number 10 in June 2006) to regulate the establishment and operations of microfinance institutions.

- **Recycling banks** (see box 2). Recycling banks have been introduced in different neighbourhoods in Vientiane in the framework of urban development projects to enable financial sustainability of solid waste management systems.

Box 2:* *Waste recycling banks

A waste separation and recycling initiative led to the establishment of recycling banks in the name of the Integrated SWM Project and the Lao Chareon Recycling Center. Supported by the Royal Dutch Embassy and German Technical Cooperation, the initiative aimed at creating a sustainable and culturally appropriate system for SWM in Vientiane. In 2005, there were 30 recycling banks operating in Vientiane—20 in communities and 10 in schools. The communities sell their waste to the recycling center once the waste banks are full. In the schools, students and teachers are operating and managing the recycling banks as an extra-curricular activity. They bring recyclables from their homes once a week to deposit in the school bank. When the bank is full, they contact a private company to come and buy their recyclables. They then distribute the income among themselves and the school administration proportionately.

3.4 Institutional arrangements

The institutional structure for urban environmental management in Lao PDR consists of: (i) national committees that guide inter-sectoral coordination among agencies; (ii) STEA as the main manager, monitor and coordinator of environment matters at the national level, and other relevant ministries such as the MPT, MoPH, and MPI with the mandate to mitigate environment and social issues arising from their sectoral development activities; (iii) provincial and district entities that have devolved responsibility for urban environmental management at the local level; and (iv) mass organizations which support the government in promoting participation and awareness.

3.4.1 Relevant organizations at national level

According to the Decree to implement the Water and Water Resources Law, different Ministries share responsibilities in managing environmental sanitation services:

- **The Ministry of Public Works and Transport (MPWT)** is responsible for the management of road projects, transport, housing and urban planning. It also oversees urban wastewater treatment, urban water supply and sanitation, riverbank erosion control, and construction. It is also is responsible for determining quality standards for water, and treatment methods for wastewater from urban areas that discharge into rivers.
- **The Department of Housing and Urban Planning (DHUP),** under MPT, is the main responsible authority on national level for the development of urban development policies, regulations and plans for water supply and drainage, solid waste and sewerage in urban areas. DHUP is also the controlling authority for approval of building works. DHUP issues building permits.
- **WASA (the Water Supply Authority)** is responsible for making sure that the water supply companies under its regulatory remit give their customers a good quality, efficient service at a fair price. WASA is a government organisation, setup in 1999, within the Department of Housing and Urban Planning (DHUP) of the Ministry of Public Works and Transport (MPT).
- **The Public Works and Transportation Institute (PTI)**, under MPT, assists the Minister in terms of developing urban planning methodologies. Besides, PTI supports MPT, DHUP and WASA in developing urban development plans around the country. PTI also provides training for governmental officials in the field of urban planning and environmental management.
- **The Science, Technology and Environmental Agency (STEA)** is the principal government agency for formulating and guiding environmental policy in the country. STEA is also responsible for the monitoring of wastewater in Vientiane (through its Water Quality Laboratory). Besides monitoring of the water quality in drainage systems of the Vientiane Municipality, the laboratory also serves for domestic wastewater quality testing.
- **The Ministry of Public Health** (MoPH) is responsible for the direction of all rural water supply, and urban and rural environmental hygiene activities. Besides, MoPH is responsible for determining water quality standards for dinking water and wastewater, in-

cluding methods of treatment of wastewater, related to health activities. MoPH also establishes standards for sanitary facilities in and around buildings.

- **The Ministry of Agriculture and Forestry** is responsible for determining water quality standards and treatment methods for agriculture and its wastewater.
- **The Ministry of Industry and Handicraft** is responsible for determining water quality standards and treatment methods for industry and its wastewater discharges.

3.4.2 Relevant stakeholders in Vientiane

- **The Vientiane Urban Development Administrative Agency (VUDAA)** is responsible for the planning, implementation, management and control of basic urban infrastructure such as roads, drainage, solid waste collection and disposal, sanitation in Vientiane. VUDAA, administered under the Governor of Vientiane and has been granted judicial status and is entitled to collect fees for the use of urban services and infrastructure.
- **The Urban Cleansing Service Center (UCSC)** was established under VUDAA administration to collect, transport, and dispose of SWM in Vientiane.
- **Nam Papa Nakhorn Luang** is the water supply provider in the project area.

Besides, there are numerous authorities on district level which have a stake in environmental sanitation service provision, such as the district level DCTPC, UDAA and planning office, the Department of Public Health etc.

3.4.3 Private sector

The private sector is being promoted in Laos as an important driving force of socio-economic development. The state encourages all economic sectors to compete and cooperate with one another in expanding their production and business activities. The private sector is strongly involved in construction, transportation, service provision. Up to now, the involvement of the private sector in environmental sanitation services has been rather limited to solid waste collection, emptying pit/septic tank etc. As a result, the government is currently developing an appropriate policy and a regulatory framework to strengthen private sector involvement in UESS provision.

3.4.4 Mass Organizations and Civil Societies

Mass Organizations and Civil Societies in Lao PDR are actively involved in participatory planning and awareness raising activities to advance the government's development agenda at the grass-roots level. Their role in environmental protection is just beginning to take shape, as are government practices for engaging civil society in development plans. Chief among the mass organizations are the Lao Trade Union Federation (LTUF), Lao Women's Union (LWU), and the Lao Youth Organization (LYO). The Lao Front for National Reconstruction (LFNR) is a Civil Society; it includes senior citizens, veterans, and ethnic groups, defending their interests and also participates in environmental protection activities (World Bank, 2006).

3.5 Required skills

3.5.1 Capacities of the authorities

A study conducted in 2003 by the Environmental Research Institute (ERI) revealed that underdeveloped staff capabilities, both in terms of quality and quantity, are a major constraint in the promotion of sustainable environmental management (World Bank, 2006). Capacities are mainly lacking on provincial and district level, whose authorities were given high responsibilities in the framework of the decentralization process. The Government is working with several donors to strengthen capacity of staff through both management and on-the-job training.

3.5.2 Hygiene and environment awareness

In 2004, STEA released the "*National Strategy on Environmental Education and Action Plan for 2006-2010*" (the EEA strategy). Raising awareness has become an important activity of the Government. Provincial Science, Technology & Environment Offices (PSTEO), in cooperation with NGOs and Mass Organizations like the LWU and LYU, are implementing specific programs to increase public awareness across the entire country on issues like health, environmental education, and poverty reduction. In addition, environmental education is being disseminated through the mass media such as newspapers, radio and TV and through local language publications.

Manuals, course books, posters and other education material was prepared for environmental education at the primary and secondary school levels, but these materials have not been yet fully introduced in the curricula.

The country's first undergraduate degree program in environmental management commenced in 2004 at the National University of Lao PDR (NUoL).

4 Site Validation

4.1 Historical background

Hatsady was established more than 50 years ago. According to local community reports, it used to be a wetland area and as Vientiane grew and its population increased, the wetlands were filled and populated. First group of settlers (4 families) migrated from Vientiane School Area, and after that more and more people from the peri-urban areas of Vientiane and from other provinces moved to this area. Nowadays the area is very congested and densely populated, and the commercial areas are steadily increasing. Some parts of the village used to be a commercial area called "morning market", until it moved to the present area of the morning market, outside Hatsady.

Hatsady is located in center of the town, in the business area of Vientiane. Given the big size of the village in comparison with other villages in Vientiane, Hatsady was divided into two villages in 1988, Hatsady Tai and Hatsady Neua.

4.2 Site justification and location

The project area includes the 5 low-income and less developed units of Hatsady Tai village. Hatsady Tai is located in the centre of Vientiane municipality, in Changthaboury district, and has common borders with Ban Hatsady Neua in the North, Ban Nahaidieuo in the East, Ban Nongchan (Morning Market) in the South, and Ban Sisaketh in the West.

The main reasons for the selection the project area include:

- Current urban environmental sanitation services (UESS) are inadequate, leading to environmental degradation of the neighbourhood and deterioration of the living conditions.
- The area is a low- to middle income area.
- Improvement of UESS in Hatsady Tai is perceived as a priority issue by the local authorities.
- The local authorities as well as the low-income community expressed their willingness to actively participate in the development of UES plans.
- City authorities and the responsible ministries expressed their support to the project and the project site selection.
- The project area is located in the centre of Vientiane and has the potential to become a demonstration site in case of project success.

5 Process and Methodology

5.1 Data collection methodology

Data related to environmental sanitation services in Hatsady Tai was collected based on three methodologies: (1) Interviews with households, the village administration and key organizations involved in UESS (both government and private sector); and (2) a topographic survey to assess the physical characteristics of the project area (exact location and type of houses, drainage channels, toilets; elevation, etc), and (3) focus group discussions with the community.

The topography survey was conducted by Mr. Phouvong, an instructor of the Communication and Training Center (CTC) Three maps were produced, using satellite images as baseline data. More detailed data (exact elevation, position of houses and environmental sanitation infrastructure) were collected using conventional surveying tools. The maps include information such as project boundary; location, type and size of all buildings; location of toilets; access roads; trees; location and type of drainage; and elevation.

