



Options for Improvement of Solid Waste Management Systems through Community Participation

With Reference to Case Study Areas of Ghousia Colony and Orangi Town in Karachi, Pakistan

Rehan Ahmed

M.Sc. Thesis E.E. 62

July , 1992

**LIBRARY
INTERNATIONAL REFERENCE CENTRE
FOR COMMUNITY WATER SUPPLY AND
SANITATION (IRC)**



OPTIONS FOR IMPROVEMENT OF SOLID WASTE MANAGEMENT SYSTEMS
THROUGH COMMUNITY PARTICIPATION

WITH REFERENCE TO CASE STUDY AREAS OF
GHOUSIA COLONY AND ORANGI TOWN
IN KARACHI, PAKISTAN.

Examination Committee Members

Prof. dr ir G.J.F.R. Alaerts (IHE)

Dr Jan van der Linden (VU)

Drs. T. Murre (IHE)

Supervisors

Prof. dr ir G.J.F.R. Alaerts (IHE)

Ing. ing Arnold van de Klundert (WASTE CONSULTANTS)

Dr. Maria Muller (WASTE CONSULTANTS)

Drs. H. Claringbould (IHE)

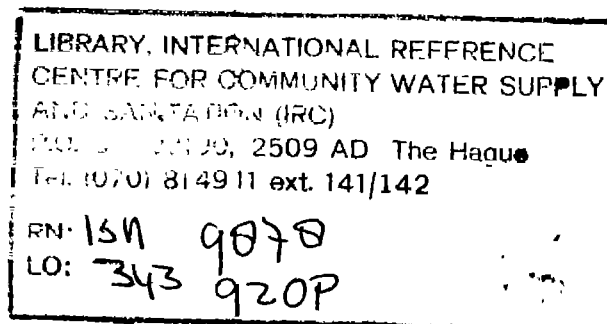
Drs. T. Murre (IHE)

Author

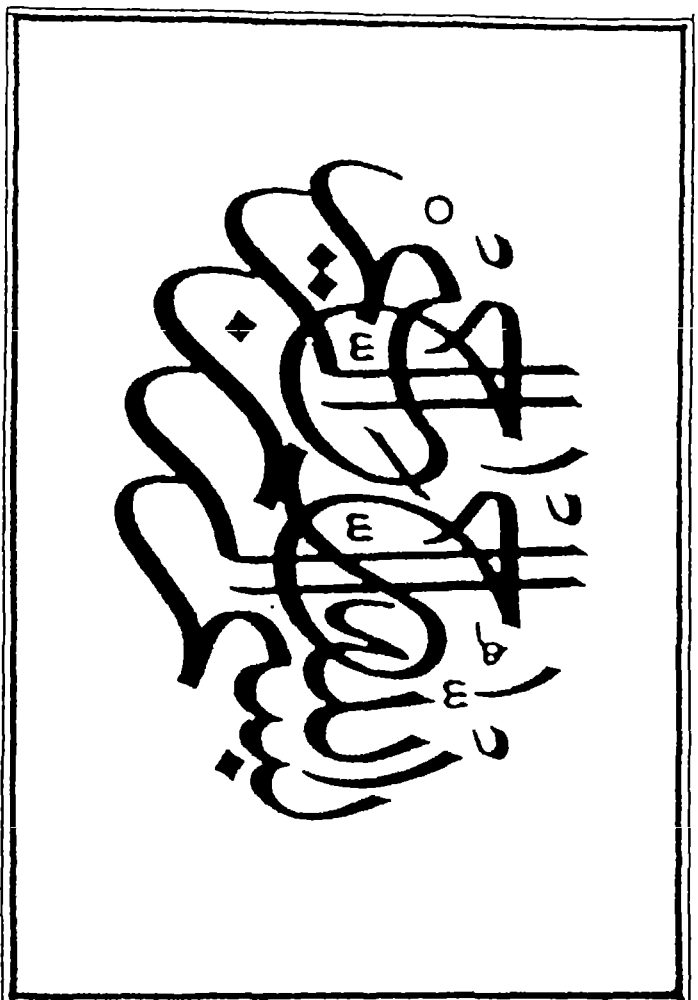
Rehan Ahmed

IHE DELFT

July, 1992







In the Name of Allah,
the Beneficent, the Merciful





ACKNOWLEDGEMENT

I am highly indebted to my thesis advisor Prof. dr.ir.G.J.F.R. Alaerts for his keen interest and valuable advices given to me during my study period.

I want to specially mention the name of Ing.ing.Arnold van de Klundert for his continued support and guidance provided during the study period. He especially boosted my morale with his presence during the field work in Karachi. I am deeply indebted to him for his friendly suggestions, technical assistance and providing a direction of my thesis. I want to sincerely acknowledge Waste Consultants for giving me an excellent opportunity to do this study through the financial assistance and making use of the wealth of literature at their office.

I greatly appreciate for the encouragement, suggestions and discussions held with Dr.J.J.van der Linden for helping me in selection of the case study areas and guiding me of the resource personnel in Karachi. I am also indebted to Dr. Maria Muller, Drs.H. Claringbould and Drs. T. Murre for guiding me on the social aspects of the study especially on the household surveys, interviews and presentations.

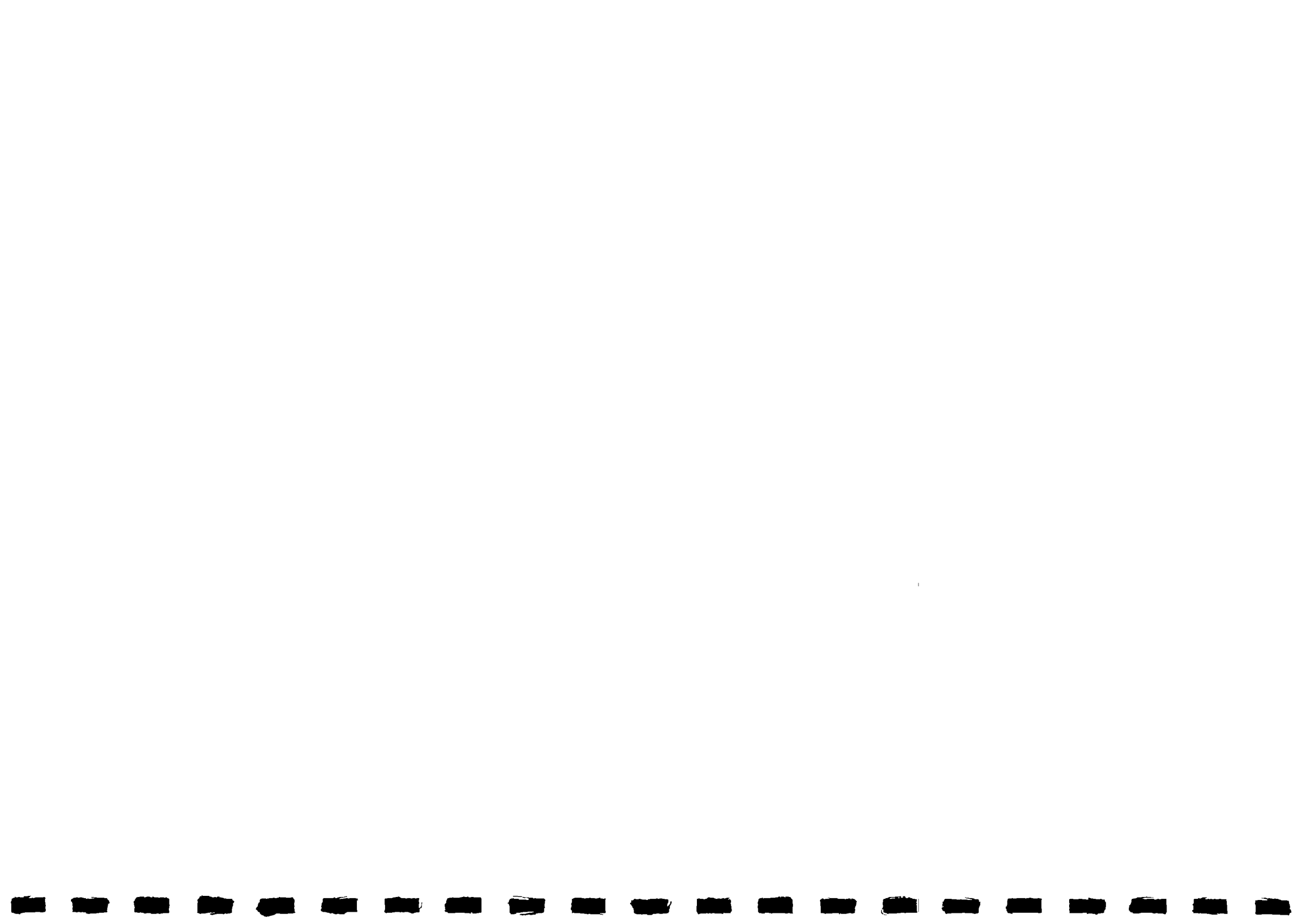
I am also thankful to my dedicated surveyors, coordinators, area councillors and opinion leaders in Ghousia colony and Orangi town. Worth mentioning is the name of Hafiz Arain of OPP who took great pain to help in my field work in Orangi and organized visits to people and sources involved in waste material trade.

Finally I would like to dedicate this work to all the scavengers in the world who are putting in a lot of physical efforts in very unhygienic conditions to earn their livelihood.



GLOSSARY

ABADI	population
ANJUMAN	association, mostly used for voluntary welfare organization
BALTI	container used for storing and conveying water
BARA	place of keeping buffaloes
BASTI	unauthorized settlement, mostly low income
BISTI	water carrier
BHOSI TUKRAY	unleavened bread
CANISTER	used tin container of ghee/ oil
CHAWK	quadrangle, square, round about
DALAL	tout
ECO-AIDES	iterant scavengers
FAVELAS	squatter settlements
GAP	wet/ dried solid material cleared from the manholes and sewers causing blocking/ chocking
GLASS BARNI WALA	person/ street vendor who exchanges old/ used clothes and shoes with glass and china ware
HAKIM	experienced person providing eastern herbal medicines
HALAL KHORES	municipal sweepers collecting night soil
JHUGGI	temporary hut
KATCHA	unbaked, clay built
KATCHI ABADI	unauthorized and unplanned squatter settlement, presently the term is used for regularized/ regularizable slums
KUNDIMAN	person employed by municipality clearing/ cleaning the manholes and sewers
MUHAJIR	refugee, evacuee, emigrant
MUSHAWARAT	discussion, advice
NALA	canal, gutter, natural gulley, non perennial storm water course
NALI	small open drain
PACCA	baked, strong, solid, firm, lasting
PURDAH	veil, curtain, cover, privacy
RABTA	liaison
SABZI MANDI	vegetable and fruit whole sale market
TANKI	water container
THALLA	manufacturing yard for cement concrete blocks, lintels, pipes, slabs
THALLA WALA	local building contractor, owner of a thalla
THELA	push cart for selling items
TOKRI	basket made of wood/ straw/ plastic
URDU	national language of Pakistan
ZAKAT	voluntary islamic deduction of 2.5% on annual amount/ deposits/ wealth/ property etc.



LIST OF ABBREVIATIONS

DKAE	Directorate of Katchi Abadis and Evaluation (Karachi Metropolitan Corporation)
KDA	Karachi Development Authority
KMC	Karachi Metropolitan Corporation
ZMC	Zonal Municipal Committee
KWSB	Karachi Water and Sewerage Board
JRP-IV	Joint Research Project number IV, for urban development and slum improvement, a joint undertaking of the Pakistan and the Netherlands Government.
MLO	Martial Law Order
NWFP	North West Frontier Province (Pakistan)
PECHS	Pakistan Employees Cooperative Housing Society (Karachi)
Rs.	Pakistani Rupee (1US\$ app.= 24 Rupees)
OPP	Orangi Pilot Project
RTI	Research Training Institute (OPP)
HH	House hold
GOS	Government of Sindh
HBFC	House Building Finance Corporation
KESC	Karachi Electric Supply Corporation
MPD	Master Plan Department (KDA)
SITE	Sind Industrial Trading Estate
GC	Ghousia Colony
OT- S5	Orangi Town Sector 5
UNCRD	United Nation Center for Regional Development
CP	Community Participation
SWM	Solid Waste Management
BCCI	Bank of Credit and Commerce
NDFC	National Development Finance Corporation
CSO	Central Statistical Office
AERC	Applied Economic Research Center (Karachi University)
UNDP	United Nation Development Programme
PROWESS	Promotion of the Role of Women in Water and Environmental Sanitation
DC	Developing Countries
IBRD	International Bank for Reconstruction and Development
IRC	International Reference Center, The Hague
IDRC	International Development Research Center
IUCN	International Union for Conservation of Nature and Natural Resources
NESPAK	National Engineering Services of Pakistan (pvt) Limited
PCSIR	Pakistan Council for Scientific and Industrial Research
SWMP	Solid Waste Management Project (Kathmandu, Nepal)
SWMRMC	Solid Waste Management and Resource Mobilization Center
MPA	Member of the Provincial Assembly
MNA	Member of the National Assembly
CAPS	Center for Advanced Philippine Study
PCO	Population Census Organization



TABLE OF CONTENTS

	PAGE NO.
- ACKNOWLEDGEMENT	
- GLOSSARY	
- LIST OF ABBREVIATIONS	
1. ABSTRACT	1
2. PREFACE	3
3. INTRODUCTION	
3.1 GENERAL	4
3.2 MAGNITUDE OF PROBLEM	5
3.2.1 GENERAL	5
3.2.2 SPECIFIC	7
3.3 SITUATION IN KARACHI	9
4. STUDY DETAILS	
4.1 STUDY OBJECTIVES	10
4.2 SCOPE OF THE STUDY	10
4.3 WORK METHODOLOGY	11
4.4 CONFIGURATION OF THE THESIS	12
5. LITERATURE REVIEW	
5.1 PROJECTS FOR IMPROVEMENT OF THE EXISTING SWM SYSTEM	14
5.2 PROJECTS FOR THE IMPROVEMENT OF RESOURCE RECOVERY AND RECYCLING POTENTIAL	20
5.3 ANALYSIS	22
5.3.1 GENERAL	22
5.3.2 SPECIFIC	23
5.4 CONCLUSIONS	25
6. SOLID WASTE MANAGEMENT SYSTEM IN KARACHI	
6.1 THE SYSTEM	26
6.2 DEFICIENCIES	28
6.3 FUTURE PLANS FOR IMPROVEMENT	29
6.4 MUNICIPAL LEGISLATION AND POLICIES	29
6.5 RECYCLING AND RESOURCE RECOVERY IN KARACHI	
6.5.1 GENERAL	30
6.5.2 HOUSEHOLD SORTING OF RECYCLABLES	30
6.5.3 SCAVENGING	30
6.5.4 WASTE MATERIAL TRADE	31
6.6 ANALYSIS	31
7. CASE STUDY AREAS	
7.1 SELECTION CRITERIA	33
7.1.1 GHOSIA COLONY	33
7.1.2 ORANGI TOWN	34
7.2 CASE STUDY AREA :GHOSIA COLONY	35
7.3 CASE STUDY AREA :ORANGI TOWN-SECTOR 5	37

8. HOUSEHOLD SURVEY	
8.1 SURVEY OBJECTIVES	41
8.2 SURVEY METHODOLOGY	42
8.3 GHOUSIA COLONY	45
8.3.1 SURVEY RESULTS	45
8.3.2 FACILITIES FOR SWM	51
8.3.3 SOLID WASTE MANAGEMENT SYSTEM	55
8.3.4 PREVIOUS ATTEMPTS FOR IMPROVEMENT OF SWM	59
8.3.5 RECYCLING IN GHOUSIA COLONY	59
8.4 ORANGI TOWN SECTOR-5	60
8.4.1 SURVEY RESULTS	60
8.4.2 FACILITIES FOR SWM	64
8.4.3 SOLID WASTE MANAGEMENT SYSTEM	67
8.4.4 PREVIOUS ATTEMPTS FOR IMPROVEMENT OF SWM	68
8.4.5 RECYCLING IN ORANGI TOWN	71
8.5 COMPARISON BETWEEN CASE STUDY AREAS	71
8.6 REMARKS	74
9. ROLE OF NGO AND CBO	
9.1 ROLE OF THE NGO	75
9.2 ROLE OF CBO	78
9.3 NGO IN ORANGI TOWN	79
9.4 CBO IN GHOUSIA COLONY	80
10. COMMUNITY PARTICIPATION IN SWM	
10.1 GENERAL	83
10.2 COMMUNITY PARTICIPATION IN SWM	85
10.3 ROLE OF THE MUNICIPALITY	86
10.4 ROLE OF NGO AND CBO	87
10.5 COMMUNITY POTENTIALS FOR PARTICIPATION	89
10.6 MANPOWER FOR COMMUNITY PARTICIPATION	89
10.7 ENHANCING COMMUNITY PARTICIPATION FOR SWM	90
11. OPTIONS AND RECOMMENDATIONS FOR THE IMPROVEMENT OF THE SWM SYSTEM	
11.1 BASES OF OPTIONS	92
11.2 RECOMMENDED PHASES FOR IMPROVEMENT	92
11.3 ESTABLISHING A WORKING RELATIONSHIP	94
11.4 OPTIONS FOR IMPROVEMENT	94
11.4.1 TECHNICAL	94
11.4.2 SOCIAL	100
11.4.3 COMMUNITY EDUCATION AND TRAINING	100
11.5 CONCLUSIONS	102
11.6 RECOMMENDATIONS	104
BIBLIOGRAPHY	107
ANNEXURES	

ANNEXURES

A.1	KARACHI	
A.1.1	HISTORY AND LOCATION	116
A.1.2	ROLE IN THE NATION	116
A.1.3	DEMOGRAPHIC BACKGROUND	116
A.1.4	SOCIAL ROLE	118
A.1.5	THE DIMENSIONS OF THE CRISIS	119
A.1.6	HOUSING	119
A.2	HOUSING PROBLEMS AND EMERGENCE OF KATCHI ABADIES IN KARACHI	
A.2.1	INTRODUCTION	120
A.2.2	EXODUS FROM THE RURAL AREAS	120
A.2.3	THE PUSH FACTOR IN PAKISTAN	120
A.2.4	HOUSING IN KARACHI	121
A.2.5	EMERGENCE OF KATCHI ABADIES	122
A.2.6	FROM BULLDOZING TO UPGRADING	122
A.2.7	UPGRADING, IMPROVEMENT AND REGULARIZATION	123
A.2.8	RECOGNITION OF KATCHI ABADIES	125
A.2.9	THE DILEMMA OF UPGRADING	126
A.3	DEFINITION OF URBAN SW IN DEVELOPING COUNTRIES	127
A.4	ORANGI PILOT PROJECT	
A.4.1	LOW COST SANITATION PROGRAMME	129
A.4.2	LOW COST HOUSING PROGRAMME	131
A.4.3	SOCIAL FORESTRY PROGRAMME	132
A.4.4	WOMEN'S DIVISION TRAINING PROGRAMME	133
A.4.5	RESEARCH, EVALUATION, PUBLICATION AND AUDIO-VISUAL SECTION	133
A.4.6	KHASDA	134
A.4.7	ORANGI CHARITABLE TRUST	134
A.4.8	WOMEN WORK CENTERS	135
A.4.9	EDUCATION PROJECT	135
A.5	POSTERS OF OPP	137
A.6	HOUSEHOLD SURVEY FORM	138
A.7	SURVEY TABLES	
A.7.1	GHOUSIA COLONY	139
A.7.2	ORANGI TOWN SECTOR-5	145
A.8	HOUSING TYPOLOGIES	151
A.9	LIST OF EXISTING VEHICLES AND EQUIPMENT OF KMC	152
A.10	GARBAGE COMPOSITION OF KARACHI	153

A.11 MUNICIPAL REGULATIONS	154
A.12 ORGANIZATIONAL SET UP OF ZMC	162
A.13 MAP OF ZMC LIMITS, WORKSHOPS AND LOCATION OF CASE STUDY AREAS	163
A.14 KEY PLAN OF GHOUSIA COLONY	164
A.15 LOCATION PLAN OF GHOUSIA COLONY	165
A.16 BASE MAP OF ORANGI TOWN	166
A.17 LAYOUT PLAN OF ORANGI TOWN SECTOR 5	167
A.18 PHOTOGRAPHS	168

1. ABSTRACT

Urban solid waste is considered to be one of the most immediate and serious environmental problems confronting urban governments in developing countries. Although municipalities tend to spend substantial expenditures (often 20-30 percent of the revenues), yet service level seldom reaches even 50 percent in major urban centers in developing countries.

The study was conducted with the main aim of assessing the community potentials for participation in improving the solid waste management system. Besides determining the role the non-governmental organizations (NGO)/ community based organizations (CBO) can play in organizing the community and filling in the gaps between the community and the municipality. Literature review conducted for SWM projects yielded some relevant examples; worth mentioning are two projects. In Kathmandu, Nepal, mass media were fully utilized to bring about behavioral changes in the way people made use of the municipal facilities and organized their self help potential for cleaning their immediate surroundings. In San Juan, Manila, Philippines, an effective resource recovery programme was initiated through educational campaign to generate employment as well as reduce the waste volume.

In this study, two slums, Ghausia colony and Orangi town were selected as case study areas in Karachi, Pakistan. Household surveys were conducted to assess the existing SWM system, garbage related habits, behaviour and practices. The existing system was found to be deteriorating due to the absence of proper garbage containers, indiscriminate dumping and insufficient municipal resources. The potentials for self help and for organizing and assisting the municipality were assessed. The previous experience with physical and financial participation in regularizing in the Ghausia colony, in laying of sewers in Orangi town as well as the household interviews showed the community in the two areas to be active and willing to participate in improving the SWM system.

The analysis of strength and weaknesses of the voluntary organizations in the two case study areas showed their potential to act as intermediaries between the community and the municipality. They could energize the community, contact the leaders, assist in forming street committees, organize cleanliness campaigns, train the trainers and do research for possible resource recovery.

Based on this field study, technical and social options for improvement have been developed, which are in line with the existing municipal system and resources. It is recommended that these options should be implemented in two phases. Phase I includes the use of appropriate garbage containers, the separation of dry and wet waste, the use of communal bins, the improvement of the organization of municipal staff in Ghausia colony and the introduction of private block collection in Orangi town. Phase II aims at using the rubber tyre or plastic garbage containers, maximum resource recovery, improved sweeping, utilizing arm roll containers and final disposal at sanitary land fill site.

For enhancing community participation for SWM, an IEM (Inform, Educate and Motivate) strategy has been developed to make the

community understand the dimensions of the SWM problem and educate them on the related consequences of ill health, proliferation of insects and decomposition of garbage. Based on their effectiveness and popularity, communication media have been proposed for different target groups in the community through individual contacts, target group activities and mass media.

It is concluded that the communities have both the right and the responsibility to be involved in the planning and implementation of their own health and services programme. The new partnership between the community and the municipality through NGO/ CBO can yield better results if a sustained IEM strategy is adopted for bringing in a change in people's attitude and more flexibility in municipal policy. Thus a model should be developed not as an option but as an essential approach to basic urban service delivery.

2. PREFACE

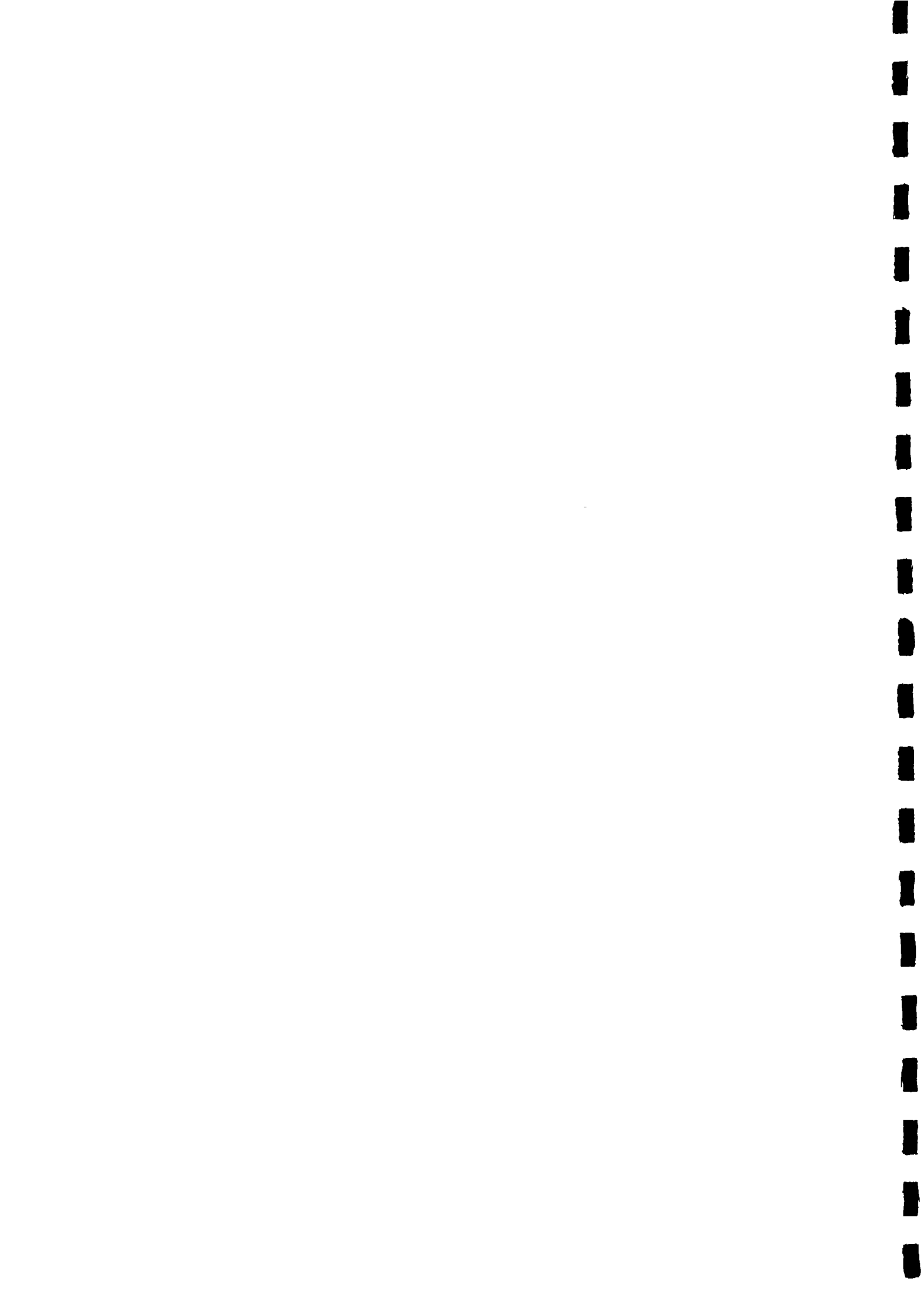
During a ten year period of my career with the Consultants in Pakistan as a Senior Engineer, Public Health and Environmental Engineering Department, I have come across many projects on water supply and sanitation for rural and urban areas, but few on solid waste management.

As part of my active involvement in the preparation of a feasibility study, project report and tender documents for a Solid Waste Management Project in Karachi, I conducted field surveys, municipal resources assessment and household surveys in low, medium and high income areas of the city. Because of this practical study, I came to the conclusion that a wide gap exists between the municipality and the community which is increasing with time whereas the service levels are gradually deteriorating. The municipality puts the blame on the people, whom they find non-cooperative, and points at the obvious reasons of limited manpower and resources which do not keep up with the exploding urban population and the formation of slums. The people on the other hand blame the municipality for not providing the required services. They consider clearing the garbage wherever it is and in whatever quantities it occurs as the civic agency's responsibility, regardless of their own behaviour and attitudes.

What should be done? Are there any workable solutions? Is there any practical approach to the problem of resources and behaviour? These were some of the questions which I found intriguing. The opportunity given by IHE and Waste Consultants enabled me to fulfil my desire of working on this study and looking into the problems of community behaviour and attitudes towards solid waste with reference to my own city, Karachi and to develop some options for the improvement.

Due to the limitations of time and scope, it was not possible to elaborate the aspects of recycling and resource recovery. However, sincere efforts have been made to address all the issues and problems associated with waste collection and disposal. It is envisaged that this study will at least be a stone on the step towards a solution for the problems of the community and municipality as far as the improvement of the SWM system is concerned.

I am indeed very fortunate to be able to work for my employer on a similar project for the entire city of Karachi, which will provide me with the opportunity to apply the knowledge I gained.



3. INTRODUCTION

3.1 GENERAL: During the International Drinking Water and Sanitation Decade, proclaimed by the United Nations for 1980-1990, the main emphasis was placed on the improvement of water supply and the safe disposal of human excreta in developing countries (DC). Solid Waste Management (SWM) received comparatively little attention (Schertenleib et al 1991).

Today, urban SWM is considered to be one of the most immediate and serious environmental problems confronting urban governments in developing countries (Schertenleib et al 1990). This is mainly due to the rapid urbanization taking on enormous proportions in Asia, Africa and Latin America. (World population projections for urban and rural areas is shown in Fig.1). An important feature of urbanization in developing countries is the rapid growth of large cities and metropolitan areas. In 1980, 5 cities in DC had a population of more than 10 million and that number is expected to increase to 17 by the year 2000 (Fig.2).

Managing solid waste is an inescapable requirement of urban life, a job that nearly everywhere is the responsibility of municipal authorities. Waste management is a costly service to provide, (typically) absorbing 30 to 50 percent of the municipal operating budget. Yet this service is frequently inadequate, with large parts of cities getting no regular attention. Future demands are certain to increase, as a city's residential, commercial and industrial sectors expand and the economy develops (Urban Edge 1987). Cities are absorbing two thirds of the total population increase in developing countries and are undoubtedly the major factors contributing to the economic output, employment and income generation in DC. However, the speed of the cities expansion has brought in its wake a host of serious environmental problems, which if left unattended, will jeopardize the sustainability of growth and development, and of urban life. This looming crisis manifests itself most severely in the mega cities of the developing world, which are on the one hand primary centres of production and service, but on the other beset by environmental problems the dimensions of which already defy municipal planning and management capacities (IBRD 1975). Inadequate management and disposal of solid waste is an obvious cause for the degradation of the environment in most cities of the DC. Many cities face serious environmental degradation and health risks due to uncollected domestic refuse on streets and in public areas, clogged urban drainage systems through indiscriminately dumped refuse, and contamination of water resources near uncontrolled tipping sites (Schertenleib 1990).

With the municipal budgets already strained, the key to improving SWM in many countries lies in greater efficiency. Based on the experience in many large cities of the world, Sandra Cointreau (Urban Edge 1987 and Cointreau 1982) pointed out that a number of techniques can help a city to provide the service at lower costs. These techniques include the choice of collection



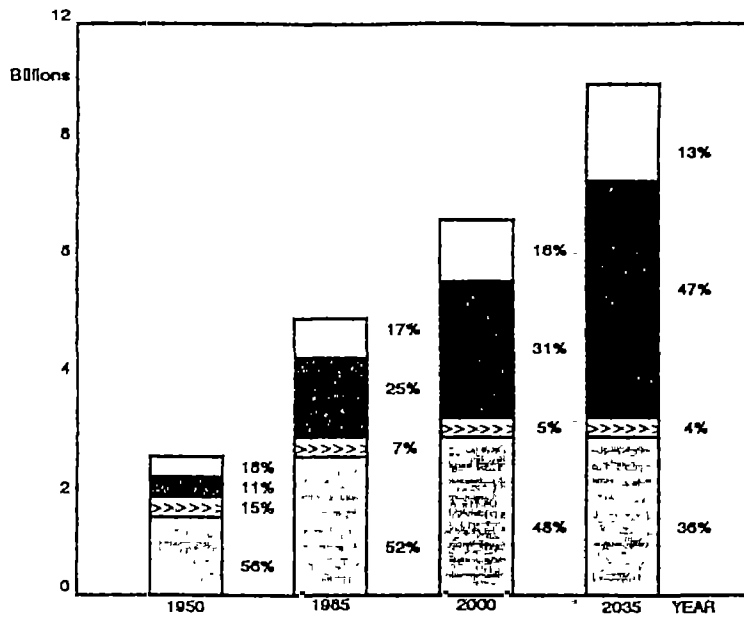
equipment, effective movement of collection vehicles, manpower management, decreasing maintenance time and developing public cooperation. Citizen participation has an important role to play in reducing costs and improving the efficiency of collection. Where public funds are sharply limited (e.g. in almost all DC), community cooperation may be the only way for a city to achieve an acceptable level of cleanliness.

Community participation in waste disposal can be a catalyst in community development work, because it gives residents a feeling of self-esteem. It can lead to possibilities for income generation through recycling, which will also reduce the quantities of material that have to be transported for disposal. Besides, waste management systems which include community participation and do not require high technology and inappropriate machinery might prove to be sustainable at community level, since income generating waste management systems can be maintained by low income communities (UNCHS-HABITAT 1989).

3.2 MAGNITUDE OF PROBLEM :

3.2.1 General: Rapid urbanization, low levels of income and savings and high costs of urban services are critical factors contributing to the widespread deterioration of the urban environment in most of the DC. The serious deficiencies in urban services are now widely recognized, but planning, resource allocation, financing and implementation of service delivery are generally unintegrated and disjointed. In many DC's, especially in Asia, fiscal resources fall short of the amounts needed to improve the urban services, even if they were to be given high priority in developing policies (Prakash 1988). Some general aspects leading to this environmental crisis are described below:

(a) Rapid urbanization: Over the past thirty years the DC's have been transformed from a world of villages to a world of cities and towns (World Bank 1991). Between 1950 and 1975, the urban population of all DC's grew at a very high annual average rate of nearly 4.2 percent, and was projected by UN studies to continue growing at more than 4 percent a year until 1990, (United Nations 1980) adding 45 to 50 million new urban residents as all countries in all regions have experienced sustained urbanization (World Bank 1991). Migration from rural to urban areas will continue to account for up to half of the population growth of cities in the DC, especially in Africa and Asia. This demographic shift means that many DC's will have been transformed from primarily rural to largely urban societies in less than a quarter of a century (Cheema et al 1988). An enormous number of urban dwellers will be added to the population of the third world cities by the end of this century. The United Nations project that more than 66 percent or nearly 2.2 billion of the world's total population will be living in developing countries by the year 2000 (IBRD 1975). It is expected that the world population of 6.1 billion will increase to 8.2 billion by the year 2025 or a 71 percent increase in a period of 40 years. The other



WORLD POPULATION

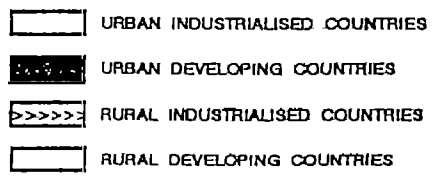


FIGURE 1

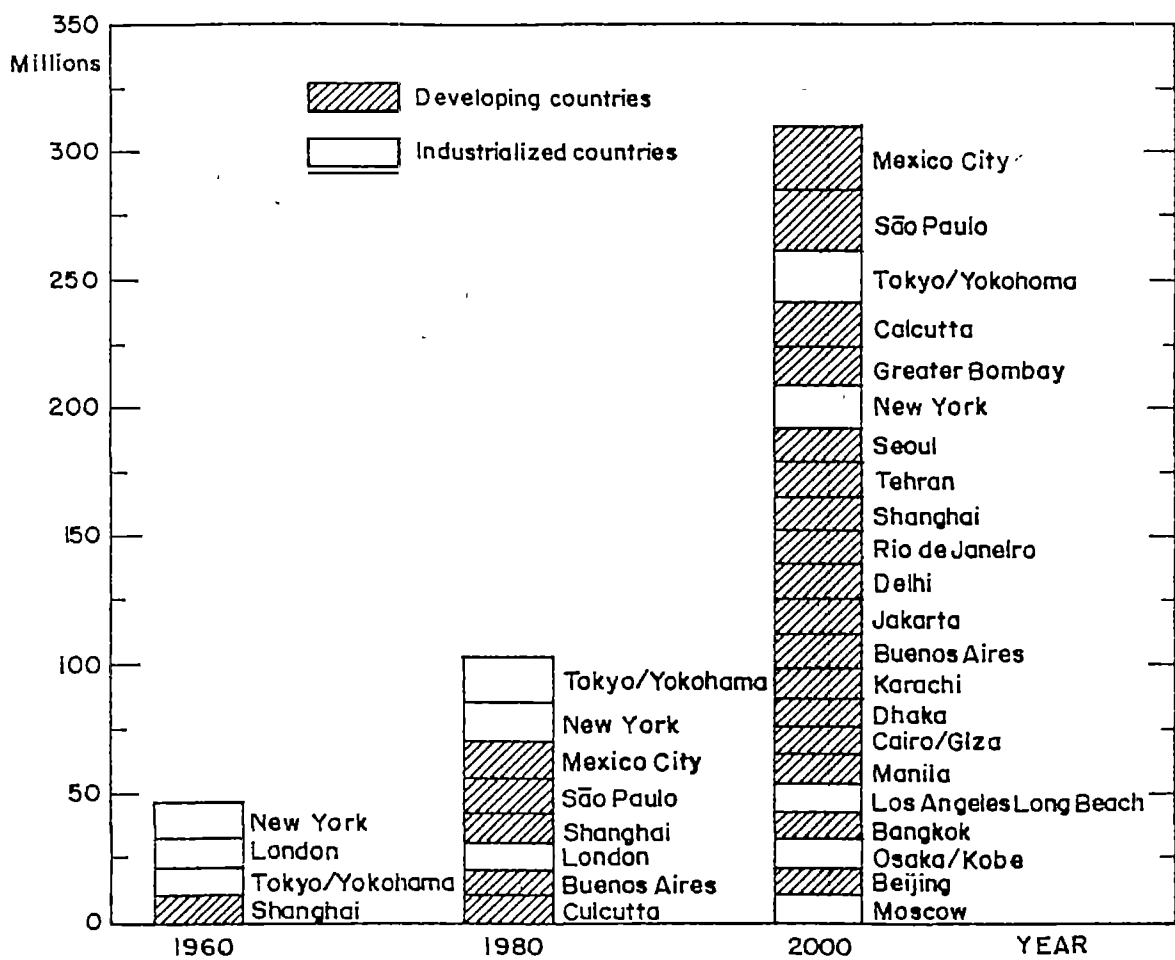


FIGURE 2

URBAN AGGLOMERATIONS
(Over 10 million People)

calculations refer that by the year 2000, 7 out of 10 people will be living in today's DC (UNCHS- HABITAT 1986).

