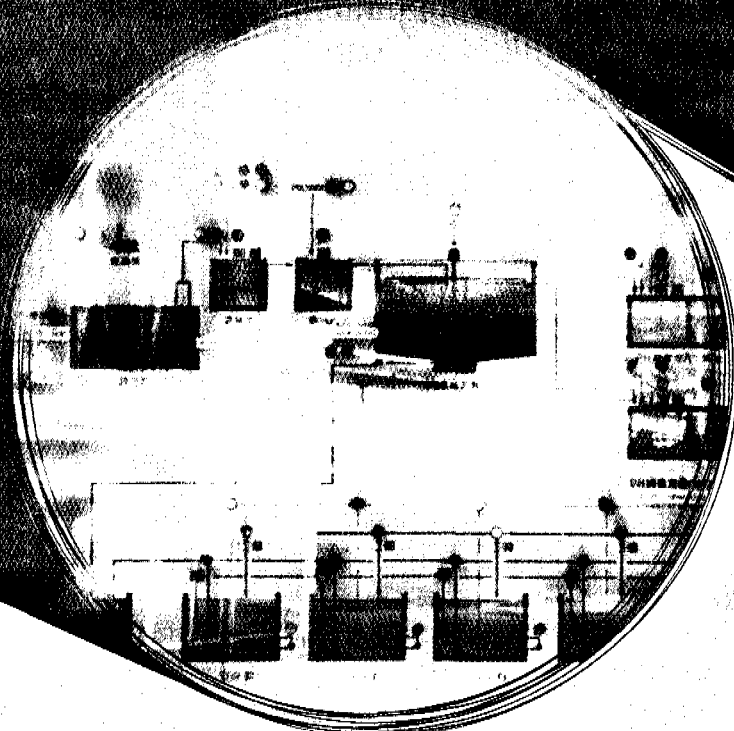


SANITATION INFRASTRUCTURE IN TWO LOW-INCOME NEIGHBORHOODS IN HO CHI MINH CITY (VIETNAM)

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Alexia Gordillo Manzano



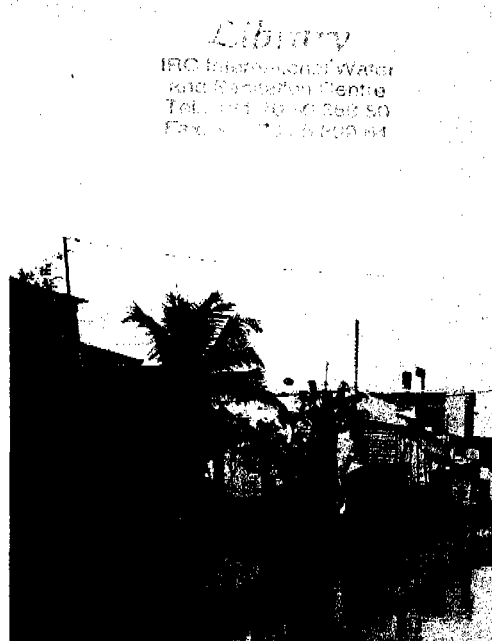
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Sanitation infrastructure in two low-income neighborhoods in Ho Chi Minh City (Vietnam)



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Wageningen March, 2004

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ABSTRACT

Ho Chi Minh (HCM) City is one of the most dynamic urban centres of Vietnam. The population explosion and the fast urbanization that the city is undergoing put the provision of adequate urban sanitation as one of the most pressing issues in the area. The quantities of wastewater increase with the expansion of water supply networks and water consumption, and there is a big need of improved sanitation systems because the existing on-site sanitation and sewer systems are now found inadequate, especially for environmental reasons.

Flooding is defined by all stakeholders as the most acute problem related to sanitation and drainage in the city. Flooding in HCM City is due to heavy rains during rainy season, tidal effect of the Saigon River, lack of implementation of land heightening of the low lying terrains prior to construction and low capacity of the existing drainage system.

This research aims to firstly understand what the stakeholders in peri-urban areas undergoing urbanization and in standing urban areas where sanitation and drainage infrastructure are not sufficient, consider as their main problems regarding sanitation and drainage infrastructure. Surveys are used as the social assessment method to know users' concern and priorities and more important the users' willingness to pay for sanitation and drainage improvements. The results obtained show that the majority of the population is willing to pay and if the willingness to pay is compared with the wastewater fees that users pay nowadays, the willingness to pay can be considered very high.

Problem comprehension about concerns and needs will be the initial step for developing strategies of most cost-effective sanitation development process bearing in mind the existing infrastructure.

1. INTRODUCTION

1.1. Research Background

Increasing urbanization is an indisputable reality. By year 2005, the United Nations predicts an urban population around the world to be greater than the rural population. The urban population is expected to contain a 60% share of the global population by 2020 (FAO 1998). Particularly cities and towns in developing countries are growing at high speed and Vietnam is not an exception.

While urban planning is viewed as positive for it prevents chaotic settlements in the cities, the current trend and manner of urban development leads to environmental ills like air and water pollution, congestion and poverty that can be attributed to inefficient planning, absence of adequate technology, and poor management capacity. The quantities of wastewater increase with the expansion of water supply networks and water consumption, and there is a big need of improved sanitation systems because the existing on-site sanitation and sewer systems are now found inadequate, especially for environmental reasons. In humid countries like Vietnam the prevention of flooding has the highest priority. Flooding in cities is a health hazard and causes much material damage (van Buuren, 2000).

The population explosion and urban population concentration in Vietnam puts institutions engaged in the provision of adequate urban sanitation under strong pressure. Ho Chi Minh (HCM) City as one of the most dynamic urban centres of Vietnam has been chosen as the study area of this research. As the public health and water resources situation finds itself in a fragile state concerning flooding and uncontrolled wastewater discharge, several approaches employed in sanitation infrastructure development have proven to be inadequate in dealing with the current situation. One is the supply driven planning process. Another one is the technological focus on large-scale centralized sewer systems. These systems have in many cases proven to be inadequate especially for fast growing peri-urban areas. These areas are in many cases characterized by a low-income population and a weak infrastructure planning and even more, unprofessional self-construction not following any plan schemes. Due to the low elevation of some of these areas in a river delta and rainfall rates of 1800 mm/year flooding is a constant threat. Additionally, uncontrolled domestic wastewater discharge causes environmental degradation and threatens public health.

In HCM City a large gap between different neighbourhoods concerning sanitation and drainage infrastructure can be observed. This depends on factors like the income structure of the population, level of governmental and external interventions and investments and the growth dynamics of that specific neighbourhood.

1.2. Research Objectives

The aim of this research is firstly to understand what the stakeholders in peri-urban areas undergoing urbanization and in standing urban areas where sanitation and drainage infrastructure are not sufficient, consider as their main problems regarding sanitation and drainage infrastructure. Problem comprehension about concerns and needs will be the initial step for developing strategies of most cost-effective sanitation development process bearing in mind the existing infrastructure.

1.3. Research Questions

The main research questions that this study aims to answer are as follows:

- a.) What do the stakeholders consider as their most important sanitation and drainage problems?
- b.) What main future interventions and planning strategies are needed to solve the main sanitation and drainage problems as defined by the stakeholders?

Specific sub-research questions to facilitate the answer of the research questions are:

1. What are the existing sanitation and drainage facilities of the stakeholders at the household level and in the sub-district level?
2. How do stakeholders define the level of adequacy of their household sanitation and drainage facilities and services?
3. How do the stakeholders address their current drainage and sanitation problems?
4. To what extent are the stakeholders willing and able to pay for improvement of their current sanitation and drainage situation?
5. Who are the main actors that are involved in sanitation and drainage issues and what are the chains of communication between them and the local people?
6. Who are the different stakeholders that can be involved in future intervention and planning processes and with whom is expected the best cooperation (e.g. community based strategies, NGOs, GOs, district level/sub-district representatives and private partners)?

1.4. Scope and Limitations of Research Work

The scope of analysis of sanitation and drainage development is not limited to the operational definition of one or two concepts. The study encompasses several and different elements such as water supply, disposal of wastewater, community health, flooding and environmental conditions. It is within the scope of this study to recommend one appropriate technology for the urban studied areas analyzed but detailed economic analysis and technical deep details are not included in the research. The study is limited to two stages. A first stage of the research involves the identification of problems related to environmental, technical, social, cultural, and health aspects as seen by the community. A second stage is focused in developing future interventions and planning strategies relevant to the provision of sanitation systems for the community.

Since specific findings are based on two districts of HCM City with different characteristics, the results of the social assessment in these districts should be applicable in other districts of the city with characteristics similar to these ones.

2. RESEARCH METHODOLOGY

2.1 Methodology of the research

The study is concentrate in Ho Chi Minh (HCM) City since sanitation and drainage development is one of the most pressing issues in this area being the most populated region in Vietnam.

The research methodology of the general report consists of several components:

- ❖ Literature research to gain insight on the following issues:
 - Sanitation and drainage infrastructure coverage in HCM City.
 - Practice and lesson learning from different projects in sanitation.
 - Institutional framework.
 - Urbanization process in HCM City.
 - Environmental impact of wastewater discharge.
 - Management on sanitation and drainage infrastructure.
 - Policies and regulations on sanitation development.
- ❖ Collecting necessary data and documents relating to natural, socio-economic conditions of HCM City; for example topography, population density distribution, population growth rates, and so on.
- ❖ Semi-structure interviews with different governmental and non-governmental organizations to understand what are the main actors involved in the sanitation and drainage upgrading actions, how they contribute to sanitation development, what their main concerns are regarding sanitation provision, and so on. Data analysis of these interviews took into account that in some cases the information was given from one source only, with no possibility of cross-linking the input with other sources.
- ❖ Conducting household surveys in peri-urban areas undergoing urbanization to asses the status of the sanitation and drainage infrastructure, what the stakeholders consider their main problems regarding drainage and sanitation development and the willingness to pay to solve these problems.
- ❖ Survey results comparison with past surveys in standing urban areas where sanitation and drainage infrastructure was proved insufficient.

It should be stated that for all elements involving the local population and local institutions related to sanitation planning processes, strong cooperation of the Vietnamese partner institutions was needed. First of all to overcome the language gap but second and very important to take advantage of the local experience in how to approach the local authorities and the population. Partly this partner network exists already for several years (e.g. CENTEMA) and partly new contacts have been created.

2.2 Methodology of the survey in Binh Chanh

To asses what the stakeholders in peri-urban areas undergoing urbanization consider as their main problems regarding sanitation and drainage infrastructure, Binh Chanh District has been selected as specific area of study. A picture of the district is shown below in the fig. 2.1.

Fig. 2.1 Binh Chanh District



The criteria for choosing Binh Chanh as the district to study were the following:

- a) Binh Chanh is a district shifting from rural to urban.
- b) The majority of the population of the district is not squatters.
- c) Mid to low-income residents.
- d) Rapid building process.
- e) Unplanned development process.
- f) Houses are been building in a chaotic way.
- g) Inadequacy and lack of sanitation and drainage infrastructure.
- h) Uncontrolled wastewater discharge.
- i) Flooding problems.

The description of the study area community is derived from a household survey carried out in 109 households, over a ten days period of time. These days were not continuing in the time. These households represent a population of 2,397 households in the 45 cells of the ward An Lac. A sampling frame was established by identifying each cell of the ward. The manager of the “Environment and Economy Division” of An Lac ward was able to provide a list of the number of cells located in the ward, the head of each cell and the number of households in each of them. This list was photocopied and distributed to all the surveyors. Moreover, the manager of the “Environment and Economy Division” was in charge of giving the authorization to start the survey in An Lac.

From the list of the cells a random sample of households were selected in each cells. The intention was to locate all the cells and select around three households in each cell, trying to make more surveys in the cells with more households. This was not possible because not all the cells were found in the field. Inside the cells, only the households characteristic for this research were chose (households in small alleys, no slum areas, etc). The households were selected randomly trying to choose as much different households as possible.

A group of ten Vietnamese students from Van Lang University of HCM City offered themselves to help with the translation and as interviewers of the survey because of the need of doing the survey in the Vietnamese language. Although the presence of ten students, none of the days the ten students were working together. Each working day

there were around six students. These students were very busy and limited the survey to 109 due to the lack of time.

The collected data was entered into an SPSS file. The file was reviewed and screened for errors by inspecting the frequencies. Errors were corrected through the process of logical deduction based on other answer provided or by returning to the original surveys when other means of correcting failed. The final database tries to be as complete and accurate as the information provided by the interviewer and respondents allowed for.

2.3 Methodology of the survey in Tan Binh

A second study area selected was Tan Binh District. Tan Binh District has different characteristics than Binh Chanh. Tan Binh is an urban mid-low income district with a sanitation and drainage infrastructure not sufficient for the dense population of the district.

The study of this district is based on the results of a socio-economic survey of the households located in the ward 19 of Tan Binh District, in the vicinity of the Tan Hoa - Lo Gom Canal Basin.

The company BBVIL – Binnie Black & Veatch (International), whose present actual director is Mr. James DM Currie, asked the “Center for Social Development and Poverty Reduction” the realization of a socio-economic survey conducted as a part of

Fig. 2.2 Tan Hoa-Lo Gom Canal, Tan Binh District



the “Feasibility Study of Tan Hoa – Lo Gom Canal Basin (HCM City) Sanitation and Urban Upgrading Project”. The survey was conducted in May and June of 2002 and the report regarding the survey was finished in July 15 of the same year.

The socio-economic survey involved 1500 households, including three wards of Tan Binh district, one of them the ward 19. Ten people of the “Center for Social Development and Poverty Reduction” conducted the survey during more than two weeks. This survey is further called the CSDPR survey.

The results of this socio-economic survey were used in this thesis due to the similarities with the survey that was going to be conducted by us in the area. The main research questions of this report, what the stakeholders consider as their main sanitation or drainage problem and the willingness to improve their situation, were included in the CSDPR survey. From the three wards of Tan Binh included in the survey, ward 19 was selected as representative after several excursions to the area. This ward shows a chaotic

urbanized area with a lack of a good drainage and sewerage infrastructure. A ward in a standing urban area with these characteristics was aimed in the objectives of the research to compare with other ward in a peri-urban areas undergoing urbanization. The number of households surveyed in this ward was 285, which is enough to compare with the 109 households surveyed in Binh Chanh district.

A permission to use the survey data of the project was given by Mr. Currie after a phone conversation on September 3 of 2003. The collected data was obtained in a SPSS file from the “Center for Social Development and Poverty Reduction”. The SPSS file with the results was reviewed and screened to contain only the data from the ward 19 of Tan Binh. Some questions from the original survey were not considered due to the low relevance to the objectives of the present research. The final database is as complete and accurate as allowed by the information the center provided.

3. LITERATURE REVIEW

This chapter presents a review of what different authors report regarding the urban sanitation situation in developing countries. Different approaches to overcome this sanitation situation and a social practices model to provide basic concepts and analytical tools to analyse the situation are critical explanations in this study. The private sector participation in sanitation concerns and the different research methods that can be applied to involve the communities in the sanitation projects are other important matters described in this study.

3.1 Urban Sanitation in developing countries

Urban areas in less developed countries are growing rapidly. It has been estimated that the urban population in these countries will grow from its current figure of around 1500 million to perhaps 4000 million by the year 2025, an increase of over 250%. This rapid growth creates an increasing demand for services, a demand that is made even greater by the fact that well over 50% of urban growth is taking place in informal settlements which are provided with few if any services at the time that they are first occupied. UNICEF estimate that at least 600 million people, 40% of the present urban population in developing countries, live in 'housing that is so crowded, of such poor quality and with such inadequate provision for water, sanitation, drainage and rubbish collection, that their lives and their health are continually at risk' (Tayler, 1999).

Up to now, informal settlements were considered a marginal and transitory phenomenon by many governments. However, Salifu and Doyen described that gradually countries are waking up to the reality that these settlements are there to stay. In fact informal settlements absorb the largest part of urban growth; in the capital cities of the developing countries they account for 40% to 60% of the city population. It is in these settlements that the challenges of urban poverty and environmental degradation will have to be met.

Municipal and administrative services in informal settlements are typically inadequate. It is common to find a low-level local branch of municipal administration serving several ten of thousands of people from a makeshift building (Salifu and Doyen, 2001).

According to Wright, typical informal settlements are in peri-urban areas. These settlements grow at the fringes of urban areas as a result of the initiatives of individuals and private developers subdividing land and building structures ahead of any formal urban planning outside of the relevant regulatory frameworks. While in most cases peri-urban settlers have some degrees of security in land tenure their settlements are developed without basic services; roads, drains, communal facilities, etc (Wright, 1997).

Wright also reported that access to convenient and safe water is often one of the top priorities for the urban dwellers, and demand for improved sanitation often follow soon afterwards, including ways to dispose of wastewater. Willingness to pay for basic water and sanitation facilities is often high in urban neighbourhoods, provided that services are appropriate, effective and affordable.

Consequently, providing urban dwellers with adequate sanitation facilities is a challenge of enormous importance. The unhealthy conditions of lacking sanitation can

not be ignored because sanitation-related diseases and polluted water sources often have devastating social, economic and environmental effects on all urban residents.

Some of the characteristics of life in areas where the urban poor live make the provision of sanitation services particularly difficult. The high population density and the lack of enforcement of environmental and hygiene standards lead to as little space as possible “wasted” for the installation of sanitation facilities. In many cases the poor live in neighbourhoods without legal tenure on land that authorities have deemed unfit for habitation. Their illegal status means that many of the urban poor are not taken into account in municipal programs to improve or extend services such as water, sanitation, garbage collection, flood protection, etc. Other difficulty in the provision of sanitation services is that constructed housing also creates physical problems in infrastructure development. For example, construction of latrines or conventional sewers is much more difficult in the congested narrow streets and alleys of many peri-urban settlements (Wright, 1997).

Wright concluded that during the past several decades effective strategies have been developed for delivering affordable sanitation services to people living in urban areas in developing countries. It is becoming increasingly urgent that these strategies be put into practice to close the growing gap between those who have sanitation services and those who not.

3.2 The debate about the Supply-Driven and Demand-Driven approach

Different ways to respond to the sanitation situation are found in different countries and in different moments. In the past, the most common approach was the supply-driven that bases implementation of utilities on demographic and economic progress indicators. This approach fails to take into account the expressed needs of the users. Reliance on this supply-driven approach has too often led to investments by governments and donor agencies that suffer from several critical defects: the investments are costly, the main beneficiaries are the richer neighbourhoods that can afford the high connection charges and investment costs are not recovered, with the result that operations and maintenance, and expansion of services to meet future needs, become impractical. Investments are wasted because intended consumers simply ignore the resulting systems. For example, in Hawrah, India, no one was connected to a sewerage system built for workers; in Ma’an, Jordan, there have been only 690 connections to a system designed for 6,000 connections; and in Addis Ababa, Ethiopia, after 10 years, only 10 per cent of the expected connections have been made to the new sewerage system (Wright, 1997).

Alternatively, infrastructure could be based on expressed demand. This demand-driven approach is based in the participation of the community. The community participates in projects preparation and implementation, identifying three levels: information sharing, consultation, and collaboration. Sanitation users or consumers express their needs and these guide the key decisions, including investments. Those who advocate this demand-based approach argue that since people are consumers of sanitation services, the market should be able to provide them with the services that they want at a price that they are willing to pay.

According to Tayler, the weaknesses of traditional supply-driven approaches to sanitation are clear. They take no explicit account of the knowledge or concerns of local people and thus provide what the professionals think is needed. Sometimes, this

corresponds roughly with what the intended users need and want and sometimes it does not. The weaknesses of a purely demand-led approach are less widely recognised. One fundamental weakness is that it underestimates the importance of prior experience, or indeed lack of it, in forming demand. When asked what they want or what they are prepared to pay for a service, people's responses are likely to be firmly based in what they know. A purely demand-led approach provides no entry point for new ways of looking at problems. A second fundamental weakness with purely demand-led approaches is that they pay insufficient attention to the need to mediate between local objectives and wider environmental and perhaps social concerns. In general, low-income people living in poor environmental conditions and with inadequate sanitation are likely to pay little heed to the wider implications of their actions. While this is understandable, it will tend to lead to short-term informal solutions to problems that may result in increased problems in the future.

Gulyani adds other problems regarding the demand-driven approach. According to Gulyani the greatest weakness is the lack of attention to institutional factors: (a) to the capacity required to implement this approach, (b) the way in which the new approach interprets institutional problems such as non-performance of utilities. It is the lack of institutional capacity combined with inappropriate institutional arrangements that have been the key causes of failure, not only of water projects but of development projects in general.

All this suggests that no single approach to sanitation provision, whether it is based on planning, the market or collective action, can tackle all aspects of those problems. The issue is not which is the best model but rather how to combine planning, engagement with the market and local initiatives into strategies that take what is best from all three. Sanitation strategies need to be demand responsive but must also recognize the ways in which supply-related factors affect the options for change.

3.3 Strategic Sanitation Approach

A proper sanitation provision can not be based on one approach only since sanitation is a complex system made from many different elements and each approach has several drawbacks. The term strategy is about achieving urban sanitation plans that lead to changes at the level of a city as a whole rather than to create isolate pockets of good practice. In addition, a strategy should be concerned with the way in which a desired outcome is to be achieved as much as with the outcome itself (Tayler et al., 2003). In some sanitation projects in developing countries, the implementation of the sanitation was given the low priority or was ignored entirely (Burundi 1886, Kenya 1978).

According to Tayler, the strategy approaches used in different projects which were noted to be effective include supply-driven mechanisms, community participatory approaches, and institutional capacity building. The strategy approach must establish first the demand, later to inform what is necessary to make real change and finally to respond to the informed demand with the new strategy.

The first stage of a strategic approach is to make a proper analysis of the current situation of the sanitation development in the area. The main sanitation problems defined by the stakeholders have to be identified. The analysis will be used to plan the future interventions regarding sanitation development. This planning has to consider the future changes in urbanization and demography in the area. With time the initial

objectives must be adapted to the new knowledge because the gained information can change insights.

Proper implementation and sustainability of strategic sanitation plans is subjected to support by the different stakeholders involved in the sanitation development. Often, there is a need to build up this support and change elements in the existing system so it will strengthen the capacity of the strategic plan. Changing elements such as policies, planning of technologies, procedures and so on in the system are the next step after changing attitudes and assumptions within organizations and agencies (Tayler *et al*, 2003).

3.4 Cost recovery

Some basic principles of strategic sanitation are fundamental to all strategic programs. One of these principles is the cost recovery. Willingness to pay and cost reduction methods are not the only ways for sustainable financing of provision sanitation systems. Other options are choosing affordable technologies fitting the specific situation (either on-site or-off site solutions); selecting appropriate level of service and not maximum/minimum level of service; designing standards fitting local situations (e.g. approving inspection chambers rather than manholes in narrow areas); improving management efficiency by involving private sector and local organizations.

User charges are at the core of a sound sanitation finance. That does not necessarily mean that user charges provide the bulk of the financing. It means that users are encouraged to contribute according to their willingness and ability to pay for the services that they have chosen as best meeting their needs.

3.5 Incremental sanitation improvement

Another principle for a good sanitation strategy is the incremental approach. Improvements in the sanitation development have to be gradual and respect the possibilities of communities that live in the urban settlements. Technical systems have to be chosen in a way that they can be upgraded without excessive costs as such as the community finds it necessary to do so. A main objective should be reached by achieving smaller more feasible objectives on the way (Loetscher, 1999).

The “small step” concept is used mainly in relation to physical improvements, suggesting for instance that incremental improvements in sanitation provision might start with a leach-pit or septic tank + leach pit and eventually lead to connections to sewerage. The same approach might be used in relation to the systems that underlie sanitation provision. Rather than trying to achieve the strategic objectives in one jump, the aim should be to identify the opportunities that exist for moving incrementally towards more effective overall planning and action. The key question here is when such incremental movements become part of a strategic approach rather than individual improvised interventions with no clear strategic goal in sight. According to Tayler, researches have not provided clear answers yet to this question but suggests that a strategic approach must take account of fundamental concepts and principles; start from a realistic assessment of the opportunities and constraints presented by the present situation (Tayler, 1999).

3.6 Technology selection

Salifu and Doyen mentioned that an important issue, closely relating to demand, is the choice of the most appropriate sanitation technology to be used in any given situation. It is commonly assumed that choice requires that people are given a range of priced sanitation options, offering different levels of service, from which they can choose. Past researches suggest that this is a flawed concept. The variations in level of service offered by different sanitation techniques are less than might appear the case at first sight. For instance, a pour-flush WC does not necessarily offer a higher level of service than a pit latrine – indeed it will offer a much poorer service where water is not reliably available on or near the plot. Similarly, where water is available, disposal to a septic tank or leach-pit does not necessarily represent an objectively higher level of service than disposal to a sewer. The advantages and disadvantages of local versus off-plot disposal of wastewater will depend on a number of factors, including the amount of space available for percolation, the possible effect of percolating pathogens on the groundwater and the possibility or otherwise of providing effective sewage treatment. It could be argued that there are variations in levels of service between different versions of a basically similar technology. For instance, VIP pit latrines are normally assumed to offer a higher level of service than basic unimproved pit latrines. Even this assumption is open to challenge. For instance, Mozambique has consciously taken a decision to promote an easily constructed form of simple pit latrine rather than VIPs and appears to believe that its standard design offers as good a level of service as the VIP (Salifu and Doyen, 2001).

