UWEP
Urban Waste Expertise Programme

Marketing of Solid Waste Management Services in Tingloy, the Philippines

A study on affordability and willingness to pay

UWEP Working Document 9

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PREFACE

It is vividly illustrated in literature and implemented in projects all over the world that an impressive range of initiatives and actions within cities in Third World countries, together with partners in international support programmes, have been improving the practice of environmental and solid waste management. This, however, stands in contrast with the one factor that allows waste problems to steadily magnify, namely one's attitude, perhaps reluctance, towards waste. Without changing one's behaviour towards waste oneself creates, it will be genuinely impossible to combat the solid waste problem in the near future.

With this in mind a marketing study was conducted, the results of which are presented in this working document. Based on a developed methodology for measuring the demand for solid waste services and, compatible herewith, the determination of voluntary solid waste fees, a participatory demand assessment and a questionnaire were implemented in Tingloy, the Philippines. Using the methodology, it was aimed at identifying the most preferred solid waste management alternative for the island. By working closely with the official bodies in Tingloy, interest and support for a community based solid waste system were gained. On that basis the survey could find its way to the residents of Tingloy. In the end, the survey accomplished an awareness raising among the population of the island's urban area and contributed to a better insight in the needs, preferences and socio-economic situation of the residents.

Yet, the questionnaire could never have taken place without the overwhelming assistance and guidance of a number of people. Above all I would like to address words of appreciation to Melchor S. Palmares (local coordinator for the UWEP pilot projects in Batangas Bay) and to Dominador H. Manguiat (Batangas Social Development Foundation project coordinator) for their help and warm teamwork during the study. Moreover, I would like to acknowledge the support of Christopher C. Ancheta (local sanitation engineering consultant) and Danilo G. Lapid (UWEP regional coordinator for South east Asia) for the profound insights in technical and social aspects of solid waste management. I also warmly appreciate the support of BBDP Officer-in-charge Cora Abansi and ENR Officer Evelyn C. Estigoy (managing director PG-ENRO) for her approval of my stay at ENRO. I am more than grateful for their contributions and support, which made my stay in the Philippines unforgettable. The six weeks study was more than just a research to me. Furthermore, a warmhearted recognition must go to Marlow and Janet Ner. They looked after me with great care during my presence in Batangas City.

In addition, words of appreciation go to Anne-Lies Risseeuw and Annette van der Heijden of WASTE for their efforts in making this working document readable. Moreover, I very much appreciate the critical notes from Wim Pelupessy, Development Research Institute at Tilburg University, without which this document would not have been so profound. Finally, and equally important are the contributions and comments from Maria Muller, senior sociologist at WASTE and Lex Hemelaar, environmental economist at WASTE. They have not only guided the process of writing this document, they have supplied me with insights and knowledge that can only come from personal experience. It is their input that gives this working document its added value.

And, finally, I dedicate this working document to the population of Tingloy. Their frankness and hospitality changed, once again, my view of life. Hopefully the results of this study will support the endeavour of building a new solid waste management system on this island.

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ABBREVIATIONS

ATP	Affordability To Pay
BBDP	Batangas Bay Development Project
BBR	Batangas Bay Region
BSDF	Batangas Social Development Foundation
CBOs	Community Based Organisations
CV	Contingent Valuation
CVM	Contingent Valuation Method
EPA	Environmental Protection Agency
GEF	Global Environmental Facility
IMO	International Maritime Organisation
IRA	Internal Revenue Allotment
ISWM	Integrated Sustainable Waste Management
kg/cap/day	Kilogram per capita per day
kg/hh/day	Kilogram per household per day
kg/m^3	Kilogram per cubic metre
LGU	Local Government Unit
MSWM	Municipal Solid Waste Management
NGOs	Non-Governmental Organisations
NSO	National Statistics Office
OECD	Organization for Economic Cooperation and Development
P	Philippine Peso; P43 for 1 US$ (August/September 1998)
PG-ENRO	Provincial Government-Environment and Natural Resources Office
PPS	Pilot Project Settings, which equal the four pilot project areas in the UWEP programme; the others are in Bangalore - India, La Ceiba - Honduras, Bamako - Mali
SWM	Solid Waste Management
UNCHS	United Nations Centre for Human Settlements
UNDP	United Nations Development Programme
UWEP	Urban Waste Expertise Programme
WB	World Bank
WTP	Willingness to Pay

For amounts stated in pesos, the exchange rate equals P43 for 1 US$ (August/September 1998)

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CHAPTER 1 MARKETING RESEARCH OBJECTIVES

1.1 Introduction

Most municipalities in developing countries spend a large proportion of their budgets on the collection, transport and disposal of solid waste. Their solid waste management is a costly service that consumes between 20 and 50 percent of available operational budgets for municipal services, yet serves no more than 70 percent of the urban inhabitants (Bartone and Bernstein, 1993). The unserved are almost always the growing low-income populations concentrated in the peri-urban areas. Keeping pace with the requirements of rapid urbanisation and continuing population growth, and because of its critical role in protecting the environment and public health, accomplishing effective municipal solid waste management should be a priority for Third World cities.

Most attempts to improve solid waste management in cities have focused on the technical aspects of different means of collection and disposal (WB, 1992). Recently, more attention has been paid to enhancing institutional arrangements for service delivery, with a special emphasis on privatization (Cointreau, 1994). Also an abundant number of articles focused on the demand-side of water and sanitation can be found (Whittington *et al.*, 1990; Whittington *et al.*, 1991; Whittington *et al.*, 1992; Altaf and Hughes, 1994). However, much less effort has been directed at investigating the demand for solid waste management. In other words, the attempts at improving the solid waste service performance have focused mainly on supply-side aspects, such as collection and disposal capacity, but have seemed to circumvent the approach of solid waste management improvement through demand-side information. This makes the case of an improved municipal solid waste management driven by demand-side information in the underdeveloped urban areas in Third World countries all the more important.

1.2 Objectives

The present research has its general objective to explore if demand-side information, among other things willingness-to-pay and affordability-to-pay, will turn out to be the most important elements to improve solid waste management in urban areas of developing countries. For this purpose, a general methodology has been developed and tested in a case study country.

The target group for using the methodology consists of people who develop and design waste management services, amongst others governmental planning agencies and development project institutions. It almost goes without saying that those who will apply the methodology should work closely with, or better, let the target community members participate in the process towards accomplishing improved solid waste management. The wisdom of involving community members directly in improving the waste conditions of their neighbourhoods appears clear. The question remains, however, how to orchestrate the most preferred solid waste alternative as a solution for the community, given their priorities and possibilities. Hence, in order to specify the research objective in more detail, several essential questions come to mind regarding three specific objectives in the search for a viable marketing method (see also Annex 1).

For a marketing method to be successful, the specific objectives need to be considered carefully because they lie at the heart of the research. Answering them will determine the contents and radius of action of the ultimate contours of a sustainable solid waste management system.

Identification of alternatives, or sets of alternatives for the delivery of waste management services

In a service oriented approach a solid waste management system can be divided into two subsystems: a primary and a secondary system. The primary system comprises the collection of waste from households at the neighbourhood level. The secondary system is the transportation to, and the disposal and treatment at the final disposal site. To identify the alternatives in the delivery of waste services, the research will try to indicate what components in the integrated solid waste system are essential and what variables need particular care. Therefore, care should be taken of the myriad ways and manners solid waste can be delivered, or better, processed. The type of delivery of solid waste services itself depends vastly on the preferred waste handling process, such as segregating waste materials for reuse or for turning components of solid waste into compost.

Measurement of the affordability-to-pay and willingness-to-pay for solid waste services of the community

A price oriented approach will perhaps be the most essential element in the marketing of municipal waste service. If urban waste management projects are to be both sustainable and replicable, a planning methodology is required that includes a procedure for eliciting information on the value placed on different levels of the service. Contributions should be paid by those who benefit from the system in order to recover the cost. A key concept in such a methodology is that of "willingness-to-pay". If people are willing to pay for the full costs of a particular service, then it is a clear indication that the service is valued and therefore will most likely be used and maintained. Hence it will be possible to generate the funds required to sustain the service[1].

To obtain the information about individuals' preferences for solid waste services, a contingent valuation method (CVM) can be applied. Such a method reveals the values of private goods and goods or services with a more public character. Contingent valuation methods are often used to assess preferences for goods and services for which a conventional market does not exist. A hypothetical situation must be described to the individual who is asked to value the good or service, through a questionnaire for example. The individual is then asked one or more questions to determine how much he or she would value a good or service if actually confronted with the opportunity to obtain it under the specified terms or conditions.

However, the extent to which an individual is willing to pay for a hypothetical service also depends on how much he or she can afford. Therefore, next to the willingness-to-pay, the affordability-to-pay is a key element in the marketing of solid waste services. Not knowing the affordability to pay implies the danger of a failure of recovering the full costs of solid waste services.

Assessing the demand for services

A preference oriented approach is needed to obtain a sense of the relative priority of improved waste management services as compared to other services, like, improved water services or better sanitation performances. This comparison is fundamental because a recent study showed that households consider solid waste services as a normal economic good with its consequences for household welfare (Altaf and Deshazo, 1996). Households can make this trade off if they understand the problems that exist and appreciate the risk they pose. Forcing the solutions upon them seems less successful

[1] Most attempts to incorporate willingness-to-pay considerations into project design of *e.g.* water delivery to rural communities in developing countries, however, have been of an ad hoc character, in large part because of the absence of validated, field-tested methodologies for assessing this aspect (Whittington *et al.*, 1990).

compared to a process of self-identification of problems and solutions through community participation. It can be argued that providing services to people without investigating what they really want is unsustainable. This argument has led more and more development organisations all over the world to attempt to provide services that are community-driven. Such a demand-driven approach requires clear guidelines on how to select the most preferred service, because simply asking what people want is not enough. For this reason methodologies have been developed which serve as a solid base to investigate what the community really wants. However, the question remains to what extent the community can maintain and sustain their most preferred service in the years to come. As with all services, someone has to cover the costs. Most likely, if the service in question extends to a whole community, it calls for a community based financial contribution, that is, each community member pays his share of the cost. On the other hand, considering the scarcity of resources, there will be a trade-off between the different services asked for.

In order to come forward with methods to measure the concerns or demand for waste services of households, the next chapter will discuss the methodology to assess this essential aspect of the marketing of solid waste services.

1.3 Outline of the working document

This working document treats the management of solid waste services. In particular, the document tries to develop a methodology for measuring the willingness and, directly linked herewith, the affordability to pay for community geared solid waste services. Nonetheless, the focus of this study is not limited to the determination of the willingness and affordability to pay for solid waste services only, but may also be of interest for other services.

Chapter 2 intends to be a broad concept, applicable as a step-by-step guideline for the measurement of the willingness and affordability to pay for solid waste services. Also, it tries to visualize the way in which the community should come up with the most preferred solid waste alternative. In that respect it builds on the idea of community involvement in the determination of their desired solid waste system.

In Chapter 3 the results of the demand assessment and survey that were implemented in Tingloy will be presented. Tingloy is a small, green island of approximately 22 square kilometres of mostly mountainous land, located two nautical miles off the Batangas mainland. Tingloy has a total number of 17000 residents, 2200 of whom live in the so-called "urban area" of the island. This area formed the nucleus for a marketing research study for the new solid waste management system to be introduced in the area. The methodology developed in Chapter 2 stands as a model for the way in which the research and questionnaire were conducted. Furthermore, to observe if the outlined step-by-step methodology really worked, Chapter 3 reads as an evaluation of the research methodology as the reader will come to notice.

It can be said that local governments in developing countries face an array of environmental problems that are growing more complex and that are particularly severe in urban communities. Because they compete with many other issues for attention and resources, there is a pressing need for analytical and procedural methods that will help the community select their concerns themselves, and to determine their financial contributions and affordability. In this way they could make sound policy decisions, and implement effective solutions to environmental threats. The methodology presented in this working document tries to help in meeting this need.

CHAPTER 2 RESEARCH METHODOLOGY FOR THE MARKETING OF SOLID WASTE SERVICES

2.1 Introduction

The last fifteen years have been a renaissance of household questionnaire studies particularly the water and sanitation sector. Yet, for those interested in the waste sector, it is hard to find concepts based on a participatory approach which determine the willingness to pay of the target population for solid waste services. Although it is often cited that solid waste services are just another public service, and therefore should be treated in line with methodologies used in water or sanitation service for example, it must be stipulated that a solid waste system differs in many ways (Anschütz, 1996). In general, it is seldom possible to exclude parts of the target population from receiving the service when they are not willing to pay for it. Moreover, if the solid waste service is not in line with the expectations of the inhabitants, it becomes very hard to find a base for regular payment for the service.

This is one of the reasons why an effort was made to develop a research methodology for the marketing of solid waste services. Using a demand-driven strategy the research aimed at creating a community based support for the sustainability of a solid waste service. This implies that the service would be in accordance with the local preferences and needs and would simultaneously build a financial basis for it. By designing and applying a demand-driven strategy one can answer the question how to discover the most preferred solid waste service and, in addition, how to measure the willingness to pay. In order to properly answer this question, a step by step approach has been laid out. Eventually, by going through these steps the reader will have a tool to use in the determination of the willingness to pay. The identified steps to come to the marketing of solid waste services are presented below and visualized in the diagram of Annex 2. Furthermore, the reader will find each step separately discussed in the following paragraphs.

It is important to note that the research methodology is not carved in stone. As with all methods, its application should be flexible to accommodate specific, local conditions altering the sequence of activities when appropriate. Hence, it is not the only instrument in identifying the willingness and affordability to pay but an approach in building a solid waste management system in line with the perceptions of the residents themselves. The question rises to what extent the research methodology was successfully applied for the case of Tingloy.

Stepwise approach of the research methodology for the marketing of solid waste services

STEP 1 Survey statement and objective
STEP 2 Survey delineation
STEP 3 Solid waste system description
STEP 4 Participatory demand assessment
STEP 5 Research method
STEP 6 Survey questions and techniques
STEP 7 Survey layout and sample size
STEP 8 Pretesting and revision
STEP 9 Selecting and training the enumerators
STEP 10 Implementation of research questionnaire
STEP 11 Analysis and reporting
STEP 12 Feedback of results among stakeholders

2.2 STEP 1 Survey statement and objective

The objective of the survey needs to be clearly and comprehensively described. To respondents and to enumerators it must be absolutely clear what the objectives are and the objectives should most preferably be stated in a simple and straightforward manner. Moreover, the survey statement needs to explain the reasons behind conducting the survey and who is responsible for the research implementation. In general, the survey statement usually explains:

1. What the survey is all about;
2. Why it is being conducted;
3. How the respondent was chosen to be interviewed;
4. How long the interview will take;
5. Assurance that the responses will be confidential;
6. A request for permission to begin asking the questions.

For example, for the survey questionnaire held on the island of Tingloy, the Philippines, the official survey statement might be described as: *"The principal component of the research study is the development and implementation of a household survey intended to elicit three types of information, namely the perceived level of existing solid waste services and based hereon the possible improved service options, households preferences and attitudes regarding these services, and their affordability and willingness to pay for improved services. The main reason for conducting this survey on the Island of Tingloy is that at present there is no formal waste collection system in operation and by investigating the state-of-the-art the Barangay Councils of poblacion 13, 14 and 15 assisted by the Batangas Social Development Foundation hope to improve the waste management service system."*

2.3 STEP 2 Survey delineation

The second step of the methodology involves a delineation of the scope of the research and a precise description of all terms used. At first glance this might not seem very important but sooner or later all project members will be confronted with questions as "where is the project going to be implemented?", and "what does the study area look like?", or "what do we mean by solid waste?", and "how do we define a household?". Thus, it is fruitless to design any project or research method if neither the location nor the terminology is identified first.

Several illustrative criteria are applicable to our methodology to curtail the scope of the to-be-implemented project. They can be summarised in a non-chronological order, being the delineation of:

1. The geographical area
2. The administrative boundaries
3. The survey population
4. The terminology

When using enumerators to conduct a questionnaire it is necessary to define standard terms with unambiguous definitions. All enumerators will then automatically follow the common set of instructions in which they have been trained and forego any interpretation problems of the terms used. Obviously, the definitions must also be in line with the vocabulary and living conditions of the respondents in a way that they understand what is being asked.

2.4 STEP 3 Solid waste system description

The third step provides the necessary information on how the prevailing solid waste management system works and what the options are for improvement.

2.4.1 A viable collection perimeter

One of the first steps in planning a solid waste scheme is to define the most suitable service perimeter and to collect basic information on the area and on the potential beneficiaries. Careful analysis of the situation may help to avoid mistakes which are difficult to correct at a later date. Apart from the geographical and administrative delineation, social, ethnological and economic characteristics of the target community, as well as existing historical boundaries and the influence of strong community organisations should be taken into consideration when building an improved waste system.

2.4.2 Waste characterisation and composition

A second parameter are the per capita waste generation and average densities as essential key parameters for determining the number of vehicles and personnel required, as well as for selecting the appropriate equipment. A careful assessment of the amount and characteristics of refuse within selected collection areas is thus decisive for a good service performance.

In general, rates and composition of household waste vary considerably in place and time. Besides cultural traditions, socio-economic characteristics greatly influence the nature of refuse in a certain area. The higher the income, the greater the generation rate and the proportional content of paper, glass, plastic and metal. The percentage of compostable waste and waste density values will decline with an increasing income. To a certain extent, it suggests that it is not possible to adopt a generalised view with regard to refuse generation and characteristics (Pfammatter and Schertenleib, 1996). Moreover, specific characteristics of urban areas also mark the generation of waste, like construction activities in growing urban neighbourhoods. Available data from one area should therefore only be applied to another study area if the socio-economic, cultural and religious conditions are very similar (UNCHS, 1995). However, if no reliable data are available and no detailed analysis has been carried out, a first approximation of average domestic waste generation in a low-income community can be estimated at 0.5 kg/cap/day (Bartone and Bernstein, 1993).

Regarding waste characteristics, it is sufficient for collection purposes to assess the generated waste quantity in kg/hh/day and density in kg/m^3 of a representative number of households over a period of about one week. A reliable average of the expected waste characteristics may be obtained by taking daily samples of refuse of about 1% of households in the selected area with a minimum of 20 households (Pfammatter and Schertenleib, 1996).

2.4.3 Collection

Where collection equipment is required, productivity and efficiency of a solid waste system are significantly influenced by the selection of the appropriate type of equipment. To come to the necessary consideration of operational design, the following parameters should be used:

1. The number of household serviced
2. The type and volume of waste collected
3. The service frequency of the target area
4. The type of temporary waste storage facilities in the target area
5. The type of equipment available and appropriate for the target area
6. The number of equipment items needed
7. The number of crew required

2.4.4 Disposal and treatment

A fourth parameter in planning an improved solid waste system is the final handling of solid waste. Much depends on the activity of waste processing resulting in a sound solid waste management system to depict the activities of waste handling carefully. Comprehensive descriptions of potential waste treatment activities in the target area are therefore necessary.

2.4.5 Resource recovery

At the centre of the description of a solid waste system lies the parameter of resource recovery. What actually constitutes resource recovery or reduction is not well defined in the literature and varies among different studies and practices. Waste prevention literally means that prevention of waste generation at source is aimed at. Generally, national governments, local communities and private initiatives are incorporating source reduction, education programmes in their solid waste policy to educate citizens about general solid waste issues, as well as specific changes in their purchasing and disposal practices. However, such source reduction programs or initiatives, particularly education campaigns, do not suffice to achieve changes in individual purchase and waste generation behaviour for a variety of reasons.

Nevertheless, local communities play an active role in diverting materials from disposal reducing waste generation rates. Such an active participation of the community can take shape as (Bartone *et al.* 1994; EPA, 1994):

- Educating citizens about source reduction, emphasizing change in purchasing practises and product reuse
- Targeted environmental education for community leaders, politicians and others
- Promoting, even awarding efficient use and reuse of all kind of resources
- Implementing volume-based refuse collection fees
- Regulating packaging or other materials sold, among other things

Usually, solid waste recycling activities are confronted with mixtures of waste materials. The more a certain type of waste is mixed with waste from other sources of generation, the more difficult it is to recover valuable waste materials for recycling and/or reuse (EPA, 1994). Therefore, next to waste prevention, segregation at source exists which has been defined as setting aside recyclable waste materials for further processing instead of final discarding (Lardinois and Van de Klundert, 1993). The major benefit of waste segregation at source would be the retrieval of valuable items from the valueless fraction before these materials enter the waste stream. This practice of retrieving valuable items from waste is actually widespread and very common in low-income countries and certainly deserves attention in designing policies for solid waste systems in urban areas in South countries. In most cases retrieving is not done at source, but somewhere downstream in the waste system.

2.4.6 Organisation and management

Appropriate organisation and management is another key parameter in establishing successful solid waste systems. Various stakeholders involved in the provision of solid waste services may have different interests and potentials for contribution. As a result, the definition of their roles, the coordination of activities, as well as of their responsibilities are crucial elements in organising a new system. Although each system has its specific stakeholders, some fundamental groups can be identified. Apart from the target community or groups of households, the main actors involved are community-level organisations, municipal authorities, non-governmental organisations, and formal as well as informal private sector participants. All of them have to be looked at separately in order to describe new, or alternative solid waste management systems.

2.4.7 Cost assessment

A final parameter in the solid waste management system is the estimation of costs. Cost estimates are not only required for the selection of the most suitable financing method, but affect almost every decision when developing a new waste scheme. Choice of service type, type and number of equipment, as well as selection of a suitable number of crew, are dependent on the costs incurred. A transparent cost structure should split up the expected expenditures into investment and operating costs.

Generally speaking, investment costs comprise of the expenditure for necessary collection and processing equipment but can also incorporate costs of infrastructure, research studies and planning. In addition, attention must paid to capital costs. If the investment is financed by a refundable loan, either the interest and principal payments must be considered in the cost assessment, or the interest and the depreciation costs of the equipment used. The operating costs include expenditures necessary for daily collection and for the maintenance of equipment. In labour-intensive systems, salaries for collectors account for the largest share of operating costs.