(b) **Shifting of Poverty:** The rapid increase and continued concentration of population in Third World cities will correspond with a dramatic shift in the incidence of poverty. World Bank studies indicate that although about two third of those households now living in absolute poverty are to be found in rural areas, by the end of the 1990s more than half of the absolute poor will be concentrated in urban places. In South Asia the number of HH's is expected to triple from a little more than 10 million in 1975 to about 32.5 million in the year 2000. Assuming an average HH size of 6 people, this would be an addition of nearly 245 million people living in poverty in the Third World cities by the end of the century (Cheema et al 1988, United Nations 1980 and Todaro 1980).

(c) **Demand of Urban Services:** Human settlements require integrated development and upgrading of all infra-structure components if satisfactory living conditions are to be achieved and social and economic development of the inhabitants are to be promoted. Improving a single component of the infrastructure will not support the level of community development which could be achieved if a combination of components were to be integrally upgraded at a costs affordable by the community concerned (UNCHS- HABITAT 1986).

Extending urban services to the poor has become a difficult problem to solve not only because of its magnitude and severity, but also because it belongs to a group that policy analysts have come to call "wicked problems" (Rittel et al 1973 and Rondinelli 1976). Any attempt to increase the coverage and quality of urban services for the poor, may encourage even more migration, thereby diluting both the coverage and quality of existing services and straining even further the limited resources available to reduce growing deficiencies. Among the most effective alternatives to rapidly expanding central and municipal government expenditures - a necessary but limited possibility in most DC - are policies that aim at changing the conditions under which services can be provided. This could be brought about by creating market surrogate arrangements, public-private sector cooperation, self-help, sites and services, and community upgrading schemes, mobilizing of voluntary and community groups, market mechanisms and the private sector (Cheema et al 1988).

(d) **Non Utilization of Resource Recovery and Reuse:** Reclamation of urban solid waste can contribute to a solution of the immense problems the municipalities and population are faced with. Urbanization in the DC's is posing innumerable problems in the field of production and disposal of wastes, thus causing pollution and environmental hazards. The potentials of recycling and reuse has not been seriously explored by any municipality and community as a means to solve their own problems, whereas only

these aspects can help in solving the following problems:

- The steadily decreasing employment opportunities. ILO projections show that labour force of the DC's is expected to increase from 1.2 billion in 1980 to 1.9 billion by 2000, around 700 million new jobs will therefore have to be created just to maintain the existing employment levels (UNCHS-HABITAT 1986).
- The increasing problems of municipalities in coping with the removal of urban solid waste. Governments in the DC's have very few possibilities to reclaim the costs of a proper waste collection and disposal system. Notwithstanding the resources invested in such system, the results are seldom efficient. The recovery and reuse of solid waste materials will provide opportunities for a reduction in operating costs for waste reclamation.
- The need for import substitution to save on foreign exchange. Most DC's are short of foreign exchange needed for the import of their raw materials. The most obvious and effective method is to conserve materials that are in short supplies by means of recycling. Although government policies are mostly aimed at competition with or elimination of the practise of "informal" scavenging, private recycling and resource recovery has a potential for saving on public finance.
- The growing strain on environmental conditions. The use of natural resources by explosively growing populations is putting resource system under great stress, mostly visible in large urban centres. Wastes are indiscriminately discharged in a manner that destroys the natural and biological cycles. The combination of massive urban growth and very low levels of development often severely effect the environmental conditions. An increased reclamation of waste will reduce the quantity of waste being dumped in open landfills or in the streets, and will offer an opportunity for the improvement of the environment (Waste consultants 1991).

3.2.2 Specific:

Based on extensive literature reviews, observations and discussions in a number of DC's, four typical problem areas with respect to SWM have been identified: (Schertenleib et al 1991)

(a) Inadequate coverage of the population served: Existing municipal SWM schemes generally serve only part of the urban population. In a typical urban area, the municipal service picks up about 50 to 70 percent of refuse and serves less than 50 percent of the population. The population of low income peri-urban areas is usually deprived of any service.

The lack of adequate institutional arrangements and the low financial and technical sustainability of existing collection systems are the main reasons. The waste generated by the fast growing cities is more and more beyond the collection capacity and financial limitations of most municipal administrations. Usually, not even the operation costs of collection services are covered by the fees, and the available funds from the central budgets are insufficient to finance adequate levels of service to

all segments of the population. In a situation where resources are scarce, priority is usually given, mainly for political reasons, to mid and high income areas. In addition, many urban poor live in unplanned and unauthorized areas (often outside the municipal boundaries) and are therefore not entitled to municipal services.

Finally, in places where waste collection is in any way linked to resource recovery (formal or informal), there is no incentive to serve low income areas, because of the insufficient re-cycling potential of waste from these areas. The major environmental consequences are serious negative impacts on human health and the quality of life . Especially in peri - urban areas with low income communities, the hygienic situation with regard to basic sanitation and domestic waste collection is generally very poor (Schertenleib et al 1989 and Bartone 1989).

(b) **Operational Inefficiencies** : Although municipalities in developing countries spend substantial resources on waste management (often 20 to 30 percent of municipal operation revenues), they tend to do a poor job from an operational point of view (Schertenleib 1989 and 1991).

Operational inefficiency is due to the inefficient institutional arrangements common to municipal governments in developing countries. In addition, waste management services generally receive little attention from top city officials and are usually assigned to the lower echelons of municipal government or to the health departments. However, the more a city grows, the more solid waste collection becomes complex and requires top level planning and sophisticated engineering and management skills.

It is sometimes argued that inefficiency is also a major contributor to the typically low coverage mentioned above, and that increased operational efficiency would automatically lead to an expansion of these services. The financial constraints that could be alleviated by increased efficiency form only one of the reasons of inadequate coverage. Perhaps more important is the lack of incentives and pressure to extend adequate collection services to low income areas. Under such circumstances, it is more likely that the money saved by efficiency improvements would be used for other municipal activities rather than for expanding waste collection services to the poor.

(c) **Limited Utilization of Capacity of the Informal and Formal Private Sector in Recycling Activities** : On the one hand the informal sector has been playing an important role in SWM schemes, especially with regard to recycling activities. However, while being basically beneficial to the environment and supporting large numbers of poor workers, these recycling activities by the informal sector can conflict with the efficient waste management services. These activities also pose serious health problems to the worker community. On the other hand, although the materials recovered from the waste stream are marketable, the formal private sector has so far been rather

reluctant to participate in the recycling activities.

Probably the best known example of a city with informal scavenging and recycling is Cairo. Approximately 45 % of the municipal solid waste generated daily is collected by some 12000 Zabbaleens living within seven communities in Cairo. Another example is Manila where 3000 to 5000 scavengers are working daily at the land fill sites (Smoky Mountains), recovering more than 200 tons of material per day. In Mexico city and Manila, 5 - 10 % of the waste stream is recovered almost exclusively by the informal sector. The recovery of all kind of material from municipal solid waste by the informal sector is not only a fact of life which cannot be ignored or even abolished, it also offers opportunities to incorporate resource recovery into solid waste management schemes. Scavenging as a whole not only provides a source of income to one of the poorest segments of the population but also reduces the need for highly sophisticated and costly recovery systems. Therefore, these recycling activities should by no means be discouraged, particularly since resource recovery is now becoming a recognised component of municipal solid waste management strategies in industrialised countries.

(d) **Specific Problems Related to the Final Disposal of the Solid Waste:** Financial and institutional constraints are the main reasons for such a situation. If financing of the solid waste collection services poses a problem, the financing of the safe disposal of solid waste poses an even greater problem. Although most people are willing to pay for the removal of refuse from their immediate environment, they are generally not concerned with its ultimate disposal.

3.3 SITUATION IN KARACHI: Karachi is the largest city of Pakistan, which due to the population explosion is swelling to its ultimate limits from all sides. For reference the population configuration of Pakistan is given in Figure 3 (PCO 1981). Similar to the situation in other major urban centers in the South East Asian countries, the population of Karachi will grow to between 12 to 15 million people by the year 2000. For comparison, the population of major urban cities in Asia is given in figure 4 (Urban Edge 1987). The basic data of the city with respect to its location, history, demographic background and housing is given in Annexure A.1

Due to the shortage of housing stock for the lower income group and the mass migration that is taking place, slums or "katchi abadis" have sprung up within the city and its periphery. It is assessed that approximately 40 percent of the population of the city lives in these sub-standard settlements which are devoid of basic facilities and utilities. The government has taken the initiative to upgrade, regularize and improve these areas to provide decent shelter with affordable and appropriate services. Details on this phenomenon and the reasons for the proliferation of such katchi abadis are given in Annexure A.2.

POPULATION CONFIGURATION – PAKISTAN

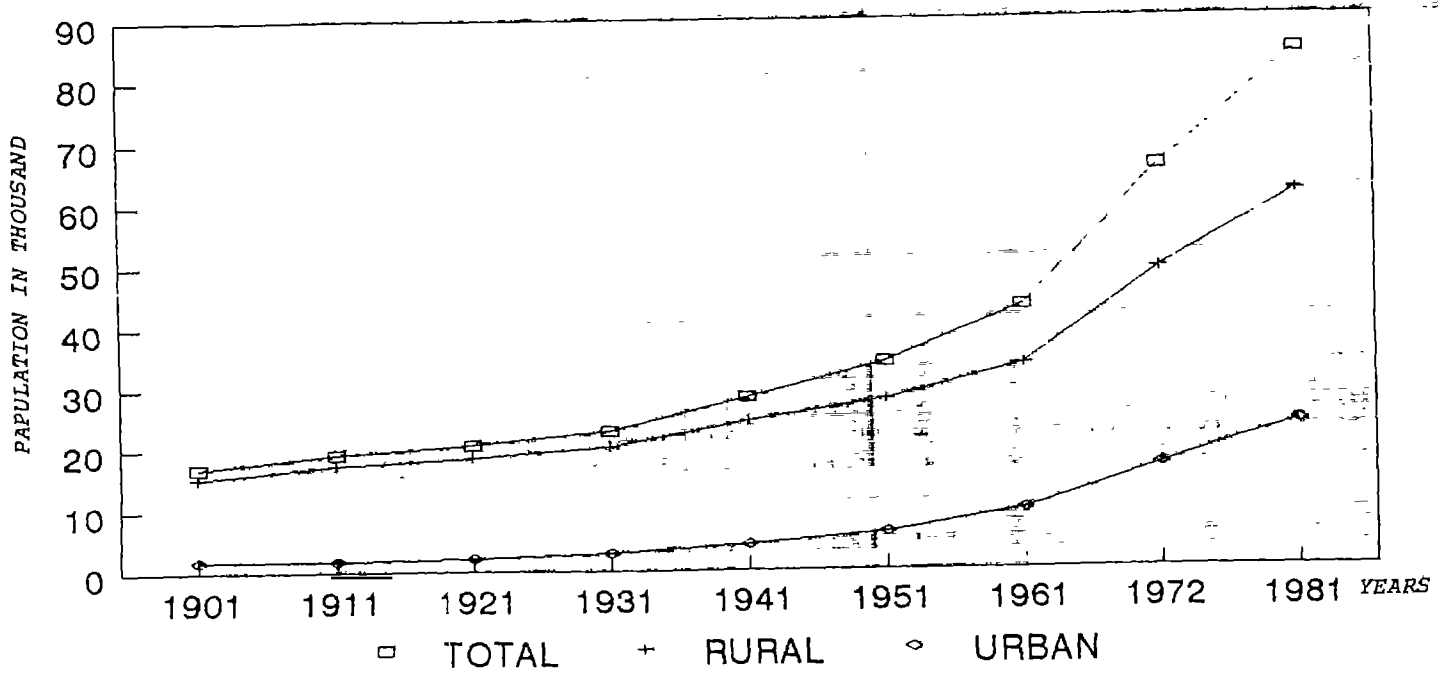


FIGURE 3

POPULATION GROWTH OF LARGE CITIES IN ASIA

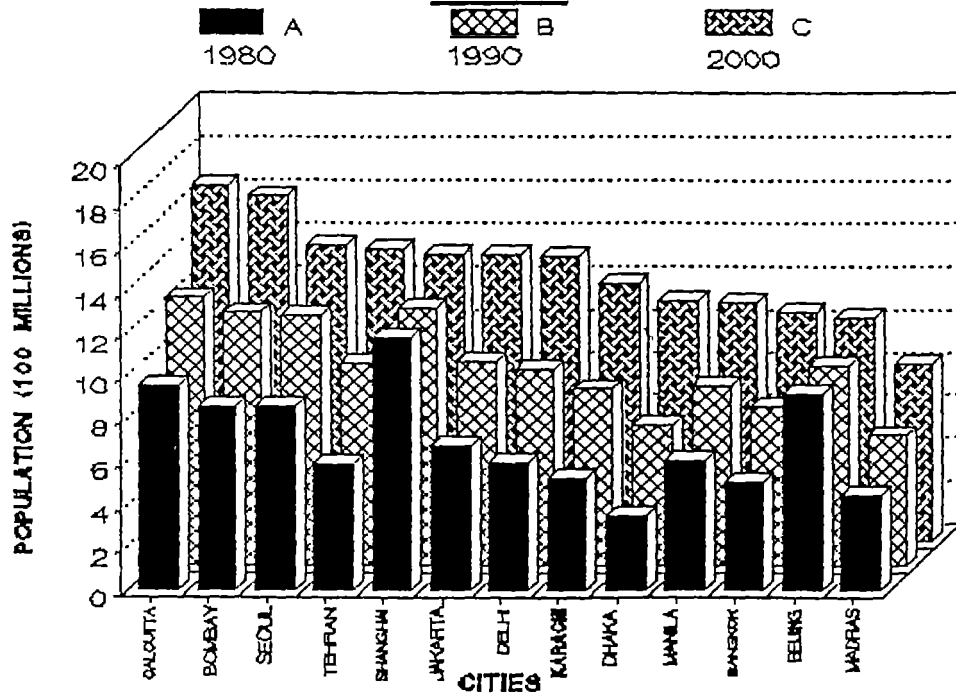


FIGURE 4

4. STUDY DETAILS

4.1 STUDY OBJECTIVES: The urbanization of DC's and the growth of spontaneous settlements are taking place on such a scale that national and local governments cannot cope with the demand for decent shelter conditions (e.g. in Karachi). At city level, this is most noticeable in the sphere of infrastructures. Services often fail to reach low income areas, while existing municipal services rapidly deteriorate. A municipal service that seems to fail most strikingly is solid waste collection which is often seen by the municipality as a problem of inadequate means of transport or the lack of modern and sophisticated equipment. When however, such equipment breaks down in DC's, the entire system fails (GTZ 1988).

In every major city of the DC's including Karachi, SWM is always found to be a gigantic problem with respect to the rapid population growth and the proportional quantities of solid waste generated. Yet the collection and disposal by the civic agencies never reaches the level desired, mainly due to lack of manpower, resources, finance and equipment. On the other hand, the involvement of and participation by the concerned communities are found to be negligible or minimal due to lack of motivation, awareness and the incapability to channelise their participation toward this aspect.

The main objectives of my thesis are to:

- Study the existing solid waste management system of a city in a DC (Karachi) and in an urban slum (Ghousia colony and Orangi town).
- Assess the deficiencies and shortcomings of the SWM system
- Assess community behaviour and attitudes toward waste handling, collection, transporting and recycling.
- Assess the community potentials for participation in the two case study areas.
- Assess the potentials and role of NGO's/ CBO's as intermediary organizations between the municipality and the community.
- Study the local municipal laws and policies to assess the role the community can play in managing waste.
- Determine the options for improvement of SWM systems through community participation.

4.2 SCOPE OF THE STUDY: There are many categories of solid waste, the term in this study refers to the waste generated through to the household activities in the residential areas. The term is further explained in Annexure A.3.

The scope of the study is restricted but not limited to the following main tasks:

- To carry out a literature study on the provision of basic services for low income population and slum areas with an emphasis on SWM systems.
- To assess the role of community participation in SWM in DC of the world, its success, failure, constraints and limitations in

- achieving the project targets.
- Selection of an urban slum, a community based organization and community in Karachi, Pakistan for a case study and field work.
 - To study the existing municipal SWM in the city , assessing the deficiencies, government and municipal regulations and policies.
 - Review of existing SWM in the case study areas with respect to storage, collection, transfer, disposal, recycling and reuse. Identification of the deficiencies and previous attempts made for improvement.
 - To assess community behaviour, and attitude towards waste handling, collection, transportation and recycling.
 - To make a thorough plan and network of contacts for the investigation of the local waste management situation through interviews and meetings with the local leaders and surveys of the selected households to assess the role and extent of participation by the community, CBO/ NGO and the civic agency.
 - To assess the recycling and resource recovery in the city and determine the channels and potentials of this trade.
 - To draw conclusions and suggest options and recommendations for the improvement of the SWM system through community participation and involvement.

4.3 WORK METHODOLOGY : Based on the study objectives and scope of the study, the work methodology was divided in two parts

PART I: DESK STUDY AND LITERATURE REVIEW

- Contacts were made with various institutions, organizations, agencies and personnel which have relevant experience with the topic of research. The aim was to gather the pertinent data available.
- The aspects of community participation in SWM projects in various DC's were reviewed as far as these were available through contacts and efforts made in the limited time for the study.
- Review of literature on community participation in SWM.
- Review of housing problems, emergence of squatter settlements and government efforts to upgrade the situation of the low income people in Karachi.
- Review of activities and field of work of the CBO's/ NGO's

PART II: FIELD STUDY

- Based on know how, available literature, previous studies conducted, background information and author's experience, two case study areas in Karachi were selected from among low income areas with NGO's/ CBO's.
- Establish, contacts and rapport with the community leaders, elected representatives and municipal authority. Preparation of questionnaire for the HH.
- Organization of survey team, training and meetings with the area representatives, collection of data of the area.
- Conducting pretesting of the survey in case study areas.
- Conducting approximately 10 percent sample HH survey in case study areas.

- Tabulation, analysis and scrutiny of data and gathering of results.
 - Study of existing SWM system in the city and in the two case study areas. Assessing shortcomings, deficiencies, previous attempts towards improvement, municipal plans and policies for SWM.
 - Study the recycling and resource recovery potential in the city of Karachi and the recycling system in the case study areas.
 - Assessment of the potentials of CBO's/ NGO's and the community through informal meetings and interviews.
 - Discussion of options for improvement of SWM system in the case study areas.
- Based on the data obtained from the field work and desk study, the options and recommendations are prepared.

4.4 CONFIGURATION OF THE THESIS: The study contains several chapters the summary of which is given below:

Chapter 5: Literature review contains the details of efforts made in Karachi and in other third world cities for the improvement of SWM systems. It contains ongoing and completed projects which are exclusively aimed at the improvement of the SWM system through community participation and enhancing resource recovery potential, which will indirectly result in a reduction of the quantities of waste and their disposal.

Chapter 6: The SWM system in Karachi gives an overview of the municipal SWM system in the city with its resources, deficiencies, future plans for improvements and legislation. The waste material collection channels, methods and its transportation to the ultimate users is described.

Chapter 7: Ghousia colony and Orangi town sector 5 were selected as case study areas in Karachi. The chapter gives the selection criteria and details of these two areas in terms of their location, area, population, problems faced previously etc.

Chapter 8: The household surveys describes the survey objectives and methodologies adopted for conducting the HH surveys in the two case study areas. The chapter describes survey results such as the general housing conditions, garbage related habits, collection and disposal patterns, existing services, SWM system, previous attempts for improvement, recyclable items retained and sold. Besides a general and specific comparison with respect to garbage related data obtained from the survey for the two case study areas has also been included.

Chapter 9: The general role of the NGO's/ CBO's, their normal functions and framework are discussed in the chapter. The NGO in Orangi and CBO in Ghousia colony are scrutinized; based on the available information and data, their strength, weaknesses and the community contacts are highlighted.

Chapter 10: This chapter describes the various definitions of CP and its utility in SWM. Assessment of community potentials for participation in the two case study areas are made. The specific activities have been defined for the overall improvement of SWM

with the role of NGO/CBO in energizing the community. A strategy for community participation is developed and recommended which should overcome the existing behaviour and attitudes of the community due to lack of information, education and motivation. **Chapter 11:** This chapter deals with the possible technical and social solutions for improvement in two practical phases. Education and training material for various target groups have been identified and recommended.

5. LITERATURE REVIEW

In the literature review the previous attempts made for the improvement of the SWM system and their details were critically studied. The quantitative successes and failures have not been analyzed as the emphasis was on highlighting any efforts done by the community or cooperative for the improvement of the system. Below the projects and efforts have been summarised in two categories:

1. Projects in which the main aim is to improve the SWM system through community participation and in which resource recovery may or may not be included in the overall project.
2. Projects in which the main activity was to improve the recycling and resource recovery potential, with a reduction of wastes as an indirect benefit.

5.1 PROJECTS FOR IMPROVEMENT OF THE EXISTING SWM SYSTEM:

1. **Community Participation for SWM in Karachi:** Till today several efforts have been made for improvement of SWM situation in many areas by different communities in Karachi which are mentioned below:

i) **OPP's garbage disposal programme:** This is described in detail in section 8.4.4 of the thesis, since Orangi is taken as a case study area.

ii) **Block Collection system In F.B. Area:** Two years ago a block collection system for solid waste was introduced in middle income areas of blocks 10, 11 and 13 of Federal B. Area on the initiative of the local councillor and through community participation. Privately owned Suzuki vans are used which collect the garbage from the houses and dump it on a concrete platform specially designed in an open amenity plot. From here the municipal refuse vans collect the garbage. At this spot the scavengers wait for the collection vehicle and manually sort the recyclable material before the municipal van arrives. The spilling of garbage is also avoided. When the van reaches its fixed location in the area it blows its horn so that the house hold can put the garbage container near the entrance door. It is then collected by the two sweepers accompanying the vehicle. Nominal fee of Rs. 25 (US \$ 1) per month is charged for the service. This system is getting popular in other blocks of the area as well. User charges are collected by the workers themselves and the system is running at a profit. This amount charged is lesser than as compared to the private sweepers. Besides it is regular and dependable and helps in maintaining the area clean. Thus with the community's cooperation a better system was enforced.

iii) **Door to door system in North Karachi:** Sector 11- E of North Karachi houses low income people living in less than 100 sq.yards plots. The area is served by private contractors who come on donkey carts and collect the garbage from door to door. By means of the public's cooperation not only the garbage collection

problem is solved but the scattering of filth in the lanes, spilling over of dustbins, and unhygienic scavenging have also been greatly reduced. Special side boards are fixed on three sides of the carts to increase their capacity as well as preventing the waste from falling off.

iv) **Area Cleaning in Turk Colony, Baldia Township :** A group of boys in Turk colony, Baldia town, which lacks basic facilities, started a thorough physical cleanup of the area to have a place for playing cricket. The 111 members and 33 active workers of the group created a great local impact and received international attention as an example of children's initiative in environmental improvement. Finances were provided by the Pakistan Jaycees and technical expertise by UNICEF. Soak pits were constructed for waste water disposal and because of public pressure other municipal services were gradually introduced in the area. Garbage was properly collected and not thrown in the streets (Bhatti 1984).

v) **Educational Campaign in District Central:** An educational campaign was also started in a number of primary schools located in ZMC Central in Karachi. The school children were taught to maintain personal hygiene, throw waste into the garbage container at home and into proper litter boxes on the streets. Practical demonstrations and school cleaning campaigns were part of the programme organized by the municipality (ZMC). The project yielded good results but due to the absence of follow up activities and a loss of interest on the part of the organizers, the campaign could not maintain its momentum.

vi) **Community Participation and Education for SWM:** The Asian Development Bank is financing a project for the improvement of the SWM system in the city of Karachi, for which a feasibility study was conducted in 1984. Community participation and education were considered to contribute to the overall improvement. Later on the Bank considered these so important that community participation for the SWM project was changed into a separate and essential part of the programme. The project is scheduled to start in 1992 after recommendations have been made by the local Consultants.

2. UNICEF'S URBAN BASIC SERVICES PROGRAMME: The UBS PROGRAMME is a strategy with a community based approach, emerging from their experience in 70 countries of the world. The UBS programme aims to provide simple and low cost services at community level and involving community groups and individuals supported by the government in problem identification, planning, establishing priorities and carrying out and administering community level actions (UNICEF 1984). Through such channels access of the poor to basic services can be increased quickly. The approach which is now widely used in developing nations has become UNICEF'S basic strategy, which as Hollnsteiner points out and gives emphasis to:

- Active community participation by men and women.
- The use of suitably trained men and women chosen by the community to work there.
- The use of a substantially higher number of auxiliary staff with

enlarged responsibilities which will contribute to the transfer of professionally qualified personnel from routine tasks for more productive jobs as trainers, supervisors and programme directors.

- The application of technology appropriate to local, social, cultural and economic conditions.
- Contributions from the community to help finance basic services in the form of cash, kind, labour and other services.

Success with this approach has been reported from Rio de Janeiro, Lima, Kuala Lumpur, Colombo, Calcutta, Guayaquil, Addis Ababa, Mexico city and several cities in Indonesia (Cheema et al 1988). Another successful approach used in several Latin American cities has combined three fundamental elements for achieving community self reliance (Bartone 1986).

- The adoption and adaptation of appropriate technology.
- The incorporation of resource recovery activities.
- Community participation in management of collection and disposal services.

In Rio de Janeiro, Brazil, approximately 1 million people live in 377 different "favelas" (squatter settlements). The municipal sanitation company (COMLURB) suggested that only 3 percent of the city's household garbage comes from the favelas although they represent almost 20 percent of the population. An urban community development project was started in "Rocinha" with a population of 80,000 inhabitants. Its aim was to develop action plans for improving and implementing basic services in these settlements. The level of municipal service provided was quite inadequate with only 15 large containers emptied three times a week. Moreover the containers were at a considerable distance from the houses. A mutual aid group (Mutirao) was set up by the residents in 1970 to work on Sundays and holidays to clean the public areas with the municipality supplying the basic tools. The community constructed a new collection post for garbage which was then regularly collected by the municipality. The result of the project was that the PROJECT BECAME A PROGRAMME (UNICEF 1988).

3. Citizen's participation and Education in Khatmandu, Nepal: SWM with people's participation in Khatmandu, Nepal is a glowing example in Asia, which has mobilised the community's resources for the improvement of SWM system. The project is successful in its implementation and operation phases. As in all developing countries the project population of the cities of Khatmandu, Patan and Bhaktapur has for many years not cared much about the waste heaps around them. Presumably the hygienic situation was not felt to be so unbearable that the people would start to do something about it. GTZ (Deutsche Gesellschaft fur Technische Zusammenarbeit) started the "reorganization of SWM in Kathmandu valley". This model project was started through a long and difficult process as both the national and foreign staff and advisers were learning in daily practice. Gradually this process of learning became more and more organized so that a concept is available which provides solutions for a wide range of waste handling problems and which may be of some use for similar projects elsewhere (Thapa 1991).

The two well defined project objectives were (Thapa 1991).

- To reduce environmental pollution through collection and

disposal of solid waste.

-To establish a waste management system based on a high degree of resource recovery.

While the specific objectives for improving the efficiency and effectiveness of SWM system with special focus on community participation were (GTZ 1988):

- To review the existing situation with regards to community participation and education aspects in SWM system in Kathmandu.
- To assess the appropriateness of parameters applied in community participation and education.
- To provide policy recommendations for effective community participation and educational system.

To earn the cooperation of the people, a battle against their existing attitude was fought as the staff were trying to convince the people that clean streets and public squares are in everybody's interest. In this effort they resorted to television, radio, public rallies and door to door visits. In Bhaktapur it took a de-worming drive to convince the people that something had to be done about the filth. The adults had felt perfectly healthy until they took the de-worming medicine and then saw the worms in their stools. Their attitude started changing, and they were prepared to clean up the streets. The fight against filth has been most successful when it has managed to motivate the people to form self help groups to keep their own neighbourhood clean (Lehnart 1983).

Thus in a project of this magnitude involving a large number of people and arranging "get - the message" campaign is quite difficult when the resources for intense educational work in neighbourhoods are not available. The SWMRMC adopted a "media blitz" approach to raise the general level of awareness of people as a basis for initiating clean up campaigns. All available media were used to some extent, miking, radio, TV, fliers, hoarding boards, newspaper, magazines, traditional ministers and performers were also used (174) (175).

The project made a serious attempt to draw upon women's understanding and knowledge of household wastes, reaching women's groups is one of the eight methods of community penetration built into the project (Devkota 1990).

For the recycling of waste material a simple and cost effective concept has been developed (Thapa 1991).

- Using waste containers and reducing informal recycling and keeping the container site fairly clean.
- As compensation for the scavengers, a special area at the compost plant and at sanitary landfill site is provided where they can sort through the waste.
- A special health programme to teach scavengers how to reduce the danger of infection by applying protective measures and by cleanliness.

The project appreciated the efforts and contributions of local NGOs especially local self-help groups, to mobilize public opinion on matters of waste handling. It was reported that more than 46 local self help groups in Kathmandu, 19 in Patan and 12 in Bhaktapur were running programmes with the cooperation of SWMRMC (GTZ 1988).

The result of the project is that the people are well aware of the programme and the agencies concerned. Now waste handling

services have been recognized by the public as an essential and valuable service. Traditional ways of thinking have been gradually changing as a result of which people from different spheres of society have started to join in the task of cleaning and waste handling. Their aspirations have increased as now they are demanding a higher level of services, dictated by their increasing awareness. This can force the concerned agencies to streamline and strengthen their role with regard to service delivery systems (GTZ 1988).

The participation of the community in the collection of waste is made clear by the fact that the public containers placed at various locations in the urban area have been adequately utilized. The community has developed the habit of utilizing the containers as opposed to the previous situation with haphazard dumping of waste. It is illustrated from the fact that the filling rate of the container has increased at present to 70 percent from 10 percent at the introduction of the container system (GTZ 1988).

With the assistance of the project, a waste law was drafted which was approved by the cabinet, passed by parliament and subsequently put into force. The waste law provides comprehensive regulations for the entire waste sector in Nepal. (Thapa 1991) The "SOLID WASTE (MANAGEMENT AND RESOURCE MOBILIZATION) ACT-1987" can be considered as a major achievement towards the regularization of waste management activities and pollution control due to the principle of "polluters pay" (GTZ 1988).

4. In Korea a highly organized and integrated community development scheme under the auspices of "saemaul undong" (new community movement) began in 1971. Initially it focused on rural development but its wide spread success led to the expansion of the movement into urban areas in 1973. It subsequently became instrumental in engineering a wide range of urban physical improvements, combined with self help activities sponsored by neighbourhood associations. Garbage and manure collection was carried out with the use of specially equipped manure trucks or garbage carriers operated by the municipality. Upon hearing the vehicle's bell housewives carry their garbage to the truck. Delayed and irregular collection and long trips to the cart were the main inconveniences in the densely populated upland community. Through this programme improvement of basic urban services, social services, income generating projects and housing improvement have also been undertaken (Park et al 1986).

5. In Bandung, Indonesia a dual SWM system has started comprising the community and the public sector. As "kampung" areas are generally not accessible to heavy vehicles, residential organizations organize their own house-to-house collection system with hand pulled carts. The refuse is deposited at road side collection points where municipal trucks collect the garbage once or twice a week. The system, however, operates in less than 40 percent of the urban area (United Nations 1984).

6. In Bamako, Mali, the population is rapidly expanding and so are the waste disposal problems. Besides, as young and educated people in other DC's find it as difficult to get employment after

finishing the university. The African division of PROWESS developed the idea of giving employment as well as solving the garbage problem. The graduates have formed a cooperative and collect the garbage from various places and deriving payment from this. The municipality is also helping them out, besides other international agencies. UNIFEM funded the project and PROWESS/ UNDP provides the graduates with training. The other project activities include training of women in small enterprise development, formation of the garbage collection cooperative, running of the enterprise for garbage collection and sanitation, elaboration and production of training materials on sanitation and family health etc. Through this project 16 graduate women are employed and the health and sanitation condition is improving in Medina- Coure neighbourhood, which has about 17,500 inhabitants. There is more awareness of health, sanitation and family planning issues among poor women and their families. Both the local government and other municipalities have responded enthusiastically to the initiative and are considering similar follow up efforts (PROWESS/ UNDP 1991).

7. Most Japanese cities and Singapore have developed good system for educating people (mainly children) on hygiene, with some attention to solid wastes. Japanese cities have the resources and trained teachers necessary to prepare appropriate lessons, attractive booklets, posters and diagrams to illustrate waste problems and the benefits of separation of clean wastes. One effective component of Japanese school curricula is field trips to waste management facilities. For younger children, garbage trucks are brought to the schools to demonstrate waste collection. Singapore employs sociologists and psychologists to assist in the preparation of educational programmes both for schools and the general public (Furedy 1991).

8. Chinese cities have basic hygiene in the curriculum, they devote resources to slogan campaigns and public signboards. Street committees are also instructed to pay attention to public awareness about garbage (Yang 1989 and Furedy 1991).

9. A comparative study of community participation in delivering urban services in several Asian cities in the mid 1980's showed very uneven success in sustained commitment by either traditional or relatively new local community groups to a range of residents needs (Yeung et al 1986:178). Hong Kong's clean city campaign in the 1970s contributed to the development of mutual aid committees because neighbourhoods were asked to look for waste problems. However these committees were mainly active in recreation, although they did cooperate in the clean up efforts because of persistent pressure from the government. A later review of the committees concluded that they were not viable as structures for participatory urban services.

10. In Calcutta, India, sections of ward 63 were thoroughly cleaned out in a pilot project co-ordinated by a voluntary group called "Let's Clean Calcutta". The labour and vehicles for this drive were supplied by the Corporation of Calcutta. The residents were informed of their duties through the media. Cleanup drive

was held with the help of residents, students and school children who also participated in the project (Furedy 1989).

11. During a major upgrading programme of refuse management in Riyadh, Saudi Arabia, publicity campaigns were held to familiarize the community with the equipment. Billboards, signs on side walks and printed leaflets advertised the new system. The local government then staged a parade of new refuse vehicles through the streets of the city to familiarize the residents with these (Anonymous 1978 and Cointreau 1989).

12. Usually SWM departments think that they know what is necessary for proper waste management and they expect to gradually persuade the public. This attitude does not help in establishing a good support from the community. In DC's, Colombo, Sri Lanka, a survey was held among the general public to assess the needs, priorities and habits of the users in order to incorporate these into the SWM system.

5.2 PROJECTS FOR THE IMPROVEMENT OF RESOURCE RECOVERY AND RECYCLING POTENTIAL:

1. THE SIRDO IN MEXICO: The SIRDO (Integrated System for Recycling Wastes) has been developed by the Alternative Technology Group (GTA) in Mexico since 1978 to develop technologies for recycling organic wastes in urban areas. The SIRDO is designed to manage the urban wastes and create a potential for income and employment generating activities. The system is based on intensive community labour inputs in all phases, from construction through maintenance and production, as well as on cooperative community management for day-to-day operation. The main activity is production of household compost and fertilizer for use in kitchen gardens. In a low cost housing estate on Mexico's south east coast, children cooperated enthusiastically in the separation of garbage and dumping of organic wastes for fertilizer. They even painted wall murals that showed how to use this system. Seeing this the community women were the next to join in and form a cooperative. Participation in these activities has built up women's confidence and strengthened their relationship with the outside authorities (Monasterio et al 1986).

2. PERA SA BASURA PROGRAMME: In July 1978 a plan called the "pera sa basura" programme (cash for trash) was organized to implement solid waste separation and resource recovery. The original programme envisioned the use of the existing informal system of resource recovery as the corner stone of the proposed plan. During the implementation the plan was modified. Instead of using the existing informal system, the implementors under the office of the Deputy Minister of Human Settlements created a parallel system to directly compete with the informal system. Eco-aides were recruited as collectors, eco-centers as junk shop dealers and a single recycling corporation was established to buy all the recyclables from the 30 eco-centers that were subsequently established.

By 1980, all the eco-centers were closed. Various analyses were made to determine the causes of the failure of the project. Experts

agreed that the primary cause was the adverse reaction to the project by the existing informal sector, most notably the junkshop dealers. Overall the collapse of the project can be traced to the failure to integrate or include the informal sector into the programme, which created a feeling of competition within the newly formed organization and gave rise to malpractices (CAPS 1991).

3. PRIVATELY INITIATED SOLID WASTE COLLECTION MANAGEMENT IN SAN JUAN, MANILA: A privately initiated solid waste collection project was started in San Juan, Metro Manila by the Metro Manila Council of Women, The Balikatan Movement Inc. (Balikatan) (Adan et al 1982). The project demonstrated that a privately initiated programme can complement the government approach to its waste collection management programme and at the same time can generate a livelihood from the recyclable materials. (CAPS 1991). In 1983 Balikatan started organizing existing junkshop dealers in San Juan in order to make them buy recyclable items. Balikatan organized the recycling activities on two levels, a household and a junkshop level. On the household level it held an educational campaign for the segregation of dry and the wet waste, communicated with the households by informing them on the schedule of waste collection, locations and telephone numbers of participating junkshops and made arrangements with the house owners associations for the entry of eco-aides on fixed dates.

Balikatan held an educational campaign to emphasize the advantages of segregating dry and wet waste. They promised the households that if their waste is separated, the council will buy all the dry waste. This will not only generate more income but will also decrease the quantity of waste to be collected by the government agency, the Environmental Sanitation Center. This will also conserve the natural resources used for the manufacture of this kind of finished material. The educational campaign was launched on different levels. Assemblies and forums explained the effects of pollution and its effects on air, water, land and the food people eat. Households were further explained how the solid waste separation can improve the environment and how it can financially benefit them. A list of recyclables were given to each family with the buying prices. Civic groups like Lions, Jaycees, Rotary were engaged to help in the educational campaign. Lectures were given to school children about solid waste recovery. Media were also utilized. Letters on solid waste recovery were sent to around 18,000 households in San Juan. Those type of letter is still sent by Balikatan four times a year.

Balikatan also supplied empty sacks to a pilot area in San Juan, to convince the people to practise solid waste separation. The programme failed due to the non-cooperation of the households, which employed housemaids who failed to follow the instructions regarding solid waste segregation because of lack of incentives. On the junkshop level Balikatan disseminated information regarding new waste materials that can be recycled, organized the junk collectors into groups with specific sectors of operation, gave assistance by granting loans and contacted the users of the waste materials that can be recycled. As a result of the research conducted, junkshop dealers have started buying non-traditional materials like cullents and straps of old rubber slippers.

In 1987 Balikpapan also started its solid waste recovery programme in Mandalyong where the Mayor was cooperative but the officials were not. As a result the efforts failed due to the fear that their alleged "income" from garbage collection would diminish.