3.7 Institutional unbundling, coordination, communication and leadership

One of the key strategic sanitation approach concepts is the institutional unbundling, the division of responsibilities between different organisations rather than their concentration in one central organisation. This division may occur horizontally - with different organisations taking responsibility for sanitation services in different areas, or vertically - with different stakeholders taking responsibility for the management of facilities and services at different levels of the service hierarchy. For example, the Orangi Pilot Project suggests four levels of sewerage infrastructure – in house facilities, lane level sewers, intermediate or collector sewers and trunk facilities (Hasan 1997).

The more common situation in developing countries is likely to be one in which a variety of organisations, groups and individuals are involved in sanitation provision. The problem here is not to unbundle responsibilities but to develop systems that recognize the reality that those responsibilities are already unbundled and provide mechanisms for improving coordination between the various stakeholders. Governments will usually have statutory responsibility for sanitation planning and provision. Community groups and organisations may take responsibility for providing and managing local services, sometimes with support from non-government organisations.

The achievement of an effective communication between these stakeholders is essential. Two aspects of this should repay further consideration. The first is the fact that much current activity is 'informal' in the sense that it takes place outside official plans, rules and regulations. It is often very difficult for official government systems to recognize such activity. Investigations in Pakistan have shown that there are often no mechanisms for regularising informally provided facilities and result in loss of revenue for centrally operating agencies when these informal facilities are connected to the

central systems. The second is that there is often no clearly defined 'lead' agency for sanitation provision. Without such a lead agency, it is difficult to develop effective plans and ensure that they are generally accepted and adopted (Wright, 1997).

3.8 Project scale: unbundling for local initiatives

Other aspect related to the unbundling of sanitation technologies is the scale of projects addressing urban sanitation problems. This supposes another handicap delaying progress in meeting sanitation needs. Costs for connections, sewers and treatment tend to be bundled together and then only a small proportion of the investment is used to meet the immediate needs of the unserved. Urban sanitation programs can be unbundled so that smaller-scale projects can bring benefits at an affordable cost to those in greatest need. In addition to benefits in expanded coverage, smaller projects tend to open up competition to more contractors and therefore encourage lower prices (Wright, 1997).

This does not mean that the macro picture should not be considered. The unbundling should take place after an adaptable strategic macro framework has been defined to sketch out the overall direction for sanitation service provision in the project area.

3.9 Social practices model

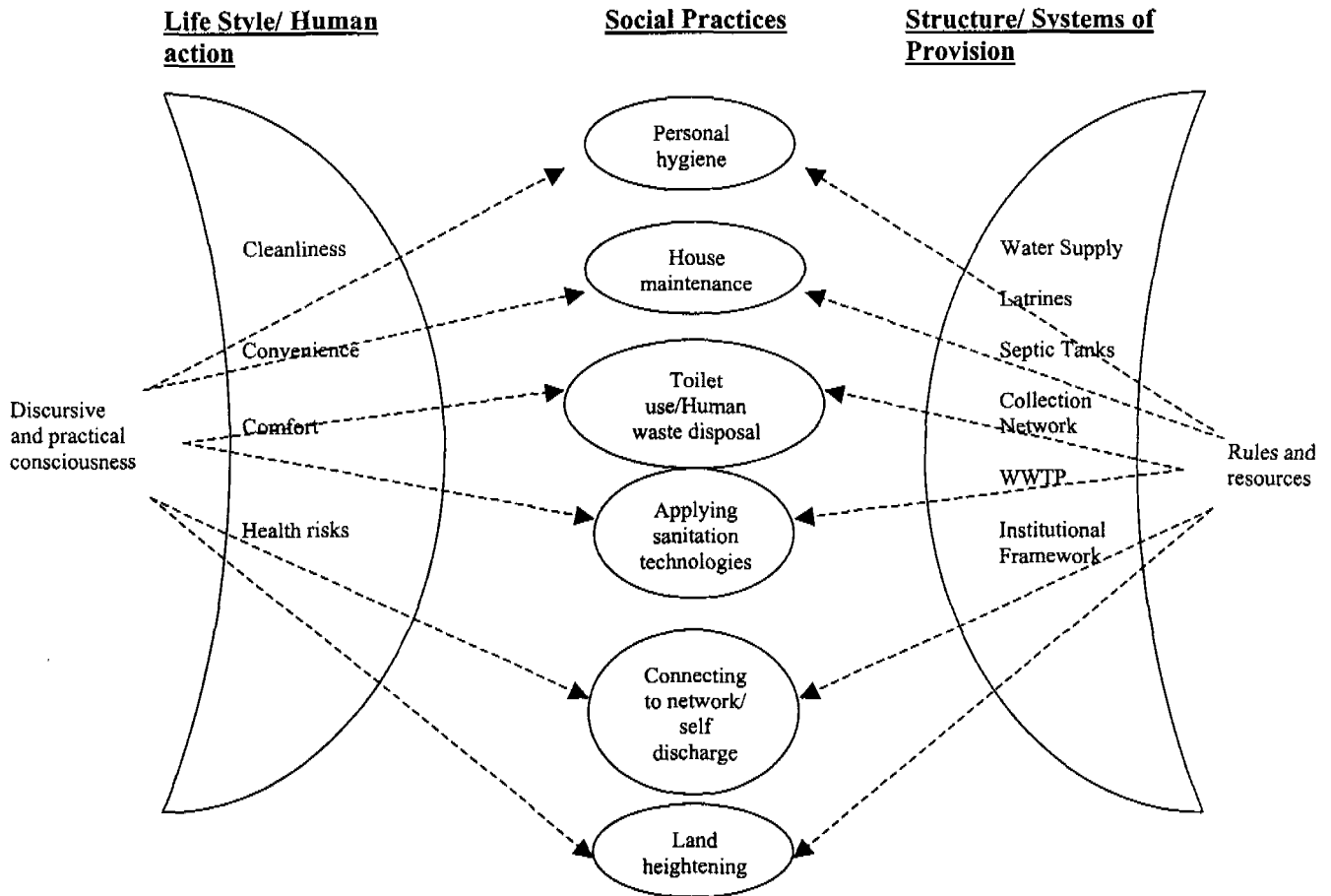
In addition to the Strategic Sanitation Approach, the Social practices model is taken as theoretical framework to provide basic concepts and analytical tools to analyse the sanitation situation in HCM City. In general the technological transition thought to be driven by technology providers and institutional actors, rather than by citizen-consumers. The role of the potential users of the sanitation technologies is crucial in the social network since a new sanitation project can only be considered successful when end-users adopt the new practices in their social life. Giddens developed a theory of socio-technical networks in which the link between system providers and users is made via social practices. Individual behavior and its underlying reasons, interests and motives are studied in the context of social practices situated in time and space and shared with others (Van Vliet, 2002).

The structuration theory developed by Giddens is described in a social practices model. This model is shown in the figure 3.1. In the center of the model one finds the actual behavioral practices, situated in time and space, that an individual shares with other persons. In the left side of the model the lifestyle of an individual person is found. The lifestyle of a person is defined by Giddens as the set of social practices that an individual embraces, together with the storytelling that goes along with it. The social practices model looks into the possibilities for designated groups of stakeholders to reduce the overall environmental impacts of their normal daily routines involving personal hygiene, house maintenance, toilet use, application of sanitation technologies, land heightening and ways of wastewater discharge. The model analyzes the process of reducing the environmental impacts of consumption in distinct domains of social life in terms of the deliberate achievements of knowledgeable and capable agents who make use of the possibilities offered to them in the context of specific systems of provision (Spaargaren, 2003).

Van Vliet explains the concept of duality of structure; social systems are produced and transformed by system users and by the dual character of the systems of provision. Systems of provision limit users' actions or enable users to act, by their sheer existence. Structures perform as a media for users activities. Actors confirm rules and

regulations by their actions; rules and regulations become outcomes of human actions. Duality of structure means that structures are actually both media and outcomes of human action.

Fig. 3.1 Social practices model



The present study aimed to analyze the development processes of sanitation provision in neighborhoods of HCM City approaching them from both sides of the model. This report focuses more on the left side of the model trying to gain an insight of how users' actions are subjected to the existing rules, resources and systems of provision. Mainly, the analysis of these lifestyles will be used to understand what are the main problems users have regarding their existing facilities (first objective of this thesis). The social survey and the communication with the local people during the field research brought a general understanding regarding life-styles in different households in HCM City. On the contrary, the MSc thesis of Gali Stamper is focused more on the right side of the model elaborating more on the applied technologies, the institutional framework and how they influence and are influenced by social practices. Analysis of the right side of the model will be used to understand what the stakeholders from this part of the socio-technical network define as their main problems.

The input in the model is based on data collected from study in HCM City as shown in the figure 2.1. The social practices model is adjusted to sanitation and drainage utility provision. In the scope of this research, the model is used as a descriptive framework for the collected information. The model does not only show the

relation but also the influence and the importance of the connection between social practices and infrastructure development.

3.10 Private sector

All the information of this subchapter is taken from the World Bank 1997 document: *Toolkits for Private Participation in Water and Sanitation*.

In cities around the world governments face the problem of how to improve citizens' access to good quality, reasonably priced water and sanitation services. Often there is a pressing need to improve the efficiency with which services are delivered, to reduce costs. More and more governments are turning to the private sector to help solve these problems. For many, this means venturing into new and unfamiliar territory.

Private sector participation is a general term covering a range of options for involving the private sector in service provision. These options differ in their allocation of risks and responsibilities between the public and private sectors, in their duration, and in where they assign asset ownership. But all involve a partnership between the government and the private sector.

Governments hope to take advantage of private sector skills and know how to improve the efficiency of service delivery and how to gain access to finance for new investments. Experience in countries that have entered into arrangements for private sector participation shows that, if well designed, these arrangements can bring big improvements in the quality, availability, and cost-effectiveness of services.

Governments seeking to involve the private sector in water and sanitation generally have one or more of the following objectives in mind:

- Bring technical and managerial expertise and new technology into the sector.
- Improve economic efficiency in the sector, in both operating performance and the use of capital investment.
- Inject large-scale investment capital into the sector or gain access to private capital markets.
- Reduce public subsidies to the sector or redirect them from the groups now served to the poor and those not now served.
- Insulate the sector from short-term political intervention in utility operations and limit opportunities for intervention by powerful interest groups.
- Make the sector more responsive to consumers' needs and preferences.

All forms of private sector participation can be designed so as to improve technical and managerial capacity. The objectives can only be achieved if the appropriate arrangement for private sector participation is chosen and if the government creates the necessary enabling and regulatory environment. The toolkits to address these objectives involve also other concerns that governments often have about involving the private sector in water and sanitation; such as the consequences for utility employees, loss of control of a strategic sector, and price increases and their impact on the poor.

Private sector participation on its own is no panacea for problems in water and sanitation. The first step is establishing a good partnership between government and the private sector participants, which requires defining the government's future roles and responsibilities and ensuring that all the pieces are in place so that it can fulfill them. An important part of this is putting monitoring and regulatory frameworks in place. Another

is working out exactly which risks and responsibilities the government will retain once the arrangement is in place and how it intends to manage them.

Some governments succeed in their attempts to find a good private sector partner for water and sanitation services; others fail. Beyond strong political commitment and careful preparation, what often makes the difference is an open, competitive process for selecting a partner.

Requiring prospective partners to compete with one another for the contract is the most effective way of ensuring that the best-qualified partner is chosen. Competitive processes almost always yield better terms on private sector transactions than negotiated contracts. They also tend to stand up better to political scrutiny and have a lower risk of being overturned if there is a change in government. Competition is particularly important when the company that wins the competition will have a sole (or monopoly) right to provide water and sewerage services to customers. The extent to which competition is achieved and the extent to which this translates into the best possible outcomes for consumers depends on how the bidding is organized and on what mechanisms are put in place to guide the relationship with the private sector and to sustain competitive pressures.

Governments may worry about how employees of the present utility will be affected and fear labor unrest. They may be concerned about the loss of control of a strategic and politically sensitive sector. And they may fear that privatization will require price increases and therefore hurt the poor.

Although there are no simple solutions, these concerns can be addressed through careful planning of the private sector arrangement and careful design of supporting policies (for example, subsidies to support low-income households). In addition, involving affected stakeholders (consumers, employees, unions, management, other government agencies and so on) from the beginning of a process of private sector participation can do much to ensure that legitimate concerns are heard and responded to.

To succeed, a process for involving the private sector must meet two basic requirements:

- The option for private sector participation that is chosen must make sense in local conditions.
- The option must be implemented in a careful, thorough, and credible manner.

The option has to make sense technically, financially, and politically. A technically sensible option is one that is well targeted to the problems (such as a need for improvements in operational efficiency or in service coverage and quality, or both) and is compatible with the existing legal and regulatory framework (or a framework that incorporates feasible changes). A financially sound option is one that can be financed at a tariff that consumers are willing to pay or with the aid of a politically viable subsidy scheme. A politically sound option is one that has political support, both within the government and among stakeholders.

3.11 Research methods

The different research methods that can be applied to understand what stakeholders defined as their main concerns and priorities regarding sanitation infrastructure are other important matter in this study.

A typical research method used to get household information is the survey. A survey is a way to collect information directly from people in a systematic, standardized way. Surveys use questionnaires that ask the same questions in the same ways to all respondents. Data collected this way can then be used to make inferences about the population of interest. Information can be collected about people's opinions, knowledge, attitudes, beliefs, behaviors, plans and backgrounds. Surveys can be carried out in a number of different ways and to collect information from a relatively small number of people or from many thousands (Trochim, 2000).

Conducting a survey is often a useful way of finding something out. Although surveys often investigate subjective issues, a well-designed survey should produce quantitative, rather than qualitative, results. That is, the results should be expressed numerically, and be capable of rigorous analysis (Taylor-Powell, 1998).

When choosing a research method, there is a need to have clear the information that is wanted. Then, it can be decided if a survey is the most appropriate research method. Not all the information is best collected through a survey. Sometimes it may be more direct and useful to use another method. A variety of research methods' alternatives exist, for example the participant observations; recompilation of existing data, records and documentation; test of abilities; case studies and so on (Taylor-Powell *et al.*, 2000).

According to Trochim, surveys can be divided into two broad categories: the questionnaire and the interview. Questionnaires are usually paper-and-pencil instruments that the respondent completes. Interviews are completed by the interviewer based on the respondent says. Sometimes, it is hard to tell the difference between a questionnaire and an interview.

Questionnaires require that the respondents can read. While this might seem initially like a reasonable assumption for many adult populations, it is known from recent research that the instance of adult illiteracy is alarmingly high. In addition, even if the respondents can read to some degree, the questionnaire may contain difficult or technical vocabulary. Clearly, there are some populations expected to be illiterate (Trochim, 2000).

Taylor-Powell explain that there are a number of things to consider when planning a survey: decide who should be involved in the process, define survey content, identify the respondents, decide on the survey method, develop the questionnaire, pre-test the questionnaire, think about the analysis of the data, communication of the survey results and so on.

Regarding the way questions should be asked, good questions should be neutral, simple and clear. According to Patton, it is the responsibility of the surveyor to make it clear to the interviewee what is being asked. Asking questions that are understandable is an important part of establishing rapport. Asking singular questions helps to make things clear. There are a number of other factors that can contribute to the clarity. For

example, it has to be found what terms respondents use when they refer to the issues being evaluated and what language participants use among themselves when talking about the research concepts (Patton, 1990).

The questions may be open-ended or close-ended. When using qualitative strategies for data collection it is critical that questions be asked in a truly open-ended fashion minimizing the imposition of predetermined responses. This means that the questions should permit respondents to respond in their own terms. Close-ended questions list answers and respondents select either one or multiple responses. These questions produce more uniform answers than open-ended questions, but depend upon the knowing of the person who makes the questionnaire because all relevant responses have to be included in the list. Responses to close-ended questions must be exhaustive and also mutually exclusive in providing for the selection of a single response (Trochim, 2000).

For Taylor-Powell, the most important issue to keep in mind when planning a survey is that something is trying to be found out. The survey's objectives have to be known in advance. If the questions asked do not satisfy the objectives of the survey, then the survey has failed. In almost all cases, the results of the survey will be generalized, that is, to estimate how the results might apply outside the survey group. If a survey is carried out by selecting the people who is no convenient to the questions, then it has to be accepted that the results of the survey will only apply to the population of which this group is representative.

An afflicting problem is the distinction between 'objective' and 'subjective' reporting. It is quite important that a person reading the outcome of the survey can distinguish easily between factual or numerical results, and the experimenter's interpretation of the results. It is perfectly acceptable to conjecture about the reasons for a particular finding, but it is almost never helpful to mix facts and conjecture in a survey report.

When presenting the results of a survey it should be included the minimum amount of data that communicates the overall findings effectively. If using questionnaires, it is not usually helpful to include copies of every response. A summary of the responses is probably enough. The best option when analyzing and interpreting the survey results is to use simple descriptive statistics (counts, percentages, averages), especially when there is not a high amount of households surveyed (Taylor-Powell *et al.*, 2000).

4. SANITATION AND DRAINAGE DEVELOPMENT IN HCM CITY

4.1 Sanitation systems in use

The technical systems available for sanitation in the city vary from one district to another and are mostly in accordance with the socio-economic condition of the population. The majority of the population has access to a toilet facility complete with a septic tank which discharge to the sewer and/or public water bodies. However, there are still households without a bathroom or toilet facility. This is especially true for the population dwelling in the slum areas.

A survey in HCM City and surroundings carried out in 1997 showed that 5 different on-site sanitation systems are in use (PCI, 1999; quoted in Van Buuren, 2000):

- a) Individual toilet stand with standard septic tank
- b) Individual toilet stand with non-standard septic tank
- c) Individual toilet stand with leaching pit
- d) Canal hang-on toilet
- e) Public toilet

The individual toilets can be either cistern flush or pour-flush toilets (fig. 4.2). A cistern flush toilet consists of a siphon, which provides a water seal against bad odors from the effluent pipe. Excreta are flushed away with water stored in the cistern, depending on the type between 5 to 20 liters per flush. Other kind of flush toilet is the dual flush, which reduces the water used to flush urine. A pour flush toilet has a water seal and requires flushing with 2-3 liters of water use. Because of the complexity of the flush mechanism, cistern flush toilets are more prone to malfunctioning than pour flush toilets. In some cases, in Vietnam, the flush toilets are used as pour-flush adding the water to flush away the excreta with a bucket. Other types of toilets known in Vietnam are the dual flush toilet and the dry double vault batch composting systems. Double vault batch composting systems is a household level dry on-site treatment system. It can either be used with or without urine separation. This type of toilet enables the reuse of excreta as compost. The compostation is anaerobic and a pathogen reduction occurs (Van Buuren, lecture notes).

**Fig. 4.1 Hang-on toilet
Binh Chanh District**

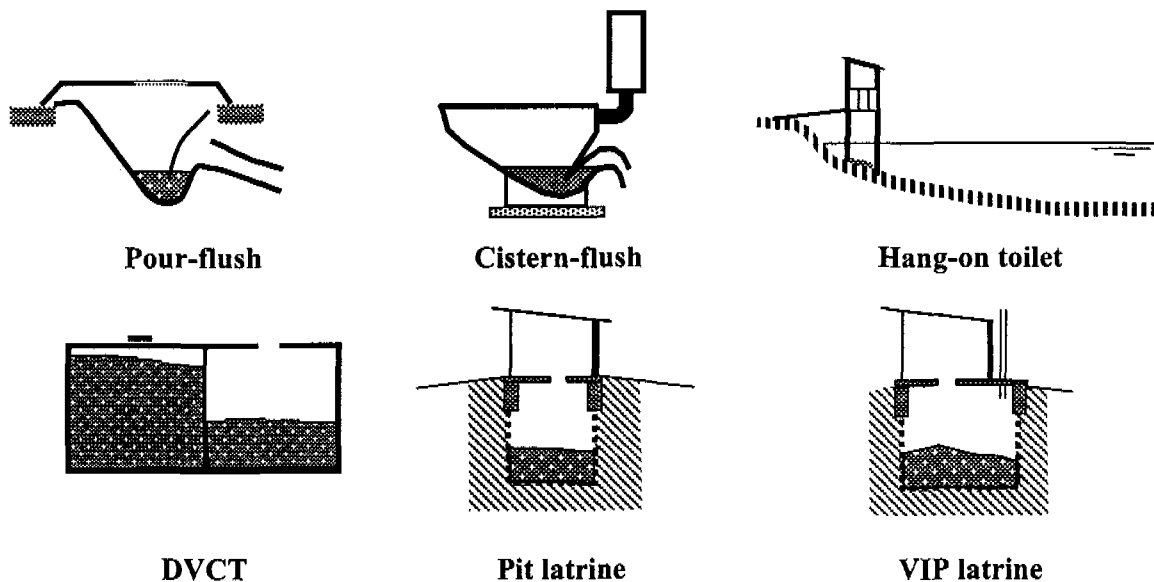


The toilet with septic tank may or may not be connected to a stormwater sewer system. The individual toilet with leaching pit includes a pit latrine (fig. 4.2), which is only a hole in the ground, discharging directly into underground water or a canal. An improved version of the pit latrines is the VIP, ventilated improved pit latrine. Hang on toilets (fig. 4.1) are located above rivers and canals and the waste is discharged directly to public water bodies. Public toilets were constructed by the Urban Environmental Company at markets, bus stations, along main streets and highly populated residential areas. Operation and maintenance are the responsibility of the local authority/community.

The current requirements for existing and new households regarding sanitation installations are that all the houses in the city are obliged to have septic tanks (PCI,

1999). Septic tanks are implemented to reduce load and pollution of SS and BOD. Now there are no treatment plants implemented in HCM so this is the only way of improving the wastewater quality. In the future, when more wastewater treatment plants will be implemented, there is a discussion if the septic tanks will no longer be a need.

Fig. 4.2 Type of toilets and on-site facilities



Approximately 55% of the households in HCM City as a whole follow the requirements and dispose their wastewater through septic tanks/vaults, while the wastewater from the remaining 45% of households is discharged directly into the drainage system (JICA, 1999; according to a report written in the framework of the HCM City sewerage and drainage master plan). Houses with septic tanks typically have dual grey water/sanitary wastes discharge systems. Grey water from food preparation, washing, bathing, etc. is discharged directly to the sewerage/drainage system. Sanitary wastes from toilet are discharged to a septic tank located beneath the house, which overflow to the drainage system. The volume of a septic tank usually is 2 m³ with two compartments. Only about half of the septic tanks/vaults are properly designed and constructed. Many of the tanks do not have regular solids removal. Thus, the treatment capability of the septic tanks is generally low. As a result of the lack of maintenance, the condition of the system has deteriorated over the years.

4.2 Existing drainage and sewerage in Ho Chi Minh City

In the current years, HCM City has rapidly urbanized and industrialized without a sufficient development of city infrastructure, especially urban drainage and sewerage systems. The basic infrastructure such as drainage and traffic systems was built long time ago. Therefore most of them have been degrading and are overloaded. The present situation shows flooding (fig. 4.3) at many places during heavy rain and traffic congestion during rushing hours, and this is an increasing trend (PC HCMC, 2002). HCM City has suffered economic and social damages caused by floods due to its geographic features with low ground elevation, the hydrological condition with high precipitation and tidal effect of the Saigon River and an insufficient drainage system constructed in the city since the French colonial period. Flooding after rainstorms brings forth a damage of thousands of USD year after year. Particularly, a heavy rain in March 1999 caused a loss of 300-500 thousands USD in goods. At that, the poor drainage

capacity has led to the prevalence of several diseases due to the dirty conditions (PMU HCMC Water Environment Improvement, 2001).

Fig. 4.3 Flooding in a main road in HCM City



The wastewater of the city almost is not treated (except for septic tanks, a few small wastewater treatment plants at hotels and industrial zones and a single 500 m³ domestic wastewater treatment plant) and discharged directly into natural water bodies. The pollution of these bodies however is not only caused by wastewater but also by the illegal dumping of the solid waste. The canals in the city have the typical aspect of heavy organic loading: anaerobicity, a black color and an abhorrent stench particularly in the dry season when no dilution with stormwater occurs (Van Buuren, 2000). In addition, many of the sewers are silted, resulting in heavier water pollution and flooding by the blockage of the system. Thus, combined with the tidal variations in the sewer system, provides insufficient drainage capacity.

The drainage and sewerage system of HCM City is a combined system, carrying storm water, black wastewater from toilets and septic tanks, gray domestic wastewater from kitchen and shower and industrial wastewater. The present building practice consists of extending the existing combined system where possible. In newly developed areas separated systems are planned.