2.5 STEP 4 Participatory demand assessment

Before turning to the actual research method, there needs to be a basis for undertaking the assessment of real demand. This basis is provided by the information gathered from a limited group of people representing the community, among whom can be distinguished municipal officials, community leaders, local residents, members of community based groups, or landowners. Because it is nearly impossible to collect each and every community member's idea, this methodology chooses to conduct demand assessment through a group of representatives. In *optima forma* these groups embody a representative number of people from each stakeholder group to stimulate the exchange of information. The required information, needless to say, depends heavily on which solid waste service system component or problem the stakeholders wish to focus on. In other words, the actual contents of the survey questionnaire, *i.e.* the questions, the waste service options, and their description, should be described after the identification of each stakeholders' needs and concerns has been accomplished.

The goal of this step is thus to obtain the necessary information of the needs and preferences of all stakeholders, including the residents of the project area. The six questions formulated below can be seen as anchors for the subjects to be analysed through the final questions in the survey questionnaire. To measure the willingness and affordability to pay this methodology chooses to use structured questionnaires illustrated with attractive drawings of the service description.

The survey conducting institution must depart from their own criteria of a) what will be the survey area in question, b) who is to be interviewed, c) what does the actual solid waste system look like, and d) what is to be investigated. Three criteria have already been put to analysis in the previous sections as steps in the integrated survey approach. Then through different ways of eliciting the necessary information, for instance workshops, meetings or informal discussion groups, the survey conducting institution assesses the wishes, preferences and attitudes of the research population. The key questions take shape as follows:[2]

1. What are the specific problems regarding solid waste and solid waste service(s)?
   The first question asks each individual his/her specific problem in order *not* to surpass one's idea of what actually is considered a problem.

[2] See also UNCHS, 1995, "Guidelines for assessing effective demand of communities for environmental infrastructure" with respect to water issues.

2. What are the perceived solutions to the above problems?
   This question tries to discern the community-supported solutions from their problems, if any.

3. What is a household currently paying for waste services?
   This third issue tries to underpin the way in which the affordability to pay has to be measured. The affordability to pay is best analysed by asking the amount currently spent on waste services. If none is found, one can try to determine cost-of-living expenditures in order to estimate monthly income. Based on internationally accepted household expenditures for solid waste services, the affordability to pay can still be measured (Cointreau-Levine, 1994; Pfammatter and Schertenleib, 1996).

4. What is a household paying for existing solid waste services?
   This fourth question puts forward the amount a household is already paying for existing solid waste services.

5. To what extent are households already involved in resource recovery and separation at source?
   This aspect focuses on the contribution of the households to diminish the amount of solid waste refuse.

6. Who should be responsible for the solid waste service system?
   This final question examines the attitudes of community members about who should be collecting the refuse, who are potential service users, who is collecting the fees and who is responsible for the daily service system operation.

2.5.1 Reiterative selection process

Although six benchmark questions have now been identified, it still remains to be seen how the development of candidate solid waste systems takes shape. In order to undertake the necessary action, it is insufficient to ask households their opinion on solid waste management services, since solid waste systems should obey criteria in the field of environmental, economic, and/or sociological sciences. In other words, the system has to be sustainable. Therefore, the different ideas of the target population to zero-in on the preferred options, must be brought in line with the sustainability criteria.

One way of doing this is to pursue a reiterative process. Basically, the process can be portrayed as follows. First of all, activities have to be organized so that members of the community can express their needs and concerns to the study researchers. This asks for a thorough understanding of the local circumstances in order to arrange the best possible activity, for example seminars, participatory workshops, consultations, or open fora. Through these activities the target population is requested to come forward with their perceptions, ideas, concerns on the subject of solid waste handling.

After obtaining this information, the next step in the process is to examine if the gathered data are in line with the sustainability criteria. This includes the assessment of potential environmental and public health impacts, the calculation of the estimated cost, and the assessment of likely responsibilities of households, enterprises, and official bodies. If there are negative environmental and public health impacts and/or if the estimated costs are excessively high, the researchers will have to inform about the deviations from sustainability and offer options for adjustment. This requires the expertise of the research staff to educate and guide the participants towards viable solid waste options. For example, if a community prefers a burning site for the final disposal of all their solid waste while segregation of solid waste seems viable, the participants have to be educated on the alternatives.

When the most preferred candidate solid waste options have been selected, the final step in the reiterative process is to consolidate the results with the target participants once again. They are the

key to the success of the implementation of the new solid waste system. The community, in particular the official bodies, should discuss the outcomes disseminated by the research facilitators. Again, this consensus building can take the form of seminars, or open fora where the presented solid waste system can be reviewed and, if approved, applied in the survey questionnaire. Otherwise, the second step has to be reiterated until the solid waste options are accepted by the community and in line with the sustainability criteria.

2.6 STEP 5 Research method

Once the preferred candidate solid waste options have been selected, the next step is to set a price to the system. In order to do this a research method has to be selected and tested for its applicability. Several techniques for assigning economic values to goods and services have already been analysed in the literature. The valuation task is to determine how much better or worse off individuals are, or would be, as a result of a change in the provision of a public service or in environmental quality (OECD, 1994). Economists define the value of a change in terms of how much of something else an individual is willing to give up to receive this change, or how much they would accept in order to permit the change to occur. Thus, the question is how can a researcher know what an individual would be willing to give up (or to pay) in order to have a specified change in the provision of the public service or environmental quality?

First of all, one could simply experiment. For instance, if we want to know how much people value a potential new national park, the park could be created and an entrance fee could be charged without consulting the visitors *ex ante*. However, large experiments of this kind are difficult to design and, most likely, politically impossible to implement.

A second method to measure the value of a non-market good uses on the idea of surrogate markets. To use this technique, a good or service that is sold in markets and is related to or bundled with the non-market service has to be found. In this situation the individual may reveal his or her preferences for both the market and non-market service when he or she purchases the market good. This surrogate market method is also known as the hedonic property value method.

A third approach to determine the value of a good or service, is based on damage. For changes in the provision of a service that reduce the individuals' well-being, we can attempt to ascertain the damages an individual will suffer. A deterioration in the quality of the provided good could cause a loss of productive assets of loss in earning power. A person could be made well or restorted to their initial state of well-being by being compensated in money or other goods or services by the amount of the loss. Together with the surrogate market technique, this "damage function" approach are termed indirect valuation methods because neither rely on people's direct answers to questions about how much they would be willing to pay (or accept) to have a change in the quality of the provided good occur.

Another approach to obtaining estimates of the value of goods and services takes a somewhat different tack. Rather than developing new estimates of value for the services of interest, estimates of value can be found for the same or similar good or service in other locations, and then transfer these estimates to the location of interest. This method is also denoted as the "benefit transfer" approach.

The most straightforward method, however, is simply to ask people how much they would be willing to give up, *i.e.* how much they would be willing to pay, to have a specified quality improvement happen. In this "stated preferences" or contingent valuation approach individuals are asked directly to state or reveal their preferences for the service or good provided. If people were able to understand the change in the quality of good being offered correctly, and would answer truthfully, then this direct

approach would be ideal. The question remains, however, what the relevant items for estimating the system's value exactly are?

2.6.1 Affordability to pay

Households in different income categories, have different levels of affordability. It is therefore important to have a clear insight in the income levels of households and categorize them in low, middle and high income classes. Nevertheless, some reticence is in place. Generally questions on income are susceptible to arbitrary answers of the respondent so that affordability measurement becomes less ambiguous. It is more likely to use information on income as a verification of the affordability to pay data rather than as an end in itself.

In assessing people's affordability to pay for waste services in developing countries, namely, it is considered more realistic to generate data on household expenditures than data on household income. Contrary to monthly income figures, statistics on monthly cost-of-living expenditures present a more realistic picture of living standards. Besides, information on family income is often not given or not given accurately for privacy reasons or simply because households do not know. The affordability to pay for solid waste services is best related to the level of expenditures of households and represents the amount people can afford to pay with respect to their budget constraints, *i.e.* the amount that can be paid at the cost of other expenditures.

The affordability to pay of households determines the maximum fee level and is an indicator for the level of cost coverage for a given system option. The method used for identifying the maximum fee for solid waste services that households can afford, will be a survey questionnaire that directly links the solid waste charges with other primary expenditures for cost of living (Agro Vision, 1997). The information on expenditures for cost of living can be obtained by categorizing daily, weekly or monthly expenditures on:
- food products
- house rent
- transportation and fuel
- water
- electricity
- education
- clothing
- medical treatment, among other things

2.6.2 Willingness to pay

Willingness to pay is defined as the maximum amount that a household is willing to pay voluntarily for solid waste services rather than do without the services, *i.e.* without reducing its welfare. This is related to the real need or demand for which households are prepared to use their own resources to obtain what is being offered. The willingness to pay offers an indication of the priority given to solid waste services and can be measured properly by applying a contingent valuation method. Generally, the willingness to pay will be affected by the satisfaction with present levels of services, the perception of waste as a problem, costs incurred on service augmentation/substitution, historic pricing systems and socio-economic characteristics such as household size, assets owned, education and occupation of the head of the household (Mani *et al.*, 1997). Moreover, aspects such as gender, age and marital status are also determinants of the level of willingness to pay as has been indicated in a research determining people's support, priorities and willingness to pay for environmental management programs in the Philippines (Tejam and Ross, 1997).

2.6.3 The contingent valuation method

Comparing the number of applications of the different valuation techniques, there are a large number of applications of the stated preferences method (OECD, 1994). This is in part because the method is flexible in terms of data requirements and can be applied many different kinds of valuation problems. In short, the contingent valuation method employs survey techniques to ask people about the value they would place on hypothetical changes in some environmental resources or non-market commodities, in this case solid waste services. All other methods of valuing publicly provided goods and services require linkages to actual market transactions.

Based on extensive research done by Carson and Mitchell (1989), a contingent valuation (CV) method typically consists of three parts. First of all, a contingent valuation method describes in detail the goods or services being valued and the hypothetical circumstances under which they are made available to the respondents. Secondly, the method entails valuation questions which reflect the respondents willingness to pay for the good or service being valued. These questions are asked on the presumption that without the respondents payment, the good or service would not be provided. This loss of expenditure on other than the provided good must specifically be stated to the beneficiaries. The questions could be reduced to a single question measuring the maximum willingness to pay. Alternatively, it could involve a bidding game, wherein a series of offers are made to respondents in an attempt to detect the maximum amount voluntarily paid for the service. Or, it could simply be a yes or no question. All types of questions are dealt with in the next paragraph. And thirdly, the valuation method contains questions about the respondents characteristics, their preferences relevant to the service being valued and their use of the good or service. While not an inherent part to the CV method, most surveys collect background information either in order to understand what influences the values people place on the good in question. This aspect will also be explained in paragraph 2.7.3.

The concepts of economic value, the maximum willingness to pay and the affordability to pay, are often difficult to translate for a researcher. It is important for the contingent valuation researcher to clearly communicate to interviewers enabling them to understand the purpose of the survey, and that answering valuation questions is based on real economic commitment, *i.e.* faced with an actual budget constraint (Whittington *et al.*, 1992; Altaf and Hughes, 1994).

A brief economic analysis can be used to clarify this point. As shown in Table 1, the total population of respondents can be envisaged as four groups (Whittington, 1998). First, there are respondents who are willing and able to pay (the upper left part). These are the ones the CV researcher wants to classify as accepting the CV scenario: they are both willing to pay for the hypothetical good or service and have sufficient income to do so. In other words, they state that they are ready to make a real economic commitment if the consequences of the CV scenario could be delivered or ensured. Second, there are respondents who are able to pay but are reluctant to do so voluntarily (the upper right part). These respondents could afford the service in the sense that they have enough income, but choose not to because they have other things on which they would prefer to spend their income.

A third group of respondents are willing but not able to pay for the good or service provided. Put differently, these people would like to purchase the commodity but cannot afford it. The CV researcher especially wants respondents in this group to take the budget constraint seriously, in which case they would reject the CV scenario. It is this group that might cause the most confusion. The argument is often made that beneficiaries in this group would like to purchase the good or service provided if their income were higher. But in their current financial circumstances they are not able to pay. Now, the CV researcher must emphasize that for the purpose of the survey such individuals must be categorized as not willing and able to pay (the lower left part). A fourth group of beneficiaries are not willing and not able to pay. These respondents cannot afford to pay for the hypothetical good or service. But even if their income would increase by a certain amount, they still would not want to pay

for the offered good or service. These people should clearly be classified as not willing to accept the CV scenario (the lower right part).

Table 1 The willingness and affordability to pay: a theoretical classification

	Respondent is willing to pay for the hypothetical good or service	Respondent is not willing to pay for the hypothetical good or service
Respondent is able to pay for the hypothetical good or service	willing and able	able, but not willing
Respondent is not able to pay for the hypothetical good or service	willing, but not able	not able, not willing

source: Whittington (1998)

Many economists and survey researchers have remained sceptical about the ability to conduct a CV survey in South countries for the presumed difficulty of understanding and interpreting respondents' answers to abstract questions. The core criticism was that for a variety of reasons respondents may not answer willingness to pay questions accurately and thus not reveal their true willingness to pay. In particular, three problems were isolated with the approach of contingent valuation studies (OECD, 1994). First, the issue of hypothetical bias, which arises from individual's inability to understand or correctly perceive the characteristics of the service being described by the interviewer. Moreover, the hypothetical bias also occurs when individuals will not take the contingent questions seriously and simply respond with whatever answer comes to mind. Second, the strategic bias may arise when an individual thinks he may influence an investment or policy decision by not answering the interviewer's question truthfully. Finally, the compliance bias, or starting point bias, may emerge through respondents giving answers which are influenced by a desire to please the interviewer. In the bidding game question format, for example, the interviewer starts the questioning at an initial price. The respondent who is unsure of an appropriate answer and wants to please the enumerator, may interpret this initial price as a clue to the correct bid. Thus the compliance bias exists if this initial price affects the final willingness to pay for the hypothetical good or service offered.

Mainstream economists are doubtful of the insights derived from people's responses to hypothetical questions. This scepticism crystallizes the initial objections into two general questions, namely "is the contingent valuation method reliable?", and "is it accurate?" Trying to answer these questions, we are confronted with the discussion of the validity of the technique, which has already been positively answered through the empirical findings of several research studies (UNCHS, 1995; Altaf and Deshazo, 1996). Among good contingent valuation surveys, successful CV studies must deal with six vital questions (Casley and Kumar, 1996) being:

1. What will be the population of people whose values for the solid waste services will be estimated?
2. How will the item to be valued be defined?
3. What payment vehicle will be appropriate?
4. What are the real preferences/problems of the beneficiaries?
5. How will the contingent valuation question be posed? and
6. What supplemental data will be gathered?

In the next three subparagraphs the first three questions are explained. Because question 4, 5 and 6 directly concern the contents of the survey itself, they will be addressed to in Paragraph 2.7.

2.6.3.1 Population definition

Assuming that the contingent valuation method is being implemented, according to its vast advantages over other direct or indirect methods of pinpointing values, the first step is to define whose values are to be counted. Thus to conduct the survey, there needs to be selection of the representative neighbourhoods, next to the definition of "household", that would give a complete view of the range of conditions prevalent in the study area. Typically the following types of neighbourhoods are identified/surveyed: (a) high income residential, (b) middle income residential and (c) low income residential, as for example has been undertaken in Dhamar, Yemen, and Gujranwala, Pakistan, and Kumasi, Ghana (Agro Vision, 1996; Altaf and Deshazo, 1996; Whittington et al., 1993).

The discussion of the term household is not redundant. The simplest definition of a household is "a group of people who live and eat together". Obviously, this concept of a household leaves much to be desired. Perhaps a clear and unambiguous term of household is "a group of persons generally bound by ties of kinship who live together under a single roof and who share a community of life [...] and a common source of food (Casley and Kumar, 1988) and/or contribute by a pooling of income". Actually, project surveys do not commonly involve the selection of households themselves. As it is notoriously difficult to define a household precisely, and to determine exactly who should be included as its members, it is generally more important to be consistent with common practice. This ensures that enumerators have a definition they can work with, rather than looking for conceptual clarity.

Furthermore, it is quite significant to be fully informed on the different types of settlements because the waste discarded is not merely an action of one person. In block settlements several families are responsible for the refuse of solid waste, whereas with communal storage sites the whole neighbourhood contributes to the litter left behind. Furthermore, it needs to be clear whom the enumerator is going to interview within the defined population. Normally, the person interviewed shall be the head of a household or someone who is clearly involved in decision-making about household expenditures and commitments.

2.6.3.2 Product definition

If contingent values are to be valid and useful, the object being valued must be appropriately defined to reflect the study or policy issue being addressed. In other words, profound research involves carefully presented descriptions of the resources, services or changes in quality that are to be valued.

Product definition also involves compromises between a detailed presentation of technical information, on the one hand, and the need to convey information in a form that is understandable to the respondents, on the other. In short, people need a concept of what they are valuing as complete as possible in order to come up with realistic values. Furthermore, there is a need to present information in simple, understandable and unambiguous terms. Verbal descriptions are standard but can be complemented by visual instruments like photographs, charts or maps. Equally important are the terms the respondents normally apply.

The product, or in this case the solid waste service, can be provided either by the local government, a private company or a combination of both. It is important therefore to determine whether the beneficiaries who receive the service have special preferences and solicit their concerns and doubts about the options of solid waste service. This is explained further in Paragraph 2.7.1.

2.6.3.3 Payment vehicle definition

In order for respondents to express valid values, some specific mechanism for payment, subsequently denoted as "payment vehicle", must be specified as part of contingent valuation questions. Two important criteria for the choice of a payment vehicle are realism and neutrality. It can be reasoned that the more realistic the situation, including the mechanism for payment, the easier it will be for the respondent to visualize the actual payment of fees and thus answer the question accurately. At the same time, however, it is important that the vehicle is neutral which means that enumerators ask the respondents to value the resource and that no bias exists against the way in which the payment occurs.

This payment procedure can take several forms, and depending on the existing payment form, it will be either an independent tax levy, a tax levy as a percentage of other costs such as the electricity bill, or a direct fee, albeit a surcharge on existing bills (Agro Vision, 1996). Fees can be collected on a monthly, weekly or daily basis, or by any other manner directly from the households either by the refuse collectors or by special fee collectors who are assigned by the local government, a private service company, or an existing collection institution. Perhaps an effective way of collecting fees is through neighbourhood meetings where quality control is being evaluated and directly linked to the fees paid.

Municipal taxes and utility bills, used in municipal recovery systems, are more centralised financing models. However, accounting through general taxes, such as a property tax, could lead to insufficient cost recovery for the collection scheme since revenues might be used for other purposes within the municipality. Furthermore, sanctions are usually difficult to apply in illegal squatter settlements. Billing together with other utility services, if present, like electricity or water supply, could entail a solution which contributes to the recovery of collection costs.

2.7 STEP 6 Survey questions and techniques

In most of the published literature hardly any attention is paid to the detailed formulation of the several forms of contingent valuation questions[3]. This is remarkable because it is this formulation of questions that makes it possible to obtain a certain type of information and should be at the centre of a survey design. Obviously specific techniques exist for posing the contingent valuation questions. However, the exact order and formulation remain unclear. The areas for questions are given below and Annex 13 gives an illustrative framework.

2.7.1 The real demand for services

To account for user demand, research analysts must conduct field studies to collect information about the demand of beneficiaries to be served (Islam *et al.*, 1994). They must develop an in-depth understanding of the preferences for the existing solid waste services provided, the advantages and disadvantages as perceived by households of the solid waste system, what the beneficiaries think about an improved waste collection system, and what they perceive as their most prioritized solid waste problem, as has been outlined in Step 4. This forms part of a comprehensive, feasible and properly executed contingent valuation survey.

The outcome of the demand assessment of Step 4 will take the form of views, preferences and needs of the representatives of different stakeholder groups. The next step is to describe the preferred solid

[3] For a detailed description and application of contingent valuation questions Altaf and Deshazo (1996), Whittington *et al.* (1990), and Whittington *et al.* (1991) provide interesting insights.

waste system according to the results of the reiterative selection process entwined with the sustainability criteria. The solid waste options can then be introduced as community-based alternatives for the actual waste situation and subsequently be presented as the centre for the willingness-to-pay measurement, the contents and form of which will be explained in the following paragraph.

2.7.2 The contingent valuation formats

The aim of the CV researcher is to identify the respondents' maximum willingness to pay for a specific service improvement. Four basic elicitation procedures for asking contingent valuation questions can be distinguished, being

1. Bidding game technique
2. Open-ended questions
3. Dichotomous choice format
4. Payment card format

Each of these questioning techniques will be explained further. However, Bishop and Heberlein (1990) argue that the ultimate choice of the questioning technique applied remains largely a matter of individual judgement and preference. This is not to be contradicted but there are arguments that favour one format over the other, as will be shown below.

2.7.2.1 Bidding games

Bidding games have been the most widely applied contingent valuation technique. In a standard bidding game, the first step is to ask a respondent whether she or he would be willing to pay a specified amount in local currency, known as the starting point. If the response is affirmative, the amount is increased to successively higher levels until a maximum willingness-to-pay bid is reached, *i.e.* the maximum amount the respondent is willing to pay voluntarily, here indicated as the bottom-up approach (see also Box 1 of Annex 3). Likewise, if the starting point causes a negative response, the amount is lowered in predetermined increments until the respondent indicates an acceptable amount, here indicated as the top-down approach (see also Box 1 of Annex 3). Thus, the actual willingness to pay bids are obtained after a series of questions have been asked. A further refinement of the bottom-up and top-down bidding games might be to raise or lower the bids in the reverse direction after a change in yes/no answers by smaller amounts.