In Manilla an ongoing campaign is presently being held to enforce an ordinance compelling the residents to separate the dry from wet waste. A similar enactment was passed and implemented in Newyork, San Francisco and Los Angeles in the USA. Another campaign started was to convince the manufacturers to label their packaging material according to what it is made and how it can possibly be reused (CAPS 1991).

4. In Olinda, Brazil, the community has established waste management enterprises. These are run by local residents. Manual collection schemes have been made for household services, community waste depositories have been set up where manual sorting and recycling is done together with manual composting. Small factories to produce brooms and other materials have also been set up (Bartone 1986).

5. Low income people in the Almaeda Norte section of Guatemala formed a cooperative, set up a waste collection service and began operating a pilot plant for the treatment of solid waste. Some of the waste is recycled and some is composted and used to prevent soil erosion and allow for tree plantation on nearby slopes. Approximately 3000 people are being served by this project.

6. The Institute for Sustainable Rural Development Foundation Inc. made an agreement with the Mayor of the city of Naga, Camarines Sur, Philippines, to handle the recycling of the city's waste. The city is spread over an area of 9600 hectares and has a population of 100,000 (1988) with a population density of 10.4 persons per hectare. The Institute has formed a cooperative of workers and scavengers which is financed by PROSAMPI or Institute cooperative. This new cooperative has the full right to the garbage and the dump site. The institute has planned to begin vermin composting for approximately 90 percent of the organic fraction. Recycling is also carried out with the community's assistance (Rossi 1991).

5.3 ANALYSIS: Limited information and literature is available on completed and on going projects involving community participation in SWM. With the available data and discussions on projects involving CP in SWM, an analysis has been made of projects mentioned in sections 5.1 and 5.2. The analysis has been done to assess the involvement of the community, extent and level of their participation, involvement and the role of voluntary organizations, involvement of the municipality, success/ failure and continuation of such projects etc. Projects with inadequate data have not been analyzed.

5.3.1 GENERAL:

1. Examples of SWM improvement projects were usually started on a very limited scale. Often small communities initiated the

improvement work on their own and in some cases through motivation by a PVO. Municipal involvement usually came at a later stage. The SWM project in Kathmandu is the only example of a city-wide programme of community participation started with the foreign assistance of GTZ. Many areas of Metro Manila also have resource recovery programmes initiated by a PVO.

2. PVO-initiated SWM improvement projects are usually successful, such as Mutirao in Rocinha, Samuel Undong in Korea, Balikatan in Manila and Let Us Clean Calcutta in Calcutta.

5.3.2 SPECIFIC:

1. OPP's Garbage Disposal Programme was initiated and organized by an NGO in 1984. The community was contacted through posters, handbills and lane meetings held for sanitation. Lobbying with the municipality was done by contacting the councillors and sanitation staff. The programme failed in the same year, mainly due to its non-technical approach and minimum participation by the community. Besides, efforts to motivate and mobilize the municipality were also unsuccessful.

2. The Block Collection System in Federal B Area and the door-to-door system in North Karachi were initiated by the respective area councillors, who are part of the municipality. No voluntary organization was involved. The community was mobilized through the councillor's personal contacts and the efforts of the private contractor. This is a better system both physically and technically, the communities in the two areas responded well and the system has been working till today. In the course of time the solid waste collection system has also been extended to other areas in the Federal B Area which is proof of its popularity.

3. The cleanliness campaign in Turk colony in Baldia town was initiated by young boys of the community. The project was in the limelight for a very long time. Due to social pressures from the community, the municipality serviced the area. The project could not be continued due to the absence of follow up and diminishing interests of the organizers and sponsoring agencies.

4. The motivation by the mutual aid group MUTIRAO set up by the residents yielded good results in cleaning the areas with municipal assistance. In the absence of municipal facilities people from the low-income areas organized their own primary waste collection schemes. The municipality was involved in the secondary stage of collecting the garbage. Physical participation and involvement in decision making by the community members made the project successful. The project later turned into a programme.

5. Sustained community education programmes organized by the municipality with the use of different communication channels are showing good results in behavioral changes among the people in Kathmandu, Patan and Bhaktapur in Nepal. All the elements of the SWM system were tackled by the municipality and GTZ to improve the existing system and optimize the resource recovery potential. The habit of using the communal and shared system are inculcated upon the masses. Involvement of voluntary organizations and communal cleanliness campaign for cleaning courtyards show a good physical involvement by the community.

6. A good community cohesion was developed in some areas, motivated by the Saemaul Undong in Korea, which played a key role

in making the people understand the waste problems and in organizing the community to find solutions. A Block collection system with municipal pick-ups solved the garbage problem in the area with physical participation by the HHs in the form of carrying and disposing garbage in the vehicles. The success can be estimated from the fact that the community has started other joint productive communal activities besides waste collection.

7. In Bamako, Mali the motivation of international sponsoring agencies yielded fruitful results in utilizing the efforts of young graduates. The community is motivated and energized by means of training on sanitation and family health. Nevertheless the community role is considered to be passive, in spite of the personal devotion and attention of the employed staff. It is envisaged that it will take quite some time to bring about a change in people's habits. The extension of this project to other areas symbolizes the popularity of the project approach.

8. In Hong Kong, Community organization and street committees formed to mobilize the HHs to properly dispose of garbage by means of municipal directives did not produce the desired results due to the absence of incentives and a community education programme. Besides, absence of involvement of the voluntary organizations also contributed to its failure as compared to street committees in China.

9. The "Let Us Clean Calcutta" Campaign was organized by a voluntary organization with municipal assistance. The campaign attracted the attention of the people through the use of mass media. People participated voluntarily in area improvement, yet the campaign did not yield successful results due to its limited project area, absence of continuous community activities and community education. It is believed that such immediate face-lifts of an area do not inculcate a behavioral change among the people.

10. The SIRDO project in Mexico is an example of a good idea for solving the waste collection and disposal problems through community initiatives, incentives and income generation-activities. Economic benefits were the main reason for participation by the community. Physical contribution by the community and technical assistance and motivation by the voluntary organization proved to be successful without the involvement of the municipality.

11. A privately initiated SWM system in San Juan, Manilla, is a good example of the involvement of a voluntary organization in educating and mobilizing the community. Sustained educational campaigns coupled to incentives in the form of financial benefits mobilized the community. Research into collection of additional non-conventional recycling items proved to be helpful in waste reduction at the source and in economic gains for the community. The extent of participation by the HH's were found to be limited to the sorting of recyclables at HH level and the proper disposal of wastes. Involvement of other civic organizations also yielded fruitful results in mass communication. The municipality gave its blessing to the project but was not directly involved. The project details showed that absence of approval by the municipality in other areas made the efforts unsuccessful.

12. A Waste recycling experiment set up in a suburb in Guatemala city proved to be extremely successful in attracting foreign

donors and municipal assistance. The setting up of a SWM system for the collection, transportation and sorting of garbage and selling the recycled products is in itself a unique task carried out by a poor community through a neighbourhood managed organization. Physical participation by young children has been witnessed. The extension of the project to other areas of the city depicts the project's success.

5.4 CONCLUSIONS: Based on the previous and on going attempts for improvement of SWM system as described in the earlier sections, following is concluded:

1. Optimization of both the factors i.e. improving the existing SWM collection and disposal system through present resources with mobilizing community participation and resource recovery can contribute significantly to the overall improvement of the system as practised in many Latin American countries.
2. NGO/ CBO/ Cooperative can contribute in solving SWM problem and can yield successful results. Regular cleanliness campaign can change the status of a project to a continued programme like in Rio de Janeiro, (Brazil), Korea, Karachi and Kathmandu.
3. Educational campaign at schools are useful to involve the children who can be motivated easily and can become a change agent in behaviours for their families as well like the efforts done in Karachi, Calcutta, Japan, Singapore and China.
4. Improvement in the system can also be achieved by employing young and energetic educated boys and girls like in Bamako, Mali.
5. Educating the people of the municipal facilities and familiarizing the equipment and efforts done by the municipality can help in making use of the existing SWM system like in Riyadh (Saudi Arabia), Japan and Singapore.
6. Government sponsored local organization like street committees can be a good unit for control and management like in China because of better administration as compared to mutual aid committees set up in Hong Kong.
7. The self help community organized service can be integrated with the municipal services if door to door collection is organized for waste collection and transportation to a convenient location to be picked up by the municipality like in Karachi and Bandung.
8. Formation of community based organization can also be integrated and combine with other improvement works of basic urban and social services, income generating and housing improvement projects like in Korea.
9. Continued educational and research on possible recycling material are required preferably conducted by the private initiated organization for the optimum recovery in which the benefits to the individuals and the environment can be explained like in San Juan, Manila
10. In large urban center it is difficult to form a cooperative for buying the garbage and employing the scavengers for a composting project like in Naga, Philippines. Marketability and its use has to be assessed before practising such programme like in Guatemala where compost is used to prevent soil erosion and tree plantation.

6. SOLID WASTE MANAGEMENT SYSTEM IN KARACHI

6.1 THE SYSTEM : Solid waste management has been mandatory function of KMC. It employs about 8875 sweepers, besides a fleet of vehicles including refuse vans, arm rolls and compacters. The garbage is disposed to the dumping site about thirty kilometres from the down town. KMC manages the SWM system through four zonal municipal committees, covering an area of about 280 square miles (ZMC 1989). The municipality spends about 8 percent of its annual budget on SWM system. 65 percent of the waste generated is of domestic and commercial in nature (Chaudry 1989).

Other organizations sharing the function of SWM with KMC are seven Cantonment Boards, Karachi Port Trust etc. covering an area of about 100 sq.miles. Although KMC along with other organizations covers most of the area in Karachi, but with the present manpower strength and equipment can only manage about one third of the total waste generated in Karachi. The remaining two third remains uncollected rotting in various localities of the city and creating various nuisance and health hazards for the inhabitants (NESPAK 1985c).

The average composition of garbage in Karachi varies significantly from locality to locality and especially between low, medium and high income areas. As per 1984 survey the average range of garbage composition in Karachi is compared with Orangi samples and is given in Annexure A 10. The average generation rate was calculated as 0.534 kg. per capita per day with an average bulk density of 128 kg./cu.m.(NESPAK 1985a).

Refuse container in a house or placed in a community is an important component in the collection system. Its design was found varying from area to area and from dwelling to dwelling. The design and type of household container depends upon the type of dwelling where it is supposed to be used. In individual flats and congested houses where availability of space is restricted, small discarded tins, baskets and cans etc. are common type of refuse containers which are emptied or replaced almost daily. In relatively high income or posh localities where sufficient space is available, larger drums, tins and plastic buckets, enough for two or three days are used.

For communal bins concrete bins with or without doors, masonry bins with three sides constructed and one side open are used. Previously portable G.I. bins of 4 ft. diameter and 2.5 ft. high with lids were used but they are now redundant. Steel containers are provided for mechanical unloading by the compacters. At present they are unloaded manually because the mechanical system of most of the compacters are not in working order. About twelve, three wheel trolleys were introduced in the city to collect the refuse mainly along the road side. Open plots, back lanes, spaces at the intersection of the streets and roads, playgrounds, open drains and other such places are usually used as informal dump places for refuse. The common occurrence of such type of places is higher in middle income localities or more sparsely populated areas. Masonry and cement bins are also constructed near the markets, hospitals, schools, flats, parks, office buildings and other such places to collect the refuse coming out of these

premises (NESPAK 1985a).

Frequency of refuse pick up by the sanitation staff varies from area to area. In most densely populated localities and commercial areas the frequency is high. In posh localities and upper middle income areas where the lanes are wide and the areas are more scarcely populated, the frequency of refuse pick up is less. A survey conducted by the NESPAK in 1984 revealed that 55 % of the domestic garbage is being thrown into the municipal bins and the rest goes to the back lanes, open drains, open land etc. (NESPAK 1985a).

The refuse collection system of the city is divided in two categories that is the primary and the secondary collection system. The refuse collection and disposal to the bins etc from individual premises, institutions and offices, markets and streets constitutes the primary collection system. The refuse collection from individual dwellings is being carried through private sweepers who are employed by rich and higher middle income people to sweep their houses as well as dispose the garbage. Generally the sweepers employed to sweep the dwellings are women and constitute about 70 % of the domestic sweepers strength. The sweepers sweep the premises and put the swept material in the outside bins or other nearby disposal points. In low income areas people do not hire a sweeper nor does the municipality service them regularly. In such cases the households throw and dispose their accumulated garbage outside the dwelling at a convenient location decided by themselves.

The institutional and commercial refuse is usually being carried out by the paid sweepers and the street sweeping is entirely done by the municipal sweepers. The sweepings are usually carried to the nearest dustbin in wheel barrows and baskets. Night soil from the unsewered areas is collected by the "halal khores" and are dumped in the nearby open drains, sea or carried by municipal night soil tractors. Open drains for carrying storm water is usually flooded by the garbage which are periodically cleaned and especially before the monsoon season by nallah coolies.

The secondary collection starts when the garbage reaches the bins and other collection points through primary collection from where it is carried to the disposal site. The garbage is transported through various type of vehicles like open refuse van, compactors and arm roll by the municipality. The list of which is given in the Annexure A.9.

The equipment used for SWM activities include brooms for street cleaning and gathering the wastes into small heaps which can be picked up and placed in the receptable usually a small basket. Wheel barrows are used to carry the swept material and accumulated garbage into the bins. Often locally made wheel carts are used for carrying the basket, usually used by female sweepers pulled by a string. Long blade shovels are used to carry the waste from the bins to load on the vans.

The official landfill/ open dumping site in Karachi is in North Karachi about 30 km. from the down town area, with an area of 8 acres. The dumped garbage is burnt and sometimes unofficially utilized for baking earthen pots. The capacity of the site has long been exhausted and due to this reason other unofficial dumping grounds are utilized by ZMC's due to close proximity.

6.2 DEFICIENCIES : The deficiencies of the SWM system in the city were noted by NESPAK in the feasibility report reference (NESPAK 1985a). Some short comings and deficiencies are briefly mentioned here:

- Most of the community bins are not in good condition either due to excessive burning of refuse or they have outlived their lives.
- Due to limited and small capacity of the communal bins often they are found overloaded which is also because of irregular clearance. People then tend to throw the garbage from a distance which makes heaps around the bins.
- Usually the sweepers set on fire the accumulated garbage to get rid of the huge garbage volume which creates tremendous air pollution.
- Due to lack of civic sense people indiscriminately throw the litter on the streets thereby increasing the work of sweepers as well as creating bad aesthetics. Besides people tend to throw the HH garbage at the nearest convenient place.
- Most of the municipal equipment have outlived their lives and need immediate replacements.
- As per routine an average refuse vehicle has to make 3 trips per day to the disposal site, while practically they make only one or two trips.
- The filling of refuse van by the motor coolies is not hygienic as the load is carried on the head and dropped in the van which results in spilling of the garbage also.
- The mechanical system of many compactors are not working hence they serve just as a refuse van.
- Due to the absence of official dump sites and its considerable distance from the city areas tend to make the drivers decide to dispose the load at any nearest convenient point.
- Lack of management control on the sanitation staff.
- Sweeping of the roads utilizes a lot of manpower with little benefits.
- The pathogenic wastes from hospitals and hazardous wastes from industries also find its way into the municipal solid wastes, endangering the health of the workers and scavengers.
- No proper final disposal method is adopted.

It is because of the above mentioned factors that the population of the city is not serviced regularly and efficiently. Besides the other health hazards due to these deficiencies leads to production of leachate and proliferation of insects and rodents. The garbage accumulations because of favourable climate and high humidity also accelerate the decomposition process of organic matter. Since most of the refuse contains domestic and kitchen wastes particularly from the low income and slum areas, it provides ideal conditions for breeding of mosquitoes, flies and cockroaches. Consequently the germs are carried away by these vectors resulting in spread of communicable diseases. Further more, pathogens and irritants leading to infection may be directly inhaled as wind transports fine grained refuse material from the open dumping grounds.

It is observed that most of the communal masonry bins were not in good condition either due to excessive burning of the refuse in the bins or they have out lived their lives . At present there are four workshops for repairing and maintenance of the municipal

vehicles. Sites for other three workshops have been earmarked and its design is in progress. The location of workshops, landfill site, ZMC's boundaries and location of the study areas is given in Annexure A.13.

6.3 Future Plans for Improvement: KMC has been striving hard to improve the conditions of SWM in the city and to improve its existing services. But due to the availability of limited budget, manpower, resources and finances were unable to implement any further improvement plans. On the contrary due to rapid increase in population the existing coverage/ collection figures are further decreasing. Besides the lack of civic sense, education and hygiene related habits in the people also aggravate the already worsen situation due to indiscriminate dumpings and informal garbage disposal practices. With the passage of time more garbage vehicles are becoming redundant and non operational. Sincere efforts of KMC for improvement of SWM is depicted from the fact that a separate SWM department has been set up and all the four ZMC's are carrying out further improvement works according to their budget, allocation and resources. The department is coordinating the sanitation activities of the ZMC, Cantonment Boards and other agencies in the city entrusted with the same work. The department is planned to provide technical knowhow about various scientific methods of recycling the waste and its disposal other than the indigenous method of throwing the waste on the dumping grounds (KMC 1991). In 1984 a feasibility study was conducted by NESPAK for the improvement of the SWM system in the city to enhance the capability of collection of garbage from 30% to 60% by the year 1992. The improvement works include detailed design of two more landfill sites, establishing three zonal workshops and siting of the community bins. Due to the importance of community participation for SWM, a separate project of two years has been chalked out for Karachi by the Asian Development Bank (KMC 1991). The recent addition of around 100 vehicles in grant from Japan and another tender of 42 refuse dump trucks and 50 arm roll vehicles is in process which will enhance the capability of the municipality. With the increase of further manpower the municipality will be able to provide a better service and further coverage in the low income areas.

6.4 MUNICIPAL LEGISLATION AND POLICIES: Legislation for SWM is important and essentially required to achieve planning and regulation of effective waste collection and disposal functions. The legislation places a duty upon the people and the municipality to ensure adequate arrangements for a clean and healthy environment. The legislation presently enforced in Karachi for SWM is governed by the Sindh Local Government Ordinance 1979 and the KMC (Prevention of Nuisance) Bye Laws 1976. Relevant extracts are attached in the Annexure A.11.

The Bye Laws are quite sufficient and adequate but are ineffective due to lack of proper enforcement. Public awareness of these laws is very limited and a sizeable population of the city is ignorant of their obligations. Infact the municipality has also failed to fulfil their duties and responsibilities assigned under the Bye Laws as clear violation of it is witnessed in every area of the city. It would be hard to trace any incident

in which prosecution for violation in the Bye Laws have been done. This lenient attitude and lack of service have together deteriorated the overall sanitary situation of the city (NESPAK 1985a).

6.5 RECYCLING AND RESOURCE RECOVERY IN KARACHI:

6.5.1 General: The material which is recovered from solid waste can be broadly categorized into two general groupings i.e. material which can be directly recycled and put back into use and those materials which requires considerable amount of processing before they can be reused. In the waste of Karachi the materials which can be directly recycled consists of paper products, glass, bones, cotton and textile, plastic, iron and waste from slaughter houses etc. Most of the recyclable material is picked up by the street vendors with door to door collection and scavengers from the communal bins and dump sites.

6.5.2 Household Sorting of Recyclables: The general trend is to keep the newspaper and magazines separate after use and is not mixed up with the wet waste (kitchen waste) because of its further use. Books and copies are also kept but since it has lower value not much care is taken. Empty glass bottles which are gathered at a definite place by the HH. Card board, boxes and cartons have no value so they are utilized in the house when required. Other items retained at the household level include tins, canisters, drums, plastic, iron, steel, metals, bones and bread(unleavened), while organic and kitchen wastes find its way to the bins. The above mentioned items are sold to the street vendors and in turn some money is obtained. This habits of collection differs considerably from high income to low income population. In high income areas usually the servants and sweepers collect the material and sell it to the hawkers and street vendors. In middle income areas and apartments, the sweepers collecting the garbage sort out the recyclable material, and sell it. The temporary servants who are working on job basis in many houses collect the recyclables and sell it. In these areas a high competition of "who takes it first" attitude prevails. Often the household himself sell the main saleable items to the street hawkers, who make a good business in these areas getting items at good profit. Besides the household also have a satisfaction of getting any amount recovered from it even how meagre it is. While in low income areas the household does the whole job himself and try to get the maximum financial gain out of it.

6.5.3 Scavenging: Scavenging or searching for discarded material is done on the communal bins and garbage heaps by the scavengers who are uneducated and poor persons who have migrated usually from the rural areas. Finding no suitable jobs they indulge in this informal sector where atleast they can earn their bread. In Karachi mostly the paper pickers are "Afghanis"(those who have migrated from Afghanistan). The scavengers search for their valuables at times before a municipal pick up is organized. A recent survey (Ali 1990) revealed that average working hours for these street scavengers are 9 per day varying from 7 to 13 hours a day. Walking on streets, searching markets and combing the

garbage dump, that's how they separate and collect the useful material in the gunny bags. It is assessed that they earn about Rs. 30-50 per day. The final accumulations are sold to the middle dealer, who are located nearby. For a better price often the scavengers coordinate together and hiring a vehicle, manage to reach the specialized dealer/ the end user. Due to the hectic scavenging activities at the bins, little valuable refuse reaches the dumping grounds. It is for this reason that few scavengers are found there.

6.5.4 Waste Material Trade: The scavengers and the street vendors sell their respective collected material to the middle junk dealers. The dealers are located usually in the periphery of the middle and low income areas and in the slums on public amenity plots and charge a profit of 10-20 percent on the material they receive. These dealers deal in any type of material which yield profit and sell it further to the main or specialized dealers who mostly deal only in one item. These main dealers are located in Shershah, North Karachi and New Karachi. Based on the garbage production of about 4500 tons per day for the city, a good quantity is recovered, the detail of which is given in the following table (PCSIR 1987). On the whole it is estimated that thousands of people are living their lives based on the earnings from these discarded materials.

TABLE: QUANTITY AND PERCENTAGE OF MATERIAL RETAINED IN KARACHI

MATERIAL	QUANTITY IN TONS	RECOVERED IN PERCENTAGE
POLYTHENE, PVC AND PLASTIC	250-318	75-80
PAPER CARDBOARD	230-300	80-85
GLASS (BROKEN)	26-34	70-75
BONES	43-56	75-80
TEXTILE (RAGS)	225-293	NA
METAL AND TINS	13-17	80-90
RUBBER	5-6	75-80
WOOD	12-15	NA
ROPE	16-21	NA
ORGANIC MATTER	1100-1400	18-20

6.6 ANALYSIS : The following is a brief of the potentials of the municipality and on analysis of the existing situation. Factors and activities which can improve the SWM situation in the city are also mentioned.

1. The manpower strength of the municipality is given in Annexure A.9. The manpower resources are considered to be quite insufficient for servicing the entire population of the city.

Especially the number of sweepers should be increased in many municipal constituencies with respect to their practical output and work load.

2. The vehicular strength of the municipality at present is given in Annexure A.9. Moreover the number of serviceable vehicles is even smaller as many of these vehicles are old and worn out. With the possible inclusion of additional vehicles (as mentioned in section 6.3) the garbage collection situation is expected to improve significantly. This will result in greater coverage of low income and slum areas of the city.

3. Due to the present SWM management practices, a lot of valuable time of the sanitation staff is wasted in procedural work. The operational output of the staff is required to be modified to optimize the output of the municipal resources. It is expected that the improved and simple procedures will yield an increase in the frequency of the garbage collection services.

4. The insufficient resources of the municipality is the result of non/ low municipal taxation for SWM. A better and affordable tariff structure should be made and implemented to generate more revenues for the municipality from the consumers of the service.

5. The municipal laws and regulations are to be updated and publicized through various communication media. Information, should reach every consumer of the service, and this should generate awareness and participation.

6. The number, size and location of the communal bins are to be decided on technical, social and practical terms. The community should be consulted in deciding and designing the SWM facilities of the area. It is necessary that the community garbage facilities are conveniently accessible to every household and are properly maintained.

7. An effective, functional, practical and detailed SWM Master Plan should be made for the entire city. Priority is to be given to slums and low income areas as well. Slums and low income areas should at least be peripherally serviced.

8. The municipality should involve the private volunteer organizations (PVO) and civic bodies for generating community awareness. The municipality should invite and include the suggestions and recommendations of the different social forums.

9. The municipality should include recycling programmes into its implementation policy. Resource Recovery Programmes should be initiated, organized and supervised.

10. With the design of the two more landfill sites in the near future, it is envisaged that the future waste disposal situation will be improved and informal dumping and burning will be avoided.

11. The municipality should develop low cost SWM solutions for various situations. Extended coverage to unserved areas can be provided through the initiation of community based primary collection schemes. In this area substantial assistance can be provided by PVO's.

12. Periodic staff training should be organized for the municipal staff, in order to achieve better results in terms of human productivity and quality of the service.

7. CASE STUDY AREAS

7.1 SELECTION CRITERIA: For doing the field studies two case study areas were selected from the city of Karachi. Following aspects were considered for selection of the areas:

- Low income areas, katchi abadi or a developed area in katchi abadi.
- Area to be in the municipal limit served by the municipal system.
- Similar facilities and organization of solid waste management in both the areas.
- Existence of an NGO/ CBO in the area, or presence of any local welfare and community organization.
- Area of locality should be such that a 10 % sample for household survey can be drawn easily.
- Areas which have been targeted for previous surveys and its results and data are available.
- Areas in which SWM problems have been quite acute and where previous attempts of cleanliness have been done in the past.
- The community feels that solid waste is a pressing problem, socially, hygienically or environmentally for which some efforts are required to be done.

Based on the above criteria Ghausia colony and Orangi town sector 5 were selected. Other pertinent reasons are mentioned in the coming sections.

7.1.1 GHOUSIA COLONY: Till 1985 the security of tenure in Ghausia Colony has been very low, which made for a certain degree of stagnation in the colony's development. As in September 1982 decision was taken that Ghausia Colony could be regularized and improved. The katchi Abadis (i.e. Unauthorized Settlements) that were regularized were rather well established colonies which already enjoyed a high level of de-facto security of tenure. Because of this, both the condition of the houses and of the environment (in terms of infrastructure and layout) were relatively good in other settlements, even before the regularization programme started, the settlements were already developing themselves. In this respect, thus, Ghausia Colony represents a rather unique case. Because of low level of security of tenure, improvement of houses and environment took place at a much lower pace, or not at all. It was because of this reason that Ghausia Colony was considered as a "Stagnating basti "(Van der Linden 1977).

The Ghausia Colony case shows that upgrading and legalization of stagnating settlements can be successful. It has long being denied that problematic areas with a high population density like Ghausia colony could ever be improved. Ghausia Colony is a proof of enormous potential of self help and peoples participation. Inhabitants of the area have voluntarily and most happily co-operated in the improvement works of their colony and in even financing it.

A special feature of Ghausia Colony which renders it even more interesting as a case of research is the presence of different ethnic group in the area. The city itself is a good amalgamation of people from different ethnic backgrounds and where the ethnic

feeling are quite strong (Van der Linden 1985).

So following reasons made it a choice for selection as case study area:-

1. Ghousia Colony is located much more centrally than other Katchi Abadis like Baldia and Orangi townships and pressure on land is probably greater.
2. Many welfare/community organizations have existed earlier in the area for solution of common problems of providing infrastructures and services.
3. Lease title has been granted to the residents and as such improvement in the area has started.
4. Total number of housing units are such that a 10% sample can be drawn which is manageable and can give a true picture of the area and its environments.
5. Previous attempts of solving solid waste management problems have been made and the community is aware of the problem and its consequences.
6. Availability of results of the previously conducted socio-economic and baseline surveys.
7. The area is in metropolitan jurisdiction and is serviced by the K.M.C.
8. The community is active and is motivated and has shown tremendous potentials during regularization and improvement process carried out by the municipal authorities.
9. Due to the implementation of upgrading programme by KMC the households have full confidence on the municipality.

7.1.2 ORANGI TOWN SECTOR 5: Orangi town is the largest squatter settlement of Karachi housing more than 800,000 people in sixteen sectors. Some sectors were developed initially by KDA to provide housing for the affected persons of other localities. The area became the target for residence by the incoming refugees from Bangladesh after 1971. Due to close proximity of the case study area to the city with respect to other sectors in Orangi town, it naturally started habiting earlier. But due to numerous deficiencies of infra- structures like shortage of water, sanitation and acute water logging situation it never became the focal point of attraction by the incoming population. The discussions with the area residents revealed that undeveloped areas farther located than sector 5 still has better land market than this area mainly due to the standing water problem and as such the commercial areas were not extensively developed on the peripheral boundaries like in other sectors and colonies.

Other reason for its selection was that it was a planned area where motivated people themselves have put in a lot of efforts through self- help in laying of under ground sewer lines but are presently becoming the victims of political negligence and indiscrimination, as the councillors attention is not much focused on the area. Besides the NGO has successfully executed the project of improvement of existing sewer lines, giving technical assistance and guidance and solving the outstanding problem of waste water flooding in streets. During the field visit also the condition of the area depicted that the problem is still present and the motivation exist for which channelizing is required.

7.2 CASE STUDY AREA - GHOUSIA COLONY: Ghausia Colony is also known as (part of) Pir Illahi Baksh Colony (P.I.B. Colony) or as Aqab (behind) jail colony. It is located behind the back wall of Karachi Central Jail (prison), while its other boundaries are demarcated by University Road, PIB bus terminal, P.I.B quarters and the wall of the 'City Centre'. The key plan is given in Annexure A.14.

The colony's location is quite favourable, it is not far from the city centre, close by Karachi's vegetable and fruit wholesale market, adjacent to main traffic arteries and main bus terminal. Nearby there are ample shopping facilities, while educational and health facilities exist in the immediate neighbourhood (Van der Linden 1985).

The land on which the settlement is built was originally destined to serve as an amenity area for the residents of PIB Colony, a legal settlement created in the early fifties to house refugees from India in 1947. In those days, the open space between PIB Colony and the Central Jail was given to some sweepers working in the area on a temporary basis. During the fifties, and even after, the settlement kept growing by accretion. Especially many people of Indian origin and Pathans from North West Frontier Province (NWFP) settled in the area. (Van der Linden 1985).

Security of tenure remained at low level as extension of the Central Jail was planned in the colony land. Low levels of security of tenure are attended with the low level of facility provision. Indeed, until the mid seventies, except for a few public stand posts, there were no facilities in the area. Over the years, many attempts were made by different groups of residents to obtain more facilities and to get colony regularized. However, all of these attempts were in vain, and in early eighties, Ghausia Colony was on the list of 72 non-regularizable katchi abadis (Van der Linden 1985).

In 1979, a councillor was elected who had promised to try his best for the area so after the election, attempts to influence the colony's future increased. During 1980, three welfare associations of the area sent requests to different agencies concerned and even to the President of Pakistan. The area councillor also started making efforts and contacted different authorities including Commissioner and the Mayor of Karachi (Van der Linden 1985).

In November 1980, the Commissioner convened a meeting of representatives of all agencies concerned, a decision was taken and Ghausia Colony "stands regularized" subject to some conditions the most important of which was that 30 ft. wide strip alongside the wall of the Central Jail is to be cleared and Directorate of Katchi Abadis & Evaluation (DKAE) will frame a plan of the area including area survey, concept plan and list of families living on the strip to be cleared. Since funds were not available with DKAE in 1981, the residents of Ghausia Colony were found willing to pay the expenses of the survey, which showed the genuine interest of the people and community cohesion in upgradation of their area (Van der Linden 1985).

In early 1982, the Commissioner again convened a meeting of representatives of the agencies concerned. The Commissioner

mentioned that the councillor and two welfare association which support the councillor had again requested for regularization and till that time Ghousia Colony had not been officially notified as Katchi Abadi. So clearing of 30 ft. wide strip alongside the Jail wall was handled as a priority matter. So during the course of time alternative plots were allocated to the shiftees in Bhitai Colony through the Cantonment Board, Korangi Creek. On December 31, 1982, shifting took place which completed in a few days. Later regularization activities occurred between various agencies and departments and ultimately the Commissioner recommended the colony for regularization under MLO 110 and in September 1982, by its Resolution No.907, the council declared Ghousia Colony a Katchi Abadi (Van der Linden).

It is to be noted that the number of the households affected by the layout plan have voluntarily and often happily sliced parts of their houses on the indication and marking by the area councillor even though the plan still awaited the council's official approval. By autumn 1984 cutting of houses and bringing streets and houses to the required width had been completed. Clearing of the strip of land along the Jail and the University Road caused the elimination of some 200 houses and affected another 30 houses partially. The research in 1985 showed that out of 200 households evicted from Ghousia Colony only 35 were found residing in Bhitai Colony (Van der Linden 1985). The layout plan of Ghousia Colony have been prepared by DKAE which spelled out its policy for planning and existing Katchi Abadis (Saleem et al 1983), which is attached as Annexure A.15.

As the demolition of houses or parts thereof is kept to the minimum the planning standards have been prepared more realistic taking into account the existing situation. Prescribed widths of streets and lanes relate to the minimum needed to bring about the infrastructure rather than referring to any code or handbook. The Colony has been planned to be serviced by major arterial roads on its periphery. Other standards are 40 ft. for major roads, 25 to 40 ft. for minor roads connecting the Mohalla, 10 to 12 ft. for minor roads with limited vehicular traffic 8 to 10 ft. for non vehicular traffic. As a general rule no house should be more than 100 yards from a vehicular road for accessibility during emergency. However standards were not applied rigidly. At the micro level the standards were sometimes handled with a certain degree of flexibility. Majority of the houses were affected in some way or the other. Thus the people so effected were allocated alternative plots in Baldia Township (109). An average of 12.5 sq.yds (median value 9.8 sq.yds.) was cut from the houses. Only 18 plots were not affected by this part of the programme (Van der Linden).

The 1983 survey data indicated that there are an over whelming majority of inhabitants who were happy and enthusiastic about the programme. Even people who had sacrificed much in term of space, labour and investment (in or rebuilding), appeared to fully support the development programme. The affected household showed their intentions on continuing their stay in the area even when their plots were greatly affected. By autumn 1984, bringing streets and lanes to the required width had been completed. The inhabitants had taken care of the cutting of their houses and the building of new compound and/or house walls. This showed the

confidence people had in the legalization process. When asked from the households about their opinion regarding the official upgrading programme of DKAE and its implementation, 72% of said they were fully satisfied with it 67% households felt positive about the cutting, they felt it was needed to make colony a proper place to live. Private transport can now make way and dead bodies could be handled in a respectful way and did not have to be transported over the roofs in order to get them out of the Colony (Van der Linden 1985).

Briefly the story of Ghousia Colony is a success story . It proves the viability of upgrading stagnating settlements having a problematic layout and high densities etc. There are some such settlement in Karachi which are stagnating in their development and many of them have the condition comparable to Ghousia Colony (Van der Linden 1977).

The case of Ghousia Colony also teaches an important lesson about peoples participation. The inhabitants have fully cooperated with the DKAE, executed DKAE'S plan, have voluntarily and at their own expenses brought the streets and lanes to the required width. Also the shifting met with the minimal resistance. The role of councillor has also been very important including acting as mediator between authorities and population which proved its value beyond any doubt. The case of Ghousia Colony shows that the benefits of the new institutional arrangements can reach down to stagnating settlements. Probably this was the first time such a thing happened in Karachi (Van der Linden 1985).

The area on which the colony is built is 18.5 acres, and before the programme started, it had around 10,000 inhabitants i.e. approximately 540 inhabitants/acre. The original layout is irregular and streets and lanes are narrow and winding (Van der Linden 1985).

Following is the land use of the area as per the Regularization and Improvement Plan of Ghousia Colony prepared by the Directorate of Katchi Abadis and Evaluation, KMC.

S.No.	Land Use	No. of Housing Units	Percentage
1.	Residential	1285	91
2.	Commercial	109	7
3.	Residential/Commercial	12	1
4.	Amenity	5	0.5
5.	New Plots	3	0.5
		1415	100%

The status was also confirmed through sample surveys in 1983 & 1986 which gives 91% for purely residential area and 9.3% for area when both residential and commercial use is combined.

7.3 ORANGI TOWN: Orangi Town is a Katchi Abadi (Sub-Standard Urban Areas SUA) a squatter town situated in the north periphery of Karachi and is one the largest Katchi Abadi, inhabiting 800,000 people in an area of approximate 5000 acres (OPP 1983). Familiarity with Orangi reveals that it houses a population as large as that of Gujranwala, Colombo, Amsterdam, etc., but

receives scanty services from official agencies (Khan 1987). Another figure quotes it to be nearly one million growing like other Katchi Abadis of Karachi with an annual growth rate of 7% per year (Sultan et al 1989). The area is one of the KDA Scheme notified in 1969 (Sultan et al 1989 and Kalim et al 1990). In Karachi division alone there are more than 450 identified Katchi Abadis housing around 40% of the city's population. At present Orangi extends over 8000 acres and housing over 100,000 families and this expansion and extension has not stopped till today. The settlers bought land from dallals (touts) and built without any help from the government. The majority belong to the lower class labourers, skilled workers, artisans, shopkeepers, vendors, peddlers, clerks etc. There is a sprinkling of middle class entrepreneurs. The sample surveys indicate that the average monthly family income is between Rs. 1000.00 to Rs. 1500.00.

Ethnically the population includes around 34% mohajirs (old immigrants from India), 27% Beharis (Urdu speaking immigrants from East Pakistan/ Bangladesh), 20% pathans from Northern areas, 14% Panjabis from Punjab and 5% local Baluchis and Sindhis (Khan 1990b, Khan 1987 and IUCN 1989). Orangi can thus be called a "Mini Pakistan" (Khan 1989).

Settlement in Orangi began in 1965, After 1972 it grew rapidly mainly due to the immigrants from Bangladesh within four years the township expended from 1300 acres to 3000 acres due to flooding of people. The greatest influx occurred between 1970-75 when 32% people migrated to Orangi, However after 1975 the trend seems to decline gradually from 32% to 24% by 1987 and than to 3% in 1988 which indicates a decline in the number of immigrants to Orangi (IUCN 1989). The problem was compounded by speculation in land and a fierce competition for its possession (OPP 1983). Land was provided at reasonal terms by the subdivider, housing was taken care by the Thallawala (manufacturing yard) but provision of services remained problem for people in the new settlements like Orangi.

The neighbourhood organizations thus become institutions of lobbying for urban services. The people however, had very little involvement in this process, which was managed entirely by the leaders with some superficial help from the self appointed office bearers.