The drainage network in HCM City is classified in 4 levels as follows:

- **Level 1:** natural canals that receive domestic wastewater and storm water. These canals are divided into 2 types: level 1a and level 1b. Level 1a canals consist of natural open canals that need minor renovation only. Level 1b canals need to be renovated and embanked and/or upgraded to level 2 sewers.
- **Level 2:** ground sewers and canals to collect water from level 3 branches. Level 2 sewers are relatively large, most of which are upgraded to box-shaped sewers, with a diameter or width of 1 m or more. They are 2-5 m under ground.
- **Level 3:** ground sewers in main roads that collect water from level 4 branches. Most of level 3 sewers have a diameter of 600-800 mm or they are culverts of 400x800, 600x800 mm.
- **Level 4:** ground sewers in alleys or inner roads that are connected to level 3 sewers with a diameter of less than 600 mm.

The total amount of wastewater of the city is estimated to double in 2010 (PC HCMC, 2002). The total present length of the level 2 and level 3 sewer systems of HCM City is 530 km with about 100 outlets to main and sub-canals. The density of sewers is allocated unequally. The former center of HCM City (districts 1 and 3) has a high density, whereas some other areas have a low density (like Go Vap district). Because of unequal allocation, a large number of habitants in the Northern part of the city are not covered by the drainage services and floods often occur (PMU HCMC Water Environment Improvement, 2001).

Today, the biggest functioning plant for domestic wastewater is the Tan Quy Don station, of about 500 m³/d. There are a few smaller plants, for example in district 2 there is one with a flow of 200 m³/day. The next plant that will be constructed is the Binh Chanh plant, with a flow of 1200 m³/day. The influent requirement to the plant will be 200 mg BOD/l and 150 mg SS/l and the effluent from the treatment plant 50 mg BOD/l and 50 mg SS/l (meeting Mr. Thin 14/8/2003).

4.3 Trends of sanitation development in Ho Chi Minh City

4.3.1 Ho Chi Minh City Master Plan and prepared projects

A master plan study (PCI, 1999) on urban drainage improvement and sewerage development for the year 2020, covering the urbanized area of about 650 km² of HCM City, was completed in December 1999 by the Japan International Cooperation Agency. This study proposed both structural and non-structural measures to improve and develop drainage/sewerage infrastructure for the city. It is also identified institutional issues related to water cycle management, and proposed a single management organization for drainage and sewerage services.

To implement the city's general master plan, smaller projects are given to development companies. These companies can be either private or state owned. They come up with a more detailed master plan that has to be approved by the Department of Construction (DOC), the Department of Planning and Architecture (DPA) and the city PC depending on the amount of money involved. In case of big and important projects approval of the ministry is also needed. The developing company does not have to design the entire infrastructure; it can hire other companies by using subcontracts to do so.

The city is carrying out some relevant projects, activities and researches on the environmental improvement and sanitation and drainage development. The most relevant large-scale projects include:

- The Tan Hoa - Lo Gom Canal sanitation and urban upgrading project (with financial support of ODA-Belgium).
- The Nhieu Loc - Thi Nghe Basin drainage project in HCM City (with financial support of the World Bank).
- The Tau Hu - Ben Nghe Canal, Doi - Te Canal environmental improvement project in HCM City (with financial support of JBIC).
- The HCM City environmental project - the Hang Bang Basin drainage improvement sub-project (with financial support of ADB).

All new projects are designed according to the latest PCI Master Plan reports and recommendations. Only separate sewers are designed and all designs are as if in the future the systems will be connected to one of the planned wastewater treatment plants. For now, since there are still no wastewater treatments plants from that plan, all

developers must provide a local solution for the waste before discharge to the nearest canal or river. Each household must connect to the local infrastructure after passing through the house septic tank. In case there is not a nearby canal or river, the developer can connect the treated sewer to the local existing drainage system (meeting Mr.Thin, 14/8/2003).

4.3.2 Urban Upgrading activities

There have been over 4,000 infrastructure improvements projects of city authorities in HCM City in the past 10 years and some projects able to be termed as “Urban Upgrading Projects” (UUP). These UUP (tertiary infrastructure) are usually promoted by ward level authorities based on submitted demands of inhabitants to cell leaders. The department of district urban management will consider these proposals and put forward their private opinion for approval. The ward authorities will organize cell meetings to have agreement on upgrading needs and contribution levels. Towards a specific project people living there will usually contribute about 30% of the project cost, the rest will be borne by the city or district budget. Sometimes, ward authorities will pay themselves this rest investment from their very little budget, which has been extracted from the “public service improvement” fund contributed by households annually. This contribution level is different from district to district and the self-managed level of each district and ward is also different (PMU HCMC, 2003).

Other bigger infrastructure upgrading projects serving for a large area will be city or district responsibility. In this case it is necessary to prepare a Feasibility Study to submit to agencies for approval according to the degradation procedure. After the Feasibility Study is approved, district authorities will carry out the project design and quotation and plan the compensation cost if necessary. However, upgrading projects should be suitable to the city master plan and local detailed projects (PMU HCMC, 2003).

Non-governmental organizations (NGOs) started to participate in UUP in the early years of the 90 decade through the Department of Land and Housing. Since 1996, French NGOs like ENDA or Villes en Transition have promoted different projects with the collaboration of local partners.

5. ADMINISTRATIVE MANAGEMENT, INSTITUTIONAL FRAMEWORK AND POLICIES RELATED TO SANITATION AND DRAINAGE

5.1 Area profile

Sanitation and drainage infrastructure development in Ho Chi Minh City is dependent on the dynamic and interconnected factors of urban growth. The state of this infrastructure is affected by the level of development, socio-economic condition, physical characteristics, policies and institutional make-up.

5.1.1 Physical characteristics

Ho Chi Minh (HCM) City is situated in the south of Vietnam and is the fastest growing region in Vietnam, and the most populous city in the country. It is also the biggest centre of cultural, social, trading and economic activities, as well as the key area for technology and international communication activities in the whole country. The city is one of the most densely inhabited in Asia. For the last 25 years the population of the city has increased from 2.5 in 1975 to 5.17 million in 2000. However, the real population is likely to be significantly higher than this because there are many unregistered people. The real population should be around 7 million (PC HCMC, 2002).

The city has a flat terrain. The north-east and north-west areas have the maximum altitude of 30-40 meters above sea level, while the average altitude of the central city is about 3-10 meters. However, most part of the city lies on the area with the altitude not higher than 2 meters above sea level, so there could occur difficulties for natural draining. This matter causes troubles for drainage in half part of southern area and most part of central city (PC HCMC, 2002).

▪ *Current City Structure*

The city area of about 2095km² is divided into 22 districts, 12 districts are defined as urban, 5 as peri-urban and the last 5 as rural. The urban area covers 140.3 km². The historical city center acts today as the main central business area. It is surrounded by the most highly populated districts of the city where population density can reach more than 40,000 inhabitants/ km². This is the inner urban circle. When going further from this inner circle the population densities decrease and the districts become more and more rural. Nowadays the government's policy is to stop the immigration to the central areas of HCM and shift the economic centers to the suburbs and outskirts of the city.

Table 5.1 Districts of Ho Chi Minh City (PCI, 2001)

Districts	Area (km ²)
1	7.6
3	4.8
4	4.0
5	4.1
6	7.0
8	18.8
10	5.7
11	5.0
Go Vap	19.2
Tan Binh	38.5

Binh Tanh	20.5
Phu Nhuan	5.1
Total urban areas: 140.3 km²	
Hoc Mon	109.5
12	52.5
Thu Duc	48
2	50.5
9	113.1
Binh Chanh	303.3
17	35.9
Cu Chi	428.5
Can Gio	714.0
Nha Be	98.4
Total peri-urban and rural areas: 1,953.4 km²	
Total area of the city: 2,093.7 km²	

- *Climate features*

Affected by the seasonal wind (monsoon) of the SE Asia, HCM City has a tropical climate with high temperatures and moderate humidity (PMU HCMC, 2003).

The SW wind in the summer from May to October brings heavy rains in the area while the period from December till April is affected by the dry NE wind. Therefore, there are 2 seasons in the year: the dry season and the rainy season with 90% rainfall every year. The average rainfall in HCMC is 1,932 mm per year of which 93% occurs during the rainy season from May to November, with the highest rainfall in August. The annual average temperature is 27.2°C and the relative humidity is 77.2% (PMU HCMC, 2003).

- *Hydrologic features*

The HCM City region contains a dense network of rivers and canals. The three big rivers (Dong Nai River, the Saigon River and the Vam Co Dong River) are usually affected by tides of the East Sea. The difference between the high and low tide changes from 2.7 to 3.3 meters. There are 27 main canal and ditches networks in the city with a length of more than 310 km. The hydrology of the canal systems is influenced by the tidal movement of Saigon River so that at high tide the discharge capacity is relatively small. Consequently, in the dry season, wastewater is retained for many days in the canal system. Only gradually during low tide it runs off to Saigon River. This process turns many parts of canals into natural ponds, characterized by a mainly anaerobic environment where organic material disintegrates causing an emanation of malodors (PMU HCMC, 2003).

Many floods occur in the rainy season from June to November and at high tide from September to January. Average inundation depth and duration in some places of the central highland city area are found to be at about 25 to 44 cm with a duration from 2.5 to 13.3 hours (PMU HCMC, 2003).

5.1.2 *Environmental quality*

The environmental condition within HCM City is alarming. The quality of natural systems like air and water are deteriorating. The city faces serious water pollution problems of the canals and rivers, due to direct discharges of domestic and

industrial wastewater without almost any treatment. In addition, solid waste disposal by the households on and along the canals worsen the water quality and the landscape along the canals, and cause malodor problems (PC HCMC, 2002).

5.1.3 Economic sector

While Vietnam as a whole has experienced Gross Domestic Product (GDP) growth of over 8% per year throughout the 1990s, with industry growing by 13% per year, Vietnam's urban center has grown at twice that rate. Even amidst the Asian economic crisis, when overall GDP growth slowed to approximately 4.8% in 1999, Vietnamese industry continued to expand by over 10%. In 2000, the economy regained momentum with overall GDP growing by 6.8% and industry growing by an enormous 15.5%. Concretely in HCM City, in 1990 GDP was 13.66% of the whole country's; in 1995, it was 16.67% and in 2000 it was 19.3% (O'Rourke, 2001).

A massive inflow of foreign direct investment (which has slowed since 1998) and foreign aid (which has stayed almost constant at 2 USD billion per year from 1994 to 2000) has been driving a process of rapid urbanization and industrialization. The Vietnamese economy is not just growing rapidly, it is also being transformed. Economic reforms and foreign investment have led to a significant shift in the structure of the economy, and a troubling trend towards more toxic industrial activities. Small and medium size enterprises are multiplying in cities around Vietnam, while large foreign joint-ventures are concentrating in the country's more than 50 new industrial zones. The oil and gas, steel, chemicals, garments, footwear and printing sectors have all grown over 20% per year during the 1990's. Many of these industries are, not incidentally, serious polluters (O'Rourke, 2001).

There also has occurred a shift in the management of industry. In the past, almost all the major industries were controlled by either central or local state authorities. Today, the private, non-state sector and foreign invested sectors are the fastest growing segments of the economy. In 2000, the emerging private sector recorded a growth rate of 18.6%, with foreign firms trailing slightly with 17.0% growth (O'Rourke, 2001).

5.1.4 Infrastructure

▪ Water Supply

Water supply is classified into two areas: areas where there are centrally distributed piped water by the Water Supply Company (regardless of common or private meters) and areas where local piped water is used. With these 2 criteria, the number of households that use centrally distributed piped water accounts for a low percentage (31.2%) and the number of households that use local piped water (rainwater and well water) account for 68.8% of a reported 3,200 households (PC HCMC, 2002). This shows that the use of well water in low income areas is larger. The quality of well water depends largely on the characteristics of the well and the way of extracting the groundwater from it. In HCM City there are over extracting (risk of saline water penetration) in one hand, and improper use of wells on the other creating water pollution. The estimation is that there are more than 100,000 wells in the city (Mr. Viet interview, 2003). Therefore, the renovation and provision of piped water to these areas is extremely necessary today. Some households without piped water and individual pumps rely on vendors.

- *Solid waste collection system*

At the residential areas, every morning domestic solid wastes are placed outside and are collected by collectors with pushcarts to transfer to the *rendez-vous points*. The solid waste is not managed properly because of a lack of investment capital, equipment, specialized knowledge and even awareness on the solid waste management importance (PC HCMC, 2002).

5.2 Institutional framework

The local authority system in HCMC can be divided into 3 levels: City, District and Ward. The institutional framework of HCM City is showed in the figure 5.1.

HCM City reports directly to the Central Government. The People's Committee (PC) is the legislative body at the City level. It is responsible for formulating policies and directions and follow-up to ensure that its policies and directions are implemented properly. The Chairperson of HCM City PC has the rank of minister and reports directly to the Prime Minister. The HCM City PC is responsible, on behalf of the Government of Vietnam, for all overseas development assistance projects implemented within the City.

5.2.1 National Level

At national level political decisions are made by the Politburo (highest lawmaking body of the Communist party), the Central Committee of the Communist party, the Council of Ministers and the General Assembly. The national ministries execute the policies that were approved by the political bodies. Each ministry or institute has its counterpart at the provincial level.

The Ministry of Natural Resources and Environment (MONRE) was created to come up with regulations, policies, environmental plans, environmental assessments, manage monitoring systems, appraise research and establish quality standards. The MONRE and the Ministry of Science and Technology (MOST) were formerly combined (until October 2002) in one ministry, the Ministry of Science, Technology and Environment.

The National Environmental Agency (NEA), established in October 2003 (Tran, 2003), is the central agency under MONRE. NEA is responsible for the state management of environmental protection activities (divided to different divisions as pollution control, EIA appraisal, monitoring, natural conservation, training and awareness, policy, plan approval etc.) Although NEA is the top-level agency in the environmental sector, this agency has a small professional staff and lacks facilities and equipment.

Other ministries relevant to the subject of this thesis are the Ministry of Planning and Investment (MPI), the Ministry of Construction (MOC), the Ministry of Transport (MOT), the Ministry of Health (MOH) and the Ministry of Finance (MOF).

5.2.2 Provincial/City Level

At the provincial level of HCM City, the environmental sector is under the jurisdiction of the Department of Natural Resources and Environment (DONRE). DONRE is responsible for the environmental policy management with respect to enterprises in the provinces and includes the Environmental Management Division (EMD) and an Inspection Division.

The EMD together with the inspection or monitoring division is responsible for implementing the Law on Environmental Protection, issuing environmental licenses for enterprises inspecting environmental performances (Tran, 2003).

The Department of Transport and Public Works (DTPW) is a large multi-service department reporting directly to the HCM City PC. The department is responsible for all public land and water transport in the City, in addition to most infrastructure including roads, bridges, canals, drains and sewers, water supply, street lighting, and parks. Water supply and sewerage/drainage services are managed through two agencies: HCM City Water Supply Company and HCM City Urban Drainage Company (UDC), respectively. DTPW has to check drainage development projects by the UDC and passing them on for approval by the PC. The various companies under the DTPW are in charge of implementation in the district level, hence, give guidance to the district PC and active state enterprises in the districts.

Some other departments at this level are:

- Department of Construction (DOC), which has the administrative responsibility for urban water supply and sanitation.
- Department of Transport (DOT)
- Department of Land Management (DLM), in charge of the future development of the whole city by defining the rural, urban, public etc. areas.
- Department of Land and Housing (DLH), in charge of details regarding residential areas, e.g. building height, size, installations etc.
- Department of Planning and Architecture (DPA), which gives approval in the execution level (building permissions). This body is subjected to instructions from the MOC and the City PC.
- Department of Planning and Investment (DPI), makes the procedures to carry out economic planning.
- Department of Health (DPH)
- Urban Planning Institute (UPI). UPI is the most important advisory body to the city PC regarding city planning. UPI makes land use and construction master plans for the city and the different districts. These plans are subjected to the authorization of the DPA and the city PC. The UPI is also in charge of creating PMUs (Program Management Units) for national level projects.

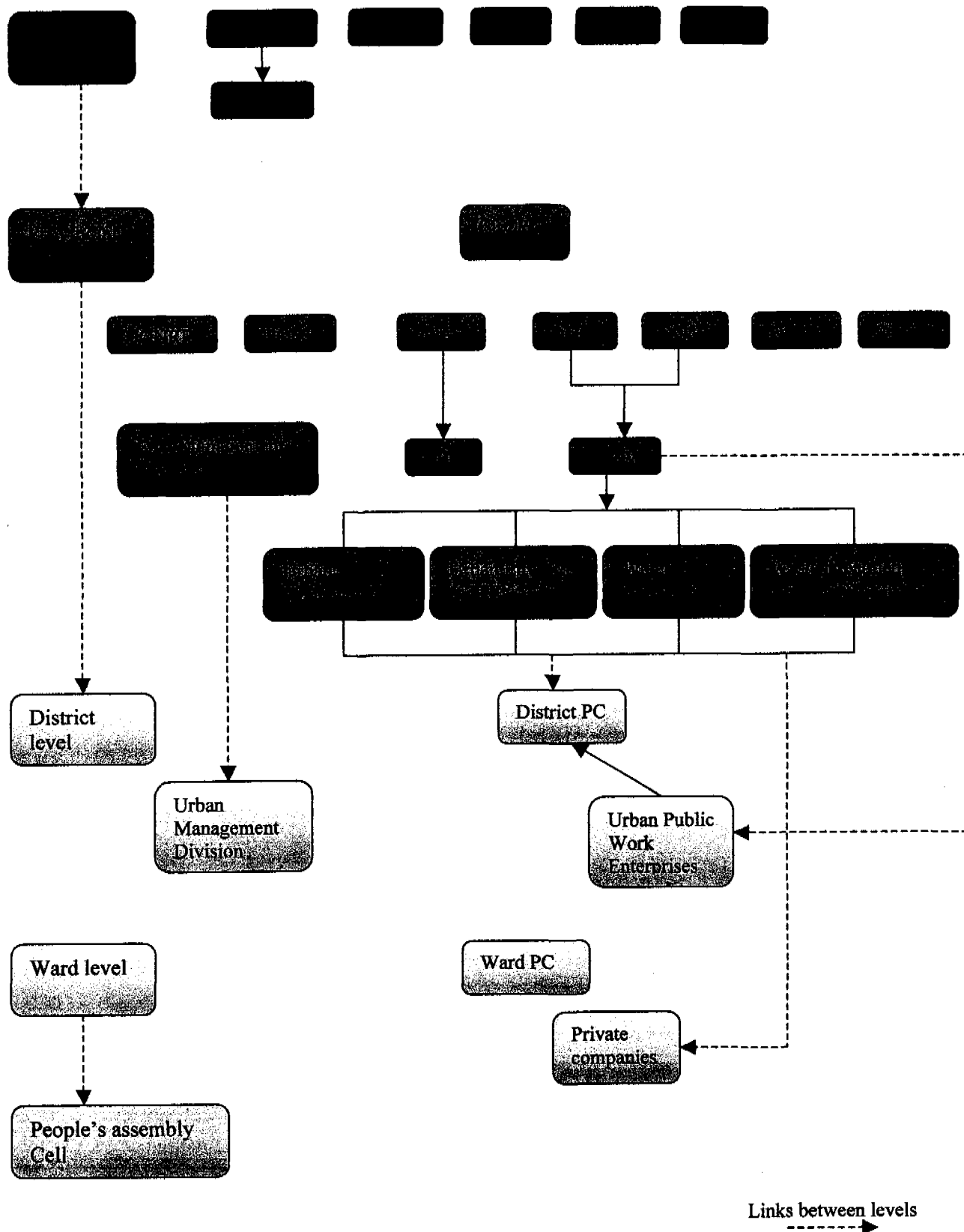
5.2.3 District Level

The PC at district level follows guidance and instructions given by the different authorities of the provincial level, yet political decisions can still be made by the PC. The Urban Management Division (UMD) is responsible for environmental matters, such as relocation of polluted industries, and report directly to the District PC. UMD's mandate is to administer, organize, and implement DONRE's plan, programs and tasks. In 21 districts there is a UMD. In one of them, Binh Chanh, the UMD is part of the Economy Department (or economy section). This is a new model that is tried out in Binh Chanh. If the result is satisfactory the UMD of all districts will be transferred inside the Economy Department.

Telephone, electricity, public work companies, construction and services, water supply, sewerage, wastewater treatment, solid waste collection, road maintenance are run by Public Work Enterprises (UPWE) under the supervision of the DTPW and the political leadership of the Provincial/City PC. These enterprises do not exist in every

district but only in districts where the state companies from the city level do not have sufficient resources to manage and implement the different tasks.

Fig. 5.1 Institutional framework of HCM City



5.2.4 Ward level

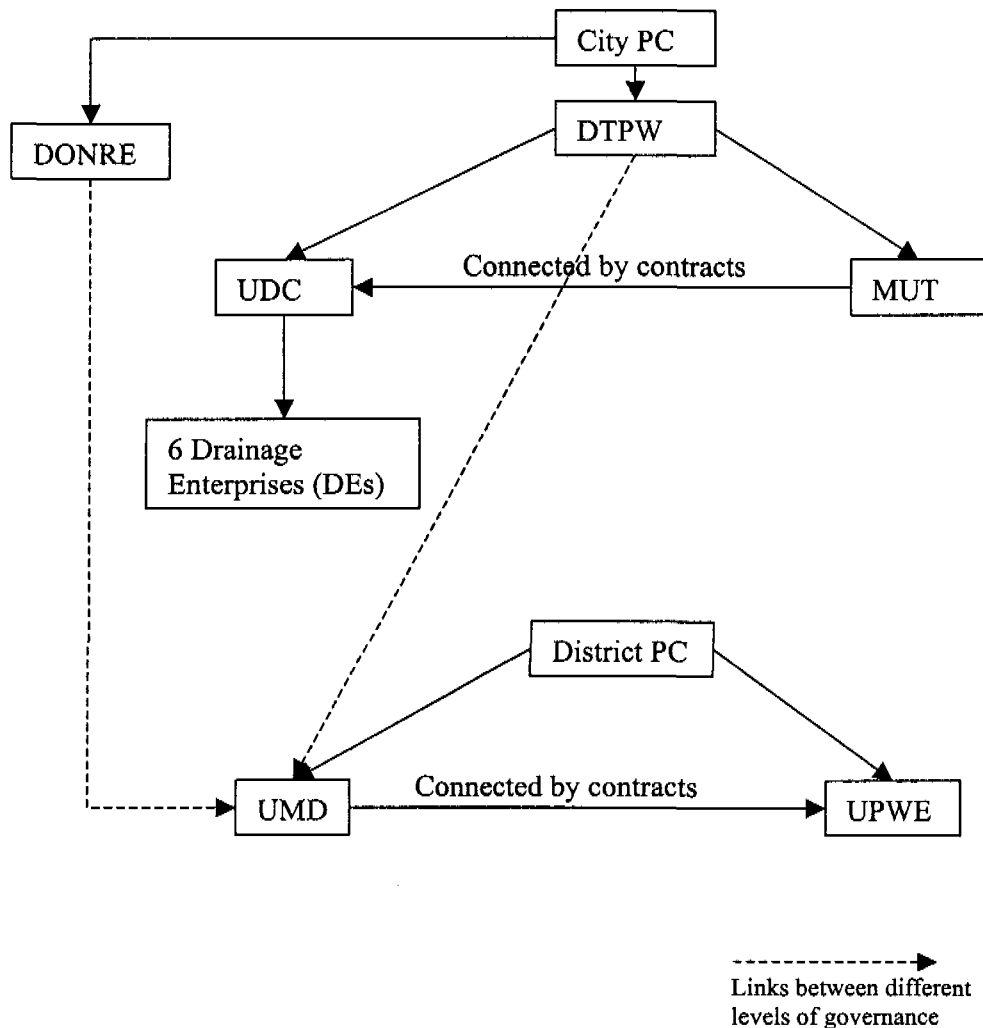
Wards are also headed by PCs. They are the lowest level in the administration structure that can make political decisions. The Ward acts as the functional unit to manage the area. The state companies at the provincial level may outsource their tasks also to the Ward level when necessary by employing a private company.

The Cell is a lower level under the Wards. This is not an administrative level. The Ward assembles the Cell only to deliver announcements and guidelines.

5.3 Management of sanitation and drainage infrastructure in HCMC

The Urban Drainage Company (UDC) is responsible for the maintenance of the main sewerage system. The remaining sewers of 450 km (level 4) are maintained by UPWE of each district. Inside the UDC there are six Drainage Enterprises (DE), each one for a different area that does not correspond with the districts. The UDC distributes the maintenance tasks to the Drainage Enterprises and manages the maintenance tasks of these DE. The Management of Urban Transport (MTU) is in charge of the management of the drainage and sewer systems. UDC signs contracts given by the MTU and later distributes the tasks to the DEs. The following figure (fig. 5.2) shows the different governmental bodies related to sanitation and drainage management in HCM City.