Another bidding game, denoted as the intermediate game, departs from an upper and lower bound. The procedure works as follows. The enumerator expresses the starting point bid and, depending on the positive or negative answer, he or she raises or lowers the bid respectively. However, the following bid does not correspond with the bottom-up or top-down approach bids. The next bid will be the upper bound bid, or lower bound bid consequently, carefully chosen in advance. The enumerator forces the respondent to state his preference between the starting point bid and the upper or lower bound bid. The process is reiterated until an acceptable amount is chosen by the respondent (see also Box 2 of Annex 3). For example, it looks like a bidding game with a starting point bid of 10. If answered affirmatively then the upper bound limit is posed, for example at 50. The enumerator returns to the starting point bids and raises it with carefully depicted amounts, say with 5, resulting in 15. Again if positively answered then the upper bound limit is lowered to 45 and so on.

Despite its wide application, there has been considerable dissatisfaction with the bidding game technique (Whittington *et al.*, 1992). The crucial problem comes forward in the starting point or compliance bias. This somewhat problematic bias occurs when the initial starting price affects the final willingness to pay bids. Clearly, the respondent is given some "assistance" to arrive at his willingness-to-pay bid. When the same respondent does not have a well-defined valuation for the

service in question, he might see the initial bid as a clue or reference point for his final valuation. Thus respondents who start with a lower initial bid will end up with a lower willingness to pay than those who start with a higher bid. To forego this problem the survey designer must seriously check his survey questionnaire. Or if he is precisely testing for this starting point bias, the surveyor has to design several questionnaires with different starting points to see if the willingness to pay bids are the same. This problem even surpasses the discussion of how to choose the level of the starting point bid. Too high a starting point possibly chokes off respondents but could very well be an acceptable starting point bid. Therefore careful attention needs to be paid to the first bid of the bidding game. Another disadvantage of the bidding game is "yes" saying which means the fact that respondents tend to agree with increasing bids regardless of their true valuations. Thus the bidding format is expected to result in an overestimation of the good/service's actual value (Wierstra, 1996).

Nevertheless, as indicated, the bidding game is the most widely used technique in South countries to measure the willingness-to-pay amounts for goods or services. One of the reasons is that the bidding game is easy to implement and understand by the respondents. As long as the service options are clearly expressed, the budgetary constraints explicitly stated by the surveyor, and the occurring biases anticipated, the implementation of the bidding game is a feasible method measuring the willingness to pay.

2.7.2.2 Open-ended questions

If the open-ended question format is used, the respondents are left to devise their maximum values without the aid of additional information or bidding. The best way to discover this amount is simply by asking "What is the maximum amount of money you are willing to pay for...?" or "What is the minimum amount of money you are willing to receive for...?". Most contingent valuation researchers have been reluctant to use open-ended questions because they fear that such questions *on their own* do not provide sufficient stimuli and information to help people thoroughly consider the values they would place on the marketed product. Indeed, the measurement of willingness-to-pay bids through open-ended questions only, have been consistently lower in value than compared with a bidding game (Bishop and Heberlein, 1990; OECD, 1994) and even compared to dichotomous choice format (Nunan, 1996). Moreover, the open-ended format opens up the possibility of some form of strategic behaviour. When answering an open-ended question individuals could behave in such a way as to snatch some personal benefit, like a zero or protest bid. This is particularly true when dealing with public goods where each individual cannot be excluded from benefiting but can refrain from paying for the good or service. Nevertheless, it is very well possible to construct a contingent valuation survey which does use open-ended questions next to a bidding game, and so foregoing the problem of providing insufficient stimuli.

2.7.2.3 Dichotomous choice format

Bidding games and open-ended questions all require study subjects to express the exact maximum value amount. Respondents may find it difficult to come up with precise amounts and are likely to find it easier to respond to questions that ask them whether or not they would be willing to pay a specific amount. This is what the dichotomous choice technique addresses. It (randomly) offers different amounts to its respondents and asks them to say if they would be willing to pay for the amount stated in a "yes" or "no" format (see also Nunan, 1997). It is merely the first round of a bidding game. It becomes immediately clear that the maximum amount the respondent is willing to pay is very hard to determine. This is the typical drawback of the dichotomous choice technique. The analysis of the survey responses for calculating the maximum willingness to pay is more difficult than that of open-ended questions or bidding games.

Normally logit or probit regression models are used to predict the probability of rejecting the offer as a function of the offer amount (the dichotomous choice) and other explanatory variables. The

probabilities are then used to calculate the mathematical expectation of the willingness to pay or the median offer amount. However, the expected mean is very sensitive to the shape of the right tail of the underlying distribution function (Wierstra, 1996). In plain words, responses to dichotomous choice questions provide less information than the other elicitation formats mentioned before. Therefore, a much larger sample is needed to obtain the same degree of accuracy of the relevant statistics. As a result, to elicit the expected maximum bids, the dichotomous choice format asks for a thorough understanding of statistical logit and probit regression models.

2.7.2.4 Payment card format

With the payment card method respondents are asked to rank various combinations of service quality and monetary outlays from most preferred to least preferred. The method involves that respondents are offered a payment card which contains a list of potential willingness to pay amounts. Also included on the payment card are so-called benchmarks, giving the respondent an indication of how much money is currently being spent by their type of household on other public goods. Respondents are asked to indicate which of the amounts of money given on the payment card they are willing to pay first (Wierstra, 1996). The according values for the to-be-valued goods are inferred through statistical analysis as has been done in the survey for integral coastal management applications in the Philippines (Tejam and Ross, 1997).

Two striking biases play a part when using the payment card technique in a questionnaire. Firstly, the benchmarks may be interpreted as clues and not as additional information as intended by the researcher. This might result in the fact that the respondent does not consider his preferences thoroughly enough. Secondly, the maximum amount on the payment card may influence the final willingness to pay bid of the respondent, as there is always an option for "other, namely..." on the payment card. Note that the maximum amount stated on the payment card does not necessarily correspond to the respondent's amount. That is entirely up to the respondent to decide. Nevertheless, it could be an indication for the respondent's maximum amount.

2.7.3 Key explanatory variables

As previously stated, most contingent valuation studies go beyond simply asking questions that are related to prices. Researchers often need to know if their estimations are valid or not. They therefore seek information that can be used to determine the validity of their results (McPhail, 1993; Whittington *et al.*, 1992; Whittington, 1998). In general, maximum willingness to pay will vary from household to household but is a function of all of the variables in the demand function except the price for the service itself. For example, if households have unusual circumstances, burdens or constraints, for instance a sick or disabled family member, recent loss of employment which might influence responses to the willingness to pay, it should be recorded separately. Furthermore, if households have unique income circumstances like informal sector income, income from foreign-based relatives which might not be readily apparent from their responses, these should be recorded as well.

Thus information about variables that influence the willingness to pay are of interest. Because most of the socio-economic and demographic variables are pivotal measures for the determinants of a respondent's willingness to pay, there is usually no clear-cut choice among them. Some key explanatory variables are:

1. gender; because it makes a difference who is responsible for the daily expenditures, or who is involved in the income generating activities.
2. age; because younger people might be more eager to participate while elderly might tend to leave things as they are.

3. education; because the level of education elicits the environmental and health risks caused by low quality of services.
4. household size; because the size of the household determines the expenditure pattern and therefore perhaps the amount one is willing to pay.
5. tenure/owner house; because the status quo of house property is an indicator of the awareness of environmentally sound surroundings, and perhaps an indicator of income.
6. profession/employment; because the level of income determines the level of the willingness-to-pay bids.
7. expenditures on cost-of-living products; because the acceptance of improved solid waste services implies extra expenditure and with budgetary limitations this entails a trade-off.
8. commercial activity (when being entrepreneur); because the type of activity involved influences the type of waste produced.

2.8 STEP 7 Survey layout and sample size

After the clarification of the questioning techniques, time should be spent on the aspect of questionnaire presentation. In general it can be argued that the questionnaire should be designed to contain simple, direct and concise statements in the common vernacular. Pictures and illustrations should replace words, where possible, in order to provide information that is both educational and entertaining (UNCHS, 1995; Tejam and Ross, 1997).

Moreover, texts should be large, with loosely fit characters for easy reading. Space must be used freely and care must be taken to avoid putting too much information in one page. Moreover, although it depends largely on the type of respondents, a questionnaire should be accomplished within an average of 20 to 30 minutes, with a maximum of one hour per respondent. An exception to this rule is of a take-home questionnaire, which would give the beneficiaries the opportunity to think the questions over.

The required sample size depends on two key factors: the degree of accuracy and the extent to which there is variation in the population in regard to the key characteristics of the study. To obtain a correct sample size it is first needed to determine what error percentage is tolerated. This margin of error, denoted by e is expressed in absolute percentage points and represents the largest acceptable error in the estimate. The margin may be two-sided or one-sided. If it is two-sided, one generally adopts equal values on either side so that the margins are $\pm e$. Furthermore, one has to fix the percentage confidence level asserting that the margin will not be exceeded. It is here that the distinction between one-sided and two-sided margins needs attention. For example, a figure of 90 percent confidence for a two-sided margin $\pm e$ implies a 10 percent probability that the error will exceed one or the other margin. This 10 percent divides into a 5 percent probability of going below the lower margin $-e$ and a 5 percent probability of exceeding the upper margin $+e$. Thus if the analyst is interested in one margin only, say the lower one, the requirement of 95 percent confidence that this will not be breached corresponds to a 90 percent confidence that the same two-sided margin e will not be breached (Moors, 1991). Subsequently, confidence limits expressed in percentage terms have to be converted into k based, by assumption, on normal distribution[4]. Finally, to determine the required sample size, one more parameter is needed, *viz.* the variance v^2 of the variable of interest of the population. With these parameters the required sample size can be calculated as is exemplified in Annex 4.

[4] See Annex 5 for a conversion of the confidence limits into k.

Here a remark is in place. Despite all the figures in the tables in Annex 4 one should think ahead to how the results are to be analysed. This aspect will be discussed in more detail in Paragraph 2.12. Moreover, desired accuracy is not the only factor in working out the sample size. Cost and time are also key factors. The final sample size will be a compromise between cost, accuracy and ensuring sufficient numbers for meaningful respondent-groups analysis.

2.9 STEP 8 Pretesting and revision

It is extremely important that the survey instrument is tested and refined. Once a questionnaire has been developed, each question and the questionnaire as a whole must be evaluated before implementation. In general, three phases of pretesting can be distinguished, *i.e.* question development, questionnaire development, and polishing pretests (Bishop and Heberlein, 1990; De Vaus, 1996).

The purpose of testing at this stage is to establish how to phrase each question, to evaluate how respondents could interpret the question's meaning and to check whether the range of response alternatives is sufficient. While new questions will need to be intensively pretested, previously used (and tested) questions should also be evaluated. When pilot testing the questions, the respondents normally are being informed about the pretesting phase and are asked to participate in reformulating, and facilitating the questions put to them.

By administering a complete questionnaire, this phase enables the further evaluation of individual subjects and the questionnaire as a whole. Rather than relying on respondents' comments about the questions, this phase analyses their answers and uses the interviewer's comments to improve the questionnaire. Moreover, this phase of pilot testing is undeclared, meaning that normally respondents are not told that the questionnaire is still under development.

Finally, with the information obtained in the previous phase of pretesting, the questionnaire can be shortened, reordered, refined and finalised.

2.9.1 Pilot testing the questions

The evaluation of individual questions should examine at least four points. In the first place when people give similar answers to a question, it will be of little use in later analysis. It is therefore advisable to test the variation of each question in relation to other questions in order to prevent single oriented answers. A second important point is to check the meaning of questions. It thus comes down to ensure that respondents understand the intended meaning of the question and that the interviewer understands the respondent's answer. Another point is the notion of non-response. The refusal of a large number of people to answer a particular question produces difficulties at the data analysis stage and can lead to serious reductions in sample size. When this fact occurs during pretesting, the causes might be found in the meaning of the question, the intrusiveness, or in the similarity to previously answered questions. Finally, questions that ask respondents to agree or disagree with a statement can suffer from the tendency of some people to agree with the statement, regardless of the question content. This tendency is also known as the acquiescent response set (De Vaus, 1996). One way of detecting an acquiescent response set is to take questions that seem completely contradictory and see whether many people agree with both of them.

2.9.2 Pilot testing the questionnaire

As well as testing individual questions, the questionnaire as a whole needs evaluating. Important aspects to be taken into consideration are first of all, the fluency of the questionnaire. Are the transitions from one section to another smooth or are there huge jumps occurring? Listening to an

interviewer rather than reading the questionnaire helps detect problems in its flow. Secondly, the total time needed for the whole questionnaire to be implemented by the interviewer needs careful attention. The concept questionnaire will normally be longer than the final version, as unnecessary parts are deleted. It is helpful to clock each section to gain some idea of how much time is necessary to conduct the survey, and perhaps, when being too long, what subsections will have to be cut out. Knowing the approximate time, the interviewer can inform the respondent how long the questionnaire will take. Finally, when the questionnaire is being tested, one should focus on the design and layout. As has been indicated, words should be replaced by pictures and illustrations in order to provide clear information that respondents recognize and understand. When using pictures, photographs or illustrations, the meaning of these instruments must be clear-cut for both the interviewer and the respondent (Baarda and De Goede, 1995).

2.9.3 How to pilot test?

As far as possible, pretesting should be conducted on people who resemble the beneficiaries to whom the questionnaire will finally be given. Depending on the content of the questionnaire, it will be important to match particular characteristics of the pilot and final samples. Age, gender, educational and ethnic characteristics should normally be matched, whereas other features like employment status, religion or family life stage depend on the purpose of the survey.

Because of the intensive nature of the first phase of pretesting, it is often not possible to test it on a large number of people. However, it remains important to prescribe the questionnaire to as many beneficiaries as possible, for too few respondents may well mean that problems indicated in paragraph 2.9.1 remain undetected. De Vaus (1996) indicates that a total number of pilot tests between 75 and 100 respondents provides a useful test. This number of pretests is fairly large and does not take into account the possibility to use each pre-tested questionnaire as the latest version with which a new pilot test must be made, thus reducing the actual number of respondents. On the other hand, there is no limit to the actual number of pre-tests required to develop a survey questionnaire. In short, testing the questionnaire is an inevitable activity for the success of the research.

2.10 STEP 9 Selecting and training the enumerators

The total number of enumerators needed to accomplish the survey implementation depends on the total of respondents to be interviewed and on budgetary and time limitations. When a research survey is implemented by several interviewers, a number of criteria is used enabling the survey coordinating institution/person to select the most appropriated interviewers. Enumerators for the survey can be selected according to the following criteria (Tejam and Ross, 1997) in descending order of importance:

1. Proficiency in the language or dialect of the area of coverage
2. Persons with experience in doing survey questionnaires
3. Persons with experience in the field of research
4. Persons coming from or living in the survey area
5. Persons with enthusiasm and a certain intention to learn

Once the number of enumerators is determined and enumerators selected, they should undergo a briefing seminar a short period before the actual survey implementation, to receive background information about the contingent valuation method, a short description of the objectives and programmes of the lead institution conducting the survey, and the survey protocol. This survey protocol requires each enumerator to observe a set of procedures to encourage an honest response and to eliminate biases as much as possible. The interviewer guidelines could be based on (UNCHS, 1995; Whittington, 1998):

1. Be completely honest in your work
2. Be completely objective in manner
3. Be accurate and neutral in asking and recording answers
4. Be reliable and conscientious
5. Be understanding and patient
6. Be presentable
7. Be confidential

Finally, a briefing is needed to instruct the selected enumerators on how to conduct the survey, implying their correct behaviour towards the respondents, the actual undertaking of the questionnaire, and instructions about what to do in case of problems.

2.11 STEP 10 Implementation of research questionnaire

When the questionnaire has been tested, revised and proven viable, the enumerators have been instructed, the sample size and target group are determined, then the survey may really begin.

To ensure adequate control of the survey, accomplished questionnaires should be immediately handed over to the team of supervisors of inspection, to see if all questions have been answered and written down according to the rules. The enumerators are obliged to observe a strict daily programme facilitating the exchange of experiences, trouble shooting, problem solving and strategic and logistic planning.

2.12 STEP 11 Analysis and reporting

The information obtained from contingent valuation surveys is typically analysed in three, increasingly sophisticated ways. Firstly, analysts examine the frequency distribution of the responses to the valuation questions. Secondly, analysts look at cross-tabulations between willingness-to-pay responses and such variables as socioeconomic characteristics of the respondent and attitudes toward the service provided. Thirdly, analysts use multivariate statistical techniques to estimate a valuation function that relates the respondent's answer to the socioeconomic characteristics and their behaviour toward the good being provided. The types of statistical procedures utilized are dependent on whether the respondent answered a direct, open-ended valuation question, a single yes/no question, *i.e.* the dichotomous choice technique, or a reiterative process of yes/no questions, *i.e.* the bidding game format. The purpose of all three types of analyses is twofold (OECD, 1994): a) to see whether respondents' answers are consistent with theory and common sense, and b) to establish statistical relationships or models that can be used in the aggregation of sample responses to the overall survey population, or for developing forecasts for policy making, planning etc.

Once the methods of analysis are ascertained in increasing order of complexity, we can ask ourselves what methods are suitable for our four valuation question techniques as described in Paragraph 2.7.2. In Annex 6 each valuation question technique, except the payment card format, will be discussed for each method of analysis, *viz.* frequency distribution, cross-tabulation, and multivariate analysis. See Table 10 for a transparent summary.

2.13 STEP 12 Feedback of results among stakeholders

The final step in the methodology is the dissemination of the research findings among the various stakeholder groups. The aim is to present the stakeholders with the information on how candidate solid waste system options are valued. The results are an input in the process of deciding which

system will be chosen. A warning is in place here. For the stakeholders, each with their own personal interest in the results, the obtained data can easily be used for political and/or strategic purposes. Therefore, the project team must be aware of this danger and should act in advance to the extent possible so that the results are interpreted objectively.

The data obtained from the questionnaire should be properly screened on errors before being officially presented to the different groups of participants. The screened and processed data will comprise the demands and preferences of the interviewed households and portray an unambiguous picture of the level of financial contributions for each precisely described solid waste management alternative. The outcome should lead to a common agreement, or acceptance of the described solid waste system. If the outcome is a low willingness to pay, then obviously the belief prevails that the solid waste system as it is presented is not in line with the expectations. Consequently, two solutions are possible. Firstly, Step 4 of the research methodology is repeated to yield a different, more acceptable solid waste management system which comes into terms with the requirements of the respondents of the questionnaire. Secondly, armed with the results of the questionnaire the solid waste system is adjusted, and simplified where necessary by the project team, approved by the representatives and official bodies, and implemented accordingly. The latter possibility circumvents Step 4. The alternative would be to combine both ways so that the community residents have a new opportunity to indicate their willingness to pay for a new solid waste system description. Clearly, the community residents are a major source of information rather than an object of the development effort or a mere recipient of benefits.

CHAPTER 3 THE RESULTS OF THE MARKETING SURVEY IN TINGLOY

3.1 Introduction

The Batangas Bay Region (BBR) in the Philippines was identified as one of the four Pilot Projects Settings (PPS) of the six-year Urban Waste Expertise Programme (UWEP) funded by the Netherlands Development Assistance (NEDA), Ministry of Foreign Affairs and executed by WASTE. The generation of expertise and the enablement of the local initiatives on waste management by NGOs, CBOs and entrepreneurs are the main objectives of UWEP. In more detail, UWEP aims to develop local expertise through research and pilot projects, to disseminate knowledge and technology on waste management, and to promote policies that will integrate small and micro enterprises in existing urban waste management systems.

One of the four UWEP pilot projects is located in Tingloy. Pilot project no. 20.4 strives for improving the hygienic and environmental conditions within the three urban barangays, the so-called *poblacion*. The activities to achieve this will be related to the improvement of the solid waste management system and the human waste management system. An incremental approach will be followed, making use of and building upon existing institutions and facilities.

The theme of the project for Tingloy will be *integration,* following the concept of Integrated Sustainable Waste Management (ISWM) aiming to improve waste management through collaborative efforts from residents, local government agencies, local organisations and small and micro-enterprises. Integration will be sought in the following components:

- institutional, by trying to organise stakeholders and, if opportunities are there, to form a body in which they meet, cooperate and make decisions;
- financial, by trying to gain financial commitments from each stakeholder through a waste management financing mechanism;
- technological, by exploring the opportunities for integrated waste management systems;
- social, by trying to introduce hygienic attitudes and behaviour towards waste related practices;
- environmental, by optimizing the potential for resource recovery of solid and human waste and thereby minimizing the volume of residual waste.

The implementation of the pilot project in Tingloy would entail four major activities, being:
- *Activity 1:* Mobilization, information and education campaign (July-August, 1998);
- *Activity 2:* Social marketing and technological options study (August-September, 1998);
- *Activity 3:* Consultation and linkage building (October-December, 1998);
- *Activity 4:* Implementation of pilot activities (January-December, 2000).

A detailed description of the pilot project can be found in the Pilot Project Proposal document of June 1998. The marketing study covers only one part of Activity 2 for Tingloy. It is complemented by the study on technological options for an integrated sustainable waste management system, conducted by the local sanitation engineering consultant. Other important team members of the social marketing of *Activity 2* comprise of:

- the project coordinator of Batangas Social Development Foundation;
- the local UWEP coordinator for PPS Batangas Bay; and
- a survey team consisting of students.

Furthermore, the team was assisted by the Batangas Bay Development Project (BBDP) Officer-in-charge for the organization of the survey. Other collaborative efforts came from the staff members of the Provincial Government-Environment and Natural Resources Office in Batangas City.

3.2 STEP 1 Survey statement and objective

Before turning to the results of the survey, it must be clearly emphasized that the implementation of the questionnaire itself was not the only goal of the marketing study. Together with the implementation of the questionnaire the aim was to evaluate the guidelines/steps as laid out in the methodology supporting the questionnaire. The reader will find therefore the same outline in this chapter as used Chapter 2.

