



JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

METROPOLITAN MANILA DEVELOPMENT AUTHORITY (MMDA)
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS (DPWH)
THE REPUBLIC OF THE PHILIPPINES

THE STUDY ON DRAINAGE IMPROVEMENT IN THE CORE AREA OF METROPOLITAN MANILA, REPUBLIC OF THE PHILIPPINES

FINAL REPORT SUPPORTING REPORT *Volume III*



MARCH 2005

PACIFIC CONSULTANTS INTERNATIONAL
NIKKEN CONSULTANTS, INC



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BARANGAY SOLID WASTER MANAGEMENT PROGRAM

Barangay 195

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SOLID WASTE MANAGEMENT PROGRAM BARANGAY 195, MANILA

I. Introduction

Every year many areas of Metro Manila experience varying levels of flooding, bringing about economic damage, disruption of normal daily living activities and increased health related problems. The flooding is not only caused by the inadequacy of the drainage and sewerage system, but also by solid waste dumped in the water bodies. It is clearly visible that much of these solid wastes come from the informal settlement areas along the waterways. The situation is exacerbated by the inaccessibility of these areas to regular collection vehicles due to narrow alleys and congestion. This scenario is demonstrated by the presence of voluminous pile of garbage choking water bodies and drainage systems.

In its desire to address the problem, the Department of Public Works and Highways (DPWH) with assistance from the Japan International Cooperation Agency (JICA) is implementing the Drainage Improvement in the Core Area of Metropolitan Manila (DICAMM). The project covers 73 sq. kilometres consisting of 1,191 of the 1,693 barangays in Metro Manila of which 376 barangays are located along the esteros. One of the components of the Drainage Improvement Project is the Experimental Research on environmental management which include environmental concerns such as pollution control, solid waste management, beautification and greening. Three barangays have been chosen as pilot areas, namely, Barangay 46 of Pasay City which is located along Estero de Tripa de Gallina; across it is Barangay Palanan of Makati City which is the second pilot barangay, and Barangay 195, Manila which is along Estero de Maypajo.

Solid waste is a major concern of the three pilot barangays, adversely affecting the environment of each. Thus, the Solid Waste Management Program of Barangay 195 for 2005 is aimed at properly addressing the garbage problems of the community within the context of existing laws and regulations. The Solid Waste Management Program (SWMP) is prepared with the active participation of the community leaders. The program focuses in the improvement of the existing collection system as this function is the source of several pollution problems in the area. Furthermore, garbage collection is the most visible element of any solid waste management system to the public and the closest to the residents' daily activities.

The strategies and approach in the community-based solid waste management program are hinged on two underlying principles: solid waste management should be a shared responsibility between the government and the public; and, the sustainability of any community-based project can only be attained if there is support and participation of the residents of the concerned area. The strategies include organizational arrangement, capability building, intensive community organizing, public education and information campaign, monitoring and evaluation, and documentation and reporting.

II. About Barangay 195

1. Historical Background

In the 1940s, Barangay 195 was a part of Barangay Obrero. There were only five families and the total population was 20. The river was clean where several types of fish lived such as catfish, dalag, martiniko, and even shrimps. Beside the river was a spring that was a source of drinking water and other domestic uses. Because it was clean, it was also good for swimming. The river was also a channel for transportation particularly for boats and rafts.

Because of fear of the Huk Balahap, people from the provinces started to migrate to Manila in the early '50s. Means of livelihood varied from market vending, carpentry, painting houses, cantero and latero. In the 60's the number of migrants increased and peace and order became a problem. The river became polluted until it became not fit for drinking. Later, it also became not fit for laundry or swimming. Thus, water pumps were built by people. When the City Government learned about the problem in water supply, it facilitated the distribution by NAWASA. Another positive development during the period was the establishment of a primary school at Mr. Narciso Lim's residence.

Population continued to increase rapidly and the quality of the river also continued to deteriorate. Peace and order worsened. The Green Revolution Program was introduced which encouraged residents to plant vegetables, trees, ornamental plants in vacant lots. Martial law was declared and the throwing of the garbage into the river was minimized.

Life seemed to progress after the declaration of Martial Law. Many were able to attend school, houses improved; households were able to own their own vehicles and other material things. But many others got stuck in poverty. And while population increased, waste generation also increased.

2. Physical Profile

Barangay 195 has a land area of 1.24 hectares. Located in Zone 17, District II, City of Manila, it is bounded in the north by Barangay 194, in the south by Estero de Maypajo, in the east by Barangay 193 and in the West by Molave Extension and Marulas Street, Caloocan City.

3. Socio-Economic Conditions

The estimated population of Barangay 195 as of 2004 is 1,800 with 344 households. Fifty-five percent of the population belong to the low income group, 25% to the middle income group and 20% to the high income group. Almost all the land area, 98%, is residential. Commercial and agricultural land uses have 1% each.

The cultural practices of the residents include supernatural beliefs such as the appearances of "white lady," and "kapre" in the barangay. Activities were limited to annual holding of *fiestas* and *pabasas* both with religious orientations.

The City Government has organized the women (Kababaihan) in the barangay. The youth on the other hand, are organized for the annual sports fest dubbed as Palarong Barangay Liga while the senior citizens have a program of their own. The pre-school children are provided a

Day Care Center while the barangay officials are provided continuing education through training seminars.

The birth rate in the barangay is -7% while the mortality rate is also -2%. Common health problems in the barangay are asthma, pneumonia, chicken pox, sore eyes and skin allergy. The barangay from its budget spends P3, 000.00 to P5, 000.00 annually for its nutrition program. It maintains one health facility which is the Barangay Health Center.

As regard sanitation, the residents along Estero de Maypajo, threw their garbage into the estero prior to the introduction of the Experimental Research for the Drainage Improvement in Metro Manila. Garbage Collection services are provided by the City collection trucks daily except Sunday.

Water supply in Barangay 195 is provided by the Metropolitan Waterworks and Sewerage System (MWSS). As to sewage and toilet facilities, 60% of the households have septic tanks and 40% use the estero. Electricity is supplied by Meralco.

The J. Trinidad is a very narrow, but paved alley that no regular vehicles can get in there. People go there on foot from Tabora and Limay Streets and Molave Extensions. The three main roads are open and accessible to public utility jeeps, private cars and tricycles. The streets are all paved with concrete. Narra Street, the space in front of the Barangay Hall is a paved street beside the *Iglesia ni Cristo* that has various uses such as parking area, car repair area, basketball court, bird house occupying about 20 sq. m area, food vendors and playground for children.

Recreational activities in the area are limited to basketball and badminton.

To maintain peace and order, *Barangay Tanods* roam around at night together with some barangay officials and make their best efforts to implement existing barangay ordinances.

Environmental Conditions

The water in the Estero de Maypajo is not clean but there are still various kinds of fish that survive such as tilapia, gurame, martiniko, dalag, biya, and hito. There are trees and plants that grow around such as guava, tamarind, santol, aratilis, star apple, bougainvillea, ornamental plants, balete and coconut.

In the neighborhood, edible plants are grown such as okra, *camote* tops, ampalaya, upo, patola, eggplant, tomatoes, papaya, ginger, onions, *camote* and baging. There are also birds and animals that such as maya, love birds, parrots dogs cats, ducks, iguana and monkey.

III. Existing Solid Waste Management System

Street Sweeping and General Cleanliness

The Barangay Government has designated a man to sweep the streets regularly with a quarterly allowance of P1, 500.00. Residents also help in sweeping particularly the frontage of their residents. However, the cleanliness of J. Trinidad Alley (between Molave and Limay Streets) and Narra Street (beside *Iglesia ni Cristo* Church fronting Barangay Hall up to

Molave Extension) are difficult to maintain. J. Trinidad is a very narrow alley, about 1.5 m wide where children play and incessantly throw just anywhere the wrappers of candies and foods including into the drains. And animal droppings are a common sight. On the other hand, Narra Street (two lane street) is a free for all space where activities such as basketball, car repair, playground of other youngsters from adjacent barangay and sidewalk vending are done, thus, characterized as littered and cluttered, also used privately as a stock room of different types of caged birds.

Storage and Segregation at Source

At J. Trinidad Alley, residents store their garbage in *sando* plastic bags and hang these at the wall of their houses. Normally, the type of garbage stored here are contaminated dry materials and candy/biscuit wrappers. The kitchen or food wastes are immediately fed to pet dogs, cats or chicken. Other types of storage devices used include milk cans not necessarily lined with plastic placed along the alley near the door of the resident who have placed it there. The garbage that are placed in the bins or *sando* bags are residual waste. The recyclable materials are accumulated and individually sold to the junkshops in the nearby barangays. In front of the Barangay Hall, beside the fence of the Iglesia ni Cristo, one roller bin (as a communal storage device) is placed for the ready use of the residents

Garbage Collection

Along the J. Trinidad Alley, two small metal pushcarts are used to collect and transport collected garbage to the ends of the alley-one, to Limay Street, the other, to Molave Extension where the LGU truck collects everyday from 6:00 A.M to 8:00 AM.

At Narra Street, the Street Sweeper takes the plastic roller bin (full of garbage) to the collection point along Tabora where the LGU truck collects everyday from 6:00 AM to 8:00 AM.

Transport and Disposal

The LGU truck takes the collected garbage to the Pier Transfer Station. Via barge, the garbage is disposed at the Tanza-Navotas Controlled Dumpsite which is owned by the Navotas LGU and operated by a private company. MMDA pays the tipping fees of the garbage taken to this disposal facility by the LGUs. *Figure 1* shows the flow of garbage in Barangay 195.

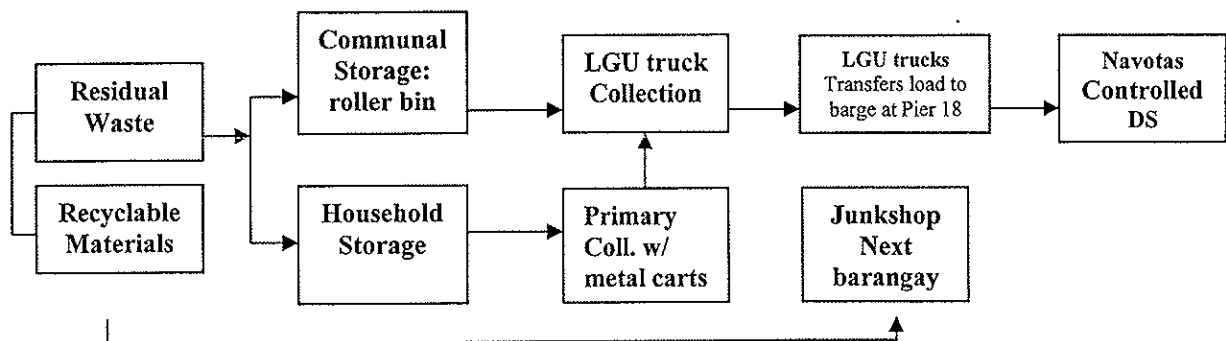


Figure 1. Garbage Collection Flow in Barangay 195, Manila

IV. Solid Waste Management Problems and Issues

In a workshop using the SWOT analysis, problems related to solid waste management have been identified. Other problems have been identified through site inspections and consultations with the residents of the area. The issues and problems are grouped into the following:

1. Knowledge and Attitude

- While the residents in the area know and understand about the benefits of proper solid waste management, many are inconsiderate and do not want to cooperate in the maintenance of cleanliness in the area;
- Many residents are lazy and complain a lot about barangay projects;
- Some residents have a *ningas cogon* attitude.

2. Practices

- Children just keep on throwing wrappers of candies anytime and along the Trinidad Alley. Even if housewives keep on sweeping, the alley just keep on becoming dirty because the children are difficult to discipline.
- Litters particularly plastic food wrappers, are sometimes stuck in the drains;
- Some residents keep chicken and pet dogs on the sides of the houses along the alley so that animal droppings are just anywhere;
- Because the Estero de Maypajo is just behind the houses, it is convenient for some residents to throw the garbage there.