Fig. 5.2 Management of sanitation and drainage infrastructure in HCM City



The UDC can act as a development company in charge of construction of sewerage systems of level 1, 2, 3 and even 4 only if they win bidding for construction that is conducted between different companies.

The households need to ask permission from the governments to connect their septic tanks to the sewer systems. This application goes to the Urban Drainage Company (UDC) and they check if the household comply with all the requirements (quality of the wastewater, characteristic of the septic tank...) to connect to the sewer system. If everything is correct the UDC gives the authorization for the connection.

It is the task of the Urban Management Division of the district and the ward to control during construction and give permission to build the houses and the connections to level 4 (the UMD is only an authorizing body, it does not deal with maintenance).

Sewerage systems from levels 1 (above 1 m diameter) and 2 (600 mm to 1 m) are maintained by the UDC. In each district there is a UDC branch that is in charge of levels 3 and 2 sewerage (tertiary infrastructure). These branches are called "enterprises of urban service". They consist of inspection units for sewerage of levels 3 and 4. Each enterprise has between 300 to 500 personnel. Among their tasks is also to take care of solid waste.

5.4 Policies on Drainage and Sewerage Management

5.4.1 *Environmental laws and standards*

Environmental concerns and developments of environmental legislation and policies in Vietnam began in early 1990s. In December 1993, the National Assembly enacted the law on Environmental Protection also referred to as EPL (JICA, 2000). Infrastructure projects after this date were obliged to follow the context of the law.

All investment projects to be implemented within the territory of Vietnam shall have to apply the Vietnamese Environmental Standard. MONRE and HCM City have issued various environmental standards (table 5.2) for nationwide and City application, respectively. HCM City standards were issued at the time national standards were not yet available. Now as national standards (especially the TCVN series) have been issued, they are to be referred to when appropriate.

Table 5.2 Relevant Vietnamese standards to sanitation and drainage

Standards	Contents
TCVN5524-1995	General requirements for protecting surface water against pollution
TCNV5942-1995	Surface water quality standards for (a) raw water source and (b) general use
TCXD188-1996	Urban wastewater: Standard for discharge

5.4.2 *Drainage/Sewerage management related policies*

Currently in Vietnam there is not a defined law for drainage construction systems. There are only many different regulations. The government has reached an understanding regarding the importance of the existence of this law; it is now in the process of preparation.

The HCM City policies on drainage and wastewater management are directed by the City's Development Plan for the year 2020. This plan was approved by Decree 123/1998/QĐ-TTg signed by the Prime Minister in July 1998. The policies can be summarized as follows (PC HCMC, 2002; PMU HCMC, 2003):

- ❖ Design population in year 2020 for the metropolitan area at 10 million, with the urban population at 6 million.
- ❖ Drainage and wastewater collection policy is to continue using combined drains/sewers in the city core, and to install separate drains and sewers in new development areas.
- ❖ Residential wastewater entering the drainage system must be pretreated in septic tanks to eliminate solids and sludge must be removed from tanks.
- ❖ The flood frequency to be used for design is 5 years for canals and 2 years for close circuits.
- ❖ In the framework of Water Quality policy phased canal improvements are carried out to improve the hydraulic capacity of canals and eliminate wastewater discharges to the canals to allow for self-improvement of the canals' water quality.
- ❖ Sewage treatment policy is to construct, subsequent to the canal improvements, large wastewater treatment plants at suitable centralized sites.
- ❖ Ultimate services objectives are:
 - 95% of population to be connected to the drainage system
 - 100% of polluting industries to provide treatment to their effluents according to the regulations
 - Operation and maintenance cost of drainage and wastewater treatment facilities should be gradually recovered from the system users. Ultimately, recovery costs should be applied to investment.

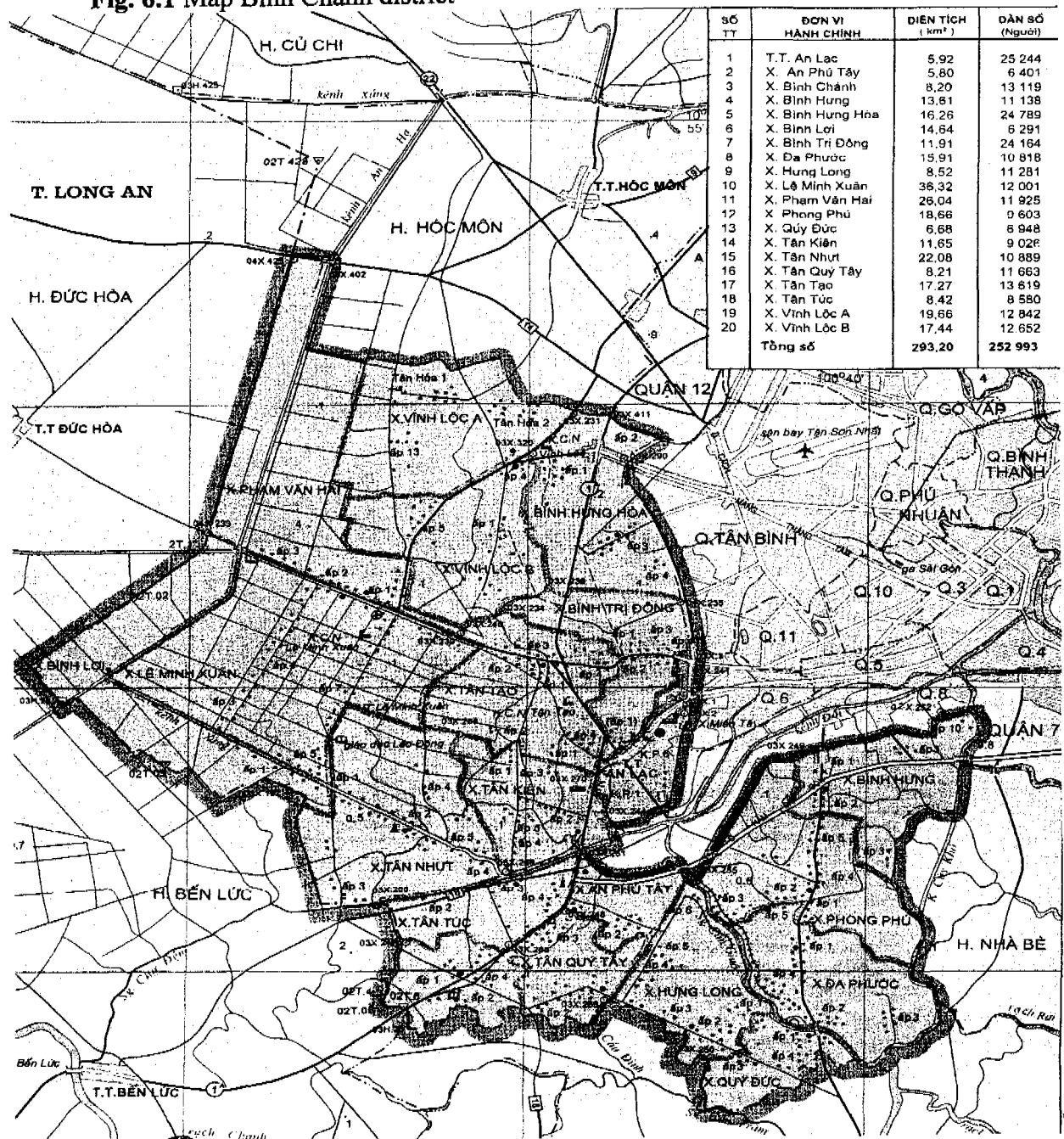
Governments stipulated several legislations as laws, decrees, regulations and decisions related to the sewerage and drainage. However, there are issues which still have to be further completed in detail in the future. Some of these issues are the effluent standards to the public sewer system, the stipulation on connections between private sewers and public sewers systems, the monitoring and inspection of the sewerage discharge, the punishments and penalties against the non-payment case, etc.

6. SANITATION DEVELOPMENT IN BINH CHANH DISTRICT: AN UNPLANNED AREAS UNDERGOING SELF CONSTRUCTION

6.1 Selection of the ward An Lac as survey area

An Lac is one of the main wards of Binh Chanh and is situated next to district 6. The area of An Lac is 5.92 km² and the population is 25,244, resulting in 4,264 inhabitants per km². In Binh Chanh between the ward and the cell there is other kind of local division called KP. There are 7 KP inside An Lac and 184 cells. The average of households in each cell is around 50. Because the huge dimension of the ward, the survey was limited to only one KP, the KP 6. In KP 6 there is exactly 2,397 households.

Fig. 6.1 Map Binh Chanh district



The households for the survey were selected in the KP 6 of An Lac ward due to its representation in the study. An Lac is an unplanned area which is undergoing fast urbanization shifting from rural to urban area. As a research question of this work, the characteristics of this area are interesting to compare with other areas where the urbanization process is already undergone. People's concerns and priorities regarding sanitation and drainage infrastructure in the two areas will be different because the different levels of infrastructure development.

In the whole Binh Chanh district there is almost no drainage system. There is only a drainage system infrastructure in the main street of An Lac (Kinh Duong Vuong) and this drainage system continues along the national highway number 1 to Binh Dien. Usually the wastewater goes directly to canals, small rivers or ponds without treatment.

There is no concrete plan to build the drainage system in the existing constructed areas in the district due to a lack of money. Only in the areas that are developed according to a plan the drainage system is being installed, whereas in the majority of the spontaneous settlements such systems are not considered.

The main management problem in Binh Chanh is the fast urbanization that is undergoing. People move to this district and start to construct without a plan. There are many new spontaneous settlements without the necessary infrastructure. This produces a big flooding problem in the area: the building plots not heightened, lack of space to discharge the wastewater from the houses (when there are few houses there are former rice fields to discharge, when the building density increase there is no place for discharge), etc.

This chapter provides a description of the socio-economic characteristics of the community living in this area, their preferences, priorities and their willingness to pay for projects improvements. The description of the community is derived from a household survey carried out in 109 households, over a 10 days period of time.

6.2 Socio-economic description of the KP 6

The distribution of sample respondents by cells is contained in table 6.1. The original intention was to survey at least two households in each cell. During the survey we had to adjust our plans since 13 cells could not be found in the ward.

Table 6.1 Number of households (HH) interviewed in each cell

Ward An Lac KP 6		
Cell number	HH interviewed in each cell	Percent of HH interviewed
117	4	3,7
118	4	3,7
120	2	1,8
121	3	2,8
122	2	1,8
123	4	3,7
124	3	2,8
125	6	5,5
126	4	3,7
127	3	2,8
128	2	1,8

129	3	2,8
130	2	1,8
133	4	3,7
135	3	2,8
136	5	4,6
137	3	2,8
138	3	2,8
139	3	2,8
141	6	5,5
142	5	4,6
144	1	,9
146	3	2,8
147	3	2,8
148	4	3,7
150	4	3,7
155	3	2,8
156	3	2,8
157	3	2,8
158	6	5,5
159	3	2,8
160	2	1,8
Total	109	100,0

6.2.1 Population and household characteristics

About 70% of the population interviewed in the study area were female and only a 30% were male. This can be because the surveys were done in the afternoons when the men of the households usually are out working. The same percentage, 70%, identified themselves as head of households.

The vast majority of the houses selected for participation in the survey accommodated a single family (94 or 86.2%). Almost 14% of the houses served as residence for two or more families. More than 80% of the houses include 4 residents or more, with an average of 5.8 residents. Of these residents the number of permanent residents is higher than the temporary. More than 60% of the houses do not have temporary residents.

6.2.2 Housing and tenancy

The questions related to housing and tenancy corresponds with the section C of the questionnaire (Appendix 1).

30 of 100 houses in the survey area were built before 1990. 9 of the surveyed house owners did not remember when the house was built. The year 1998 was when more houses were built (12%). 20% houses were built from the 2000 on.

The majority of the households interviewed lived in shop-houses (89%). These houses were built with concrete material (82%) and do not have more than one floor (71%). The size of the building plots varies a lot depending of the income of the household.

Almost any road was paved in the whole KP. Only the biggest road Kinh Duong Vuong and very few alleys more appeared paved. There was one small street called Khu Ngo Y Linh which was paved and heightened by the ward governments to avoid the flooding problem.

In Vietnam, land is property of the people, as represented by the State, which issues permits to use it. The different types of certificates are explained in the Msc thesis of Gali Stamper. Among the sampled households, house ownership certificate is quite high at 35%, followed by land use certificated at 20%. Only 7% of the households have a temporary certificate and 27% do not have official resident certificate. 11% have other type of certificates. Some households for example are waiting for the final certificate and in the mean time the government has given them a hand written paper. 30% of the households having legal certificate obtained it before 1990, 50% after the year 1999 and 15% do not know when they got the certificate.

The main reasons for not having a legal certificate is the long duration of the procedure to obtain it (22.5%), following by the need of other legal documents (12.5%), and the high cost of the certificate (10%). 50% reported other reasons, like they are doing the certificate now, governments do not give it to them for unknown reasons, they do not care about having a certificate or that the house is not of them.

More than 50% of the study area was agricultural land before people moved to live there. 35% reported the land title before moving already as residential area. The land title has been changed since people moved to the area in approximately 50% of the cases and of these this change was applied by own request in the 70% of the households.

Almost all the households sampled are self-owned (96%). Only 4% hired or borrowed their house from a private individual.

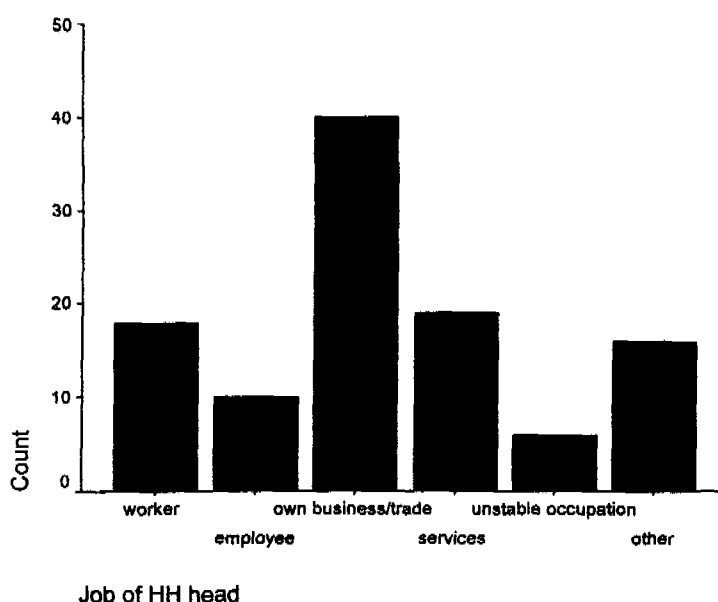
6.2.3 Income and employment characteristics

The survey collected information concerning every member of the household who was working and every member of the household who was unemployed. These questions appear in section B of the questionnaire (Appendix 1).

Of the 109 households interviewed 72% have two or more residents who earn wages, and even a 16% have more than four members earning wages. 82% of the households have at least one member jobless in the house. The average of jobless in the households is two.

The main source of income in the households (Fig 6.2) is people's own business or trade, with a 36% reporting work in this sector. This is followed by public services (17.4%), skilled salaried workers (16.5%) and employee in different companies (8.3%). A 5.5% have an unstable occupation. Almost 17 % of the head of the households were reported as working in other kind of jobs. Of these, 7.3 % are housewife and 6.4 % are retired. Only one person was reported to be a farmer.

Fig. 6.2 Main source of income in the household (HH)



To estimate the household income a question related to the presence of different facilities in the house was asked. The higher income households have, much higher consumption and expenditure patterns. The increased consumption is attributable to larger household size and proportionately more workers, as well as higher wages earned by each worker. 85% of the households reported to have at least three of the mentioned facilities (electricity, motorbike, television, telephone, air conditioner, central heater, refrigerator, washing machine and computer). The most common facilities are electricity and television (91%) and motorbike (87%). These are followed by the refrigerator and the telephone (about 50%).

6.3 Water and sanitation services

The questions regarding water and sanitation services appear in section D of the questionnaire (Appendix 1).

6.3.1 Water services, consumption and cost

The water source of the households in the study area varies with the purpose drinking or living. For drinking water, of all the houses surveyed 40% had wells, 39% used water seller, 11% had piped water with a private meter and 7% use piped water with public meter. For living water, the main source is the wells (80%) and only 10% are water piped with private meter.

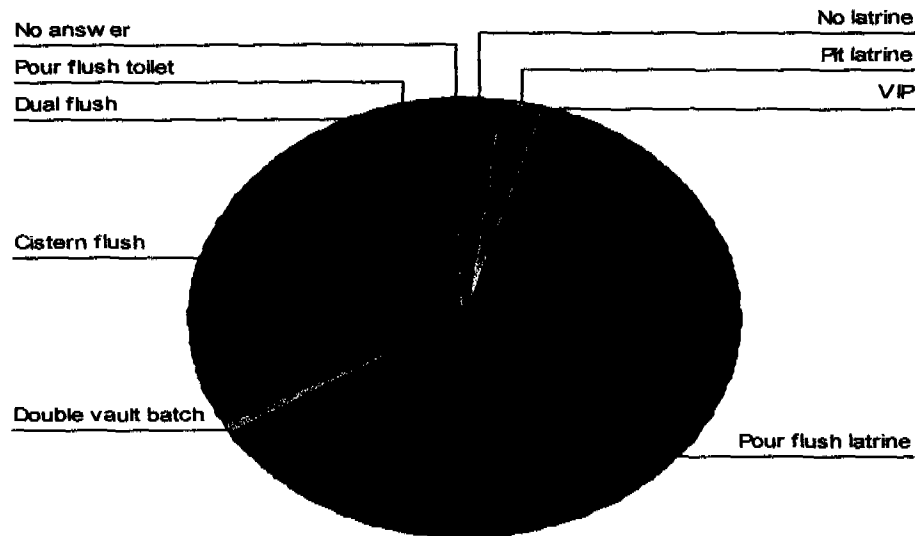
On average, the cost of the water supply is around 4 USD per month. 22% of the people sampled do not pay anything for water supply and 40% pay more than 4 USD.

6.3.2 Sewerage and sanitation

The survey collected information regarding presence of toilets inside the house. Almost in all the cases (97%) there is a toilet inside the house and in 91% of these cases it is connected to a septic tank. Only in 7.5% of the cases the toilet is directly connected to the public sewer. In case of not having toilet inside the house, household members use the canal as a toilet, a hanging toilet on a pond or a neighbour's toilet.

The type of toilet each house has was reported by visual observation of the surveyors (fig. 6.3). The most typical found in the area was the pour-flush toilet (66%), followed by cistern flush toilet (25%). Pit latrines, VIP (ventilated improved pit latrine), double vault batch composting and dual flush were presented in a very low percentage.

Fig. 6.3 Type of latrine



Pit latrine, VIP and double vault batch composting toilets are on-site treatments and pour-flush, cistern flush and dual flush toilets are only types of toilet which require a septic tank as the on-site treatment to follow the regulations. The presence of a septic tank in the houses was reported in almost 94% of the households. This means there is a septic tank in all the households that need to have one. Wastewater from the septic tank was reported to go to the public sewers by 62% of the households, direct to a canal or pond by about 20% and soakage pit by 13%.

The septic tank installation was less than five years ago in 50% of the households surveyed, with the 35% between 2 and 5 years ago. Since the installation, more than 70% never have emptied the septic tank and only 12% less than one year ago.

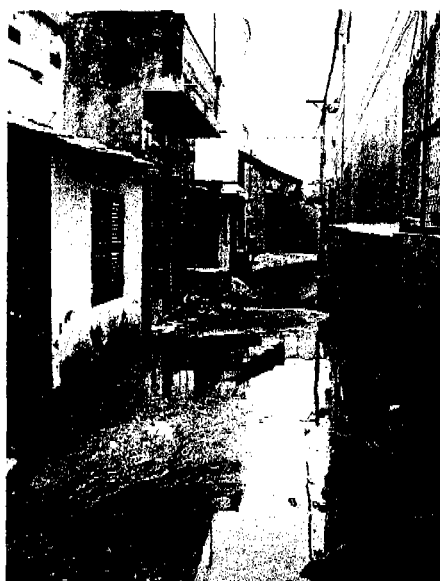
In 86% of the households, the cost of construction the septic tank is unknown. 6% reported to have paid around 100 USD and the rest of the households a higher amount of money. The cost of septic tank maintenance is unknown by 15% of the households and 78% never paid any amount of money for maintenance. Four cases of 102 reported to have paid between 10 and 13 USD for maintenance.

In general the level of satisfaction with the septic tank is quite high, with 77% of the households satisfied. Few households reported problems regarding the septic tank. In 83% of the households the wastewater discharge system had to be constructed by the household members and of these only 19% received help from the ward governments. The help can be in planning, construction itself, funding or consulting. In the cases that the household receive help usually is in planning (40%) or in funding (40%).

6.4 Flooding

One of the primary considerations in the selection of the survey sample for the study area was to include areas that may experience flooding. When speaking about flooding both flooding inside and around the households are included. The questions

Fig. 6.4 Flooding in Binh Chanh District



regarding flooding problems appear in section E of the questionnaire (Appendix 1). In the fig. 6.4 flooding in a small alley of the district is presented.

6.4.1 Sources and intensity

In the survey results 42% of the households said that they experience flooding quite often, 21% sometimes and 6% rarely. Only 30% never experienced flooding. Of those people who responded to suffer flooding problems, when their opinion of the main reason of flooding is asked, most said heavy rain (58%) or a combination between high tides and heavy rains (20%). Almost 20% blamed blocked sewers, the lack of them or floor of the house lower than the street.

6.4.2 House heightening

Of the 109 households surveyed 55% answered to have their building plot heightened. Of those houses heightened the average of heightening is around 83 cm. 20% of the households have been heightened 100 cm and 40% of the houses have been heightened only 50 cm or less as present in the table 6.2.

Table 6.2 House heightening (cm)

cm	Nr/total sample	Percent	Valid Percent	Cumulative Percent
No answer	12	11,0	20,0	20,0
7	1	,9	1,7	21,7
10	1	,9	1,7	23,3
20	2	1,8	3,3	26,7
25	1	,9	1,7	28,3
30	2	1,8	3,3	31,7
35	2	1,8	3,3	35,0
40	1	,9	1,7	36,7
50	9	8,3	15,0	51,7
60	4	3,7	6,7	58,3
70	5	4,6	8,3	66,7
80	1	,9	1,7	68,3
100	12	11,0	20,0	88,3
110	1	,9	1,7	90,0
120	1	,9	1,7	91,7
150	2	1,8	3,3	95,0
200	2	1,8	3,3	98,3
500	1	,9	1,7	100,0
Total	60	55,0	100,0	
No heightening	49	45,0		
Total	109	100,0		

6.5 Health information

The questions regarding health information appear in section F of the questionnaire (Appendix 1).

Almost 70% of the respondent said that they were never or rarely sick during the last year. Less than 6% considered that they were sick relatively often. The most common illness that these families mentioned was flu (fever) (almost 37%) and ears, nose and throat diseases (16%). When asked about the main source of these illness, 45% considered the weather as the main cause, 12% the water pollution and less than 7% flooding, air pollution and flies and insects from garbage.

6.6 Household concerns and priorities

As regards the drainage and sanitation situation, people were asked what the main infrastructure problem in their houses was. They could choose from lack of water supply, poor latrine installation, problems of operating and maintaining the septic tank, uncontrolled discharge of the wastewater, poor connections to the pipes of the sewerage system, flooding or other problems. This corresponds with the section G of the questionnaire (Appendix 1).

What people choose as their main infrastructure problems is presented in table 6.3. The most frequent problems are the lack of water supply (43%) and flooding (27%). Almost 5% consider that there are no infrastructure problems around their houses.

Table 6.3 Main infrastructure problems

	Nr/total sample	Percent	Valid Percent	Cumulative Percent
Lack of water supply	47	43,1	43,1	43,1
Problems in O&M septic tanks	3	2,8	2,8	45,9
Uncontrolled discharge of the wastewater	14	12,8	12,8	58,7
Poor connection to the pipes of the sewerage system	10	9,2	9,2	67,9
Flooding	29	26,6	26,6	94,5
Other	6	5,5	5,5	100,0
Total	109	100,0	100,0	

The households were also asked what they felt would be the most important action to improve their quality of life. The opinions are presented in table 6.4. In response, clean water supply and stopping flooding were the first and second priorities, accounting for around 67% of all responses. Improve the connection to the pipes of the sewerage system was reported by 14% and 15% mentioned other actions like to install a sewer system, build water supply pipes or clean the small canals of the area.