The main objective of the research was to develop or identify, if present, a method for the marketing of waste management services. In more detail, to investigate the demand for improved waste management facilities and the potential financial contribution from stakeholders for the most preferred solid waste alternative in the setting of a developing country. Originating from the marketing study as a tool for assessing households' demand for solid waste services, a survey was planned to determine the willingness and affordability to pay for an integrated solid waste management system for Tingloy. In Annex 13 each of the survey questions are described. Annex 12 has been used as a basis for the categorization of the survey questions. The questionnaire was conducted during a six weeks period both in Batangas City, at Provincial Government-Environment and Natural Resources Office, and in the poblacion of Tingloy, Maricaban Island.

3.3 STEP 2 Survey delineation

To implement the survey, obviously, a pilot project area had to be identified. The candidate area came to be the island of Tingloy. Particularly three barangays located in the municipality of Tingloy, in the Batangas Province were considered for the research.

The *poblacion* of Tingloy forms an urban area with a total population of around 2,200 inhabitants. Because the island is mountainous, agriculture is very rare with exception of a number of rice farmers and livestock raising farmers. As a consequence the main source of income is fishing next to the few employee positions held in the municipal office and the opportunities offered by the mainland. Available data indicate about 40% are engaged in handicrafts, 50% earn through fishing, and the remaining 19% are either employed or are in retail business (Muñoz *et al.*, 1997).

The municipality of Tingloy is a 5th class authority which relates to the level of funds appointed by the national government based on the Internal Revenue Allotment (IRA), and also to the number of its inhabitants. The municipality is divided into 15 barangays, three of which form the poblacion (see also Annex 11). In 1995 the total population was estimated to be around 14,900 of which almost 1,900 residents lived in the poblacion, whereas in 1990 the estimate was higher reaching up to 15,430 (GEF/UNDP/IMO, 1997; NSO). An exact explanation for this decline in population growth could not be found. Possibly a positive emigration to the mainland, driven by its job opportunities, contributed to the decline in growth on the island. Surprisingly, the projected population in the year 2000 and up varies considerably among different studies using the same source of information. This is one of the reasons that making a population forecast for Tingloy is a fairly ambiguous endeavour. In this study, the estimated population for the island is assumed to range from 14,000 to 18,000 in the year 2000 and from 15,000 to 22,000 inhabitants in the year 2010 (GEF/UNDP/IMO, 1996b, 1997; Muñez *et al.*, 1997).
The municipal and city governments jurisdiction with respect to environmental management has been expanding following the Local Government Code in 1991[5]. They are now vested with powers and

[5] Local Government Code - Republic Act 7160, 1991 - states that local government units shall likewise exercise such other powers and discharge such other functions and responsibilities as are necessary, appropriate and incidental to efficient and effective provision of the basic service and facilities enumerated herein [...] services related to general hygiene and sanitation, beautification, and solid waste collection, disposal systems and facilities.

functions giving them greater latitude in the management of natural resources in their surroundings. Part of their responsibilities lie in maintaining the cleanliness of their environment through a proper disposal of wastes, conservation of the natural resources, and through the enforcement of rules, ordinances and regulations. In the BBR (see also Annex 10), some of the municipalities haven taken active roles in environmental management with the issuance of ordinances and the launching of environmental awareness programmes (GEF/UNDP/IMO, 1996a). Nevertheless, coordination and implementation enforcement among the coastal municipalities for the protection of the bay still remains weak. Although, as can be seen below, the LGUs ordinanced penalties for indiscriminate garbage disposal, there are almost no responsible agencies that see to the penalization.

Municipal solid waste management is one of the responsibilities vested upon the Local Government Units under the Local Government Code. The barangays are responsible for collection, whilst the city and municipal government are responsible for the development of solid waste management systems and final disposal of wastes. One practical example of this, is the compulsory identification of a landfill site for waste disposal, ordinanced by the national government. The Code also provides that when barangays are not capable of carrying out their responsibility for collection, the city is to take over the collection of waste. In the case of Batangas Bay Region, only a few barangays carry out the responsibilities of garbage collection themselves. In most cases, it is the city and municipal government that hauls the solid waste from their neighbourhoods. In the exceptional case of Tingloy, there is no waste collection service provided to citizens mounting the volume of untreated waste on the island.

3.4 STEP 3 Solid waste system description

The poblacion thus has no solid waste collection system resulting in disorderly discarded solid waste materials. Although 20 green garbage containers were distributed to mostly residents living on the main road through the poblacion, no disposal site had been identified for the final storage of the garbage. The small green containers are regularly emptied by one of the household members on nearby, unsuited disposal sites in their own barangay, *i.e.* the banks of the river running through Barangay 13 and the farest end of 14, the mangrove area in Barangay 15, or even the sea shore (see photos of the current dumpsite of Tingloy in Annex 16). This is why the household premises and streets appear very clean despite a seemingly congested built-up residential area in the poblacion.

The daily routine in every household in the whole poblacion starts with women sweeping the backyard and, if the residence is located on the main road, also the main street. Generally speaking, the swept household waste is mainly biodegradable waste, and to a lesser extent plastics, paper and metal cans. When the backyard and the street are swept clean, the small heap of waste is set alight. This practice is repeated almost every day for the simple reason that it is considered the number one way of diminishing the amount of waste. However, not all components of the swept and burnt waste can be disposed of by setting it alight. As a consequence, the small heaps end up being burnt only partly leaving plastic bottles, small bags, straws, cans and other glass untouched.

The composition of the discarded waste has not been assessed leaving the total volume of recyclables, its quality, the total volume of organic waste and remaining waste unknown. This lack of information is recognized as being a severe obstacle to the success of the newly formed solid waste system. It obstructs an accurate estimation of the volume to be collected, of the compostables that can be produced, and of recyclables that can be sold. One assumption which had to be made, therefore, was the waste generation rate per capita per day. In the technical study of the Pilot Project drafted by the local sanitation engineering expert, the waste generation is considered to be 0.32 kg/cap/day based on existing data of Batangas City waste characteristics. However, the problem of categorizing the different types of waste and their volume still remains. Due to this and other uncertainties, a similar outline as the one displayed in Chapter 2 is not possible.

Barangay 13 and 14 are the two barangays that have no area available for dumping the generated waste from the households and/or small businesses. Waste therefore ends up being burnt in backyards, dumped on the river banks, and left on the sea shore. Barangay 15 is the only barangay with an open site available for all kinds of waste. Unfortunately this used site is completely unsuitable for the ultimate storage of the refuse of households. The site forms part of a precious mangrove area which in its turn is directly linked with the Marikaban Strait (see Annex 11 and 12).

3.5 STEP 4 Participatory demand assessment

Prior to the execution of the questionnaire a brief desk study was carried out to collect data on the number of households, socio-economic levels of households and living conditions for Tingloy. It appeared that only very limited reliable and existing socio-economic data were available. In addition, encountered statistical data were mostly out-dated and, if recent, based on trivial assumptions.

The methodology developed to elicit the measurement of willingness and affordability to pay for SWM also intends to seek a way of gearing the most preferred solid waste alternative as perceived by the residents themselves. In order to come up with the opted solutions for the solid waste problem, therefore, public consultations were held. These consultations were carried out through a number of workshops and meetings with stakeholders' leaders from the poblacion in July and August 1998. Using a demand-driven approach it was aimed at achieving an acceptable but also, through the expert's interference, sound solid waste alternative.

One of the first activities was carried out by the Recycling Movement of the Philippines. The seminar focused on ISWM and had the intention to mobilize the community of Tingloy and provide them with information on sustainable waste management practices. In short, it was an education and information seminar directed towards educating the stakeholders on the possibilities for waste management implementation.

The seminar preparation started by visiting the barangay officials and the municipal office on an informal basis. After an area familiarization had taken place, the actual meeting with different stakeholder groups was organised. The total number of participants exceeded everyone's expectations, mounting up to 27 different people present on July 29. The participants could be grouped into municipal staff, health workers, barangay officials, junkshop operators, a school teacher, and several other curious residents from Tingloy. During the course of the seminar it became clear that the stakeholders had little knowledge on the concept of integrated sustainable waste management. Therefore, to brighten the concept of ISWM, the Recycling Movement of the Philippines centred their seminar on reduction, reuse and recycling of solid waste. Using tools as open forum and group discussions, the Recycling Movement of the Philippines team assessed the different types of waste and their effects. By means of clear examples, the participants were also taught to separate biodegradable waste from non-biodegradable waste. The team motivated the participants by demonstrating the practical merits of segregation activities, such as self-made organic vinegar. Applying the cardinal rule of waste segregation would be the first major step towards an integrated sustainable waste management system in the poblacion.

Although the eager participants took notice of all the disseminated information during the seminar, the effects in the poblacion remain to be seen. The seminar lasted only one day and did not seem to set any domino-effect in motion, as became clear when the marketing research team interviewed several other residents on the topics discussed during the seminar.

The second meeting was held with the barangay captains, the Mayor's spokesman, municipal employees, and other interested people from the poblacion on the 6th of August. The gathering was

supposed to be informative, introducing the purpose of the WASTE consultant's stay, visualizing once more the contents and planning of UWEP, and asking assistance from the three barangays. The barangay's support was given, warmly welcomed by the staff members, and the official introduction was done in a very pleasant manner.

The next gathering on the 13th of August took the form of a multi-sectoral participatory workshop in which the objectives were to:

- underpin the contemporary handling of solid waste in the urban area,
- determine the needs and expectations of the different stakeholders regarding waste management,
- provide and guide the stakeholders, among which was the Local Government Unit (LGU), on integrated sustainable waste management system, and to
- seek support for the newly formed waste management body which was supposed to chair the management of the solid waste system in Tingloy.

The workshop was attended by 15 participants including barangay officials, municipal employees, chairman of the municipal environmental committee, school principal and guidance advisory board, and a representative of the police office. They were asked to solicit their actions, needs, and views on threats and barriers regarding the solid waste generation in their poblacion. Using the metacard technique, the outcomes on their expectations, present practices of waste handling, effects, and preferred solutions could be shared by all attendees of the workshop. Small pieces of paper carrying the views of the participants were posted on a black board, making discussion possible. The results of the workshop are extensively recapitulated in Annex 6. Furthermore, the facilitators of the workshop cited that the would-be waste management system for the poblacion will entail costs. These costs will have to be covered by the residents, businesses and LGU themselves to help maintain and sustain the system.

Comprising the thoughts of the 15 participants, the next step was to formulate an integrated solid waste system based on the outcomes of the workshop. One predominant drawback occurred, however, while visualizing the community based solutions for the solid waste situation in Tingloy. The participants were not able to come forward with solutions for the storage of the waste residue and the usage of compostable waste. It was argued that segregation at source was favoured, *i.e.* separating recyclables, but no further processing of waste was suggested. For reasons of limited skills, financial means, and the lack of political interest the residents never identified sound storage sites and usage of compostables. It is therefore that staff members had to guide them towards a sustainable alternative. One can argue, now, that an alternative opted in such a way is not entirely based on the perceptions of the participants. True, however, abandoning the sustainability criteria as laid down below, the system without a proper disposal site could actually lead to a worsening of the environmental and health situation in the poblacion.

Ultimately, the necessary information was gathered to come up with a detailed description of a waste management system, which yet had to be approved by the official bodies on the island. Based on the community findings and adhering to UWEP's criteria, the highlights of the solid waste system were expressed as follows:

1. All the household's solid waste has to be segregated at source into recyclables, which are items that can be used again to generate other goods, and into biodegradable waste, which is mainly your kitchen waste, plants, leaves etc. that can be used for composting, and into waste that remains.

2. One will have to bring the biodegradable waste to a communal compost pit in one's own barangay, and subsequently bring the recyclables together with the remaining waste to the closest garbage can in the main street where it is stored for further collection by a collector that same day.

3. Each barangay will collect its recyclables and remaining waste from the main street on a daily basis to an identified site outside the poblacion where recyclables are stored separately from the remaining waste.

4. The site will be called a *redemption centre* and is managed by a trained individual who will also see to it that no littering takes place.

The four steps in the solid waste system address both segregation at source, performed by the residents themselves, and collection and storage of the three waste streams performed by trained collectors. In the end, only the waste residue would be permanently stored on the island. The recyclables would find their way to Metro Manila through junk shop operators on the island and in Batangas City, and the bio-degradable waste would be turned into compost and used on farmland on the island.

The redemption centre would function as a place where recyclables would be stored for further treatment, where compostables would be reservoired for later usage in the fertilisation of farmland, and where the waste residue would safely be discarded. To date no suited disposal site meeting the criteria of a) environmental sustainability, b) safely located away from the living and playground area, but also c) being a low-cost site geared to local preferences and needs, and d) maximisation of reuse and recovery of resources, had been distinguished on the island. Thus, one of the spear items for the staff members was to agree upon finding a safe location for the redemption centre. Without the identification of a suited piece of land for the redemption centre, the survey would be of little use. All residents are aware of the fact that the island has no safe disposal site for the generated waste. It would thus be worthless asking respondents their opinion about a community-based solid waste system if before-hand no safe disposal site had been identified.

The local sanitation engineering consultant and the staff members tried to localize a sound site for the redemption centre. Though the urban area is densely populated, the research team fortunately found a suitable site for the construction of the redemption centre[6]. Yet, the proposed redemption site together with the demand-driven solid waste concept had to be submitted to the municipal official body for approval.

In order to involve the municipal officials, especially the Mayor of Tingloy, to approve of the identified solid waste alternative, a consultation meeting was prepared. This meeting was held on the 20th of August and attended by 15 different municipal and barangay officials, the Mayor, the vice-Mayor. The activity aimed to impart the different ideas, suggestions and omittances to zero-in on the presented solid waste alternative which would be included in the questionnaire. After a brief report on the different options for each phase in the waste stream, the participants were asked to add or reduce the choices. By open forum it became rapidly clear that the refined options for each stage in the waste process as presented to them were accepted by the Mayor, the council members, and barangay officials. Nonetheless, questions remained on how to ordinance the privately owned land for the disposal site, and how to spearhead the integrated sustainable waste management system.

Summarizing, it can be stated that the solid waste alternative for Tingloy gained support from the official bodies after having been crystallized through a reiterative process of eliciting the community based option. Yet, some remarks are worth paying attention to. The final version of the solid waste management system in Tingloy could not have been ascertained without the approval of the Mayor of Tingloy, despite the support from the participating representatives of the three barangays. The Mayor

[6] For a detailed analysis of the technical aspects of the redemption centre, its facilities and functions, see C.C. Ancheta "Integrated sustainable waste management in Tingloy: a study on the technological options", PPS Batangas Bay - UWEP 20, Pilot Project no. 20.4, WASTE, Gouda, the Netherlands, August 1998.

has the informal right to make decisions leaving the decisive power of other officials sealocked. Moreover, the Mayor's support for the redemption centre will be based on the available municipal budget and his priority given to it. If other investment projects are put on the municipal agenda which yield higher priority or revenue, then less official support can be expected for the construction of the solid waste management system.

3.6 STEP 5 Research method

The actual implementation of the estimated 120 interviews on the subject of "Demand assessment and willingness to pay survey for solid waste services in Tingloy, the Philippines" took four days, one of which was reserved for training the enumerators on how to conduct the questionnaire. The questionnaire itself was translated into *Tagalog* to facilitate the communication between the enumerator and the interviewed person *viz-a-viz* an English version of the questionnaire[7]. To provide information that was both educational and entertaining, three drawings were added to the questionnaire to illustrate the described solid waste option as put forward in the questionnaire (see Annex 14 for the drawings).

Before the questionnaire was tested, the staff members discussed some problematic concepts used in the survey. It was not clear, for example, what was meant by *tenure*. The question referred to house ownership, but in the case of Tingloy, it could very well implicate the property of land. Congruent to this, it had to be clarified what was meant with *house ownership*. In Tingloy, one can be neither a tenant nor a house owner whilst still living in the poblacion legally. The residents, on the ground of an informal agreement, are in such cases taking care of someone else's premise without paying rent for it. Also the question related to the level of education had to be adjusted for the local situation in the poblacion. Moreover, to guarantee an equally conducted survey, a clear description of the *household* and the *would-be interviewed respondent* was necessary. To solve the problem of whom to interview and whom not to interview, the staff members had to examine the family situations on the island.

The actual household situation in Tingloy is rather blurred. Because of the highly populated urban area, the tied family bonds, and extensive families in Tingloy, it was difficult to distinctly describe a "normal" household. It is common knowledge that children will permanently stay at the house of close relatives of their parents, or will just go from one place to the other. Moreover, more or less every household has a relative working and living on the mainland, frequently travelling to and from Tingloy. Clearly, the study was not aimed at yielding information of respondents not permanently living in the poblacion, even though he or she would be present at the time of the survey implementation. As a result, the enumerators were instructed to address their questions directly to the head of the household. The head of the household was identified as the person in charge of the daily expenditures and other (younger) family members. In general, this description did not encounter any interpretive problems. In case of absence of the head of the household, the questions would be steered at the next household member, older than 15 years, living at the premise. In addition, household members were referred to as persons of any age eating, drinking and sleeping in the identified house on a regular basis.

[7] An English questionnaire could very well be implemented, for most of the residents in Tingloy have gained their education in English. Due to a long presence of America, which ended with the independence of the Philippines at the end of the Second World War on July 4, 1946, English became their second language.

3.7 STEP 6 Survey questions and techniques

Basically for reasons of convenience and a tight time schedule the bidding game was chosen as the method for measuring the willingness to pay. In order to conduct the dichotomous choice format or the payment card technique, namely, not only several solid waste options had to be identified by the community of Tingloy but also a financial calculation had to take place. This financial analysis is necessary to render the household fees for the different options; options of which the respondents are asked to choose from. Normally, this *ex ante* estimation study is a time consuming activity. The research team therefore decided to apply the bidding format. Additionally, it was agreed to implement a bottom-up bidding game; a technique that asks respondents their willingness to pay in an incremental way. This technique is world wide understood and applied in South countries for all kinds of buying and selling in contrast to the top-down bidding game technique.

The total number of questionnaires was divided into two groups of 60 interviews. 60 questionnaires using a starting point of 10 pesos per month for the described solid waste option, and the other group of 60 questionnaires using a starting point of 20 pesos. Based on secondary data of the municipality of Bauan and Batangas, the expected two starting points were calculated[8]. In principle, households in Bauan pay a monthly fee of only 15 pesos, whilst commercial establishments and industrial companies have to contribute in advance a P200 and P500 fee per year respectively (GEF/UNDP/IMO, 1997; Muñez, 1997). In Batangas City the collection fee also depends on the residential structure. Here, the household solid waste management charge is only 10 pesos per month (or P120 per year) which covers only 20% of the current total operations and maintenance cost of 55 pesos per month per household. These costs, in addition, do not include the cost of capital which boosts the monthly fee with approximately 20 pesos to 75 pesos per month per household (GEF/UNDP/IMO, 1997). As a fact, all residential property owners whether they are serviced or not, are charged with the collection fee. Thus, the fee disregards the number of residents within one property so that an 8-door apartment property also pays P120 per year. The monthly fees of business establishments are incorporated in the charges upon issuance of business licenses and vary according to the type and size of activity. Dealers or retailers of junk materials pay up to P1000 for the annual garbage fee whereas industries in the city pay P5000 a year.

Incorporating the monthly household fee both in Bauan and Batangas City, and the notion that the municipality of Tingloy belongs to the lower income municipalities in Batangas Province, a 10 and 20 pesos starting point were considered viable for the willingness to pay questions. The WTP questions were framed within a bidding game technique, as described in Section 2.7.2.1 and modulated in the questionnaire in Annex 14. To anticipate the starting point bias, survey questions were formulated to remind respondents of the fact that they have to pay for the presented service, and asking them what to give up instead. Surprisingly, the starting point bias did occur as will be explained in Paragraph 3.12.

3.8 STEP 7 Survey layout and sample size

The layout of the questionnaire for Tingloy was developed in close cooperation with the BSDF project coordinator. It was designed in such a way that the enumerators could go through the questions without much trouble. The respondent's answers could subsequently be ticked on the answer sheet attached to the questionnaire without much effort. In order to prevent a rather dull listing of questions, three illustrative drawings were handed out to the respondent while interviewed.

[8] The municipality of San Pascual, the third largest municipality in the Batangas Bay area, does not have a wide formal waste collection system and is therefore not levying any collection fee to its residents and commercial entities.

The drawings gave visual support to the implementation of the questionnaire and were submitted to different people, other than the target group, before actual usage in the field (see Annex 15). They were asked if they would understand the drawings without reciting the highlights of the solid waste system of Tingloy as written down in Paragraph 3.5 and the questionnaire in Annex 14. Other people were asked to do the same but this time while reading the aspects of the solid waste management system for Tingloy. Based on their comments, the drawings were revised several times. On the whole, the drawings were found to be very entertaining and extremely useful for a quick understanding of the contents of the solid waste management system.

The required sample size was obtained from applying formula (1) presented in Annex 4. Accepting a sampling error of around 9 percent under a confidence level of 95 percent, the sample size corresponds with 120 interviews[9]. The results captured from the 120 questionnaires and presented in Paragraph 3.12 should be interpreted with an accuracy of plus or minus 9 percent. For example, if the results of survey question 22 in table 3 are put in the limelights, we can be 95 percent certain that 85,71 percent of all residents in Tingloy plus or minus 9 percent error are currently separating recyclable goods.

The actual determination of the sampling error and confidence level depends on what the research team perceives as acceptable. It also depends on the time and funds available to conduct the survey. A tight timetable forces researchers to reduce the number of questionnaires and accordingly the level of accuracy. This was typically the case for the survey in Tingloy. Four days were carefully planned: each enumerator was supposed to carry out 15 questionnaires, each 30 to 40 minutes long, every day. Would a sampling error of 7 percent have been accepted, for example, then the sample size should have mounted up to almost 200 interviews[10]. Consequently, this would bring forward a planning of seven working days, implying an even tighter schedule and asking much more efforts from the enumerators. Fortunately, all questionnaires were successfully returned at the early beginning of the fourth day.