3. Equipment and Supplies and Others

- The metal pushcarts that are used to collect garbage from the households and take them to the ends of the alley (Limay and Molave Streets) are both broken.
- The Barangay does not have enough supplies of broom sticks, dust pans, storage and storage bins.

V. Goals, Objectives and Targets

The ultimate goal of the solid waste management system that will be put in place is to keep the waterways free flowing so that flooding will be minimized and the daily lives of the people will not be adversely affected.

The objectives are as follows:

- Improve the collection system;

- Ensure a sustained implementation of the barangay solid waste management program which is focused on efficient door to door collection and waste reduction;
- Promote public participation through continuing education and information dissemination

The targets are as follows:

- Maintain satisfactory level of cleanliness;
- Achieve 75% household participation in segregation at source;
- Reduce the amount of solid waste by 10% in one year;
- Produce and distribute at least four types of IEC materials before the end of the year.

VI. Barangay 195 SWM Program

1. SWM Framework

A previous study shows that of the total waste generated in Metro Manila about 24% (MMDA-JICA, 1997) are not collected. The uncollected amount of waste end up in water bodies such as the esteros, rivers, and drainage systems that causes clogs and floods and most of these are produced by informal settlers in unplanned areas where road networks and alleys are narrow, and residential structures are congested. There are very visible indications that this problem remains in many areas in Metro Manila, including Barangay 195. Barangay 195, particularly along the J. Trinidad Alley, is a congested informal settlement area that lies along the stretch of Estero de Maypajo. The basic characteristic of the area suggests the need for an improved system of collection including other support activities to ensure sustained implementation. The Solid Waste Management Program should take into consideration the provisions of Republic Act 9003 or Ecological Solid Waste Management Act of 2000, specifically the implementation of segregation at source and separate collection for the different types of solid waste in line with the diversion goal of 25% in five years from the time RA 9003 has become effective. Further, to be taken into consideration is the implementation of an MMDA Resolution regarding Unified Approach on SWM. This resolution focuses on door-to-door collection particularly in inaccessible areas along the waterways. The door-to-door collection system is also a tool to effectively implement the collection of source segregated waste.

2. SWM Operations Flow

Table 1 shows the flow of the collection system based on the type of solid waste collected from the households.

Table 1. Solid Waste Management Operations Flow

1 →	2 →	3 →	4 →	5 →
Waste Generation	Storage/or activity at household level	Primary Collection	LGU Collection	Destination
Biodegradable Waste:	Plastic bag or bin; immediately fed to	Daily, 6:00-8:00 A.M., door-to-door	LGU truck collects the load of the roller bins	Taken by LGU truck to Tanza,

kitchen waste	household pets and animals like cats, chicken, dog and hogs.	collection with the use of plastic roller bins ;	from the collection point daily at 8:00 A.M	Navotas Controlled Dumpsite
Recyclable Items	Sando Bags	(Residents sell their recyclable materials directly to the junkshops)		Junkshop/Junk buyers
Residual Waste	Sando plastic bag or any container	Included in the collection of biodegradable waste daily.		Taken by LGU truck to Tanza, Navotas Controlled Dumpsite

3. Waste Generation

The estimated population of Barangay 195 is 1,800. The population produces some 711 kilograms of garbage daily (projected from the 1997 MMDA-JICA Study). More than half or 52% is biodegradable and 41% is recyclable. There are other 7% that can be classified as residual waste. *Table 2* below shows the composition of solid waste in Barangay 195, Manila City.

Table 2. Waste Composition, Barangay 195, City of Manila

Type of Waste	Percentage	Type of Waste in kgs/day
Kitchen Waste	45%	320
Yard Waste	7%	50
Paper	17%	121
Plastic	16%	66
Metal	5%	36
Glass	3%	21
Residual/others	7%	50

Biodegradable waste refers to kitchen and garden waste; dry recyclable items include the different types of paper (old newspaper, old corrugated cartons, office white paper and mixed waste) different types of plastics such as PET plastics or mineral water bottles and *sibak* or assorted plastics. Metals include iron, aluminium cans and tin cans while glass includes whole glasses such as soft drink bottles, liquor and alcohol, medicine bottles. From time to time, some items may not be traded or new items under the four categories of dry recyclable items may suddenly be included in the market. Others or residual wastes are those that may no longer be recyclables. In most cases, these are recyclable items but may be contaminated or too expensive to recover and process like the polystyrene materials under the classification of plastics.

4. Storage and Segregation at Source

As provided by RA 9003, segregation at source or at household level is mandatory which should be implemented by the Barangay Solid Waste Management Committee chaired by the Barangay Chairman. This requires different containers to be used. Normally, paper is segregated from the other recyclable materials to prevent it from getting soiled. Plastics,

glasses and other food containers should be washed before they are stored prior to the collection by the primary collector.

While other communities may opt to use color coded plastic bags for the three different types of garbage, sando plastic bags are practical devices to store clean and dry recyclable materials and biodegradable materials (but separately) at household level.

For a community-based storage device, one unit of metal storage bin (Satobin) shall be constructed to test its efficiency. Plastic roller bins and pushcarts will be provided not only to collect from the areas but also to store the collected waste.

5. Collection System

There are two levels of collection:

- Primary collection with the use of roller bins, and
- Secondary collection with the use of the big collection trucks of the local government unit.

The improved collection system for Barangay 195 is concentrated along the J. Trinidad Alley and Narra Street. Two roller bins shall be used instead of the metal pushcart to save space because the bins are vertical. One bin shall collect from a number of houses towards one end – Limay Street, the other, towards the end of Molave Street where the LGU truck collects every 6:00-8:00 daily. Those stored in the two roller bins beside the Iglesia ni Cristo shall be taken to Tabora Street, the same time every day for the time of collection of the LGU truck.

Table 3. Collection Route and Schedule

Collection Routes	Collection Equipment	Time
1. J Trinidad towards Limay Street	Roller bin	6:00 A.M. – 8:00 A.M. Daily
2. J. Trinidad towards Molave Ext.	Roller bin	6:00 A.M. – 8:00 A.M. Daily
3. Narra Street towards Tabora Street	Satobin (with rollers)	6:00 A.M. – 8:00 A.M. Daily

Figure 2 shows the garbage collection route of Barangay 195.

6. Materials Recovery Facility

A Materials Recovery Facility (MRF) is a recycling center to process and store dry recyclable materials prior to selling. It may also process biodegradable waste into compost or organic fertilizer. Barangay Officials are required by law to put up a MRF in their respective jurisdiction. In the absence of an area, clustering is recommended.

In the case of Barangay 195, no MRF is going to be constructed or clustered with. Instead, the residents are going to directly take their recyclable materials to nearby junkshops.

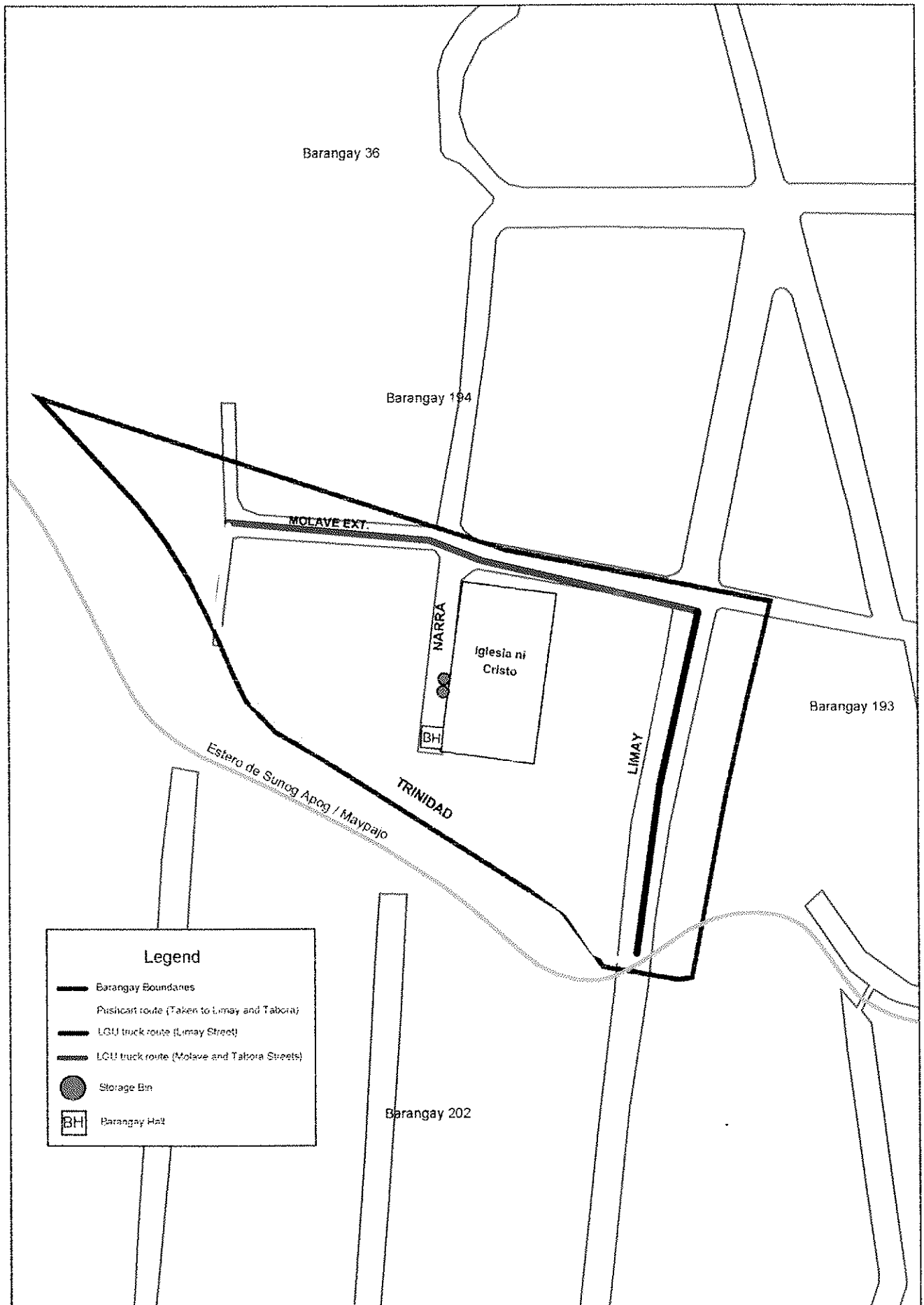


Figure 2. 2005 Garbage Collection Route of Barangay 195, Manila

VII. SWM Strategies

1. Organizational Arrangement

Anchored on intensive community organizing, the planning and implementation of the Solid Waste Management Program require human resources. The following groups are organized according to their functions. It is noted that the new organization is an additional grouping as there are already at least 40 committees in each barangay in the country.

- The constitution of the Barangay Solid Waste Management Committee (BSWMC) is mandated by RA 9003. It is headed by the Barangay Chairman with eleven members. It is tasked to formulate the Barangay Solid Waste Management Program consistent with the 10-Year SWM Plan of the LGU or City of Manila.
- Organization of the Core Group. The Core Group serves as the technical working group of the BSWMC. It assists not only in the formulation of the BSWM Program, but also in its implementation. In the case of Barangay 195, the Core Group composed of community leaders is organized under the name, BEM-ESTERO (Barangay Environmental Management-Environmental Strategic Task for Estero Renewal Organizing) Team headed by a BEM or a Barangay Environmental Manager (who is not the Barangay Chairman). In the implementation of the Barangay SWM Program, the Barangay SWM Committee may function as a supervising group to the BEM and ESTERO Team.
- The Street Leaders assist the Core Group in the implementation particularly in the dissemination of information and/or distribution of materials. The street leaders serve as monitors regarding level of cleanliness, among others. In the case of Barangay 195 there are no identified Street Leaders. However, to support the BEM ESTERO Team, a group of elementary children has been organized. The name of the group is tentatively named Basura Rangers.
- Basura Rangers is a group composed of 12 elementary children whose ages range from 8 to 12 years old. Two young male adults are included in the group to serve as their Team Leaders. Initially, the task of the group is to remind their playmates to throw their candy wrappers in the storage bags or bins along J. Trinidad Alley and Narra Street (*Note: the organization of the group is dependent on the approval of the parents of the children*).