Interviews were conducted with households, local authorities and relevant governmental and non-governmental institutions based on pre-defined questionnaires. In total, 48 households (out of total 84), two representatives of the village authorities and nine institutions were interviewed (see Annex 1: List of institutions interviewed). Information collected includes both quantitative and qualitative data. The household survey focused on the status of environmental sanitation services (ESS) in the project area, the level of satisfaction of the population with the current ESS, and the willingness of the population to contribute and participate in the improvement of these services. Interviews with sector specialists aimed at assessing the current policies and practices related to UESS in Lao PDR and more specifically in Vientiane, including institutional setup of UESS provision, tariff structures, legislation etc. The questionnaires are presented in annex 5 to 7.

Focus group discussions were conducted in the launching phase of the project. The aim of the discussions was to rapidly assess environmental sanitation services in the project area, to define the UESS that should be prioritized, and to assess the level of knowledge of the community related to the current practices and resulting problems.

6 Baseline conditions

6.1 Socio-economic data

Hatsady Tai homes 889 people with different social, ethnical, educational and religious background. The village is sub-divided in 14 units and counts 180 households. Besides households, there are 2 hotels, one public bank and several small businesses such as restaurants and shops. The population of the project area is about 275 people (125 female) in 72 households. Out of which 48 households were interviewed during the data collection period. The socio-economic data resulted from data collection are presented in the table below:

Table 6: Demographic and socio-economic data related to project area

Number of households	72
Total population	275 (125 female, 150 male)
Household size	Less than 3 persons: 4 HHs (8.3 %) 3–4 persons: 23 HHs (47.9 %) More than 4 persons: 21 (43.8%)
Nationalities	Laotian (833), Vietnamese (36), Chinese (8), Thai (2), French (9), Indian (1)
Household head	9 (18%) women, 39 (82%) men
Level of education of household head	No education: 5 (10.4%); (male: 3, female: 2) Primary school: 17 (35.4%); (male: 12, female: 5 Secondary school: 20 (41.7%); (male: 18, female: 2) Higher education: 6 (12.5%); (male: 6, female: 0)
Age of household head	younger than 20 years: 0% 20–45 years: 14 (29.2 %) Older than 45 years: 34 (70.8%)
Average household income	Less than 100,000 kip/month: 2 % 100.000–500,000 kip/month: 39.58 % More than 500.000 kip/month: 58.32 %

The average number of people per household is 4.9. One third of the household heads are in the working age range of 20–45 years. People in Hatsady Tai village gain income from a variety of sources. The average income varies between 100,000 to 4,250,000 kip per household and month. Middle-income as well as low-income households are present in the village. Most low-income households are located in the project area (units 9 to 14).

6.2 Political situation

Ban (village) is the lowest level in the Lao administrative system. Ban Hatsady Tai is lead by the village chief (Naiban, Mr. Souvannalath Sayavong). The Lao Revolution Party (LRP) plays an important role in the definition of future developments of the village. Many activities in the village are coordinated and supported by village branches of mass organizations including the elderly association (LEA), the youth organisation (LYO), and the women union (LWU). Different committees under the village head are responsible for aspects related to security (FDCC and DCC), socio-economic development (CTPC and DFU) and socio-cultural development (see Figure 1).

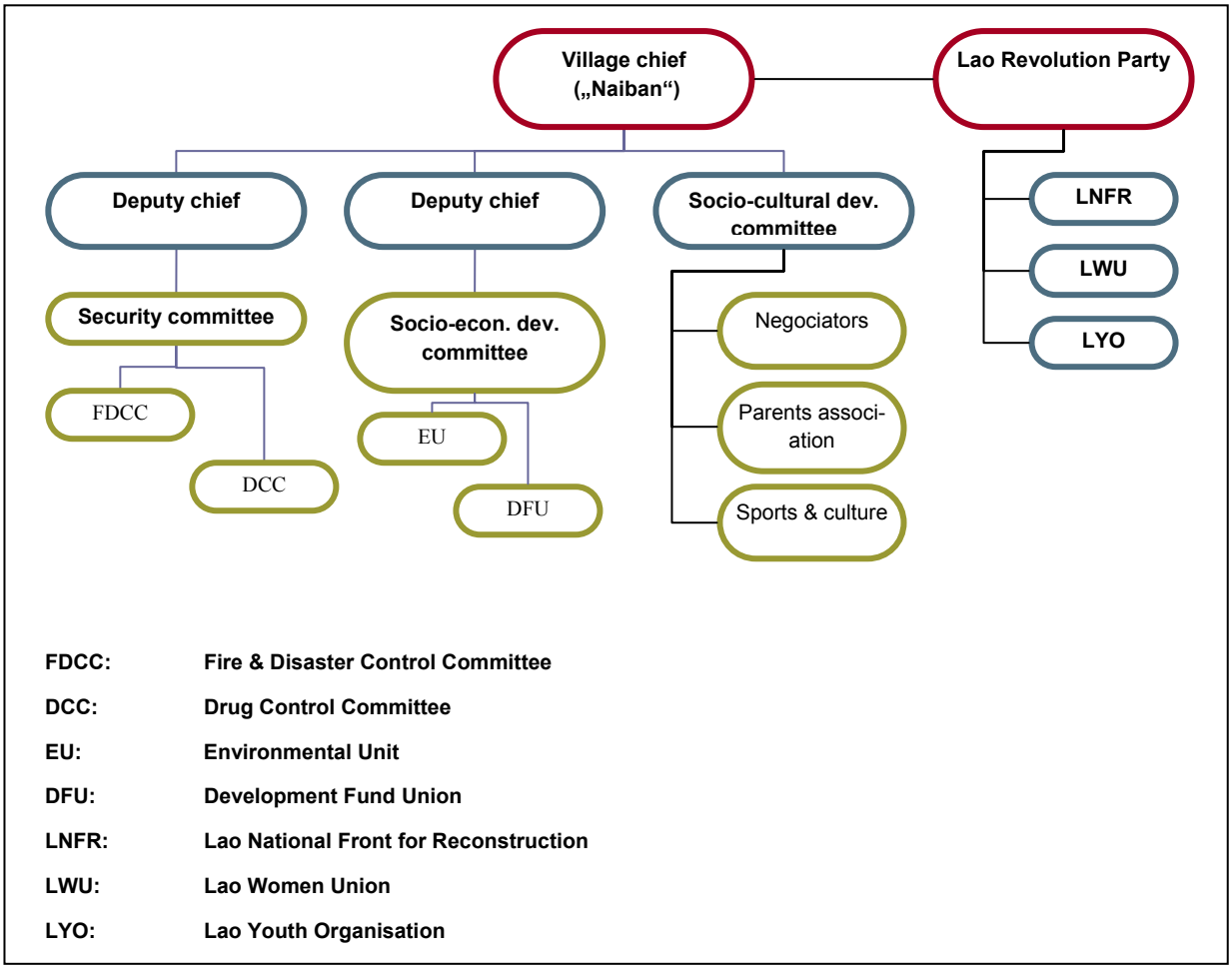

Figure 1: Organisational chart of Ban Hatsady Tai

Since there is no temple in the village where village meetings are traditionally held in Lao PDR, the meetings are held in the village administration hall. Attendance of the community in village meetings is strongly dependent on the issues discussed, but is generally low. The low-income community is usually well represented since the meetings often tackle issues that directly affect their livelihood.

6.3 Health and hygiene situation

Hatsady Tai is located in the center of Vientiane Capital; the population density is very high, especially in the low-income core of the village (project area). Public health is seriously at stake, given the inadequate level of environmental sanitation services: Wastewater is ponding in the village's open drainage system, solid waste is dumped in these drainages favoring blockages and local floods, there is a constant smell of waste etc. The household survey revealed that the units 9, 10, 13 and 14 of Ban Hatsady Tai are regularly flooded in the rainy season, with water levels of 20 cm.

While the health department of Vientiane Capital organized awareness campaigns in the village on bird flue, dengue fever and other diseases, the inadequacy of the current UESS indicates a lack of awareness on environmental sanitation and its impact on public health. According to the health department of Vientiane Capital, the prevalence of water-borne diseases in Hatsady Tai is high, with 14.5% of the population suffering from diarrhea in 2007. Health statistics are difficult to get for Ban Hatsady Tai, but it must be assumed that it is similar to the rest of the country; According to World Bank (2005), throughout Lao PDR there is a high incidence of gastrointestinal diseases, such as diarrhea and dysentery, caused by inadequate water supply, poor sanitation and sewerage, and poor hygiene.