Table 2 Classification of the number of interviews per barangay

Barangay	Number of interviews per barangay	Population
13	30(= 557/2228 x 120)	557
14	50(= 920/2228 x 120)	920
15	40(= 751/2228 x 120)	751
Total:	120	2228
Total number of households:	387	
Total number of houses:	368	

Source: Municipal Health Office (1997)

The number of conducted questionnaires per barangay depended upon the total number of households encountered. As Barangay 14 has the largest number of residents it goes without saying that the

[9] Note that there is only a small difference in sample size when using formula (2).

[10] See also Annex 4.

number of respondents interviewed is correspondingly the largest. The exact calculation can be found in the tabulation of the number of interviews for each barangay as is shown in Table 2.

3.9 STEP 8 Pretesting and revision

After the design of the survey and the determination of the sample size, the questionnaire was translated and tested by two members of the staff team in another urban area than Tingloy. Eventually it was agreed upon to execute the testing of the survey in an urban barangay in Bauan. Because of the very tight schedule of the whole marketing research in Tingloy, the order and contents of questions could only be tested in 4 interviews. Before asking the questions, the respondents were clearly informed about the testing of the survey, trying to discover irrelevant questions, misunderstandings, and the time needed to conduct the interview. Surprisingly, only minor differences of opinion regarding question concepts came forward.

After these test cases, the questions were further finalized and ultimately printed for a 120 multiplication. Nevertheless, during the execution of the questionnaire in Tingloy it became clear quite rapidly that Question 10 and thereby also Question 11, both on solid waste collection, were all answered identically. Before the actual interviews took place, it was not agreed upon by local staff members if Tingloy did have some sort of a solid waste collection system. Officially the poblacion of Tingloy does not have a formal waste collection system. This does not necessarily imply that solid waste can not be collected informally from the premises on a regular basis. During the testing in Bauan this problem did not come forward, for Bauan does have a regular collection system making Question 11 important for data analysis. In short, the two questions are of no use to the final data analysis but do no harm the overall information gathered.

In short, to have better anticipated the minor obstacles with which both the enumerators and the interviewed residents were confronted, the questionnaire should have been carried out in more than 4 test cases and in Tingloy itself. In addition, it was very hard to examine the willingness-to-pay questions directly related to the solid waste management system. Namely, the described solid waste management system was only applicable for the three barangays of Tingloy and not for the neighbourhoods of Bauan and, therefore, the bidding game technique could not be run properly. Hence, for future actions, it is certainly recommended to test the questionnaire in areas very similar to the target area. If such urban areas are not available, it is encouraged to apply the preliminary questionnaire in a limited, carefully chosen domain of the target area itself. In the latter case, nonetheless, the final version of the questionnaire should not be conducted in the test domain again to prevent biased answers.

3.10 STEP 9 Selecting and training the enumerators

The enumerators were selected according to three criteria, being a) proficiency in the dialect of the area of coverage, b) coming from or living in the survey area, and c) being enthusiastic and eager to learn something about the subject of solid waste. Unfortunately it was impossible to find enumerators who were experienced in doing survey questionnaires, or had previously gained experience in the field of research, thereby eliminating two initial selection criteria.

Because of the lack of experience in both conducting surveys and conducting surveys in the field of solid waste management, careful attention was paid to the aspect of solid waste, and to the questionnaire itself. The complete lay-out of the questionnaire was explained going through the questions one by one. Moreover, the enumerators were asked why they would like to participate as interviewers and what they expected to learn from the three days' experience. One of the outcomes of this training session was that the enumerators indeed had very little experience in the topic of solid

waste management thus simultaneously creating the opportunity of teaching them on the subject of waste management.

As Annex 8 shows, the enumerators were predominantly young and equally divided into males and females preventing a gender bias when conducting interviews. Nevertheless, a particular bias did present itself during the implementation of the survey. In the Philippines family ties are important and narrow, resulting in whole families living together. As mentioned, it is quite normal to live in with your parents, parents' family members, or nearby friends, especially in small settlements like Tingloy. Hence it becomes nearly impossible to have objectively conducted interviews. Strikingly, some of the enumerators indicated having interviewed a (close) relative and were therefore convinced of the quality of the interview. This "relative" bias materialized in the danger of having the enumerator answering the question him/herself when interviewing a close relative. Some remarks of the enumerators were *"I already know what my auntie thinks about segregation at source so I needn't ask her that question"* and *"I have seen my mother segregate organic waste so I am convinced that she agrees with segregation at household level"*.

3.11 STEP 10 Implementation of research questionnaire

The eight enumerators conducted fifteen surveys, divided at random among three appointed barangays. To minimize the "relative" bias, the households attended were selected according to the choose-skip-choose method. This method simply implies that after ending an interview in a house, one skips the neighbour's. The starting house was also chosen randomly. In spite of efforts of arbitrary selection it could not rule out interviewing close relatives. This is all the more proof of the fact that in Tingloy whole families live together in one or two barangays.

Only 105 of the 120 interviews could be used for the measurement of expenditures related questions, and for eliciting the level of awareness on solid waste segregation. During the inspection of the completed questionnaires it became apparent that a series of answers of some interviews conducted by one of the enumerators were exactly the same. After briefing the specific enumerator the staff members were told that several respondents had collectively answered the questions and discussed the results with each other. This, unfortunately, could not be accepted as more than one questionnaire. Nonetheless, the data collected from the survey questions addressed to elicit information on the willingness to pay, age, domicile, water bill, electricity bill and other expenditures could be used from all interviews.

3.12 STEP 11 Analysis and reporting

Taking all completed answer sheets into consideration the total number of male respondents was 9 while the total number female respondents was 111. This could be verified by the labelled answer sheets with the names of all respondents. The survey was intended to be confidential but, by chance, none of the interviewed residents of Tingloy would object his or her name being written down. As a matter of fact, it would have been more or less an insult not to mention the name of the respondent after he or she had put in the effort to answer all the questions.

The relatively high contribution from female respondents was another issue that had not been foreseen. Although some of the enumerators did conduct their surveys after working hours, *i.e.* after dark when everyone would be in or around the house, it still remains unclear why so very little male respondents were addressed to. Possibly for lack of interest male respondents did not want to be interviewed, or perhaps because female respondents are the first to welcome a person entering the house and would be more willing to spend 30 to 40 minutes answering questions. In addition, when it

comes to household matters, among which solid waste and sanitation are considered, it is the female head of the household who is concerned with these matters.

As mentioned before, only 105 questionnaires could be used to get a clear picture on the level of awareness and the possible action to be undertaken by the households themselves regarding segregation at source. In order to visualize their contribution one part of the questionnaire was addressed to asking the actual level of segregation at source for recyclable waste (Question 22 and 23 in Annex 14) and biodegradable waste (Question 24 and 25 in Annex 14). Surprisingly all respondents answered positively to Question 26 on their willingness to contribute to the safe disposal of their solid waste in the neighbourhood. Indeed, more firmly, of the 105 interviewed persons only four of them mentioned not to be willing to segregate the compostable and recyclable waste products, as Table 3 shows. This high percentage of willingness certainly is a welcome development in the process towards a sustainable solid waste system in Tingloy.

Table 3 The current level of residents segregating at source

	Barangay			
question/answer	13	14	15	Total
22 yes	24	31	35	90
no	6	4	5	15
23 yes	6	3	5	14
no	0	1	0	1
24 yes	15	29	33	77
no	15	6	7	28
25 yes	15	3	7	25
no	0	3	0	3
26 yes	30	35	40	105
no	0	0	0	0

These findings also correspond with the outcomes of the open-ended questions with respect to solutions of the solid waste problem in the poblacion. The actual willingness to segregate at source does exist which became clear after discussing the subject with the official bodies. It was emphasized that for a short period after the information and education seminar of the Recycling Movement of the Philippines had taken place, waste was being segregated. However, due to the lack of further treatment activities, the segregated products were dumped at the mangrove area in Barangay 15 or in the sea.

In addition, the majority of the respondents indicate that the present green containers in the main street are too small to comprise all the waste. They also emphasized that the location of these containers is too far away for them to discard their waste. They would rather like to have their own garbage can and subsequently empty it themselves. Not surprisingly, as a consequence of this deficiency, solid waste now ends up being burnt or dumped indiscriminately.

While the interviews were being conducted in the poblacion, it became clear that the two starting bids used in the willingness-to-pay questions were seen as anchor points. The respondents were biased by the amounts they were confronted with for valuing the solid waste system. When asked if they would

pay for the starting point bid, they would generally state "yes", but the follow-up bidding game questions would be answered negatively. Thus, the 60 questionnaires beginning with the starting bid of 10 pesos clearly showed a large number of respondents not willing to spend more than 10 pesos per month. The 60 questionnaires beginning with the starting point of 20 pesos tend to show a more severe bias towards the presented amount of 20 pesos per month as the maximum willingness to pay. In Table 4 the percentage of households is depicted that would contribute to the solid waste service as described to them at different price levels. Clearly, more than half of the households interviewed would support the service at a service fee of P20. The results also indicate that only 12.50% of the questioned households are not willing to pay for the service. Six of those non-willing households consider the service not important enough to pay for.

It is remarkable to note that none of them answered that the municipality of Tingloy should cover the cost of the service. A reasonable explanation is that the respondents had the impression that only they were to pay for the solid waste system in Tingloy. Namely, the questionnaire clearly expressed the aspect of voluntary contributions from residents but refrained from mentioning a contribution from the municipality or other possible contributors residing in Tingloy.

Table 4 Respondents' willingness to subscribe to the solid waste system by price of service

Service fee	Respondents willing to subscribe to the service	
pesos per month	numbers	percentage
0	120	100.00
10	105	87.50
15	76	63.33
20	69	57.50
25	11	9.17
30	10	8.33
35	1	0.83
40	1	0.83

In that respect it should not come as a surprise that, summarizing the results, the *average* amount voluntarily stated by the respondents of the poblacion is P15.75 per month[11]. Sofar no unambiguous reason has been found. Nonetheless, some ideas can be put forward.

Bargaining used in various kind of buying and selling in Third World countries does not exist on the island. This might be one of the reasons why the WTP answers were somewhat biased towards the first presented bid. In other words, the respondents might not have fully understood the purpose of the bidding game and considered the starting bid as a clue to their answer. In addition, no formal waste collection system can be encountered on the island, so that residents were not able to compare the offered bids to any other service fee but to Batangas City and Bauan collection fees.

These monthly service fees, however, are most likely neither based on the affordability nor on the voluntary contributions of residents. This is portrayed by a recently conducted UNDP study on the establishment of a solid waste management system for the Batangas Bay Region. From this report it becomes clear that, indeed, households in Batangas City are able to pay the full amount per month, *i.e.* 75 pesos for the services offered in Batangas City (GEF/UNDP/IMO, 1997). This could imply

[11] This includes the number of respondents indicating a zero willingness to pay for the offered service, that is, using the entire sample. If, on the other hand, only respondents with a positive value for the service are concerned, then the average willingness to pay amount will be higher reaching up to P18 per month.

that the two starting point bids for the questionnaire in Tingloy were too low. To verify this it is obvious to relate the willingness to pay to the affordability to pay for other services, like the water connection or electricity service.

As a benchmark it can be alleged that between 0.7 and 2.5 percent of monthly expenditures for living can be contributed to the cost of SWM services by households in low income countries (Cointreau-Levine, 1994; Altaf and Deshazo, 1996; Pfammatter and Schertenleib, 1996; World Bank, 1992)[12]. This internationally accepted figure can be used as the basis for assessing people's affordability to pay for SWM services, and likewise, to verify an over- or underestimation of the willingness to pay results.

To investigate the average monthly expenses for a household in Tingloy, several questions were asked related to their living conditions were asked. Although not all of the affordability-to-pay related questions were answered properly, the total results depict an unambiguously clear picture of the expenses on food products, water consumption, electricity and house rent. These outcomes are quite unambiguous and valid because the questionnaire includes a double-checking of answers.

The answers with respect to the expenses for fuel/transport, clothes and taxes revealed that residents in Tingloy spend very little of their income on transport, clothes and taxes. This is explicitly depicted in Table 13 of Annex 9. Up to now, no explanations for these insignificant expenditures have been found. Other results emanated from the interviews exhibit large monthly expenditures on education and social events. Logical reasons for these relatively large expenses stem from the attendance of private schools on the mainland, and the preparations for the yearly fiesta on the island. To prevent the average monthly expenses per barangay from fluctuating heavily, the expenditures on education and social events are left out. They originate from only a small number of respondents and as such would influence the average cost-of-living expenses disproportionally.

The double-checking of answers secured a safe calculation of the average monthly expenditures for each barangay which in its turn made it possible to estimate the affordability-to-pay expenses for solid waste collection. Table 5 pictures the average monthly expenditures for each barangay calculated by means of the data in Table 12 in Annex 9. In the same table the affordability-to-pay ranges are displayed based on the accepted benchmarks of 0.7 up to 2.5 percent of average monthly expenditures. Clearly, the average willingness-to-pay of P15.75 is only a small disbursement when mirrored to the affordability-to-pay brackets; it falls even below the lower bound bracket of barangay 15. Hence, it can be concluded that, based on the average expenditures, the willingness to pay of P15.75 for the solid waste management system for Tingloy is somewhat underestimated.

Table 5 Average monthly expenditures for each barangay

	Average expenditures[a)]	Affordability-to-pay brackets[b)]
Barangay 13	P3,704.68	P25.93 - P92.62
Barangay 14	P4,273.52	P29.91 - P106.84
Barangay 15	P3,659.59	P25.62 - P91.49

a) The average monthly expenditures are calculated by means of the data in Table 12 in Annex 9 and on the assumption of 28 days a month.
b) The affordability-to-pay brackets are calculated by means of the internationally accepted benchmarks of 0.7 and 2.5 percent for solid waste services of average monthly expenditures.

[12] Low-income countries are defined as countries with an average annual per capita income of US$ 350 based on 1988 data.

Although less reliable, the affordability-to-pay for solid waste services can also be verified through the elicitation of household income. In essence, income questions are susceptible to arbitrary answers of the respondent. Hence, estimations and conclusions based on the income generated data should be approached with caution and validated by means of data on cost-of-living expenses. The average monthly income generated from the survey results is depicted in Table 6. Notwithstanding the arbitrary answers, the average monthly income depicted in the same table corresponds in large parts with the average monthly expenditures in Table 5, in particular the middle income bracket. This implies that for the middle income bracket, the average monthly income is a good proxy for determining the affordability to pay.

The average monthly income for each barangay has been untwisted into three income brackets to get a more meaningful and simplified overview. The table should be read as follows. The high income bracket of up to P9,999 is supported by 30 respondents yielding an average monthly income of P5,341.67 in Barangay 13 whereas the middle income bracket yields an average monthly income of P3,923.91 based on only 23 respondents in the same barangay, and so on. By doing so, the middle and low income brackets are less influenced by large income earners.

Table 6 Average monthly income for each barangay

Barangay 13		Average income	Number of respondents	P15.75 in %
	up to P9,999	P5,341.67	30	0.29
	up to P7,999	P3,923.91	23	0.40
	up to P4,999	P2,683.33	15	0.59
Barangay 14				
	up to P9,999	P5,031.25	38	0.31
	up to P7,999	P3,977.27	33	0.40
	up to P4,999	P2,607.14	21	0.60
Barangay 15				
	up to P9,999	P4,578.95	37	0.34
	up to P7,999	P3,233.33	30	0.49
	up to P4,999	P2,413.04	23	0.65
Total average				
	up to P9,999	P4,958.33	105	0.32
	up to P7,999	P3,703.49	86	0.43
	up to P4,999	P2,550.85	59	0.62

The average willingness-to-pay amount of P15.75 is shown as a percentage of the average monthly income in the last column in Table 6, not exceeding 0.65% for the low income bracket up to P4,999. Taking the reference point of 0.7 up to 2.5 percent into account, it is most likely therefore that the

15.75 pesos per month for the collection service is underestimated[13]. The same conclusion was found for comparison of the willingness to pay *vis-a-vis* the affordability to pay based on average monthly expenditures of the residents of Tingloy.

Would a different willingness to pay measurement technique have been applied, a top-down bidding game for example, then the average willingness to pay amount would presumably have been higher. Under such circumstances, a high upper bound bid would force the respondent to take his monthly expenditures into account. This, in contrast, to the starting point bids used in the questionnaire for Tingloy where they were considered as anchor points. This very much pleads for a careful handling of the bidding game technique. As has been clearly emphasized, the questionnaire should be tested and pre-tested extensively, in particular the willingness-to-pay technique to prevent any form of bias.

3.13 STEP 12 Feedback of results among stakeholders

After the analysis, tabulation, and documentation of all returned questionnaires and their data, the final presentation of the results took place on the 31st of August in Tingloy and on the 7th of September in Batangas City. The results and remarks were immediately translated and used for the calculation of the willingness to pay, the presentation of the outcome of the respondents' perceptions about the redemption centre, their own preferences and their contribution to segregation at source.

During the presentation on 31st of August almost the whole council of Tingloy was present accompanied by the three barangay officials, several other interested people, and the project team members assisted by the local sanitation engineer. All attendants were very curious to know what the questionnaire had brought forward and what the expectations were of all the respondents interviewed. This was reflected by an enormous active participation of the people present. After the data were shared among the people and written down on the blackboard in a room of the City Hall, the municipal council wanted detailed information on the redemption centre, especially the form of the official waste management body responsible for its implementation. After clarifying this issue, it was agreed upon to wait for the written results and to brainstorm on the final multi-sectoral waste management body.

One follow-up activity of the marketing research in Tingloy, therefore, is for the municipality of Tingloy to ordinance a collection fee and, as mentioned, to create a multi-sectoral waste management body that will spearhead the solid waste management system. For this to be possible, it needs the approval and cooperation of the official council. Although the planning of a redemption centre does not appear to be of a very high priority, the municipal council is already energetically involved in the composition of the management body. Additionally, the Mayor unofficially agreed with a collection fee ordinance up to P30 based on the outcomes of the affordability to pay of the survey. Yet, caution is in its place because there certainly are households that can not afford to pay P30 per month. These households must be safeguarded against a too high solid waste collection fee.

Finally, performing the research methodology, it displayed that the reiterative process assumed participants with some knowledge of the subjects discussed, *eg.* what is meant by segregation at source? and what does an integrated solid waste management system imply? and so forth. It also asked all stakeholders to devote their time, efforts and resources to participating in the project, *eg.* approximately 30 to 40 minutes for households answering the survey, for barangay officials attending the consultations, for municipal officers organising logistics etc. In other words, the success of the

[13] This conclusion also holds when the willingness to pay amount is compared with the low income brackets of each barangay. These income brackets equal P18.78 - P67.08, P18.25 - P65.18, and P16.89 - P60.33 for Barangay 13, Barangay 14, and Barangay 15 respectively. Obviously, P15.75 turns out to be less than the lower bound of the low income brackets for all barangays.

step-by-step approach depended on a range of political, social, and technical issues without which the research could not be conducted. Hence, it can be suggested that stakeholders' enthusiasm, granted support and open minded approach are very welcomed aspects before executing a research.

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ANNEX 1 TERMS OF REFERENCE

Marketing of Waste Management Services in South Countries, with a focus on affordability-to-pay and willingness-to-pay

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Objective: To identify/develop a method for the marketing of waste management services to domestic customers, and to test the feasibility of the method in South countries.

Duration: 5 months

Requirements: A graduate student with a specialization in social marketing and a proven interest in the issues of developing countries.

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1. Introduction

In this research, waste management services refer to a) the collection and transportation of domestic solid waste and human excreta, and b) the disposal and treatment of domestic solid waste and human excreta. The management system of domestic solid waste and human excreta can be divided into two subsystems, *viz.* a primary and a secondary system. The primary system comprises the collection of waste from households at the neighbourhood level. The secondary system is the transportation to, and the disposal and treatment at the final disposal site. Often the interface between the two systems is a neighbourhood based temporary storage site/facility.

In many South countries the responsibility of waste management lies with the Local Authorities. However, the entities that render services include, next to the municipal service, also private entities and community-based organisations.

Waste is also a valuable resource. Many, often informal, activities take place to capture the economic value, like waste picking, separation and sorting, pre-treatment, reuse and recycling. In a sound waste management system, these waste recovery activities should be integrated with the collection, transportation and disposal of waste.

The cost of rendering the primary and secondary waste management services include a) the cost of depreciation and interest of investments in land, buildings and equipment, and b) the cost of operation and maintenance, mainly the cost of labour, energy and materials. Both in North as in South countries the mainstream policy is that the cost should be recouped through specific user charges, rather than from public means.

In many cities in South countries waste management services are not effectively and not efficiently rendered. Service levels vary from 50 to 90%, and as a consequence, uncollected waste is burnt or disposed of randomly in water bodies. The impacts on public health and the environment are obvious. One of the reasons for the deficiencies is that the responsible agencies receive insufficient means to cover their cost. Many customers of waste services do not or only partially pay the user charges.

2. Reasons for default on payment for waste management services

In general there are two reasons why customers do not pay:

A. A customer cannot afford to pay the user charge.
This means that there is a mismatch between what the customer is able to pay for a waste service and the cost of the service rendered. It is therefore an income related subject. However, affordability-to-pay is a function of the customer's living conditions and of his consumption preferences. Therefore it is also a highly personal matter and thus a social subject. For example, a given user charge may be regarded as affordable by customer X, but not by customer Y with a similar income level. Subsequently, it will be difficult to judge objectively whether a customer can afford a given user charge or not. Solutions to this problem are the establishment of a lower cost system, the mobilization of community participation as a contribution in kind, or the introduction of a cross subsidy mechanism.

B. A customer is not willing to pay the user charge.
In this case the customer can afford the service, but is reluctant to pay. Among others, reasons could be a dissatisfaction with the service, a disagreement with the level of the charge, the absence of law enforcement towards defaulters, a distrust in the management of financial means.