2. Capability Building

The human resources organized to formulate plans and execute certain activities to meet the objectives of the project needed to be trained. Training needs are assessed. A shopping list of the basic subjects which the committees, groups and community leaders should be trained or oriented with are the following: Understanding garbage: its source, amount generated by each person, problems associated with and impacts of improper management of garbage, benefits of properly managed solid waste; functional elements of solid waste management; hierarchy of practices in solid waste management; SWM in Metro Manila; barangay concerns in RA 9003; door-to-door collection; facilitation techniques; presiding meetings; preparation of minutes; MRF housekeeping and operations; recording, monitoring, documentation and reporting. The capability building activities may be done through

consultation meetings, lectures, orientations, seminars and workshops, study tours, mentoring and learning by doing.

3. Public Education and Information Dissemination

It is important to educate and inform the public about the project and instruct them on what to do if only to solicit their support and participation and make them realize their responsibility in solid waste management. It is also important to provide the public a feedback on the performance of the project so that they become a part of the whole process of proceeding and improving. Public education and information dissemination should not be treated as a one shot deal in the project. A schedule of issues/concerns, messages and media should serve as a guide in the implementation of a public education program.

Table 4. Public Education and Information Implementation Schedule

Issues and Concerns	Messages	Media	Schedule
1. <ul style="list-style-type: none"> Residents are not aware of the SWMP in the barangay; or Lack appreciation of the community problems in relation with SWM, Residents do not know what to do with their garbage 	<ul style="list-style-type: none"> SWM problems in the community; Introduction of the SWMP including provisions of RA 9003 relevant to the barangay; Instructions on how to store and segregate waste, and Schedule of collection 	Flyer : 1500 copies <ul style="list-style-type: none"> House to house campaign by the BSWMC and Barangay Council; BEM ESTERO; Homeowners Association Coordinators 	<ul style="list-style-type: none"> After formal entry in the project site or during the project launching to kick-off program implementation
2. Residents lack the visual knowledge on the types of recyclable items.	<ul style="list-style-type: none"> Photos of dry recyclable materials 	Flyer: 1500 copies	<ul style="list-style-type: none"> Distributed after program introduction.
3. Residents are not aware of how the progress of the program. going	<ul style="list-style-type: none"> Project Update: community participation, level of cleanliness, MRF performance reduction. 	Flyer: 1500 copies	<ul style="list-style-type: none"> Should be issued every month or every two months
4. How to do backyard or household composting	Backyard or Household composting	Flyer: 1500 copies	<ul style="list-style-type: none"> To be issued once during the project implementation (optional)
5. Level of household	<ul style="list-style-type: none"> Program status; Announcement of 	Flyer : 1500 copies	<ul style="list-style-type: none"> Issuance is staggered based

participation is low.	incentives such as: <ul style="list-style-type: none"> The project will buy the recyclable items from the households; Recognition of participation. 	<ul style="list-style-type: none"> Letter and House Sticker: 1200 copies 	on the monitored performance of the households.
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4. Monitoring and Evaluation

The level of cleanliness and the amount of recyclable materials recovered are the basic gauge that measures the efficiency of the collection system reflecting not only the performance of the change agents involved but also the impact of the public education and information campaign. The conduct of monitoring and evaluation should be periodic.

4.1 Level of Cleanliness

The most visible result of solid waste management in a given area or community is the level of cleanliness measured by the presence or absence of garbage on the streets, sidewalks, frontage of households and structures, canals, vacant lots and waterways. The monitoring checklist on *Table 5* provides a count of occurrences of things that make the area dirty. The score at the rightmost column shows the items that are prevalently seen in each street. Thus, based on the sample filled out monitoring checklist, the most common problem in the barangay is the presence of litter (litter is defined as one liter of garbage that is scattered) followed by animal droppings (dogs, rooster). The bottom score indicates the total number of occurrences in the area. The higher the score, the dirtier the area, thus, the scores can be compared to show which street is the dirtiest. In the sample checklist (*Table 5*) presented, the dirtiest street is Narra Street. On *Table 6*, the total score of 12 is considered Delightfully Clean.

Table 5. Sample Filled-out Monitoring Checklist on Level of Cleanliness

What can be seen in the area or street	<u>Route 1</u> J. Trinidad to Limay	<u>Route 2</u> J. Trinidad to Molave Ext.	<u>Route 3</u> Narra Street	Score
1. Litter	1	2	2	5
2. Piles or scattered garbage	0	0	0	0
3. Garbage bins w/o cover	0	0	0	0
4. Bins w/ overflowing garbage	0	0	0	0
5. Canals or drains with litter/garbage	1	0	0	1
6. Animal dropping	2	1	1	4
7. Junk vehicles	0	0	1	1
8. Bulk waste or construction debris	0	0	1	1
9. Soil/Sand mounds	0	0	0	0
10. Floating garbage along estero	0	0	0	0
TOTAL SCORE OF AREA	4	3	5	12

Note: The scoring system may be fine tuned after initial implementation and evaluation.

Table 6. Evaluation of Level of Cleanliness and Orderliness

Level	Score	Description
5	0	Sparkling Clean
4	1-25	Delightfully Clean
3	26-50	Satisfactorily Clean
2	51-75	Dirty Ugly Area
1	76 and more	Yucky Area

4.2 Waste Diversion

RA 9003 has set the target of 25% diversion goal in five years or starting from the time the law became effective. This will be in 2006.

The diversion target set for this program is 10% by 2005. Measurement of the recovered amount will be based on the recyclable materials delivered to the MRF and/or sold to Junkshop buyers.

This will be achieved through the implementation of segregation at source and separate collection.

4.3 Frequency of Collection

As already programmed or determined, the frequency of collection by the primary collectors in the designated routes shall be recorded and evaluated against the agreed schedule. An easy-to-fill up form shall be used to record data.

Likewise, the frequency of collection of the secondary collectors (LGU) shall also be recorded and evaluated against agreed schedules.

The impact of the actual frequency of collection on the level of cleanliness and waste reduction shall be evaluated.

5. Documentation and Reporting

Documentation entails the recording of events in the form of minutes of meetings, attendance sheets, receipts, field inspection reports, photo documents, chronology of events and regular reports. The records store the "story" of the project that provides the lessons that may help in assessing what practices are effective that may be worth replicating in other similar situations.

VIII. Equipment and Supplies Requirement

The metal pushcarts of the barangay are broken and would need repair. However, it was decided upon by the Barangay Chairman that roller bins (also handcarts) may instead be used so that space will be saved when parked. These bins can also be used as communal storage devices that can be readily used by the residents while parked along the alley. It can also transport the accumulated waste to the ends of the alley on time for the arrival of the LGU truck. Since these are plastic, they can be easily washed. The Satobin, on the other hand is

a metal roller bin that will be stationed at Narra Street It is a communal storage device that can also be used to transport the garbage to the pick up point when the LGU truck arrives. *Table 7* lists the materials and supplies required in the activities.

Table 7. List of Supplies and Equipment

Items	No. of Units	Source
Satobin	1	Jica
Dustpan	2	Jica
Roller bins	3	Jica
Gloves	10	Jica
Boots	5	Jica
Water pails	2	Jica
Stick brooms	10	Jica
Shovels	2	Jica
Rakes/kalaykay	2	Jica

IX. Action Plan

Table 8. Schedule of Implementation

Activities	Schedule
1. Formal Entry	May 26, 2004
2. Organization of Working Group: BEM-ESTERO, HOA Coordinators	June 2004
3. Constitution of the Barangay Solid Waste Management Committee	December 2004
4. Planning Workshops	June-August 2004
5. Preparation of the BSWMP (including approval of the Barangay Council)	December 2004
6. Preparation of IEC Materials	December 2004
7. Launching Activity/Clean up day including distribution of initial IEC Materials	January 2005
8. Implementation	February 2005
9. Monitoring and Evaluation	February and onwards
10. Conduct of Survey to determine knowledge, attitude, practice and level of participation	June 2005

Chronology of Activities of Experimental Research

Barangay 195, Manila City		
Date	Title	Place
May 26	Explanation Experimental Research to Manila City Government	Manila City Hall
May 31	Explanation of Experimental research to Brgy. 195	Brgy. 195 Hall
June 9	Data Gathering - Barangay Profile	Brgy. 195 Hall
June 12-14	Training Program for BEM and Team ESTERO	Great Eastern Hotel and Aberdeen Court, DPWH Central, Tripa de Gallina Pumping Station, Calatagan Creek, Brgy. 24 South Cembo, Estero de Tripa de Gallina, Pier 17 Dumpsite
June 19	Site Inspection	Barangay 195
June 26	Training Workshop for BEM and Team ESTERO	Executive Plaza Hotel, Malate, Manila
July 5	Stakeholder Analysis and SWOT Analysis Demonstration	Brgy. 195 Hall
July 24	Lecture on Waste Segregation and R.A. 9003	Jollibee, Abad Santos corner Hermosa Branch, Manila
August 5	Following-up of Program Proposals for each Focal Point (SWM, Beautification and Greening, Pollution Control, and IEC)	Brgy. 195 Hall
August 19	IEC Workshop	Brgy. 195 Hall
September 9	Monitoring	Barangay. 195
October 16	Presentation General Rehearsal	Barangay Palanan Hall, Makati
October 19	Presentation Final Rehearsal	Brgy. 195 Hall
October 22	2 nd Barangay Cluster Workshop	Traders Hotel, Manila
October 27	Site Visit	Barangay. 195
November 4	Surprise Site Inspection	Barangay. 195
December 8	Evaluation Monitoring – Knowledge, Attitude, and Practices Survey for BEM-ESTERO Team	Brgy. 195 Hall
January 15	Site Visit	Barangay. 195
January 22	Site Visit	Barangay. 195
January 29	Brgy. 195 Children's Participation in the Experimental Research (Orientation-Seminar)	Barangay. 195

EXPERIMENTAL RESEARCH FOR DRAINAGE SYSTEM IMPROVEMENT IN THE CORE AREA OF
METROPOLITAN MANILA

Barangay Profile
Barangay 195, City of Manila

1. History

YEAR	EVENTS
1940-1950	<ul style="list-style-type: none"> ➤ Barangay 195 was part of Barrio Obrero, by the boundary of Caloocan, Manila ➤ The land area was around 1.24 hectares ➤ The settlers were only five families totaling a population of 20 ➤ The river was clean that it can be swam into, potable, and vegetables and banana trees were planted ➤ Beside the river is a spring where water was being used for drinking and other domestic uses ➤ Varieties of fishes were present like catfish, dalag, martiniko, and even shrimps ➤ The means of transportation were boats and rafts
1951	<ul style="list-style-type: none"> ➤ People from provinces migrated to Manila because of fear of the Huk Balahap ➤ Livelihood were market vending, cantero, capentry, painting (houses/buildings), and latero
1960	<ul style="list-style-type: none"> ➤ Due to continuous increase of migrants, peace and order became a problem ➤ The river was not anymore useful for recreation, laundering, and drinking ➤ Plants, fishes and birds were decreasing in number ➤ A primary School was put up at Mr. Narciso Lim's residence/Health Center in Barrió Obrero
1961-1970	<ul style="list-style-type: none"> ➤ Due to the river was not usable anymore, pumps were built by people ➤ When the City Government learned the lack of water supply in the area, NAWASA was installed
1971-1980	<ul style="list-style-type: none"> ➤ The population is continuously growing and the river was becoming nonfunctional ➤ Peace and order became worse ➤ Due to absence of peace and order, Martial Law was declared by President Ferdinand Marcos on September 21, 1972 ➤ Under Martial Law, Green Revolution came into existence, which taught the people to plant trees, and throwing of garbage in the river was minimized
1981-1990	<ul style="list-style-type: none"> ➤ Life progressed <ul style="list-style-type: none"> - many were able to attend school - houses were fine - households were able to afford their own vehicles and other materials - population increased continuously, as well as the waste generation - due to poverty, several were also not able to finish school, awareness in solid waste management and their own livelihood became their priority