Photo 1: Current hygienic conditions in Ban Hatsady Tai

6.4 Land ownership – tenure status

Until the end of the last decade, the State was the owner of all land on behalf of the Lao people. It granted legal ownership of use rights to individual households. Lack of access to land and housing is a critical issue among the poor in most cities and to completely resolve the problems of this group of people is far beyond the financial ability of the government. A critical issue that has caused an environmental degradation and social problems is the uncontrolled urban development whereby the non-poor infringe upon the marginal areas where the urban poor live (UN-HABITAT, 2001). In 2001, women ranked insecurity of tenure as the second priority problem after flooding. According to that study, lack of formal land rights make people reluctant to invest in their houses and services (UN-HABITAT, 2001).

Since 2000, the Government has the strategy to move toward the implementation of a land registration system and the issue of titles to all landholders. In 2006, more than 200,000 families had titles to their land, as the result of Lao PDR's Land Titling Project, supported by Australia, Germany and the World Bank (World Bank, 2007). It is expected that by the end of the Land Titling Project (2009), 600,000 families will have titles to their land.

In Ban Hatsady Tai, the situation of the land owner is slightly different. The land belongs merely to the Government, as the area used to be a natural drainage and wetland system (Hongthong drainage area) before it was illegally settled. The total land of the project area is 14,450 m^2. 37.5% belongs to the Government of Laos, 62.5% is privately owned.

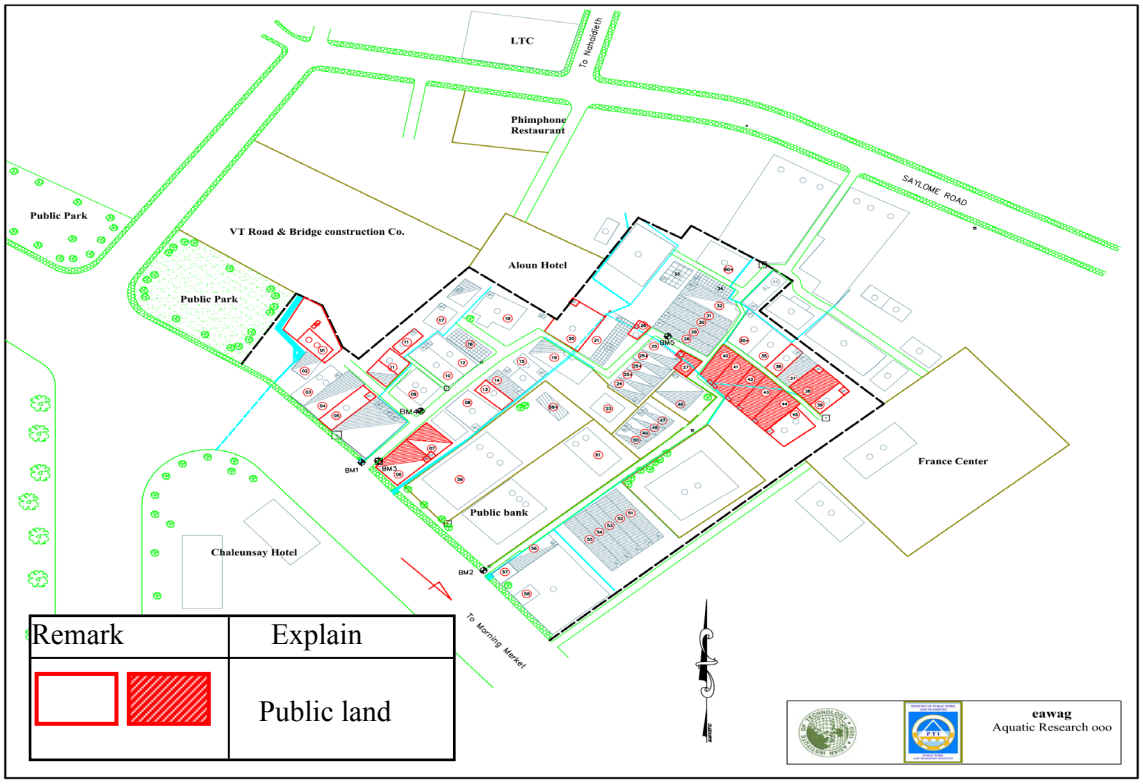

Figure 2: Location of public land in the project area

6.5 Housing situation

Ban Hatsady Tai counts 85 buildings. 72 buildings belong to the project area. While buildings adjacent to the main road are permanent, multi-storey buildings of good quality (brick and reinforced concrete), the buildings in the low-income core area of the village are non permanent buildings made out of wood and bricks, with galvanized iron roofs. Based on the survey the housing types can be summarized as follows:

Table 7: Type of houses in the project area, calculated based on responses from household interviews

		Frequency	Percent
Number of floors	*One storey buildings*	26	54.2 %
	Two storey buildings	21	43.8 %
	Three storey buildings	1	2.1 %
Building material	*Wood*	23	32 %
	Bricks	28	39 %
	Bricks and wood	20	28 %
	Galvanized iron walls	1	1 %
Roof material	Galvanized iron	41	(85.4%)
	Tiles	7	(14.6%)

Buildings in the project area belong mainly to the residing households (85.3%) and the government (4%). The number of renters is small (6.4%). Few buildings belong to private enterprises (4.3%) such as a bank or restaurants. Few households (4.3%) leave in the house of their relatives.

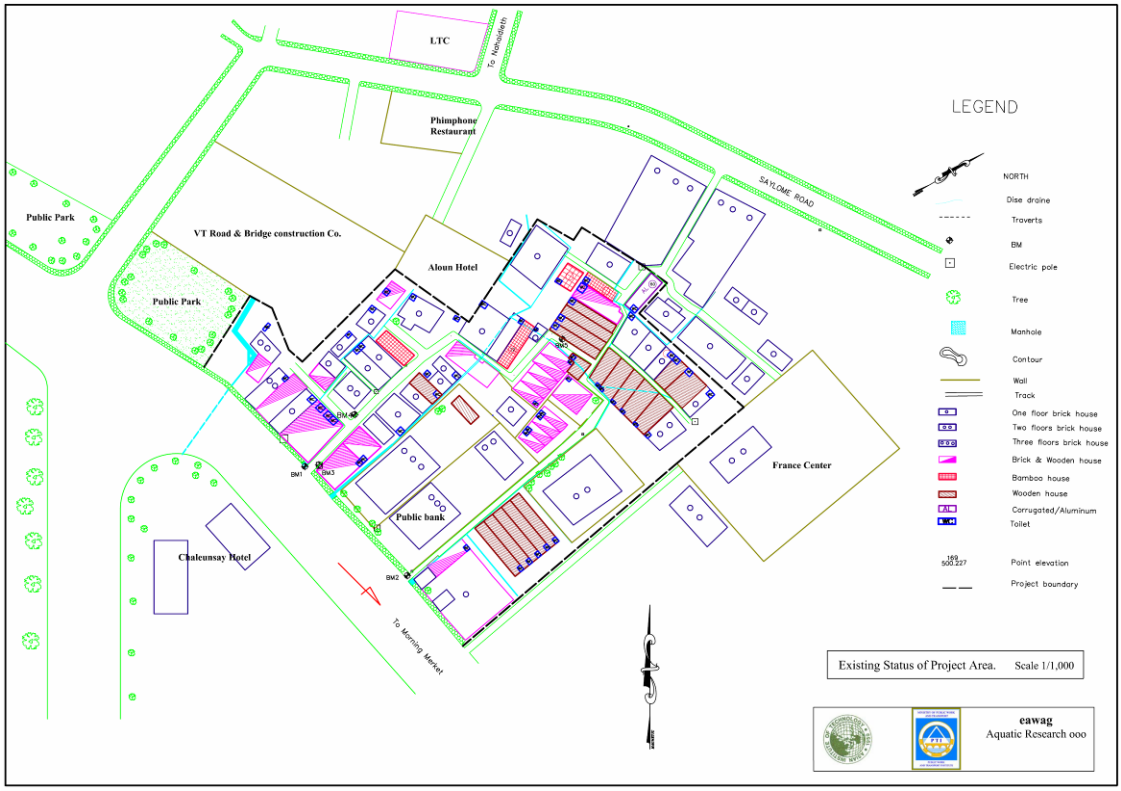

Figure 3: Map of the project area, with building types and height, toilet location

Access to the buildings is only possible on narrow, unpaved paths. Access with cars is not possible given the narrow pathways.

6.6 Physical geography, topography, climate

Hatsady Tai village was built on a former wetland system. The wetlands were filled up. The project area is flat, with an average elevation of still 20–30cm below the level of the main road system adjacent to the project area. The groundwater level is very high, averaging 0.5-1.0m during the dry season. The groundwater level can reach the surface during the rainy season. The quality of the groundwater is however poor due to ground water contamination (UN-HABITAT 2001).