Transport was established in the early stages by raising funds from within the community to pay a transporter to acquire a route permit for the area by bribing a relevant government agency. He could then ply his buses in Orangi. An additional lump sum payment would be made to him by the community as he would be working in an area which had no roads. It is stated that the office bearers of the neighbourhood organizations misappropriated large sums in the process. The people were aware of this but did not object as they were able to get what they desperately needed (OPP 1986a).

The only infrastructure put up by the local bodies in Orangi till 1983 was the building of roads and the construction of some storm drains from the lanes to the nearest open creeks. Very often people connected their latrines to these drains thereby creating pollution and health hazards (OPP 1986a).

Each lane constructed its own communal underground water tank into which the tanker emptied the water. To manage the

distribution of water the lane residents nominated a committee known as the "tanki" committee. The members of this committee were the trusted residents of the lane and as such its possible leaders. However, since water was scarce; the tanki committee members soon became very unpopular and were constantly accused of nepotism and corruption. If disputes were referred to the leadership or the "respected" residents, they always supported the accusers (OPP 1986a).

The people of Orangi depend mainly on "informal" (often underground) sources. Land is obtained through dallals; credit, material and advice for housing is obtained from thallawalas (block manufacturers). Self-supporting private schools and quacks (physical and spiritual) treat their ailments. They continuously resort to the black market for business facilities and welfare amenities. This huge informal sector and its black market is many times the size of the formal or official sector indicates the weakness of government planning for the poor. At the same time it also indicates the vitality of the poor themselves and their skill in the area of survival. Besides their vitality it demonstrated by the presence everywhere of "anjumans" and "associations" which lobby intensely all the time, presenting claims and guarding gains. It is further demonstrated by the growing consciousness, specially among the new generation, of their collective vote power and street power (Khan 1987).

The residents of Orangi felt that the development of the area and provision of services was the duty of the local councillors or the KMC or KDA. These organization on other land being unable to recover the development charges from the low income areas left things as they were, and the results was further deterioration of the substandard and unhygienic conditions in the lanes and in the area as a whole. Under these difficult conditions some people have themselves made several attempts to improve the sanitation of their lanes including constructing elementary sewerage facilities in a few areas like in Sector 5. A few people who can afford the cost have even made their own septic tanks. However, due to the lack of technical support many such efforts have been unsuccessful (Anzorena 1986).

Case Study Area : Orangi Town Sector-5

Sector-5 is a planned (authorised) sector of Orangi township. There are 57 lanes and 882 houses, the population is estimated to be above 7000 (Rahman et al 1984). The base map of Orangi town is given in Annexure A.16 and base map of sector- 5 is given in the Annexure A.17. The case study area was settled by the government in 1965, accommodating shiftees from various encroachment areas of the Karachi city, namely Gujar Nala, Jalalabad in Nazimabad and Goa Mill in Lasbela. Most of the original allottees either sold their plots or did not immediately occupy it, as Orangi was then a deserted tract of land devoid of all basic amenities. At 1969 the area was completely settled. Around the same time several organisation took shape, namely Anjuman-e-Bashindgan Sector-5, Tanzeem-e-Mohiban and Anjumn-e-Ghulaman-e-Ghousal Azam. These organisation's and their activities differed with respect to efforts for facilities like water supply, electricity, roads, schools and mosques. With time the activists succeeded through lobby with the authorities, in

obtaining the facilities. For the disposal of excreta, bucket latrines and soakpits were used, while waste water flowed into the lanes (OPP 1985c).

Contour of Sector-5 is such that, one third portion is very low lying surrounded by high contour. Waste water accumulates in this area, as there is no outlet. The only natural creek or nala, is far away. None of the lanes of Sector-5 have direct access to the nallah (OPP 1986 c).

The problems due to waste water flowing in the lanes was evident. Since 1977 activists of the area lobbied with the KMC and the area councillor for the construction of sewerage drains for the entire sector. In 1979 KMC constructed two open drains linking only a part of the sector to the nala. But the problem of disposal in the remaining lanes remained unsolved, the low lying area was the worst affected (OPP 1986 c).

From 1979 onwards developments started taking place in and around Sector-5. First road were laid along the two main roads. Piped water supply from the Hub was restored, Sector-5 started receiving regular supply of water. All these development adversely affected the low-laying area. With increased water supply and no disposal, acute waterlogging set in. Frequent bursting of the water main, with the roads being at a higher level, diverted the water to the low laying area, aggravating the situation. Many shops closed down and some were put to sale. Houses needed frequent repair, damaged by seepage of moisture through the floors and walls. People under worst circumstances had to daily pump out water from their houses. After rains in 1983 the area was flooded and for two whole days, the people had to pump out water from their houses or remove it in canisters. Soakpits being constantly filled were abandoned and effluent flowed in the lanes (OPP 1986c).

Observing the situation of distress, OPP social organizers, started motivation in the area. Research by OPP revealed that in order to connect the low lying area to the disposal, a secondary drain connecting, all 26 lanes is required. This meant in order to execute the work a combined effort of 26 lanes is needed which seemed difficult at first, but there was no alternative. The design of Sector-5 was one of the initial attempts of OPP in which the drainage design followed the natural contour. Plan incorporating the entire sector, consisted of 2 secondary drains, 1800 feet and 800 feet connecting 26 and 13 lanes respectively (OPP 1989 c). The work done so far by the people's cooperation and OPP's supervision is given in the Annexure A.4.

8. HOUSE HOLD SURVEY

In order to assess the existing condition of the area with respect to housing characteristics, number of household members, area and condition of households, facilities and the attitude towards solid waste management, household and community needs assessment survey was planned and conducted in the two case study areas of Karachi. Such surveys are essential and are the first step before engineering design and planning for improvements of infrastructures and allied facilities are undertaken. Beside they also dictate the existing tendencies and circumstances which help the planners, designers and engineers to take into consideration the priorities and choices of the similar people in other localities.

8.1 SURVEY OBJECTIVES

Keeping in view the data required to be obtained from the households, the questionnaire was designed to include the following main objectives which can help in assessing the existing SWM system, its deficiencies, attitude towards recycling and participation for improvement:-

i) To identify the professional and occupational characteristics of the households surveyed in order to assess their economic background and time that can be spent on any participatory activity.

ii) To determine the average size of the plot, number of rooms, number of household members in one household and number of families living on the plot to assess the crowdedness and number of users generating the solid wastes.

iii) To ascertain the occupancy status and length of stay on the plot which will determine their previous role of participation during the upgrading and regularization process as well as the genuine need to clean their immediate surroundings and environments.

iv) To determine the condition of the plot and structure to assess the improvement that has taken place after the regularization.

v) To determine the presence of courtyard to assess the probable place for keeping the garbage container, hygienic conditions w.r.t. children's defecation and presence of pests.

vi) To determine the presence of dustbin inside the house, its material, capacity and frequency of filling of the dust bin to assess the general cleanliness of the household and capacity of the container to store the garbage hygienically.

vii) To determine the role of the household members in throwing the garbage out of the house to assess whether municipal collection services are extended to the household or not.

viii) To assess the attitude and behaviours of the household towards dustbin cleaning and its replacement to have knowledge of the life of primary storage facilities.

ix) To determine the place of first disposal of garbage outside the house and to assess whether municipal secondary storage facilities are used or not.

x) To ascertain the public knowledge of municipal services



provided to integrate such information in the options for improvements.

xi) To determine the presence of community dustbins and reasons for its non utilization by the community.

xii) To determine the presence of flies, insects and rodents with in the house to assess the sanitary conditions.

xiii) To gather knowledge of any cleanliness campaign held earlier involving solid waste management, its success and failure which can help in evolving further better options.

xiv) To assess the potential and level of participation of the household in any scheme involving improvement of SWM system so that the extent of participation can be judged.

xv) To determine the waste material recovered by the household, to assess its disposal frequency and monetary benefits/financial gain achieved. Further resource conservation and reuse programme can thus be prepared in the light of such information.

8.2 SURVEY METHODOLOGY

i) **Study of survey requirements:** First of all the survey requirements were established in consultation with the thesis supervisor, mentor and advisor. Since the solid waste management procedures are typical from area to area depending on the socio-economic characteristics, location and community cohesion thus information on the existing plot, users, waste collection method within the house, disposal outside the house, transportation to the communal or central location and its ultimate disposal were included in the survey questionnaire of the household.

ii) **Design of Questionnaire Form:** Keeping in view the perceived needs and requirements of the thesis the questionnaire was designed. Pertinent information to be obtained which contribute towards solid waste management system, personal habits and behaviour were included. The questionnaire was theoretically finalized after detailed discussions with the supervisory staff of the thesis and was adjusted/readjusted to suit with the aims and objectives of the research work.

iii) **Translation of the Questionnaire:** The preliminary questionnaire prepared was then translated into Urdu and questions were set accordingly. Ample space was provided to accommodate the answers from the household along with their remarks and observations by the surveyor.

iv) **Contact with the Surveyors:** For conducting the household survey and to gain practical knowledge of its methodology, expert staff from Karachi University was consulted. Experienced surveyors were then contacted who had previous know how of conducting related surveys on urban infrastructures and facilities. Four surveyors were selected to form two teams comprising of two persons.

v) **Discussion and Training of the Surveyors:** The surveyors were explained the brief of the project, aims and objectives of conducting the household survey, requirements and needs, sampling techniques, reading and consulting area maps, area boundaries, main features and back ground of the area, establishing the rapport with the residents, explanation of the study needs to the residents etc.

vi) **Familiarization with the Area:** The surveyors were than taken to the area and an informal meeting was arranged with the councillor's representatives and area leaders. By walking on the peripheral roads, internal streets and lanes the area was familiarized for conducting the field survey.

vii) **Field Testing:** For testing the prepared household survey forms, field testing was done. Random houses were selected and the households were interviewed.

viii) **Identification of Information Gaps and Deficiencies:** Based on the field testing of the survey done, the gaps and deficiencies were identified. Some of which are given below:-

- Marking of physical boundaries of the case study area.
- Presence of representative from councillor's office or area representative accompanying the surveyors which can inculcate confidence in the respondents about the need and use of the survey.
- Enough time consumed for taking the respondents into confidence.
- Difficulty in transferring the gathered information on the survey form.
- Incomplete and open ended questions in the questionnaire.
- Extent of answers from descriptive questions.
- Filling of questionnaire by the respondents who were educated.
- Time of availability of the head of household or responsible male member for the survey.

These deficiencies and short comings were seriously considered, discussed and removed through following actions:

- Detailed area visits and memorizing the area boundaries.
- Assistance from area councillor's representative during the sample survey.
- Preparation of survey form in easy and communicable language so that two way communication can be achieved.
- Reducing the length and size of the survey form to accommodate more information to be answered.
- Providing copy of area maps to the survey teams and marking the tentative sample houses for target survey.
- Fixing time of the survey during morning and evening.

ix) **Redesigning and modifications of Survey Form:** Based on the deficiencies noted and the open ended questions in the survey form, the questionnaires were redesigned and their numbering were changed to have a good continuity of information acquired.

x) **Translation of the Survey Forms:** The redesigned form was than translated and condensed on one page to give a good psychological effect of less number of questions to be inquired from the residents.

xi) **Printing of Survey Form:** The forms were than printed more than the number required for the sample survey to include for wastage, incompletely filled and rejected forms.

xii) **Contact with the Area Councillor:** The elected representatives are always familiar with the area and its population. The assistance was provided through survey coordinators deputed by the councillor who accompanied and helped the surveyors in establishing

rapport with the residents.

xiii) **Sampling Frame:** On an average a total of 10% sample size was surveyed to gather homogenous information and better results. The scientific method for preparation of sample design was adopted and random sampling method was considered. Detail site plans, regularization and improvement plan and overall base map of the area were obtained from the DKAE and OPP. The maps containing the house number and their configuration were studied and representative sample was drawn. Every tenth house was selected from the detailed plans and was marked to enable the surveyors to identify it on the field. Copies of the plans were made and provided to each team containing their hypothetical jurisdiction. The arrangement made the survey operation flexible and smooth to accomplish the sample target.

If the tenth house was found to be a commercial establishment then number one less than required was taken. Similarly in the field, if the selected plot was found locked, closed, under construction or the household was not found cooperative and hesitant to provide any information than first house on the right was selected as the representative house of the survey.

xiv) **Conducting Actual Field Survey :** After acquiring the necessary knowledge, conducting physical and reconnaissance survey of the case study area, the work on actual field survey was undertaken. Due to the experience gained during the field testing, the timings adopted for the survey were decided to be few hours in the day and in the evening hours and mostly on Fridays. The time was decided due to the availability of the head of the household or other senior member of the household to give proper answers to the questionnaire. Utilizing services of female surveyors also proved to be very effective as both the head of the household and his wife were interviewed at the same time. Information on matters pertaining to SWM its accumulation and generation within the households were better explained by the females while questions regarding general cleanliness, waste collection and disposal, frequency and facilities by the municipalities were discussed by the head of the HH. Unknowingly such interviews also turn out to be a motivation for the residents who were eager to participate and solve the problem. The area representatives and the councillor were a constant source of help from whom the assistance was sought regularly. The additional information collected was noted by the surveyors on the back of the questionnaire form or on additional note sheet. The existing services and facilities, housing conditions, location of dustbins, general cleanliness were also assessed during the field surveys.

xv) **Interview with the Area Councillor and Representatives:** During the process of interviews the area councillor, members of arbitration council and formerly elected representatives were informally interviewed. Besides, sanitation staff of municipality deputed in the area were also contacted. The questions contained in the questionnaire were also inquired from them and general answers received from the household were confirmed. Present and future development works planned and implemented were asked, photographs

and slides were made during their presence. Two members of the arbitration committee in Ghousia colony and area activists in Orangi town who are the senior residents of the area and well known in the locality were also contacted and their opinion, suggestion and views were gathered.

xvi) **Completion and Processing of Data:** With the completion of the physical sample household surveys, all the information collected and noted during the survey was compiled. The incomplete forms were processed and data gaps were filled. The incomplete form or forms found to be erratic were discarded. All the survey forms were duly edited to check and rectify the errors and omissions which might have occurred during the field surveys. So all the ambiguities from the forms were removed.

xvii) **Preparation of Tabulation Sheets:** Based on the completed forms the tabulation sheet of each area was prepared manually to contain the data from all filled in/complete forms.

xviii) **Completion of Results:** The results were then derived from the tabulation sheet.

OBSERVATIONS: The observation made during the field work are given below:-

- The rate of 'No Response' was generally low. The sample households usually responded well.
- The households were very willing to answer the questions when the need of survey was explained to them.
- The households participated well and gave their free and honest opinion about various aspects so as to participate in the progress of work.
- A lengthy questionnaire was found leading to uninteresting conversation and incomplete answers.
- Sample household survey was found to be the best tool of acquiring the first hand complete information on the existing social, economical and physical characteristics and getting their unbiased opinion and remarks.

8.3 GHOUSIA COLONY

8.3.1 SURVEY RESULTS:

Following is the brief of results obtained from the household survey of Ghousia colony, the tables are given in Annexure A.7.1.

8.3.1.1 **Population:** After the major demolition of the houses and shifting of the inhabitants of had taken place, the residential plots were assessed to be 1188 with some 30 non-residential plots. With an average household size of 8 - one household is doubling up with every tenth household. Second and subsequent household tend to be smaller than the first household on the plot. Based on the approximation, the population of Ghousia Colony was thus estimated as between 9000 to 9500 (Van der Linden 1985).

8.3.1.2 **Status of interviewee:** The main aim of the field study was to acquire knowledge from the head of the household and possibly also from the females who are responsible for the daily household

activities and as such are the major indoor garbage producers. The status of the interviewee is given in table 1 which shows that the majority respondents were the head of the households. While in their absence wives and other elderly females responded on the questionnaire.

8.3.1.3 Place of origin: The population of Ghausia Colony is composed of different ethnic groups. Information is given in table 1a representing the head of household origin.

The majority group, refugees from India make for slightly over half of the population living mainly in the western and central part of the colony. People from the NWFP are concentrated in the North Eastern part of Ghausia Colony, while Punjabi Christians live in a cluster, west of the centre of the colony. People of the Indian origin predominate in the rest of the area, while Punjabi Muslims live somewhat dispersed in the centre and eastern part of the colony (Van der Linden 1985).

8.3.1.4 Length of Residence: Sample household survey revealed that almost three quarters of the heads of household in Ghausia Colony have resided there at least for the last 15 years. A survey carried out in 1975 had already provided a picture of quite stable population (Van der Linden 1985 and Ahmed 1990). The data obtained from the earlier surveys have been compared and given in table 2. Survey has revealed that 58% of the household surveyed have Ghausia Colony as their first residence in Karachi, majority of which came after independence from India. The major reasons for settling in Ghausia Colony were low price of land, availability of transport, affordability, security and availability or nearness to the water supply (Ahmed 1990). The present household survey revealed that only 5% household are on rent while 2% are the relatives of the owners & the rest 93% are the owners of the houses. The average period of residence for the owners is calculated to be over 22 years.

8.3.1.5 Household Size and Composition: A majority of the households consist of families of the nucleus type i.e. a married couple with children (54%) while another 6% are nuclear in principle namely in the case of one parent families or childless couples. Another 35% of the households consists of families of one of the above type having one or more relatives and/or in laws living with them (Van der Linden 1985). Data obtained from the sample surveys have been compared and are given in table 3.

The average number of household size as determined from various studies yielded as 9 (Ahmed 1990), 7 (Van der Linden 1985) and 8 (this study). The minimum and maximum number of family size was found to be 2 & 19 (Ahmed 1990) and 3 and 19 (this study).

In 10% of the sample, more than one household was found residing on one plot. Seldom more than two households were found living on one plot. The average number of household which was determined as 1.1 (Van der Linden 1985) was confirmed as 1.05 found in this study.

8.3.1.6 Occupational profile: Sample surveys conducted by the Consultants NESPAK and for the thesis revealed the occupational profile given in table 4. The results depicts that majority of the people are self employed either within the commercial shops or employed in the nearby places (Ahmed 1990). The occupational profile does not show an exceptional picture of Katchi Abadis of Karachi. Obviously, the higher paid occupations are under-represented. What distinguishes the above profile somewhat from the average Katchi Abadis is a relatively high proportion of sales workers and rather low percentages of both skilled and unskilled labourers (Van der Linden 1977). This of course is a reflection by Ghousia Colony's location amidst residential and business area rather than in an area of industrial activities (Van der Linden 1985 and Richardz 1988). Unemployed is rare in Ghousia colony. The survey revealed that if the head of the household is unemployed or widow than their elder sons are in job. The average number of income earners per household is found to be 1.64 which increased to 2.09 and shows that the number of extra income earners has increased significantly during the period from 1983 to 1986. Almost half of the heads of households are self employed. Daily wage earners are a small minority (Van der Linden 1985).

8.3.1.7 Monthly Income: Assessment of monthly income of the household (including all the earning numbers) is a difficult job. No such question was asked in this survey. Yet the previous sample survey revealed that 78% of the households can be placed in low income (upto Rs. 1500), 18% in medium income (Rs. 1500 to Rs. 3000) and 2% in high income (more than Rs. 3000) categories (Ahmed 1990). Second and further additional earners make for a substantial contribution to the household income besides second jobs held by the household (Van der Linden 1985). For reference, (AERC 1988) sample income and expenditure of a typical household in katchi abadi is given in table 5 in Annexure A.7.2.

8.3.1.8 Place of Work: The survey data on the place of work of the head of the household was not required yet data gathered from other surveys show a certain ambivalence. On the one hand, some 30% find work in, or very close by Ghousia Colony. Another 40% work in rather far off places, obviously profiting from Ghousia Colony's good bus connections to other parts of the city available on two sides of the Ghousia Colony. The low percentage served by typically industrial areas, such as SITE and Sher Shah, again reflect the dominance of non-industrial occupations of the heads of the households in the colony (Van der Linden 1985). The results are given in table 4a.

It is interesting to compare the data with those collected regarding transport to the place of work, i.e. survey of 1975. In this survey, it was found that close to 50% either worked in the colony itself or reached their place of work by foot or by bicycle while another 45% relied on bus services for reaching their place of work (Van der Linden 1977).

8.3.1.9 Occupancy Status: The majority of the population lives in property of their own and are the owner of the house. Data from other surveys and the present study is given in table 6 which confirmed that over 90 percent of houses are habited by the owners. An increase of renters was also recorded.

8.3.1.10 Turnover: The two sample surveys conducted in 1983 & 1986 confirmed a displacement process taking place in Ghousia Colony. Only 13% of the population has left their plots in a period of 3 years meaning an annual turnover of nearly 4.3% (Van der Linden 1985). Compared to Baldia Township where comparable studies were carried out and a turnover of 5 to 8.5% per year was found (Nientied 1982).

8.3.1.11 Housing: The current housing typologies and their definitions of a dwelling unit are given in Annexure A.8. As very rightly said that "squatters built houses in which nobody else is interested and which nobody is prepared to invest money in" (Mangin 1969). Thus the sample survey in 1990 revealed that 42% of the present households have bought the undeveloped plot or open land and have gradually improved the condition of housing while 58% have brought the developed house with any sort of walls and roofs. The method of acquiring plots were predominantly (97%) through lump sum payment while only 3% paid in instalments. 80% of the households bought the plot through their savings, 20% through loans and/or saving. 94% of the households initially settled have self acquired the plots while 6% acquired through relatives and friends. Nobody was found to have acquired the plot through estate agents or informal brokers (Ahmed 1990). In spite of the insecure tenure situation of Ghousia Colony, over the years, the inhabitants have slowly improved their individual houses. In 1971 it was estimated that 60% of the houses were "Jhuggis", (huts), 10% were clay built and 30% were semi pacca i.e. with walls of concrete blocks and roof of more temporary materials (Van der Linden 1985).

A survey in 1975 and in 1985 made use of a categorization in six types as follows. This criteria is based on the quality of building materials and was chosen because it disregards ethnic influences and has dynamic components (Van der Linden 1977).

- Type I Very Temporary, entirely made of reed or second hand tin sheets.
- Type II Temporary, mainly reed and tin, but also mud, stones and/or planks are used.
- Type III Prolonged Temporary, mainly stones, mud and/or planks are used.
- Type IV Semi Permanent, unplastered concrete blocks are used for the walls, roofs of asbestos or corrugated iron sheets.
- Table V Provisional permanent, like IV but with plastered walls.
- Table IV Permanent, houses with a roof of reinforced concrete cement.

A graphical representation of the survey results on the housing type (Richardz 1988) is given in Annexure A.8 which clearly shows the essential changes which have taken place in a period of 12 years. The income categories with respect to housing categorization is given in table 6a.

In 1975 the security of tenure in the settlement was considered low but by 1983 the security position was reversed and the condition of the houses in Ghousia Colony were improved. This confirms the fact that living conditions in Katchi Abadis are dependent to a great extent on government decisions (Van der Linden 1985).

8.3.1.12 Plot Sizes: Plot sizes are generally small, they range from just over 20 sq.yds. to slightly over 100 sq.yds. Comparison of survey made by (Ahmed 1990) and survey conducted for the thesis is given in table 7 which revealed that the average residential plot size as per previous survey was found to be 44 sq.yds. Van der Linden's Urban Research Working Paper No. 4 (1985) confirmed it to be 46.6 sq.yds and survey conducted for the thesis revealed 47.9 sq.yds. The average commercial plots or shops are very small with an average area of 14 sq.yds. Only 18% of the plots were found to be more than 60 sq.yds. The maximum size of the plot was found to be 200 sq.yds. The smaller size of the plot is due to the fact that during the course of past 20 years the population increase has taken place and the plot was divided and bifurcated within a family (Ahmed 1990). The sample survey conducted for the thesis revealed a maximum size of 139 sq.yds and a minimum size of 22 sq.yds.

8.3.1.13 Number of Storeys: The sample survey done by Ahmed (1990) and this survey yielded the results given in table 8 which shows that 78 percent houses are single storeyed.

In fact it was only after the regularization and improvement programme had started that the inhabitants started investing in improvements of their house of such magnitude as a second storey. During 1984, many more house owners added a storey to their house. Adding a storey compensates for the loss of space caused by the widening of streets and lanes. In many cases, this addition will also result in a substantial increase of the effective living space (Van der Linden 1985).

Majority of the houses in the area are single storey, yet with the grant of lease and the affordability the household are constructing the second storey to accommodate their increasing family. Few household are constructing the upper storey for any financial benefits i.e. giving it on rent (Ahmed 1990). However many houses are observed to be constructing its third storey for having more accommodation.

8.3.1.14 Number of Rooms: The sample surveys conducted by Van der Linden in 1985 and for the thesis revealed that 86 percent houses have three rooms. The comparison of results and findings of the survey is given in table 9.

8.3.1.15 Presence of a courtyard/open space: 80% of the houses have been found to have a courtyard or an open space while 20% of the houses have no area within the houses which is open to sky and such houses are mostly double storey houses. The result is given in table 10.

8.3.1.16 Obtaining of Lease: Sanctioning of lease started in 1989. The sample survey conducted by Ahmed (1990) revealed that 63% households have obtained lease while another 37% have not acquired the lease documents. Reasons for not obtaining lease from the households were also inquired, which revealed that 41% do not have the money. The main reason is the absence of the main bread earner and head of the household or those people who are old and retired. Interview with the councillor and the members of the Arbitration Committee disclosed that they are trying their best to acquire funds and allocations through KMC special funds to pay for the dues of widows and who do have any earning member in the house. 20% do not know where to go and contact for the lease. These are the segregated members of the community or were not very sure for the reply they have meant even sometime later or when the funds will be available. 25% do not have time and another 14% were not interested in obtaining lease documents because their plot was to be voluntarily cut and set back for proper clearance and creating right of way. However 91% of the households not acquired lease till 1990 showed their intention of acquiring lease in near future (Ahmed 1990).

8.3.1.17 Availability of Existing Services & Facilities:

i. **Water Supply :** After 1984 the Karachi Water and Sewerage Board (KWSB) has built a reservoir for the colony (Richardz 1988). Due to the intermittent water supply, low pressure and illegal connections from the mainline the water quantity available is less and not upto the requirement.

ii. **Sewerage System:** After 1984 the KWSB laid a main sewerage system in the 30 ft. land strip cleared alongside the central prison on Al- Mohajir street (Richardz 1988). The system is available to almost all the residents of the area. The individual house sewers are connected to the municipal mains and not much complaints were reported by the households. For cleaning of sewers 5 kundiman and one Mistri (Supervisor) are deputed for the constituency.

iii. **Electricity :** Nearly 85% of the housing units have the electric connection. Individual house connection are dominant and illegal connections were found minimum.

iv. **Gas:** Nearly 70% of the household have gas connections through Karachi Gas Company for piped gas.

v. **Roads, Street and Lanes:** In 1986 most streets and lanes were metalled (Richardz 1988). The peripheral roads are wide catering for voluminous traffic. The encroachments in some portion have not been removed and the lanes are only 3 ft. wide.

vi. **Street Lighting :** Nearly 72% of the households enjoy the facility of street lighting. On an average satisfaction with the above mentioned facilities have been reported. Hospital, Schools,

Parks are reported to be much required by the residents (Ahmed 1990).

8.3.2 Facilities for Solid Waste:

Specific questions were asked from the household regarding attitude, behaviour and facilities for solid waste management which depicted the following results:-

8.3.2.1 Presence of Garbage Container: 92% households confirmed that they have some sort of garbage container within the house premises. Usually it is kept in the kitchen or immediately out of it at convenient location where waste and floor sweepings can be placed easily. The household also try to keep the container out of reach from the young children. The result is given in table 11.

8.3.2.2 Type of Garbage Container Used: Different type of garbage containers were found in use by the households and is given in table 12. The survey revealed that the majority of the households have used wooden crates as garbage container. This is because of the close proximity and nearness of wholesale fruit and vegetable market, less cost (Rs. 2.00 = 0.08 US \$), easy availability and besides it was used and provided in two earlier cleanliness campaigns. The usual dimensions were found to be 2ft x2ft x 1ft. 23% households are found to use canister (used tin containers in which ghee (oil) is sold) having a usual dimensions of 1.5ft.x 1.5ft.x 2ft. Its usage was preferred because of its water tightness, long life, large volume and optimum height.

8.3.2.3 Persons Disposing the Garbage out of the House: In 13% of the household surveyed dual responsibility was found for taking out the garbage out of the house. Either the garbage was given to the sweeper who comes in the morning or it is provisionally kept out side the house to be taken by the sweeper at his convenience. Usually wooden crates are found lying outside the houses as there is less chances of it being taken away by somebody. The results obtained are given in table 13.

The result depict that it is the duty of the children to put the garbage out of the house. Normally they are young and non- school going who does the job. It was observed that during transportation of the garbage outside the house often the children comes in contact with it. The chance of putting garbage out by house wives is found less because of her involvement in the kitchen in the morning, keeping young children and due to purdah (covering, not coming in front of other people).

8.3.2.4 Frequency that the Garbage Container is Filled: As expected 95% household responded that their garbage container is filled once a day only. Only 3% replied that it is two times in a day for which they have alternative arrangement of a container or usually manages through cheap plastic shopping bags. 2% household have their container filled once in two days. The garbage generation is dependent on the number of household members and the capacity of the container to store it. This shows that usually the

capacity of the container used by the household is sufficient to meet their requirements. The results are given in table 14.

8.3.2.5 Cleaning of Garbage Container: The results were obtained and are given in table 15. The data shows that majority (82%) of the household clean their container daily and empty it to its full capacity. This exercise is done to avoid any foul smells emanating from the container. Due to the limited space of the plots and because of the kitchen wastes, the container gives a stinking smell if not properly cleaned daily. Cleaning means complete emptying of the material so as to render the container in good and hygienic conditions.

8.3.2.6 Replacing the Garbage Container: The results obtained are shown in table 16 which shows that 27% households replace the container in one month. 23% in one week. Altogether 65% households replace in a period of a month.

The period mentioned above is approximate and relates to the type of container used as wooden crates when becomes fouled and can not be cleaned easily are usually replaced. The canister and plastic containers are usually washed. Due to the availability of wooden crates the same are replaced often.

8.3.2.7 Place of Garbage Disposal: The results are given in table 17. 65% of the garbage generated is taken and collected by the sweepers while 23% of garbage is disposed to nearby open spaces. During field visits only two open plots were found other wise the colony is fully built and occupied. Also 5% household replied that during the absence of the sweeper and as or when required they throw their garbage on the open space.

10% households use old 'Balti' (Galvanized iron bucket used for storing and carrying water). Its advantages are similar to that mentioned for canister. 8% household used a container made of plastic. This includes broken plastic balti, bowls and ready made plastic garbage container, while 7% used 'Tokri' (bucket made of wood and/or straws/plastic).

8.3.2.8 Presence of Night soil in the Garbage: Ghousia Colony has now a good and manageable sewerage system. The main trunk sewer runs parallel to the Al-Mohajir or 30 ft wide road along the Central Jail. There has been a tremendous development in the availability of facilities to the inhabitants and night soil content in the garbage has not been noticed neither at the household level nor in the main community bin. The same was also not reported by the households. Only very occasionally the excreta from infants find its way into the dump. However at the dustbin site 'gap' is often noticed, which is dried matter found from cleaning/clearing of sewers by the kundiman.

8.3.2.9 Payment for Garbage collection & Disposal Services: The household survey revealed that 93% respondents do not pay for

garbage collection and disposal services to the sweeper. However no private sweeper is found working in the area who is paid by the residents. Since many sweepers also live in the area who work mostly on private jobs, they clear the garbage occasionally. Only 7% household pay voluntarily to the sweeper an amount of Rs. 10-15 per month just to make sure that their garbage is taken from the their premises regularly.

8.3.2.10 Distance of the Community Bin: In Ghousia colony no community dustbin or large container is provided by the municipality. The garbage and road sweeping gathered is disposed to the two main dustbin located at some 100 metres away from the colony towards city centre side shown on the key plan in Annexure A.14. Thus carrying of garbage on the trolley becomes a substantial task for the sweepers. 95% respondents replied that the main community dustbins are located far from their houses. Only 2% claimed it is near to the bin. While 3% do not have any knowledge of the final disposal point since it can not be seen within the area. The result is given in table 18.

8.3.2.11 Reasons for not Using the Community Bin: Normally all the respondents claimed that since the community bins are located farther from their houses they can not avail the facility. During the absence of the sweeper they have to resort to unhygienic disposal on open area or on road side.

8.3.2.12 Presence and Effects of Flies, Insects & Rodents: The presence of flies, insects and rodents also greatly attribute to the prevalence of diseases. The status is given in table 19 which shows that 77% houses have flies, 83% have mosquitoes, 73% have cockroaches and 58% have rats. Due to the unhealthy and unhygienic conditions in the area 17% households reported that at least one HH member had fever within one month period. Besides 3% reported for malaria, 10% influenza, 2% typhoid, 3% asthma and 12% reported itching on the skin. The itching prevailed in nearly all the houses in the street. While 50% household never had any health related complain in the past month.

8.3.2.13 Frequency and Extent of Collection Done by Municipality: The households were inquired of the frequency of collection of garbage from the community bins. The study yielded interesting results. 50% respondents replied that they do not know about it which is due to the fact that the two dustbin sites are away from the locality. 28% respondents are of the opinion that collection frequency is once in two days/alternative days. 14% residents think that daily frequency is maintained by the municipality while 8% are of the opinion that the collection is weekly due to the reason that the garbage is seen littering of and on in the area and the sweepers are only seen in the early morning hours.

65% of the respondents thought that the sanitation staff removes the full load of waste daily from the dustbin. While 28% are of the opinion that the full load of garbage is not removed. 7% are not

sure of it and they refrained themselves of giving any reply.

44% of the respondents are of the opinion that in spite of garbage collection by sweepers, the garbage is sometimes seen spilling on roads, streets and lanes. While 18% are positive about it. 38% do not consider spilling of garbage as a problem and do not witness any unhealthy signs due to spreading of garbage in the area.

8.3.2.14 Satisfaction with the Municipal Systems: 85% respondents are found satisfied with the present municipal system while the rest 15% are not satisfied and think that there are many deficiencies which have to be removed.

8.3.2.15 Suggestions for Improvement: 30% of the respondents felt that more dustbin should be made and should be near to the houses. 5% think that only additional sanitation staff can solve the problem. 8% are of the opinion that the key figures in the system are the sweepers whose efficiency needs to be improved and they should work as per their designated work schedules and work timings. 10% are of the opinion that only hard work and honesty can solve the problem. 13% wanted that the residents should also cooperate in the management of the overall system. 15% did not know or can not suggest properly how the system can be improved. 3% respondents suggested that through more trolleys and equipment the system can be improved. About 3% attributed it through proper management of the entire system. 7% suggested that the area councillor has the power and is able to solve the problem.

8.3.2.16 Previous Attempts of Garbage cleaning by the Community: 92% respondents reported of the cleanliness campaigns organized through the councillor and the sanitation staff on call from the political party in 1988 and in 1989.

8.3.2.17 Willingness and Extent to Participate for Improvement/Better System: Since solid waste management is a very pressing problem in the area more in terms of garbage littering on the streets rather than its collection. 95% household agreed or are ready to participate in any campaign for a system which can lead to improvement in the overall solid waste management situation.

Mostly people are ready to participate themselves as well as along with their family members and in cash also. 93% household wishes to coordinate through their own physical involvement. 60% household have intentions through contributing in cash and 20% household have showed intentions that their family members will also participate in the campaign along with them.

8.3.2.18 Role of The Councillor: Nearly all the households confirmed the assistance and help provided by the area councillor. The councillor is accessible and meets the residents daily in the office during morning and evening hours. He also listen to the personal problem of the residents and try to solve it through the arbitration committee (Ahmed 1990).

8.3.3 SOLID WASTE MANAGEMENT SYSTEM: There are 52 sweepers deployed for the "Halqa" or unit No. 58 of Karachi (usually they are in grade 1 of the municipality system) and are in the jurisdiction of the area councillor. The unit includes Ghousia Colony, Usmania Mohajir Colony, Nishtar Basti, Monoo Goth, Furganabad., Karnal Basti, Liaquat Basti, Ibrahim Village, Goharabad and Press Quarters. In non recognized slums which are not regularized, daily clearance is not usually done as in other areas in unit 58. The same sweepers are deployed once or twice a week to clean/clear the accumulated garbage. Such team of sweepers are called fatigue party.

Approximately eight sweepers are deployed in Ghousia Colony permanently with few trolleys. They start their work early in the morning usually at 6 or 7 AM and work till 2 PM. During this time they come to the councillor office for their attendance at 11 AM. Every sweeper is required to do his fixed daily job in a certain specified area called "beat" fixed by the Sub-Inspector sanitation of the area since long time back. Every sweeper is assigned fixed area of his work. It includes sweeping of lanes, roads, garbage removal from houses and shifting it in the basket or trolley to the nearest dustbin or garbage accumulation site from where it is removed by the refuse van. Since the number of trolleys are limited, the sweepers accumulate the dust/garbage at convenient places from where another sweeper removes it through trolley. In Ghousia Colony it is calculated to be around 150-200 houses per day per sweeper along with sweeping of lanes/roads.

Irrespective of the time of start, the sweepers are required to complete their work (beat) before 11 AM or coming for attendance where the daily report is taken from them. The sweepers are supervised by Muqaddam (usually in grade 2 of the municipality system) and Sub-Inspector (usually in grade-7). At the time of attendance both the Muqaddam and Sub-Inspector are present. This attendance is normally taken at the councillor's office since it is the convenient location in the whole constituency. As no extra sweeper is available, thus in the absence of any sweeper his work is given to other sweeper to be done after 11 AM. Additional jobs of cleaning, dirt/debris removing, road sweeping, garbage clearing is taken after this period till 2 PM. Since all the sweepers are Christian or Hindus, Sunday is a declared day of holiday for all sanitation staff. Special jobs of cleaning are also taken on Fridays. The Muqaddam usually has a bicycle and supervise the work of the sweepers in the area, while Sub-Inspector usually have a motor cycle to check the work. In case of any complaint he specially visits the site.

For unit No. 58 one permanent refuse van is assigned which is parked at Mehmoodabad (waste water treatment plant-II Site), the refuse van model is Hino and it is an open dump truck with no windows or top cover. These vans are assigned work in ZMC East because of larger capacity than Bedford Vans and are able to accommodate garden trimmings, garbage and cut bushes etc. on the top. But over loading of these refuse vans also cause lot of other problems. During transportation and especially negotiating a road

curve they spill the garbage on the roads and in its way causing other nuisance as well as generate bad smell. All these refuse vans are with double cabin that is besides the driver four other motor coolies can be accommodated.