2. Physical Profile

2.1 Geography

2.1.1 Location

- Zone 17, District II, City of Manila

2.1.1.1 Boundaries

- ❖ North - Barangay 194
- ❖ South - Estero de Maypajo
- ❖ East - Barangay 193
- ❖ West - Molave Extension and Marolas Street, Caloocan City

2.1.2 Land Area

- 1.24 hectares

3. Organizational Structure

3.1 Administrative Services

3.1.1 Barangay Council

Hon. Nestor Ereño	- Barangay Chairman
Hon. Carolina G. Alvarez	- Barangay Kagawad
Hon. Felman Magsangkay	- Barangay Kagawad
Hon. Myrna P. Cacho	- Barangay Kagawad
Hon. Pacita N. Paras	- Barangay Kagawad
Hon. Sonny O. Reyes	- Barangay Kagawad
Hon. Geraldo A Godoy	- Barangay Kagawad
Hon. Orlando Reyes	- Barangay Kagawad
Ms. Vilma C. Nonles	- Barangay Secretary
Mr. Jun T. Dee	- Barangay Treasurer

3.1.2 Barangay Tanod

Mr. Nestor Domingo (Ex-O)
Mr. Joseph Bayna
Mr. Miguel Nonles
Mr. Edgar N. Ilagan
Mr. Albert Eslira
Mr. Jaime Grienso
Mr. Benjamin Alvarez
Mr. Rodolfo dela Cruz
Mr. Robert Gonzales
Mr. Romeo dela Cruz
Mr. Maximo dela Cruz
Mr. Rodrigo Mabanag
Mr. Cesar Cacho
Mr. Cesar Rivera
Mr. Diosdado Esmas

3.1.3 Lupon

Mr. Wenceslao Villanueva
Mr. Aldo Rye Ilagan
Mr. Mario Villanueva
Mr. Rodolfo Estrabella
Mr. Joel Rivera
Mr. Danilo Gargantilla
Mr. Crispin Rivera
Mr. Severino Reyes
Mr. Miguel Nonles

Mr. Francisco Cirera
Mr. Benjamin Roque

3.1.4 Barangay Environmental Manager

Mr. Francisco Cirera

3.1.4.1 Team ESTERO (Environmental Strategic Task for Estero Renewal Organizing) Members

Mr. Severino Reyes
Ms. Rosalinda Antonio
Ms. Analiza Lao
Mr. Lucio de Guzman, Jr.
Mr. Joseph Bayna
Ms. Jean Rosas
Ms. Arlene Bautista

3.2 Budget and Expenditures

- o *Please see attachment*

4. Socio-economic Conditions

4.1 Population

- o 1, 800 (as of 2004)

4.2 Number of Households

- o 344 households

4.3 Income Level Population

- o High Income Level - 20% (360)
- o Middle Income Level - 25% (450)
- o Low Income Level - 55% (990)

4.4 Land Use

- o Residential - 98%
- o Commercial - 1%
- o Agricultural - 1%

4.5 Social Environment

4.5.1 Cultural Practices

- White lady
- Tiyanak
- Kapre
- Fiestas
- Pabasa

4.5.2 The Roles of Women, Youth, and Elderly

4.5.2.1 Women

- ❖ *Women-Kababaihan* by Mayor Lito Atienza

4.5.2.2 Youth

- ❖ Palarong Barangay Liga

4.5.2.3 Elderly

- ❖ Senior Citizen Program

4.5.3 Education

- Day Care Center
- Seminar of Barangay Officials with P42, 000.00 budget

4.5.4 Health

4.5.4.1 Birth Rate - 7

4.5.4.2 Mortality - 2

4.5.4.3 Morbidity

- ❖ Asthma
- ❖ Pneumonia
- ❖ Chicken Pox
- ❖ Sore Eyes
- ❖ Skin Allergy

4.5.4.4 Nutrition

4.5.4.4.1 Nutrition Program

- P3,000.00 to P5,000.00 budget for malnutrition

4.5.4.5 Health Facilities

- ❖ Barangay Health Center

4.5.5 Sanitation

4.5.5.1 Solid Waste Management

- ❖ Before the Experimental Research for DICAMM, the residents along the estero throw their garbage in the estero
- ❖ Garbage collection is being done by the Manila City Truck/Leonel daily, except Sundays, during the morning without certain time
- ❖ The garbage from the residents along the estero are being collected by the barangay-assigned collector, which are being brought to Trinidad Street (east); the residents take their garbage out from 6:00 a.m. to 8:00 a.m.
- ❖ The rest of the residents, especially near the roads, simply bring out their garbage whenever the Manila City Truck arrives

4.5.5.2 Water Supply

- ❖ MWSS (Metropolitan Waterworks and Sewerage System)

4.5.5.3 Sewage and Toilet Facilities

- ❖ 60% Septic Tank
- ❖ 40% Estero

4.5.6 Community Infrastructure

4.5.6.1 Transportation

- ❖ Public Utility Jeeps
- ❖ Private Cars
- ❖ Tricycles
- ❖ Bikes

4.5.6.2 Electricity

- ❖ Meralco

4.5.6.3 Recreation

- ❖ Basketball
- ❖ Badminton

4.5.7 Peace and Order

- Barangay Officials
- Barangay Tanod

5. Environmental Conditions

5.1 Water Environment

5.1.1 Esteros

- Fishes like tilapia, gurame, martiniko, dalag, biya, hito
- Plants like guava, tamarind, santol, aratilis, star apple, bougainvillea, ornamental plants, balete, coconut

5.1.2 Drainage System

- Main drainage pipes

5.2 Land Environment

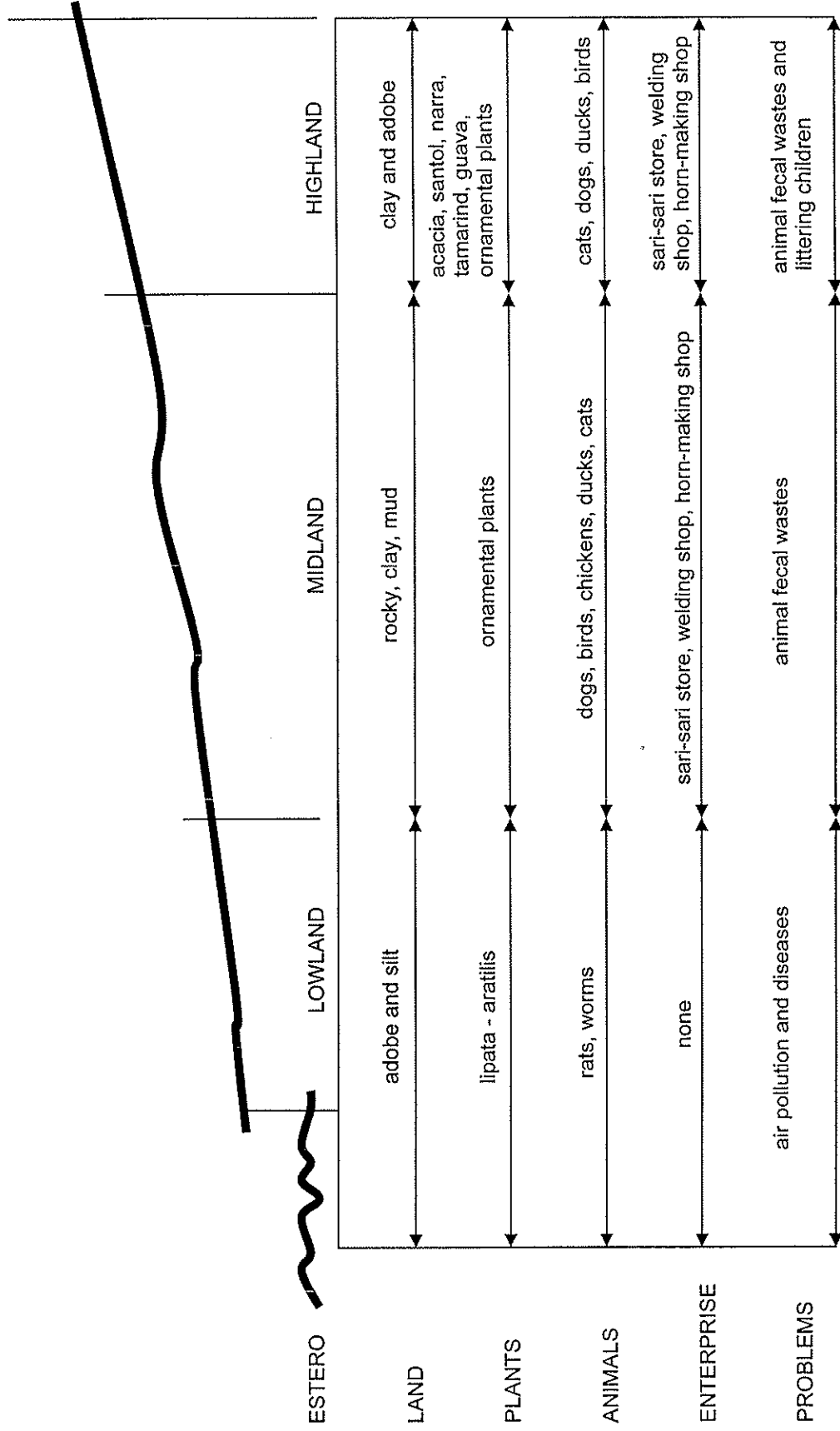
5.2.1 Vegetation

- Okra
- Camote tops
- Ampalaya
- Upo
- Patola
- Eggplant
- Tomatoes
- Papaya
- Ginger
- Onions
- Camote
- Baging

5.2.2 Birds and Animals

- Maya
- Lovebirds
- Parrots
- Dogs
- Cats
- Iguana
- Monkey

BARANGAY 195, CITY OF MANILA TRANSECT MAP



JICA - DPWH - MMDA Team & BARANGAY

BUDGET AND EXPENDITURES BARANGAY 195, ZONE 17, DISTRICT II FOR CY 2004

A. PERSONAL SERVICES			P <u>332,000.00</u>
1. Salaries and Wages (Casuals / Contractuals)			P 69,000.00
Allow. of Streetsweeper (1) @	500.00 ea./mo. P	6,000.00	
Allow. of Tanod Members (15) @	350.00 ea./mo. P	63,000.00	
2. Honoraria			
Basic (11)			P 84,000.00
Additional (11)			P 119,336.00
Chairman	13,162.00	/annum	
10 Members	106,174.00	/annum	
3. Cash Gift @ P5,000.00 each (11)			P 55,000.00
4. Other Personnel Benefits			
Hospitalization & Medical Laboratory Expense			P 5,000.00
B. MAINTENANCE AND OTHER OPERATING EXPENSES			P <u>146,473.00</u>
1. Travelling Expenses - Local			P 18,000.00
Chairman	P	13,000.00	
Treasurer	P	5,000.00	
2. Training and Seminars Expenses			P 30,000.00
Human Resource and Development Program	P	30,000.00	
3. Office Supplies Expense Cert., Letterhead, Record Book etc.			P 10,000.00
4. Other Supplies Expenses			P 53,000.00
Nutrition Quaker Oats, Milk, Lugaw & etc.	P	3,000.00	
Uniform - Uniform of Barangay Officials	P	15,000.00	
Peace and Order Supplies - Vest, T-Shirt & etc.	P	20,000.00	
Electrical Supplies - Elec'l Wire, Bulb, Tape & etc.	P	5,000.00	
Christmas Decoration	P	10,000.00	
5. Electricity			P 5,000.00
6. Membership Dues and Contribution to Org. - Annual Dues			P 2,000.00
7. Repair & Maintenance - Cleaning of Drainage (Declogging)			P 20,000.00
8. Fidelity Bond and Premium - Bonding of Chairman and Treasurer			P 1,500.00
9. Other Maintenance and Other Operating Expenses			P 6,973.00
Other Expense	P	3,973.00	
Installation of Electric Meter	P	3,000.00	
C. CAPITAL OUTLAY			P <u>20,000.00</u>
Other Property Equipment - 1 unit Equilizer	P	10,000.00	
1 unit Amplifier	P	10,000.00	
D. STATUTORY AND CONTRACTUAL OBLIGATIONS			P <u>218,653.00</u>
1. 20% Community Development Fund			P 112,416.00
Estero Canal Declogging	P	20,000.00	
Repair & Maint. of Streetlights	P	68,000.00	
Clean and Beautification Program	P	24,416.00	
2. 10% Sangguniang Kabataan			P 71,671.00
Unprogrammed	P	70,238.00	
2% Annual Dues	P	1,433.00	
3. 5% Calamity Fund			P 34,566.00
TOTAL:			P <u>717,462.00</u>