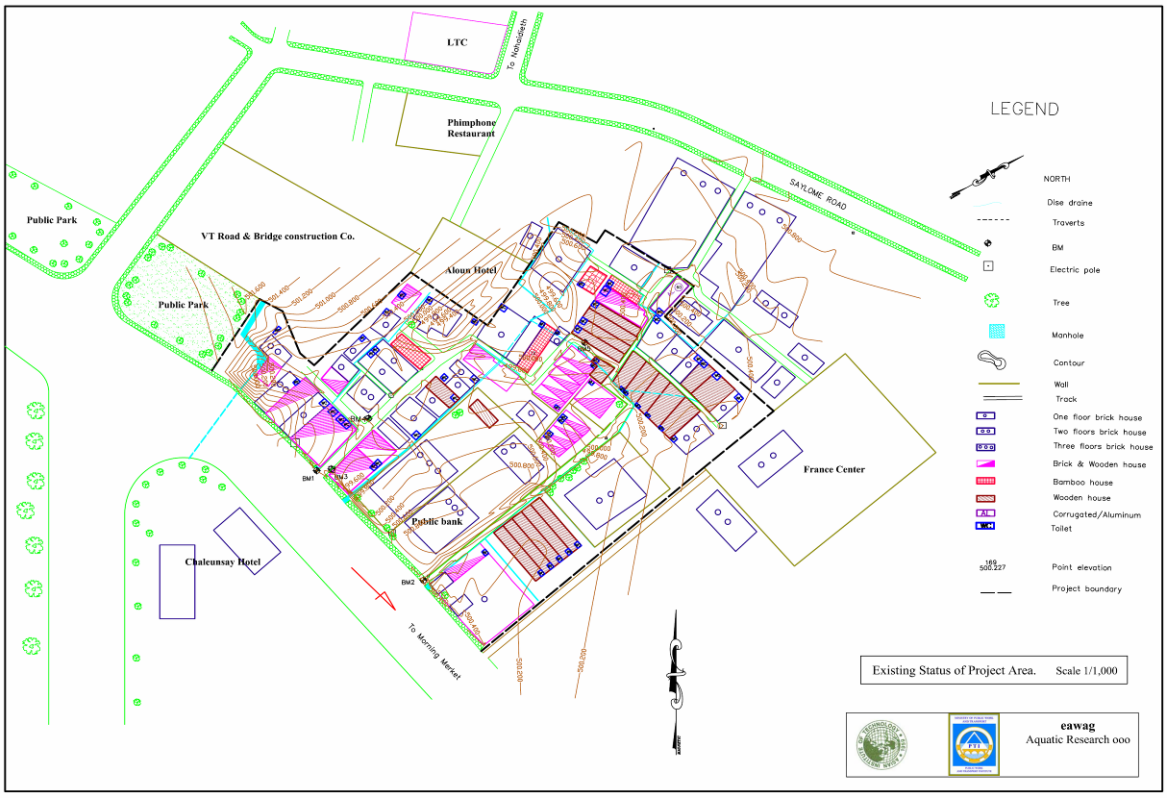

Figure 4: Topographic Map of the project area

Due to the low absorption capacity of the soil and the high ground water table in Vientiane, many soak ways fail to operate effectively, causing discharge of sewage from pits and tanks into road side drains, drainage channels and low-lying areas (UN-HABITAT 2001).

The frequent flooding in the Hatsady Tai has contributed to the poor state of repair of the roads which also suffer from a lack of regular and adequate maintenance. Roads comprise earth or gravel surfaced secondary and tertiary roads, which are in poor conditions.

Lao has two distinct seasons: a dry season and a wet season. The dry season lasts from November to April, and the wet season from May to October. The temperature in Vientiane ranges between 12 ^{0}C (December/January) to 38 ^{0}C (March to May). The relative humidity is generally 75–80% during the rainy season and 65–70% during the dry season. The average annual rainfall is around 1,600 mm in Vientiane, of which about 85% occurs during May to September.

7 Environmental Sanitation

7.1 Water supply

The situation with respect to water supply is generally good. Vientiane draws its water from two intakes on the Mekong River both upstream and downstream of Vientiane. It is treated before distribution. Within the urban districts of the Vientiane Prefecture, 81.2 per cent of the urban households had access to potable water in 1998 (UN-HABITAT 2001). In Hatsady Tai, water is supplied by Nam Papa Lao, a state-owned enterprise. The average per capita consumption in Hatsady Tai was estimated at 80–120 liters per day. The quality and reliability of the supply is perceived rather good by most households, although some people interviewed reported periodic water shortages. Piped water is available continuously over the full 24 hours, but water pressure can be low during periods of peak demand, especially in the 2–3 storey buildings. The piped water is generally not used as drinking water source; most families buy bottled water for drinking purposes.

Households are connected to water meters and pay a monthly charge of about 2 – 3 US$/month to VCC Water Supply Authority. 81% of the households have their own water meter; 9% are connected to the water supply or their neighbour. The water prize is considered reasonable by the households.

Table 8: Level of water supply and household perceptions on quality of water supply service (resulting from focus group discussion and household interviews)

Average water consumption	80–120 L/p/d
Water bill	2-3 USD per household and month, based on water meters
Water supplier	Nam Papa Nakhorn Luang
Contact person in the village in case of problems	Village Chief (Naiban)
Level of satisfaction with the service	Highly satisfied: 0 Satisfied: 39 (81.3%) Neutral: 5 (10.4 %) Not satisfied: 1 (8.3 %) Not satisfied at all: 0
Perception on costs of service	Too high and unaffordable: 0 High but affordable: 14 (29.2%) Adequate and affordable: 34 (70.8%) Too low and affordable: 0
Problem statement (3) by residents	The pressure in the water pipes is very low. The water supply network is not complete and not properly constructed (incrementally, informally built) The water quality is not high enough (no drinking quality)

7.2 Sanitation facilities, wastewater management

Most buildings in the project area have on-site wastewater disposal or pretreatment facilities such as soak pits and septic tanks, but the facilities are often poorly designed, constructed and maintained and therefore perform poorly. The problems with the present system of on-site sanitation is exacerbated by a flat terrain, high water table and low soil permeability, resulting in a failure of the systems, overflow of effluent and pollution of surface waters and drains. It is common practice to dispose greywater to surface drains and drainage channels. As a result, the storm water drainage system is contaminated by wastewater that ends up in the wetlands and marches contributing to environmental degradation.

Almost 94% of the households in Hatsady Tai have a private toilet. Since there is no public toilet in the village, the remaining households use the toilets of their neighbours. The sanitation systems applied are the pour flush squatting system with soak pit (90%) or septic tank (10%).

Photo 2: Pour flush squatting latrines with soak pits in Hatsady Tai

There is no sewer system in the project area. Septic tank effluent and other wastewater sources such as greywater are discharged into the drainage system. Some households (10%) discharge their greywater into their soak pits, others (15%) on open ground.

Women are often responsible for the in-house maintenance of the toilet facilities. Septic tank and soak pit emptying is a problem for almost 50% of the village (mainly in the low-income core), since vacuum trucks can not access the pits. In these cases households empty their pits manually by making a hole in the pit and draining it to the stormwater drainage. This leads to pollution and odour problems, a problem often mentioned by the residents.

While Vientiane has a sewerage system, there is currently no functioning waste treatment facility near the urban area. Sewage is either hauled to a waste treatment plant 17 km outside of the city limits or, more commonly, discharged into natural water bodies, either as raw wastes or as seepage from septic tanks. A considerable quantity of household waste and sewage is discharged into Nong Chang, and then flows into That Luang Marsh before entering the Mekong.

Storm water from the urban area also drains into That Luang Marsh, making it the basis for flood control in the municipality.

The level of satisfaction with the current sanitation and wastewater management system is relatively low, and people wish to improve the system. The fact that most households perceive the septic tank technology as system to install indicates a basic lack of knowledge of technical alternatives.

Table 9: Sanitation and wastewater management in Hatsady Tai

Type of sanitation facilities	Flush toilets: 7 (14.5%) Pour-flush squatting pan 40 (83%) No toilet facilities: 1 (2.1 %)
Sanitation coverage	Households with private toilets: 93.8% Households without private toilets: 6.2%
Quality of toilet estimated by respondents	Very good:7 (14.6%) Good: 17 (35.4%) Normal: 18 (37.5%) Poor: 5 (10.4%) Very poor/No toilet: 1 (2.1%)
On-site storage & treatment	Soak pits: 89.4% Septic tank: 10.6%
Anal cleansing material	Water: 83.3% Paper: 16.7%
Sludge emptying	Contact vacuum truck: 52.2% Manual discharge (nearby): 36.2% Opening new pit: 2.1% Emptying not required yet: 10%
Greywater management	Discharge to drainage system: 75% Discharge to soak pit: 10.4% Discharge on open ground: 14.6%
Responsibility for maintenance of sanitation facility (cleaning)	Every member contributes: 48.9% Mother (female head): 27.7% Father (male head): 6.4% Children: 10.6% (girls: 8.5%, boys: 2.1%) External (hired): 4.3% never cleaned: 2.1%
Costs for pit or septic tank desludging	About 15 -20 US$ per time, to private service provider.