Table 6.4 Action for improving quality of life

	Nr/total sample	Percent	Valid Percent	Cumulative Percent
Clean water supply pipes	46	42,2	42,2	42,2
Improve latrines in the houses	2	1,8	1,8	44,0
Improve septic tank conditions	2	1,8	1,8	45,9
Improve connections to the pipes of the sewerage system	15	13,8	13,8	59,6
Flood prevention measures	27	24,8	24,8	84,4
Other	16	14,7	14,7	99,1
No answer	1	,9	,9	100,0
Total	109	100,0	100,0	

6.7 Willingness to pay for improvements

An important purpose of the household survey was to assess the priorities of the study area beneficiaries and to what extent these might be translated into a demand and a willingness to pay for improvements. This also corresponds with the section G of the questionnaire (Appendix 1). The results of the survey show that almost all the households (83%) have willingness to improve the drainage and sewerage systems of the area. When asked those how much money they would be willing to pay, there is a difference between those who are willing to pay an amount per month for improving their situation and those who only want to pay one time. Of the households willing to pay per month 16% would pay more than 100,000 VND (6.5 USD), 17% between 51,000 and 100,000 VND (between 3.3 and 6.5 USD), 15% between 31,000 and 50,000 VND (between 2 and 3.3 USD), 17% between 10,000 and 30,000 VND (between 0.65 and 2 USD) and around 3% less than 10,000 VND (0.65 USD). 12% of the households reported that they would pay an amount per month depending on the quality of the improvements or the amount that other people pay for similar improvements. 20% only want to pay an amount of money one time. The majority of these cases do not mind the quantity if it is only one time. All this information is represented in the table 6.5.

Table 6.5 Willingness to pay for improving each month

	Nr/ total sample	Percent	Valid Percent	Cumulative Percent
Less than 10,000VND/month	3	2.8	3.3	3.3
10,000/30,000VND/month	15	13.8	16.7	20.0
31,000/50,000VND/month	13	11.9	14.4	34.4
51,000/100,000VND/month	15	13.8	16.7	51.1
More than 100,000VND/month	14	12.8	15.6	66.7
Depends of different factors	11	10.1	12.2	78.9
Pay only one time	18	16.5	20.0	98.9
No answer	1	,9	1.1	100.0
Total	90	82.6	100.0	
People not willing to pay	19	17.4		
Total	109	100.0		

Regarding the 17% households not willing to contribute about a half said that they are satisfied with the current level of infrastructure. Some said they are not satisfied with the infrastructure but do not have willingness to improve (3%) or that the improvements are government's responsibility (3%). Only 2 of the 109 households reported not to have enough money to contribute.

6.8 Problems of the questionnaire

The questionnaire, due to our lack of experience carrying out socio-economic surveys, had different problems when it was prepared. On one hand, there were some questions which answers were unknown and options could not be given. On the other hand, some questions were not considered relevant and were not included in the questionnaire but later we realized of their relevance. Some information, which could have been relevant for the research, was observed lacked or asked in an incorrect way.

For example, an option that was left out of the questionnaire is the roads and alleys improvement. This was not included as an option of the questionnaire when asked regarding main concerns and priorities of the community. Although maybe the roads condition is one of the main concerns, if it is not given as an option it will not be mentioned. Other questionnaires carried out by other organizations and institutions in other districts included this option and roads were mentioned as a main concern by a high percentage of the population.

Other example of questions which could not be included in the survey is the income of the households. The income could not be asked because of the low-acceptability that this question has in the community. A general idea of the income had to be estimated by the number of facilities that the community mentions to own in their houses.

The majority of the problems were solved thank to the help and knowledge of the local people. The "Center for Social Development and Poverty Reduction" was a big source of information regarding the best way of prepares and carries out the survey. All the problems about ways to ask the questions and options to give in each question were solved.

6.9 Discussion

Binh Chanh is a district in the transition from rural to urban area where there is almost no drainage system. As the level of urbanization in the district is quite low, there is still enough space to discharge the wastewater around the households causing the formation of ponds or dirty canals. The problem is the number of housing is increasing rapidly, and in few years there will not be sufficient space to discharge the wastewater between the houses.

The main problem considered by the community is the lack of water supply. People demand water supply by pipes because usually they obtain the water from a well or a water seller. To buy the water from a seller is very expensive and to get it from a well does not ensure a high quality. The second big concern of the community is the flooding. The survey was carried out at the end of the rainy season but still the area was full of pools caused by a combination of heavy rain and a lack of drainage system. The flooding level varies depending on the cells but in the biggest no paved roads the pools were quite big. Surprisingly, although flooding was defined by stakeholders as the most acute problem related to sanitation and drainage in the city, the percentage of households that mentioned flooding as the biggest concern was quite low percentage (25%).

As shown in the results of the survey, almost all the households have a toilet inside the house and a septic tank. A problem that can be detected regarding the septic tanks is that they are not in good condition due to the lack of desludging considering the

year of installation. This supposes a problem because in many households the septic tanks discharge to the environment with just the limited treatment they provide and if they are clogged this treatment is still more limited. These septic tanks are not connected to the sewer system because there is no presence and no intention to build this system in almost any part of the ward.

The problems related with the wastewater discharge were mentioned as the third priority of the community. This is what was expected because if people do not have a good water supply system they will not care about not having a wastewater discharge system. Without recognition of the importance of good sanitation, there can be no concerted effort to provide improved services.

In a European point of view the environment of the area can be considered really unhealthy but when asked regarding the frequency of water and excreta related diseases in the area is very strange that the lack of sanitation and drainage infrastructure do not produce important sickness.

Another important purpose of this survey was to get information about the willingness to pay for improvements. The results obtained shows that the majority of the population is willing to pay. As mentioned before, around 75% of the households would pay more than 10,000 VND (0.65 USD) per month. If this amount of money is compared with what people pay now as wastewater fees (264VND or 0.017 USD per m³ water consumption, considering 150 m³ of water consumption, people pay 39,699 VND or 2.6 USD per year and per household) is very high amount of money. The wastewater fees could be increased and more money could be spent by the governments in water supply, sanitation and drainage improvements.

The households surveyed were quite willing to answer the questionnaire because they thought that their contribution could help to improve their situation. It illustrates, in my opinion, their willingness to improve their situation.

6.10 Conclusion

This chapter supposes an answer to the main research questions of the research. The objective of the survey is to see what are the viewpoints and concerns of a community living in a peri-urban area undergoing urbanization.

The information obtained in this consultation activity was proved very useful for projects development in the area. Community's awareness and people's willingness to contribute for improvements are the key aspects to be considered for the planning and implementation of upgrading sanitation and drainage projects.

Communities are important partners in the sanitation sector. As consumer groups, communities, irrespective of their income status, can play a significant role in ensuring cost recovery and, thereby, sustaining investments in the sector. Communities can also play an important role in improving the efficiency of service provision and management in the sector.

The main conclusion got with this socio-economic survey is that all projects regarding water supply and prevention of flooding in the area will be highly accepted by the community and the willingness to contribute in the implementation or maintenance of these projects would also be high. Projects not related to water supply or flooding

prevention would not have so high acceptance. The wastewater fees of the area could be increased and the community would support this increase whereas the fees would be destined to improvements in sanitation and drainage infrastructure. In some cases (20%), the community would be only willing to pay for the installation of the infrastructure but not for the maintenance. This is because these people think that the maintenance should be government's responsibility.

Consultations with communities with a view to assess their effective demand (affordability and willingness to pay) for the services help service providers to understand community preferences and to move away from top-down planning to participatory planning approaches.

7. UNPLANNED EXISTING AREAS: TAN BINH DISTRICT

7.1. Selection of the ward 19 as survey area

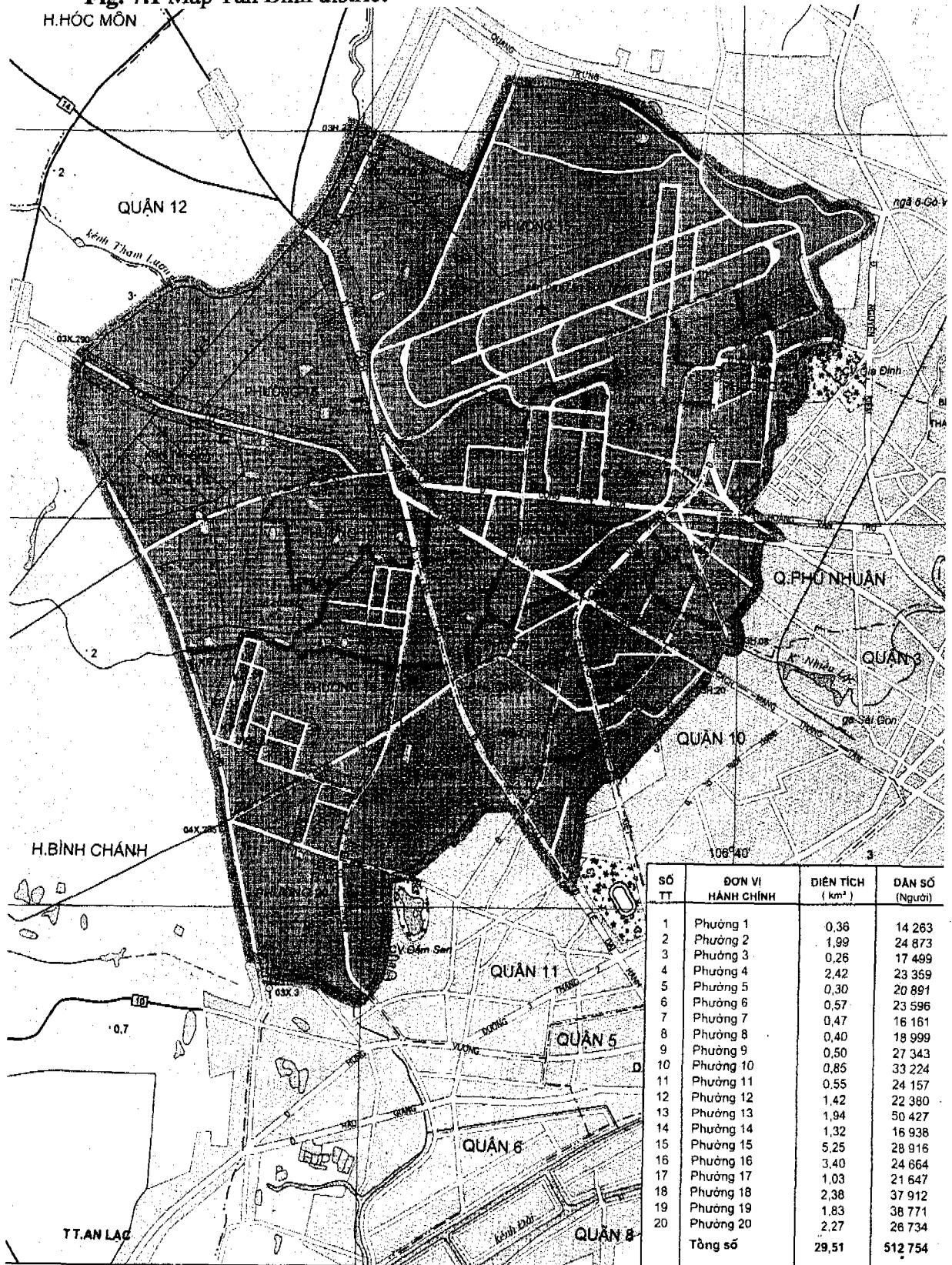
Tan Binh district in HCM City is considered as one of the nine newly urbanized districts. Tan Binh is crossed by the Tan Hoa-Lo Gom Canal, one of the most polluted canals in the city. The sources of the pollution are both domestic and industrial waste discharges. On June 25, 1997, the Governments of Belgium and Vietnam signed a specific agreement for the "Tan Hoa-Lo Gom Canal Sanitation and Urban Upgrading Project" in HCM City. A household survey was defined as a study project aimed at addressing the problems in a comprehensive manner through a participatory approach. This survey was conducted by the "Center for Social Development and Poverty Reduction" and the results obtained are used in this chapter as source of information.

The overall objectives of the Tan Hoa-Lo Gom project, which include Tan Binh district, are to improve the quality of life of the people living in the canal basin and to strengthen the institutions and authorities dealing with problems related to environment and urban planning. From an infrastructure point of view, the main objective of the study is to investigate the urban drainage problems along the Tan Hoa-Lo Gom Canal and to suggest possible means of floods control and reduction of the flow rate of storm water runoff. The project intends to integrate several development strategies to meet its goals, including among other things wastewater treatment, solid waste collection, institution building, job creation, capacity building, community development and urban revitalization.

From the different wards surveyed by the CSDPR, the ward 19 of Tan Binh district was identified as relevant for the research after several excursions to the area. This ward shows a chaotic urbanized area with a lack of a good drainage and sewerage infrastructure. It is part of the objectives of the research to compare people's concerns and priorities in this ward and in a ward of Binh Chanh. The narrow streets in the ward 19 were very striking, even on the main roads. At the moment the city is widening some parts of the main traffic roads (because of the coming SEA games in December 2003). Inspection showed that most drainage pits were clogged. The houses are built on very narrow paved alleys except in the main road. It is obvious that the house owners did not follow any plans while building. In many places there is no possibility to pass through even with the motorbikes due to sudden set of steps in the way. It is also visible that this was a rural area recently; some graves commonly found in rural areas were noticed suddenly in the middle of an alley.

The area of the ward 19 is around 1.83 km² and the population 38,771, resulting in a population density of 21,186.3 inhabitants per km². As said before, the number of households surveyed in the ward 19 was 285, which is enough to compare with the 109 households surveyed in Binh Chanh district.

Fig. 7.1 Map Tan Binh district
H.HÓC MÔN



7.2. Socio-economic description of the ward

The distribution of sample respondents by cells is contained in table 7.1. The cells surveyed were located along the Tan Hoa-Lo Gom Canal.

Table 7.1 Number of households (HH) interviewed in each cell
Ward 19 Tan Binh

Cell	Number of HH interviewed	Percent of HH interviewed
1.00	1	.4
53.00	16	5.6
57.00	12	4.2
58.00	14	4.9
59.00	23	8.1
61.00	7	2.5
62.00	9	3.2
70.00	12	4.2
71.00	11	3.9
72.00	11	3.9
73.00	8	2.8
74.00	10	3.5
75.00	11	3.9
76.00	4	1.4
77.00	4	1.4
78.00	6	2.1
79.00	8	2.8
104.00	8	2.8
105.00	10	3.5
106.00	7	2.5
107.00	6	2.1
108.00	9	3.2
112.00	14	4.9
113.00	7	2.5
123.00	7	2.5
124.00	12	4.2
125.00	11	3.9
126.00	12	4.2
127.00	1	.4
130.00	7	2.5
131.00	3	1.1
132.00	4	1.4
Total	285	100.0

7.2.1. Population and household characteristics

A basic description of some of the characteristics of the ward under consideration can be found in the 1999 Census of Vietnam data. The total population in the ward 19 was 48,292, of which 23,546 are male and 24,746 are female.

285 households in the ward were surveyed and among their population 39% of the respondents were male and 61% were female. A little bit more than half of the respondents (53%) identified themselves as head of the household. The exact number of people living in each household surveyed was not asked in the CSDPR survey.

The vast majority of the houses include only one household, with only a 6% that include two households or more.

7.2.2. Income and employment characteristics

The survey collected information concerning the members of the household who were working and the members of the households who were unemployed. Of the 285 households interviewed, all except five reported at least one wage earner. A high percentage (75%) has two members or more earning wages. This represents an average of 2.25 wage earners per household.

Regarding the jobless, 13.5% of the households have at least one member unemployed. Of those jobless, 41% have only one member of the household without a job.

The average per person income and the total household income were calculated for the whole ward asking the people the income of all the household members. The average of the income per person per household was 723,000 VND per month (around 47 USD) and the average of the total household income per month was 2,851,000 VND (184 USD).

7.2.3. Housing and Tenancy

Each respondent was asked when was his or her house built. Around 70% of the houses were built from 1992 to present. There is a quite high percentage of the respondents (12.5%) who do not know when the house was built.

Of the 285 households included in the survey, 52% reported that they have no legal certificate (the different types of certificates are explained in the Msc thesis of Mrs. Gali Stamper). About 28% have house ownership certificate, 9% temporary certificate and 8% land use certificate. Those without a legal certificate were asked why they did not have the appropriate certification. The majority (41%) answered they simply have no legal documents. In addition, only 5% said it was too expensive to get the certificate.

Almost all the households reported that the house was self-owned (92%). Over 6% were rented from a private party and the rest do not know or reported other ownerships.

7.3. Water and sanitation services

7.3.1. Water services, consumption and cost

The majority of the households get their water from a well. This is true regardless if the water is from drinking or for living. About 71% of the households get the drinking water from a well, 15% from a private piped service with water meter and around 10% from a water seller. In the case of the water for living activities, more than 80% get it from wells and 15% from a private piped service with water meter.

7.3.2. Sewerage and sanitation

Almost all the households (98%) have a toilet inside the house and in 66% of those cases the toilet is connected to a septic tank. In 31% of the cases the wastewater from the toilet goes directly to the public sewer. The households who do not have toilet use the ground around the house. The type of toilet cannot be reported because it was not asked in the CSDPR survey.

A septic tank inside the house was reported by 95% of the households of the area. In the houses with septic tank the wastewater goes to the public sewer in 66% of

the cases, to a second septic tank in 6%, to septic tank-sewer-canal in 23% of the times and only in 1% the wastewater is soakage pit. When there is no septic tank the wastewater is thrown outside the house without any treatment.

In more than half of the households interviewed the septic tank was never emptied. Less than 13% of the households emptied the septic tank less than 5 years ago. 13% of the households did not answer this question.

7.4. Flooding: sources and intensity

Only 6.3% of the households in the ward reported to have flood during the past year. Of those 72% reported two or less days per month with flooding problems. The level of the water in 83% of these households never exceeds 10 cm. In almost half of the households surveyed, the water reaches 5 cm. The main source of the flooding is the heavy rain mentioned by 94% of the flooded households, followed by the floor lower than the street (56%), high tide and blockage of the sewer (11%) and no sewer (6%).

7.5. Health information

More than half of the households surveyed (64%) reported that at least one member of the family has been sick last year. Of this percentage, 61% consider the sickness related to the conditions of the area where their live: 52% related to the air pollution, 4% related to water pollution, 3% related to flies and insects from the garbage and 1% related to the flooding.

7.6. Household concerns and priorities

Regarding household concerns and priorities, 24% reported as major problems for the family poor infrastructure in the area and 23% poor sanitation and housing conditions. There is a 21% of the households surveyed who consider no problem in their families. Around 22% consider as problems the unemployment, the low income of the family, bad debts, sickness, flooding or no security in the area, as shows in table 7.2.

Table 7.2 Main problem in the households Ward 19 Tan Binh District

	Nr/total sample	Percent	Valid Percent	Cumulative Percent
No, Don't Care	60	20.8	20.9	20.9
Unemployment	6	2.1	2.1	23.0
Low Income	29	10.1	10.1	33.1
Bad Debt	3	1.0	1.0	34.1
Sickness	10	3.5	3.5	37.6
Flooding	7	2.4	2.4	40.1
Poor Conditions	65	22.6	22.6	62.7
Poor Infrastructure	70	24.3	24.4	87.1
No Security	11	3.8	3.8	90.9
Other*	26	9.0	9.1	100.0
Total	287	99.7	100.0	
Missing system	1	.3		
Total	288	100.0		

In the same context, it was asked what households consider the two most important things which should be done to improve the quality of life of the family. As first infrastructure improvement, 62% of the households answered clean water supply pipes and around 28% answered other needs as better sewerage or wastewater disposal, more flood prevention measurements, better garbage collection systems and others. The rest (10%) did not express any need for improvements.

When asking a second infrastructure improvement, 40% consider improving the roads and alleyways as the first second option, followed by better garbage collection systems (9%) and better sewerage or wastewater disposal system (6%). 35% of the households did not answer this question for different reasons.

7.7. Willingness to pay for improvements

A quite high percentage of the households (77%) in the study area reported to be willing to contribute to the construction and maintenance cost of better infrastructure to prevent flooding and improve water supply or sewerage systems for instance.

Of those willing to contribute for improvements, 92% of the households only are willing to pay 30,000 VND (around 2 USD) or less per month. Only 1.5% would be willing to pay more than 50,000 VND (3.3 USD) per month. How much people are willing to pay is shown in table 7.3.

Table 7.3 How much money people is willing to pay monthly

	Frequency	Percent	Valid Percent	Cumulative Percent
< 10,000 VND	86	29.9	39.1	39.1
10,000 - 30,000 VND	116	40.3	52.7	91.8
31,000 - 50,000 VND	15	5.2	6.8	98.6
51,000 - 100,000 VND	2	.7	.9	99.5
> 100,000 VND	1	.3	.5	100.0
Total	220	76.4	100.0	
Missing system	68	23.6		
Total	288	100.0		

The main reason not to be willing to contribute to improvements is not to be able to afford it, mentioned by 61% of the households. Other households reported improvements should be government's responsibility (21%), satisfaction with current level of provision (9%) and not satisfaction with the current level of provision but willing to pay lower than willing to improve (8%).

7.8. Problems of the questionnaire

As said before, the socio-economic questionnaire was adapted from the CSDPR survey. Several questions were not relevant to the purpose of this research and were not considered. Other questions that would have been relevant for us were not included in the CSDPR survey and then this information is lacking in the research.

Examples of relevant questions lacking in the questionnaire are the number of people living in each household, type of house, heightening of the building plot, amount of money paid for water supply, etc.

The CSDPR survey was prepared by social experts but not by technologist. This means the knowledge regarding water, sanitation and drainage infrastructures is not very high. This can be noticed in the way some technical questions are formulated and the inconsistency found in some answers. For example in the question regarding where the wastewater goes after a septic tank (question 21b of the questionnaire, appendix 2) the options of answer given are not clear: septic tank, self-drain, direct to public sewer or to septic tank, sewer and canal. It can be seen that the concepts regarding the sanitation infrastructure are not clear for the CSDPR.

Other problem regarding the CSDPR survey is that the original language of the questionnaire was Vietnamese. In this research was used an English translation but this translation was not very reliable due to the low level of English of the translators.

7.9. Discussion

Tan Binh is one of the urban district where there are spontaneous settlements. The chaotic unplanned buildings with narrow alleys create physical problems in infrastructure development. In this district, and in other with similar characteristics as Binh Thanh, district 6 or district 11, sanitation and drainage infrastructure is not sufficient.

As said before, in Tan Binh almost all the households interviewed reported to have a toilet inside the house and the wastewater goes to a septic tank. Almost all the household reported to have a septic tank (95% or 273 households) but the percentage of toilets connected to the septic tank is lower in this district than in Binh Chanh. Only 66% (or 190) of the households with toilets have them connected to the septic tank. This means that the black water from the households is not connected to the septic tank. This issue was mentioned by Miss Mai Do Thuy Dung from Van Xuan (pers. comm., 24/9/03) as one of the main problems regarding the self-connections to the sewer system make by the households.

In Tan Binh the majority of the wastewater from the septic tank (almost 90%) goes to the public sewer. In Binh Chanh this percentage is lower, around 60% of the households are connected to the sewer system.

An emerged problem that is happening in both districts is the lack of emptying the septic tank, which produces no retention of solids and the wastewater arrives to the public sewer without treatment. Although this wastewater not treated may produce indirect problems it is not considered a problem for the community.

Regarding the health information, this area differs from Binh Chanh. In Tan Binh more than half of the households consider to have been sick last year where in Binh Chanh this percentage was really low. Most of the people who reported been sick in Tan Binh last year connected the source of sickness with the air pollution of the area were they live. The percentage of households who related it to water or sanitation issues is very low. This means that, at least in the opinion of the community of the ward, sanitation and drainage improvements are not going to involve an increase in the health of the community. This result corresponds with the general opinion in all HCM City, which is quite strange seeing how sanitation conditions are in and around the houses.

The biggest concern or priority mentioned by the households is different depending on the district. There is a quite big group of people that considers there are no problems in the area where they live. But when asking about the problem most needed of a solution to improve their quality of life, to clean water supply pipes is the most common answer.

In Tan Binh it is seen that people priorities are in the air quality and in the water supply field. The importance given by the households to sanitation and drainage development is lower. However, people give quite high priority to improve the roads and there is a relation between the drainage infrastructure and the roads. In Binh Chanh, questions regarding air pollution or roads and alleys improvement were not asked, and

then they can not be considered as a difference in the concerns between the two districts.

Almost all the households have willingness to pay for improvements but this can be because the question includes improvements in not only the sanitation or drainage field, if not in water supply too. The wastewater fees are 264 VND (0.017 USD) per m³ of the water consumption (Mr. Khanh meeting 8/10/2003). Considering a household uses 150 m³ of water per year; 39,700 VND (2.6 USD) have to be paid as wastewater fees per year. If the willingness to pay is compared with this amount of money the willingness to pay can be considered very high. This means that the wastewater fees could be increased in the area and this money used for improvements in water supply, sanitation and drainage infrastructure.

Anyway, the amount of money people willing to pay per month is lower in Tan Binh than in Binh Chanh. This can be because in Binh Chanh there is less sanitation and drainage infrastructure and they would pay to install it.