The driver (usually in grade 7) is the supervisor of the vehicle. His duty is to reach the parking plot at Mehmoodabad in the morning. After attendance he take his vehicle to the ZMC office from where fuel is arranged for the vehicle. The quantity of the fuel is usually fixed for each vehicle but varies if more work is to be done or if there is an emergency duty or more trips are required to be done to the dumping site. For Ghousia Colony 36 litres of diesel is issued daily which is sufficient to make 3 trips daily. After getting the fuel order the driver takes the vehicle to the designated fuel station and puts the fuel in the vehicle. The vehicle then reaches the dustbin of Ghousia Colony situated outside the locality. Four motor coolies are assigned to one vehicle who joins the vehicle at the dust bin. At the same location the motor coolies change their cloths, takes their equipment and baskets, fill the baskets and dump them in the truck. Usually one man fills the basket while the other carry it on the head and dump it in the refuse van. The normal precaution they take is to wear a hat and having cloth spread on the back and shoulder to avoid spilling of garbage on the body. Since the garbage is to be loaded in the vehicle which is quite high, the motor coolies use wooden plank to climb at a convenient position from where they can drop/dump the garbage in the vehicle. So motor coolies form two teams of two people for collection of garbage. The crew also separate the recyclable/ resaleable garbage during loading and often put it in a sack or basket to carry at the end of their working time. But the driver who is of senior grade seldom involves in such separation and selling unless it belongs to a very high resale value or can be reused. The driver supervise the work of the motor coolies. In Ghousia Colony the vehicle get fully loaded with garbage of two dustbins from Ghousia colony and nearby apartment building. The garbage is usually of domestic nature but often the small commercial units also dump their waste in the dustbin which is also cleared. The normal time to load the vehicle with four motor coolies was found to be approximately one and half hours. Transportation to the dump site, dumping and being back at the other dustbin in the area again takes two hours. The final load is taken to the present dumping site at Korangi besides the Malir River embankments in an open land. The garbage is burnt and is spread on the land. The Sub-Inspector explained that this is done to avoid excavation of earth by the contractors who sell the earth in the local market. Such excavation in this land is planned to be avoided due to proximity of the Malir bank embankments to save any breach or holes.

After dumping the vehicle then moves to the other designated dustbins in the area. Usually 2 trips per day are done but in alternative days 3 trips have to be undertaken to dispose the accumulated garbage. After finishing the trips the driver takes the vehicle to the parking yard. He also gets overtime payment since he

utilizes more time in this system.

If minor repairs and maintenances is required the driver either does it on Sunday (holiday) or after the working hours i.e. 3 PM. He takes the vehicle to the designated workshop. If major repairs are required then the vehicle is to be taken to the Central Workshop at Nishtar Road. During the breakdown /repair / service maintenance period an alternative refuse vehicle or a dump truck is sent to the effected area/zone. If the repair require one or two days then vehicles from other areas are also deployed after their working time to the effected area however for one single day the extra load is carried on the other day. The Muqaddam or Sun-Inspector checks the dustbin and also guide the driver if additional load is to be taken off. In Ghousia Colony it was noted that since 2.5 years the refuse van has never been out of order for more than one day.

For clearing the manholes and sewer lines the job is done by the staff of Karachi Water & Sewerage Board. For unit 58 including Ghousia Colony, 5 Kundi man are deployed with one mistri (Supervisor) who on getting the complaints from the residents sends the kundi man for clearing/cleaning of sewers and manholes. The dirt/grit/ accumulated solid material (called gap) cleaned by them is usually put outside the manhole/sewer or open drain for drying and is reported to the Sub-Inspector/Muqaddam of sanitation dept. for clearing the other day (as the wet material cannot be transported easily the same day). Thus such material is also removed by the sweepers and thrown to the dustbin for ultimate disposal. The councillor according to his quota receives the manholes covers, the same when found damaged/misplaced/ broken are replaced by Kundi man checked by the supervisor.

The jurisdiction of unit is controlled by the Sub-Inspector who is under the Inspector. The sanitation Inspector daily checks the major roads in his area and visit the sub areas of the Sub-Inspector. He is also in contact with the area councillor for any complaint and visit his office at least once a week.

Informal interviews with the sweepers yielded that more than 50% of them are also engaged in other private work after their usual duty hours. They manage this extra working between the duty hours for which they usually start early to complete their normal duties. Some sweepers start early at 5 AM first to do their required 'beat' and especially sweeping on roads. As the vehicular movement in the day time never allow them to do so. The supervisors are not bothered about this extra work of the sweepers as they require the 'beat' to be done regularly otherwise the residents in their area complaint to the councillor office.

A detailed survey of municipal sweepers were carried out in Ghousia colony which revealed that 47% of sweepers deputed are females. Their average service in municipality was found to be 9.4 years in male and 17.3 years in female sweepers. This is due to the reason that the male sweepers finding a better job opportunities in private sector leaves the job while the municipal job is best suitable for the female workers due to the timings, medical facilities, work load, holidays and secured job. The female

sweepers only cleaned the paths, streets and remove garbage. They make appropriate "accumulations" or heaps to be removed by male colleagues through wheel trolley. Often the female sweepers make themselves mobile through a basket loaded on a small four wheels cart locally made to which a rope is tied for easy pulling. The average number of family members of the sweepers was found to be 6.3. On an average 50% of household members to found to be sweepers working in different localities.

Around 13% municipal sweepers were found to have cold and fever in the preceding month before the survey. The rest never had any serious complains or sickness. 67% sweepers serving Ghousia Colony were found to reside in the same locality.

A normal sweeper of municipality earn Rs. 1500 per month and can make another Rs. 1500 (max.) from his part time work. But this requires a long working time of 12 hours from 5 AM till 5 PM. An average amount of Rs. 800 was noticed from different sweepers. Usually they get the job in the nearby affluent localities, apartment buildings, commercial establishment etc. for garbage cleaning/clearing and sweeping of stairs and walk ways. Usually all the male and female members of the sweepers are productive and are engaged in some sort of municipal or private work. Only the young girls of the age 14-25 years and those not married do not work and stay at home or do limited work in day hours at a safe place with their elders.

At least once in a month routine anti-mosquito and anti fly spray is done in the area i.e. the insecticide coopec mixed with diesel is sprayed. This spraying is done after sunset when more insects are found on the move. In ZMC East there are at present two Suzuki vehicles on which fogging machines are fitted. Based on the requirement one more Suzuki van is acquired by ZMC East on which fogging machine will be fitted in near future. Usually spray is done on an emergency basis or after the rainy season and sometimes at the request from the councillor.

Following are the short comings in the system as noted:

- As fixed quantity of diesel is provided to the vehicle the driver is apt to save the fuel. So to make his life easy he try to find the nearest dumping points for ultimate disposal of the garbage. Due to the vehicles getting older require more fuel than the new ones. The designated dumping site of North Karachi is quite far as well as due to traffic congestions, the drivers find it unfeasible to take their vehicles there.
- Sometimes the roads leading to the fuel station are crowded or there are many vehicles at the fuel station to be filled which also causes delays.
- No proper wearing gears are provided to protect the motor coolies from coming in contact with the garbage. Often they work with bare feets and their hands are always in contact with the garbage.
- Plenty of flies were noticed at the dumping site due to the fresh dumping of garbage.
- Small commercial units and shops generate a lot of garbage and litter found loitering in the lanes. Also garbage is thrown

by the moving vendors.

8.3.4 PREVIOUS ATTEMPTS FOR IMPROVEMENT OF SWM: Two cleanliness campaigns in terms of "Haftae Safai" (cleanliness week) have been held in Karachi during 1988 and 1989 organized by the most popular political party of the city M.Q.M. (Muhajir Qaumi Movement). The efforts were done combined with the elected representatives, (Councillors, MPA's , MNA's) member of the party, workers and the people without any sponsor or financiers. The religious institution was not contacted yet voluntary help were provided by them. The municipality provided the necessary equipment, tools, technical and administrative guidance while all the physical efforts were done by the people and the community. These efforts were very successful.

The cleanliness started from the house it self where motivated family cleaned the house, put their rubbish out and even white washed and painted their house. The workers and the households together with the sanitation staff of the municipality cleared the garbage, swept the lanes and roads, painted the footpaths and sprayed insecticides for mosquito and flies. Parking lines were highlighted and surplus earth and garbage heaps were removed. Walls of the public buildings and amenities were also cleaned to give a healthy look to the area. During the campaign week people were found busy in cleaning round the clock as and when time were available to them and after their normal work. In lanes where non cooperation was found then the voluntary workers and students went to the premises and cleaned it on their own. This also inculcated a feeling of participation and thus the residents efforts were also then combined.

The administrative control of the campaign was done by the councillor and his team. During the last campaign approximately. 65 voluntary workers gathered for the work. Gutters were opened and cleaned by the community on self help basis. For the houses having no garbage container, empty wooden crates utilized for fruit packing and readily available in the nearby whole sale vegetable market (Sabzi Mandi) were provided by the councillor free of charge to the residents. The cost of which is very nominal or usually Rs. 2. It is expected that a similar week will be announced by the party in 1992 for which preparation are underway.

The success of these campaign was city wide and this inculcated a feeling of responsibility among the people to clean their houses, roads and surroundings environments. This feeling needs to be renewed often and at regular intervals. As people have short lived memory they tend to forget the efforts made and the same old situation comes back soon. The publicity was made through radio, newspapers, banners, posters and pamphlets. But the movement lacked accurate and long remembering messages on health, hygiene and sanitation.

8.3.5 RECYCLING IN GHOUSIA COLONY: Approximately 97% of household in Ghousia Colony collect the recyclable and reusable material at home and sell it at appropriate time, the frequency of which is not defined and known. Only 2% of the household find a needy person

usually a widow to give their collected material. 1% household did not give any opinion on it.

The items collected and sold varies in wide range and prices. But it usually includes newspapers, magazines, and copies, glass and plastic bottles, tins, unused and old bread etc. and are shown in table 20, other uncommon items are broken and redundant household items like children toys, bicycles, furniture, machinery, batteries, tyres & tubes etc. Besides there are items which have direct return in low income localities like old wood, used cloths, slippers, shoes etc. which are exchanged through street vendors called "glass barni wala" Such people are only visible in low income areas operating either on foot carrying the exchangeable items on head and collected material on shoulders or on a bicycle.

In Ghousia Colony 88% of the household sell the collected material to the hawkers or street vendors who comes in the area on "Thela" (push cart) from morning till afternoon. These hawkers sell their material to the middle man who deals in all items and are usually located in the residential areas and its vicinity. Five shops are also found in Ghousia colony which are dealing with such recyclable/ reusable material. In an interview the middle dealer revealed that his employees operate in medium and high income nearby areas on push carts and at the end of the working day bring the load to sell to them. Due to the presence of such middle dealers in Ghousia Colony 12% of the households have direct contact with them and sell their material to these middle dealers in bulk usually after one month or more when the quantity of collected material becomes sizeable.

The frequency of selling the collected recyclable/reusable material varies as per needs and presence of the street hawkers. On detailed discussion the results obtained are given in table 21, which shows that 93% of household sell the accumulated material within one month. the approximate amount received on selling this material is an average of Rs.33 varying from Rs.10 to 60.

8.4 ORANGI TOWN SECTOR 5

8.4.1 SURVEY RESULTS: Following are the survey results obtained from the household surveys of Orangi town, the tables are given in the Annexure A.7.2.

8.4.1.1 Status of the interviewee: The sample survey conducted for the thesis was mostly done with the head of the household to ensure proper answers. The status of respondents for this survey is given in table 1, which shows that 96% respondents were male and 4% were female.

8.4.1.2 Length of residence in Orangi Town: The sample household survey revealed that the average period of stay in Orangi Town Sector-5 is 12.8 years for the owners and 3.8 years for people on rent. The detail of which is given in table 2, which depicts that the area got habited after 1970. Quite many people have bought the house in this sector in the recent years as well as renters also preferred the area due to the close proximity to the commercial

and industrial places.

8.4.1.3 Household Size and Composition: The maximum number of household size is found to be of 16 members and minimum of 2 household members. While the average size is 7.4. Data obtained from the survey has been compared with the previous survey conducted in 1984 (NESPAK 1985).

While another recent survey conducted (NESPAK 1991) confirmed the average family size to be 7.1. The average number of families per household is found to be 1.12 where as the other survey (NESPAK 1991) observed it to be 1.21. Survey conducted for Karachi Master Plan revealed that the average size of the household for the Katchi Abadis is 7.3 which was assessed as 7.6 for Orangi (AERC 1988). The average value of 7.6 was also confirmed by survey conducted in 1984 (Sinatamby 1984).

8.4.1.4 Gender Distribution: The ratio of males to females in the Katchi Abadis stands at 1.17. The share of male and female population was found to be 53.9 and 46.1 percent for all Katchi Abadis and for Orangi sample as well. The difference in the sex ratio, is due to the presence of single male migrant workers in Katchi Abadis (Aerc 1988).

8.4.1.5 Crude Birth Rate: The crude birth rate (CBR) calculated as the number of infants of age one year and less per 100 persons stands at 3.6 for Katchi Abadis (1987) and is lower than the CBR for Pakistan (4.3) during (1987-88). The basic reasons is that a number of Katchi Abadis are migrant localities where population increases are primarily on account of immigration rather than higher birth rate (AERC 1988).

8.4.1.6 Occupational Profile: The labour force participation in Katchi Abadis is found to be 38 percent implying a dependency ratio of 62 percent. The share of the housewives is the largest at 34 percent with the student population being about 20 percent. About 6 percent of the population is classified as "Doing nothing". These include unmarried daughters, children above 10 years of age who are not going to school etc. Distribution of those working and seeking work shows an open unemployment rate of 10 percent and the employed population shows that over 50 percent are doing temporary jobs (AERC 1988).

Sample survey conducted revealed the status given in table 4. Majority of the people are in public and private Service and 21% earn their money according to their skills and through their commercial or business enterprises. Another recent survey conducted revealed that majority of the household who stay in Orangi work in the neighbourhood of Orangi as there is no significant centre of employment in the area. Besides there is greater out-flow to the down town areas from Orangi which lends some support to the notion that Orangi is tending to attract a higher proportion of white collar workers. (NESPAK 1991).

8.4.1.7 Education: The overall literacy rate in Katchi Abadis is 48.6 percent which is slightly higher than the urban literacy rate of 47 percent for Pakistan in 1981. Orangi Town is an area with over 60 percent literacy rate (AERC 1988).

Another sample survey conducted in 14 mohallas in unplanned areas of Orangi on the status of education give the data shown in table 4 b. (NESPAK 1991). Compared to the survey conducted for all over Orangi Town and in all Katchi Abadis in Karachi. The result of the level of education in Orangi reflect the generally low status of education in Pakistan. 54% of respondents were found to be illiterate while 12% had received some primary education. Education between males and females also indicate national trends where female education is extremely low. In Orangi 67% females were illiterate in comparison to 40% males and the figure for primary education were 9% for females to 16% for males (IUCN 1989).

Another survey revealed that the majority of respondents were craftsman or those who had some sort of technical expertise (24%). This was followed by shopkeepers (15%) and transport workers (13%). Other occupation included service and clerical workers and managers. 19% were retired, unemployed or unskilled workers. According to the ethnic groups, the predominant occupation among the pathans were transport workers, among the baluch unskilled labourers, and technical craftsman was the main occupation among the Punjabis, Mohajirs and Beharis (IUCN 1989).

8.4.1.8 Monthly Income: No question was asked to assess the monthly income as it creates a feeling of suspicion and dwindle the confidence of the respondent. Yet the surveys (AERC 1988 and NESPAK 1991) revealed the status given in table 4c according to which the mean income was calculated to be Rs. 2010/-. An average Katchi Abadi family budget comprising incomes and expenditures is given in table 5 (AERC 1988).

8.4.1.9 Occupancy Status: Majority of the household were found to be owners of their property. The status is given in table 6. The question of land ownership and lease holdings are a controversial subject in the Katchi Abadis. This question rarely receives an accurate answer from respondents. From the data 88% said they owned the houses and 9% said their house is rented (iucn 1989).

8.4.1.10 Plot Sizes: The case study area is a developed area thus the plot size are usually determined and are as planned. Mostly plot sizes are of 120 sq.yds which is well depicted from the table.7

8.4.1.11 Housing Typology: Orangi area in general represents a good picture of the overall Katchi Abadis of Karachi. The definition of housing typology is given in the Annexure A.8 and the findings in table 7a. However in case study area of Sector-5 mostly pucca plots exists.

8.4.1.12 Number of Storeys: Majority of the houses are still single storeyed as has been noted and observed during the survey, the

result is given in table 8.

8.4.1.13 Number of Rooms: The status of the number of rooms with in a household in the Orangi Town as a whole and particularly for Sector-5 is given in table 9.

The average number of rooms per household was found to be 3. While density of population per room in the Katchi Abadis is 0.33 and for Orangi was find to be 0.36. Based on the floor space calculated per household, the density of population stands at 13.6 sq.yds per persons for overall all Katchi Abadis and 15.72 for Orangi (AERC 1988).

8.4.1.14 Presence of a Courtyard: 96% of the houses have a courtyard in their house. While the rest are usually two story houses in which the open space is covered. The status is given in table 10.

8.4.1.15 Availability of Existing Services & Facilities

1. Water Supply: The first supply in the area were through water tankers. Stand posts connections were provided one for every 40 houses. After the supply from Hub Dam the quantity was increased and house connection were provided. No water storage problem exists in the area. There is an adequate water supply to Orangi.

2. Sewerage System: The sewerage system was mostly laid on self help basis. KMC constructed one main drain on the periphery of the area boundaries. Later in 1984 other sewer lines were laid through the technical assistance of OPP. Due to the low lying area, some lanes are still flooded with waste water.

3. Electricity: Electricity is the main necessity of life. it was provided to the residents somewhere in 1969. All have individual electric connections compared to 73% household in overall Orangi.

4. Gas: Supply of natural gas was provided somewhere in 1982 hence the individual connections are there in the locality. More than 90% have piped gas compared to 24% availability in Orangi Town and 32% in all Katchi Abadis in Karachi.

5. Roads, Streets and Lanes: All the 40 ft. major planned roads within the area were constructed in 1980. After wards in 1986 some roads were re-carpeted and few were constructed. In 1989 again re-carpeting was done but hardly any road seems to be in good condition due to improper maintenance and flooding of the area from time to time.

6. Street Lighting: Almost all streets have now street lights which was provided in 1988. The overall ranking for the provision of services in various Katchi Abadis in Karachi revealed the following services in descending order, water, gas, electricity, garbage disposal, health, education, playground/parks, sewerage, roads and street lights. In overall Orangi solid waste problem was found to be on the ninth priority (AERC 1988). For community facilities the priorities were hospital/clinic, school, post office, park/ playground and public telephone (NESPAK 1991).

8.4.2 Facilities for Solid Waste

8.4.2.1 Presence of Garbage Container: 96% households confirmed that they have garbage container in the house. The remaining household who do not keep the container use the plastic bags or other packaging material and throw their garbage in the back lane. Some HH living quite near to the dustbin or open land suitable for informal disposal often do not feel the need of the garbage containers. The table 11 shows the status.

8.4.2.2 Type of Garbage Container Used: The type of garbage containers found in use by the households is given in table 12. The results obtained are compared with the previous survey conducted for Orangi (Sinatamby 1984). The majority of the households use the canisters (used oil tins of 18 litres capacity) for garbage collection due to its availability, water tightness, easy in carrying, unloading and cleaning.

8.4.2.3 Persons Disposing the Garbage out of the House: The status is given in table 13 which shows that mostly the throwing of garbage out of the house i.e. dumping the garbage out of the container is done by the Children or at times by the housewives. People who can afford have hired the private sweepers to collect the garbage from their houses.

The young children perform the duty of throwing the garbage out of the house. These children often do not go to the school or are otherwise playing in the street or helping their parents in the economic pursuits. While the survey conducted in 1984 (NESPAK 1985a) revealed that the jobs was done entirely by household members.

8.4.2.4 Frequency that the Garbage Container is Filled: The result obtained are compared with the pervious survey conducted in 1984 and is given in table 14 which shows that 88% remove the garbage once a day. The increase in frequency can be attributed to the normal increase in S.W. quantity, quality and composition, planned area, vertical construction (more storeys), increased awareness etc.

8.4.2.5 Cleaning of Garbage Container: The answers received during the sample household survey is given in table 15 which shows that majority of the household clean the container daily while 17% do not clean it and just empty it till the time the container cannot be used due to offensive smells or develop any leakage/holes.

8.4.2.6 Replacing the Garbage Container: The results obtained are given in table 16 which shows that replacement is dependent on material of the container .The canister type garbage containers has usually prolonged life if maintained properly.

8.4.2.7 Place of Garbage Disposal: The main garbage disposal locations where the garbage is dumped is compared with the previous survey in Orangi and is given in table 17. It is very obvious from

the table that majority of the households do not throw their garbage at a proper disposal site or dustbin. Since mostly the job is done by the children. Therefore the most convenient place is near the house or at the nearest open space. That is why many informal dump places are found with in the area which are not being serviced by the municipality. It is also not certain that the sweepers dispose the garbage into the dustbin.

In other unplanned areas of Orangi also the tendency is to leave the solid waste in front of the plot. 48% respondent practice this method or 33% throw in the open plots, 3% throw in the open drains, 8% in municipality's dustbin while 9% have no fixed arrangement (NESPAK 1991).

8.4.2.8 Amount Paid to the Sweeper: 23% households pay some amount to the sweeper for the collection and disposal of garbage. 60% household upto Rs. 10 while 40% paid upto Rs. 20. The average amount paid is Rs. 12.

8.4.2.9 Nearness to the Formal Dustbin: Nearness to the formal dustbin is very essential for the proper disposal of the garbage to be taken up by the municipal vehicle. The answers received from the respondents are given in table 18.

Majority of the households reported the bin to be far and out of reach. This reach can be defined as the carrying or convenient distance of the garbage container to the dustbin by the children. This also shows that only 11% can claim that the dustbin is near to their house.

8.4.2.10 Reasons for not Using the Community Bin: The reasons of not using the existing community bins include the bins to be very far from the house as children or female household can not go there. Besides they find the dustbin is not properly cleaned/cleared, and is overflowing etc. For the HH whose garbage is taken by the sweeper think that their garbage is disposed off properly into the bin.

8.4.2.11 Presence of pests: Table 19 depicts the presence of pests due to the unhygienic situation and improper garbage clearance from the area, presence of such insects, flies and rodents are self explanatory.

8.4.2.12 Prevalence of Disease: On inquiry about the disease during the current month 40% respondents and their family did not have any complains, 30% reported to have fever of any kind and 20% reported malaria while the rest had complains of typhoid, stomach ache and asthma.

A recent survey in other unplanned localities in Orangi suggested that higher illness is noticed in Orangi as compared in Baldia Township where 31% household had at least one family members fall ill in the month prior to the survey. Of the known reported cases 50% are of malaria, 23% diarrhoea, 7% typhoid, 4% upper respiratory, 2% hepatitis, 3% scabies, 2% worms & 12% others are known. However this is only an indicator and firm conclusions

cannot be drawn from it (NESPAK 1991).

Another survey conducted by the students of the Aga Khan University Hospital in Orangi revealed that 41% households were found to be ill in the previous month when the survey was conducted. The usual occurring diseases were respiratory, fever, diarrhoea, skin infections and accidents. Besides registered medical doctors, households also get treatment and medication from homeopath, hakim, quacks and medical compounders.

8.4.2.13 Satisfaction with the Municipal System: The respondents in general were not found satisfied with the municipal solid waste collection system. 97% were found either dis-satisfied or showed their feelings toward it. While only 3% were fully satisfied having no complains. This is also confirmed from the fact that 84% respondents find garbage spilling in the lanes and street while 16% find it occasionally that the garbage is found littering in the streets.

When asked of the opinion that the ZMC clean the existing dustbins regularly, only 2% respondents applied in affirmative while 69% replied in negative and 29% did not know of the situation due to being far away from the dustbin. Some HH have not noted it due to their absence from the area in the day time because of their jobs. In other previous survey it was found that 30% garbage dumped stays there while 63% was burnt.

When inquired about the frequency of garbage clearance by the municipality 94% respondents replied that they do not know. 2% said once in two days and 4% think it is once a week. Probably this is due to the reason that the garbage is always seen in the dustbin.

8.4.2.14 Suggestions for Improvement: The various suggestions for improvement were given by the residents for the improvement of SWM services include provision of more dustbins in the area(31%), proper management of SWM services(31%), requirement of more municipal sweepers(21%), public participation(15%), daily clearing/ servicing of communal bins(15%), utilization of private sweepers(10%). 8% respondents highlighted on the need of hard work and honesty in the job by the municipal staff and similar percentage wanted more refuse vehicles for the area, while 4% wanted organization of weekly cleanliness campaign.

8.4.2.15 Previous Attempts of Garbage Cleaning by the Community: 65% respondents replied in negative that any garbage cleaning campaign has taken place, 29% remembered the cleanliness campaign week held in 1988 and 1989 while 6% did not remember. This also show that if such campaign has been held, than effective and physical participation from the community was not there.

8.4.2.16 Willingness and Extent to Participate for Improvement/ Better System: Looking at the severity of the problem and the high priority the residents give for the solution of garbage collection and disposal problem, 97% of the respondents have been found willing to participate for improvement in the area or to work for

a better system.

For the extent of participation, 39% respondents agreed to participate physically and are ready to devote their time and energy, 9% also were willing that their family members will also join the campaign if held, while 52% agreed to pay monetarily for the area improvement.

8.4.2.17 Role of the Councillor: Majority of the household showed their dissatisfaction towards the services provided by the area councillor and the development work in the area. This was found to be because of the following reasons:-

i) The constituency of the councillor is very big. It includes Sector 5, Sector-4, Bijlinager, Islam Nagar, Khyber Colony, Agror Colony, Mujahid Colony, Quaid-e-Awan colony, Mominabad, Zia Colony, Kashmir Town and Mianwali are also in the councillor's jurisdiction.

ii) Since many unauthorized katchi abadis are also in the jurisdiction of the area councillor, so he spends most of his time in solving other problems. In his interview he revealed that he has spent the required share of money from the budget in Sector 5.

iii) The councillor office is far from the study area and his availability is uncertain and to voice one's views is also difficult.

iv) Since the councillor belongs to the other ethnic group and hails from different political party hence a good working relationship is not maintained.

v) Due to the frequent disagreements on the needs and services to be provided in the area between the councillor and the residents, there is a cold war existing between the two parties. Thus the people are not voicing their views and the councillor is also only attending to the problems communicated to him/his office.

vi) The case study area is not having a very significant position politically as the number of voters are not comparable with other areas in the constituency.

To avoid any confusions and for establishing better contact with the residents the councillor has set up a "Mushawarati Council" in which there are two members taken from every locality. The council meets as per requirement and needs. Besides a Mohalla Committee is also formed to solve the day to day problem of the locality. But the two committees due to difference of opinion and political background are not found to serve their needs.

8.4.3 Solid Waste Management System in Orangi Town Sector - 5:

There are around 30 sweepers including 29 male and one female sweeper for the whole councillor's constituency, which include the two regularized areas of Sector 4 and 5 and the rest are all unauthorized but regularizable katchi abadis. The number of sweepers in all the constituencies in ZMC West is approximately the same irrespective of the population and the area. Thus according to the schedule prepared by the councillor's representative and the sanitation staff of ZMC, Sector 5 receives only 2 days service during a month and the same is for road sweeping. In many areas

private sweepers are being hired to collect and dispose the solid waste. The number of sweepers are grossly inadequate considering their duties which include road sweeping, dustbin clearance, open chocked manholes and clear the obstructed sewer (as KWSB staff is not deployed in this area), one open refuse van is now allocated to each councillor since past two years, otherwise earlier one van was shared by two constituencies. The three motor coolies are also included in the overall strength of 30 sweepers. According to the area councillor out of these 30, three are used as motor coolies, three are deputed in the market area two for opening of the sewers/manholes. Excluding for sweepers on leave and for sickness etc. only about 18 sweepers are available for a day's job. Thus these municipal sweepers are not collecting the garbage from the houses and private sweepers are plying in different areas as per needs.

To improve the solid waste collection system three new cement concrete dustbins were constructed at various locations in the case study area. But according to the councillor and observations made during the survey such bins were not found to be servicing properly due to the following reasons:-

- i) The habit of the people developed during these years of throwing the garbage on open plots and in lanes according to their convenience.
- ii) The number of formal dustbins (kundi) are insufficient in number and capacity.
- iii) The location of dustbins are inappropriate as according to the councillor the residents did not allow to construct the bins near to their houses.

The garbage pick up from the three newly constructed dustbins and other informal locations is done once in two days by the refuse van which makes on an average 2 to 3 trips per day. The councillor has requested for about a minimum of 100 sweepers from the ZMC, while it is envisaged that since most of the constituencies of councillor have one refuse van so this number will not be increased in near future.

Another problem of the area is the illegal livestock keeping in the area where owners have kept their buffaloes in front of the houses or open plots which is disturbing the over all health environment. Their excreta mixed with the solid waste and cattle food served becomes an ideal place for breeding of insects and mosquitoes as well as emanating offensive odours. Although in overall Orangi. 94% household do not own any livestock yet only these 6% create problems of varied nature to the residents. The owners are politically and socially so powerful that in spite of several efforts made for their eviction it could not be met with a success.

8.4.4 Previous Attempts for Improvement SWM: In Orangi like other areas of Karachi, no facilities for collection, transportation and disposal were provided earlier. As such the resident adopted different habits of garbage collection and disposal. Open and amenity plots were made as garbage dumps as nobody permitted to

have the dump site or dust bin near to their residence. Usually children were involved in garbage dumping to the nearby informal disposal point in unhygienic containers. This created not only spilling of garbage in the lanes but are also dangerous for the children who carried the garbage as more body contact is noticed.

Till 1984 there was no proper system for garbage disposal. People adopted various methods the sole purpose of which was to get the garbage out of their house. This attitude resulted in garbage being thrown in lanes, open plots/space, nalla (open drains). The result was the piling of rotting garbage in the area which served as the breeding ground for insects and mosquitoes. Children who are often seen playing in the garbage dumps are the worst sufferers of this unhygienic condition. Harmful skin and fly borne diseases are common among them. Also garbage when dumped in the nalla blocks the flow of the nalla which is the final source by disposal. In many places the bed of the nalla has risen due to solids accumulation chocking the connecting sewerage lanes (Rahman et al 1984).

In 1984 the study conducted by OPP showed than an average family in Orangi comprises of 7 members generates 0.5 cft. of garbage per day. This is collected in tin canisters having capacity of 1 cft. and disposed off every alternate day. The composition of garbage are vegetable peels, plastic bags, pieces of paper, clothes and leaves. Tin glass and hard plastic are found to be infrequent items of disposal, which are usually stored and sold to the junk collectors. Besides the small pieces of glass and tin in the garbage pile are responsible for the cuts and wounds inflicted on the children (Rahman et al 1984).

Along with the improvement in sanitation, OPP also directed its effort towards improvement of solid waste collection services in the lanes. Following efforts were done:

i) **Cleanliness Campaign:** OPP contacted the sweepers of Orangi and entered into contract with them to do the following work:

- Take, the garbage from the houses to the dustbin through trolley.
- Cleaning/sweeping of the lane.
- Cleaning/clearing of the manhole in case of blocking of sewers.

For the services rendered by the sweepers contribution of Rs. 10.00 was to be collected and paid by each household.

This was popularized and publicized by the OPP and pamphlets were distributed to the residents for cooperation. This system still exists in many parts of the Orangi areas and also in Sector-5 but not supervised or looked after by OPP any more.

ii) **Eradication of Insects & Spraying:** A pamphlet was prepared and distributed by OPP giving instructions to the household for killing and eradication of insects from the houses. Spraying of insecticides is recommended to be done in each house at regular intervals.

iii) **Construction of Durable and Low Cost Dustbin:** A pamphlet and a poster was made and distributed by OPP giving a simplified design of dustbin which is stronger and durable than common circular. G.I. dustbin accommodating twice as much garbage with one third cost of

Rs. 450.00 than conventional G.I. bin. The dustbin was designed with 6 ft. dia. and 4 ft. length to accommodate garbage of four lanes with only a contribution of Rs. 10.00 per household. OPP prepared the shuttering which was provided free of charge to the residents.

In 1984 OPP tried to find the solution of the garbage menace and gave two solutions:

1. Collection of garbage in pits at the home and burning.
2. Collection of garbage in canisters at home and burning it every alternative day and then spreading it in the lane. According to the OPP this system was to have the advantage of killing the germs and reducing the volume to one fifth of the original. The disadvantages as OPP foreseen were that the burnt garbage when spread in the lanes can pose health hazard due to small pieces of glass and tin which do not burn.

OPP also looked into the concept of conversion of household garbage into compost and its utilization but reported the following:

- i) The average plot size in authorized areas is 80 sq.yds. with the space inside is comparatively less and is usually found paved. As the process of compost formation require unpaved space it cannot be adopted in such areas.

- ii) Average plot sizes in unauthorized areas is 120 sq.yds. with space inside the houses are comparatively large, but the concept of compost formation and its acceptability needs time.

Thus OPP initiated the garbage burning thereby increasing the storage capacity of the communal bin and reducing its volume and frequency of disposal avoiding disposal of fresh garbage in the communal bin.

There was an acute shortage of sweepers, dustbins and refuse vans in the area which leads to the delay in the removal of garbage. Study conducted by OPP in 1984 revealed that in Orangi garbage was a source of income for 200 families including 125 families of Junk vendors or middle dealers and 75 families of beach combers (scavengers) (Rahman et al 1984).

OPP methodology of solution of garbage problem in 1984 was the following (Rahman et al 1984).

- i) Utilization of KMC refuse vans through lobby with the councillor (as he was responsible for obtaining and directing the KMC facility).

- ii) Garbage was to be burnt and disposed thereby reducing the volume and increasing the storage capacity. OPP advocated that the garbage is to be burnt individually rather than collective burning, as the responsibility and frequency for burning was disputed, quantity burnt was unchecked. Before burning the separation of items was required, which was to be sold to the junk vendors can add to the household economy. The other advantages of the system as OPP foresee were reduction in health hazard as burnt garbage was germ free and its storage was of no harm, Filth scattered in the area will be eliminated as the burnt garbage will be disposed off at KMC bins only.

- iii) A coordinated efforts of OPP, people and KMC was required

whereby the OPP's role can be taught to the people (through meetings, demonstration, leaflets, pamphlets and slides) and coordinate with the area councillor. People to separate items for sale, burn the stored garbage and then dispose to the nearest KMC bin, lobby with the councillor for provision of refuse vans and dustbin. KMC to provide the bins and refuse vans.

The pamphlet issued by OPP were published and distributed in Urdu language for easy understanding of the residents. The messages given in the pamphlets include the following:

1. Protecting the big nala saving yourself from further problems.
2. Burn the garbage and throw it in the dustbin.
3. Garbage - a health problem.

The last two are included in Annexure A.5 with the English translations.

8.4.5 Recycling in Orangi Town: Almost all the households have been found to gather the recyclable material with in their premises to sell to the hawkers or street vendors and get some financial benefit. Nobody sells the material direct to the shop or to the middleman due to the reason that such shops are not present with in the area and taking the collected material to the shop requires efforts and transportation which is not economical and feasible for the household.

There is a wide variety of items collected and sold by the household. The used shoes and old/worn out clothes are either given to the other poor people or are exchanged with glass, jugs, plates and plastic ware through "Glass-Barni Wala". Usually the old bread or "Bhosi tukray" is sold once in a week since it cannot be stored for a long time. The use of glass bottles, its collection and selling represents the highest percentage. While newspaper is not read daily by the household and is readily put to other use like for packing, covering and as mats. The various items retained and sold are given in table 20.

In previous survey conducted in 1984, it was found that 46% household do not retain any material for sale, 12% retain paper, plastic, sandals and cloth, 43% retain roti, 32% glass and 13% metals.

The frequency of selling the material has been found to be as per need, collected items and its quantity. Sometimes the hawker also persuade the household to sell the material in what ever quantity it is. The answers received from the households regarding materials retained and sold are given in table 21.

8.5 COMPARISON OF CASE STUDY AREAS: General and specific comparison between the case study areas is made specially with respect to SWM facilities in the following chart:

GENERAL COMPARISON

	DESCRIPTION	GHOUSIA COLONY	ORANGI TOWN
1	LOCATION	Centrally located	Northern periphery
2	STATUS	Regularized Katchi Abadi	Developed area in Katchi Abadi
3	LAYOUT	Haphazard and congested	Regular and planned
4	POPULATION	11,500	7000
5	AMENITY PLOTS	No	Yes
6	MUNICIPAL JURISDICTION	ZMC - EAST	ZMC -WEST
7	ETHNIC BACKGROUND	Varies	Same
8	NUMBER OF HH MEMBERS	8	7.4
9	AVERAGE NO. OF HH/DWELLING	1.05	1.12
10	MAJOR OCCUPATION	Self employment	service
11	OWNERSHIP PATTERN	93 %	81 %
12	AVERAGE PLOT SIZE IN SQ. YDS.	44	120
13	SINGLE STOREY HOUSES	78 %	90 %
14	PRESENCE OF COURTYARD/ OPEN SPACE	80 %	96 %

SPECIFIC COMPARISON

	DESCRIPTION	GHOUSIA COLONY	ORANGI TOWN
1	PRESENCE OF GARBAGE CONTAINER	92 %	96 %
2	TYPE OF GARBAGE CONTAINER	Wooden crate	Tin canister
3	MUNICIPAL SWEEPERS COLLECTING GARBAGE	Yes	No
4	PAYMENT TO SWEEPER	9 %	22 %
5	ROAD SWEEPING	Regular	Once a month
6	PERSON DISPOSING GARBAGE OUT OF HOUSE	Housewives	Children
7	DAILY FREQUENCY OF GARBAGE REMOVAL	95 %	80 %
8	DAILY CLEANING OF HH GARBAGE CONTAINER	82 %	72 %
9	REPLACEMENT OF HH GARBAGE CONTAINER	65 %	14 %
10	GARBAGE DISPOSAL AT INFORMAL PLACES	35 %	73 %
11	GARBAGE BURNING	Rare	Often
12	SATISFACTION WITH MUNICIPAL SWM SYSTEM	85 %	3 %
13	NON AWARENESS OF GARBAGE DISPOSAL FREQUENCY BY THE MUNICIPALITY	50 %	94 %
14	PRESENCE OF FLIES, INSECTS AND RODENTS	Yes	Yes
15	WILLINGNESS TO PARTICIPATE FOR IMPROVEMENT	95 %	97%
16	EXTENT OF PARTICIPATION -PHYSICAL -FINANCIAL	93 % 60 %	39 % 52 %
17	PRESENCE OF VOLUNTARY ORGANIZATION	CBO	NGO

8.6 REMARKS:

1. More vertical growth is taking place in Ghousia colony due to its location and small size of plots, thereby increasing the population density and garbage generation.
2. All the basic services and utilities are available in both the areas.
3. Owners in both the areas are more enthusiastic and willing to cooperate for improvement works.
4. More active community was observed in Ghousia colony due to previous attempts of regularization and upgrading.
5. HH without garbage containers tends to do indiscriminate dumping at open places, back lanes and amenity plots.
6. Wooden crates as garbage container are not found to be a good choice due to absence of proper base, less capacity, fouling and no cover, which tends to attract insects and rodents.
7. In Ghousia colony only two communal bins are present located away from the area while in Orangi town three new dustbins are constructed but not found in much use.
8. Non utilization of communal dustbins is noted in both the areas which is due to insufficient number, less capacity and far off location.
9. Garbage littering is a common phenomenon especially in Ghousia colony because of less width of lanes and improper dumping/throwing out occasional dirt in spite the fact that municipal clearance is done daily.
10. The community in Ghousia colony is more aware of the problem and often report to the councillor's office, while in Orangi town people have developed a habit of "staying quite and bearing the consequence" attitude.
11. Majority of people in Ghousia colony physically participated in the two cleanliness campaigns held in 1988 and 1989 while limited participation was noted in Orangi town.
12. Generally a faith on the municipality has been developed in Ghousia colony which is best represented from their willingness to participate.
13. The area councillor in Ghousia colony is more active in solving the problems of the residents, besides the location of his office in the colony.