Certified Correct:


NESTOR ARENO
 Chairman

**Experimental Research for the Study on Drainage Improvement in Core Area of
Metropolitan Manila**

Barangay Council of Barangay 195, City of Manila

Hon. Nestor Ereño	- Barangay Chairman
Hon. Carolina G. Alvarez	- Barangay Kagawad
Hon. Felman Magsangkay	- Barangay Kagawad
Hon. Myrna P. Cacho	- Barangay Kagawad
Hon. Pacita N. Paras	- Barangay Kagawad
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Hon. Orlando Reyes	- Barangay Kagawad
Ms. Vilma C. Nonles	- Barangay Secretary
Mr. Jun T. Dee	- Barangay Treasurer

**Experimental Research for the Study on Drainage Improvement in Core Area of
Metropolitan Manila**

The BEM-ESTERO Team of Barangay 195, City of Manila

Barangay Environmental Manager: Francisco E. Cirera

Team ESTERO: Severino C. Reyes
Rosalinda F. Antonio
Arlene A. Bautista
Flordeliza A. Isip
Joseph H. Bayna
Jean M. Rosas
Analiza A. Lao

**KALINISAN AT KAAYUSAN
SA KAPALIGIRAN
BRGY.195 – 17**

From: Brgy.195

Zone 17

Sa mga ka – Barangay,

Pinababatid po namin sa inyo na mayroon tayong programa laban sa basura, binubuo po ito sa pamumuno ng JICA, MMDA, DPWH, DOH at ang BEM at ESTERO TEAM. Hinihiling po namin ang lubos na pag-unawa at suporta ng bawat isa. Ang layunin po namin ay kalusugan ng mamamayan.

KAHALAGAHAN

- A. Sanhi ng pagbabara ng kanal at estero.
- B. Mairwasan ang anumang sakit na maaaring idulot ng maruming paligid at baradong Estero.
- C. Sanhi ng pagbaha.

DAPAT GAWIN

- 1. Huwag magtapon ng basura kung saan-saan lalo na sa Estero.
- 2. Ipunin ang basura sa tamang lalagyan (plastic bag) at dalhin sa barangay, at ilagay sa barangay container.

Oras: 7:00 to 8:30 AM (umaga)

PAALALA!!

Sundin ang tamang oras ng pagdala ng basura sa tamang lugar, at ng hindi maantala.

Maraming Salamat Po.


Francisco Cirera
BEM


Nestor Ereno
CHAIRMAN


Pacita Paras
Kagawad

JICA, MMDA, DPWH, DOH, BEM & ESTERO TEAM

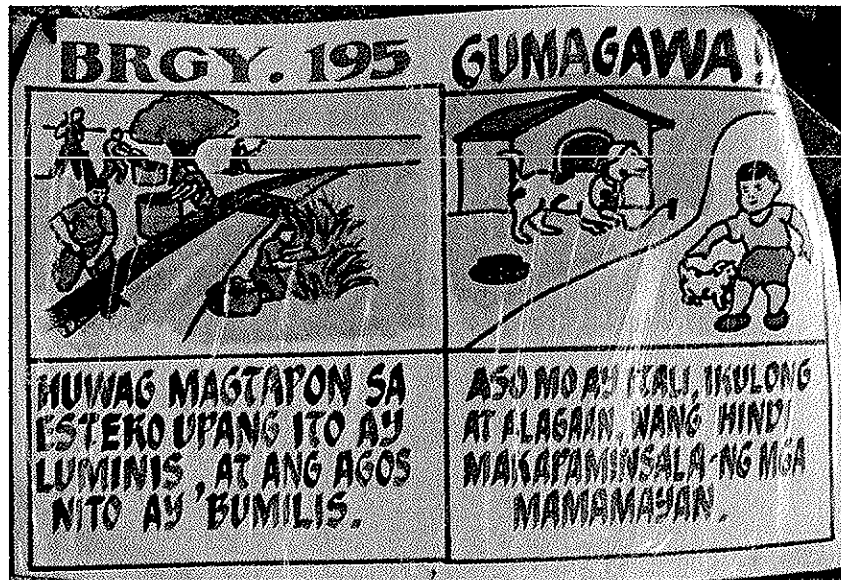
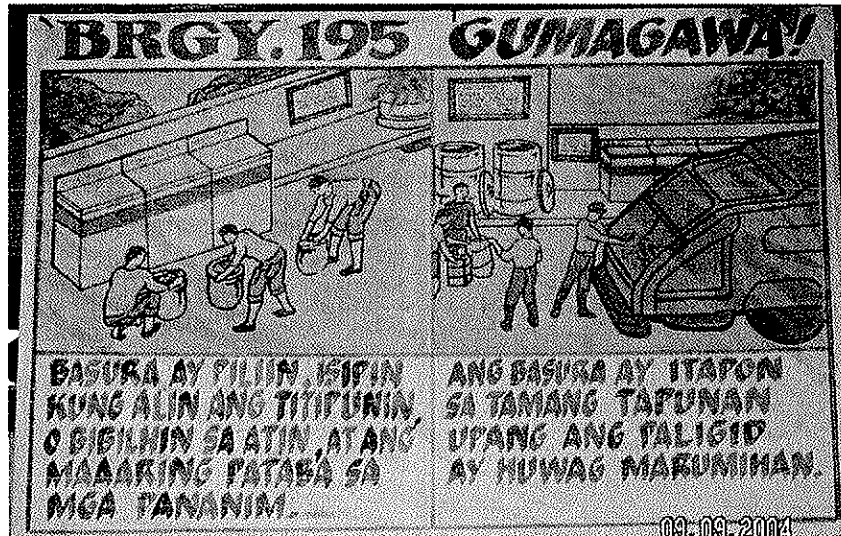
Experimental Research for the Study on Drainage Improvement in Core Area of Metropolitan Manila

IEC Materials Used by Barangay 195, City of Manila



Experimental Research for the Study on Drainage Improvement in Core Area of Metropolitan Manila

IEC Materials Used by Barangay 195, City of Manila



Experimental Research for the Study on Drainage Improvement in Core Area of Metropolitan Manila

IEC Materials Used by Barangay 195, City of Manila



Experimental Research for the Study on Drainage Improvement in Core Area of
Metropolitan Manila

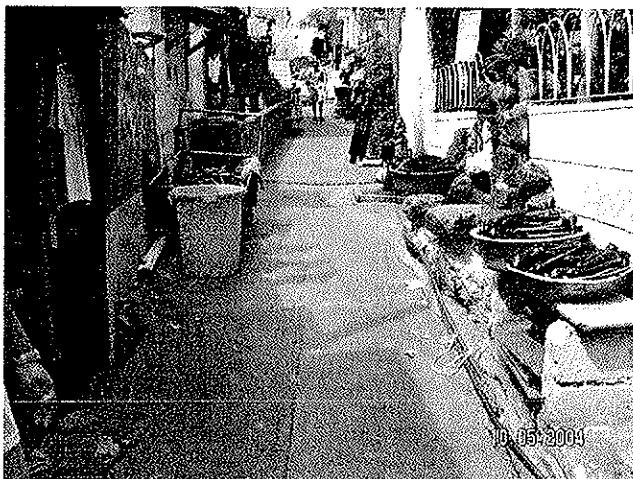
Photo Document of Barangay 195, City of Manila



The usual situation in the streets of the
Barangay



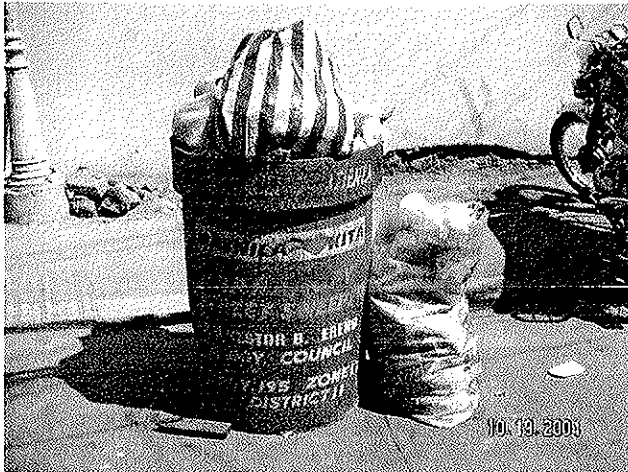
The usual situation in the streets of the
Barangay



The usual situation in the streets of the
Barangay

**Experimental Research for the Study on Drainage Improvement in Core Area of
Metropolitan Manila**

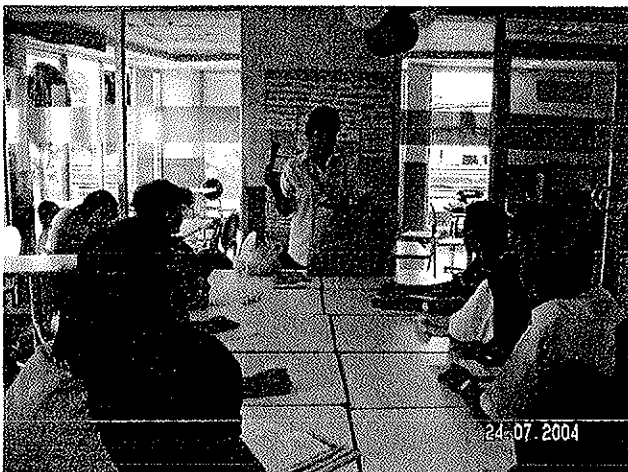
Photo Document of Barangay 195, City of Manila



Common garbage storage bin of the Barangay



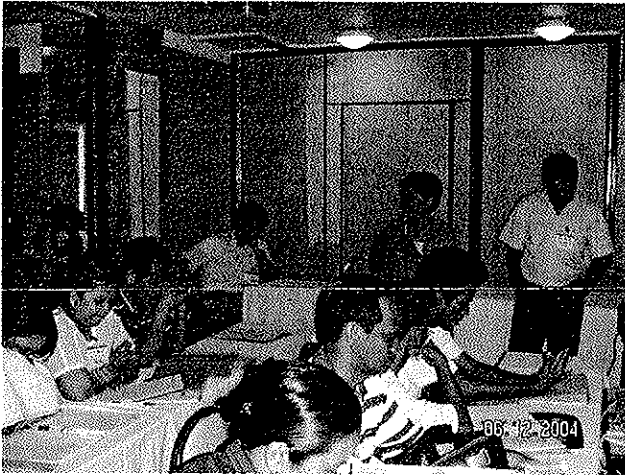
Estero de Sunog Apog/Maypajo's current situation