Table 10: Household perceptions on sanitation facilities and wastewater management (based on focus group discussion and household interviews)

Level of satisfaction with toilet facilities	Highly satisfied: 6 (13%) Satisfied: 23 (48%) Moderate: 8 (17%) Not satisfied: 10 (21%) Not satisfied at all: 1 (2%)
Intention to improve toilet facilities	Plans to improve: 29.2% Basic intention to improve: 33.3% No intention to improve: 37.5%
Preferred system (private/public)	Private sanitation facilities: 97.9 % Public sanitation facilities: 2.1 %
Wished on-site system:	Septic tank: 86.7% Soak pit: 13.3% Other: 0%
Level of satisfaction on current waste-water management system	Highly satisfied: 14.6% Satisfied: 20.8% Not satisfied: 60.4% Not satisfied at all: 4.2%
Problem statement (3) by residents	Latrines are not properly built and maintained. There is no access for vacuum trucks. Latrines are thus often overflowing. There is no sewer for the removal of household wastewater.

7.3 Drainage

In Hatsady Tai, there are 2 types of drainage system: (1) open earth channels is about 498 meters (83%) of the length (in poor condition), and (2) concrete channels (open and covered) is about 102 metres (17%) of the length. The total length of the drainage system is 600 meters. Some parts of the drainage run under houses and are very difficult to access.

VUDAA is basically responsible for the maintenance of the drainage network, but basic maintenance such as removal of solid waste is usually done by the community. Residents are not asked to pay any fee for the maintenance of the drainage channel, and there would not be willing to pay for drainage maintenance.

The drainage water is discharged into the primary drainage network (aside the main road, in front of village), but the drainage system in some areas of the community has no link to this drainage system, so during the rainy season the area is flooded, and during the dry season drainage water is stagnant.

Table 11: Stormwater drainage in Hatsady Tai, household perception (based on focus group discussion and household interviews)

Type of drainage network	Earth drainage (open): 448m (74.7%) Concrete drainage (open): 70m (11.7%) Concrete drainage (with cover): 32m (5.3%) Sewer: 50m (8.3%)
Perceived problems by residents:	The drainage system is in good condition: 48.9% The system is often blocked with solid waste: 23.3% Water is not flowing (stagnant): 21.3% No drainage/discharge to low-lying area: 6.4%
Level of satisfaction of residents:	Satisfied: 15 (31.3%) Neutral: 15 (31.1%) Not satisfied: 18 (37.6%)
Problem statement (3) by residents	- No drainage for wastewater and rain water (only natural drainage), causing flood problem when there is hard raining - Overflow of sludge from full latrines into drainage system - Stagnant water in the village

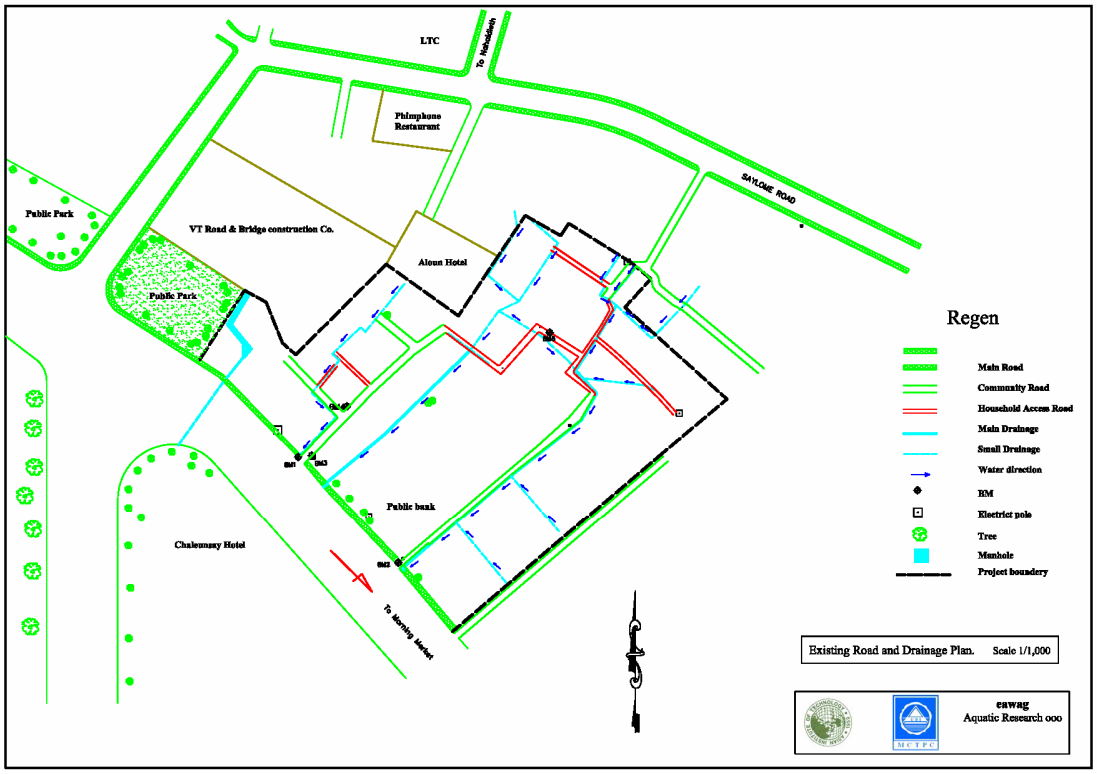

Figure 5: Existing drainage system in the project area

7.4 Solid waste management

Approximately 80% of the households in the project area are served with solid waste collection service. Since waste collection vehicles cannot access the centre of the village, waste is either disposed in front of the house or brought by the households to collection points close to the main road, where it is collected by the waste collectors. Households carry their garbage to the subsection point next to the Public Bank, or people take their garbage to a collection point on the day of appointment. This system is quite good in the study area because each family keeps their garbage at their house until collection time to collect, so they voluntarily take care of the garbage to reduce bad smells from it.

Currently, UCSC, the Lao Garbage Company, and Chanthabouly Cleansing Pvt. Company are jointly handling city waste in Vientiane. The charge for waste collection from households ranges from 10,000 to 20,000 kip (US$1–2) /month depending on the frequency of collection. In Hatsady Tai, solid waste is collected twice to three times a week. The municipal administration (VUDAA) dictates collection frequency and charges to households and commercial institutions. About half of the solid waste generated in Vientiane is now collected and disposed of at the sanitary land fill facility located 18 kilometers from the city centre.

Waste dumping and burning within the community boundaries is still a common practice, indicating a limited awareness on solid waste management and the risks caused by open fires. Lots of waste ends up in the drainage network, under buildings and on open ground. This contributes to drainage blockages, local flooding, odor problems and esthetic nuisance. Waste burning can be observed regularly.

A small number of interviewees (39.6 %) reported to separate and recycle their waste. Most recycled waste is sold (84%). The KM 7 Waste Buying Company (supported by a Thai Company) and the Lao Chareon Recycling Center, both private enterprises, are major centers that successfully collect recyclables. They buy recyclables from waste pickers, from school waste banks, from other similar groups, and from individuals and sell their materials in Vientiane. The recyclables ultimately go to Thailand and Vietnam.

The average daily waste production is 0.75–1.00 kg per capita, which is in the typical range of Vientiane Capital City (World Bank, 2006). Solid waste in Vientiane consists mainly of organic material (approx. 30%), plastic (30%), paper (15%), glass, cans and other metals (25%).

Residents in Hatsady Tai village are to a large extent not satisfied with the current solid waste management system. The main reasons mentioned include: (a) lack of central waste collection and storage points, (b) deterioration of living conditions due to littering, (c) lack of awareness of some community members on solid waste management.

Table 12: Solid waste management in Hatsady Tai, perceptions of the residents (based on focus group discussion and household interviews)

Waste generation rate	< 3kg per hh per day: 20.8%
	3–5 kg per hh per day: 35.4%
	5–10 kg per hh per day: 41.7%
	> 10 kg per hh per day: 2.1%
Waste collection & disposal	Collected by company (which one?): 81.3%
	Disposal, burning within community: 8.7%
Recycled waste	sold to recycling company: 84.2%
	kept for future use: 10.5%
	directly reused: 5.3%
Level of satisfaction of residents	Very satisfied: 2.1%
	Satisfied: 27.1%
	Not satisfied: 70.8%
Waste collection fee	18,000–25,000 kip per hh per month
Satisfaction with tariff	The waste collection fees are perceived as fair to high.
Problem statement (4) by residents	There is no public bin or collection point for solid waste
	Solid waste is disposed of on the streets and into the drainage system
	Solid waste is flying around
	Some community members are not aware how to collect and manage solid waste

When asked on possible interventions to improve the solid waste management system in Hatsady Tai, the interviewees supported the following interventions (most frequent answers at the top):

- Increase awareness on improved waste management (especially reduction of water quantities);
- Encourage waste separation and recycling at household level
- Increase knowledge on waste re-use and recycling
- Provide training on how to make fertilizer from waste (i.e. composting)
- Increase the waste collection frequency

7.5 Priority issues related to UESS

In a community meeting, the residents were asked to prioritize the urban environmental sanitation services according to the level of importance of the service, and the need to increase the level of service.