9. ROLE OF THE NGO AND CBO

9.1 ROLE OF NGO: The term NGO (non-government organization) is usually called as PVO (private voluntary organization) although both omits the developmental role which is surely crucial. Pardon (quoted in Landim, 1987) describes their development role as "private non-profit organization that are publicly registered (i.e. legal status), whose principal function is to implement development projects favouring the popular sectors, and which receives financial support. The sources of financial support are almost always non-governmental organizations themselves, based in industrialized countries, operating in the framework of international development cooperation".

As indicated by Havers (1991), It is indeed difficult to make a valid generalization on the NGOs, given the different realities in which they operate, the different goals they pursue and the diversity of activities to which they are dedicated.

NGO's can usually be characterized as having the following key features (Havers 1991).

- Private ownership.
- Non-profit (or perhaps, not-for-profit) orientation.
- Legal status.
- Principal function is people-centred development.
- Not financially self reliant.

Practically only a small number of NGOs are close to financial independence, and many are striving for it, but for the time being at least dependence on external financing is definitely the norm of the NGOs of south, while many NGOs of the north such as Oxfam and Novib are financially self-reliant.

The development of the philosophy, strategy and programmes of NGOs have been well described by Korten's (1987) generational framework. He characterized NGOs as falling into three generations:

- First generation NGOs are concerned with relief and welfare oriented programmes, geared to immediate provision of goods and services to individuals and families facing difficult or emergency situation.
- Second generation NGOs have moved beyond the relief and welfare stage to develop small scale self reliant organizations of the poor supported by an integrated programme of activities. This might include literacy, health etc.
- Third generation NGOs emphasize sustainability, and attempt to influence the country's formal development systems, seeing themselves as catalysts.

Generally NGOs pass from one generation to the next and it is also possible for one NGO to be involved in activities of three generations simultaneously.

A similar framework is proposed by Elliot (1987), who observes three positions within the range of agency behaviour:-

- WELFARE: delivering services to specific groups, but in programmatic terms, rather than empowering local communities.
- DEVELOPMENTAL: whose ultimate goal is to improve the capacity of a community to provide for its own basic needs.
- EMPOWERMENT: which sees poverty as a result of political processes and is committed to enabling or training communities

to enter those processes.

As assessed by Schertenleib et al (1990), NGO usually enjoy a good reputation and respect in the eyes of the general public, local and federal governments and with foreign donors. The main reason for such popularity is the ability of the NGO's to reach the target population more cheaply and directly than the government agencies. Thus they are able to reach grass root poverty in ways not open to official institutions.

WHO (1985) refers NGOs as having the general characteristic that they are outward oriented as they exist to serve the benefit of people other than themselves. NGOs work through "direct action" e.g. grass root education work or "external advising" (not insetting people in communities, but responding to requests for support as they arise. The aim of the NGO is on the principle of helping people to help themselves and stimulating self help in the community.

There are other external factors which have led to this gain in favour by NGOs at the expense of government initiatives. Significant in this have been the twin bureaucratic cultures of lethargy and corruption found in many government agencies, often resulting in dys-functional behaviour. Another has been the increasing credibility of voluntary organizations. Infact, the global trend towards the increasing respectability of private initiative is an important one. Experience shows that relying on governments and their command system approach to resource management is unsatisfactory. NGOs by contrast work through the development of people rather than the transfer of capital resources, emphasizing local control, accountability, initiative and self reliance (Bartone 1986). In any case NGO's are the potential vehicles for broadening the base of participation in the community, for increasing the locality's access to development resources and for promoting technical change (Schertenleib et al 1990).

The strength of NGOs lies in the credibility of both the donors and the target population. Following are some of its strengths that favours their involvement in civic projects and interaction with the community (Havers 1991):

-Target group approach, the NGO approach target groups for their active participation.

-Flexibility and responsiveness, NGOs are not tied in bureaucratic systems of government, and are thus able to be much more flexible. Their informal system means that they can adapt to change. They enjoy loose control which enables them to offer a flexible response.

-Heterogeneity, a result of this flexibility and responsiveness is the tremendous variety of enterprise programmes run by the NGOs. Even within a single organization, different approaches may be used in different geographical areas. They are not tied to a highly standardized homogenous development product but are characterized by a rich variety of approaches and philosophies.

-Experimentation and innovation, the ability of NGOs to experiment is vital. It is worth quoting Alliband, (1983) " one of the strongest functional aspects of NGOs is their potential role as trailblazers i.e. pioneers of new and untried development approaches. Unlike government programmes which may be handicapped by complex political constraints, they can operate more or less

independently of concern about failed projects, so long as they have a sympathetic patron."

-Local grass root presence, NGOs are on the spot, operating very close to their target group.

-Dependence on customer satisfaction, the organization as a whole is totally dependent on customers satisfaction for its survival, they remain considerably more accountable than their public sector counterparts

-Motivation, the salaries of NGO staff are generally rising, but it is still true that people do not join the staff of an NGO to get rich. It is individuals commitment to the aims of the organization which is the real motivation. NGOs have often been founded by a charismatic individual with a clear mission. An interesting example of different motivations is described by Rahman et al (1986), who observe that in agricultural credit, government staff were concerned only with the formalities of loan recovery while those of the NGOs were committed to ensure that the loan proceeds were properly used as well.

But of course there are some weaknesses of NGOs also while exists as promoters and developers. Buijs (1988), identifies three sets of institutional shortcomings of the NGOs:

-Policy orientation, because of their focused, target group approach, NGOs only usually provide assistance to those who most need it. They sometimes put social considerations before economic viability and the interest of the community before those of the individuals.

-Management system, generally NGOs have weak management information systems.

-Capacity gap, manpower is generally seen by NGOs as a cost to be minimized, not as essential resource for the organizations future development. Many NGOs recruit people with the right attitudes rather than the right technical skills.

Other weaknesses of NGOs can be considered as follows (Havers 1991):

-Leadership and succession, many NGOs are still run by their founders. A management structure is needed in which strategic responsibility is not confined to one person.

-Anti business culture, within many NGOs there is a considerable suspicion of anything to do with business or profit.

-Lack of programme integration, to maximise effectiveness, different components must be brought together in a logical and coherent manner. Finance should be integrated with advice, training and continuing support

Irrespective of some weaknesses and short comings, many multilateral, bilateral and other aid agencies are now approaching NGOs with the belief that they, more than state organizations are capable of solving many problems standing in the way of sustainable development and satisfaction of basic needs at the local level. In the field of environmental conservation, the Brundtland report assigns to NGOs an important role. The World Resource Institute sees them as contributors in conservation projects that include education, training, planning, policy analysis and strengthening of regional development authorities. The World Bank sees NGOs as agents capable of compensating and alleviating the social costs of structural adjustment policies. The United Nations Development Programme

ascribes to them an important role in urban management and development (Yeung et al 1986).

The Manila Declaration prepared during the conference from 6-10 January 1989, have also highlighted a major role and need of NGO's and peoples organizations to be involved in all phases of project cycle (Eco forum 1991).

9.2 CBO (Community Based Organizations): CBO'S are formed in the urban and rural communities to solve one or a set of problems confirming to their basic needs, provision of services and utilities. In urban slums and squatter settlements the existence is a difficult task in terms of living on an unauthorized plot, having fear of eviction, payment to the landlord, owner or(dallal), fetching water for daily use, transport, buying of daily necessities, disposal of human wastes, power supply, cooking fuel, getting and maintaining employment etc. These are some of the basic problems to be dealt with on an urgent basis. A group of people, initiators and leaders who think that a collective action can solve the problem or can help in alleviating the difficulties, form an informal association/organization. Usually such organizations start first with a problem identification and than motivation to sit together for brain storming of solving the problem(s). Initiation is taken by somebody who calls for a meeting and the residents/ members thus gather to make a collective decision. By such process the CBO is formed. Till the problem continues, or enough motivation and motivators are present, the CBO exists. Usually the initiator becomes the head/ leader of the organization since he already had the problem and the possible path for solution(s), while the others rely on him but are ready to participate in any physical or financial task that can help in solving their collective problem. The essential part in the process is that a collective decision is taken by the community for solving of their problem. Due to the urgency of the problem, limited know how and time frame the approach taken may not be the correct one but the decision describes that the community is still alive and they have a genuine problem to be solved. Such awareness is also created/ felt in the women who are the main initiators and beneficiaries since they are the one who stays indoors and enjoys the facilities more.

Based on the author's experience in a number of urban slums in karachi, it is noticed that community participate positively and actively towards their urgent problems when the need is felt by them. Earlier at the time of settling in the locality the residents think that they will be able to live with the problems and will get used to it with time or something will be done somehow or by the others or at last by the government for the improvement. After settling the main pursuit by them is getting the employment and maintaining it to feed the family. In such cases the individuals gradually improve on their living as time passes and initially they try to solve the problems individually or in small groups having a localized solution on a temporary basis depending on the nature of the problem. After formation of CBO, they are motivated to solve the problem which can have improvement on their life styles. Since CBO forms from with in the community and no external human resources are used or are

affecting on its decision thus people have more confidence and they rely heavily on it. The organizers and motivators also are more responsible to their task assigned as the community inquire about the progress of work every now and then. So such voluntary action by the organizers becomes a compulsion and a duty to the community. Since no or little finances are usually involved by the members, mistrust and chances of embezzlement are also reduced to a minimum. On the other hand since many representatives are there from a lane, street or cross section of population, the members enjoy more confidence and trust. If proper technical, administrative and institutional set up is made than such CBOs can achieve better results.

9.3 NGO IN ORANGI TOWN: Orangi Pilot Project was started through the individual efforts of an experienced person who accepted the responsibility of providing the urban services to the residents of the largest slum in Pakistan, Orangi Town. This NGO started in 1980 with the approach of lobbying with the local community organizations, elected councillors, leaders and government officials for help and assistance in giving the acceptable level of services to the planned and unplanned areas of Orangi. The time and efforts spent taught them a good lesson of gearing their efforts to a new direction of self help and developing a strategy from bottom to top organizing the community. Through this method, the creation of effective local organization and utilization of technical skill among local people was to be the key to improvement of Orangi by developing a low cost technology, building technical competence and professional approach.

Considerable time was spent by OPP on creating awareness and organizing the community through lane meetings and motivating the residents to solve their own problems. OPP was established with the prime objective to analyze the outstanding problems of the area through prolonged action, research, and extension education and discovering some workable solutions by promoting community participation and self management. Through research and education they tried to change the attitudes so that the practise of cooperative action can grow among the residents (Khan 1985a). OPP has a private ownership and control with the principle function of people centred development with a not-for-profit orientation. Many localized associations, societies, clubs and "anjumans" existed in Orangi for various purposes, but OPP never came in competition with them as they made "lane" as a unit for construction appointing lane managers and area activists w.r.t. the physical boundaries. It is assessed that as per Korten's definition of generational framework described earlier, OPP has been simultaneously involved in the activities of the three generations doing relief and welfare oriented programmes, developing small scale self reliant organizations of the poor and emphasizing sustainability, attempting to influence country's formal development system through its various projects.

Over the period of nearly 12 years OPP has a dedicated and recognized team of social organizers, technicians and grass root contacts. During the course of time OPP has been upgraded into four autonomous institutions having their own management system and has successfully developed the various research action programmes besides low cost sanitation, low cost housing

programme, social forestry programme, women's division training programme, women's health, education and family planning programme, women work centres, orangi charitable trust, education and economic programme. The details and brief of their achievements and programmes are given in the Annexure A.3.

OPP is thus working through a "direct action " approach of taking grass root education work for all the cross section of population benefitting from their activities. OPP has a high credibility with the donors and sponsors and are being funded by many national and international agencies.

OPP is equally or rather more popular in orangi as many programmes have been started for their benefit like establishing work centres from where they can earn a decent living without moving out of the area, forming women cooperatives and consumer stores, health education and birth control programmes for which women contact women approach is utilized.

The success and recognition of OPP's programmes can best be judged from the fact that the Planning Commission, Government of Pakistan recommended that OPP be converted into a research and training institute with orangi serving as a demonstration. The OPP programmes have now been replicated in other areas of the city and in the province as well.

9.4 CBO IN GHOUSIA COLONY: Many welfare associations and community organizations have existed in Ghouisia Colony for solving the common problems of providing infra-structures and urban services. But the main aim was to get the colony regularized as till 1980 it was among one of the non-regularizable Katchi Abadies. As per the survey conducted by Van der Linden (1985), there were at least 6 welfare organization of the residents.

During the present interviews it was noted that no such organization existed till today or had the chance of surviving during the course of time. Regularly new association are formed and many are defunct. Survey revealed that for these welfare organization started earlier, the residents have no high regards for the organizations and their leaders due to one or many reasons noted below (Van der Linden 1985).

1. Many association consist of a board only. Although they are meant to be resident's associations, their membership is seasonal and so are their activities. Rightly, Segaar (1973) labels such organization as paper associations. According to him the main aim of the board members of such association is their want to manifest themselves and to gain status. Organizing and making plans appears to be more important than results.

2. Where association can rightly boast of certain activities, the interests of leaders and the common population do not always coincide. Often leaders try and mobilize the population only to further their own interest (Van der Linden 1985 and Yap 1982).

3. The resident's association seldom exceed the boundaries of ethnicity. In Ghouisia Colony, they do not. As a result, even if an active association achieves support the population, it can at most represent a part of the residents only.

4. There is often much competition between associations, instances are known where the only activity of an association was undertaken to frustrate the eventual success of an other association.

Thus the state of affairs sharply contrasts with the enormous obstacle with peoples association find in their way if they really want to achieve something for the members or for the people they represent, in spite of the generally dismal situation in Ghousia Colony a few instances were recorded of associations which for long periods of time have tried their best to obtain facilities for the settlement and to get it regularized. The facts and procedures adopted can best be studied in reference (Van der Linden 1985) as it is found to be out of scope of this thesis.

In principal, there is a 'Rabta' (liaison) committee consisting of people who each represent small rows or cluster of some 10-15 houses. But survey (Van der Linden 1985), revealed that most of the households do not know who are the community members and they rather contact the councillor himself for any information (109). This can be attributed to the reason that the councillors office is located in the area where he is available in the morning and evening.

Though several welfare associations and four mosque committees existed yet they were not utilized for the development works. The power structure is a pyramid type with the councillor on the top and below him are selected, not elected local leaders and below them is the population. The middle cadre include the people "who can read and write, have sufficient spare time and command some authority amongst their people" (Van der Linden 1985).

After the municipal elections nine years ago, MQM (Mohajir Quami Movement) won majority of seats. The councillor of Ghousia colony also belongs to the same party. Due to majority of people in the area also supports the party, the young members of the community informally organized the CBO. From the chances of eviction to regularization, legalization and shifting, a minimum period was consumed as compared to the other katchi abadies of Karachi. Thus the community was very much motivated and were aware of the various problems and its consequences. The residents of the colony were lucky in the sense that the basic services were not far from their door steps before regularization due to its location with in the city center. After regularization other municipal services were provided and standards for water supply, sewerage, street lighting etc. were improved. During this process of regularization, getting lease title, shifting and movement, the volunteers of the CBO actively participated to their maximum capabilities under the leadership of their elected representatives. The work received an impetus during 1988 and 1989 when cleanliness campaign in the form of cleanliness week was organized. The author during the second campaign witnessed the dedicated work done by the volunteers at night painting the footpaths of the streets. During the period of one week several teams were formed within the area who performed various tasks within their capabilities and capacities through councillor's office. This showed the immense potential of self help in the community. During the period all the ethnic groups participated open heartedly in making their surroundings clean. No follow up of cleanliness campaign was planned which could have motivated the community. Besides, the community think that solid waste is a generalized problem that has to be sorted out individually rather than collectively. This describes the passive attitude of

the people towards SWM. The organization of the CBO is within the structure of the set up of the political party (MQM) as most of the volunteers within the age of 16 to 25 years have their membership or are affiliated with it.

The CBO is primarily concerned with the relief and welfare oriented programmes geared to provide services and facilities to the individuals and families like helping in distribution of "zakat" to the poor families, waiving of lease charges for widows, helping jobless people to establish their own small business, collection of hides and skins for generation of funds, financial assistance to poor families, solving day to day problems with the municipality like cleaning of sewers, manholes, emergency water supply through tankers etc. But they have never been involved in providing any infra-structures to the residents through participatory approach.

The main criteria of joining the CBO is dedication both in terms of physical involvement and time, where as the members are controlled and advised by the seniors of the party. CBO in the area has a system of external advise also as it is connected to the other units of the city. While no strict leadership pattern exists.

10. COMMUNITY PARTICIPATION FOR SWM:

10.1 GENERAL: Community participation is active involvement of the local population in decision making concerning development projects or in their implementation. A community consist of people living together in some form of social organization and cohesion. Its members have varying degrees of political, economic, social and cultural characteristics in common (UNICEF/WHO 1977). For the present study Community is defined as a homogeneous mass. Within the communities there may be many different groups, old/young, rich/poor, Hindu/ Muslim, men/women/children, each with different priorities, vulnerabilities and talents (Melchior 1989).

Similarly participation is not a universal thing to be measured but rather an umbrella term covering a variety of related activities. Participation is not the same thing every where, Measuring and assessing it in any particular project is affected by a number of conditions. The nature of the task being undertaken i.e. the development activity and environmental impact, is of special significance. Variations in these two factors affect the who, what and how of participation.

Participation is also to be seen with regard to the real world conditions that surround it. The project/ area environment is not only the physical environment but also the neighbourhood environment (Cohen et al 1977). Participation is essentially a descriptive term, comprising numerous activities and situations, there is much room for confusion about its causes and effects, its volume and distribution. Participation is not a thing that exists in certain quantities and can be measured like the capacity of a dam or a farms production. There is a lot of resemblance with such blanket concept as power and energy because its state of the art is fairly rudimentary (Goldsmith et al 1979).

Participation means the involvement of the community in the determination of what to do and how to do it. People are to be seen as genuine partners, and planners should serve as resource persons instead of authority figures who have total control. Through community education and participation, authority is given to the people to determine how to meet their own needs (WHO 1985). Thus participation should be seen as not only the contribution of labour, ideas and materials but also as partners for decisions (Melchior 1989).

Participation is taken as an initiative from the "bottom" of a voluntary nature not rewarded or enforced. This participation is active not a token one in which the people are given no real choices, only standard designs that they must accept. Incentives are sometimes used to gain acceptance of the project by a reluctant public. Unfortunately, it is often the case that there is in- sufficient time to build among the people the necessary trust and conviction regarding the need for the project. The planner may believe that, once the technology is in its place, the people will grow accustomed to it in time. Yet people may never accept solutions that they have had no part in developing (WHO 1985). The honest and sincere inclusion of Community representatives as partners in decision- making makes for

successful participation (Ramos et al 1986).

Many kinds of participation exist. Those identified are participation in (a) decision making (b) implementation (c) benefits (d) evaluation. Together they constitute a cycle for development activities which appears to be fundamental, with interactions and overlapping each other (Cohen et al 1977 and World Bank 1988).

The participatory approach has a different basic objective, namely to strengthen and enlist local problem solving and decision-making capacities (individual and communal). This skill in turn is used by communities to derive a greater benefit from and sustain development activities. The experience of PROWESS/UNDP has also been along the lines of participatory approach.

The main advantages of community participation in water supply and sanitation projects are to a greater extent also applicable to SWM. White (1981) include reduction in the costs of improved facilities, more people to be served, adaptation to local situations and needs, increasing the chance of proper use and continuous functioning and creating a catalyst for further socio-economic development (White 1981).

Long term sustainability and social awareness are the key factors in any public service delivery system. Community participation in policy formulation, planning, implementing and controlling development programmes is now a universally accepted phenomenon (GTZ 1988). Community Participation helps to overcome any gap that may exist between people and the planners as a result of different perceptions and community needs. The objective of CP is to improve communication with the community so that planners can come to understand the community's problems, and people can participate in decision regarding how to meet community needs through a development project. People also come to an understanding of what resources the implementing agency can provide to the community as part of the proposed project, and what community resources will have to be mobilized in the process.

The second dimension that arises concerns whose participation we are concerned with. The term "popular participation" is very broad and serves no analytical or evaluative purpose unless greatly refined. The main persons whose participation is required are the local people including men, women and also children, local leaders (elected or appointed) and the municipal personnel. The local people do not (this also applies to our case study) constitute a homogeneous group with the same education, income level and social status. It is generally difficult for local people to participate as a group in decision making, not only due to their large number but also due to their level of technical knowledge and experience (Cohen et al 1977).

In this regard community participation is the process by which individuals and families assume responsibilities for their own health and welfare and for those of the community and develop the capacity to contribute to their own and the community's development. They get to know their own situation better and are motivated to solve their common problems. This enables them to become agents of their own development instead of positive beneficiaries of development aid. They therefore need to realize

that they are not obliged to accept conventional solutions that are unsuitable but they are capable of improvisation and innovation in order to find solutions that are suitable (UNICEF/WHO 1977).

Thus it is concluded from all the various definitions and explanations that CP means the readiness of both the government and the community to accept certain responsibilities and activities and that the value of each group is seen, appreciated and used, and mere tokenism or propaganda will not make participation useful (Ramos et al 1986).

The emphasis on CP in new projects implies that communities will be involved early in the project planning and will be encouraged to play an active role in it. The importance of CP is further reflected by the fact that it will be one of the criteria by which national programmes are evaluated for support by external aid agencies (Whyte 1986). The UNDP-World Bank has also increased its concentration on the community level interaction relationship between infra-structure development projects including SWM.

On the other hand CP is not to be taken as a threat to absolve governments of their responsibilities nor as a political change or shifting of power from the center to the community. The fear of CP giving more power to the local elites and becoming a cause for increasing the distance between the haves and the have not is also unrealistic, as the term is not taken in its full spirit (Furedy 1991).

10.2 COMMUNITY PARTICIPATION IN SWM: The main aspects of SWM in developing countries for which community participation is desired are mentioned as per reference Furedy (1991) are:

- Managing wastes within the household and removing them from the premises.
- Reducing waste production (through consumer choices, reuse and repair) and facilitating recovery for recycling through source separation.
- Keeping the public areas of the neighbourhood clean.
- Supporting city or regional projects for improvement.
- Supplying "watchdogs" for the neighbourhood and the city.
- Allowing for rational decisions on suitable disposal sites and methods
- Supporting value changes in industry, government and citizenry that have their impact on SWM problems.

In this context, it is important and most essential to communicate the basic aspects of SWM to the people so that, they recognize its importance and realize the benefits. The main thrust of the community approach should contain the following aspects (GTZ 1988):

- To make the population aware that cleanliness promotes individual and public health, reduces the level of illness and supports the environment.
- To motivate the people to get rid of their waste regularly and voluntarily in line with the system approach.
- To persuade the people to share the costs of the overall waste management service meant for the public as a valuable public service liable to be paid for.

Of all urban services, SWM requires the greatest amount of citizen co-operation to succeed. The Asian countries that have

made the best progress in SWM--China, Japan, Singapore, Hong Kong have, each in a distinct way, succeeded in gaining good levels of community cooperation for city cleanliness (Furedy 1989).

The recent interest in "responsibility sharing" and citizen participation in SWM of Asian cities was reflected by the efforts made by the UNCRD (United Nation Center for Regional Development) in organizing conferences and seminars in Kitakyushu, Beijing and Bandung and calling an international experts to voice their views. The UNCRD meeting at Kitakyushu adopted the theme of encouraging citizen participation and cooperation in SWM and the Kitakyushu Declaration include that "Government should promote active community involvement in the decision making process and have a sustained programme to provide public health education on SWM, environmental protection, public health, waste reduction, recycling and resource recovery" (UNCRD 1990).

It is now a well understood fact that municipal governments are loosing ground in the collection and disposal of urban wastes in spite of the fact that up to 50 percent of their funds are spent on these services. It is recognized that citizens have a right to play a role in planning the services that meet their basic needs. The development projects that do not secure genuine citizen participation fail to achieve their goals.

For the present study CP in SWM is taken in a broader context of using appropriate techniques for collection, transportation, disposal, reduction recovery and recycling of municipal solid waste for creating a better civic culture. The term has been significantly misinterpreted and has been perceived by the civic agencies as a means of utilizing the public and inducing it to conform to procedures already devised by the planners. It is also true that in cities of the developing countries where slum and squatter settlements exist, individual and community responsibilities grow after regularization/ legalization. It is important to have a "sense of place" and decent shelter like in Ghousia colony where people have a sincere desire for area improvements. It is thus easy to inculcate in them a sense for personal and neighbourhood hygiene and for the reputation of their locality.

As referred to reference (Furedy 1989), the citizen's participation in SWM should thus be looked into, apart from the clean up drives, more of individuals altering their daily habits and conforming to rules and schedules determined collectively by them, as the improvement will not necessarily end up in escalation in property values and family's opportunities of extra income (Furedy 1989).

10.3 ROLE OF THE MUNICIPALITY: The model of providing urban services in Karachi is similar to that of other cities in DC, which is top down delivery i.e. the government provides the services, the people pay for them and a group of managers and workers ensure that the services are provided regularly.

The SWM system of the two case study areas lie with the ZMC.

The following is recommended to obtain an optimum level of service from the existing resources of the municipality:

- An appropriate ratio of supervisory staff to direct labour.
- Providing/ arranging equipment supply and facilities to the workers.

- Proper maintenance of existing equipment, machinery and vehicles.
- Fixed responsibilities and duties of municipal staff.
- Establishing a clear communication system to log and report the performance, failures and problems so as to maintain effective communication system and coordination between workers, supervisors and top management staff
- Make room for community participation activities.
- Periodic training of SWM staff at all levels.
- Role sharing and accountability among the sweepers.
- Creating incentives for the staff.

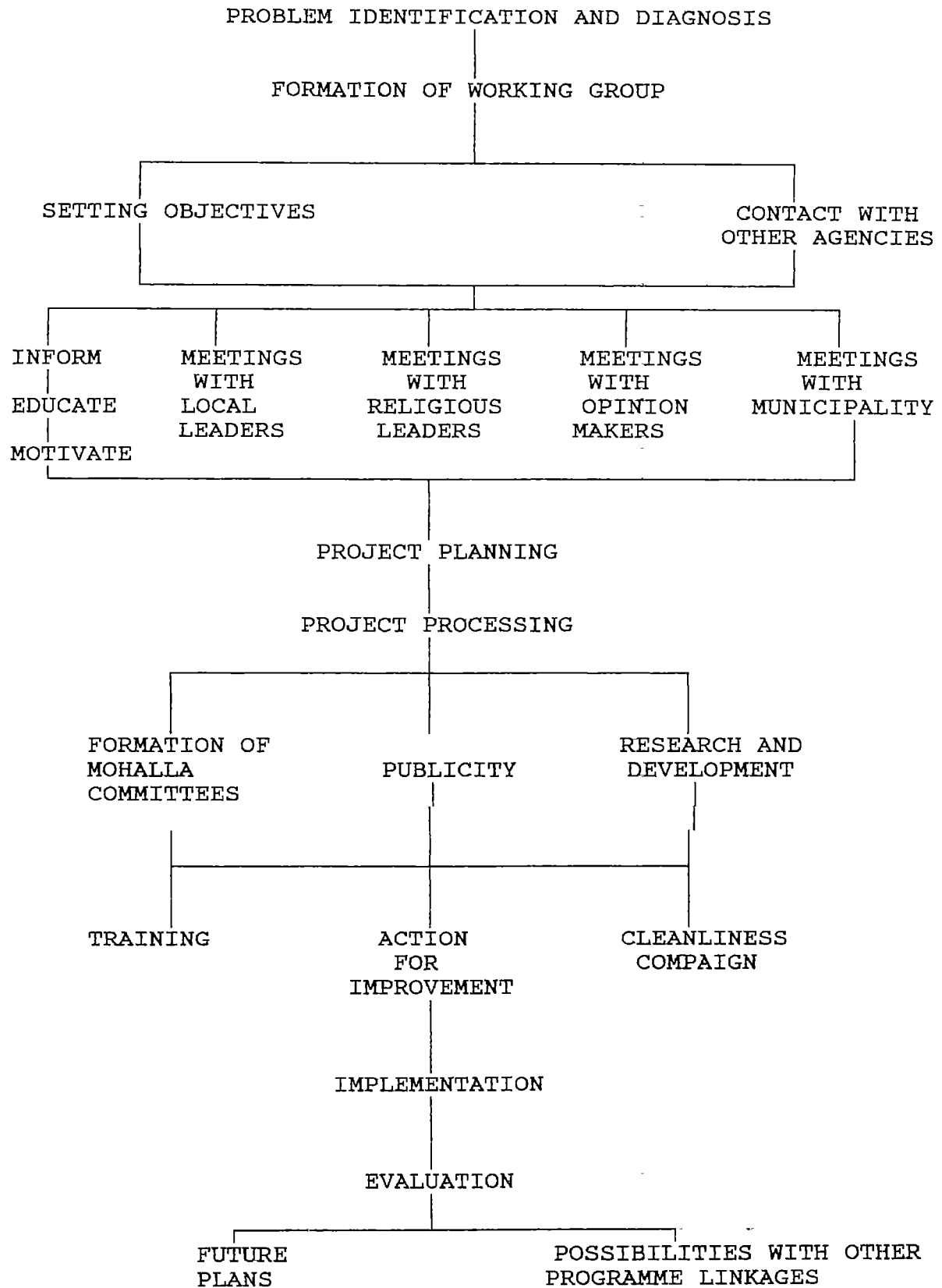
It is further recommended that the municipality should adhere to a more flexible attitude and provide a courteous service to the customers (public). Especially since the sweepers are the main link between the community and the municipality, his appearance, courtesy, competence and consideration would provide an incentive for the community to cooperate. Thus worker's training is to be done first by the trainers and then among the sweepers themselves.

The municipality could also benefit from the ideas and suggestions obtained from the community which will help them to formulate general working plans and future projects. It is required that the municipality should prepare and reconsider the existing laws, regulations and priorities for enforcement with the adequate provision of CP and resource recovery activities among the informal sector. The bureaucratic attitude has to be made flexible in order to absorb such a change but this of course require time, training, resources and will. The traditional paternalistic attitudes of "working for" rather than "working with" the community will take quite some time for adjustment. It is envisaged that such attitudes and activities will enable the municipality in providing the most satisfactory services with the available resources.

10.4 ROLE OF NGO/ CBO: Based on the field study, review of the existing resources and previous attempts towards CP in projects, it is envisaged that NGOs/ CBOs are necessary agents required for the improvement of SWM systems. The community does not have the organizational potential and resources to persuade the municipality. The latter on the other hand are willing but have serious reservations concerning the community which should be integrated into the municipal procedures rather than the municipality participating in communal activities. Thus foreseeing the management and organizational problems, the introduction of NGOs/CBOs is suggested. Their present status and potentials have already been discussed in chapter 7. Here the role of the NGO/ CBO is highlighted regarding performance of the task as mentioned in the accompanying figure, and their specific role in improving the SWM system is further discussed in the next chapter. It is estimated that the intensity of staff and voluntary organization interaction with local people is likely to affect the amount of participation. Coupled with education and training this will improve the level of available skill and will make a continuing contribution to productivity and welfare.

For the case study area Orangi town sector-5, it is assessed that OPP can play a vital role in the general cleanliness of the

ROLE OF NGO /CBO



area and serving as a main link with the community through motivation and direct involvement. This assessment is based on the following strengths of the NGOs:

- Local grass root presence.
- Target group and realistic approach.
- Flexibility and readiness to adapt to change.
- Tremendous background of community motivation and participation.
- Many successful programmes to their credit.
- Good credibility and widely known among the government departments, agencies, donors and sponsors.
- Good publicity potential.
- Rich variety of approaches and philosophies.
- Capability for experimentation and innovation.
- Motivated staff committed to the aims of the organization.
- Potential for periodic evaluation.
- Potential for effective women participation.
- Affectivity through programme integration.
- Previous experience of adopting options for the improvement of SWM system.

For the case study area Ghousia colony, the local CBO has the following potentials:

- Young and energetic members.
- Active membership by young and motivated people.
- Problem solving attitude.
- Principal function is problem solving, welfare and help to the poor.
- Previous experience of twice organizing cleanliness campaign.
- Good contacts with the municipality and the councillor.
- Influential with municipal sanitation staff.
- Good coordination with other neighbourhood organizations/ CBO'S
- Good publicity potential within the community.
- Have access to all ethnic groups.

There are some weaknesses as well but it is assessed that these will be overcome/ improved gradually:

- Participation of women is not utilized.
- More popular among "mohajirs" as compared to other ethnic groups.
- No defined set of programmes but work on day to day and emergency problems.
- Young organization lacking experience and direction.
- No definite and well defined management structure for performing various tasks.
- Limited capabilities for experimentation and innovation
- No diversity of approach for involvement in different developmental activities.
- No direct dealing with finances and funds, this is usually done through the councillors office or through personal donations.
- no training skills and potential as the members are not paid for their services and are less qualified than the NGOs staff.

It is recommended that both the NGO/ CBO should concentrate their strengths in organizing the community through a participatory approach rather than a didactic or a promotional one as the former approach is aimed at creating conditions to help people solve their own problems. The objectives, contents and methods are determined as far as possible by the target groups in dialogue with the educator/ motivator and by means of

community self surveys and evaluation, if a more sustained impact is needed for the improvement of SWM system (IRC 1988).

NGO/CBO should monitor and coordinate the level of motivation and participation of the community as well as the readiness of the municipality. Otherwise it will result in putting the cart before the horse, which will lead to misleading results, inconsequential conclusions and ultimately the misuse of community potentials.

10.5 COMMUNITY POTENTIALS FOR PARTICIPATION : Community participation is now accepted as a key ingredient for the success of development projects. However, for community participation to be effective, it is necessary to ensure that a suitable social, cultural and economic climate exists in the areas where projects are to be implemented. Thus, before launching a programme based on CP, it is judicious to assess whether or not the contemplated approach is viable. It is recommended if there has been no past experience of CP to gather information concerning certain social and economic conditions. Then an assessment can be made as to what potentials exists for applying the participatory approaches (Whyte 1986).

In the absence of any criteria or yardstick to measure the potentials of the community, the author based on the literature study (Whyte 1986 and Cohen et al 1977), previous experience and field study conducted in the areas, prepared a checklist for assessment of community participation potential of Ghousia Colony and Orangi Town. This is described in checklist 10-A. The parameters of the check list are not dealt in detail here because of the limitations and scope of the thesis.

It can be concluded that the community in Orangi Town is passive and dormant whereas Ghousia Colony is still active. Both communities in their own ways have experienced CP in the obtaining of services. Residents in GC are lucky to have a good elected representative in the person of a councillor who is eager to solve the area problems. Because of him the community takes interest in service maintenance. The HH interview in both areas revealed that the HH are ready to participate in any kind of improvement programme in kind and in cash. Though it will take some concerted efforts by an intermediary organization to develop the municipality's confidence in the community. The communities in both areas possess innovative skills, experience and the will to improve. All that is required is a proper channelizing of their efforts through information, education and training.

10.6 MANPOWER FOR COMMUNITY PARTICIPATION: For the success of the project incorporating CP, the following is recommended concerning the manpower required for the project:

- Individuals from the community.
- Members from all cross sections and ethnic groups.
- Both men and women.
- Residents of the area.