Waste Segregation and Ecological Solid Waste Management Act (R.A. 9003) Lecture

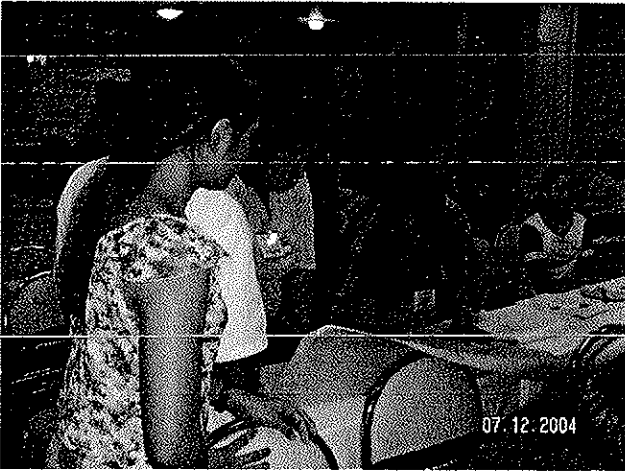
**Experimental Research for the Study on Drainage Improvement in Core Area of
Metropolitan Manila**

Photo Document of Barangay 195, City of Manila



A 3-day Training Program for BEM and
Team ESTERO
*(Overview and Briefing on Experimental
Research)*

Day 1



A 3-day Training Program for BEM and
Team ESTERO
*(Overview and Briefing on Experimental
Research)*

Day 2

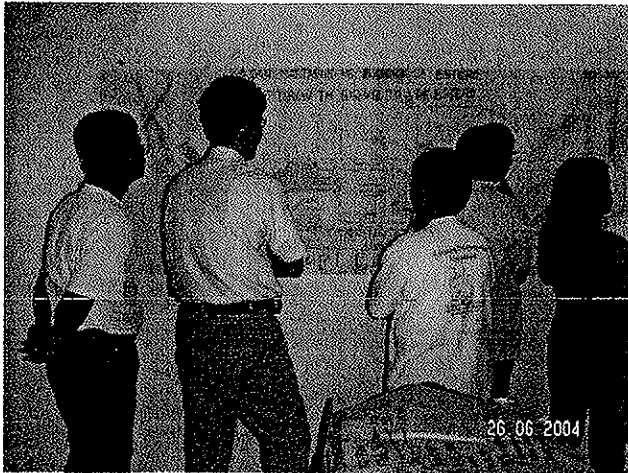


A 3-day Training Program for BEM and
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Research)*

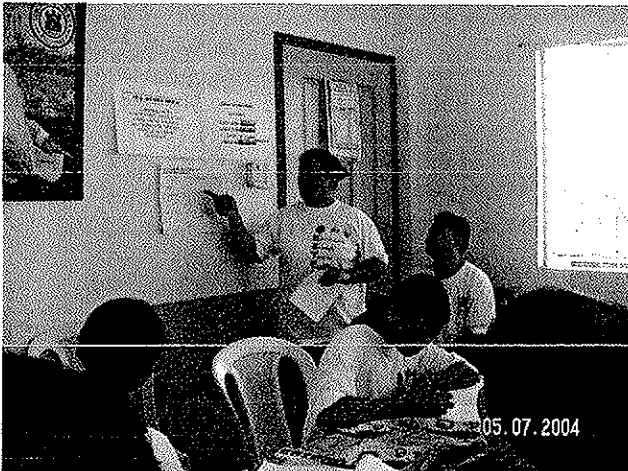
Day 3

**Experimental Research for the Study on Drainage Improvement in Core Area of
Metropolitan Manila**

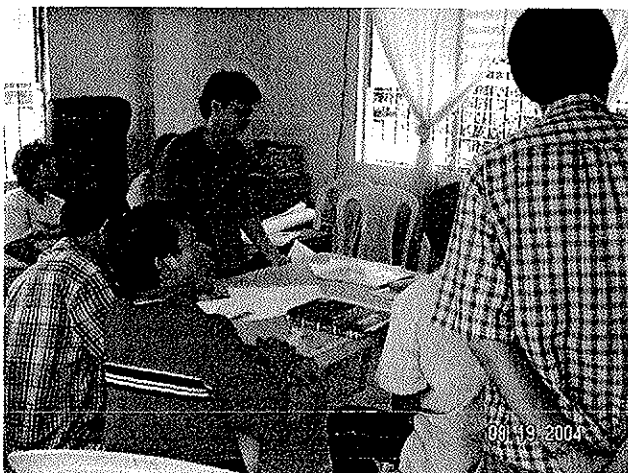
Photo Document of Barangay 195, City of Manila



Training Workshop for BEM and Team
ESTERO on Barangay Profile Writing



Stakeholder and SWOT Analyses
Workshop for the BEM and Team
ESTERO



Information, Education, and
Communication (IEC) Workshop

**Experimental Research for the Study on Drainage Improvement in Core Area of
Metropolitan Manila**

Photo Document of Barangay 195, City of Manila



**Knowledge, Attitude, and Practices (KAP)
Survey for the BEM-ESTERO Team**



**Mobilization of youth leaders in
implementing cleanliness in the Barangay**

Barangay 46

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Appendix 6-5	Photo Document of Barangay 46, Pasay City
Appendix 6-6	Photo Document of Barangay 46, Pasay City

SOLID WASTE MANAGEMENT PROGRAM BARANGAY 46, PASAY CITY

I. Introduction

Every year many areas of Metro Manila experience varying levels of flooding, bringing about economic damage, disruption of normal daily living activities and increased health related problems. The flooding is not only caused by the inadequacy of the drainage and sewerage system, but also by solid waste dumped in the water bodies. It is clearly visible that much of these solid wastes come from the informal settlement areas along the waterways. The situation is exacerbated by the inaccessibility of these areas to regular collection vehicles due to narrow alleys and congestion. This scenario is demonstrated by the presence of voluminous pile of garbage choking water bodies and drainage systems.

In its desire to address the problem, the Department of Public Works and Highways (DPWH) with assistance from the Japan International Cooperation Agency (JICA) is implementing the Drainage Improvement in the Core Area of Metropolitan Manila (DICAMM). The project covers 73 sq. kilometres consisting of 1,191 of the 1,693 barangays in Metro Manila of which 376 barangays are located along the esteros. One of the components of the drainage improvement project is the Experimental Research on environmental management which include environmental concerns such as pollution control, solid waste management, beautification and greening. Three barangays have been chosen as pilot areas, namely, Barangay 46 of Pasay City which is located along Estero de Tripa de Gallina; across it is Barangay Palanan of Makati City which is the second pilot barangay, and Barangay 195, Manila which is along Estero de Maypajo.

Solid waste is a major concern of the three pilot barangays, adversely affecting the environment of each. Thus, the Solid Waste Management Program of Barangay 46 for 2005 is aimed at properly addressing the garbage problems of the community within the context of existing laws and regulations. The Solid Waste Management Program (SWMP) is prepared with the active participation of the community leaders. The program focuses in the improvement of the existing collection system as this function is the source of several pollution problems in the area. Furthermore, garbage collection is the most visible element of any solid waste management system to the public and the closest to the residents' daily activities.

The strategies and approach in the community-based solid waste management program are hinged on two underlying principles: solid waste management should be a shared responsibility between the government and the public; and, the sustainability of any community-based project can only be attained if there is support and participation of the residents of the concerned area. The strategies include organizational arrangement, capability building, intensive community organizing, public education and information campaign, monitoring and evaluation, and documentation and reporting.

II. About Barangay 46

1. Historical Background

Based on the testimonies of the residents, Barangay 46 used to be a part of Barangay San Isidro in 1950's. The area had many trees and it was a haven for birds. Houses were mostly made of plywood. There was a bridge in the area because the water coming from the river was deep. Beside the river was a spring. The residents made fishing as means of livelihood. The Manila Railroad crossed the area.

In the '70s, the head of the barangay was called *Cabeza de Barangay*. There were already at least 300 houses in the barangay. The barangay was cluttered and *tambo* plants grew. A wooden footbridge going to the barangay was constructed. And in the river, fishes such as *gurami*, *hito*, *dalag* and shrimps could be gathered. During that time, 30 families who lived along the banks of the river were relocated to Dasmariñas, Cavite Resettlement Area.

People from the provinces started to crowd the barangay in the early and late '80s. During the period, the Project Green Revolution was introduced and the *Kabataang Barangay* was established. There were several activities conducted such as Feeding Program, Barangay Clean-up, and sports tournaments.

Between 1989 and 1996, a fire occurred in the barangay. As a result, the unfortunate children were recipients of scholarship programs. The barangay was able to put up its Barangay Hall along the Tramo Line. Other facilities established along the Tripa de Gallina were Day Care Center, Barangay Chapel and Barangay Outpost.

2. Physical Profile

Barangay 46 has a land area of 34,901 sq. meters and is located in Zone 6 in the north-eastern of Pasay City. It is bounded in the North by Barangay 43, in the south by Gil Puyat Avenue (Buendia), in the east by Estero de Tripa de Gallina and Barangay Palanan, Makati and in the West by Barangays 48 and 45.

3. Socio-Economic Conditions

The estimated population of Barangay 46 as of 2001 is 4,509 with 868 households. Forty percent of the households belong to the middle income level while 30% belong to high income level and another 30% to the low income level. Almost all the land area of the barangay, 98%, is residential, 1% is commercial and another 1% is institutional.

Some cultural practices of the residents include "manghihilot," "nagtatawas," "albularyo," and the belief on superstitions. Some women are self-employed. They operate eateries or *carinderias*, *sari-sari* store, and cook/sell native delicacies.

The youth play sports such as basketball, volleyball, billiards and chess, while the elderly look after their grandchildren or do some gardening. There are disabled persons who work on electronics, as technicians or do painting jobs.

Health-wise, the birth rate in the barangay is -1% while the mortality rate is also -1%. Morbidity causes include *tigdas*, bronchopneumonia and epilepsy. There are 70 children

(age 1-6) who are on the 1st degree of malnourishment and 2 children on the 2nd degree. Ten children's health is considered above normal.

The Barangay Health Center has only the following equipment such as weighing scale, blood pressure apparatus, nebulizer, and thermometer. For health needs that can not be addressed in the Barangay 46 Health Center, residents go to the Barangay San Isidro Health Center which is more equipped with family planning services, dental services, laboratory, treatment room, weighing scale, and blood pressure apparatus. It also has a mini conference room.

As regard sanitation, the residents along Tripa de Gallina, prior to the Experimental Research for DICAMM (Drainage Improvement for the Core Area of Metro Manila) would throw their garbage to the estero for convenience although collection is regularly done by a collector with the use of a push cart. Those who live along Tramo rely on the collection services with the use of open dump trucks delivered by the office of the Solid Waste Management of Pasay City.

For water supply, Barangay 46 has an artificial well, water pump, and NAWASA. Some collect and store rain water.

For sewage and toilet facilities, households have *poso negros* or septic tanks. Others discharge directly to the estero.

Electricity is supplied by Meralco, however, there are some that are illegally connected with "jumpers."

Access by regular cars to the *iskinita* along Estero de Tripa de Gallina is difficult since the streets leading to it are very narrow. One convenient mode is the *trisikad*. The *iskinita* is paved with concrete.

The recreational activities in the area are: sports activities like basketball (a basketball court is installed on the *iskinita* space near the Barangay Hall) and volleyball. The popular card game *tong-its* is a favorite including bingo and gossiping.

To maintain peace and order, barangay tanods roam around at night together with some barangay officials and make their best efforts to implement existing barangay ordinances.

Environmental Conditions

The water along Estero de Tripa de Gallina is visibly not clean but there are *pako* fishes that are present. There are 17 drainages in the area but have no screens. There are also several small water outlets.

Vegetable plants are present in the barangay such as *camote* (for *camote* tops), eggplants, *pechay*, okra, tomatoes, string beans, *alugbati*, *malungay* and cassava. The production is only for household consumption.