Table 13: Level of satisfaction with current UESS services

	Importance of UESS	**Level of satisfaction**
Water supply	4th priority	Moderately satisfied with services and infrastructure (+)
Drainage	1st priority	No satisfied with services and infrastructure (-/-)
Sanitation	2nd priority	No satisfied with services and infrastructure (-/-)
Solid waste	3rd priority	No satisfied with services and infrastructure(-)

While most participants are rather satisfied with the level of water supply (rated +), there is a big dissatisfaction with the drainage system and the sanitation situation (rated -/-). These results were confirmed in the households' interviews: Improvements of the liquid waste management (drainage, wastewater management) was prioritized by 87% of the households.

These results were confirmed in the Step 4 workshop (outcome of the pocket voting exercise).

More than 50% of the workshop participants defined drainage as the priority issue related to UESS in Hatsady Tai (see Figure 6). Solid waste management and sanitation are rated in a similar way, with slight prioritization of solid waste management by the male voters. Water supply is clearly defined as least pressing issue in the village, with approximately 80% of both women and men defining it as 4th priority.

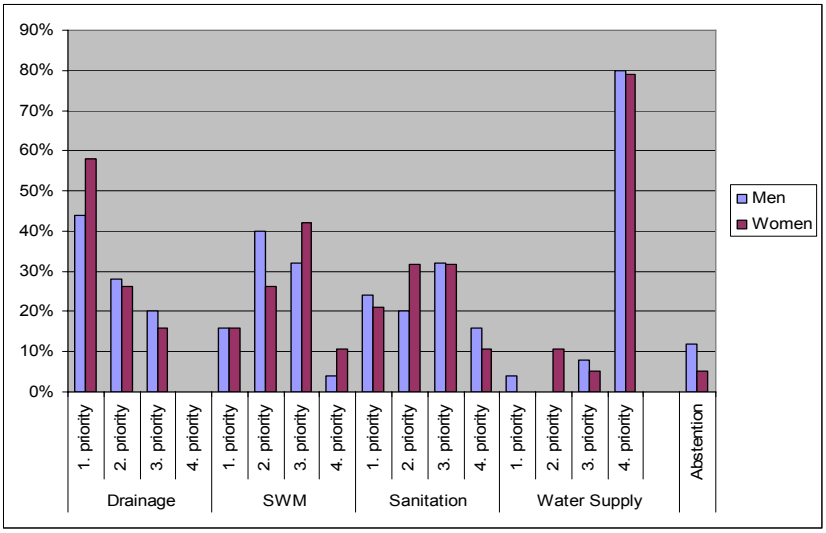

Figure 6: Priorities set by the community related to urban environmental sanitation services in Hatsady Tai; result of the pocket voting exercise.

The main reasons mentioned include:

- Poor infrastructure
- Lack of sound planning (responsibilities not clearly defined, lack of maintenance etc.)
- Many community members are not aware of the need to properly manage UESS or don't know how to do it.
- Lack of community involvement and participation in the management of UESS.

7.6 Willingness of community to participate in and contribute to improvement of UESS

The involvement of the community in the management of urban environmental sanitation services is still limited, and strongly informal. While households are asked to pay for water supply, solid waste collection and sludge emptying, there is no financial contribution to wastewater management and stormwater drainage. There is no organized action for the cleaning of the village, and most households tend to clean their house and its surrounding only.

At several occasions, the community members expressed their basic willingness to actively participate in the planning and implementation of plans to improve the urban environmental sanitation in Hatsady Tai. A series of questions were asked to the households in order to evaluate more specifically what kind of contribution would be acceptable at this stage of the project and the current level of knowledge/awareness.

The results of the household interviews indicate a basic willingness to participate, although with some limitations:

- 89.6% of the interviewed households expressed their willingness to financially contribute to the project.

- 70% of the households willing to financially contribute to prioritize a one-time financial contribution at the beginning of the project for the implementation of infrastructure (contribution to construction costs). 33% would be willing to pay a monthly fee to finance construction. 6% only are willing to pay a maintenance tax.

- 50% of the households are willing to contribute an initial amount of 100,000 Lak for the construction of UES infrastructure. 25% are willing to contribute 300,000–50,000 Lak.

- A monthly UESS fee of 3,000-5,000 Lak is perceived as acceptable by two third of the interviewees. 25% of the households are not willing to pay more than 2,000 Lak per month for UESS.

- Only 15% of the households questioned would consider borrowing money to finance their environmental sanitation improvements.

- All households express their willingness to actively participate in the implementation and the management of improved UESS, with the highest willingness (66%) to provide labor during the construction phase.

These results were confirmed in the Step 4 workshop (outcome of pocket voting). While the absolute number of voters is confusing (several cards were put in the same pocket by men), the vote reveals that both men and women are basically willing to contribute to the project. It is interesting to note that people are more willing to contribute in kind than in manpower. The relatively low level of willingness of women to contribute to O&M is not fully understood, but is an indication that awareness on the importance of O&M for the sustainable management of UESS has to be built up.

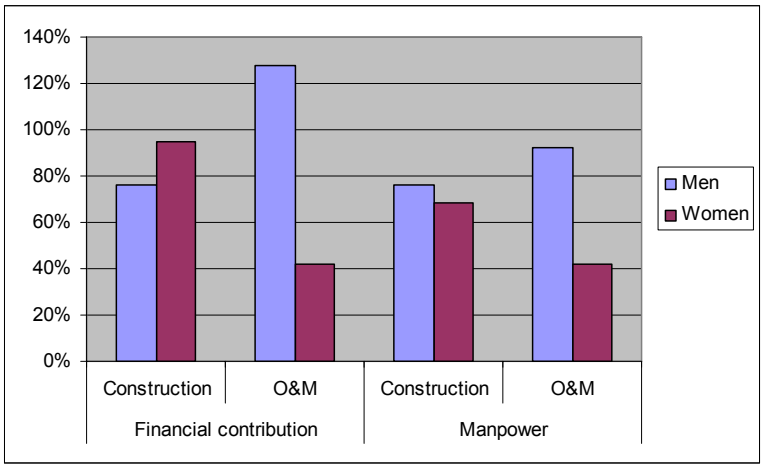

Figure 7: Willingness of the community to contribute to the HCES project (financially or manpower); result of the pocket voting exercise.

These results look promising, but according to Mr. Souvannalath Sayavong (Nai Ban), active participation of people in the community still has to be demonstrated. He believes that people still lack awareness for environment management and lack willingness to participate and cooperate in maintenance, cleaning and management of the village.

8 Stakeholder Analysis

Based on the launching workshop, the field assessment and interviews with national and local authorities, the following stakeholders were identified which play an important role in the project development and implementation.

8.1 Primary stakeholders

At village level:	Residents of Hatsady Tai
	Heads of Units
	Naiban (village chief)
	House owners
	Small and medium enterprises (shop and restaurant owners)
At city level	PTI (implementing agency)
	VUDAA (service provider)
	Nam Papa Nakhorn Luang (service provider)

8.2 Secondary stakeholders

At village level:	Front for National Reconstruction (LFNR)
	Women's Union in Ban HST (LWU)
	Youth Union (LYO)
	Banks and Hotels (outside project boundaries, but in Hatsady Tai)
	French Language Center
At city level	Changthabuly District Administration
	Mass organizations (LWU, LRP, LYO)
	District DCTPC, District Planning Office
	STEO-VTE
	Public Health Office
	DPI-VTE
	Land Management Authority Office VTE
	Private service providers
At national and international level	Nam Saat (National Center for Water and Sanitation)
	National University of Lao
	Department of Housing and Urban Planning

	Science Technology and Environmental Agency
	Ministry of Public Health
	Ministry of Public Works and Transportation
	Environmental Protection Fund
	Asian Institute of Technology
	Swiss Federal Institute of Aquatic Science and Technology
	Asian Development Bank
	UN-Habitat