It may not always be possible to distinguish whether default of payments are due to reasons of affordability-to-pay or to reasons of willingness-to-pay. What makes the subject complicated is that the demand for waste management services is low or sometimes absent. In many cases people do not recognize the impact on public health, and do not have a problem with charging the environment with the negative impact of indiscriminate disposal. Therefore, it is not unthinkable that, because of the low level of demand, customers may use the 'not-affordable' label as an excuse rather than as a serious reason. Only through interviewing people this could become clear. Through awareness and educational campaigns the demand for waste management services could be created.

Another important aspect from a marketing point of view is that, to some extent, waste management services can be regarded as a public good. This implies that also those who do not pay for the service, will enjoy the benefits of the service. For instance, in those urban areas where a collection service is rendered, all the waste is collected for environmental, public health and aesthetic reasons. So those who do not pay have a free ride, especially because law enforcement towards defaulters is weak.

3. Research

From a financial point of view, a sustainable waste management system requires that the cost of the service matches the financial capabilities and attitudes of the users. Therefore it is essential that customers can afford the service and are willing to pay for the service. This is a subject which pertains to the domain of the marketing of public services, on which in North countries many theoretical and empirical work has been done.

However, in South countries sound methodologies for the assessment of the demand for waste management services, the affordability-to-pay and the willingness-to-pay are seldom applied. Some experiences and methodologies are available, which have mainly been applied in the drinking water sector.

The objective of the research is to identify/develop a method for the marketing of waste management services in South countries. The emphasis should be on the assessment of demand, and on the assessment of the potential financial contributions of the users. Elements of the method should include, but not be limited to:

- the development of a set of alternatives in the delivery of waste management services (service-orientation);
- the assessment of the demand for the services (demand-orientation); and
- the assessment of the affordability-to-pay and willingness-to-pay for the services (price-orientation).

The target group for using the method are those who develop and design waste management services, amongst others governmental planning agencies and development projects.

A second objective is to test the feasibility of the method in case studies in cities in South countries. WASTE will provide case study locations and facilities through their running projects.

4. Phasing

The research can be divided into three phases.

Phase 1 Literature Review (1,5 months)

This comprises a review of the existing literature on the marketing of public services in general and waste management services in particular, in North and South countries. It also includes experiences in this field from South countries.

Output: Report which presents an overview of theories, methodologies and experiences of the marketing of public services in North and South countries

Phase 2 Identification/development of a method (1,5 months)

From the results of Phase 1 a method has to be identified/developed which, after modification, has a potential for application in the field of waste management services in South countries. This phase also includes the development of a plan for testing the method. Peer reviewers from the case study locations will evaluate the proposed method on its feasibility.

Output: Report which presents a) a potential method for the marketing of waste management services in South countries and b) a research plan for testing the method.

Phase 3 Testing the method (two months)

The last phase comprise the implementation of the method in two case study locations in South countries, in order to evaluate the feasibility. This part of the research will be carried out in collaboration with local researchers.

Output: Report which presents the results of the test, evaluates the method and makes recommendations.

ANNEX 2 STEP WISE APPROACH OF THE RESEARCH METHODOLOGY FOR THE MARKETING OF SOLID WASTE SERVICES

(1) refers to the target output of every step in the process, and
(2) denotes all the actors in the underlying step.

step 1

survey statement and objective

(1) a clear understanding of the research objective(s)
(2) project staff
local counter-part
funding agencies

step 2

survey delineation

(1) a comprehensive description of the survey area and a reliable delineation of the field of research
(2) project staff
local counter-part

step 3

solid waste system description

(1) to analyse the solid waste system variables and to disseminate the applicable information among stakeholders
(2) project staff
local counter-part
technical advisor
municipality/local government

step 4

participatory demand assessment

(1) to elicit needs and preferences of the stakeholders, and to formulate the preferred waste services on the basis of a reiterative proces
(2) project surveyor
local counter-part
local key persons
municipality/local authorities
sample of households
private sector entrepreneurs

step 5

research method

(1) to define and specify the survey population, product, and payment vehicle
(2) project surveyor
local counter-part
municipality/local government

step 6

survey questions and techniques

(1) to resolve the valuation questions and techniques, and to determine the independent variables
(2) project surveyor
local counter-part

step 7

survey layout and sample size

(1) to design the questionnaire and to calculate the sample size
(2) project surveyor
local counter-part

step 8

pretesting and revision

(1) to test, pretest and revise the questionnaire due to be implemented in the field
(2) project surveyor
local counter-part
sample of households

step 9

selecting and training the enumerators

(1) to select and train the enumerators
(2) project surveyor
local counter-part
training expert(s) of local NGOs
enumerators

step 10

implementation of research questionnaire

(1) to conduct the survey in the field and to collect and administer the questionnaires
(2) project surveyor
local counter-part
enumerators
sample of households

step 11

analysis and reporting

(1) to analyse the preliminary results, refine them and report them subsequently in a document
(2) project surveyor
local counter-part

step 12

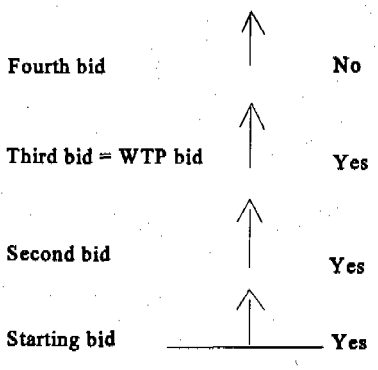
feedback of results among stakeholders

(1) to redirect the survey results towards different stakeholder groups
(2) project surveyor
local counter-part
local key persons
municipality/local government
households
private sector entrepreneurs
local NGOs and/or CBOs

ANNEX 3 THREE BIDDING GAME FORMATS

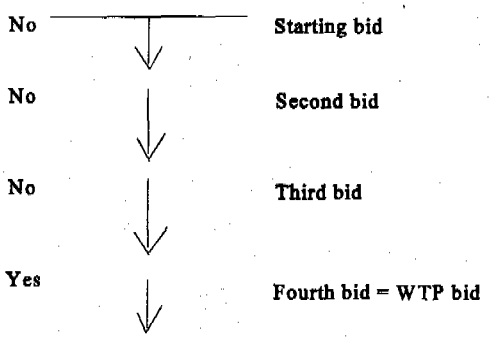
Box 1.

Would you be willing to pay the amount of ...?



Bottom up game with a low starting point

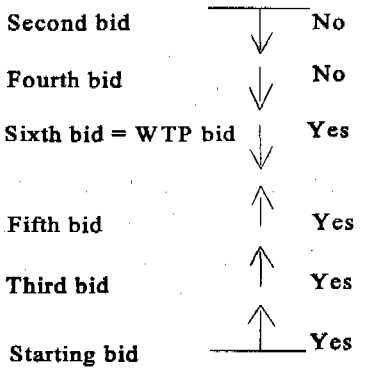
Would you be willing to pay the amount of ...?



Top down game with a high starting point

Box 2.

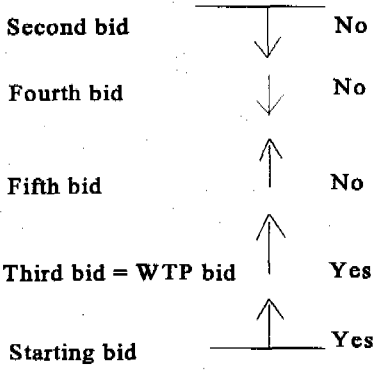
Would you be willing to pay the amount of ...?



Upper bound bid

Lower bound bid

Would you be willing to pay the amount of ...?



Two intermediate games with low starting points

ANNEX 4 MATHEMATICAL DETERMINATION OF THE SAMPLE SIZE

To determine the sample size, Paragraph 2.9 already identified the necessary parameters. In order to facilitate the quest for the correct number of questionnaires, the following mathematical analysis can be applied immediately.

For a percentage rate of r the variance v^2 can be formulated as $r(100\text{-}r)$ indicating the heterogeneity of the population. If no guess can be made about the composition of the survey population, r can be equalled to 50, the maximum value reached serving as a safe upper limit. Translated into plain words, when one has no idea about the corresponding population characteristics influencing the dependent variable, it is safe to take the population as completely heterogeneous. As a consequence the required sample size will be larger than when the population is considered homogeneous.

Now the required sample size can be obtained from the following formula:

(1) $n = k^2 r(100\text{-}r)/e^2$

where
n = the required sample size
k = the value of the "converted" confidence limits of a normal distribution function
v^2 = the variance of the variable of interest among the population
e = the margin of error (or sampling error)

In Table 7 the sample sizes required to determine samples of varying degrees of accuracy are listed. The figures in this table are calculated such that we can be 95 percent confident that the results from the whole population will be the same as in the sample plus or minus the margin of error. Thus, for instance, if in a sample of 2401 cases a percentage of 53 percent was found of respondents voting for, say, the Labour Party, we can be 95 percent certain that 53 percent plus or minus 2 percent of the population intends to vote Labour.

Table 7 Required sample sizes for various sampling errors at 95% confidence level[a)]

Sampling error (%)	Sample size	Sampling error (%)	Sample size
1.0	9604	6.0	267
2.0	2401	7.0	196
3.0	1067	8.0	150
4.0	600	9.0	119
5.0	384	10.0	96

a) the sample sizes are drawn from a complete heterogeneous population: $r = 50$
Source: De Vaus (1996), Moors (1991), Casley and Kumar (1988)

There are several things to note about the relationship between sample size and accuracy. First, when dealing with small samples a small increase in sample size can lead to a substantial increase in accuracy. Typically, increasing the sample size from 119 to 150 reduces the sampling error from 9.0 to 8.0 percent, whereas with larger sample sizes an increase does not pay off that well. To reduce the sampling error from 3.0 to 2.0 percent an increase of 1334 respondents is needed. And second, the size of the population from which the sample is drawn, is largely irrelevant for the accuracy of the sample. It is the absolute size of the sample that is significant (Casley and Kumar, 1988). That is why the exogenous variable N, *i.e.* the population size, is left aside in equation (1). However, a problem

presents itself when the survey population N becomes quite small, say for instance smaller than the sample size corresponding with a 4 percent sampling error in Table 8. We are not able to use formula (1) anymore and are thus forced to look for another viable way. Fortunately statistics brings us the solution in the following formula (Agro Vision, 1997):

(2) $n = k^2Nr(100-r)/\{e^2(N-1) + k^2r(100-r)\}$

where
n = the required sample size
N = the survey population
k = the value of the "converted" confidence limits of a normal distribution function
v^2 = the variance of the variable of interest among the population
e = the margin of error (or sampling error)

As is clear from equation (2) the survey population is now taken into consideration, and thus useful when we are faced with a small population size. In table 8 the sample sizes with corresponding sampling errors have been calculated for N equals 400. Typically, when we require a very small sampling error of 1 percent, the corresponding sample size of 384 almost matches the population size of N = 400 in contrast with a large population size. In other words, if we desire a high level of accuracy for small survey areas, almost everyone of the survey population needs to be interviewed.

Table 8 Required sample sizes for various sampling errors with N=400 at 95% confidence level[a)]

Sampling error (%)	Sample size	Sampling error (%)	Sample size
1.0	384	6.0	160
2.0	343	7.0	132
3.0	291	8.0	109
4.0	240	9.0	92
5.0	196	10.0	78

a) the sample sizes are drawn from a complete heterogeneous population: r = 50
Source: De Vaus (1996), Moors (1991), Casley and Kumar (1988)

ANNEX 5 THE DISTRIBUTION FUNCTION OF THE STANDARD NORMAL CURVE

ϕ (k) for K ~ N (0,1)

	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
2.1	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
2.2	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
2.3	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
2.4	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
2.5	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
2.6	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
2.7	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
2.8	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981
2.9	0.9981	0.9982	0.9982	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986
3.0	0.9987	0.9987	0.9987	0.9988	0.9988	0.9989	0.9989	0.9989	0.9990	0.9990
3.1	0.9990	0.9991	0.9991	0.9991	0.9992	0.9992	0.9992	0.9992	0.9993	0.9993
3.2	0.9993	0.9993	0.9994	0.9994	0.9994	0.9994	0.9994	0.9995	0.9995	0.9995
3.3	0.9995	0.9995	0.9995	0.9996	0.9996	0.9996	0.9996	0.9996	0.9996	0.9997
3.4	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9998

ANNEX 6 ANALYSIS AND REPORTING OF DATA

1. Frequency distributions of WTP responses

Respondents' answers to direct, open-ended valuation questions yield a data set of WTP point estimates because there is a specific WTP value for each respondent. Answers to a reiterative yes/no question format, place each respondent's willingness to pay in an interval defined by the last value accepted, *i.e.* the actual WTP bid, and the last value rejected. The WTP bids can be estimated by taking the mid-points of these intervals, providing a set of point estimates of individuals' willingness to pay. Subsequently, descriptive statistics such as the mean, median, and frequency distributions can be prepared for these data sets of point estimates (Moors, 1991) and are of particular value for policy purposes. This information can now easily be understood and interpreted by noncconomists. Moreover, mean estimates of WTP bids or frequency distributions can be applied to develop preliminary estimates of the total value of the service provided for instance.

The answers to a single yes/no question technique can be summarized in a manner that provides similar information to the frequency distribution of point estimated described above. It comes down to a straightforward calculation to determine the percentage of respondents in each sub-sample of the total sample that agreed to pay for the stated price of the improved service (OECD, 1994; De Vaus, 1996).

2. Cross-tabulations of WTP responses with socioeconomic characteristics

A next step in the analysis of contingent valuation data is to determine whether different groups of people in the sample gave different responses to the valuation questions. These analyses begin to address the questions of who is willing to pay the most for the good or service, and why. This is relevant to determine the accuracy and reliability of the WTP responses. When point estimates of willingness to pay are available the analyst can calculate the mean WTP bid for different groups. But what to do with these figures?

For data collected through open-ended and multiple yes/no questions clear presentational tables can now be depicted with which relationships between an independent variable and the dependent variable can be measured. Such cross-tabulations are powerful ways of communicating information and visualising relationships between different socioeconomic characteristics and WTP responses. Computing models do exist and facilitate the presentation of the collected data; for example SPSS is a comprehensive computing programme that enables this type of analysis.

It is also possible to prepare cross-tabulations for data based on answers to single yes/no questions, *i.e.* dichotomous choice format, and the corresponding explanatory socioeconomic variables. However, the analysis requires very large sample sizes to be representative for the whole population because dichotomous valuing crystallized less information (OECD, 1994; De Vaus, 1996). It is therefore more efficient to use multivariate analysis, like logit models instead of cross-tabulations, to report the data.

3. Multivariate analysis of the determinants of WTP responses

The use of multivariate analysis can provide better information and greater insight into the factors that affect the WTP responses than simple cross-tabulations. The general approach is to estimate a valuation function that relates the hypothetical determinants with the WTP responses. The decision on what determinants of WTP should be included in the valuation function is typically based on consumer demand theory. Socioeconomic and demographic characteristics of the household, and prices and availability of substitutes goods and services are commonly used to explain the variations

in the dependent variable. Since answers respondents give to open-ended questions provide a continuous measure of willingness to pay for the service, in this case ordinary least square models eventuated with computing models like SAS or SPSS.

In the case of a single yes/no question technique the response to the valuation question is not a continuous variable, but rather a discrete response. Thus ordinary least square techniques are not appropriate for the estimation of the valuation function. Instead, analysts utilize a variety of discrete choice models to attempt to explain the probability that a respondent will give a "yes" response to that valuation question. In this case the valuation model tries to explain the respondent's answer to the single question format as a function of the same kind of independent variables used in the ordinary least square models. Typically logit or probit models can be applied to estimate this relationship (OECD, 1994) but are very time consuming and more complicated to handle than regression or correlation models based on the findings of ordinary least square data analysis.

4. Qualitative analysis

How data is being analysed depends on what we want to know. Above a short summary has been given about what kind of quantitative methods are suitable for what kind of question format. Here attention is paid to the qualitative ways of providing information, how to group data related to the questionnaire, and how to reshape the results in a clear and unambiguous manner. In other words, the presentation of data is basically used for a more comprehensive way of analysing the survey data, as we have seen in the previous section, and not merely as an explanatory analysis in itself. The collected data could simply take the form of a table in which vital data are being processed (UNCHS, 1995). For the collected supplemental data one can depict the following, exemplary table.

Table 9 Data recording for supplemental data

	age	gender	education	household size	house ownership
respondent	*years*	*male/female*	*years*	*numbers*	*tenure/owner status*
1.					
2.					
3. *etc.*					
total					
percentage					

Table 10 Research methods for different valuation question formats

Analysis	Open-ended questions	Bidding game	Dichotomous choice	Payment card format
Univariate analysis *Respondents' WTP answers*	mean, median and frequency distribution	mean, median and frequency distribution	mean median and frequency distribution for split sample	mean, median and frequency distribution for split sample
Bivariate analysis *WTP responses and socio-economic characteristics*	cross-tabulation regression	cross-tabulation regression	cross-tabulation but requires a very large sample size	cross-tabulation
Multivariate analysis *WTP responses and socio-economic characteristics*	ordinary least squares correlation regression	ordinary least squares correlation regression	logit models probit models	ordinary least squares correlation regression

source: De Vaus (1996), OECD (1994), Moors (1991), Casley and Kumas (1988)

Likewise, for the reporting of the willingness-to-pay data a similar tabulation can be created. However, the exact contents of the table depends on the formulation of the willingness-to-pay question asked to the respondent. If a dichotomous choice technique is used the tabulation looks different than when an open-ended question format is used. Roughly, the possible data tabulation can be depicted as is shown in Table 11.

Table 11 Data recording for willingness to pay for a specific service option[a)]

	Open-ended game	Bidding game	Dichotomous choice	Payment card
respondent	*maximum WTP bid*	*acceptable WTP bid*	*chosen WTP bid*	*first WTP bid*
1.				
2.				
3. *etc.*				
total				

a) all bids are in local currency

ANNEX 7 MULTI-SECTORAL WORKSHOP ON INTEGRATED SUSTAINABLE WASTE MANAGEMENT (ISWM)

Municipality of Tingloy, Batangas
August 13, 1998

1. Introduction

The municipality of Tingloy has no formal collection system for all the types of produced waste on the island. A pilot project aimed to introduce the possibility of installing a collection system for all types of waste in the three barangays in the poblacion, is little by little being steered and built on the island through the collaborated assistance of Batangas Social Development Foundation, Inc., Provincial Government-Environment and Natural Resources Office and WASTE, the Netherlands.

Part of the pilot project is to conduct an on-site study on how to market the concept of integrated sustainable waste management to the local residents. The study is aimed to find out what is(are) the acceptable alternative(s) with regard to the would-be introduced waste management system on the island and how much each household is willing to voluntarily set aside as a payment for this would-be waste management system. In line with all this, a workshop that will involve the participation of different representatives from various sectors present on the island was scheduled first to validate some gathered data and second to solicit the stakeholders opinion on possible alternatives acceptable to the local residents.

2. Objectives

The objectives of the activity are :

1. to be able to determine the needs and preferences of the different stakeholders regarding waste management;
2. to be able to provide and guide Local Government Unit and other stakeholders on integrated sustainable waste management system, that is:
   a. improving waste management practices by a step-by-step process
   b. highlight the needs for such system in the island
   c. what will be the roles each stakeholders play
   d. how the system can be initiated and sustained;
3. to be able to form an ad hoc body which will chair the management and sustainability of the waste management system to be introduced.

3. Methodology

Some of the participatory methodologies used were :

1. Meta-card technique
2. Lectures
3. Sharing
4. Open forum

4. Flow of activity

1. Invocation
2. Presentation of the participants
3. Leveling of expectations
4. Objective setting
5. Workshop proper

5. Results of the workshop

In total eighteen (18) people attended the workshop including the facilitators. These were barangay officials, municipal employees, chairperson of the municipal environmental committee, school principal and guidance advisory board, a representative from the private sector and a representative from the police.

6. Expectation checking

The facilitators solicited the expectations of the participants by using the metacard technique. The attendees were grouped into four and they were asked to write their expectations regarding the activity to pieces of paper distributed to them. The answered papers were then posted on the board according to the content. Some of the expectations shared by the attendees were:

	expectation	**frequency**
1.	after the activity, they expect to have a solution to the waste problem	3
2.	to have a clean environment	2
3.	to identify a person who can buy recyclables	1
4.	to have a body that will solve waste problems	1
5.	to understand the topics to be discussed	3

7. Existing waste management on the island

To verify the collected data on the existing waste management activities practiced on the island, the facilitators posed the question "What are households, barangay officials and municipal authorities doing about solid waste?" to the four groups. Again using the metacard technique; but this time it will be the representative of the group who will post the answered papers to the board. The results of the inquiry were as follows:

for households	**frequency**
waste is left in their backyard	1
waste is gathered in one place and burnt	7
waste is gathered and buried in the backyard or in seashores	2
for barangay	
waste is thrown at the seashore	1
waste is placed in designated barangay disposal site	1
waste is gathered in one place and burnt	3

for municipal

all the attendees replied that the municipal government was doing nothing on this waste management problem.

8. The effects of waste

One of the facilitators made a review on the topics discussed during a seminar on ISWM by Recycling Movement of the Philippines in their barangay last 29th of July. A brief sharing transpired on the topics imparted during the seminar. To know the level of awareness of the participants on the effects of improper waste management as described during the seminar conducted by the Recycling

Movement of the Philippines. The facilitators requested the latter to give their comments on the question, "Knowing all this, what do you think will be the effects of your current waste management practices on a) yourself and on b) the environment?"

The responses of the stakeholders were as follows:

effects on people

Almost everyone answered that improper waste management will lead to more cases of human diseases and more chances of having a diseases.

effects on the environment	**frequency**
it can cause deaths to plants and animals	3
it causes pollution	3
it enhances the population growth of diseases-carrying insects and rodents	2
carrying insects and rodents	2
it is unsightly and dangerous for playing kids	2

9. Preferred solution

To be able to come up with a more acceptable solution or lists of options to deal with the solid waste on the island, the participants were told to cite as many actions or activities as they can, on how a household, a barangay or a municipal government can effectively manage all the types of waste produced on the island.