7.10. Conclusion

The socio-economic survey used in Tan Binh district, as the Binh Chanh survey, is used to answer the first research question of this report: the priorities and concerns of the users and their willingness to pay for improvements. The objectives of the research are to compare these concepts in the two different districts mentioned.

When thinking in the expansion of sanitation systems, it will not be possible unless an institution or group of individuals, preferably the intended users, are willing to pay for the new facilities required. Even when facilities have been provided, they will fail later or sooner unless funds are available to cover their ongoing operation and maintenance cost.

The community survey indicates, broadly, acceptance by low and middle income residents of Tan Binh of the need to pay for sanitation. However, this willingness depends on the delivery of services which are perceived by users to offer 'value for money'. It is higher the willingness to pay for water supply improvements or for the installation of roads and alleyways. The amount of money the community is willing to pay is quite high when comparing with what is actually been paid as wastewater fees.

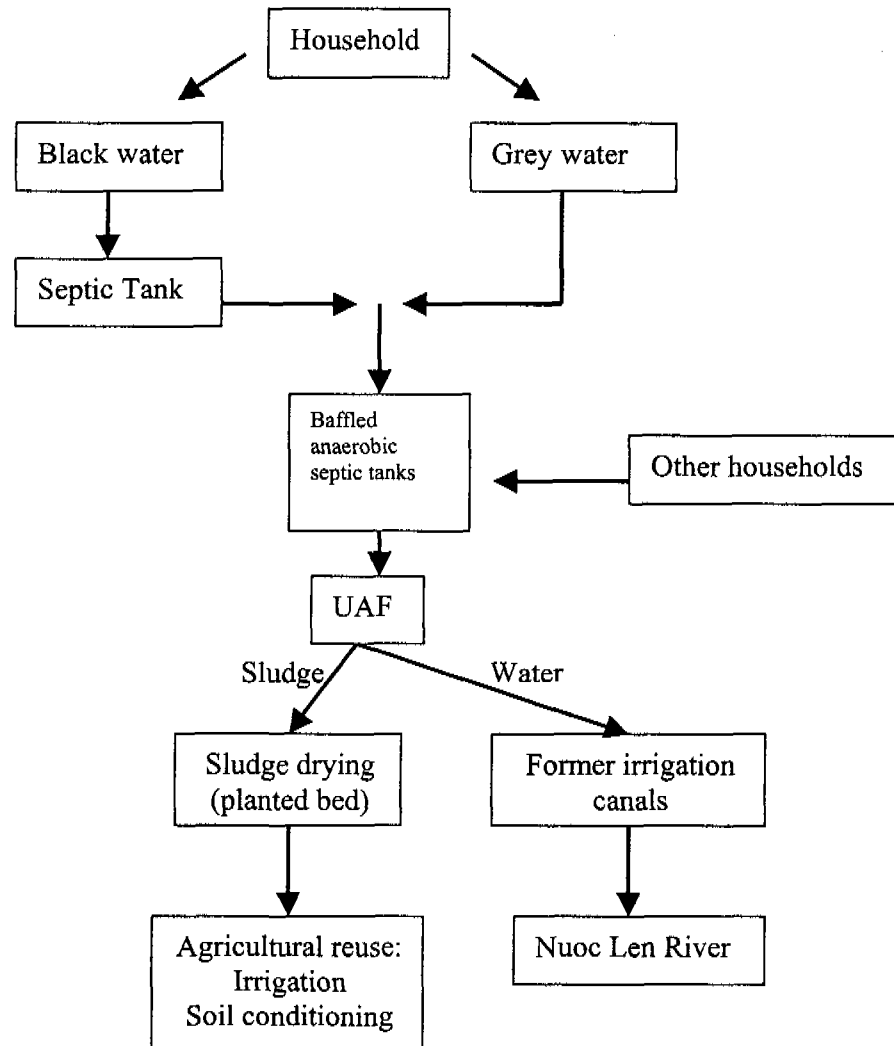
The results of the survey presented in this chapter can be analysed to determine significant factors to consider in the provision of sanitation technologies for the community.

8. TECHNICAL OPTIONS TO SANITATION DEVELOPMENT IN TAN BINH AND BINH CHANH DISTRICT

8.1 Binh Chanh District

In Binh Chanh district, decentralized low-cost community on-site and small-scale systems seem particularly useful because large-scale sewage collection systems are unaffordable, and a sanitation (with or without resource recovery) solution has to be found.

Fig. 8.1 Separate system: proposed sewerage in Binh Chanh District



Combined and separated sewer systems are explained in the MSc thesis of Gali Stamper. In a district with the characteristics of Binh Chanh district a separation of stormwater and wastewater is chosen as the best type of sewerage system option (fig. 8.1) because this system is more suitable for areas with an irregular and excessive rainfall. For economic and practical reasons it is very difficult to use a combined sewer system for the enormous stormwater flows observed in HCM City during half of the year. For example, in separate sewers the wastewater treatment work will be smaller, the flooding will be by stormwater only, the wastewater and storm sewers may follow

own optimum lines and depth (for example, stormwater to the nearby open ditches), and so on.

At the moment, in the peri-urban areas of HCM City, the conventional (combined) sewerage is strongly questioned. Authors with experienced in developing countries find that sewerage systems are hardly economically feasible (Kalbermatten, 1982; Varis and Somlyodi, 1997; Serageldin, 1995; van Buuren and Handers 2003). Since affordability is a crucial factor, simplified (or condominial sewerage) could be a better option in these peri-urban districts as Binh Chanh.

Simplified sewerage should collect all household wastewaters (toilet waste and sullage) in small-diameter pipes laid at gradients as flat as possible. The sewers should be laid inside the housing block or, since in Binh Chanh there is almost no paved roads, under the sides of the streets (or sidewalk when the case), rather than in the center of the road as with conventional sewerage. According to the literature (van Buuren and Handers, 2003), this condominial sewerage is suitable for existing unplanned low-income areas as Binh Chanh district.

Since the households in both Tan Binh and Binh Chanh districts have already a toilet or latrine (the majority a pour-flush toilet), it is assumed that these systems will also be predominant in the future and that it is not useful to change them for other types of on-site treatment latrines (like a ventilated improved latrine or double vault composting toilet).

Almost all the households have already a septic tank. The most cost effective option will be to maintain the septic tanks (Butler and Davies, 2000). Only the black water of the households (wastewater from the toilet flush with urine and faeces) is connected to the septic tank. The grey water (water from the kitchen, laundry or shower) would join the black water stream after this has left the septic tank. The separation of the two streams is mainly due to two reasons. The first reason is that almost all the solids that are settled in the septic tank are presented in the black water. Another reason is the advantages that the treatment of only a small amount of water in the septic tank supposes. If the grey water will be included in the septic tank treatment, the retention time of the septic tank would be reduced in a high degree and the treatment would lose efficiency.

An important issue regarding septic tanks is the type of tank used. There are two types of septic tanks defined in the City Master Plan for sewerage and drainage (1999); standard septic tanks and non-standard septic tanks (fig. 8.2). These types of septic tanks are described in MSc thesis of Gali Stamper. There is a need for at least two chambers since in the last chamber a quiescent zone with minimum mixing is created for better treatment and sedimentation. Each additional chamber in the septic tank creates more contact between the sludge and the water, resulting in a lower content of BOD in the effluent. It has to be checked the type of septic tanks that each household has, trying that all the septic tanks follow the regulations of at least two chambers.

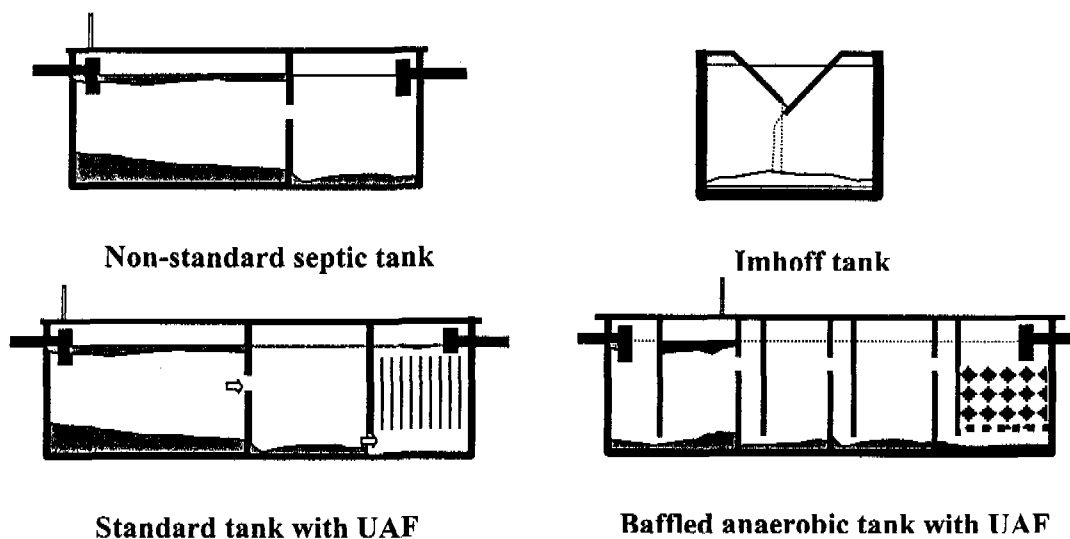
There is a need of maintain the septic tank in good condition. In both Tan Binh and Binh Chanh district a lack of emptying the septic tanks was observed. The majority of the septic tanks are clogged or full and the wastewater is discharged into the environment without treatment. It is necessary to avoid the clogging of the sewer system produced due to the solids that arrive to the sewer and the low quantity of water used to

flush the toilets. It is important to keep the tanks accessible to vehicles in order to perform maintenance.

Improvement of septic tanks implementation and performance may be reached by using professional labor assigned only for these issues. Local specialized teams can be in charge of implementation and maintenance on an area they have the capacity to control and in this way enlarge the capacity of the local government. It is important to mention that there are certain bodies in HCM City that perform septic tank maintenance, but ordering them should be by the initiative of the household. Using a better marketing technique, involving local authorities and maybe even using incentives, such actions will result in more usage of this service.

The black water and the grey water streams will join after the septic tank treatment of the black water in the septic tank. The combined wastewater stream will mix with the streams from others households and will receive a community on-site treatment to increase the efficiency of the treatment. The treatment system scale is between ward and household on-site treatment and it is necessary because the treatment of the septic tank does not have a high efficiency due to the lack of emptying.

Fig. 8.2 Septic tanks



Local communal treatment units (fig. 8.2) may consist of a communal septic tank, septic tank with an UAF in its last chamber, Imhoff tank or Baffled tanks (Sasse, 1998; see Gali Stamper MSc thesis for further explanations regarding these technologies). The strengths and weakness of these treatments are show in the table 8.1. Advantages of these units are that they are quite low-tech, easy to construct and there is no need for highly knowledgeable personnel to perform O&M. Some major drawbacks are that it is hard to control the effluent parameters and there is risk of pollution; furthermore, these may not suffice in cases of highly dense populations. Finally, there is need to perform sludge removal and treatment in other facilities, this also increases investment and O&M costs.

Table 8.1 Summary and comparison of the suggested on site treatment units

Type	Area requirements [m ² /m ³ daily flow]	Removal rates of BOD [%]	Advantages	Disadvantages
Septic tank	0.5	25-50	Simple, durable, little space required due to underground location	Effluent not odorless, construction and maintenance may prove difficult, regular desludging required, facilities for sludge disposal needed
Imhoff tank	0.5	25-50	Durable, little space required due to underground location, odorless effluent, little maintenance required	Need of desludging, skilled workers for construction
Anaerobic filter	1	70-90	High treatment efficiency, little space required due to underground location	Costly in construction due to filter material, possible blockage of filter, slight odor of effluent
Baffled tank	1	70-90	Simple, durable, high treatment efficiency, little space required due to underground location, low chances of blockage, cheaper than Anaerobic filters	Requires larger space of construction, less efficient with weak wastewater (diluted), longer start up phase than other technologies

(Data taken from Sasse, 1998 and Loetscher, 1999)

The removal efficiency fall into a range since they depend on several parameters that vary in different conditions (e.g. temperature, wastewater composition and retention time).

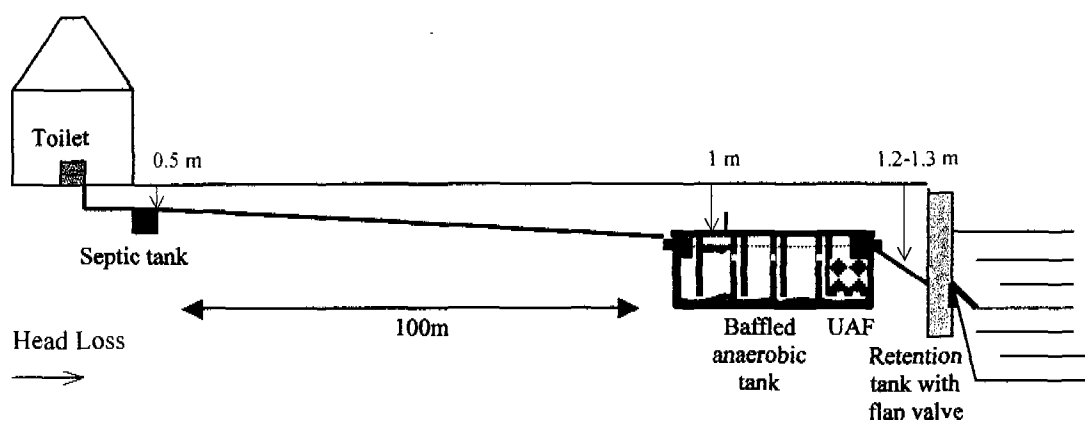
After analyzing all these treatments the most suitable option for Binh Chanh district is the baffled anaerobic septic tanks with an UAF (up-flow anaerobic filter) as a post-treatment. Baffled septic tanks and anaerobic filters give the highest treatment efficiency from all methods mentioned above and may not need extra treatment subsequent to discharge. Sasse (1998) notes that the statistical risk of infection from pathogens from the effluent of septic tanks and anaerobic filters are low. In cases of high risks such as hospital effluents or during an epidemic breakout, it is possible to use simple devices with automatic dosing to chlorinate the effluent. Another advantage of the baffled septic tanks and the UAF filter is that they can be integrated into the surroundings of the residential area since they are located underground and covered by a concrete cover.

The water effluent from the community on-site treatment in the baffled anaerobic septic tank will discharge into the former irrigation canals existing in the district. These canals must be widened due to their small size nowadays. The canals'

water will discharge finally in the Nuoc Len River, the biggest river that crosses Binh Chan district and where now the wastewater from the areas with sewer system discharge already.

A problem that has to be mentioned is the head loss in the sewer pipes. The houses are not heightened and the septic tanks are located around half meter under the houses. Figure 8.3 below represents a typical example that can be found in Binh Chanh district. The pipes of the sewer system can have a slope of 0.5% and they can cover 100 meters until the baffled anaerobic septic tank. This means that the pipes will end half meter (0.5 m/100 m) under the septic tank. The effluent from the baffled tank will be around 10 cm deeper and if there is an anaerobic filter then the pipes could be still 20 cm deeper. Finally, the depth of the sewer system can be around 1.20 meters. This represents a problem because the outlets of the sewer pipes in the canal are situated very low and the wastewater can only be discharge when the tide level of the canal is lower.

Fig. 8.3 Head Loss



The outlet problem can be solved using a flow control to limit the flow from the canal to the sewer pipes. In Binh Chanh district the flap valve is the best option to control the tidal effect of the canals. A flap valve is a hinged plate at a pipe outlet that restricts flow to one direction only. When the level of the receiving canal is above the outlet, the flap valve prevents tidal water entering the sewer (fig. 8.3). In these circumstances if there is no flap valve, any flow in the sewer will back up in the pipe (Butler and Davies, 2000).

In the treatment and disposal of the sludge from the septic tank and the baffled anaerobic septic tanks, in HCM City the number of consecutive treatment stages should be at a minimum. The treatment of the sludge from these two types of tanks may consist of a simple planted sludge drying bed, which delivers a dried and stabilized solid to be used as soil conditioner (fig. 8.1). In a comparison of three non-mechanized septage treatment systems, that are feasible to Vietnamese cities, Klingel (2001) concludes that planted drying beds are by far the cheapest and most feasible treatment option. The options compared were planted drying beds, unplanted drying beds, and settling tanks followed by a secondary pond for the treatment of the liquid fraction and storage of the sediment for further drying. The main reasons for the good assessment of the planted drying beds are the relatively low maintenance requirements (low costs) and the good quality of the final product sludge.

Sludge treatment and disposal from these drying beds could be combined by direct application of more or less stabilized sludge to a soil at agronomically acceptable rates and using environmentally acceptable methods of application (Crites and Tchbanoglous, 1998).

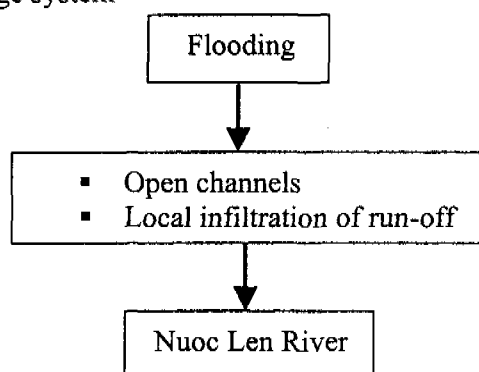
In all the official information that was gathered during the research, there is no mentioning of reusing wastewater at the house level in all the HCM City districts. Even so, households often apply methods of reusing wastewater by flushing pour flush toilets with water used for hand cleaning and laundry washing. The suggestion for wastewater reuse at household level is at the moment not so relevant to any district of HCM City since there are still problems of water and sanitation provision. For government authorities it is not acceptable to allocate resources for reuse issues when more basic problems still exists. However, it is important to be aware of these possibilities and the options of implementing them if possible in new projects.

Regarding the drainage system, a good measure for flood protection is to create the system as a series of open ditches (fig. 8.4). Open ditches have a number of advantages when compared to closed pipes. The flow from peak storm events will be attenuated and infiltration will be allowed to take place. Mosquito breeding is easier to control than in closed drains. Thus, the use of available head is more efficient. Another advantage of an open ditch system is the reduced cost as there are simpler and shallower than closed pipes.

However, the open ditches have disadvantages worthy to mention. These open ditches suppose an important dumping area for solid waste from the households. There is a need observed for an education campaign to make the household aware of the importance of avoiding this waste dumping to the ditches. Other disadvantages of the open channels are the big amount of surface space that they take, the risk of children playing in or falling into the water and the possibility of vehicles damaging the drains (Butler and Davies, 2000).

After the opening ditches, the rainwater flow should be spread over a long stretch of the receiving watercourse (the Nuoc Len River), making much better use of the buffering capacity of the receiving watercourse. The risk of flooding will be reduced by such measures.

Fig. 8.4 Drainage system



One of the disadvantages of a completely separate system is the fact that surface run-off resulting from the rainfall is not always clean, especially after a long dry-spell

(Wiggers, 1996). Several pollutants may be encountered in the first run-off, e.g. Pb, dust, PAH, rubber, and so on.

One important principle in the low-cost sewerage is the pivotal role of the community especially during planning, construction and maintaining the feeder systems. Several projects have implemented low-cost sewerage (Hasan, 1997, Mara et al, 1996, Reed, 1995, Watson, 1995). Close cooperation between users, young engineers and social scientists is needed to lay out shallow sewers at expenses that can be only one sixth of conventional sewerage. Community self-help is at the basis of the technologies success (Hassan, 1997). Costs would be saved by self-help during construction, repair and maintenance activities. It is evident that these measures require instruction of the users and collaboration of all stakeholders.

It is assumed that the de-centralization and community on-site alternatives are constructed and maintained using an unbundled and community-driven approach. Under these conditions there are an impressive list of strengths and opportunities of small-scale systems. The main ones being a quick protection of public health and the environment connected with easy cost recovery.

8.2 Tan Binh District

In Tan Binh district the situation is different from Binh Chanh. Tan Binh district is a newly urbanized district where a drainage and sewerage system already exists but this system is not working properly. This means that the solutions are more difficult to find than in Binh Chanh district. In Tan Binh district there is the Tan Hoa – Lo Gom Canal project to develop the sanitation and drainage infrastructure. According to the project, the existing combined drainage system will be maintained. In the new areas that will be developed in the district a separate system will be implemented according to the city master plan. A combined sewage overflow (CSO) device will be constructed close to the Tan Hoa – Lo Gom canal on each existing discharge outlet, which will discharge dilute wastewater into the canal during the periods of heavy rain.

In the future, the sewage pipes will be conducted to a terminal pumping station and from there to a wastewater treatment plant. The pumping station will be located at the downstream end of the Tan Hoa-Lo Gom Canal adjacent to Nguyen Van Luong Street in District 6. From the pumping station the sewage will be driven to a wastewater treatment plant which will be located in one of the two alternative sites in Binh Chanh district (feasibility study report from Tan Hoa-Lo Gom Canal Project).

Two main processes (activated sludge and aerated lagoons) were considered for wastewater treatment. Following extensive consultation at city and district level an activated sludge process was selected at a site at Tan Nhut Commune in Binh Chanh District, even though this is not the least-cost alternative as the land required is significantly less than for aerated lagoons (feasibility study report from Tan Hoa-Lo Gom Canal Project).

9. SANITATION AND DRAINAGE DEVELOPMENT IN HCM CITY: CONSTRAINTS AND PERSPECTIVES

9.1 Constraints in the Sanitation and Drainage development

One of the main constraints regarding sanitation and drainage development is that the situation of one district depends quite a lot on its PC (People Committee). Where the committee is aware of the importance of proper water supply, sanitation and drainage, they shift money to that purpose. As an example, Mss. Mai Do Thuy Dung from Van Xuan (architect and group leader of the private Vietnamese Van Xuan Construction and Environmental Design Company, involved in the Urban Upgrading Project of the Tan Hoa-Lo Gom project) (pers. comm. 24/9/2003) mentioned that these kinds of problems were found in the Tan Hoa-Lo Gom project. This project had several complications since involved 3 different districts and 20 different wards. In each district the PC had a different idea of what their priorities were and the project had to be changed and adapted to each different district. For example the road widening regulations says that the main roads has to be of at least 6 meters wide for emergency vehicle. In some districts they are not willing to follow this regulation and they demand only a width of 4 meters.

Usually, the drainage and sanitation issues demand planning and a future vision. In order to make a sanitation system appropriate for the long-term including environmental demands, the growth dynamics of a neighbourhood have to be taken into account. This leads initially to rather high investment costs. When dealing with a developing country like Vietnam that has many poverty problems is hard to see the long-term consequences. The PC tends to think of fast solutions for urgent problems and in different ways of saving money. In HCM City it can be observed that this is another fact that leads to an attitude of continuously postponing the implementation of major sanitation infrastructure projects. It might be that the overall amount of money is much higher than what have been invested at the beginning for the long run. This results in the vicious cycle of solving one problem, and actually creating another.

For example, the UDC conducted land and road heightening to solve the flooding problem in one area but they also heighten the drainage system, worsening the problems of the residents because their houses are not heightened and they can not make the connection with the drainage system (Mr. Huey Douglas Pham and Mr. L. Fernando Requena pers. comm., CDM 03/10/03; Mss. Mai Do Thuy Dung pers. comm., Van Xuan 02/10/03). This is what happened in district 6 where a road was heightening but not the households along the road. This caused flooding in the houses because the rainwater is not drained from the houses to the road if not the other way around.

There are standards and regulations for level 4 sewerage and drainage constructions, like size of pipes, slopes and so on. All these standards and regulations can be obtained in the UDC office. The cost of the level 4 constructions is shared between the district and the people of the households. The people have to take the initiative to ask for permission and help to connect their houses to the sewer systems. If they do not have enough money they can ask for financial help from the government. The problem is that they do not always know that they are entitled to such help. People could know about this from the TV and newspapers and go to the district authority for help. Districts and wards have the duty to help these people. There is a new project of putting all the information on internet and building computer data posts around the city to give the people better access to the information. This expectedly will be a partial

solution since a part of the households do not know their rights or have access to the internet or to the use of the computer posts (Mr. Nguyen Van Quoc, DTPW; 1/10/2003).

In a meeting with the DTPW, Mr. Nguyen Van Quoc said that the problem of the community is not about knowing the rights regarding sanitation; it is the lack of knowledge during construction. He said there is need of good consultants and planners whenever construction or connections in the households are made. The problem is the low budget for level 4 that makes it impossible to hire such expert people. Only the people that are educated and understand the importance of this issue can pay the assistance of good experts.

According to Mr. Tran Van Thin (pers. comm., 07/10/03), one common way of saving money in the districts is not using the standards in construction of sanitation and drainage infrastructure because they are often too costly and not feasible. Instead, an "acceptable standard" is usually used. The "acceptable standard" is used in low-income projects like in Urban Upgrading Projects (UUP). These projects using acceptable standards are supposed to be upgraded after a certain amount of time (e.g. Tan Hoa-Lo Gom project will be upgraded in 10 years) because the solutions applied will not sustain more than this time. It is a way of reducing costs but shortening the time horizon. One method to save money allowed by the "acceptable standard" is replacing only those parts of the sanitation and drainage systems that are in a bad condition or installing new systems only where none exists, using clay pipes instead of concrete or PVC (clay pipes have an inlayer to prevent corrosion and can last long if laid underground in a proper way and not under surface that endures heavy loads), etc.