Maya birds thrive in the area. There are chickens raised, doves, dogs, cats and rats. Even roaches are inevitably present.

III. Existing Solid Waste Management System

1. Storage and Waste Segregation

Based on consultations with the barangay leaders and residents and observations through site visits, the most popular form of storage device used by the households is the *sando* plastic bag. These plastic bags are hung inside the house or yard. Sometimes these are placed in street corners as there are no appropriated sidewalks along the Tripa de Gallina. Other containers include small cans or boxes. Generally, garbage is mixed at household level. Level of recycling is appears low as there are no organized collection system for such. Recovered materials that are recyclable are immediately sold by households to the nearby junkshops.

2. Collection System

Since the streets are narrow, collection vehicles could not enter the interiors of the barangay. Thus, primary collection system is implemented in the barangay with the use of two pushcarts - one wooden, the other metal. But the metal cart is broken. Collection time is between 6:00 am-8am. After collection, the pushcart is stalled near the barangay hall and later taken near the main road to wait for the arrival of the LGU collection trucks. This is the only time when the garbage is unloaded from the push cart. Otherwise, if the collection truck of the of the LGU does not come on time along Gil Puyat, the pushcart stands by near the barangay hall along the Estero Tripa de Gallina. There is no available cover for the loaded pushcart, therefore, it emits foul odor and attracts flies. It also attracts scavengers. The wooden pushcart is dilapidated so that it also looks like garbage. The pushcart boy collects from the stretch of the Tripa de Gallina Street.

3. Transport and Disposal

The LGU truck takes the collected garbage to Rodriguez Controlled Dumpsite. This disposal facility outside Metro Manila, while owned by the LGU of Rodriguez (formerly Montalban) is operated by a private contractor. MMDA takes charge of the tipping fees of the garbage taken to this disposal facility by the LGUs.

IV. SWM Problems and Issues

In a workshop using the SWOT analysis, problems related to solid waste management have been identified. Other problems have been identified through site inspections and consultations with the residents of the area. The issues and problems are grouped into the following:

1. Knowledge and Attitude

- There is low level of knowledge regarding proper solid waste management and health and sanitation;
- People are lazy and tend to complain a lot about the projects of the barangay office;

- There is a concern that the solid waste management problem will worsen because in 10-20 years, there will be no more areas where the garbage can be dumped.

2. Practices

- The area, while generally clean, is littered with candy wrappers, plastics, cigarette butts and others;
- The wooden pushcart used for primary collection is now dilapidated that it also looks like garbage;
- While waiting for the arrival of the LGU collection truck, the pushcart full of garbage is not covered, thus, foul smell is emitted and flies are attracted;
- The Tripa de Gallina stretching 500 meters running parallel along the main road, is used as a convenient disposal area, thus, loaded with solid waste.

3. Others

- There are structures along the bank of Tripa de Gallina. Some of these structures are residential houses of informal settlers that make use of the waterway as direct disposal area. There are also structures that are extended above the waterway. All these structures constrict accessibility to the waterway for clean-up activities.
- Flooding occurs in the area particularly during the rainy season;

V. Goals, Objectives and Targets

The ultimate goal of the solid waste management system that will be put in place is to keep the waterways free flowing so that flooding will be minimized and the daily lives of the people will not be adversely affected.

The objectives are as follows:

- Provide an alternative collection system appropriate for the inaccessible informal settlement areas;
- Ensure a sustained implementation of the barangay solid waste management program which is focused on efficient collection and waste reduction;
- Promote public participation through continuing education and information dissemination

The targets are as follows:

- Maintain satisfactory level of cleanliness;
- Achieve 75% household participation in segregation at source;
- Reduce the amount of solid waste by 10% in one year;
- Produce and distribute at least four types of IEC materials before the end of the year.

VI. Barangay 46 SWM Program

1. SWM Framework

A previous study shows that of the total waste generated in Metro Manila about 24% (MMDA-JICA, 1997) are not collected. The uncollected amount of waste end up in water bodies including esteros, rivers and drainage systems that causes clogs and floods. Most of uncollected wastes are produced by informal settlers in unplanned areas where road networks and alleys are narrow and residential structures are congested. There are very visible indications that this problem remains in many areas in Metro Manila including Barangay 46. Barangay 46 is partly congested informal settlement area that lies along the 500 meter stretch of Estero de Tripa de Gallina. The basic characteristic of the area suggests the need of an improved system of collection including other support activities to ensure acceptance of the program and consequently, public participation at a level to guarantee sustainability. The solid waste management program should take into consideration the provisions of Republic Act 9003 or Ecological Solid Waste Management Act of 2000 specifically the implementation of segregation at source and separate collection of different types of solid waste in line with the diversion goal of 25% in five years from the time RA 9003 has become effective. Further, to be taken into consideration is the implementation of a MMDA Resolution regarding Unified Approach on SWM. This resolution focuses on door-to-door collection particularly in inaccessible areas along the waterways. The door-to-door collection system is also a tool to effectively implement the collection of source segregated waste.

2. SWM Operations Flow

The chart below shows the flow of the collection system based on the type of solid waste collected from the households.

Table 1. Solid Waste Management Operations Flow

1 →	2 →	3 →	4 →	5 →
Waste Gen. (2765 kgs/day)	Storage/or activity at household level	Primary Collection	LGU Collection	Destination
Biodegradable Waste: kitchen and yard waste (1438 kgs.)	Plastic bag or bin ; Kitchen waste are fed to pet animals or hogs; Backyard composting may be done.	Daily, 6:00- 8:00 A.M., door-to-door collection with the use of pushcart is made; pushcart awaits arrival of LGU truck in the collection point	LGU truck collects the load of the pushcarts or roller bin at the collection point daily.	Rodriguez Controlled Dumpsite
Recyclable Items (1133 kgs/day)	<i>Sando</i> Bags	Once/week collection (or individual persons take		Barangay MRF, Junkshop buyer

		recyclable materials to MRF anytime)		
Residual Waste (194 kgs/day)	Sando plastic bag or any container	Included in the collection of biodegradable waste daily.		Taken by LGU truck to Rodriguez Controlled Dumpsite

3. Waste Generation

The estimated 7,000 population of Barangay 46 of Pasay City produces approximately 2,765 kilograms or 2.8 tons of garbage daily (Projected from the 1997 MMDA-JICA Study). More than half or 52% is biodegradable and 41% is recyclable. There are other 7% that can be classified as residual waste. Table 2 below shows the composition of solid waste in Barangay 46, Pasay City.

Table 2. Waste Composition in Barangay 46, Pasay City

Type of Waste	Percentage	Type of Waste in kgs/day
Kitchen Waste	45%	1,244
Yard Waste	7%	194
Paper	17%	470
Plastic	16%	442
Metal	5%	138
Glass	3%	83
Residual/others	7%	194

Biodegradable waste refers to kitchen and garden waste; dry recyclable items include the different types of paper (old newspapers, old corrugated cartons, office white paper and mixed waste) different types of plastics such as PET plastics or mineral water bottles and *sibak* or assorted plastics. Metals include iron, aluminium cans and tin cans while glass includes whole glasses such as soft drink bottles, liquor and alcohol, medicine bottles. From time to time, some items may not be traded or new items under the four categories of dry recyclable items may suddenly be included in the market. Others or residual wastes are those that may no longer be recyclables. In most cases, these are recyclable items but may be contaminated or too expensive to recover and process like the polystyrene materials under the classification of plastics.

4. Storage and Segregation at Source

As provided by RA 9003, segregation at source or at household level is mandatory which should be implemented by the Barangay Solid Waste Management Committee chaired by the Barangay Chairman. This requires different containers to be used. Normally, paper is segregated from the other recyclable materials to prevent it from getting soiled. Plastics, glasses and other food containers should be washed before they are stored prior to the collection by the primary collector.

While other communities may opt to use color coded plastic bags for the three different types of garbage, *sando* plastic bags are practical devices to store clean and dry recyclable materials and biodegradable materials (but separately) at household level.

For a community-based storage device, one unit of metal storage bin (Satobin) shall be constructed to test its efficiency. Plastic roller bins and pushcarts will be provided not only to collect from the areas but also to store the collected waste.

5. Collection System

There are two levels of collection:

- Primary collection with the use of pushcarts, and
- Secondary collection with the use of big collection trucks of local government unit.

To implement the primary collection system, Barangay 46 is divided into six areas each representing a neighborhood or homeowners association. A coordinator of each of the association is tasked to supervise the discharge of bagged garbage by the households and ensure the collection of these by the pushcart collector, everyday at 6:00-8:00 AM. The 2 pushcart collectors take the pushcart at a specific point everyday where accessible to the LGU truck to collect. The first route covers Areas 1-3 using one pushcart. The second route covers Areas 4-7 using the second pushcart. Since it is mandatory to segregate waste and collect only segregated waste, primary collection is designed only to collect residual waste that should be taken to the dumpsite by the garbage collection trucks of the LGU. The recyclable materials that have been pre-separated are taken to the MRF by the Area Coordinators.

Table 3. Collection Route and Schedule

Collection Routes	Collection Equipment	Time
Route 1 : Areas 1-3	Pushcart	6:00 A.M. – 8:00 A.M. Daily
Route 2 : Areas 4-7	Pushcart	6:00 A.M. – 8:00 A.M. Daily
Route 3 : Tramo	LGU dump truck	6:00 A.M. – 8:00 A.M. Daily

Figure 1 shows the garbage collection route of Barangay 46.

6. Materials Recovery Facility

A Materials Recovery Facility (MRF) is a recycling center to process and store dry recyclable materials prior to selling. It may also process biodegradable waste into compost or organic fertilizer. Barangay officials are required by law to put up a MRF in their respective jurisdiction. In the absence of an area, clustering is recommended.

The Council of Barangay 46 shall appropriate a room for MRF in the barangay hall that is approximately 20 sq. m. in area. This MRF shall be dedicated to dry recyclable items only which means that there will be no composting activity in the area. Since the proximity of the MRF to the residential areas is walkable, the Area Coordinators may personally take the collected recyclable materials there. There is no need to use the pushcarts to collect.