The listed recommendations were:

on household level	**frequency**
segregate at source	11
keep the waste out of children's reach/playground	1
learn the basics of reuse, reduce and recycling	1
the household to "set as an example"	1
cooperate with barangay/municipal ordinances and waste management activities	3
on barangay level	
initiate the practice of proper waste management	1
organize a cooperative/body that will lead	1
establish a redemption centre for recyclables	1
conduct information-education campaigns on waste management	2
formulate and enforce ordinance pertaining to waste management	2
segregate at source	1
on municipal level	
extend financial and non-financial assistance for the activities	3
conduct different consultations and meetings on waste management	1
review, formulate and enforce laws on waste management	4
work with other NGOs on the issues of financing and strategies	1
provide a site for final safe disposal of waste	8

work in partnership with barangay officials on waste management	2
take the lead in implementing the ISWM in Tingloy	2
conduct information-education activities on the island	1

10. Notations

The facilitator cited that the would-be waste management system for the island would entail costs. It only means that households and private businesses in the poblacion will have to separate an amount that will be solicited to help maintain and sustain the would-be solid waste management system. Suggestions and comments also indicated that parts of the strategies to be implemented should include the concept on merit and demerit. This to ensure the active participation of the residents. Contests on cleanest and greenest barangay were also cited as a good activity to start with in the poblacion. Moreover, schools were recommended to initiate information-education activities on proper waste management. This will nourish students clear understanding regarding their personal responsibility on waste each one of them is producing.

Moreso, seasonal waste was cited to be one of the major causes and source of pollution in the island's soil and waters. A suggestion on how to deal with this seasonal waste was shared by the attending school principal. This was through a semi-landfill technology as explained and depicted in a drawing on the blackboard. One of the staff members present during the workshop replied that although the idea and the intention was good, having it done near or on the seashore will only lead to more problems in the near future. The expert suggested that further research regarding the principal's suggestion should be done to help eliminate major risks.

The problem on seasonal waste was then identified to be the next agenda issue after a waste management system for the three barangays was installed.

11. Multi-sectoral waste management body

A multi-sectoral waste management body was planned as the last activity of the workshop. The composition of the created body will be represented by the following sectors:

two representatives from the municipal council
three representatives from the health unit of Tingloy
the three barangay chairpersons (13, 14 and 15)
the three SK chairpersons (13, 14 and 15)
two representatives from the school
a representative from the cooperative sector
a representative from the waste buying sector
a representative from the church/religious sector

An initial site to do the final safekeeping of non-marketable and re-usable waste was identified and scheduled for study if it can serve the purpose. The marketing study on waste management that will be conducted in the area was also announced. The meeting to finalize the created body was tentatively set on the 24th of the month.

ANNEX 8 INFORMATION ON THE SELECTED ENUMERATORS

Number of enumerators	Sex	Age	Barangay addressed
1. J. Adalia	Male	22	13
2. J. Manalo	Male	21	14
3. J. B. Garcia	Female	21	13
4. R. Manalo	Male	32	15
5. J. H. Manalo	Female	22	14
6. M. Valinton	Female	25	14, 15
7. O. Manalo	Male	21	15
8. R. B. de Chavez	Female	34	14

ANNEX 9 KEY RESULTS OF THE SURVEY CONDUCTED IN TINGLOY

Table 12 Expenditures on the daily food products and monthly electricity and water bill per barangay

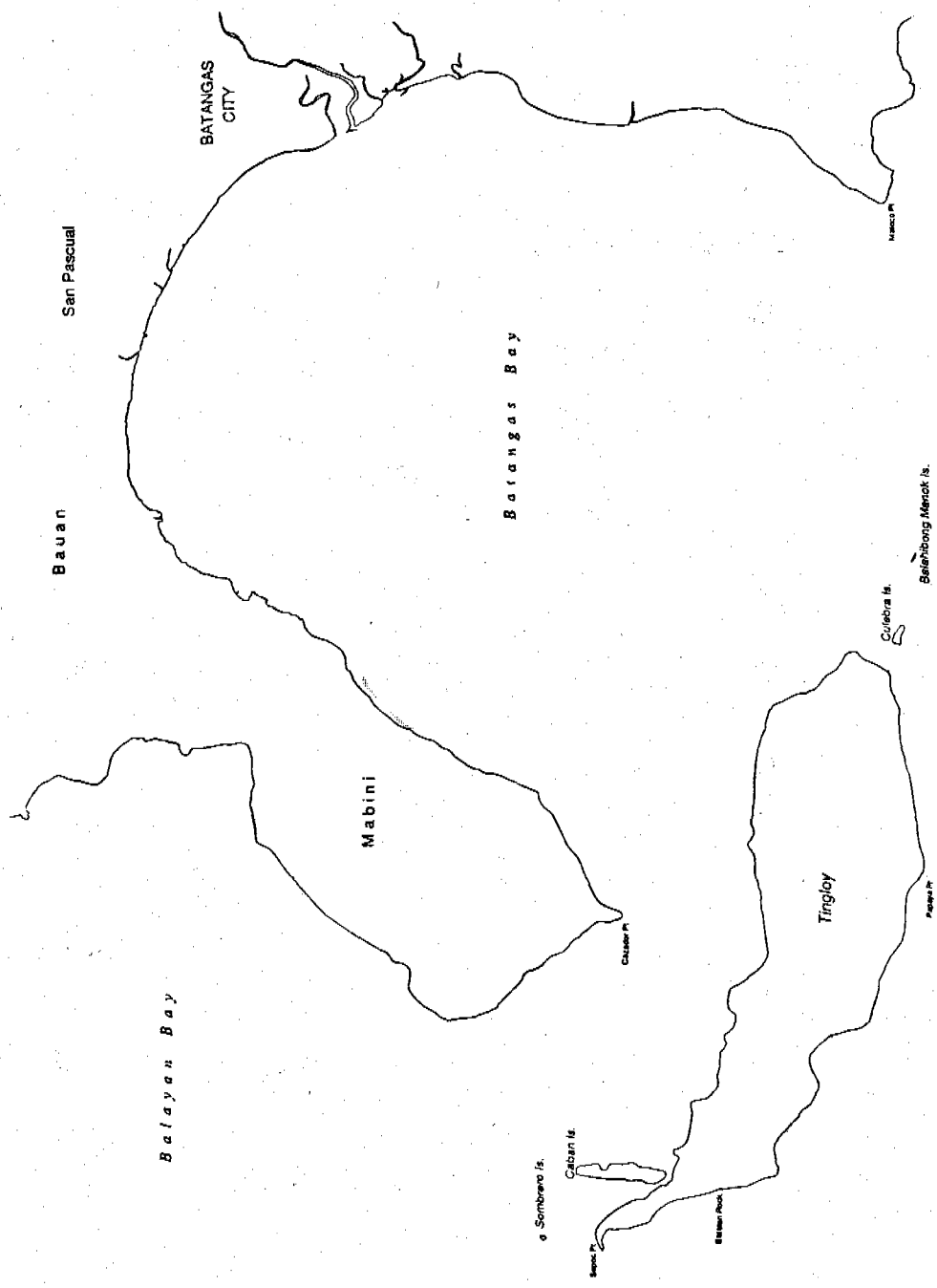
		Number of respondents	Item	Amount
Barangay 13				
Food products			daily expenditures	P 115.67
Electricity connection	yes	22	electricity bill last month	P 297.59
	no	6		
Water connection	yes	15	water bill monthly average	P 168.33
	no	13		
Not answered		2		
Total		30		
Barangay 14				
Food products			daily expenditures	P 139.85
Electricity connection	yes	38	electricity bill last month	P 221.39
	no	6		
Water connection	yes	24	water bill monthly average	P 136.33
	no	20		
Not answered		6		
Total		50		
Barangay 15				
Food products			daily expenditures	P 119.39
Electricity connection	yes	30	electricity bill last month	P 197.23
	no	7		
Water connection	yes	18	water bill monthly average	P 119.44
	no	19		
Not answered		3		
Total		40		

Table 13 Average daily/monthly expenditures for the poblacion

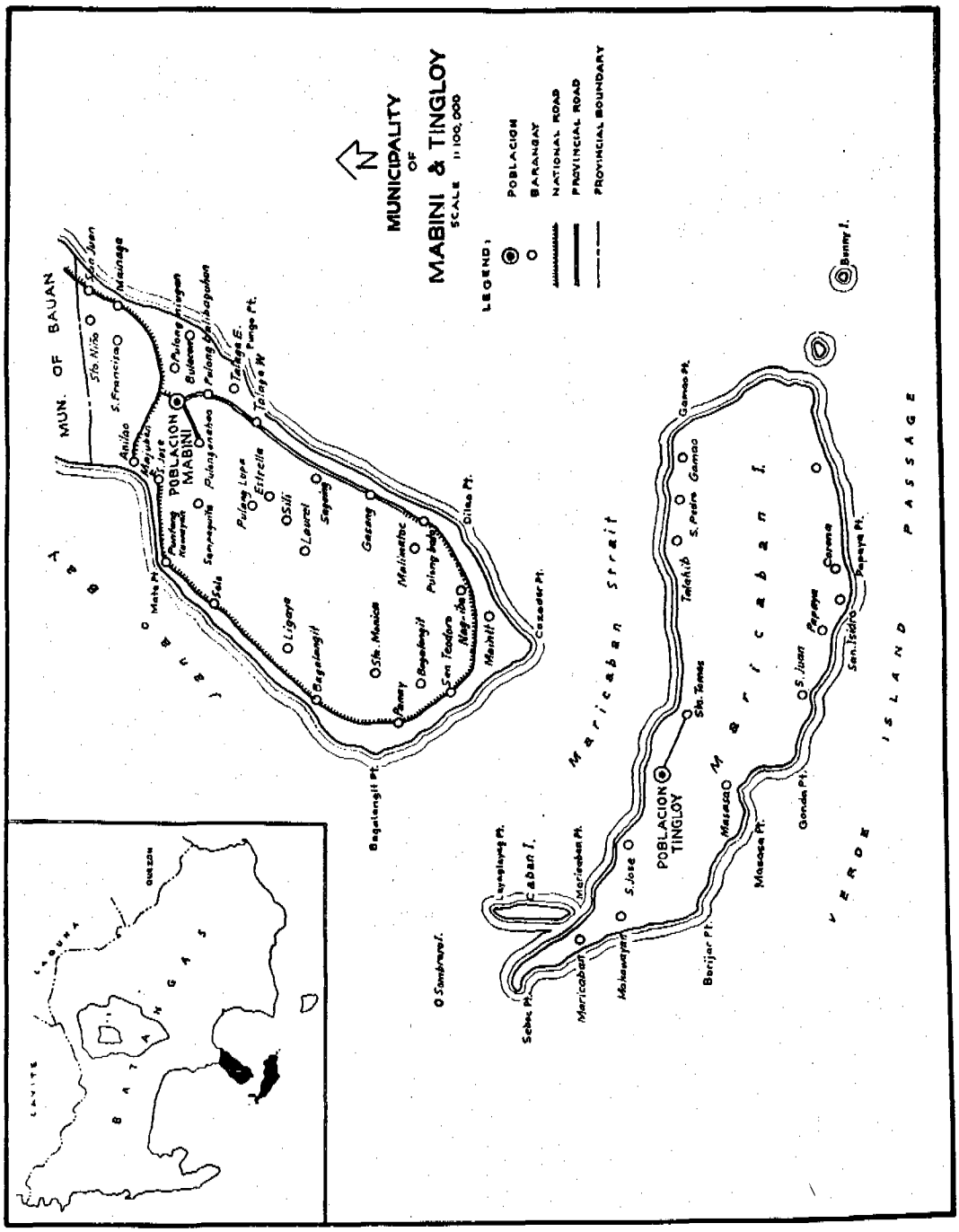
Expenditures' item	Daily/monthly	Average expenditures	Number of respondents
1. food products	daily	P 124.97	97
2. house rent	monthly	P 356.25	7
3. fuel/transport	monthly	P 10.00	29
4. water consumption	monthly	P 143.35	57
5. electricity and gas	monthly	P 241.43	90
6. education (of children)[14]	monthly	P 956.25	62
7. clothes	monthly	P 98.33	10
8. taxes	monthly	P 76.94	6
9. social events (savings)	monthly	P 1,016.67	20

[14] If the expenditures on education above P 1,000 per month are left out of the calculations, the average expenditures decline to an average of P 398.37 for 49 respondents.

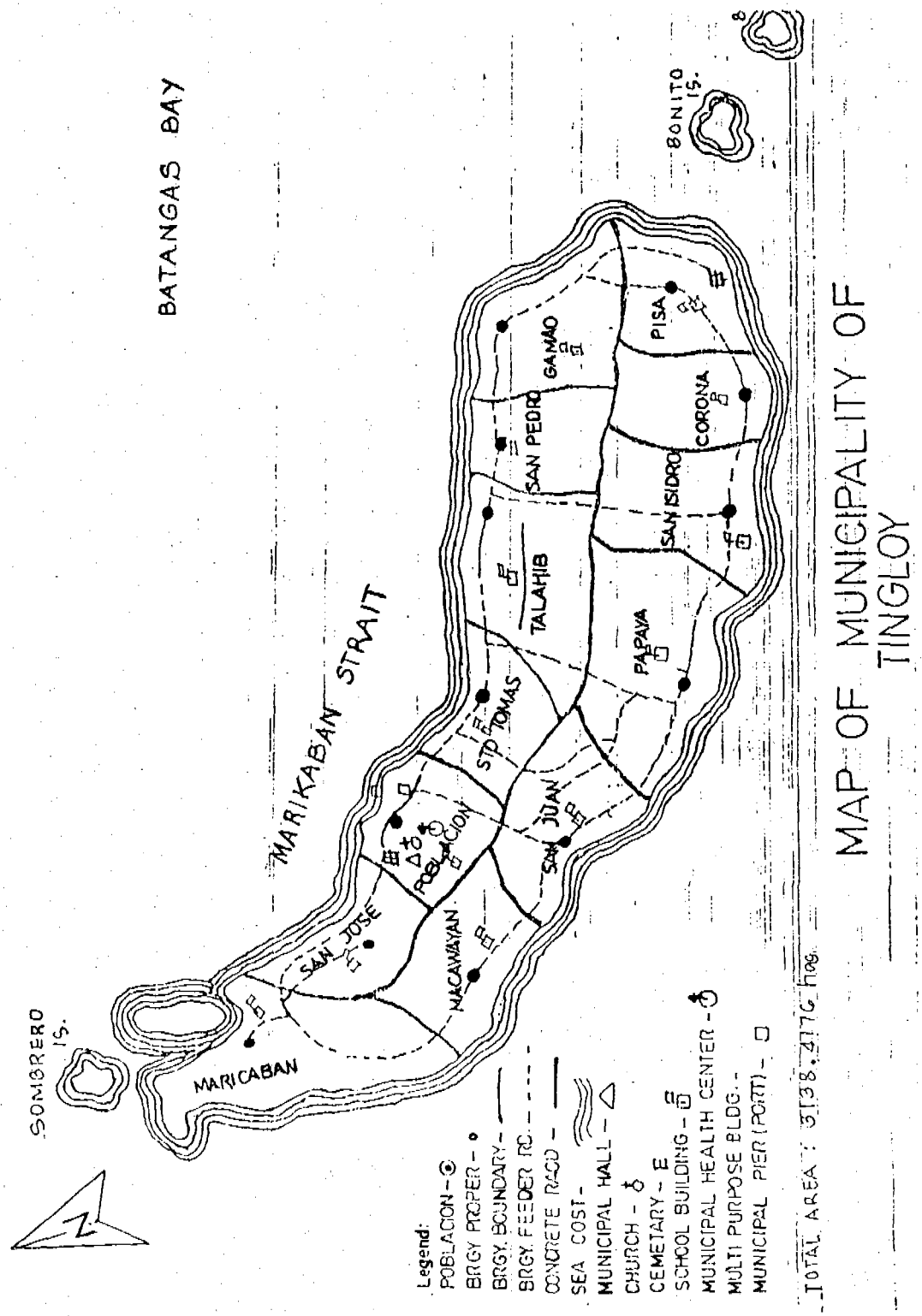
ANNEX 10 MAP OF THE BATANGAS BAY AREA



ANNEX 11 MAP OF THE LOCATION OF TINGLOY



ANNEX 12 MAP OF TINGLOY



ANNEX 13 SURVEY FRAMEWORK FOR THE DEVELOPMENT OF THE QUESTIONNAIRE FOR TINGLOY

Demand assessment and willingness to pay survey framework for solid waste services on Tingloy, the Philippines

Name of surveyor: _____
Date of interview: _____

1. Survey statement

Questionnaires are usually designed with an opening statement to be read by the interviewer to the respondent. This statement usually explains (UNCHS, 1995):
- what the survey is all about;
- why it is being conducted;
- how the respondent was chosen to be interviewed;
- how long the interview will take;
- assurance that the responses will be confidential;
- a request for permission to begin asking the questions.

Survey description and target could be stated as: "The principal component of the research study is the development and implementation of a household survey intended to elicit three types of information, namely the perceived level of existing solid waste services and based hereon the possible improved service options, households preferences and attitudes regarding these services, and their affordability and willingness to pay for improved services."

If the survey statement is defined, for instance as is in the case of Tingloy, then the survey statement might look like: "Good morning/afternoon. Can I have a moment of your time? My name is (*name of interviewer)* and I am conducting a survey for the Integrated Sustainable Waste Management Project in Tingloy. I would like to ask you some questions that would assist the project team in determining how to improve solid waste services to your neighbourhood. Your opinion is therefore very important to be heard. The questionnaire will only take about (*estimated time*) minutes and all answers are treated confidentially. Moreover, there are no wrong answers because everyone has a different opinion."

2. Determination of the area

In order to have a clear insight in the geographical location of each household or entrepreneur and the total number of responses of each *poblacion*, the next step is to localise the target area. This will come down to a very simple question, being

"Let me first ask you a two questions to identify the location of your house/enterprise (*ask the questions*)."
- Household is identified as being a resident of poblacion number.
  (*13, 14, or 15*)
-The respondent is a citizen of the described poblacion of Tingloy.
  (*yes/no*)
- How long have you been a resident of Tingloy? (*number of years*)

3. Determination of the current situation of solid waste disposal

The next group of questions is related to the existing situation of solid waste services and disposal found in the survey area. To be able to formulate these questions, the questionnaire designer must

have an understanding of the actual situation. The questions are thus formulated to discover (the frequency of usage of) these services.

The questions and possible answers differ from every other situation but may come down to:
"I would like to ask you some questions regarding the usage of solid waste services as being provided in your neighbourhood (*ask the questions*)."

Household or private entrepreneurial participation in current solid waste service system could be described by means of:
- the way and frequency in which households or small scale enterprises discard their waste;
- the frequency of the solid waste service are provided to the respondents.

4. Demand assessment of respondents with respect to solid waste disposal

Before turning to the demand assessment of the stakeholders, the survey needs to indicate to what extent the respondents are aware of the environmental problems they are exposed to when no improvement of the actual waste system occurs. It is quite significant for the researcher to understand the potential level of participation and support for all kind of waste related activities. The reason is that a higher degree of familiarity increases the readiness to physically and financially contribute to environmentally supporting activities.

To promote the awareness of the local population an extensive promotion programme could be planned which focuses on the basic hygiene behaviour and the according public health dangers. The actual promotion material, however, varies from programme to programme and from location to location. Nevertheless, all "mobilization" programmes should emphasize long-term environmental and health impact on the one hand, and the behavioural changes necessary to alleviate these hazards on the other. From a social marketing point of view, it asks for a method to increase the awareness of the beneficiaries, *i.e.* all persons benefiting from the improved quality of living, and a mobilization of these people to actually take affordable action, *i.e.* a way of creating real demand for improved services.

The statement could look like: "As you know in your neighbourhood there are problems of discarding solid wastes. If nothing is undertaken to lift these problems, you might be faced not only with a decrease in quality of your living area but also with a threat to public health. I would therefore like to ask you some questions related to these environmental problems (*ask the questions*)."

The questions determining the degree of awareness could take as indicator:
- the specific problems as indicated by the respondents themselves;
- support and participation of existing activities in the field of combatting environmental problems.

Then, after having visualised the situation and the environmental problem indication in the survey area, the questionnaire is aimed at identifying the preferences of the stakeholders. Only in accordance with their needs an improved waste system will be successful. Thus questions must be developed to monitor their demand and attitudes towards the existing waste service system. Here also, it is impossible to specify each question *ex ante* although several criteria can be distinguished that measure the preferences of the stakeholders.

"I would also like to know your opinion about the present provision of solid waste services. This is of vital importance because otherwise we would not be in the position of understanding your true preferences and problems (*ask the questions*)."

The demand assessing questions could be based on the following aspects:
- the preferences on the present provision of solid waste services;

- the formulation of the most serious problem encountered by the respondents;
- the identification of the least provided service;
- the desired results from the improvement of these services within the technically viable framework;

5. Measurement of the affordability and willingness to pay for waste services

Without any information on the affordability to pay of stakeholders, there is a serious drawback in the determination of the willingness to pay for the improved services provided. Not knowing the affordability to pay implies the danger of a failure of recovering the full costs of the service system. It is therefore vital to measure it. To be able to estimate the affordability to pay to financially contribute for waste services, one can ask a number of questions that relate to the expenditures on existing services, living expenditures or just income. The choice merely depends on the easiness to gather this information, the budgetary limitations, and the available time to conduct the survey.

"Now I would like you to think carefully, for the following questions are not easy to answer. The questions I am about to ask relate to your daily/weekly expenditures on existing services, if any, on cost-of-living, or income *(ask the questions)*."

The questions that intend to measure the affordability-to-pay will depart from the following indicators:
- the current level of expenditure on existing solid waste services;
- the level of primary cost-of-living expenditures;
- the level of income or saving.

Note that the order of indicators is taken such that the first is considered to be the easiest to measure.