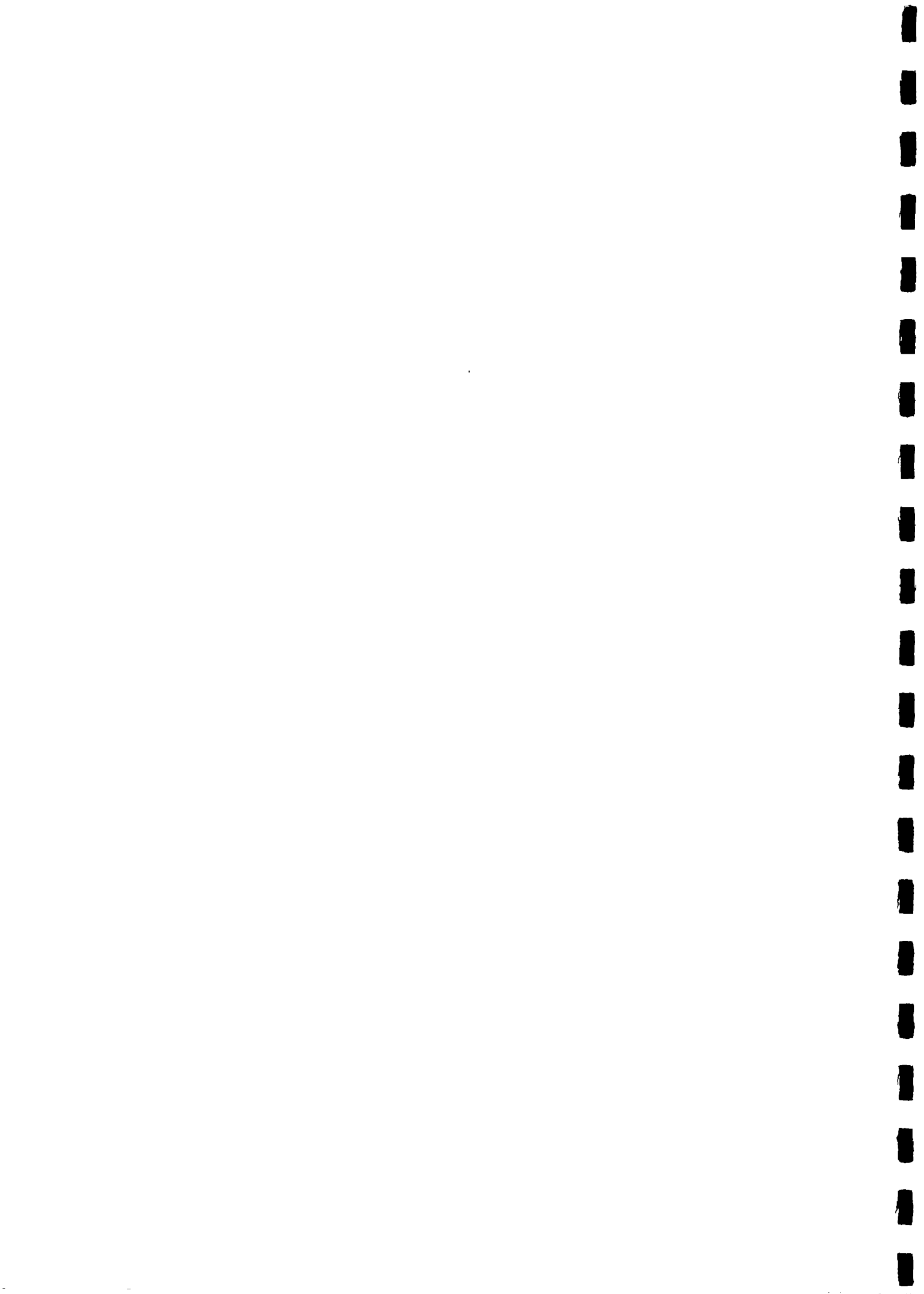
As recommended in reference (Cohen et al 1977), the following characteristics of the individuals are to be considered:

- Age and sex.
- Family status.
- Education.

CHECK LIST FOR ASSESSING COMMUNITY PARTICIPATION POTENTIAL

PARAMETERS	GHOUSIA COLONY	ORANGI TOWN
Type of area	Low income	Low income
Status of area	Regularized Katchi Abadi	Regularized area in Katchi Abadi
Location of area	City center	City periphery
Area layout	Haphazard	Regular
Ethnic background	varies	similar
Local languages	Urdu/pushto/punjabi	Urdu
Length of residence		
Habitation started in	1950's	1970's
Total population	11,500	7,000
Vertical growth	In progress	In progress
Ownership pattern	93 %	81 %
Average size of plot	44 SQ. YDS.	120 SQ. YDS.
Presence of water supply/sewerage/gas/ electricity.	Yes	Yes
Education level	poor	good
Awareness of SWM problems	Yes	Yes
Previous attempts for SWM improvement	Yes	Yes
Readiness for participation physical/ financial	Yes	Yes
Presence of NGO/CBO	CBO	NGO
Presence of other welfare organization	No	No
Previous task showing Comm. Participation	-Regularization -Shifting -Cleanliness campaign	-Laying of sewerage system
Self help potential	High	High
Physical involvement	Yes	Yes

Previous educational methods: -Personal communication -Pamphlets/handbills	Yes	Yes
Administrative agency	ZMC (EAST)	ZMC (WEST)
Contact with area councillor	Good	Poor
Confidence on NGO/CBO	Good	Good
Municipal contacts	Good	Poor
Presence of area activist/motivators	Few	Many
Active involvement of Women	NO	Yes
Previous involvement of women	No	Yes
Obligation to local leaders	Good	Poor
Obligation to religious leaders	Good	Fair
Access to mass media	Good	Good
Understanding messages -verbal -written	Good Poor	Poor Fair
Presence of area trainers	No	Yes
CP POTENTIAL	Good	Fair



- Social background (ethnicity, religion, caste, place of origin).
- Occupation.
- Length of residence.

Besides individual's previous experience with such activities, organizational ability, attitude towards community oriented work, commitment and enthusiasm for the project, availability of time are also to be considered. These, however are just recommendations, and not an absolute criteria for judgement. According to reference (GTZ 1988), opinion makers are every where, only one has to find them. It is recommended that NGO/CBO should look for people of whatever function or profession they are, who have authority in their neighbourhood. To motivate and prepare such persons for information activities is a very important task, as their approach is both inexpensive and effective. The advantages of having a local motivator is that he knows his neighbours, can speak their language, is familiar with the problems and is generally more trust worthy to the community than the NGO/CBO staff.

Integration of women in development has become a standard international objective (Liljenkrantz et al 1975). Women's management of water and wastes is a good example of their participation in an essential activity that tends to be "invisible". Disposal of wastes is but one of the many tasks women carry out routinely as a part of their roles as housewives. Thus it is recommended that women's collective efforts in the project should be realized as they are the main target group in the community and their involvement in waste management projects is essential to their long term success. Women contribute significantly in the provision of services and constitute the majority of direct consumers. As such they have the greatest incentive for implementing and sustaining the project (UNDP/ World Bank 1990). In the case study areas women have not much input in formal decision making, however it is assessed that a grass root organization is required to make it easier for them to accept important roles in the project motivation and at HH level to carry out the initial sorting of recyclable and reusable items. Such a cooperative when formed for the improvement of SWM system, will also enhance the ability of the community to address other problems and setting priorities in a long term perspective (Monasterio et al 1986).

10.7 ENHANCING COMMUNITY PARTICIPATION FOR SWM: Based on the fact that in both case study areas there is community potential for participation, the IEM strategy is suggested by the author for enhancing CP for SWM. This strategy should be linked directly to the community whose members are the main participants in improving the situation of the SWM system. The strategy is recommended to be applied to all the target groups in three successive steps.

INFORM EDUCATE MOTIVATE

The first step is to inform the community of the existing SWM system, its deficiencies, short comings, resources, funds, manpower, equipment, machinery and the limitations of the municipality. The community should also be informed of the magnitude of the problem that have arisen due to population increase and urbanization coupled with inadequate education,

poverty, unemployment and lack of incentives which have further deteriorated the already worst situation. It is suggested that open hearted and unbiased general information be communicated to the community through various media. Sample information to be conveyed to the community is given in checklist 10-B.

After the community is informed the **second step** is to educate them with all the available tools and resources for the dissemination of the appropriate knowledge and to supply them with tools to solve the problems. Continued education will be able to change present attitudes. The various target groups of children (up to 15 years), boys/ girls (from 16 up to 25 years), men/ women (up to 50 years) and the elderly should be separately addressed and their roles should be highlighted. The message should be communicated via social, cultural, administrative and educational systems, so that every individual can know of what he/ she can contribute to the system and what his/ her obligations and duties are towards the community, area, city in general and country as a whole. Sample education to be provided to the community is given in Checklist 10-C.

It is recommended that the participation by the community should be properly controlled/ guided and monitored by the NGO/CBO to check whether the efforts are going in the right direction. The attached figure illustrates the monitoring of each process (GTZ 1988).

The **third step** is to motivate the community. This is to be done when sufficient know how and awareness have been developed among the public and when the iron is considered to be hot enough to be shaped into the required form through the right motivation. Knowing the deficiencies, recognizing the magnitude of problem and the priorities, the community will work together in solving the problem, for which problem solving cycle and motivational cycle is given in the figure 2 and 3 (Dijsselbloem 1986).

The teachers, organizers, coordinators who are to implement this IEM strategy can be staff from the municipality itself / community based organizations / self help groups/ neighbourhood associations /voluntary civic organizations/ NGOs. For the two case study areas of GC and OT, it is recommended that implementation should be taken up by the NGO in Orangi Town and by the CBO in Ghousia Colony. Since no previous model of such a strategy exists, there is a dire need for the creation of such an information system which should be and practically evaluated. Various media are recommended to be used for communication to bring about the desired social change among the people. The model will act as a tool for the decision making process and for organizing the people in management of the system (Bosma 1990). The recommended media are given in the Check list 10- D.

CHECK LIST 10- B

INFORMING THE COMMUNITY REGARDING SWM SYSTEM

- SOURCES AND CATEGORIES OF SOLID WASTES
- AVERAGE WASTE GENERATION RATES
- AVERAGE WASTE COMPOSITION
- MAGNITUDE OF PROBLEM
- EXISTING SWM CYCLE
 - * HH GENERATION
 - * DISPOSAL OUTSIDE THE HOUSE
 - * DISPOSAL IN THE COMMUNITY BIN
 - * TRANSPORTATION BY MUNICIPAL VEHICLES
 - * FINAL DISPOSAL
- EXISTING MUNICIPAL SWM SYSTEM
 - * EXISTING RESOURCES OF ZMC (MANPOWER, EQUIPMENT, VEHICLES)
 - * EXISTING DEFICIENCIES
 - * SOURCES AND UTILIZATION OF FUNDS
- PUBLIC BEHAVIOUR AND ATTITUDES
- GENERAL DISEASES RELATED WITH SOLID WASTES
- HEALTH RISKS ASSOCIATED WITH SW
 - * PRODUCTION OF LEACHATE
 - * DECOMPOSITION OF GARBAGE
 - * PROLIFERATION OF INSECTS AND RODENTS

CHECK LIST 10- C

EDUCATING THE COMMUNITY REGARDING SWM SYSTEM

Separate education to different target groups

1. CHILDREN: (UP TO 15 YEARS)

- HEALTH AND HYGIENE EDUCATION AT SCHOOL AND HOME
 - * DISPOSAL OF WASTES
 - * WASTE HANDLING
 - * HAND WASHING
 - * LITTERING OF WASTES
 - * USE OF GARBAGE CONTAINER AND MUNICIPAL BINS
 - * MESSAGE COMMUNICATION

2. BOYS/ GIRLS: (FROM 10-25 YEARS)

- * ASSISTING THE MUNICIPALITY
- * MESSAGE COMMUNICATION
- * WASTE DISPOSAL PRACTICES
- * NEED FOR RECYCLING
- * VOLUNTARY PARTICIPATION

3. MEN/ WOMEN:

- * NECESSITY OF SEPARATING DRY/ WET WASTE
- * LESS GARBAGE GENERATION
- * TEACHING CHILDREN OF GARBAGE RELATED HABITS
- * PAYMENTS OF MUNICIPAL CHARGES
- * BENEFITS OF COMMUNITY PARTICIPATION
- * FINANCIAL BENEFITS OF RESOURCE RECOVERY AND REUSE
- * CLEANING AND REPLACING THE GARBAGE CONTAINER
- * ACTIVE PARTICIPATION IN COMMUNITY ACTIVITIES

CHECK LIST 10 -D

IEM STRATEGY

COMMUNICATION SOURCES	CHILD	BOYS/ GIRLS	MEN/ WOMEN
I. INDIVIDUAL CONTACTS:	--	--	--
1. DIRECT MOTIVATION	--	I M	I M
2. HOME VISITS	I E	I M	I M
3. LETTER/ PAMPHLET/ HANDBILL	--	I E	I E
II. TARGET GROUP ACTIVITIES	--	--	--
1. SMALL GROUP MEETINGS	--	I E M	I E M
2. TRAINING TO VOLUNTEERS	--	I E M	--
3. TEAM TEACHING	--	I E M	I E M
4. DEMONSTRATIONS	--	M	M
5. SHORT COURSES	--	E M	--
III. MASS APPROACHES	--	--	--
1. LARGE GROUP OPEN DISCUSSIONS	--	I	I
2. SPEECHES	--	M	M
3. COMMUNAL CONGREGATIONS	E	E	E
4. MESSAGES	I E M	M	M
5. POSTERS/SLOGANS/BANNERS	E	E	E
6. BULLETINS	--	M	M
7. HOARDINGS	I	I M	I M
8. ANNOUNCEMENT BOARDS	--	E	E
9. CLEANLINESS CAMPAIGN	I M	I E M	I M
10. MASS MEDIA (RADIO, TV, PRESS)	I E M	I E M	I E M
11. HEALTH EDUCATION IN SCHOOLS	I E M	--	--
12. EXHIBITION, DISPLAYS	I E M	E	E

LEGEND:

I = INFORM

E = EDUCATE

M = MOTIVATE

PLANNING FRMEWORK FOR COMMUNITY EDUCATION AND PARTICIPATION
FOR S.W.M. PROJECTS

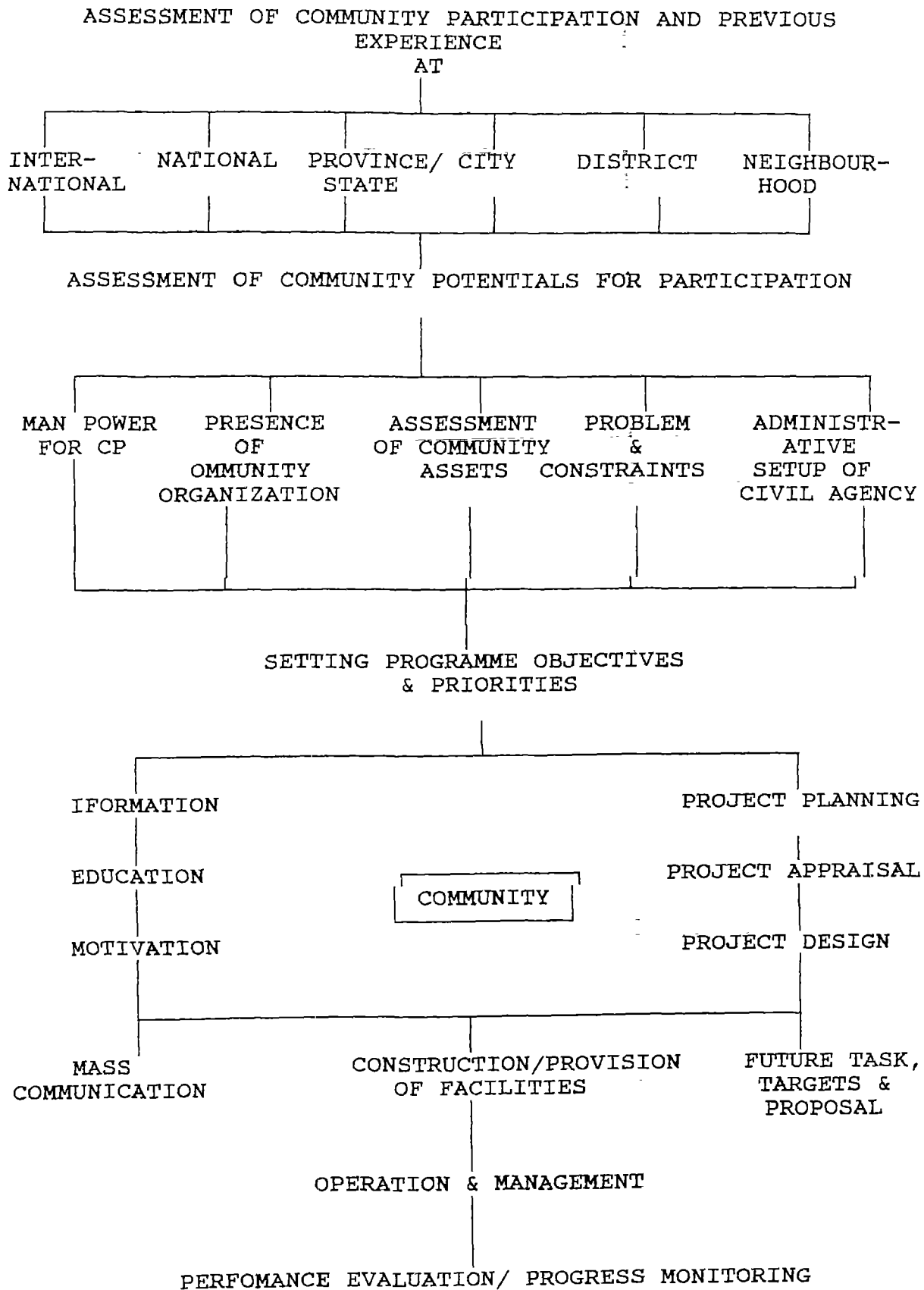


FIGURE 1

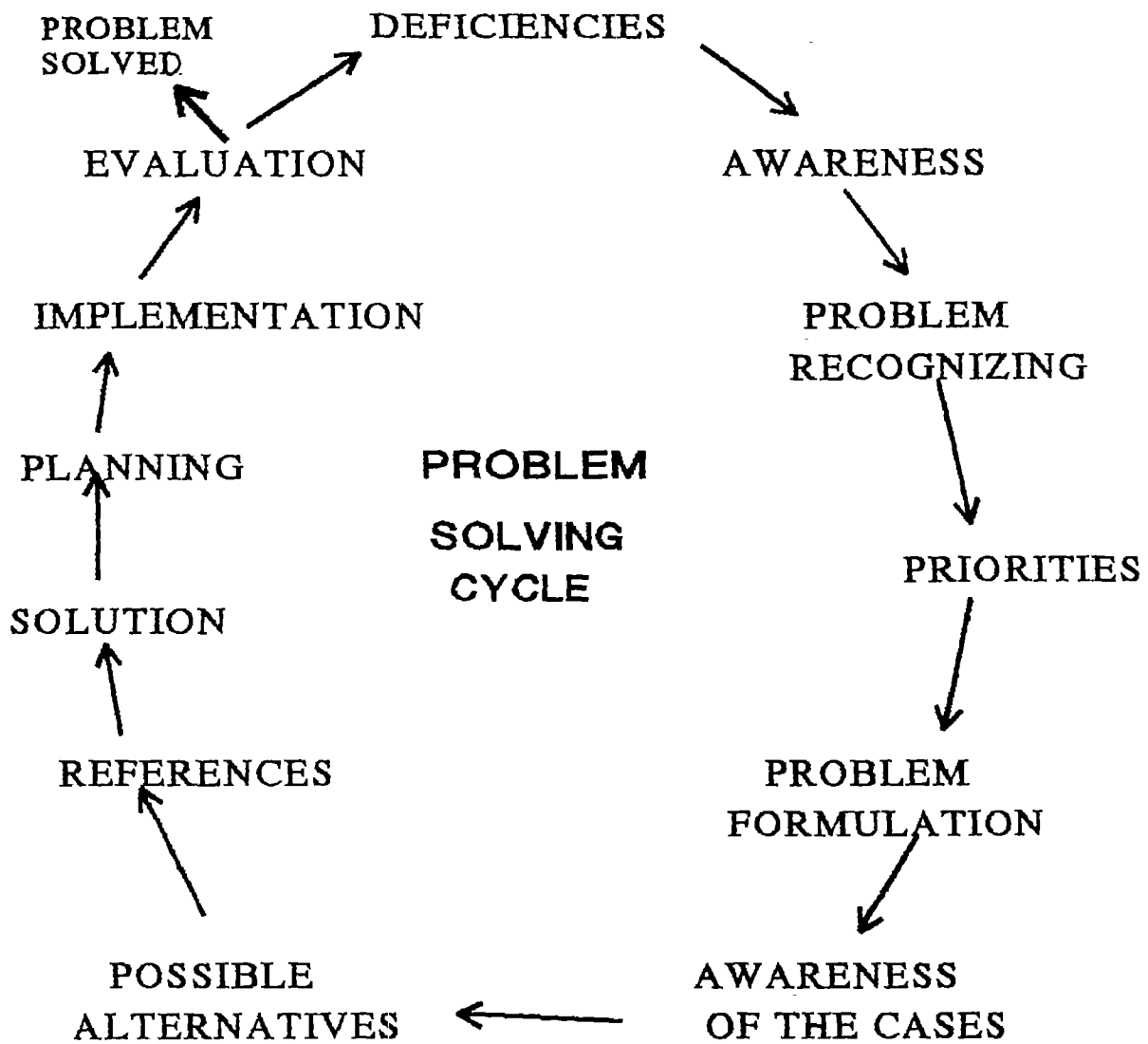


FIGURE 2
 DEFINE OR SELECT
 TARGET GROUP

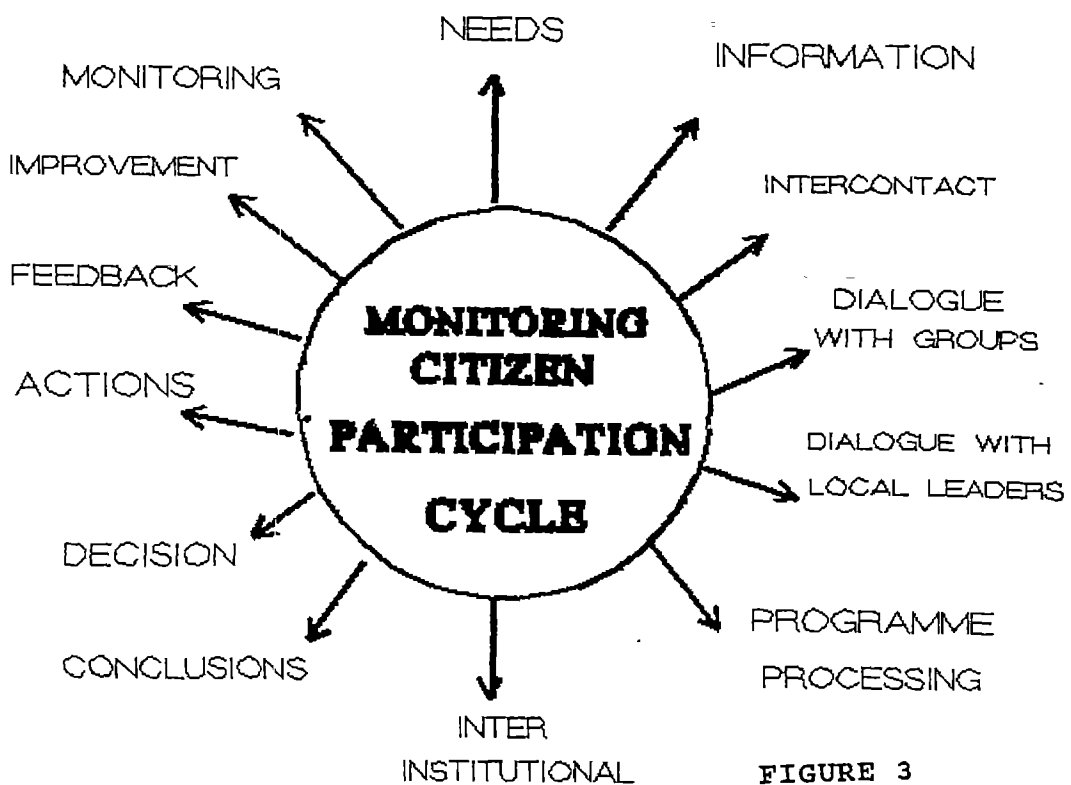


FIGURE 3

11. OPTIONS AND RECOMMENDATIONS FOR THE IMPROVEMENT OF THE SWM SYSTEM

11.1 BASIS FOR OPTIONS: For determining the options for the improvement of the SWM system in the respective case study areas, the advice of the general public was sought through household surveys as well as through the elected and appointed leaders who served as acknowledged spokesmen and representatives of the community and for their own particular ethnic groups (as in Ghousia Colony). Besides participation from the municipal authority was also sought. They were sympathetic and open to local deficiencies and needs. Moreover they tend to be dominant in participation processes, possibly overshadowing local leaders and residents. During the field work it was also observed and assessed who participated how much in which activities and how participation took place. All these elements were judged rather than measured. The household survey and the act of participatory data collection is in itself a method of energizing the community to deal with the problems. The community members have the ability to discuss and think through the situation. The data obtained were helpful, as the information collected on knowledge, beliefs, attitudes and practices were not biased.

The options are suggested keeping in view the planner's and coordinator's duties rather than those of an engineer. Believing that a successful planner operates in a flexible manner and never forces an option on the community. It has often happened that planners develop the technologies they believe to be appropriate mostly according to physical criteria and impose them upon the community. Thus the planner has to work closely with the people to decide what options to consider, as imposed technologies are frequently rejected because people have their own perceptions of what is appropriate (WHO 1985).

The assistance of the surveyors who worked on the thesis was acquired to gather the true and exact nature of the problems and their dimensions. It was taken into consideration that the surveyors should have background and customs in common with the community. Male and female surveyors were utilized to interview men and women in a natural and informal manner in the course of data collection. Adequate time was spent with the community to collect data and to overcome any gaps and deficiencies in understanding the various cross sections of the population.

Besides observations, interviews with the municipal workers and sweepers were also held which helped identify the needs of the disadvantaged and weaker groups within the community, such as Ghousia Colony where people belong to different ethnic groups.

11.2 ESTABLISHING A WORKING RELATIONSHIP: At present, due to non-involvement of any intermediary association, both parties i.e. the community and the municipality are at extreme ends. They have opposing expectation of each other. The community thinks that it is the municipality's responsibility to collect and

dispose off the garbage, while on the other hand the municipality is short of man- power and equipment, resurces and finances. Thus the municipality wants the burden to be shared by the producers of the waste. Putting the entire responsibility on any one side will certainly not solve the problem. To start the process, familiarisation of both the parties is necessary so that a good mutual working relationship can be established. The main aim is to develop a SWM system which is affordable and within the reach of municipality's resources as well as has the optimum participation of the community. It is recommended to adopt the following process which should be based on discussions, field studies and interviews to be carried out before any other process for improvement can start:

1. Energising the CBO in GC and establishing contact with the NGO in OT Sector 5 to understand the problem and scope for participation and improvement.
2. Meetings with the elected representatives, religious and social leaders to gain their confidence before the commencement of any field campaign.
3. Informal get- togethers and meetings to be called at the councillor's offices office of the parties concerned, with CBO / NGO working as the moderators/ mediators. Opinion makers from the community should be engaged from the community like area activists and social workers. From the municipality the area sub- inspectors and inspectors, sanitation and other senior staff from the ZMC and SWM department of KMC to be engaged.
4. Ways and means to solve the problem and a work- plan to be made by all sharing the joint responsibility for improving the existing situation. An Upward planning and downward support mechanism is to be created.
5. The CBO/ NGO along with area activists, lane managers and social workers should start a mass communication campaign to inform, educate and motivate the community. This IEM strategy is to be used by the NGO /CBO and local self- help groups to mobilise the public opinion on matters of waste handling.
6. The officers of the municipality should contact their staff and the message of cooperation should be communicated to them so that they are also informed and can participate in the right spirit. The NGO should form a team of personnel, both from the technical and social side, that can serve as the link between the planners and the community .Similarly the CBO should organise its members from and within the community in order to make them responsible for the task. The community leaders supported by the cooperation of the NGO /CBO should contact the residents about the programme. The community in return can nominate the volunteers, (the number of whom is dependent on the area and the population). One member per forty houses is a sound figure which best represents the lane / street or geographical boundary set by the NGO for the SWM facilities. The IEM strategy is to be applied for community

education, training and organising those involved.

11.3 RECOMMENDED PHASES FOR IMPROVEMENT: Based on the literature study and data obtained, options were prepared and were discussed with the community and again scrutinized. Two phases of community participation have been recommended for all levels of planning and implementation. SWM system which is socially, technically, financially and environmentally acceptable to the local conditions has been recommended. Successful experiences obtained in Katmandu, Nepal (Thapa 1991) and San Juan, Manila (CAPS 1991) were used as guidelines. The first phase includes the improvement of the collection and appropriate disposal of solid waste and the second phase relates to the optimum resource recovery and utilization. The phase are:

PHASE I: Persuasion of people to dispose of their individual and collective waste voluntarily and regularly at public disposal sites. The disposal can be made through other existing and planned municipal channels and to continue with the existing practise of retaining and selling the recyclables.

PHASE II: Separation at the source and reduction of all possible reusable and recyclable waste and replacing the presently used plastic shopping bags by other available means.

11.4 OPTIONS FOR IMPROVEMENT:

11.4.1 TECHNICAL: The technical aspect consist of the physical improvements of the SWM system in which both the community and the municipality are completely involved. The existing role and channels are defined and a SWM system is proposed in which special attention is paid to the following aspects of phase I and II:

1. It is difficult to change the community's habits and attitudes in a short span of time, yet it is believed that constant contact through education and motivation can help to bring about the desired results much sooner.

2. Changes in phase I have been recommended with minimum alterations allowing for the time for gaining the confidence of all parties concerned, and similarly allowing for change in the attitudes towards each other. It is envisaged that during such a period of time a good working relationship will be developed between the users and the municipality through the NGO/CBO which will broaden and soften the already developed attitudes.

3. The duration between the two phases will also allow for adequate time for assessment and improved planning of the second phase, based on the results of the evaluation of phase I. The remaining deficiencies will be removed or tackled easily/appropriately.

4. Based on the author's information and experience, many gigantic and well- publicized projects have failed or have not yielded enough successful results as foreseen due to:

- Thrusting of promotional/ improvement plans on the community.
- Less flexibility in approach.
- Desiring immediate changes within the community.

- Non- evaluation or irregular evaluation of their activities.
- Not accepting the shortcomings in implementation process.
- Improper time- frame.

Gradual change and improvement in the community's attitude are foreseen. Besides, the introduction of a new technology/ approach depends on both technical and social processes and requires the long term commitment from the community.

5. Use of complicated technology is avoided as it restricts the opportunities for participation (Cohen et al 1977).

6. The extent of participation and the present level of physical and financial contribution are foreseen.

7. A flexible approach and a simple system is adopted in order to gain more participation from the community.

8. Immediate benefits will be noticed in a short span of time.

The existing SWM system practised in both the areas is given in Checklist 11-A. The recommended SWM system is given in Checklist 11-B. A checklist of the contributions and actions are mentioned in the exhibit.

The various steps towards technical solution and improvements are discussed below:

1. PRIMARY STORAGE: The basic criteria considered for primary or individual storage are based on the recommendations of reference (UNCHS-HABITAT 1988) that such storage should be:

- Animal proof.
- Insect proof.
- Weatherproof.
- Washable.
- Of a robust type to meet the exigencies of normal use.
- Capacity enough for two days.

The following temporary facilities were discarded due to the obvious reasons of not meeting the desired specifications.

- Plastic carrier bags.
- Cardboard boxes.
- Sacks (cloth, plastic, polypropylene).

The permanent facilities considered but not found workable include:

- Wooden crates.
- Used bucket (plastic, G.I.).

The recommended facilities consists of containers which have enough capacity to accommodate the garbage of all household members for two days(having 50% excess capacity in case the collection service is daily (UNCHS-HABITAT 1988). It should be based on the number of the households and the quantity of waste generated.

PHASE I: Those HH using tin canisters (18 litre capacity) should continue using it but with proper lids and cover facilities of either material (cardboard , chip board, plastic, wood) as in Orangi Town. The community in Ghousia Colony is to be persuaded to replace the wooden crates.

PHASE II: Based on research and development, NGO/CBO can introduce container made of used rubber tyre with lids which can

CHECK LIST 11- A

THE EXISTING SOLID WASTE MANAGEMENT SYSTEM

RESPONSIBILITY	SYSTEM	FACILITIES	
		GHOUSIA COLONY	ORANGI TOWN
COMMUNITY	PRIMARY STORAGE	WOODEN CRATES	USED CANISTERS
COMMUNITY	RESOURCE RECOVERY REUSE	SOLD TO STREET VENDORS	
MUNICIPALITY	COLLECTION	DOOR TO DOOR	NO FIXED ARRANGEMENT
MUNICIPALITY	STREET SWEEPING	REGULAR	TWICE IN A MONTH
MUNICIPALITY	SECONDARY/ COMMUNAL STORAGE	MASONRY BINS	
MUNICIPALITY	COLLECTION THROUGH VEHICLE	OPEN REFUSE VAN	
MUNICIPALITY	FINAL DISPOSAL	OPEN DUMPING	

CHECK LIST 11- B

RECOMMENDED SOLID WASTE MANAGEMENT SYSTEM

RESPOSIBI-LITY	ADVISE	SYSTEMS	PHA-SE	FACILITIES
COMMUNITY	NGO/CBO	PRIMARY STORAGE	I	-MAINTAINING SANITARY CONDITION -USING CONTAINER WITH LID -REGULAR CLEANING/CLEARING
			II	-USED RUBBER TYRE -PLASTIC CONTAINER WITH LID
COMMUNITY	NGO/CBO	RESOURCE RECOVERY REUSE	I	-EDUCATION, MOTIVATION, AND ADVICE. -SEPARATE DRY AND WET
			II	-ORGANIZE RESOURCE RECOVERY PROGRAMMES. -RESEARCH AND STUDY ON RECYCLABLE MATERIAL
MUNICIPAL-ITY/ NGO	COMM.	COLLECTION	I & II	-DOOR TO DOOR IN GHOUSIA -BLOCK COLLECTION IN ORANGI
MUNICIPAL-ITY	NGO/COMM	STREET SWEEPING	I	-ORGANIZING & SCHEDULING.
			II	-IMPROVED EQUIPMENT
MUNICIPAL-ITY	NGO/CBO COMM.	SECONDARY/ COMMUNAL STORAGE	I	-EXISTING BINS/ ARM ROLL.
			II	-ARM ROLL CONTAINER
MUNICIPAL-ITY	-----	COLLECTION THROUGH VEHICLES	I & II	-OPEN REFUSE VAN/ ARM ROLL
MUNICIPAL-ITY	-----	FINAL DISPOSAL	I	-OPEN DUMPING
			II	-SANITARY LAND FILL & COMPOSTING

be manufactured locally, in different capacities of 10, 15 and 15 litres. Local discarded material and craftsmanship should be utilized which can provide employment for many individuals in the informal sector. An estimated price for such container is Rs. 25 (1 US \$) (Sinatamby 1984). Plastic containers with lids of different capacities can be provided through sponsorship or at reduced/ subsidized rates. The HH is also recommended to keep the container inside the house as any valuable (of even things of little value) is susceptible to theft.

2. SECONDARY/ COMMUNAL STORAGE: Mainly there are two types of secondary storage facilities, stationary and mobile (haulable) ones.

PHASE I: The following haulable communal bins were considered:

i) Used 100 / 200 litre oil drums: The drums are relatively cheaper in price. Their use will also facilitate the use of discarded material as they can be conveniently located near to the houses. But the disadvantages are bigger than the benefits as they:

- Are heavy to be handled manually.
- Are difficult to unload into the refuse van.
- Do not facilitate speedy transfer into the collection vehicles.
- Require two labourers to empty.
- Require fixing arrangement and handles on their circumference.
- Are difficult to maintain/ provide with lids.
- Are accessible to and manoeuvrable by the scavengers.
- Can be misused and garbage can be burnt in them.
- Susceptible to theft and damage.

ii) 180 litres plastic "tote" bin: They are usually imported or are mass manufactured but since they are not used in the city so they are not recommended. Their disadvantages for use in the case study areas include being susceptible to damage, interruption by scavengers and requiring mechanized lifting equipment and special refuse collection vehicles.

It is recommended to use the present existing uncovered masonry bins in both the areas in phase I. In Orangi these bins have been recently constructed by the municipality while in Ghousia Colony additional requirements can be met by placing two arm roll containers on the 30 ft wide Al-Mohajir Street (parallel to the Central Prison) at locations decided by the community in consultation with the CBO and the municipality. The load can be removed on alternate days because of their large capacity compared to the existing bins. It is envisaged that since the arm roll containers are used in the nearby locality of P.I.B. Colony and Sabzi Mandi (wholesale vegetable market) such a facility can be extended.

It is recommended that a routine maintenance should be made and that the bins should be made more hygienic rather than serving as a breeding ground for insects, rodents and a paradise for scavengers. Regular raking of the surface, spraying of insecticides/ pesticides and painting should be done to make it more aesthetic and hygienic. Spilling should be checked and

discouraged.

PHASE II: Arm roll containers are best suited for both case study areas due to the fact that they:

- Pose less danger of insects, rodents and animal interference.
- Have more vehicle productivity.
- Require less travelling and disposal time.
- Requiring fewer labourers.
- Minimum obstruction to pedestrians and traffic.
- Minimize/ prevent the entry of scavengers.
- Can be checked and controlled for spilling.

3. FREQUENCY OF COLLECTION : The frequency of collection is recommended to be daily in both areas, as practised in Ghousia Colony. But due to weekly holidays and other restrictions/ disturbances etc. it should always be on alternative days.

4. METHODS OF COLLECTION : The main four types of collection methods were considered. Based on the existing system and availability of manpower resources, door to door collection is recommended in Ghousia colony. In Orangi town two options are presented. Based on the affordability, the second option is recommended.

FIRST OPTION: The existing situation does not allow for municipal sweepers to collect garbage daily from the households, it is recommended to use private sweepers, which can be arranged and organized through the NGO. The NGO can engage a supervisor, either through sponsorship, by self- arrangement, partial payment through community contribution or fully subsidized by the community. He is required to supervise the activities of the sweepers (initially three) covering some 300 houses and shops each. A general criteria of service by a sweeper is to serve about 500- 600 persons or sweeping about 0.25 tons of waste per day. (NESPAK 1985). Based on the household survey and interviews, the community is ready to pay an amount of Rs. 10 per HH per month which can generate enough funds to meet the expenditures. Thus daily collection can be maintained in the area.

SECOND OPTION: Block collection is to be practised on an experimental basis as done in F. B. area blocks 10 and 11, mentioned in the literature review. One Suzuki van of 500 kg. design capacity will be suitable. The NGO can enter into a contract with an individual who is preferably a resident of the same locality. This system can finally lead to an improvement of the sanitary conditions in the area. Two sweepers are to be hired with the van and a driver. The driver blows a horn when entering the street/ lane and the household will put the containers out. The sweepers dump the garbage into the covered van and dispose it at the nearest communal bin/s designated for the daily clearance by the municipality. The HH's will get used to the system if the collection will be on time and according to schedule. Approval and initiatives from the councillor and municipality are required. It is estimated that Rs. 15 per HH will cover the

necessary expenditures of van and personnel.

5. COLLECTION VEHICLES :

PHASE I: In both areas open refuse vehicles are used. It is recommended that they should be covered on the and at the back to avoid spilling of the garbage due to movement on the roads. For this a permanent construction carried out at the KMC Central Workshop or a temporary solution by means of tarpaulin, plastic, strong polythene or parachute cloth can be used for covering. Hygienic measures should be adopted during the loading of the vehicles and regular training should be given to the municipal workers.