Mr. Thin also mentioned that the communities apply other practices to save money in sanitation and drainage development. Even though there are standards and regulations, in many cases the households make their own sanitation and drainage designs and applications. These practices are not according to the regulations and are conducted without authorization. Especially these practices can be observed in the low-income neighborhoods such as the ward 19 of Tan Binh. Examples of these practices are not connecting the house to the drainage system, making an unofficial connection to the pipes of level 3, use of soakage pits, not constructing a septic tank, not connect the black water to the septic tank and so on. According to Mss. Mai Do Thuy Dung (pers. comm. 24/09/03) all these problems are known but ignored since they are not given high priority and no solutions are available according to the designers.

Currently in Vietnam there is not a defined law for drainage construction systems. There are only many different regulations. The government has reached an understanding regarding the importance of the existence of this law and it is now in the process of preparation the law (Mr. Nguyen Van Quoc, DTPW; 1/10/2003). This lack of law is one of the reasons for household's self-constructions. There is no enforcement and punishment, no incentives for making proper constructions. This can be observed for example in Tan Binh, where there are a high number of wastewater self-connections from the households to the sewer systems.

Another constraint worthy to be mentioned is the 'individualist way of thinking'. This way of thinking means an obstacle for the sanitation and drainage infrastructure development. It is a major reason for regulations not to be followed ("master plans belong to the government and not to me"). The communities do not involve themselves with the projects. When asked government representatives about the cooperation of the

local residents in the sanitation projects always answer that they attempt to implement a community participation approach.

For example, maintenance of the systems is complicated since the households do not understand that some activities of their daily life, as dumping their waste in the canals and inlets to the systems, are worsening the situation. The districts are being encouraged to contact and educate the households for a better behavior. This is also why there is a demand that the communities contribute monetarily to the new systems as a way of involving the communities with the sanitation and drainage projects (Mr. Huey Douglas Pham and Mr. L. Fernando Requena pers. comm., CDM 03/10/03).

The district level is supposed to implement the community participation approach by using tools as: identification of the people's priorities, awareness raising, consulting the people regarding development plans, involving the people with the construction itself, and so on. All this sounds great and exactly as the tools that a community participation approach should include but when asked how is the grade of implementation of this approach the answer was there is not implementation because there is not enough personnel (Mr. Nguyen Van Quoc, DTPW; 1/10/2003). This means that nowadays there is no involvement of the community in the sanitation and drainage projects.

Analysis of the current sanitation situation in HCM City will often reveal poor coordination between the various stakeholders involved. This is one of the main constraints found during the research because it is the cause of many of the problems mentioned above. For example, the level 4 of sewer and drainage system does not have a clear definition of who is responsible for it. The important point to recognize is that, where there is already a real division of responsibilities for sanitation provision, efforts to separate stakeholder responsibilities must be matched by efforts to improve coordination between the different stakeholders.

9.2 Perspectives

One of the possible future options in the sanitation and drainage development of HCM City could be the introduction of the private sector through local companies to provide the services. In theory, the private sector offers a means of enhancing efficiency and lowering costs when existing public service delivery is either too costly or inadequate. In situation like in HCM City where local public funds for investment are in chronically short supply, the private sector may be able to mobilize funds. The private sector is well situated to draw on international experience, and to introduce proven and cost-effective technologies (Bartone, 1999).

Private sector participation should be viewed only as a possible opportunity, not a panacea, and there are important questions on whether, and how, to involve the private sector in the provision of sanitation and drainage infrastructure. In several cases in HCM City there is an overload of tasks in the state companies or departments. A typical case is the UDC which has no capacity to deal with all its tasks. The UDC has a monopole regarding the maintenance of the sewerage system. This maintenance is observed not to be properly done in almost any district of the city.

There is an understanding of the government that privatization would be a good way of reducing costs and giving better sewerage and drainage service. A private company working closer to the community would be able to give better and also cover

the expenses of the sanitation and drainage service (Mr. Tran Van Thin pers. comm., 7/10/2003; Mr. Huey Douglas Pham and Mr. L. Fernando Requena pers. comm., 03/10/03).

Another case where privatization may help in enhancing the capacities of a body related to sanitation provision is with DONRE. DONRE is in charge of monitoring the application of local treatment plants and on site treatment units. Since often they can not monitor all units due to lack of personnel and time, they can hire a specialized company like CENTEMA to do that. The company will be obliged to report to DONRE.

An example where privatization already is happening is in the water supply sector. The Water Supply Company puts a meter for a certain area and a smaller private company is in charge of monitoring and collecting fees from the houses in this area. The service of cleaning septic tanks is also done by a private company.

HCM City needs to adopt the policy of providing, at full cost, private services that people want (water and collection of wastewater) and allocating scarce public funds only for services with wider communal benefits (treatment and disposal of wastewater). Willingness to pay studies is an appropriate tool for assessing the services and service levels that people wants (World Bank; 1992, 1994).

An important question is why privatization is not working in Vietnam although the government understands it could bring to an improvement. The answers could be the following:

1. There is no experience in dealing with private companies. For example the government can not really know what the incomes in the company are; making it hard to control the company. In the past there were high taxes on company interests and that is why profits are less declared.
2. Governments can not decide what to turn into private, there is not even enough knowledge of how to write a contract and there is no regulation system for private companies.
3. Regarding problems of the companies there can be a lack of management experience in the companies and there are very few companies having enough capital to afford the investment of a new business.
4. The government companies get big loans to start a business that they later need to return. Vietnamese private companies will find it hard to earn enough at the beginning to return the loan. There is always the possibility that the company's owners will disappear after getting the loan and never returning it. There are no long term loans in Vietnam with low interest. Loans are always short term and with high interest making it hard to really use them.

Maybe the option most appropriate in HCM City is the "coproduction". Coproduction has been used to refer the creation of goods with contributions from private and public sectors, and sanitary improvements has been cited as a good far more efficiently coproduced than produced within one sector alone (Ostrom, 1996). Since Vietnam is a socialist country and not capitalist, the trend can not be towards a complete privatization. Coproduction should be a more logic solution. Thus, for example, the condominial system which has proved to be successful in spreading comparatively low-cost sanitation in several cities, works through combining the centralized provision of trunk lines with active local involvement in financing, maintaining and even designing the connections to people's homes (Briscoe, 1993; Mara, 1996).

Regarding other kind of perspective, there is no doubt that in HCM City there is need to enhance and strengthen policies related to septic tank construction and maintenance, standards of wastewater discharge, construction of sewer and drainage systems laws, construction application, maintenance of the systems, treatment facilities, capital allocation and so on.

In HCM City, because of the intention of the government representatives to implement a community participation approach, all the sanitation and drainage development projects must include a community consultation and participation program. This program should include the use of mass media (television, radio and newspaper) introducing slogans of environmental protection as well as urban wastewater treatment, providing information about different environmental improvement projects, publish articles about sanitation and health relation, etc. Public information agencies at ward level could disseminate information on sanitation construction requirements for community groups to increase public awareness regarding construction and operation of drainage and sewerage. Social activities, social organizations as wards "Women Union" and school's environmental courses are other components which should be included in the program to organize meetings, distribute information or distribute questionnaires. Panels and posters with pictures and slogans of environmental protection and sanitation development and organized educational programs for each locality and households are other possible component of the program. A Public Information Center providing information about the different sanitation projects and receiving suggestions from the interested population would be other option. Finally, a *Consultation Committee formed with representatives from DPTW, the PMU of the project, and District, Ward or Cell officials*, could be used to keep the local authorities informed of progress on the different projects and to facilitate assistance from the district or ward when needed.

10. MAIN STAKEHOLDERS

10.1 Main stakeholders at local community level

One of the two communities that we surveyed was located in An Lac, ward in Binh Chanh district. The survey was focussed in the Khu Pho 6. In this area, the community was disposed to contribute to the survey due to the willingness to improve its situation. None of the household refused to answer our questionnaire.

The other community was situated in the ward 19 of Tan Binh district. Here, we had no direct contact with the households but used the results of an earlier survey. Only in excursions to the district a few households were asked to show us the different cells included in the ward 19 and the sanitation characteristics of the area. The willingness of the households to answer this kind of questions was very high.

To make the work with the households possible, the help of a group of 10 students from Van Lang University was essential. The students became one of the main stakeholders of this research because without them it would have been impossible to get information regarding the households' concerns and priorities.

The age of the students was around 22 or 23 years old. All of them except one were girls. They were studying environmental technology but they also had a background of research methods. In the past they carried out other surveys as part of one of their university subjects.

CENTEMA (Center of Environmental Technology and Management) was an important stakeholder during all the research. The Center provided staff to help as translators in the different meetings with the ward and district representatives. The Center also was very useful to both choose the surveyed area and get information to prepare the questionnaire. The contact with the students was made thanks to this Center because the staff works as teachers in Van Lang University too and they asked the students if they were willing to help to carry out the survey.

10.2 Work with these stakeholders

Regarding the relation with the households in the survey area, the possibility of giving a gift to the household members (e.g. shampoo for women, candy for children, pens for men, etc) was considered. After asking about this issue to different local people, the option was considered as unnecessary because people would have willingness to answer a survey that will not harm their situation. If a survey will include resettlements of the households or other negative consequences, then the need of a gift would be necessary to get answers of the questionnaires.

Mr. Viet, director of CENTEMA, was really interested in involving the students in the research, especially because it was a way for the students to practice English. Mr. Viet thought that it would also be very useful for us to work with local students. That is why he encouraged the students to get involved in the survey.

In our case, the main reason to ask help of Vietnamese students was the problem with the local language. The households in Vietnam in general do not master the English language have not enough level of English to be able to answer an English survey.

At the beginning, only 3 students from Van Lang University were willing or able to help with the surveys. The rest of the student refused especially due to difficulties in understanding English and the lack of time to do other things apart of their university's



Fig. 10.1 One of the students carrying out the survey in Binh Chanh District

tasks. These first three students took charge of the translation of the questionnaire from English to Vietnamese. Later, staff from CENTEMA and from the "Center for Social Development and Poverty Reduction" checked this translation to be sure that was correct.

After we got an authorization from the ward level representatives of An Lac to carry out the survey in the ward, other students were persuaded to help as surveyors. Finally, a total of 10 students were collaborating with this research although only the first day all the students were working together at the

same time. The rest of the days, the number of students working together per day was an average of 5 or 6 students.

The possibility of giving any remuneration to the students was not considered. Maybe this was a mistake because it could have been an incentive to ensure the attendance of all the students everyday that the survey was conducted. The only thing that the students received was an invitation for a dinner at the end of the research.

10.3 Strengths and weakness in the relationship with the stakeholders

The work with the communities was not a problem at any moment. From the beginning the people surveyed were willing to participate in the survey, as well as the district, ward and KP authorities. In their opinion, the survey was a way of publicizing their interests and complaints.

The work with the students was essential to carry out the survey. Without their help, it would have been impossible to get all the information from the community. The students were willing and happy to contribute with the survey but only because the possibility to speak in English and have a relationship with a foreigner.

Despite the important role of the students, the relationship with them was more problematic than the relation with other stakeholders. There was a preparatory phase to explain the students all the questions and the best way to carry out the survey. To understand all the questions properly is very important to achieve a good reliability in the results. In this preparatory phase the students were not really interested and they did not want to spend so much time in it because they thought that they know already enough about surveys. It was really complicated to try to explain the survey. Sometimes they did not understand some questions or some explanations but they did not admit it.

When the survey started a lot of misunderstandings were observed. The students did not understand all the questions properly, and the first questionnaires had to be

thrown away. There were problems in the translation of some questions which were not detected by any of the person who checked the survey.

Due to the presence of only one person controlling the students when they were carrying out the survey, there was a weakness related to the control of the households surveyed. It was important to choose the correct households to survey and not repeat more than three questionnaires in the same cell. Despite all these issues were explained to the students, it was necessary to check all the time the households chosen to survey. While the students were surveying some households, next houses to interview were selected. At the same time, the surveys done had to be checked trying to find if some of the relevant information was left out of the questionnaire and that information could be filled in that moment.

Another problem which limited the number of surveys done was the lack of time of the students. The students only were able to work in the afternoons and some weekends in the mornings. The first idea was to do more than 100 surveys in the area, or at least to do a survey in another different district. This was not possible because to carry out a survey takes too much time and there were no students or other Vietnamese people able to help with it.

10.4 Overcoming the weaknesses

To overcome the weakness in the relation with the students regarding the misunderstanding and unanswered questions, an individual conversation with each student was conducted to explain the problems observed in their questionnaires. The questionnaires were checked several times after all the households surveyed due to the high number of questionnaires lacking some information. At the beginning, nobody was following this instruction but after a while each person was in charge of checking the surveys of other different person. This method solved the problem of empty questions because of oversight.

Another way to solve the difficulties found was to adapt questions to what the students understood when they read the survey for first time. Some of the questions were interpreted in a different way because of the difference of culture. Since they know more about how people in their country think the questions were changed and adapted as they thought necessary.

Only gradually the students were learning how the survey had to be carried out. The high willingness to help me (no the survey) was enough for the students to overcome all the weaknesses found during the research.

11. CONCLUSIONS AND RECOMMENDATIONS

11.1 Conclusions

The Social Practices Model (Giddens, fig. 2.1 in chapter 2) shows that the connection between the technology networks and the users is a mutual one. To analyze this relation a perspective in which social practices around sanitation and drainage are linked to on one hand individual life-style and on the other to system of provision was used. This report is rather focused on the life style and social practices of the users while the MSc. thesis report of Gali Stamper investigates the developments of the systems of provision.

The users of the sanitation and drainage infrastructure have to be involved in the sanitation development. Sharing information with the users, as a starting point for community involvement and participations is important because information helps communities to understand issues and bring their commitment to the process of partnership between providers and users. Good information and communication between the stakeholders is critical for effective improvements in households and neighborhood environments. It is needed by the households and communities who are most exposed to the sanitation or drainage infrastructure. It is needed by delivery agencies that provide infrastructure. It is needed by the health authorities involved in primary healthcare activities. It is needed by those inside and outside government who are involved in settlement improvement. And it is needed in order to develop an effective and coordinated strategy for the numerous actors involved (McGranahan; 2001).

Both users and providers involved in sanitation and drainage issues must understand the importance of improving the sanitation systems. Enhancing awareness and genuine participation in all the phases of planning, designing, implementation and evaluation are consequently important preconditions for establishing successful sanitation and drainage infrastructure developments.

Social assessments are one of the participatory tools most frequently used in sanitation development projects. A social analysis is key in the design of sanitation projects but surveys should not be carried out only at project identification or preparation. The social assessment should rather be an interactive process with new surveys added as needed to address the concerns of various places and populations. It should be part of the supervision plan and carried out throughout project implementation.

Surveys are needed to know users' concern and priorities and more important the users' willingness to pay. Surveys in one community usually can not be used to predict household behavior even in a neighboring community if the characteristics between these communities are different. Studies have found water and sanitation demand to be extremely site-specific (Griffin et al., 1995). Each sanitation project developed in areas with different characteristics (different income structure of the population, level of governmental and external interventions and investments, growth dynamics, infrastructure development, and so on) should put a community consultation into practice, because depending on the characteristics of the community a different sanitation strategy could be expedient.

As shown in the surveys carried out in HCM City, users are willing to pay high prices for sanitation and drainage services, and that is evidence by the responses even

low-income dwellers give in the socio-economic surveys. People are willing to pay a higher cost for good water and sanitation services, then why charge them less? Sanitation and drainage project's development would be highly accepted in the different districts of the city. The high willingness of the community to improve their sanitation situation is shown through the high willingness of the community to answer the questionnaires.

Looking at the general concepts in the policymaking and planning bodies of the projects that are being implemented now in HCM City the impression is that things are advancing in the correct direction. All the new big projects, as Tan Hoa-Lo Gom or Nhieu Loc Thi Nghe projects, are including a community consultation to take into account people's concern and priorities and especially people's willingness to pay for sanitation improvements. Objectives of different sanitation projects always include the definitions "sustainable improvement to public health", "promotion of increased economic development", "development of more efficient institutes", "community consultation and participation program" and so on, always mentioning the improvement to the urban poor.

11.2 Recommendations

One of the objectives of this study is to come-up with strategies of most cost effective sanitation development processes. Based on the assessment of the general situation of HCM City showed in this report, the following are the recommended strategies that would strengthen the sanitation development in the city.

➤ Privatization:

Since one of the main problems related to the institutes involved in sanitation provision in HCM City is their low capacity in giving services, privatization may be an option to enhance this capacity. A private company working closer to the community could solve the overload of tasks in the state companies or departments. The private company could give better and also cover the expenses of the sanitation and drainage services. More about privatization options in Vietnam due to the governmental structure is noted in chapter 9.

➤ Strengthening related policies:

Good strong policies are an important basis for proper strategic sanitation (Tayler *et al*, 2003). There is no doubt that in HCM City there is need to enhance and strengthen policies related to sanitation and drainage issues, such as policies of construction and maintenance of septic tanks, construction and maintenance of sewer systems, the level 4 connections to the sewer system and so on.

➤ Community participation approach:

A community participation approach based in a community consultation and a participation program should be implemented as part of the sanitation development projects carried out in HCM City. They are important issues to develop sense of ownership of the projects. Surveys will be an important part of this approach to know users' concern and priorities and more important the users' willingness to pay. Willingness to pay studies are crucial in this approach because they are the appropriate tool for assessing the sanitation services that people wants.

➤ Suitability to local condition:

Projects that are suitable to local conditions are necessary due to differences in economic and environmental conditions. Community sense of ownership to the project is a factor that would contribute to sustainability.

➤ Communication between the stakeholders:

In HCM City there is a clear lack of communication between the different institutional levels and stakeholders involved in the sanitation development. The completely institutional framework is based on top-down communication. An official way of giving opinion or criticizing the upper levels is by sending letters. There is no direct chain of communication. This is one of the main constraints found during the research because it is the cause of many of the problems mentioned. For example the lack of communication between the different stakeholders involved in the level 4 of sewer and drainage system causes that there is not a clear definition of who is responsible for it. Good communication between all the stakeholders is critical preconditions for establishing successful sanitation and drainage infrastructure developments.

➤ Continuous promotion of environmental awareness:

Environmental awareness is crucial to promote the implementation of the sanitation technologies in the households; such as toilet facilities, septic tanks or the connections to the sewer system. Educational campaigns are needed to become the people aware of the importance of not dumping waste in the canals, not discharge the wastewater without treatment to the environment, the need of a clean environment around the houses, the prevention of health problems and so on.

➤ Land heightening:

Land heightening should be applied prior building construction to avoid flooding problems. Another issue is that if no heightening is applied the sewer pipes have not enough slope to discharge the wastewater into the canals without the need of pumping. Authorities are already aware of the importance of this issue. There is a regulation, which says that all the building plots should be heightened 1.5 meters but the problem is that households do not follow it. The regulation should be stricter including a punishment to the households that do not follow it. There is a need of an institution in charge of checking if this regulation is applied.

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ANNEX I: SURVEY QUESTIONNAIRE BINH CHANH DISTRICT

Study on Sanitation and Drainage development in peri-urban areas undergoing urbanization

SOCIO-ECONOMIC SURVEY QUESTIONNAIRE

There is a study in progress which is trying to understand what the stakeholders in unplanned areas undergoing self construction development consider as their main problems regarding sanitation and drainage infrastructure and what is the willingness and ability to improve their situation. We are currently conducting a survey as part of this project to find out people's opinion about their living conditions, their problems and how these can be improved. Your opinion is important to us because you live in the area and we would like to thank you in advance for talking to us. All the information you give will be strictly confidential and not shown to anyone else.

Surveyors Name/Code:..... Questionnaire No:.....
Date:.....
Address: No..... Street.....
District:..... Ward:..... Cell:.....

A. GENERAL INFORMATION

1. Sex of respondent
Male - 1 Female - 2
2. Is respondent head of household?
Yes - 1 No - 2
3. Number of households (HH) living in your house?
1 HH - 1 2 HH - 2 >2 HH - 3
4. How many people are there in the house?
 - a. permanent residents : person(s)
 - b. temporary residents : person(s)

B. INCOME AND EMPLOYMENT

5. How many people in the house earn wages? person(s)
6. How many people in the house are jobless? person(s)

7. What is the job of the head of the household?

- Worker - 1
- Employee - 2
- Own business / Trade - 3
- Services - 4
- Unstable occupation - 5
- Other..... - 6

8. Which of the following do you have in your house? *Please mark all the options*

- Electricity - 1
- Washing machine - 2
- Telephone - 3
- Television - 4
- Refrigerator - 5
- Air conditioner - 6
- Computer - 7
- Motorbike - 8
- Water heater - 9

C. RESIDENCE

9. When was the house built?

10. Which of the followed certificates do you have? *Please mark only one option*

- Land use certificate - 1
 - House ownership certificate - 2
 - Temporary certificate - 3
 - No official residence certificate - 4 (*go to question 10b*)
 - Other..... - 5
- } (*go to question 10a*)

a) When did you get your legal certificate?

b) Reason for not having a legal certificate

- Too expensive - 1
- Not having legal documents - 2
- Rented - 3
- No time -4
- Other..... - 5

11. What was the land title before you moved to this land?

- Agriculture - 1
- Recreational - 2
- Business area - 3
- Living area - 4
- Other..... - 5

12. Was the land title changed since you moved here?

- Yes - 1 (*go to question 12a*) No - 2 Unknown - 3

- a) Who applied for the land change?
- Governments - 1
 - Own request - 2
 - Other..... - 3

13. What is the ownership of your house?

- Self-owned - 1
- Hired/Borrowed from private - 2
- Hired from governments - 3
- Collective/Religion - 4
- Not clear about ownership - 5
- Other..... - 6

D. HOUSING CONDITIONS

14. What is your water source for drinking and living activities?

- | | a. <u>Water for drinking</u> | b. <u>Water for living</u> |
|------------------------------|--------------------------------|--------------------------------|
| | <u>activities</u> | |
| Piped with private meter - 1 | <input type="checkbox"/> | <input type="checkbox"/> |
| Piped with public meter - 2 | <input type="checkbox"/> | <input type="checkbox"/> |
| Canal - 3 | <input type="checkbox"/> | <input type="checkbox"/> |
| Rain water - 4 | <input type="checkbox"/> | <input type="checkbox"/> |
| Well - 5 | <input type="checkbox"/> | <input type="checkbox"/> |
| Water Seller - 6 | <input type="checkbox"/> | <input type="checkbox"/> |
| Other - 7 | <input type="checkbox"/> | <input type="checkbox"/> |

15. How much do you pay for water supply per month?

.....VND

16. Do you have a toilet inside the house?

Yes - 1 (*go to question 16a*) No - 2 (*go to question 16b*)

a) To where is it connected?

- Septic tank - 1
- Public sewer - 2
- Other..... - 3

b) Where do you go to the toilet?

- Public toilet - 1
- To the canal - 2
- Local patch of ground - 3
- Anywhere - 4
- Other..... - 5

17. Do you have a septic tank in your house?

Yes - 1 No - 2 (*go directly to question 24*) Unknown - 3

18. Where does the wastewater go?

- Direct to public sewer - 1
- Direct to canal - 2
- Self-drain - 3
- Other - 4

19. When was the septic tank installed?

- Less than 1 year
- Between 1-2 years
- Between 2-5 years
- More than 5 years

20. When was the last time of emptying the septic tank?

- Never - 1
- < 1 year - 2
- 1-3 years - 3
- 3-5 years - 4
- > 5 years - 5

21. What was the cost of construction of the septic tank?

.....VND

22. What is the cost of maintaining the septic tank? VND per month/year

23. Are you satisfied with the current state of your septic tank (wish to improve/change the tank)?

Yes - 1 No - 2

24. Did you construct the discharge system for your wastewater?

Yes - 1 No - 2

25. Did you receive any help from the ward regarding construction and planning of your discharge system?

Yes - 1 (*go to question 25a*) No - 2

a) What kind of help did you receive from the ward?