8.3 Proposed organizational structure of the project

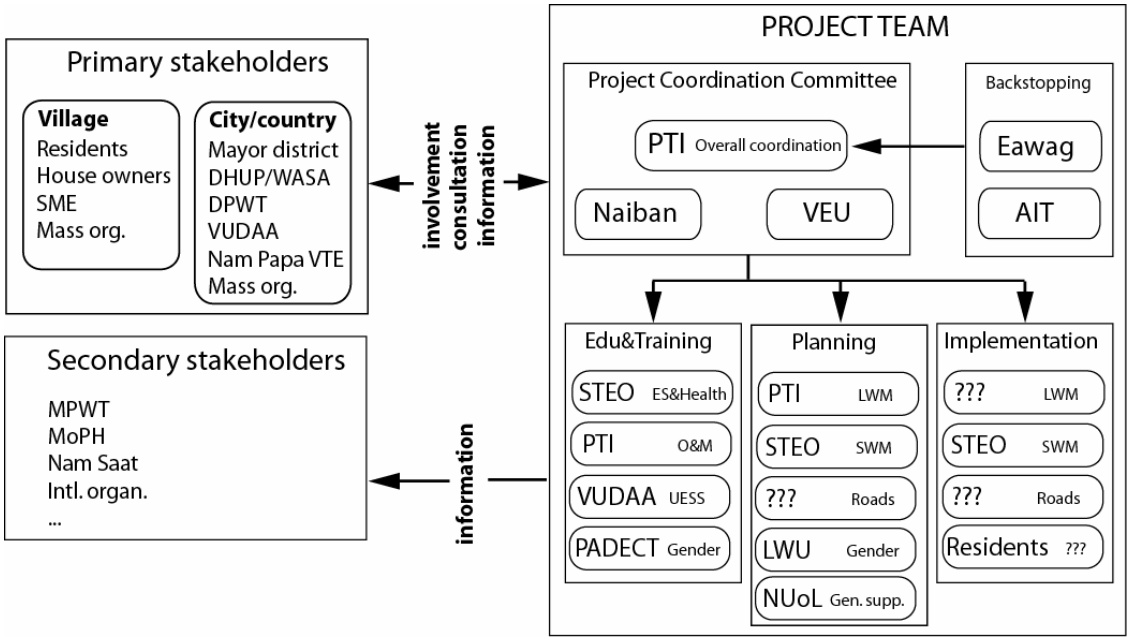

Figure 8: Proposal organisational structure of the project

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Annex 1: List of institutions interviewed

No.	Name	Organization
1	Mr. Daopheth Aloun	STEA, Vientiane CC
2	Ms. Bounyaseng Sengkhammy	Environmental Research Center STEA
3	Mr. Khaikeo Phomvilay	PADECT
4	Mr. Phetnakhorn	Environmental and Landmark improvement project
5	Mr. Sysouk Samthala	VUDAA
6	Mr. Souksakhorn Chanthaphone	Nam Saat centre
7	Mr. Khamthanh	Department of Health, VTCC
8	Mr. Phosay Panyaphone	Deputy District Major
9	Mr. Khambai Vongsayalath	Nampapa Lao

Annex 2: Questionnaire for Officers and Organizations

Name of interviewer……..…….……

Name of respondent:……..…… ; Sex: □ Male □ Female

Office:……..…; Responsibility:……..

Telephone:…… ……Date:……..… / ……..… / 2007

- **Institutional questions**

1. What institutions have the legal responsibility for managing different types of environmental sanitation systems?.....
……

2. How is this legal responsibility implemented?.....
……

3. Are there any public or private sector institutions that are responsible for different aspects of environmental sanitation
□ Yes; □ No □ No comment

3.1 If so, what is that?
□ Funding, □ Hygiene education, □ On-site inspections, □ Operation and maintenance

4. Are there administrative committees or service cooperatives within the project area composed of community representatives in the field of UESS?
□ Yes; □ No □ No comment

5. Is the private sector involved in sanitation? □ Yes; □ No □ No comment
5.1 If so, how (e.g. involved in emptying septic system, building latrines etc.)?.
……
……

6. Are there any specific skills available (e.g. construction companies, architects, social workers, financial experts) in the project area that might be interested to actively participate in the project?
……
……

- **Financial questions**

7. What financial mechanisms are available to support operation and maintenance of UESS?
……
……

8. Do local authorities have the authority to impose user fees and charges?

……

9. Are general revenues available to finance O&M?
……

10. Is there a billing and collection system for the different environmental sanitation systems in place?
……

11. Are there any services where recovery of operating expenditures is already occurring, e.g. solid waste, water supply?
……

12. What are potential sources of investment capital for UES project?
……

13. Are local commercial banks a potential source of financing?
……

14. What are the local policies regarding tariffs?
……

15. What is current spending for recurrent costs (e.g. emptying of septic tanks, solid waste collection etc.) as a percentage of income for households?

- **Legislation, national strategies and policies**

16. What are the regulations that govern sanitation (toilets, wastewater discharge, wastewater treatment)?.....
……

17. What are the regulations that govern solid waste management?
……

18. Are there any building or health codes that might influence the range of suitable UESS options?
……

19. What are national strategies and policies that might affect the project design and implementation?
……

20. Please provide any other opinion, suggestion, or recommendation that you may have to improve the sanitary condition.
……
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……
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……

Annex 3: Questionnaire for Village Authorities

Name of interviewer……..…….……

Name of respondent:…….…… ; Sex: Male Female

Village:……; Responsibility:…….……

Telephone:……..……Date:……..… /…..…/2007

I. Baseline Technical Information

1. What is the population of the village?..... Female……; Population growth rate……..
2. What is the population of the project area?..... Female…….
3. Number of Households.…….……; woman-head households…….….

4. Are there population fluctuations during the year? Yes; No
   4.1 If yes why:……
   ……

5. Is there a large population of renters? Yes; No
6. Is space available for central solid waste collection? Yes; No

7. Is space available for central wastewater collection and treatment?

   Yes; No
8. What is the predominant soil type?
   Plastic Paper Glass Other…….
9. What is the topography of the project area?.....

10. Where are the natural drainage paths?……..……

11. Are there any agricultural activities in or around the project area? Yes; No

II. Water Supply

12. How do you assess the condition of servicing water supply?

□ Very good □ Good □ Fair □ Poor □ very poor

13. How the price of water bill to pay every month?
□ Expensive □ Middle price □ Cheaper

14. Do you satisfy of the quality and quantity of water supply? □ Yes □ No
15.1 If, No, what is it? (your opinion:...……..

.....

15. Are there plans in the project area to improve water supply? □ Yes; □ No

I. Sanitation

16. What is the role of the local authority in environmental sanitation management?....
……...

17. How do you see the sanitary condition of the village?
□ Highly satisfy □ Satisfy □ Moderate □ Unsatisfied □ Highly unsatisfied

a. What is the reason for the above answer?.....
……...…

18. What would your priority if you are asked your opinion to improve the sanitary condition of your area? (Please rank your priority from 1- 5 in the boxes, 1 mean highest and 5 means lowest priority).
□ Sullage disposal □ Sewage disposal □ Solid waste disposal

□ Storm water drainage □ Water supply □ Pest control

□ Fecal sludge disposal □ Any other (specify) ……

19. Is there an existing health/hygiene promotion effort within the district/town?
□ Yes □ No
a. If so: who leads this effort: (local health promoters, NGOs…)?.....
20. Is there an existing household sanitation inspection programme? □ Yes □ No
a. If so, who is responsible?.....
21. Is there evidence of fecal contamination outside and/or inside the house?.....
22. What method you think as suitable for the sanitation improvement in your village, and Why?
□ A Central system for the whole city ……

□ A system catering the whole community ……..……...

□ A system catering a group of household ……...…….……...

□ A system catering individual households ……...……..

23. If a decentralized sanitation system is implemented in the community who would be the best for monitoring and maintenance of that system?
    □ Youth organization □ Elder organization □ Women organization

    □ Village association □ Others……

II. Drainage

24. What kind of drainage system is installed in the village?
    □ Covered; □ Opened; □ Earth; □Concrete; □ Sewer

25. Where does drainage water exit the village?.....
26. What is the present status of drainage facilities?.....
    □ Very good; □ Good; □ Moderate; □ Poor; □ Very poor

27. What are the main problems related to stormwater drainage?.....
28. How often are floods occurring in the project area?
    □ 1 to 2 timesr; □ 3-5 times; □ > 5 times
29. Where are floods occurring within the project area?.....
30. How high is the water level during flooding?.....Cm/m;
31. What are average annual damages in USD due to floods?.....USD;
32. Who covers these costs? □ Government; □ villager; □ Private; □ Other……
33. Who is responsible for maintenance of drainage?
    □ Government; □ villager; □ Private;
34. How is this maintenance work financed?.....
35. What alternative method you recommend as suitable to dispose household waste water (kitchen and bathroom)?
    □ Road drain □ Soakage pit/septic tank near each house

    □ Common septic tank for a group of household

    □ Common septic tank for the community

    □ Send by pipe to main drainage

III. Solid waste Management

36. How do you assess the condition of existing solid waste collection and disposal methods?
    a. Collection method
       □ Very good; □ Good; □ Moderate; □ Poor; □ Very poor
    b. Disposal method……

37. What method you recommend as suitable to make solid waste management more efficient?
    □ Give awareness to reduce waste

    □ Give awareness to recover for reuse/recycle

    □ Separate waste at households for easy collection

    □ Increase frequency of collection per week

□ Give training to make composted at HH level

□ Other ……

38. Are there any composting schemes in the project area? □ Yes □ No

39. Would there be enough space for a composting scheme? □ Yes □ No

IV. Environment

40. Is the existing wastewater management system contributing to the pollution of local surface waterways or underground aquifers?.....

41. Is sewage (sludge from on-site sanitation) being transported and dumped untreated into local water bodies or ontoland?.....