To ascertain the voluntarily financial contributions for the new or improved services, several steps have to be taken into account. The first step involves the explanation of the service options for solid waste to the respondent. These appropriate based options imply alternatives that are practical, environmentally and economically viable, that they satisfy the needs of the users, and that they are socially acceptable.

After the description of the options, the next step is to emphasize that the provision of these services involves costs, generally involving costs of procurement, costs of operation and maintenance, and costs of depreciation and financing. And as with all products and services, they have to be funded in one way or the other. Thus, as this service is no exception, the surveyor must clearly state to the respondent that if he or she desires the improved service, he or she must pay the price attached to its consumption. Moreover, the interviewer continues to stress that this obligation involves a tradeoff between waste services on the one hand and other goods or products on the other. This reminder is important because it forces the respondent to think hard about his income constraints, eliciting the true preference for the improved service provided.

The third step is to clarify the payment "vehicle" to the respondent or put differently, the way in which the payment will occur. Again this reminder is to emphasize the seriousness of the payment for the service offered.

Finally, the respondent is asked his or her opinion about the maximum amount he or she is willing to pay voluntarily. When applying the contingent valuation method several ways to elicit the true willingness to pay can be distinguished, such as the bidding game, dichotomous format, payment card format or just open-ended questions as has been portrayed in chapter 2. One has to make a choice between the most effective and efficient method based on each pros and cons.

After describing the viable options and reminding the respondent to the expenditure constraints

involved, the interviewer can start asking the willingness to pay preferences. Then the willingness-to-pay statement might look like:

"As you know the new or improved waste services are being provided to your neighbourhood. For the new system to be operational all costs must be recovered. In order to estimate the total recovery I would like to know your preferences about the amount you are voluntarily willing to contribute (*ask the questions*)."[15]

1. "Are you willing to pay __(x)__ amount each day/week/month in order to receive the service option ?"
   a. yes, I will pay __(x)__ amount each day/week/month (go to 2)
   b. yes, I would like to receive the service but I want to pay less than (x) amount (go to 5)
   c. no, I do not want to pay for the provided service
   (go to 4)

2. "Are you willing to pay __(x+1)__ amount each day/week/month in order to receive the service option?"
   a. yes, I will pay __(x+1)__ amount each day/week/month (go to 3)
   b. no, I do not want to pay __(x+1)__ amount for the provided service
   (go to 6)

3. "Are you willing to pay __(x+2)__ amount each day/week/month in order to receive the service option?"
   a. yes, I will pay __(x+2)__ amount each day/week/month (go to 6)
   b. no, I do not want to pay __(x+2)__ amount for the provided service
   (go to 6)

4. "What is the reason that you do not want to pay for the service option?"
   a. can't afford to pay the full cost
   (go to 6)
   b. don't consider the service important enough to pay for (go to 6)
   c. believe that the municipality should cover the cost of the service option (go to 6)
   d. don't trust the new service option
   (go to 6)
   e. prefer another service option

5. "What is the reason that you prefer to pay less than __(x)__ amount?"
   a. can't afford to pay the full cost
   (go to 6)
   b. believe that the municipality should cover a part of the cost of the service option (go to 6)

6. "What is the maximum amount that your household would be willing to pay each day/week/month for the service option?"
   maximum of __(y)__ pesos each day/week/month

6. Supplemental information of household/entrepreneural stakeholders

To be sure of the validity of the survey results additional information is needed. Namely, the willingness to pay varies from household to household, and from small scale entrepreneur to small

[15] For a detailed outline, see also "Guidelines for conducting demand assessment and willingness to pay surveys for solid waste collection and disposal services", World Bank 1989.

scale entrepreneur so that information on variables that influences the willingness to pay is a necessity in order to infer the true commitment to pay for the improved services provided. It is this final part of the survey that addresses to this information.

"I will soon be ending this interview. Before I do, however, I would like to ask you some questions about you and your family (*ask the questions*)."

The additional data recorded is generally based on:
- gender; because it makes a difference who is responsible for the daily expenditures, or who is involved in the promotion activities as indicated in Part 4.
- age; because younger people might be more eager to participate while elderly might tend to leave things as they are.
- education; because the level of education elicits the environmental and health risks caused by low quality of services.
- household size; because the size of the household determines the expenditure pattern and therefore perhaps the amount one is willing to pay.
- tenure/owner house; because the status quo of house property is an indicator of the awareness of environmentally sound surroundings, and perhaps an indicator of income.
- profession/employment; because the level of income determines the willingness to pay.
- expenditures on a) existing services, b) cost-of-living, or c) income; idem.
- commercial activity (when being entrepreneur); because the type of activity involved influences the type of waste produced.

Finally,
"Thank you very much for your contribution to this survey. Do you have any questions or comments that you would like to ask me?" (*record the question(s) and/or comment(s)*).

"Thank you very much for your cooperation. We hope to use these results to determine how best to provide affordable and desirable services to the people of your neighbourhood. Good bye."

ANNEX 14 SURVEY QUESTIONNAIRE FOR TINGLOY

Demand assessment and willingness to pay research survey for solid waste services on Tingloy, the Philippines

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Read the following introductory statement

"Good morning/afternoon. Can I have a moment of your time? My name is (*name of interviewer)* and I am conducting a survey for the Integrated Sustainable Waste Management Project assisted by the Batangas Social Development Foundation in Tingloy. I would like to ask you some questions that would assist the project team in determining how to improve solid waste services to your neighbourhood. Your opinion is therefore very important to be heard. The questionnaire will only take about 40 minutes and all answers are treated confidentially. Moreover, there are no wrong answers because everyone has a different opinion."

1. Introduction

Let me first ask you some questions to identify the location of your house (*ask the questions*).

1. Gender of the respondent?

   a. male
   b. female

2. Are you a permanent resident of the attended neighbourhood of Tingloy?

   a. yes (go to 5)
   b. no (go to 3)

3. Can I interview someone else of this household who is a permanent resident and is present today?

   a. yes (go to 1)
   b. no (go to 4)

4. Can I come back tomorrow to continue this survey questionnaire?

   a. yes (go to end)
   b. no (go to end)

Record the address and/or family name: _____

5. How long have you been a resident of the attended neighbourhood (*13, 14 or 15*) in Tingloy?

   a. less than a year
   b. more than a year but less than three years
   c. more than three years but less than ten years
   d. more than ten years

6. What is your age?

   _____ years

7. Is the person being interviewed the head of the household?

a. yes
b. no

8. Is this a single-headed household?

a. yes
b. no

2. Existing situation regarding solid waste disposal

"I would like to ask you some questions regarding the situation of solid waste in your neighbourhood (*ask the questions*)."

9. How do you discard the waste that is no value to your household?

a. burn it
b. leave it on the street
c. throw it in the river
d. throw it in the sea
e. discard it in the communal containers
f. burry it in the backyard
g. burry it on the seashore
h. burry it near the riverbank
i. bring it to the dump site
j. leave it to be collected from the house
k. don't know

10. Is the solid waste collected from your house?

a. yes
b. no (go to 12)

11. How many times per week is your solid waste collected from your house?

a. daily
b. twice a week
c. once a week

d. now and then
e. there is no collection
f. don't know

12. Who is handling your solid waste?

a. father
b. mother
c. children
d. other relatives

13. What do you do with your recyclable products?

a. discard them with other solid waste
b. separate them for selling to junk shop collector
c. separate them for own reuse
d. separate it and give it away to others who will use it again
e. don't know

14. What do you do with your organic waste?

a. use as compost
b. feed the animals
c. leave it to be collected from the house
d. discard it in the communal containers
e. discard it in the street
f. throw it in the sea
g. don't know

3. Assessment of respondent's demand: disposal, separation at source and resource recovery

"I would also like to know your opinion about the present situation of solid waste services. This is of vital importance because otherwise we would not be in the position of understanding the true preferences and problems of you and your neighbourhood (*ask the questions*)."

15. What is your opinion about the current situation of the disposal of solid waste in your neighbourhood?

a. I'm doing it because everyone else is doing it
b. there will be problems in the end
c. nothing is wrong with what I'm doing now
d. no opinion/don't know

16. What do you consider the most urgent problem related to the disposal of solid waste in your neigh bourhood?

a. personal health
b. pollution of living area and playgrounds for children
c. littering of solid waste in the neighbourhood
d. it will endanger the fishcatch
e. nothing is wrong
f. no opinion

17. What is your opinion about the current green communal containers in your neighbourhood?

a. they are too far away from the house
b. they are too small to contain all solid waste

c. they produce unpleasant odours

d. the size is sufficient (go to 19)
e. nothing is wrong with the communal containers
(go to 19)
f. no opinion (go to 19)

18. What would you prefer as a solution?

_____

19. What is your opinion about the present site where you dispose your waste?

a. anyone can throw his waste there
b. anything can be thrown there
c. the site produces foul odours
d. nothing is wrong with the site
e. no opinion/don't know

20. What do you consider the most urgent problem related to the present site in your neighbourhood where you dump your waste?

a. public health risk
b. groundwater contamination
c. it becomes an eyesore with unpleasant odours
d. uncontrolled dumping at the area
e. nothing is wrong with the dump site (go to 22)

21. What would you prefer as a solution?

_____

_____

22. Are you currently separating recyclable goods?

a. yes (go to 24)
b. no

23. Would you be willing to separate recyclable goods?

a. yes
b. no

24. Are you currently separating compostable goods?

a. yes (go to 26)
b. no

25. Would you be willing to separate compostable goods?

a. yes
b. no

26. Would you be willing to contribute to the safe disposal of the solid waste in your neighbourhood?

a. yes
b. no (go to 28)

27. How would you be willing to contribute?

a. bringing my own garbage to the communal container as whatever the neighbourhood identifies as container
b. bringing my own and my neighbour=s garbage to the communal container as whatever the neighbourhood identifies as container
c. separate recyclables
d. separate organic waste
e. cleaning litter around the communal containers as whatever the neighbourhood identifies as container
f. cleaning litter around the site where the containers are emptied
g. paying for an amount agreed upon by the community for a solid waste collection system

28. Why not?

_____

_____

4. Willingness and affordability to pay measurement

"Now I would like you to think carefully, for the following questions are not easy to answer. The questions I am about to ask relate to your daily/weekly expenditures and to an integrated solid waste service to be implemented in your neighbourhood *(ask the questions)*."

29. Can you indicate what your daily and monthly expenditures are?

a. yes, I can
b. no, I can't (go to 31)

30. Give a subscription of your expenditures on:

Expenditures' item:	Daily/weekly/monthly	Amount in pesos
1. food products		P
2. house rent		P
3. fuel/transport		P
4. water consumption		P
5. electricity and gas		P
6. education *(of children)*		P
7. clothes		P
8. taxes		P
9. social events *(savings)*		P

31. What is the reason you can't indicate your expenditures?

a. don't want to
b. have no idea what the expenditures are
c. afraid someone will come to know the information
d. private information
e. don't know

32. What is your monthly household income in pesos?

a. 1000-1499	e. 3000-3999	h. 7000-7999
b. 1500-1999	f. 4000-4999	i. 8000-8999
c. 2000-2499	g. 5000-5999	j. 9000-9999
d. 2500-2999	h. 6000-6999	k. 10000 and above

"Now I would like to present to you the identified solid waste service which might be implemented in your neighbourhood. The Mayor, the council members, and the barangay captains are aware of this solid waste alternative and support the idea of this integrated solid waste system. In order to receive the service you are also asked to pay a small fee per month."

An integrated solid waste service for Tingloy

"The solid waste service that can be identified regarding waste management in your neighbourhood has the following aspects *(show the drawings)*:

1. You need to segregate all your solid waste at source into recyclables, which are items that can be used again to generate other goods, and into biodegradable waste, which is mainly your kitchen waste, plants, leaves etc. that can be used for composting, and into waste that remains.

2. You have to bring your biodegradable waste to a communal compost pit in your own barangay, and subsequently bring your recyclables together with your remaining waste to the closest garbage bin in the main street of your barangay where it is stored for further collection by a collector the same day.

3. Each barangay will collect its recyclables and remaining waste from the main street daily to an identified site outside the poblacion where recyclables are stored separately from the remaining waste.

4. The site will be called a *redemption centre* and is managed by a trained individual who will also see to it that no littering takes place. This site is already been located and agreed upon by the Mayor and council members.

5. The to-be formed municipal waste body will be responsible for the management of this solid waste service and the whole neighbourhood will contribute to the service system."

33. Are you willing to pay P10 (P20) each month in order to receive the service option?

a. yes, I will pay P10 (P20) each month	
b. yes, I would like to receive the service but I want to pay less than P10 (P20)	(go to 37)
c. no, I do not want to pay for the provided service	(go to 36)

34. Are you willing to pay P15 (P25) each month in order to receive the service option?

a. yes, I will pay P15 (P25) each month	
b. no, I do not want to pay P15 (P25) for the provided service	(go to 38)

35. Are you willing to pay P20 (P30) each month in order to receive the service option?

a. yes, I will pay P20 (P30) each month	(go to 38)
b. no, I do not want to pay P20 (P30) for the provided service	(go to 38)

36. What is the reason that you do not want to pay for service option?

a. can't afford to pay the full cost (go to 38)
b. don't consider the service important enough to pay for (go to 43)
c. believe that the municipality should cover the cost of the service option (go to 43)
d. don't trust the new service (go to 43)
e. prefer other solid waste alternative (go to 43)

37. What is the reason that you prefer to pay less than P10 (P20)?

a. can't afford to pay the full cost
b. believe that the municipality should cover a part of the cost of the service option
c. no comment

38. What is the maximum amount that your household would be willing to pay each month for the service option?

maximum of _____ pesos each month

39. Do you think it is realistic that you could reduce your expenditures on these items by this amount every month in order to pay for a solid waster service system in your barangay?

a. yes (go to 41)
b. no

40. What do you think is a more realistic amount that you could actually afford every month for an improved solid waste service ?

a. revised amount _____ pesos per month

41. If you wish to receive the service option, what other goods would you give up?

a. don't want to give up other goods
b. want to substitute food products (go to 43)
c. want to substitute other products, like ... (go to 43)
d. want to substitute savings (go to 43)

42. How would you pay for the provision of the service option if you don't want to give up other expenditures?

a. use of savings
b. generate extra income
c. don't know

5. Supplemental data

"I will soon be ending this interview. Before I do, however, I would like to ask you some questions about you and your family (*ask the questions*)."

43. How many persons live in your household, *i.e.* how many persons eat, drink and sleep in your house on a regular basis?
a. _____ adults (15 years and older)
b. _____ children (under 15 years)

44. What is your level of education in number of years in school?

a. _____ years in primary school
b. _____ years in high school
c. _____ years in university
d. _____ years in professional courses

45. What is the level of education of the most educated member of your household in number of years?

a. _____ years in primary school
b. _____ years in high school
c. _____ years in university
d. _____ years in professional courses

46. What does the principal income earner do?

a. fisherman
b. craftsman
c. teacher
d. employee
e. owner of business
f. tricycle rider
g. driver
h. cook
i. worker on passenger boat
j. unemployed

47. Where does the principal income earner work?

a. Tingloy
b. mainland
c. abroad

48. How many other people in your household contribute regularly to the household income?

_____ number of people

49. Who makes decisions for the daily expenditures?

a. father
b. mother
c. other relatives

50. Do you own your house?

a. yes (go to 53)
b. no, I am a tenant
c. no, I am taking care of the house

51. What is your monthly rent?

_____ pesos per month

52. How do you pay your rent?

a. in cash and directly to the house owner
b. in cash and directly to the caretaker of the house

53. Does this house have electricity?

a. yes
b. no (go to 55)

54. What was your household's electricity bill last month?

_____ pesos

55. How much are you more or less paying for your water consumption per month?

_____ pesos

56. Does your household have a business here in the house?

a. yes
b. no (go to end)

57. What type of business is it?

a. grocery shop
b. candy shop
c. butchery
d. barber shop
e. selling cooked food
f. bakery
g. video shop

End

"Thank you very much for your contribution to this survey. Do you have any questions or comments that you would like to ask me? (*record the question(s) and/or comment(s)*).

Thank you very much for your co-operation. We hope to use these results to determine how best to provide affordable and desirable services to the people of your neighbourhood. Good bye."

For the enumerator only
evaluation questions

Evaluation questions

58. Was the person who answered the questions irritated or nervous during the interview?

a. yes
b. no

59. Do you think the respondent made an effort to tell the truth about his/her willingness to pay questions?

a. yes
b. no specify this:_____

60. How would you rate the overall quality of the interview?

a. good
b. fair
c. poor specify this:_____

61. How many people were listening while you conducted this interview with the respondent?

a. other family members
b. non-family members

For the enumerator only

Name of Enumerator :
Barangay :
Date :
Time start :
Time finish :

Answers to the questionnaire

1. A B

2. A B

3. A B

4. A B

Record the address and family name: _____
_____

5. A B C D

6. _____ *years*

7. A B

8. A B

9. A B C D E F G H I J K

10. A B

11. A B C D E F

12. A B C D

13. A B C D E

14. A B C D E F G

15. A B C D

16. A B C D E F

17. A B C D E F

18. _____
_____
_____
_____

19. A B C D E

20. A B C D E

21. _____
_____
_____
_____

22. A B

23. A B

24. A B

25. A B

26. A B

27. A B C D E F G

28. _____
_____
_____
_____

29. A B

30. Give a subscription of your expenditures on:

Expenditures' item:	Daily/weekly/monthly	Amount in pesos
1. food products		
2. house rent		
3. fuel/transport		
4. water consumption		
5. electricity and gas		
6. education *(of children)*		
7. clothes		
8. taxes		
9. social events *(savings)*		

31. A B C D E

32. A B C D E F G H I J K

33. *amount P* _____ B C

34. *amount P* _____ B

35. *amount P* _____ B

36. A B C D E

37. A B C

38. *maximum amount P*_____

39. A B

40. *revised amount P* _____

41. A B C D

42. A B C

43. A _____ *adults (15 years and older)*
B _____ *children (under 15 years)*

44. A _____ *years in primary school*
B _____ *years in secondary school*
C _____ *years in high school*
D _____ *years in university*

45. A _____ *years in primary school*
B _____ *years in secondary school*
C _____ *years in high school*
D _____ *years in university*

46. A B C D E F G H I J

47. A B C

48. _____ *number of people*

49. A B C

50. A B C

51. _____ *pesos per month*

52. A B

53. A B

54. _____ *pesos*

55. _____ *pesos*

56. A B

57. A B C D E F G

58. A B

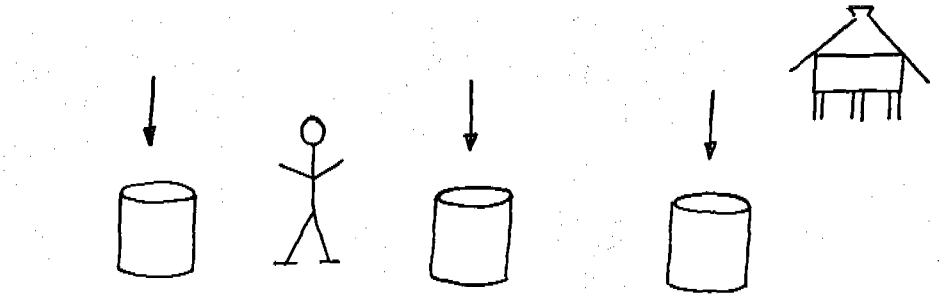
59. A B *specify* _____

60. A B C *specify* _____

61. A B

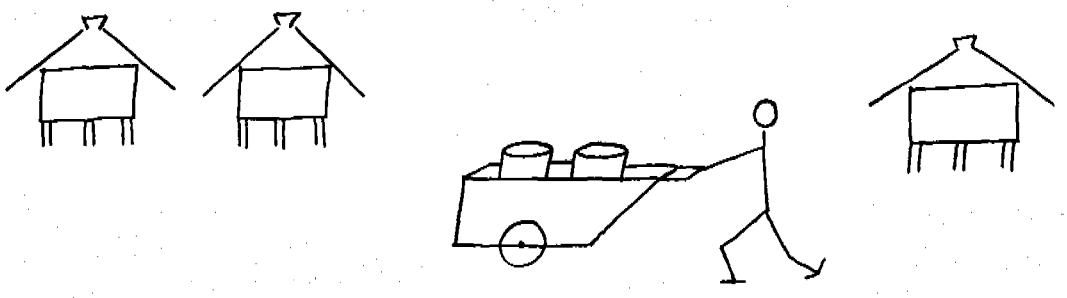
ANNEX 15 DRAWINGS CLARIFYING THE NEW SOLID WASTE SYSTEM FOR TINGLOY

1 PAGHIHIWA-HIWALAY NG BASURA SA BAHAY-BAHAY

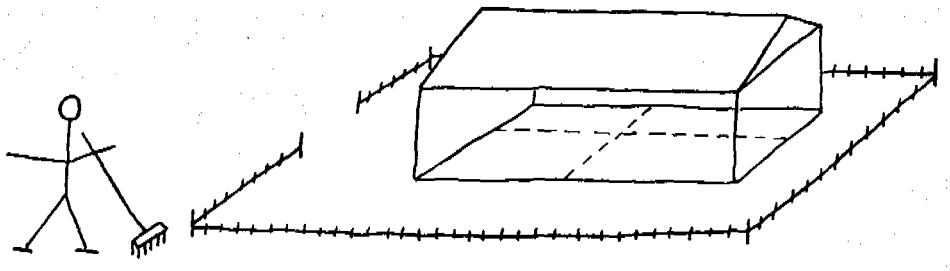


BASURA DI NABUBULOK

2 ARAW-ARAW NA KOLEKSYON NG BASURA (DI NABUBULOK)



3 PAMAMAHALA NG REDEMPTION CENTRE



ANNEX 16 PHOTOS OF TINGLOY

Photo 1 The dump site adjacent to the main road of Tingloy

Photo 2 The dump site situated in a precious mangrove area where currently all waste is discarded