- Planning - 1
- Construction - 2
- Funding - 3
- Consulting - 4
- Other..... - 5

E. FLOODING PROBLEMS

26. How often did your house get flooded last year?

- Never - 1
- Rarely - 2
- Sometimes - 3
- Often - 4

27. What is the main reason of flooding?

- Heavy rain - 1
- High tide - 2
- Floor of house is lower than the street - 3
- Blockage of the sewer - 4
- No sewer - 5
- Other - 6

28. Was your house heightened?

- Yes. How much? - 1
- No - 2
- Unknown - 3

F. HEALTH INFORMATION

29. How often have the members of your family been sick last year?

- Never - 1
- Rarely - 2
- Sometimes - 3
- Often - 4

30. What is the most common illness in your family?

- Fever - 1
- Ears, noses and throat diseases - 2
- Dengue fever - 3
- Diarrhea - 4
- Skin problems - 5
- Other..... - 6

31. What do you think is the main source of these illnesses?

- Water pollution - 1
- Air pollution - 2
- Flooding - 3
- Flies and insects from the garbage - 4
- Poor food - 5
- Other..... - 6

G. HOUSEHOLD UP-GRADING

32. What are the main infrastructure problems in your house? *Please select only one option*

- Lack of water supply - 1
 - Poor latrine installation - 2
 - Problems of operating and maintaining the septic tank - 3
 - Uncontrolled discharge of the wastewater - 4
 - Poor connection to the pipes of the sewerage system - 5
 - Flooding - 6
 - Other..... -
- 7

33. What action related to sanitation will improve your quality of life? *Please select only one option*

- Clean water supply pipes - 1
 - Improve latrines in the house - 2
 - Improve septic tank conditions - 3
 - Improve connection between pipes and the sewerage system - 4
 - Flood prevention measures - 5
 - Other..... -
- 6

34. Would you be willing to improve drainage and sewerage systems in your area?

Yes - 1 (go to question 34a) No - 2 (go to question 34b)

a) How much would your family be willing to contribute each month?

- Less than 10,000 VND - 1
- 10,000 / 30,000 VND - 2
- 31,000 / 50,000 VND - 3
- 51,000 / 100,000 VND - 4
- More than 100,000 VND - 5

b) What is the main reason not to be willing to contribute?

- Can not afford it - 1
 - Should be government responsibility - 2
 - Satisfied with current level of infrastructure - 3
 - Not satisfied but not willing to improve - 4
 - Other..... -
- 5

The interview is now over. Thank you again for answering our questions.

Interviewer,

OBSERVATORY INFORMATION:

1. Type of house:

- Duplex
- Shop house
- Villa
- Apartment buildings

2. Constructed material:

- cheap and light material, no floor
- concrete, no floor
- concrete, with floor
- villa, building

3. Type of latrine:

- Pit latrine
- VIP
- Pour flush latrine
- Double vault batch composting
- Cistern flush
- Dual flush

ANNEX II: SURVEY QUESTIONNAIRE TAN BINH DISTRICT

Feasibility Study on Sanitation and Upgrading of Tan Hoa-Lo Gom Canal Basin

SOCIO-ECONOMIC SURVEY QUESTIONNAIRE

Introduction.

There is a study in progress which is looking at ways to improve the Tan Hoa-Lo Gom Canal Basin. We are currently conducting a survey as part of this project to find out people's opinions about their living conditions, their problems and how these can be improved. Your opinion is important to us because you live in the area and we would like to thank you in advance for talking to us. All the information you give will be strictly confidential and not shown to anyone else.

Surveyors Name/Code: _____ Questionnaire No: _____
Date: _____
Address: No. _____ Street _____
District _____ Ward _____ Cell _____

A. GENERAL AND EDUCATION

1. Sex of respondent.
MALE 1 FEMALE 2
2. Is Respondent Head of Household?
YES 1 NO 2
3. Number of households (HH) living in your house?
1 HH 1 2 HH 2 >2 HH 3
4. Are your children going to school at present?
Yes 1 (go to a) No 2 (go to b)
 - a. Are you satisfied with the education facilities available for your children ?
Yes 1 No 2
 - b. If NO, what are the main problems? (choose more than 1)
Lack of access 1 Need children to work to support family income 2
Poor teaching quality 3 Insufficient income to maintain children at school 4
School too far 5 Other _____ 6
5. Do any members of the family attend a Vocational Training Center?
Yes 1 (go to a) No 2 (go to b)
 - a. If YES, what kind of training courses: (more than 1)
Construction 1 Garment 2 Electronic 3 Informatics 4
Foreign language 5 Other _____ 6
 - b. If NO, why not? (more than 1)
Not needed / No interest 1 Training type not available / realistic 2
Would like but too expensive 3 No time 4
Other _____ 5

6. How many people are there in the house and what is the educational level of family members ?

Number of members	Sex (Male=1 Female=2)	Age	Relationship with HH owner	Educational Level	Residential Registration status
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					

<u>Relationship with owner</u>	<u>Education Level</u>	<u>Residential status</u>
Owner =1	Primary = 1	KT1 (Regular) = 1
Wife/husband =2	Secondary =2	KT2 = 2
Child/ = 3	High School =3	KT3 = 3
Grandparents = 4	Technical = 4	KT4 (Temporary) = 4
Niece/Nephew=5	College/University = 4	
Other =6	Illiterate = 5	
	Other =6	

B. INCOME & EMPLOYMENT

7. How many people who live in your house earn wages? _____ persons
What type of job do they have? Note- Names to correspond to numbers in Q 6.

Number of members	Income (1000VN D/month)	Full time (1) or Part time(2)	Job Code	Distance to the workplace	Facilities to travel to work

<u>Job Codes.</u>	<u>Distance to the workplace</u>	<u>Facilities to travel</u>
Worker (Blue collar) = 1	At home = 1	Walk = 1
Employee (White collar)= 2	< 1 km = 2	Bicycle = 2
Own business/ Trade = 3	1-3 km = 3	Own motor cycle= 3
Services = 4	>3 km = 4	Public bus = 4
Unstable occupation = 5	Don't know= 5	Other =5
ther =6		

8. How many people in your house do not have work? (just list people over 18 to 60 year-old, excluded student)

Number of members	Ages	Last Occupation	Length of time out of work (Years)	Reason for not having a job

Job Codes

Worker (Blue collar) = 1
 Employee (White collar) = 2
 Own business/ Trade = 3
 Services = 4
 Unstable occupation = 5
 Other _____ = 6

Reason for not having a job.
 Lack of permanent/ Can not find jobs = 1
 Retired = 2
 Health problem, can not work = 3
 No casual/ seasonal employment = 4
 School leaver, no experiences for jobs = 5
 Other (specify) _____ = 6

9. Average monthly expenses of your household (HH)

Expenses	Amount VND
Food	
Electricity	
Water	
Garbage, sewage	
Transportation	
Fuel (gaz, coal, wood)	
House renting (if any)	
Education	
Telephone bill	
Recreation	
Other expenses	

C. RESIDENCE

10. Location of the house:

Street front 1 Alley more than 5m 2
 Alley 3 to 5 m wide 3 Alley less than 3m 4
 On the canal bank 5 Part/all of the house located on the canal 6

11. The existing road connected to your house is: (Combine with observation to record)

Asphalted 1 Concrete 2
 Cement 3 Gravel paved road 4
 Path way 5

12. How far from your house to the canal:

Canal bank 1 < 20 m 2 20 - 50 m 3 > 50 m 4 Not known 5

13. Size of house (LxW) _____ sqm Size of land (LxW) _____ sqm

14. Housing Stock. (Combine with observation to record)

Permanent 1 Semi-permanent 2 Wood frame, leaf roof 3
 Simple 4 Other _____ 5

15. **When was the house built?**
 Before 1975 1 Between 1976-1991 2
 From 1992 up to now 3 Not known 4
16. **What Year did you move here?**
 Before 1975 1 1976-1980 2
 1981-1992 3 1993-present 4
17. **Where did you live before?**
 In HCMC 1 Outside of HCMC 2 *Province* _____
18. **Which of the following certificates do you have? (one choice only)**
 Land Use Right Certificate 1 House ownership certificate 2
 Temporary certificate 3 No official residence certificate 4 (go to a)
 Other (Specify) _____ 5
- a. **Reason for not having a legal certificate: (more than 1)**
 Too expensive 1 Not having legal documents 2
 Rented 3 No time 4 Other _____ 5
19. **What is the ownership of your house?**
 Self-owned 1 Hired/borrowed from private 2 Hired from government 3
 Collective/Religion 4 Not clear about ownership 5 Other _____ 6

D. **HOUSING CONDITIONS**

20. **Where do you get your water source for drinking and living activities? (chose 1 only each column)**

	<u>Water for drinking</u>	<u>Water for living activities</u>
Piped with private meter	1	1
Piped with public meter	2	2
Canal	3	3
Rain water	4	4
Well	5	5
Water seller	6	6
Other _____	7	7

21. **Do you have septic tank inside your house?**
 YES 1 NO 2 Don't know 9 (go to 22)
- a. **If YES, where waste water go?**
 Septic tank 1 Direct to public sewer 2
 Self-drain 3 To Septic tank, sewer, canal 4
 Other (Specify) _____ 5
- b. **If NO, what do you do with waste water?**
 Throw it outside 1 Other (Specify) _____ 2
22. **Do you have a toilet inside the house?**
 YES 1 (go to a) NO 2 (go to b)
- a. **If Yes, is this connected to a**
 Septic tank 1 Public sewer 2 Other (Specify) _____ 3
- **If Septic tank, when was this last emptied?**
 < 1 year 1 1-5 years 2 > 5 years 3 never 4

b. If NO, where do you go to the toilet? (more than 1)

Public toilet 1 In the canal 2 Local patch of ground 3
Anywhere 4 Other (Specify) 5

23. Do you have a garbage collection service?

YES 1 (go to a) NO 2 (go to b)

a. If YES, what kind of collection?

Municipal collection 1 Private tricycle collection 2
Other (Specify) 3

b. If NO, what do you do with your garbage? (more than 1)

Burn it 1 Throw it on a local dump 2 Throw it in the canal 3
Throw it anywhere 4 Other (Specify) 5

24. Does your house have electricity?

YES (go to a) NO 2 (go to 25)

a. What is your electricity's source?

Have own meter 1 Share with neighbor 2 Use another source 3

25. Does your house have telephone?

YES 1 NO 2

26. Does any members of your family has cellphone?

YES 1 NO 2

E. FLOODING PROBLEMS.

27. Did your house flood during the last year?

YES 1 (go to a, b, c) NO 2 (go to F - Health)

a. How many times a year?

How many days /month, how many hours /day

b. The highest level of the flood? cm

c. What do you think causes the flooding? (more than 1)

Heavy rain 1 Floor of house is lower than the street 2
High tide 3 Blockage of the sewer 4
No sewer 5 Other 6

F. HEALTH

28. Has any member of your family been sick in the last year?

YES 1 NO 2 (go to 30)

29. If Yes,

Type of Sickness	Number of times	Frequency of sickness

Code sickness
Fever = 1
Ears, noses and throat = 2
Dengue fever = 3
Diarrhoea = 4
Other = 5
Times
Rarely = 1
Sometimes = 2
Often = 3
Frequency of sickness
Light = 1
Medium = 2
Serious = 3

30. Do you think sickness has anything to do with the conditions in your area?
 YES 1 NO 2 (go to 31) Don't know 9 (go to 31)
- a. If YES, what do you think is the main cause of these illnesses? (1 choice only)
- | | | | |
|-----------------|---|--------------------------------|---|
| Water pollution | 1 | Flies and insects from garbage | 2 |
| Air pollution | 3 | Poor food | 4 |
| Flooding | 5 | Other (Specify) _____ | 6 |
31. Are you satisfied with the health facilities that are available to your family?
 YES 1 (go to G - Recreation) NO 2 (go to a) Don't know 9
- a. If NO, what are the main problems? (more than 1)
- | | | | |
|--------------------------|---|-----------------------|---|
| Too expensive | 1 | Not enough facilities | 2 |
| Poor quality of services | 3 | Other _____ | 4 |

G. RECREATION

32. Do your family participate any kind of recreation/sport?
 YES 1 (go to a) NO 2 (go to b)
- a. If Yes, what kinds of recreation are there in your district? (more than 1)
- | | | | | | |
|----------------|---|------------------------------|---|-------------------------------|---|
| Public parks | 1 | Indoor recreation facilities | 2 | Outdoor recreation facilities | 3 |
| Swimming pools | 4 | Family entertainment area | 5 | Children garden/ places | 6 |
| Other _____ | 7 | | | | |
- b. If No, why? (more than 1)
- | | | | | | |
|--------------------|---|------------------------|---|--------------|---|
| Too expensive | 1 | Having no time | 2 | Too far away | 3 |
| Not allowed access | 4 | Not bothered / No need | 5 | Other _____ | 6 |

H. COMMUNITY UP-GRADING

33. Which of the following would you say is a major problem with your family? (only 1)
- | | |
|--|---|
| Unemployment | 1 |
| Insufficient family income | 2 |
| Bad debt | 3 |
| Sickness | 4 |
| Flooding | 5 |
| Poor sanitation and housing conditions | 6 |
| Poor infrastructure | 7 |
| No security of tenure | 8 |
| Other(Specify) _____ | 9 |
34. In this context, what are the two (each) most important things which should be done to improve the life of your family?
- Infrastructure
- | | |
|---------------------------------------|---|
| Pipes clean water supply | 1 |
| Better sewerage/waste disposed system | 2 |
| Better garbage collection system | 3 |
| More flood prevention measures | 4 |
| Better power supply/ public lighting | 5 |
| Improved roads and alleyways | 6 |
| Other _____ | 7 |

Living conditions

- Improvements to School system 1
Improved Vocational training 2
Better community Health care 3
Better provision of Recreation and Sport facilities 4
Drug/AIDS Prevention Programmes 5
Improved access to Credit facilities for:
a. houses and utilities improvement 6
b. income generation/ business enterprise development 7
35. If better infrastructure was built to prevent flooding or to improve water supply for instance, would you be willing to contribute to their construction and maintenance cost?
YES 1 (go to a) NO 2 (go to b)
- a. If Yes, approximately how much would your family be willing to contribute each month?
- | | |
|----------------------|---|
| Less than 10,000 VND | 1 |
| 10,000- 300,000 VND | 2 |
| 31,000-50,000 VND | 3 |
| 51,000 - 100,000 VND | 4 |
| More than 100,000VND | 5 |
- b. If No, why not?
- | | |
|---|---|
| Can not afford it | 1 |
| Should be government responsibility | 2 |
| Satisfied with current level of provision | 3 |
| Not satisfied with current level of provision, but willing to have it rather than pay | 4 |
| Other | 5 |
36. Would you like to see the canal (banks) cleaned-up and converted into open space?
YES 1 (go to a) NO 2 (end of questionnaire, thanks!)
- a. If Yes, what would you prefer to see if the canal area was cleaned up and became:
- | | | | |
|--|---|------------------|---|
| Garden/ Park and recreation facilities | 1 | A new road | 2 |
| Shops and restaurants | 3 | Other (specify) | 4 |

The interview is now over. Thank you again for answering our questions.

Interviewer,

APPENDIX I: LIST OF CONTACTS AND INTERVIEWEES

Name	Institute	Office phone	Mobile phone	Fax	Home phone	e-mail and/or website	Office address	Remarks
Madam Nguyen Thi Anh Nguyet	PMU - Urban Upgrading Project	08-8247663 #33 08-8246499 08-9000702		08-8246499	08-8326114	lennieen@hcm.vnn.vn	25 Pham Ngoc Thach, 6 Ward- Q.3 HCMC	Vice Director, upgrading basic infrastructure for low income areas. Master of system of engineering, environmental management system
Anh - Pham Thi Anh	Staff of Van Lang university	08-8365317	090-3156131		08-7400780	centema@hcm.vnn.vn		
Bans (Mr.)	PMU NLTN; Transport and Public Works dept. Environmental Sanitation Projects	08-9142871		08-9142983		ctnnltn@hcm.vnn.vn	35-37 Ben Chuong Duong St. (8th floor) Dist. 1 HCM City	
CDM - representative office in Vietnam	consulting engineering company - PMU NLTN	08-9100709, 090-3953133		08-9100710		Mainoffice@CDMVietnam.com http://www.cdm.com	Saigon Trade Center, 2nd floor, room 226, 37bTon Duc Thang st., Q1. HCMC	corporate headquarters: One Cambridge Place, 50 Hampshire st., Cambridge, MA 02139 USA, tel:(617)4526000, fax: (617)4528000
Cuong - Mr. Nguyen Dinh Cuong	PMU - NLTN, Architect, senior expert, procurement specialist	08-9142871	090-3688451	08-9142983		ctnnltn@hcm.vnn.vn	35-37 Ben Chuong Duong St. (8th floor) Dist. 1 HCM City	very knowledgable about all the project, speaks good english, very helpful
Mr. James Currie	BBVIL - Binnie Black & Veatch (International) Ltd	08-8660982/4		08-8660982		curriejdm@bv.com	270 Bis/A1 Ly Thoung Kiet st.	Director - ordered the social survey for the THLG basin from the of Center of social development and poverty reduction
CENTEMA	CENTEMA	08-8981504/1/2		08-8981505		centema2@hcm.vnn.vn	C4/5-6 Dinh Bo Linh, Phuong 26 Quan Binh Thanh, TpHCM	
Chinh - Mr. Pham Van Chinh	Director of the UPWE in Binh Chanh	8753194	090-3919183				Binh Chanh	Director of the UPWE
Christine van Wijk-Sijbesma	IRC - international water sanitation centre, NL	0031-(0)15-2192947		0031-(0)15-2190955		wijk@tref.nl wijk@irc.nl www.irc.nl	P.O.Box 2869, 2601 CW Delft, The Netherlands	Senior Program Officer
Dien, Nguyen Thi Thanh Dien	DTPW - Consultant of Construction Division	08-5122723	913614822				152 Dien Kim Phu, District Binh Tanh	
Dieu	CENTEMA and Wageningen		091-3664643					
Dung - Miss Mai Do Thuy Dung	Van Xuan, construction and environmental design co., ltd	08-8448303, 08-8457389, 08-8246502	090-3998424	08-8449979		vn2000group@hcm.vnn.vn (personal) kittie_vn77@yahoo.com	25 Pham Ngoc Thach st Q.3; main office: 437 Hoang Van Thu, ward 4, Tan Binh district	architect and group leader designing level 4 systems for the THLG project
ENDA	ENDA - Environment and Development Action	08-9703273 08-9700243		08-9703273		endavn@hcmc.netnam.vn endavietnam@hcm.vnn.vn	C2, Buu Long Street, Cu Xa Bac Hai, Ward 15, Dist.10, HCM City	
Fernando - L. Fernando Requena, P.E., DEE	CDM, associate	++617 452-6000		++617 452-8000		requenalf@cdm.com		CDM Inc., One Cambridge Place, 50 Hampshire st., Cambridge, MA 02139 USA, tel:(617)4526000, fax: (617)4528000
Hai (Mrs.) - Pham Thi Thanh Hai, Eng.	UPI - vice director	08-9303553	090-3946473	08-9303293	08-9910340	hai415@yahoo.com	216 Nguyen Dinh Chieu, Q3, HCM	
Hoa (Ms.) - Hoa Thi Hoang	World Bank Hanoi - involved in the urban upgrading project in HCM	04-9346600 #248	090-3430174	04-9346600		hhoang@worldbank.org	63, Ly Thai To str., Hanoi	

Houng (Mrs.)	PMU 415 - THLG canal sanitation and urban upgrading project		091-8345933	08-9144789		idanh@hcm.vnn.vn thig415@hcm.vnn.vn www.btcctb.org/thig	8 th floor, 35-37 Ben Choung Doung, Dist.1 HCMC	Vice Coordinator, incharge of the contacts with consulting agencies
Hong (Ms.)	Center of social development and poverty reduction	08-9101027	0918-304554				Vietnam National University, 12 Dinh Tien Hoang Str. Dist.1, HCMC	
Huey Douglas	Principal country manager/ chief representative	08-9100709, 090-3953133		08-9100710		Mainoffice@CDMVietnam.com	Saigon Trade Center, 2nd floor, room 226, 37b Ton Duc Thang st., Q1. HCMC	corporate headquarters: One Cambridge Place, 50 Hampshire st., Cambridge, MA 02139 USA, tel:(617)4526000, fax: (617)4528000
Pham - CDM Khai - Doan	ENDA - Environment and Development Action	08-9703273		08-9703273	08-8492617	endavn@hcmc.netnam.vn	C2, Buu Long Street, Cu Xa Bac Hai, Ward 15, Dist.10, HCM City	project coordinator
Van Khai		08-9700243						
Khanh - Nguyen Bao Khanh	PMU Nhieuc Loc - Thi Nghe Transport and public works dept. Environmental Sanitation Projects	08-9142870	090-3821401	08-9142963		khanh_nb@yahoo.com	35-37 Ben Chuong Duong St. (8th floor) Dist. 1 HCM City	head of the technical department (chief engineer)
Lam - Nguyen Thanh Lam	DONRE	08-9320122	091-8452383		08-8374843	pdmt@hcm.vnn.vn		
Le (Ms)	Center of social development and poverty reduction	08-9101027					Vietnam National University, 12 Dinh Tien Hoang Str. Dist.1, HCMC	
Le Dieu Anh	PMU 415 - Tan Hoa - Lo Gom Canal, sanitation and urban upgrading project	08-9144786	091-8030725	08-9144789		idanh@hcm.vnn.vn thig415@hcm.vnn.vn www.btcctb.org/thig	8 th floor, 35-37 Ben Choung Doung, Dist.1 HCMC	PMU vice director
Nhat (Madam)	consultant for PMU - urban upgrading project		091-8080157					works on social assessments and participatory methods
Quoc - Nguyen Van Quoc	Public Work and Transportation department	8.274192 8.250183	0903.708.005	8,290458		quocnv@hcm.cnn.vn	63 Ly Tu Trong, Dist. 1	Head of water supply and drainage management division
Thinh - Mr. Tran Van Thinh	Politechnich University and managing director of VIDANCO works (Danish company)	08-8640552, 08-9706723	090-3900452	08-9706702		vidaneco@hcm.vnn.vn	51A Cu Xa Tu Do, Cach Mang Thang 8, Ward 7, Tan Binh Dist. HCMC	works a lot with the planned programs in district 2
Nguyen Kim Thu	UPI - Urban Planing Institute	(84-8)9303420 (84-8)9301466	090-3825552	(84-8)9303293		nkthu-up@saigonnet.vn	216 Nguyen Dinh Chieu St., Dist. 3, HCMC	Architect-Master of System Engineering
Tran Thanh Danh	Drainage Company Enterprise	08-9852498	091-3702086	08-9852498	08-9855677	bao-vy@bdvn.vnd.net	334/2bis Duong Quang Ham - Phuong 5, Quan Go Vap	
Tuan - Baug Anh Tuan	ENDA - Environment and Development Action	08-9700243	090-3938548				C2, Buu Long Street, Cu Xa Bac Hai, Ward 15, Dist.10, HCM City	
Tung - Son Thanh Tung	Vietnam National University, HCMC, Faculty of Geography	08-8291103	090-8357291	08-8221903	08-8998106	sttung@vnuhcm.edu.vn	12 Dinh Tien Hoang Str. Dist.1, HCM City	Environmental Management

APPENDIX II:

DIFFERENT STAKEHOLDERS THAT WERE APPROACHED IN THE RESEARCH

Stakeholders	Aspects related to sanitation provision
CDM	Foreign consultancy involved in planning of city level projects
CENTEMA	Local company related to planning, and joint research with Van Lang and Wageningen University
Center for Social Development and Poverty Reduction	Part of an international program managed by CIDA (Canadian International Developed Agency) operating in the local level. Involved in social surveys and projects aiming for improvements of social welfare
Drainage Enterprise 6	Government agency under the UDC in charge of maintenance and sometimes construction of level 1, 2 and 3 systems
DTPW	Government office in the city level involved in planning, implementation and surveillance
ENDA	International NGO involved in approaching the communities for environmental education and improvement of social status
Households	109 social surveys were conducted in Binh Chanh District
PMU 415 – THLG	Project Management Unit of the THLG basin involved in planning, implementation, project monitoring and contact with foreign finance and consultancy groups
PMU NLTN	Project Management Unit of the NLTN basin involved in planning, implementation, project monitoring and contact with foreign finance and consultancy groups
UDC	Government office in city level in charge of maintenance and supervision of sewer systems of level 1, 2 and 3
UMD	Government office in district level in charge of maintenance, supervision and sometimes construction of sewer systems of level 3 and 4
UPI	City level government institute in charge of urban planning
Van Lang University	Department of environmental technology involved in research related to sanitation and wastewater treatment
Van Xuan	Local consultancy involved in planning of sanitation infrastructure
VIDANECO	Local consultancy involved in planning of sanitation infrastructure
VUUP	PMU concerned in upgrading the tertiary infrastructure of low-income areas of HCM City. The PMU is involved in social analysis and planning of infrastructure
Women's Union	Act in ward levels to increase communication with local communities and implement social projects for improvement of welfare

The following publications can be ordered after sending a cheque to the Department of Environmental Policy (175), Wageningen University, Hollandseweg 1, 6706 KN Wageningen, The Netherlands (tel: +31 317 484452; fax: +31 317 483990); or at CENTEMA, C4/5-6 Dinh Bo Linh Street, Binh Thanh District, HoChiMinh City, Vietnam (tel: +84 88981502; fax: +84 88981505). Price € 18.25 or 100,000 Dong

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