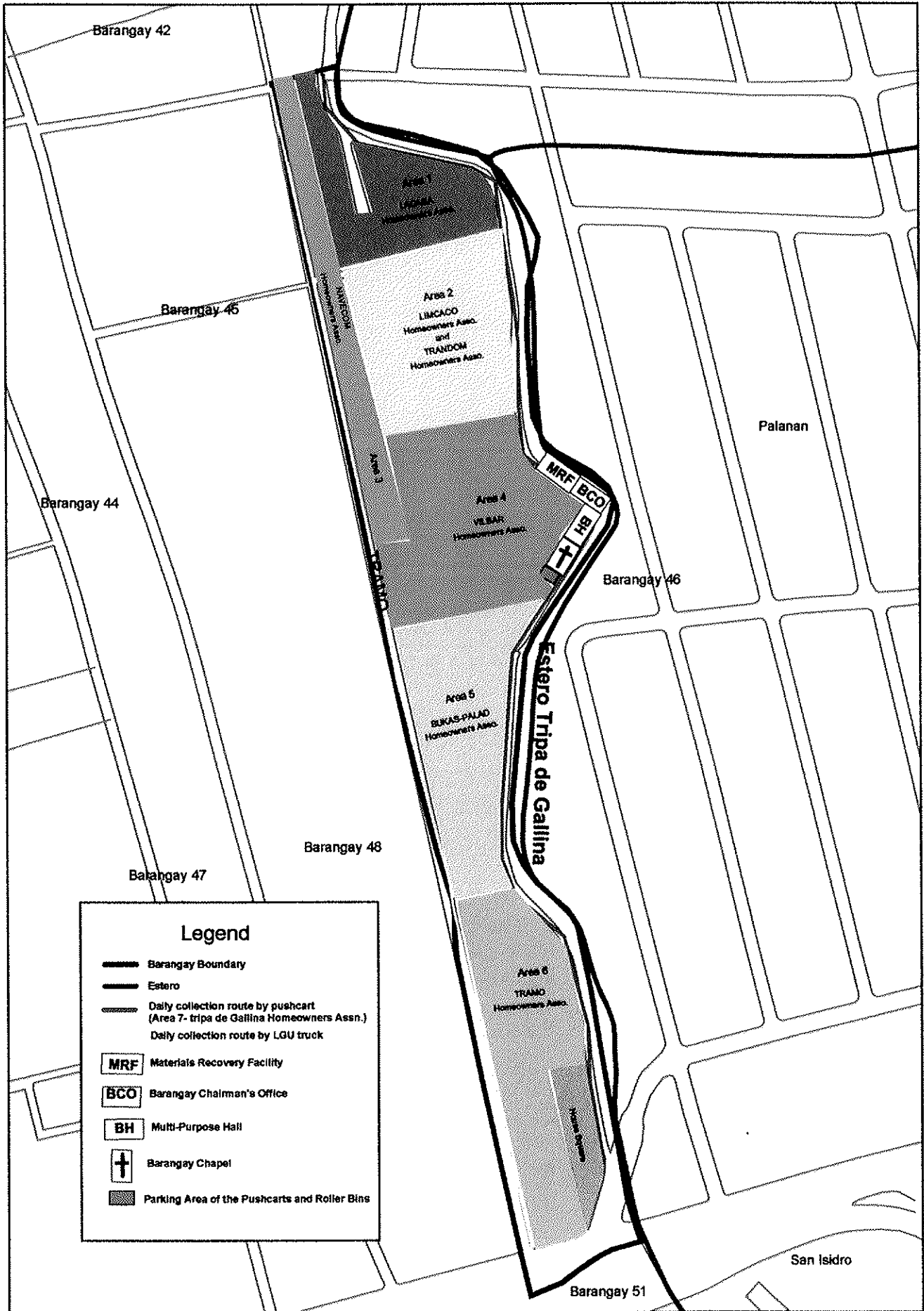


Figure 1. 2005 Garbage Collection Route of Barangay 46, Pasay

To operate the MRF, the Barangay Chairman shall designate one or two of the members of the Core Working Group or the ESTERO Team.

The MRF shall operate like a buy back centre. It shall buy the materials that will be taken there. When a large volume is accumulated, the materials shall be sold to the highest bidder among the nearby junkshops. To operate this way, the MRF shall be provided a mini-grant that will serve as seed money from which micro entrepreneurship may be developed. How the revenues will be used shall be decided by the project team.

VII. SWM Strategies

1. Organizational Arrangement

Anchored on intensive community organizing, the planning and implementation of the solid waste management program require human resources. The following groups are organized according to their functions. It is noted that the new organization is an additional grouping as there are already at least 40 committees in each barangay in the country.

- The constitution of the Barangay Solid Waste Management Committee (BSWMC) is mandated by RA 9003. It is headed by the Barangay Chairman with eleven members. It is tasked to formulate the Barangay Solid Waste Management Program consistent with the 10-Year SWM Plan of the LGU or Pasay City.
- Organization of the Core Group. The Core Group serves as the technical working group of the BSWMC. It assists not only in the formulation of the BSWM Program but also in its implementation. In the case of Barangay 46, the Core Group composed of community leaders is organized under the name, BEM-ESTERO (Barangay Environmental Management - Environmental Strategic Task for Estero Renewal Organizing) Team headed by a BEM or a Barangay Environmental Manager (who is not the Barangay Chairman). In the implementation of the Barangay SWM Program, the Barangay SWM Committee may function as a supervising group to the BEM-ESTERO Team.
- The Street Leaders assist the Core Group in the implementation particularly in the dissemination of information and/or distribution of materials. The street leaders serve as monitors regarding level of cleanliness, among others. In the case of Barangay 46, the Street Leaders are called Coordinators. They are the Homeowners Association representatives.

2. Capability Building

The human resources organized to formulate plans and execute certain activities to meet the objectives of the project need to be trained. Training needs are assessed. A shopping list of the basic subjects which the committees, groups and community leaders should be trained or oriented with are the following: Understanding garbage: its source, amount generated by each person, problems associated with and impacts of improper management of garbage, benefits of properly managed solid waste; functional elements of solid waste management; hierarchy of practices in solid waste management; SWM in Metro Manila; barangay concerns in RA 9003; door-to-door collection; facilitation techniques; presiding meetings;

preparation of minutes; MRF housekeeping and operations; recording, monitoring, documentation and reporting. The capability building activities may be done through consultation meetings, lectures, orientations, seminars and workshops, study tours, mentoring and learning by doing.

3. Public Education and Information Dissemination

It is important to educate and inform the public about the project and instruct them on what to do if only to solicit their support and participation and make them realize their responsibility in solid waste management. It is also important to provide the public a feedback on the performance of the project so that they become a part of the whole process of proceeding and improving. Public education and information dissemination should not be treated as a one shot deal in the project. A schedule of issues/concerns, messages and media should serve as a guide in the implementation of a public education program.

Table 4. Public Education and Information Implementation Schedule

Issues and Concerns	Messages	Media	Schedule
1. <ul style="list-style-type: none"> Residents are not aware of the SWMP in the barangay; or Lack appreciation of the community problems in relation with SWM, Residents do not know what to do with their garbage 	<ul style="list-style-type: none"> SWM problems in the community; Intro of the SWM Program including provisions of RA 9003 relevant to the barangay; Instructions on how to store and segregate waste ; and Schedule of collection 	Flyer : 1500 copies <ul style="list-style-type: none"> House to house campaign by the BSWMC and Barangay Council; BEM ESTERO; Homeowners Association Coordinators, 	<ul style="list-style-type: none"> After formal entry in the project site or during the project launching to kick-off program implementation
2. Residents lack the visual knowledge on the types of recyclable items.	<ul style="list-style-type: none"> Photos of dry recyclable materials 	Flyer: 1500 copies	<ul style="list-style-type: none"> Distributed after program introduction.
3. Residents are not aware of the progress of the program.	<ul style="list-style-type: none"> Project Update: community participation, level of cleanliness, MRF performance reduction. 	Flyer: 1500 copies	<ul style="list-style-type: none"> Should be issued every month or every two months
4. How to do backyard or household composting	Backyard or Household composting	Flyer: 1500 copies	<ul style="list-style-type: none"> To be issued once during the project implementation (optional)
5. Level of household	<ul style="list-style-type: none"> Program status; 	Flyer : 1500 copies	<ul style="list-style-type: none"> Issuance is

participation is low.	<ul style="list-style-type: none"> • Announcement of incentives such as: • The project will buy the recyclable items from the households; • Recognition of participation. 	<ul style="list-style-type: none"> • Letter and House Sticker: 1200 copies 	staggered based on the monitored performance of the households.
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4. Monitoring and Evaluation

The level of cleanliness and the amount of recyclable materials recovered are the basic gauge that measures the efficiency of the collection system reflecting not only the performance of the change agents involved but also the impact of the public education and information campaign. The conduct of monitoring and evaluation should be periodic.

4.1 Level of Cleanliness

The most visible result of solid waste management in a given area or community is the level of cleanliness measured by the presence or absence of garbage on the streets, sidewalks, frontage of households and structures, canals, vacant lots and waterways. The monitoring checklist on *Table 5* provides a count of occurrences of things that make the area dirty. The score at the rightmost column shows the items that are prevalently seen in each Area. Thus, based on the sample filled out monitoring checklist, the most common problem in the barangay is the presence of litter (litter is defined as one liter of garbage that is scattered) followed by animal droppings (dogs, rooster), then by the presence of open garbage bins with exposed contents. The bottom score indicates the total number of occurrences in the area. The higher the score, the dirtier the area, thus, the scores can be compared to show which area is the dirtiest. In the sample presented, the dirtiest area is Area 5 followed by Areas 4 and 6 then Areas 1 and 2. Using *Table 6*, the total score of 50 (*in Table 5*) Barangay 46 covering Areas 1-7 is considered Satisfactorily Clean.

Table 5. Sample Filled-out Monitoring Checklist on Level of Cleanliness

What can be seen in the area or street	Area 1	Area 2	Area 3	Area 4	Area 5	Area 6	Area 7	Score
1. Litter	1	2	2	5	2	2	1	15
2. Piles of garbage	0	0	0	0	0	0	0	0
3. Scattered garbage	1	0	0	0	0	0	0	1
4. Garbage bins without cover	1	2	1	1	3	1	0	9
5. Bins with overflowing garbage	1	1	0	0	1	0	0	3
6. Canals with litter/garbage	0	0	0	0	0	0	0	0
7. Animal droppings	2	1	1	2	1	2	1	10
8. Junk vehicles	1	0	0	0	1	0	0	2

9. Construction debris	0	0	0	0	0	0	0	0
10. Furniture (bulk waste)	0	1	0	0	0	1	0	2
11. Soil/sand mounds	0	0	0	0	0	0	0	0
12. Floating garbage on estero	0	0	0	0	3	2	3	8
TOTAL SCORE OF AREA	7	7	4	8	11	8	5	50

Note: The scoring system may be fine tuned after initial implementation and evaluation.

Table 6. Evaluation of Level of Cleanliness and Orderliness

Level	Score	Description
5	0	Sparkling Clean
4	1-25	Delightfully Clean
3	26-50	Satisfactorily Clean
2	51-75	Dirty Ugly Area
1	76 and more	Yucky Area

4.2 Waste Diversion

RA 9003 has set the target of 25% diversion goal in five years or starting from the time the law became effective. This will be in 2006.

The diversion target set for this program is 10% by 2005. Measurement of the recovered amount will be based on the recyclable materials delivered to the MRF and/or sold to Junkshop buyers.

This will be achieved through the implementation of segregation at source and separate collection.

4.3 Frequency of Collection

As already programmed or determined, the frequency of collection by the primary collectors in the designated routes shall be recorded and evaluated against the agreed schedule. An easy-to-fill up form shall be used to recorded data.

Likewise, the frequency of collection of the secondary collectors (LGU) shall also be recorded and evaluated against agreed schedules.

The impact of the actual frequency of collection on the level of cleanliness and waste reduction shall be evaluated.

5. Documentation and Reporting

Documentation entails the recording of events in the form of minutes of meetings, attendance sheets, receipts, field inspection reports, photo documents, chronology of events and regular

reports. The records store the “story” of the project that provides the lessons that may help in assessing what practices are effective that may be worth replicating in other similar situations.

VIII. Equipment and Supplies Requirement

Table 7. List of Supplies and Equipment

Items	No. of Units	Source
Satobin	1	Jica
Pushcart (metal and wooden)	2	Jica, Barangay
Dustpan	4	Jica
Roller bin	1	Jica
Gloves	10	Jica
Boots	5	Jica
Water pails	2	Jica
Stick brooms	10	Jica
Shovels	2	Jica
Rakes/kalaykay	2	Jica
Logbooks	2	Jica
Ballpens	6	Jica
Cutter	2	Jica
Straw rolls	1	Jica
Plastic filing cabinet	1	Jica
Sacks	50	Jica
Scissors	2	Jica

IX. Action Plan

Table 8. Schedule of Implementation

Activities	Schedule
1. Formal Entry	May 25, 2004
2. Organization of Working Group: BEM-ESTERO, HOA Coordinators	June 2004
3. Constitution of the Barangay Solid Waste Management Committee	December 2004
4. Planning Workshops	June-August 2004
5. Preparation of the BSWMP (including approval of the Barangay Council)	December 2004
6. Preparation of IEC Materials	December 2004

7. Launching Activity/Clean up day including distribution of initial IEC Materials	January 2005
8. Implementation	February 2005
9. Monitoring and Evaluation	February and onwards
10. Conduct of Survey to determine knowledge, attitude, practice and level of participation	June 2005