42. Are there other existing sources of water pollution?.....

43. Is there any local industry within/nearby the village that produces wastewater and solid waste? □ Yes □ No □ No idea

44. If so: how is wastewater and solid waste of these local industries being managed?.....

V. People's participation issue

45. What is the main reason for the existing sanitation condition of the community?
□ Lack of budgets □ Lack of planning
□ Lack of responsibility of government □ Lack of community participation
□ Lack of suitable land □ Lack of awareness
□ Other……..…….

46. Do you think people in the community adequately participate in improving the sanitary condition? □ Yes □ No □ Don't Know

47. If No; What are the barriers for the participation of people in this community for improving sanitation?……
……

48. Are there any specific skills available (e.g. construction companies, architects, social workers, financial experts) in the project area that might be interested to actively participate in the project?
……

……

VI. Cost recovery and fees

49. If the sanitary condition will be improved by cost-sharing basis do you think that people of this community can make a financial contribution?
    □ Yes □ No □ No comment
    a. If yes, what kind of financial contribution is practical?
       □ Contribution for the construction cost

       □ Contribution for the maintenance and operation cost

       □ Paying a monthly bill for each service

    b. If No, is some kind of non-financial contribution is practical?
       □ Yes □ No □ No comment

    b.1 If answer from (b) Yes, please give details what is that?

       □ Labour for construction □ Labour for operation

       □ Labour for maintenance □ Material for construction

       □ Any other……

50. Is there any micro-credit organization that might serve for sanitation improvement in the project area? □ Yes □ No □ No comment

51. Please provide any other opinion, suggestion, or recommendation that you may have to improve the sanitary condition of the village.

……
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Annex 4: Questionnaire for Households

Name of interviewer……..…….……

Name of respondent:…… ; □ Male □ Female

Village:……..……...……; Unit:…… House No:…….……

District: Chanthaboury District; Vientiane Capital City

Telephone:…… Date:…..…/……/2007

I. Baseline Technical Information

1. Household head □ Male □ Female
2. Size of household, age, and education

Household size (persons)			**Age of HH head (years)**			**Education of HH head**			
1-2	3-4	>5	<20	20-45	>45	None	Primary	Secondary	High and over

3. What are the lot sizes?.....m2 (ກ້ວາງ/Wide ..… m; ຍາວLong.….m)

(Drawing a shape of lot)

4. Who owns the land?
   □ Public; □ Private □ My parent

   □ My own □ Others please specify: ……...……

5. Who owns the houses?
   □ Public; □ Private □ My parent

   □ My own □ Others please specify: ……...……

6. What is the characteristic of your house?
- Number of floor:.....
- Housing type: □ Brick □ Brick and wood □ Wood □ Bamboo □ Zinc or Aluminum
- Roofing material; □ Fiber cement □ CPAC □ Bamboo/Grass □ Zinc

II. Sanitation

7. What is your priority to improve the sanitary condition of your area? (Please rank your priority from 1- 5 in the boxes. 1 = high priority, 5 = low priority)
   □ Greywater disposal □ Sewage disposal □ Solid waste disposal

   □ Storm water drainage □ Water supply □ Pest control

   □ Any other (specify) ……...……..…

8. How do you currently manage your excreta?
   …….

9. Are toilets connected to a septic tank? □ Yes □ No
10. Do you have specific preferences regarding toilet placement?
    □ In the house □ in the backyard □ Community lands □ Other……

11. What are the factors that influence your choice of a sanitation system?
    □ Cost, □ Health, □ Convenience, □ Odors

12. What are the most common anal cleansing materials? ……..…
    a. How are these disposed of?.....
13. What is the sewage disposal system that you have now?
    □ Flush toilet and septic tank □ Cesspool □ Latrine with soak pit

    □ Flush toilet and soak pit □ Nothing

14. Quality of toilet/latrine
    □ Very good □ Good □ Fair □ Poor □ very poor

15. What is the level of satisfaction of households with their current toilet system?
    □ Highly satisfy □ Satisfy □ Moderate □ Unsatisfied □ Highly unsatisfied

16. Who is in charge of cleaning the toilets?
    □ Mother □ Father □ Male children □ Female children □ Other….....

17. What do you do when your toilet/septic tank is full? ……..……
18. What is the reason for that choice?
    □ Costs, □ Lack of alternatives □ Other…….....

19. Who is in charge of maintaining the sewerage system?
    □ Mother □ Father □ Male children □ Female children □ Other….....

20. If there is no sewerage system: where is the greywater and wastewater going?……
21. Did anyone of your family member get sickness from the environmental sanitation?
    □ Yes □ No □ No comment

    a. If yes; what kind of disease do you infected?
    □ Gastroenteritis □ Cholera disease □ Diarrhea disease □ Skin infection

    □ Hemorrhagic fever □ Malaria □ Other:……....…

22. What is the level of satisfaction with the wastewater/greywater disposal system?
23. Do you wish or have planned to improve your toilet?
    □ wish □ plan □ No

    a. If wish: What method would you prefer?
    □ Individual household toilet **(1)** Soakage pit **(2)** septic tank **(3)** ther…….....

    □ Community toilet for a group of households

    □ Community toilet for the whole community

    □ Any other (specify)……

III. Drainage system

24. What are the main problems related to storm water drainage?.....
25. What kind of drainage system is installed in the village
    □ Covered; □ Opened; □ Earth; □ Concrete; □Sewer

26. Are you satisfied with the current drainage system?
    □ Highly satisfy □ Satisfy □ Moderate □ Unsatisfied □ Highly unsatisfied

27. Where are the natural drainage paths?.....

28. How do you currently manage your wastewater?
    □ Road drain □ Soakage pit/septic tank near each house

□ Septic tank for the community □ Common septic tank for a group of household

□ Any other (specify)……..……

IV. Solid waste management

29. How do your household currently manage your solid waste?
□ Burn □ Used a service from VUDAA
□ dig a hole □ dump in open space

30. How much does your household produce garbage (km/week)?
□ < 3 kg □ 3-5 kg □ 5-10 kg □ > 10 kg

31. Is solid waste disposed of in the project area? □ Yes □ No
32. How much does your household pay for solid waste collection (per month/year)?
□ <10,000 kip □ 10,000-20.000 kip □ 21,000-40,000 kip □ > 40,000 kip

33. How many times per week is solid waste collected? □ one time □ 2-3 times □ >3 times
34. Who is collecting the solid waste?.....
35. Are parts of the solid waste recycled or reused in your village? □Yes □ No
36. Do you separate solid waste in your house (plastic, paper, glass etc.)? □ Yes □ No
a. If yes; what for? □ for reuse
□ recycling □ composting □ Selling

37. Does your household generate income from solid waste recycling? □ Yes □ No
38. What is the level of satisfaction with the current solid waste management system?
□ Highly satisfy □ Satisfy □ Moderate □ Unsatisfied □ Highly unsatisfied

39. What method you recommend as suitable to make solid waste management more efficient?
□ Increase awareness to reduce waste

□ Increase awareness to recover for reuse/recycle

□ Separate waste at households for easy collection

□ Increase frequency of collection per week

□ Give training to make compost at HH level

□ Other ……

V. ນ້ຳປະປາ / Water supply

40. What kind of water supply connection do you have?
□ My own meter □ Connect from neighbour □ Any other (specify)……

41. Is water available 7 days a week, 24h a day? □ Yes □ No

42. Does the level of service vary during the year? □ Yes □ No

43. Is there an improvement or decline in level of water supply over the past few years?
□ Improvement □ Decline □ No change

44. What is the average water consumption and the range (liters per person per day?.....

45. What is the level of satisfaction with the water supply service?
□ Highly satisfy □ Satisfy □ Moderate □ Unsatisfied □ Highly unsatisfied

46. How much do you pay for water supply per month? …...….Kips
47. How do you feel about the amount you have to pay every month for water bill?
□ Too high and unaffordable □ High but affordable

□ All right and affordable □ Too low and affordable

VI. People's participation

48. If the sanitary condition will be improved by cost-sharing basis do you think that your household can make a financial contribution?
□ Yes □ No (go to Q. 51) □ No comment

49. If yes, what kind of financial contribution is practical?
□ Contribution for the construction cost

□ Contribution for maintenance and operation cost

□ Paying a monthly bill for the service

□ Others……

50. If a money contribution is possible, how much can you contribute for the project?
□ 100,000 Kip □ 300,000 Kip □ 500,000 □ 1,000,000 Kip

□ 1,500,000 Kip □ 2,000,000 Kip □ Over 2,000,000 Kip

51. If it a monthly payment for the services is affordable, how much you can afford?
□ 2,000 Kip □ 3,000-5,000 Kip □ 5,000-10,000Kip □ >10,000 Kip

52. If you cannot afford any financial contribution, is some kind of non-financial contribution practical?
□ Yes □ No □ No comment

a. If so. What is that?
□ Labour for construction □ Labour for operation □ Labour for maintenance

□ Material for construction □ other……..

53. Would your household consider borrowing money to finance private environmental sanitation infrastructure? □ Yes □ No
54. Please provide any opinions, suggestions, or recommendations that you may have in following space

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