Another better option is the use of gunny bags for the collection of the garbage from the communal bins which can be emptied at the disposal site. This will save time in loading the vehicle as the vehicle is recommended to drop the motor coolies to the other bin at the time of leaving for the disposal site. So this method will improve the timing of the coolies and will reduce the health hazards of loading the refuse van and reduce the time of loading the vehicle.

PHASE II: To be served by the arm roll vehicle, as in the future plans. More vehicles of this kind will be introduced in Karachi. According to KMC arm roll vehicles have proved to be extremely suitable for the city as they can normally make 5 trips per day. They are also very effective where bulk garbage is generated because no time is wasted in filling the containers (KMC 1991).

6. RECYCLING AND RESOURCE RECOVERY :

PHASE I: The survey has revealed that the community in both the case study areas retains valuable recycling material and sells/exchanges this for financial gain. It is thus recommended that in phase I an educational campaign may be taken up like in Katmandu, Nepal, to inform the community of the following:

- Separating the dry from the wet waste.
- Conserving the dry waste appropriately.
- List of possible recycling materials and their ultimate reuse.
- Need for reuse, recycling and resource recovery.
- Deciding with the middlemen the extent and nature of items to be accepted and their prices.
- Arranging collection frequencies with the middle dealers for the regular collection through vendors. In Ghousia Colony middlemen will surely be interested in such a contract. In Orangi Town, an NGO can establish contacts with such dealers. The schedule could be based on collection frequencies of two to three times a week.
- Through education and through earlier and clean separation, more recyclable waste will be generated and thus more financial gains will be obtained. Such a system, though applied on a small scale (only in two areas), will conserve the natural resources and less garbage will be generated, collected and transported. Besides, unorganized scavenging will be avoided.

PHASE II:

- For decreasing the health hazards associated with scavenging,

some organization needs to be implemented. It is recommended to base this on the SAN JUAN experience in the Philippines, Resource Recovery Centers (RRC) are to be encouraged in each community. The centers should pay reasonable price for clean and sorted materials and should be operated by the local residents.

-After research, a list of new and non traditional materials should be provided to the people. The middle dealers should also find the market and the direct contacts for setting the materials, such as glass pieces, broken plastics and card board boxes.

-Facilities for small loans to start business on recycling or reuse should be arranged and encouraged. Loans from OPP's economic programme should also be directed at individuals and enterprises involved in such activities.

7. STREET CLEANING

Phase I : Street sweeping in low income areas especially has always been neglected. It is recommended that the system should be more organised in consultation with the community. Specific persons and days should be selected for the sweeping of major roads, minor streets and lanes in consultation with the lane representatives, who should be allowed to supervise and keep record of the cleanliness. Therefore a dual control is recommended for sweepers as it is humanly not possible for the sub-inspector and the mugaddam alone to check the sweeping in a big unit. Following is recommended:

- For street sweeping, a frequency of twice a week or at least once a week on major roads, three times a week in lanes and streets is recommended from the existing sweepers in G.C. and three times a week from hired sweepers in O.T

Phase II:

- Presently used broom to be reconsidered
- Using brooms with long handles makes the job easy. New brooms to be designed in a pilot project and subsequently to be applied in the case study areas.
- Research should also be carried out keeping other Asian Metropolitan Cities into consideration.

8 . FINAL DISPOSAL

Phase I: In this phase it should be checked that the disposal is at the designated place and location at the open dumping site.

- Four motor coolies should be deputed on the van , when going to the disposal site. Two of them can sweep the road and two can accompany the vehicle. For the next trip the two groups can be interchanged under the driver's supervision.

- Open burning at any location should be prohibited.

Phase II:

- The final disposal to be carried out at future land fill site(s) which are now being designed.

A simple Checklist 11-C has been prepared for activities which are to be performed and activities which are to be avoided. This

can also be used during training of municipal workers and community representatives.

11.4.2 SOCIAL: For better control and management it is recommended that both the case study areas be divided into sub-areas or " mohallas" /streets/lanes based on the geographical boundaries. From every 40 houses one representative should be selected on a temporary basis of one month (tentative) to monitor and supervise the garbage collection work of the sweepers and street cleaning. Spreading of litter should be avoided, complains should be directed at the sanitation sub- inspector and coordination should be with the NGO/ CBO/ municipality. This voluntary post can rotate among the residents so as to adopt a democratic policy and to give each potential member a fair chance to lead the community. This responsibility (on the other hand) will also give a sense of pride in serving the area. In phase II, young and educated boys can be made responsible for the areas, and mohallas on a paid basis. They are required to organize the waste collection as well as impart health and hygiene training to the residents based on the pattern used in Bamako, Mali. Sponsoring agencies can also be contacted for the purpose. Similarly within the area a cleanliness competition should be held for which some incentive should be devised. It is recommended that a meeting of all the representatives of the area should be held once fortnightly. The mohalla committee can also decide on the location of communal facilities like municipal dust bins. Such committees could create a revolving fund based on HH donations for litter boxes to be placed at main locations in the area and at suitable locations near the electricity poles. The committee should also take the responsibility of training/educating the neighbours and organizing cleanliness campaigns. Checklist 11-C is prepared for those activities common in the existing system which are to be avoided by the target groups of the community and by the sanitation staff of the municipality.

11.4.3 COMMUNITY EDUCATION AND TRAINING METHODS :

Waste removal should not be considered as a purely public task. It always includes a certain amount of private responsibilities. The border line between private and public responsibilities is variable. It is obvious however, that waste removal can only work if the population is involved and understands that its own interests are at stake. This can be achieved with the help of information and participation programmes.

A common error usually made is to have all theoretical training precede practise, the idea is to provide theory as a foundation for practise. Training has been shown to be far more effective when theory and practise are linked together (Billington 1985). The recommended programme/media and target groups are mentioned in checklist 11-D. Their use, application and advantages are briefly mentioned in a sequential manner.

The training methods have been recommended due to the nature of

CHECKLIST OF ACTIVITIES TO BE AVOIDED

S.N	DESCRIPTION	C	B / G	M / W	A	M S
1	Absence of garbage container			*		
2	Throwing garbage other than the container	*	*	*	*	
3	Garbage dumping in the back lanes/ open space/roadside	*		*		*
4	Throwing the waste outside the bin	*	*	*		*
5	Littering on the streets/ lanes	*	*	*	*	*
6	Night-soil dumping in the refuse			*		*
7	Production of leachate and its infiltration in the ground			*	*	*
8	Garbage exposure to animals	*	*	*	*	*
9	Garbage exposure to scavengers			*		*
10	Producing more garbage			*		
11	Throwing plastic bags and other solid material in the sewer	*		*		*
12	Breeding of insects and rodents inside the container		*	*		
13	Production of bad odours in the container		*	*		
14	Handling of garbage by young children	*				
15	Children playing on/with waste material	*				
16	Dumping material cleaned from sewer/ manhole on the street		*	*	*	*
17	Pushing house sweeping out on the street		*	*		
18	Throwing/ dumping construction debris on the street		*	*		
19	Burning of garbage	*		*		*
20	Making heaps of garbage on streets/ house			*		*
21	Compressing/ compacting garbage by hands and feet					*
22	Sitting on exposed garbage	*				*
23	Eating after garbage handling	*	*	*	*	*
24	Non participation in community activities	*	*	*	*	

CHECK LIST 11- D EDUCATIONAL AND TRAINING METHODS

EDUCATIONAL AND TRAINING METHODS	P H A S E	C H I L D	B / G	M / W	N G O/ C B O	M U N S U	M U N S W
I. INDIVIDUAL CONTACTS							
1. DIRECT MOTIVATION	I	*	*	*			
2. HOME VISITS	I		*	*			
3. LETTER/PAMPHLET/HANDBILL	II	*	*	*		*	
II. TARGET GROUP ACTIVITIES							
1. SMALL GROUP MEETINGS	I		*	*	*		
2. TRAINING TO VOLUNTEERS	I		*	*	*		
3. TEAM TEACHING	I		*	*	*		
4. DEMONSTRATIONS	I	*	*	*	*	*	*
5. SHORT COURSES	II		*		*	*	
III MASS APPROACHES							
1. LARGE GROUP OPEN DISCUSSIONS	I	*	*	*	*	*	*
2. SPEECHES	I	*	*	*	*	*	*
3. COMMUNAL CONGREGATIONS	II	*	*	*	*	*	*
4. MESSAGES	II		*	*			*
5. POSTERS/SLOGANS/BANNERS	I	*	*	*	*	*	*
6. BULLETINS	II		*	*	*	*	*
7. HOARDINGS	I		*	*			*
8. ANNOUNCEMENT BOARDS	II		*	*	*		
9. CLEANLINESS CAMPAIGN	I	*	*	*	*	*	*
10. MASS MEDIA (TV, RADIO/PRESS)	II	*	*	*	*	*	*
11. HEALTH EDUCATION IN SCHOOLS	II	*			*		

LEGEND:

B = BOYS G = GIRLS M = MEN W = WOMEN
MUN SU = MUNICIPAL SUPERVISOR
MUN SW = MUNICIPAL SWEEPER

the project, needs, target population, background, social and cultural situation.

Audio visuals, lectures, simulation games and exercises, films, case studies, counselling, field visits, individual tutoring and study, video, drama, role playing etc. have been discarded due to their being of little/ no use, as they have limited potential in the areas.

Individual Contacts:

i) **Direct motivation :** The community members are contacted and motivated through a simple explanation of the facts, problems and solutions. When motivated they can be trained for performing their individual tasks and communicating the message to others.

ii) **Home visits:** It is essential for the motivation of women, also socially and morally, to establish good personal relationships with the participating HHs.

iii) **Letters/pamphlets/handbills:** Cyclo-style/ photocopied common messages can be transmitted to the target groups or to all the households.

Target Group Activities:

i) **Small group meeting/ discussion:** This approach is extremely useful in affecting changes of attitude especially where the target groups are homogeneous. It provides the opportunity for people to learn from each other, build group consciousness, provide chances for exchanging opinions, increase tolerance and understanding

ii) **Training to volunteers and social workers:** Such training is essential for the trainers, who, after understanding the approach, task and methodology, can contact and convince others

iii) **Team teaching:** Organized teaching to increase educational knowledge, methods, technologies and participatory approaches, essential for social conditioning and inducing motivation

iv) **Demonstrations:** In order to show the community how to perform the task, representatives/ motivators/ trainers of NGO's/ community/ CBO's should do the demonstration followed whenever possible by the community or students practising what has just been demonstrated. This will result in a good learning process and change of habits and convince the audience that things can be easily done

v) **Short courses:** The courses can be designed and conducted for municipal staff, volunteers and community representatives.

Mass Approach:

i) **Large group/ open discussion:** This is fundamental to any community participation, in order to create public interest and awareness. The beneficiaries are allowed to give their opinions, suggestions, recommendations, and express their satisfaction and their shortcomings. Animation techniques for large local groups on a temporary basis can be used to reach a common decision on a solution for their needs.

ii) **Speeches:** Speeches should be avoided and kept to a minimum,

except for speeches by some eloquent well- respected visiting dignitaries.

iii) **Communal Congregations:** If and when required and depending on school holidays and feast days, a communal get together could be arranged once or twice a year in the public places (for sports and fun). The messages can be conveyed separately under one umbrella.

iv) **Messages:** Explicit messages can be sent concerning specific activities to the particular target group. Changes in behaviours and attitude can also be made in the community by organizing young children (say two/three) to go to every house in the locality and convey the message of cleanliness and garbage related habits to the fellow children and indirectly to their mothers. A member of the NGO/CBO can accompany the children who are selected every week at school. As practised in a locality in India this can be a good motivational scheme.

v) **Posters/ slogans/ banners:** During the campaign these can be used to transmit the message and remind the people of their duties as the public is very short of memory.

vi) **Bulletins:** The community/NGO/CBO can issue a regular bulletin containing some useful information.

vii) **Announcement Boards/ Hoardings:** Such boards can be placed for messages/ meetings/ other communal activities which are freely accessible to the public.

viii) **Exhibitions and displays:** They are suitable if the project is well sponsored as they require finances and convey the message to a limited group of people only.

ix) **Mass Media:** Radio, television, press, cinema are common media approached by all and they have a good impact on the population.

It is true that starting up of community based projects is likely to be staff- and- time intensive and that the absorption capacity of the community is low and it will render few spectacular results. However, the more they become successful, the more the reverse will be true and many unanticipated benefits will be achieved (UNICEF 1983). It is foreseen that through energizing, education and motivation the community will perform the basic tasks and fulfil their responsibilities and will share these with the municipality. Due to this a voluntary work brigade can be formed at the community level.

11.5 CONCLUSIONS: The following is a brief of roles/ functions highlighted for those who took part in this study:

NGO/ CBO :

- Assessing and diagnosing the present problem and its magnitude.
- Formation of a team of social and technical personnel.
- Applying an IEM strategy to the community.
- Meetings with area leaders and municipality.
- Formation of mohalla/ street committees.
- Training of the trainers and volunteers.
- Acting as intermediaries between the community and the municipality.

- Research in possible recycling and resource recovery methods.
- Formation of Resource Recovery Centers.

COMMUNITY:

- To use appropriate garbage containers in the house.
- Developing a change in habits and attitudes and separation of dry/ wet garbage at HH level.
- To coordinate with the municipal/ private sweepers in garbage collection and street sweeping.
- Active participation in mohalla/ street committees and cleanliness campaigns.
- Educating the users with more emphasis on women and children.
- Messages to be conveyed to and through children.

MUNICIPALITY:

- Develop a flexible attitude and accommodating the CP approach.
- Maintain communication channels with the community and the voluntary organizations.
- Accepting shared responsibility of the community representatives.
- Conduct in- house training of sanitation staff.
- Develop an attitude of "working with" rather than "working for" the community.
- Optimum utilization of resources and effective planning.
- Provide facilities for collection and transportation according to available resources.

Other conclusions:

1. Communities have both the right and the responsibility to be involved in the planning and implementation of their own health and services programmes. Community participation is essential for such projects to be successful.
2. There is no doubt a tremendous potential for new partnership between municipality and local community organizations if control largely rests with the consumers of services.
3. There is no one model of community participation suitable for all situations and which can be replicated to all situations.
4. No model or approach can boast to be successful if blindly applied and copied.
5. From the experience gained so far with community development projects in SWM insufficient data have been publicised. Many projects which failed during in the course of time have been forgotten or never came in the lime light.
6. The background information, locations of settlement, presence of services, regularization, existing behaviour and attitudes regarding SWM are important features to be considered for designing a community participation programme.
7. A community participation strategy as developed and recommended is: INFORM, EDUCATE and MOTIVATE (IEM). This requires careful consideration and integration of actions to be taken at all levels from the community up to government level.
8. The communities in Ghousia Colony and Orangi Town are found to be cooperative to have problems related to collection and disposal of wastes and to understand the problems. Priority of

the problem was at present not found to be such as to be dealt with on an emergency/urgent basis.

9. The community in both case study areas are found willing to cooperate for the improvement programme and the extent of their participation includes individual and family efforts, besides financial contributions.

10. The formulation of laws, regulations and policies is an easy task compared to enforcement. But the first need is to establish a system with all facilities necessary to collect the waste and create a good community and civic sense among the masses through a continued IEM strategy. It is only after informing the community through notices that waste should be put in the proper place, that people should not litter or dump waste in illegal or unidentified spots that regulations can be enforced. Usually the enforcing mechanism is a fine. On the spot fines extracted by law enforcers are cited with approval, such as in Nigeria where armed guards accompany waste collection crews to fine or to imprison non-cooperators (Cointreau 1989).

Enforcement cannot be a compulsory approach to CP. Even in Singapore the strategy was that the people should first have the proper facilities and then education before enforcement is applied (Furedy 1991), The same approach is also considered for the study.

11. NGOs/ CBOs were found to have the right potential and strengths for organizing the community.

12. NGOs/ CBOs were found to be necessary agents required for the improvement of the SWM system. They work with the community and the municipality and should carry out the IEM strategy along the lines of the participatory approach, besides involved in research and development.

13. A checklist was developed to assess the community potential's for participation in both case study areas. It was concluded that the communities possess the will to participate and make improvements through physical and financial contributions.

14. The role of women is highlighted as this is important for a change in behaviour and attitudes. They should be motivated to carry out dry/ wet separation and train their children.

15. Based on the IEM strategy, communication media, educational and training methods for individual contacts, target group activities and mass approaches for different target groups are being prepared.

16. The options for improvement are recommended to be implemented in two phases allowing for minimum changes in the municipal system with optimum benefits.

17. For an effective management of the SWM situation, the case study areas are proposed to be divided in sub- areas or mohallas with representatives supervising the sweepers and contacting the communities in their areas.

11.6 RECOMMENDATIONS: Further recommendations are:

1. The present system of street vendors should not be neglected. They should still be allowed to ply their trade in the

areas. It is recommended that the authorized or regular vendors should be channelized through the middle dealers.

2. The scavenging activities should not be prohibited. The scavengers should rather be encouraged to do their jobs in more seclusion and better surroundings at the communal and dump sites, as done in Federal B area, Karachi. A person or group can be nominated/ authorized to do the work on specified platforms or places at the sites after getting training on job functioning and hygiene.

3. Detailed community attitude surveys should be undertaken by the NGOs/ CBOs in cooperation with the metropolitan agency to improve the provision of services. Besides, these surveys are also useful as an education for increasing the awareness among the people. Studies of households reuse and recycling habits, the perceptions, needs, opinions and understanding of the problems may show great differences with those of the planners. It will also help in designing effective public education programmes.

4. More emphasis should be put on the target group of children as they are the large proportion of the population of future householders and decision makers. Besides, their values are also easily influenced. They have the potential to influence adult behaviour and influence the community. The school system is the easiest way to begin with public education (Furedy 1991). For non-school going children, non-formal teaching is recommended through the NGOs/ CBOs and through other charitable organizations.

5. Community based waste management schemes should be started which involve the local community in collection, sorting and recycling activities. Research is needed to determine how such schemes can be implemented under different types of local conditions.

6. Research should be carried out in addressing the question of increasing the involvement of the private sector to improve the operational efficiency of the SWM system. A private door-to-door or block collection service can be utilized additional to the limited resources of the municipality.

7. The improvement of the SWM programme should be tied up with other priority and infra-structure improvement projects. Through such efforts the community can be mobilized once in many directions. Examples are health and hygiene education, water conservation, sanitation improvement etc. programmes such as immunization, diarrhoea control, literacy campaign, kitchen garden, tree plantation, insect and rodent control, income generation for women, women cooperatives etc.

8. Market analysis and promotion needs are required before household or communal composting is to be undertaken. Otherwise the use of kitchen gardens should be initiated like in Orangi. Because of lack of space this programme cannot be planned in Ghousia Colony.

9. Once only cleanliness campaigns which give an instant face-lift of the area should never be undertaken. Regular and periodic cleanliness drives linked with follow ups and educational

campaigns have an ever-lasting effect on the community. It is recommended to hold a monthly cleanliness campaign on the last Friday of the month to clean the houses, surroundings and facilities.

10. A slogan should be chosen to attract the public's attention. In Singapore the government chose the slogan "It's Our Home", the clean up drive developed into a sustained campaign and cleanliness of public areas is promoted as a part of the image of country (Loh 1989). The present slogan used by the municipality "Keep Quaid's City Clean" can be promoted and sustained.

11. The benefits of recycling activities and participation by the informal sector should be officially recognized, improved and encouraged.

12. There is therefore a need to extend services through community participation strategies. In the past little and limited community involvement has been sought in government projects. What is needed, therefore, is a model that will describe an approach to service delivery of a participatory nature. This should be considered not only as an option but also as a recommended approach in future plans for urban development.

13. The government and municipal agencies should also sincerely think of changing their approach and should accept the benefits achieved through community participation in providing and expanding the service coverage. The indicators used to measure the performance of agency personnel should also be reviewed and revised accordingly (Ramos et al 1986).

14. An evaluation of the project should be made based on the feedback obtained directly from the target groups, the surveys by NGOs/ CBOs, formal reporting mechanisms, question and answer sessions at meetings, field visits, evaluation studies or through self surveys by the community. A combination is proposed depending on time and resources.

15. A mass communication policy for SWM should be prepared to inform and educate people in a better and organized way. The information will help the people to understand their duties and obligations. This will also result in a communal sense and change in attitude in the community.

BIBLIOGRAPHY

1. Adan, Cruz and Palaypay, (1982). Scavenging in Metro Manila. March.
2. Ahmed, Rehan., (1990). Household and Estate Agents Survey of the Karachi Land Market., Document 3, Urban Land Management Study; Karachi Special Development Project; Directorate of Katchi Abadis and Evaluation, KMC, Karachi.
3. Ali, S.M., (1990). What Happens to the Things We Don't Want, Article in the Daily Dawn, Karachi, September 20,
4. Alliband, Terry (1983). Catalysts of Development, West Hartford, Kumarian Press.
5. Applied Economic Research Center, University of Karachi, (1988). Socio-Economic Profile of Katchi Abadis in Karachi. Karachi Development Authority, Karachi.
6. Anonymous, (1978). Waste Management Helps Saudis, Set Up Massive Sanitation System, Solid Waste Management, September.
7. Anzorena, J. (1986). Orangi- Report on a Project in Pakistan. Land Mark- Karachi Development Authority, Karachi.
8. Baile, A.F. (1938), Reports-political, Geographical, Commercial Relating to Sind, 1837-1935.,
9. Baile, A.F. (1975), Kurrachee- Past, Present and Future, Oxford University Press, Karachi.
10. Bartone, Carl. (1986). Recycling Waste, The World Bank Project on Resource Recovery, Development: Seeds of Change.
11. Bartone, Carl. (1989). Environmental Issues in Urban Management, Draft Discussion Paper, The World Bank, May.
12. Billington, D.R., (1985). Review of Training Approaches to Enhance Resource Recovery, Development: Seeds of Change. Community Participation in Water Supply and Sanitation, 30 November-4 December.
13. Bhatti, R. (1984). First Dig Your Pit, UNICEF NEWS, Issue 110.
14. Bosma, Neik, (1990). Community Approaches in Rural Water Supply Schemes, M.Sc. Thesis Report No.EE-32, IHE, Delft, May,

15. Buijs, Pieter, (1988). Institutional Shortcomings of NGOs and Donor Agencies Affecting Micro Enterprises Support Activities, Washington DC, World Conference on Micro Enterprise, 6-9 January,
16. Burgess, R., (1978). Petty Commodity Housing in Developing Countries. A Critique on John Turner's Review on Housing Policy. World Development.
17. Center for Advances Philippine Studies (CAPS), (1991). A Case study of a Privately Initiated Solid Waste Collection Management in San Juan, Metro Manila. World Bank Metropolitan Environmental Improvement Programme, August.
18. Chakravorty, U.N., (1985). Calcutta's Slum Improvement: A Myth?. Center for Science and Environment, New Delhi.
19. Chaudhry, M.Hanif, (1989). Infra-structure Sector Profiles, KDA, MPED for UNCHS, Karachi Master Plan 1986-2000. PADCO and PEPAC
20. Cheema, Shabbir. and Rondineeli, Denis (Ed.) (1988). Urban Services in Developing Countries: Public and Private Roles in Urban Development. The Macmillan Press Ltd.
21. Chishti, S. and Rahman, S. (1989). Population Dynamics of Karachi. KDA- Master Plan and Environmental Control Department, Karachi.
22. Cohen, J.M., and Norman, T., (1977) Rural Development Participation: Concepts and Measures for Project Design, Implementation and Evaluation. Cornell University, New York.
23. Cointreau, S.J., (1982). Environmental Management of Urban Solid Wastes in Developing Countries, A Project Guide, The World Bank, Washington DC.
24. Cointreau, S. (1989). Policy Options in Solid Waste Management, International Expert Group Seminar on Policy Responses Towards Improving SWM in Asian Metropolises, Kitakyushu, October.
25. Devkota, B. (1990). Community Participation: Integrated Action Undertaken in SWMRMC, Kathmandu. International Workshop on SWM and Resource Recovery, Kathmandu, 27 October-4 November.
26. Deutsche Gessellschaft fur Technische Zusammenarbeit (GTZ), (1988). Solid Waste Management with People's Participation, An Example in Nepal, Eschborn.
27. Dijsselbloem, Irene. (1986). Problem Solving and Decision Making by Community Participation, Agricultural University, Wageningen, The Netherlands, December.

28. Ecoforum, (1991). The Manilla Declaration: Providing the Framework for Consultations, Volume 15:3, October,
29. Elliot, Charles. (1987). Some Aspects of Relation Between the North and the South in the NGO Sector, Supplement to World Development, Vol 15, Autumn.
30. Furedy, Christine, (1989). Responsibility Sharing in Solid Waste Management: Encouraging Citizen Participation and Cooperation in Asian Metropolises, International Expert Group Seminar on Policy Responses Towards Improving SWM in Asian Metropolises, 16-21 October. Kitakyushu, Japan. UNCRD AND Kitakyushu City Government.
31. Furedy, Christine, (1991). Resource Paper: Emerging Concepts of Citizen Participation, Cooperation and Education for Responsive SWM in Asian Cities, International Expert Group Seminar on Policy Responses Towards Improving SWM in Asian Metropolises, 4-8 February, Bandung, Indonesia. UNCRD AND Ministry of Public Works, Republic of Indonesia.
32. Goldsmith, A. A. et al., (1979) Feasibility and Application of Rural Development Participation. Cornell University, New York.
33. Government of Pakistan, (1976). Fifth Five Year Plan 1976-1981. Planning Commission, Islamabad.
34. Haider, A., (1974). History of Karachi: 1900- 1939. Ph.D Thesis, University of Karachi.
35. Hasan, A., (1986) . OPP'S Low Cost Sanitation and Housing Programme -An Overview. Orangi Pilot Project, Karachi.
36. Hashmi, S.S., (1965). The People of Karachi.
37. Havers, Mark. (1991). NGO'S as Agencies for Small Enterprise Development, Small Enterprise Development Vol.2 No. 3.
38. Hollnsteiner, Mary Raceless. Government Strategies for Urban Areas and Community Participation, Assignment Children, Vol 57-58
39. IBRD, (1975). The Task Ahead for the Cities of Developing Countries, World Bank Staff Working Paper No.209, Washington DC.
40. IRC, (1981). Community Participation in Water and Sanitation, Technical Paper No.17, IRC, The Hague.
41. IRC, (1988). HYGIENE Education in Water Supply and Sanitation Programmes, Technical Paper Series No.27, The Hague.

42. IUCN, (1989). Feasibility Study for a Forestry Programme in Orangi-Socio- Economic/ Attitudinal Survey. IUCN, Karachi.
43. Jha, A.K. (1990). Methods and Techniques used in the Mass Media, International Workshop on SWM and Resource Recovery. Kathmandu, 27 October-4 November.
44. Johnson, J.E., (1987). Upward Filtering of the Housing Stock: A Study of Upward Filtering of Housing Stock as a Consequence of Informal Settlement Upgrading in Developing Countries. Habitat International.
45. JRP IV, (1975). Usmania Mohajir Colony.
46. Khan, A.H., (1985a). The Problem of Katchi Abadis. Orangi Pilot Project, Karachi.
47. Khan, A.H., (1985b). The Problem of Katchi Abadis. Orangi Pilot Project, Karachi.
48. Khan, A.H., (1987). Experiences of the Orangi Pilot Project. OPP-RTI, Karachi.
49. Khan, A. H., (1989). Women Work Centers, OPP, Karachi.
50. Khan, A. H., (1990a). OPP Models, OPP-RTI, Karachi.
51. Khan, A.H., (1990b). My Development Education, OPP-RTI, Karachi.
52. Kalim, I. and Nientied, P., (1987). Housing in Pakistan, Handbook on Housing, University of Pennsylvania Press, Pennsylvania.
53. Kalim, I. and Hasan, A., (1990). Profile of Karachi Land Market, Review of Conditions in the Formal and Informal Sectors. ,Urban Land Management Study, NESPAK, Karachi.
54. Karachi Development Authority, (1987). Karachi Master Plan 2000- Technical Note. Master Plan and Environmental Control Department, KDA.
55. Karachi Development Authority, (1974). Karachi Development Plan 1974-1985. Master Plan and Environmental Control Department, KDA.
56. Karachi Development Authority, (1984). An Overview of KDA's Housing in Karachi. Urban Design Unit, KDA.
57. Karachi Metropolitan Corporation, (1984). Brief Sketch of Karachi- The Nerve Center of Pakistan, KMC.

58. Karachi Metropolitan Corporation, (1991). Improvement of Environmental Conditions in Karachi, Basic Information Submitted to the Survey Team of Japan International Cooperation Agency
59. Kazmi, S.R., (1975). Housing Finance, MPD Newsletter, Special Issue, May.
60. Korten, Davis C., (1987). Third Generation NGO Strategies: A Key to People Centered Development. NGO Supplement to World Development Vol.15, Autumn
61. Landim, L. (1987). Non Governmental Organizations in Latin America, NGO Supplement to World Development Vol. 15, Autumn.
62. Lehnert, Petra. (1983). Aid TO clean up Kathmandu.
63. Liljenkrantz, C. and Boserup, (1975). Integration of Women in Development: Why, When, How, UNDP, New York. ___
64. Loh, A.T. (1989). Solid Waste Management in Singapore, International Expert Group Seminar on Policy Response Towards Improving SWM in Asian Metropolises, Kitakyushu, October.
65. Mangin, W., (1969). Latin American Squatter Settlements a Problem and a Situation, Ekistics.
66. Melchior, S., (1989) Women, Water and Sanitation or Counting Tomatoes as well as Pumps, PROWESS/ UNDP Technical Series, May.
67. Monasterio, Fernando Ortiz and Schmink, Marianne, (1986). Learning about Women and Urban Services in Latin America and the Caribbean. The Population Council.
68. NESPAK, (1985a). Solid Waste Management Project, Project Report on Existing System, for KMC.
69. NESPAK, (1985b). Solid Waste Management Project, Project Report on Proposed System, for KMC.
70. NESPAK, (1985c). Solid Waste Management Project, Project Report on Planning and Base Data, for KMC.
71. NESPAK and KINHILL ENGINEERS, (1991). Detailed Design and Assistance in Implementation for Katchi Abadis Upgrading, Karachi Urban Development Project.
72. Nientied, P. and Meiger, E., (1982). Karachi Squatter Settlement Upgrading: Improvement and Displacement, Amsterdam Free University, Amsterdam.

73. Nientied, P. (1984). The Third Baldia Upgrading Evaluation Survey. Urban Research Working Paper, Number 2. Amsterdam Free University.
74. Nientied, P. et al. (1985). Low Income Housing Improvements and Displacement: Some Comparative Evidences. Urban Research Working Paper, Amsterdam Free University, Amsterdam.
75. Nizami, H.M., (1989). Environmental Pollution, The City and Its Problems, A Statistical Report, Institute of Environmental Studies, University of Karachi and KDA.
76. OPP, (1983). OPP Progress Report 1980-1983, OPP, Karachi.
77. OPP, (1986a). OPP'S Low Cost Sanitation Programme, A Collection of Arif Hasan,s Papers on the Issue, OPP, Karachi.
78. OPP, (1986b). 42ND Quarterly Progress Report of OPP, Karachi
79. OPP, (1986c). Case Studies- Gradual Development of Structural Sewerage Plan, OPP, Karachi.
80. Park, S.Y., Kim, Y.W. and Yang, O.H., (1986). Urban Services and the Poor: Case Study of Republic of Korea, Community Participation in Delivery of Basic Urban Services in Asia. International Development Research Center.
81. PCSIR, (1987). Refuse Recycling Processes in Karachi, Pakistan, Prepared for UNCHS-HABITAT.
82. Population Census Organization, (1985). Handbook of Population Census Data.
83. Population Census Organization, (1987) District Census Report of the Karachi Division, Statistical Division, Government of Pakistan.
84. Prakash, Ved, (1988). Financing Urban Services in Developing Countries, Urban Services in DC.
85. PROWESS/ UNDP, (1991). Global Assembly of Women and the Environment, Success Story: Women, Health and Employment in Mali.
86. Rahman, M.L. and Alam, M.F. (1986). Financing the Rural Poor in Bangladesh: Experience of Some Government and Non Government Organizations, Bangladesh Journal of Agricultural Economics, Vol.9.No.
87. Rahman, P. Arain, H., (1984). Disposal of Garbage-Menace in Orangi, OPP, Karachi.
88. Rahman, P. and Rashid, A., (1990). Concept, Methodology and Programme, OPP-RTI, Karachi.

89. Ramos, E. and Roman, A.A., (1986). Community Participation Model, Article in Community Participation in Delivering Basic Urban Services in Asia, IDRC.
90. Richartz, R.J.H.M., (1988). Improvement of an Inner City Basti of Karachi: The Second Evaluation Survey of Ghousia Colony, Urban Research Working Paper No. 17, Center for Asian Studies, VU, Amsterdam.
91. Rittel, Horst and Webber, M.M., (1973). Dilemmas in a General Theory of Planning. Policy Sciences Volume 4.
92. Rondinelli, Denis A., (1976). Public Planning and Political Strategy. Long Range Planning, Volume 9.
93. Rossi, Basil A., (1991). Personal Communication through Asian Recycling Association, Balcod City, Philippines, November,
94. Saleem, Shahid. et al., (1983). Improvement Strategy for Katchi Abadis, KMC, Karachi.
95. Schertenleib, Roland and Triche, Thelma, (1989). Non-Government Delivery of Urban Solid Wastes Services, Draft Framework Paper, INUWS, September.
96. Schertenleib, Roland and Bartone, C., (1990) Urban Management and the Environment, Workshop on Special Development, Jakarta, Indonesia.
97. Schertenleib, Roland. and Meyer, Warner., (1991) Municipal Solid Waste Management in Developing Countries: Problem and Issues; Need for Future Research, EAWAG NEWS No. 30/31, July.
98. Segaar, J.J., (1975). Karachi ends Basti, Amsterdam Free University, Amsterdam.
99. Siddiqui, I., (1971). Goths at a Glance.
100. Sinatamby, Gehan, S. (1984). SWM in Orangi, Project Report. BCCI Community Development Project, Orangi Karachi, UNCHS-HABITAT.
101. Sultan, Jawaid, and Zia, A. (1989). Case Studies in Population and Natural Resources of Pakistan, IUCN, Karachi.
102. Thapa, Shashi Bahadur, (1991). Citizen Participation and Education for Solid Waste Management, International Expert Group Seminar on Policy Responses Towards Improving Solid Waste Management in Asian Metropolises, 4-8 February 1991, Bandung, Indonesia, UNCRD and Ministry of Public Works of Republic of Indonesia.

103. Todaro, M.P., (1980). Urbanization in Developing Nations: Trends, Prospects and Policies, Journal of Geography, Volume 79.
104. UNCHS-HABITAT, (1986). Global Report on Human Settlements, Oxford University Press.
105. UNCHS-HABITAT, (1988). Refuse Collection Vehicles for Developing Countries.
106. UNCHS-HABITAT, (1989). Solid Waste Management in Low Income Housing Projects: The Scope for Community Participation, Nairobi.
107. UNCRD, (1990). UNCRD Newsletter, January,
108. UNDP- World Bank, (1990). Water and Sanitation Programme, Annual Report 1989-1990.
109. UNICEF/ WHO Joint Committee on Health Policy (1977). Community Involvement in Primary Health Care, Geneva.
110. UNICEF, (1983). Urban Examples for Basic Services Development in Cities, NO:UE-5
111. UNICEF, (1984). Urban Basic Services: Reaching Children and Women of the Urban Poor, Occasional Paper Series No. 3, February.
112. UNICEF, (1988). Urban Examples: Improving Environment for Child Health Development, March.
113. United Nations, (1980). Patterns of Urban and Rural Population Growth, Department of International Economics and Social Affairs, Population Studies No. 68, New York.
114. United Nations, (1984). Economic and Social Commission for Asia and the Pacific, Improvement of Slums and Squatter Settlements: Infra-structures and Services.
115. Urban Edge, (1987). Solid Waste Management : Reducing Costs, July.
116. Van der Linden, J.J., (1977). The Bastis of Karachi: Types and Dynamics, Amsterdam Free University, Amsterdam.
117. Van der Linden, J.J., (1983). Actors in Squatter Settlement Upgrading: Their Interest and Roles.
118. Van der Linden, J.J., (1985). Ghousia Colony: The Upgrading of a Stagnating Basti, Urban Research Working Paper No.4, Amsterdam Free University Press, Amsterdam.

119. Van der Linden, J.J., (1989). Squatter Settlements in Pakistan, The Impact of Upgrading.
120. Verheijen, A.M.J., (1990). A Practical Fieldwork at the OPP, Rotterdam.
121. Waste Consultants, (1991). Waste Recycling in Nairobi, August.
122. White, A. T., (1981). Community Participation in Water and Sanitation Concepts, Strategies and Methods. Technical Paper 17, IRC, The Hague, June,
123. WHO, (1985). Achieving Success in Community Water Supply and Sanitation, SEARO Regional Health Papers No. 9, New Delhi, Prepared for UNDP.
124. Whyte, Ann. (1986). Guidelines for Planning Community Participation Activities in Water Supply and Sanitation Projects, World Health Organization, Geneva.
125. World Bank (1978). Towards a Typology of Popular Participation, Policy Planning and Programme Review Department. May.
126. World Bank (1991). Urban Policy and Economic Development: An Agenda for the 1990, World Bank Policy Paper, April.
127. Yang, S. (1989). Group Discussion, UNCRD Meeting, Beijing, September.
128. Yap, K.S., (1982). Leases, Land and Local Leaders, Bijdragen tot de Sociale Geographie en Planologie, No.4, Amsterdam Free University, Amsterdam.
129. Yeung, Y., and Mc. Ghee, T.G. (Ed.) (1986). Community Participation in Delivering Urban Basic Services in Asia, International Development Research Center, Ottawa.
130. ZMC, (1989). Zonal Municipal Committee- Central: An Introduction, ZMC, Karachi.

A.1 KARACHI

A.1.1 History and Location: Karachi is the largest city of Pakistan and provincial capital of Sindh. The city was founded in 18th century and was called "Kulachi- Jo-Goth" (village of Kulachi). The name gradually changed to Kurrachi and in the course of time to its present name of Karachi (PCO 1987). The history of Karachi can be traced from the Reference (KMC 1984). Karachi is a youngest and fastest growing urban centre which has grown 75 times in 100 years and 18 times in 40 years (KDA 1984).

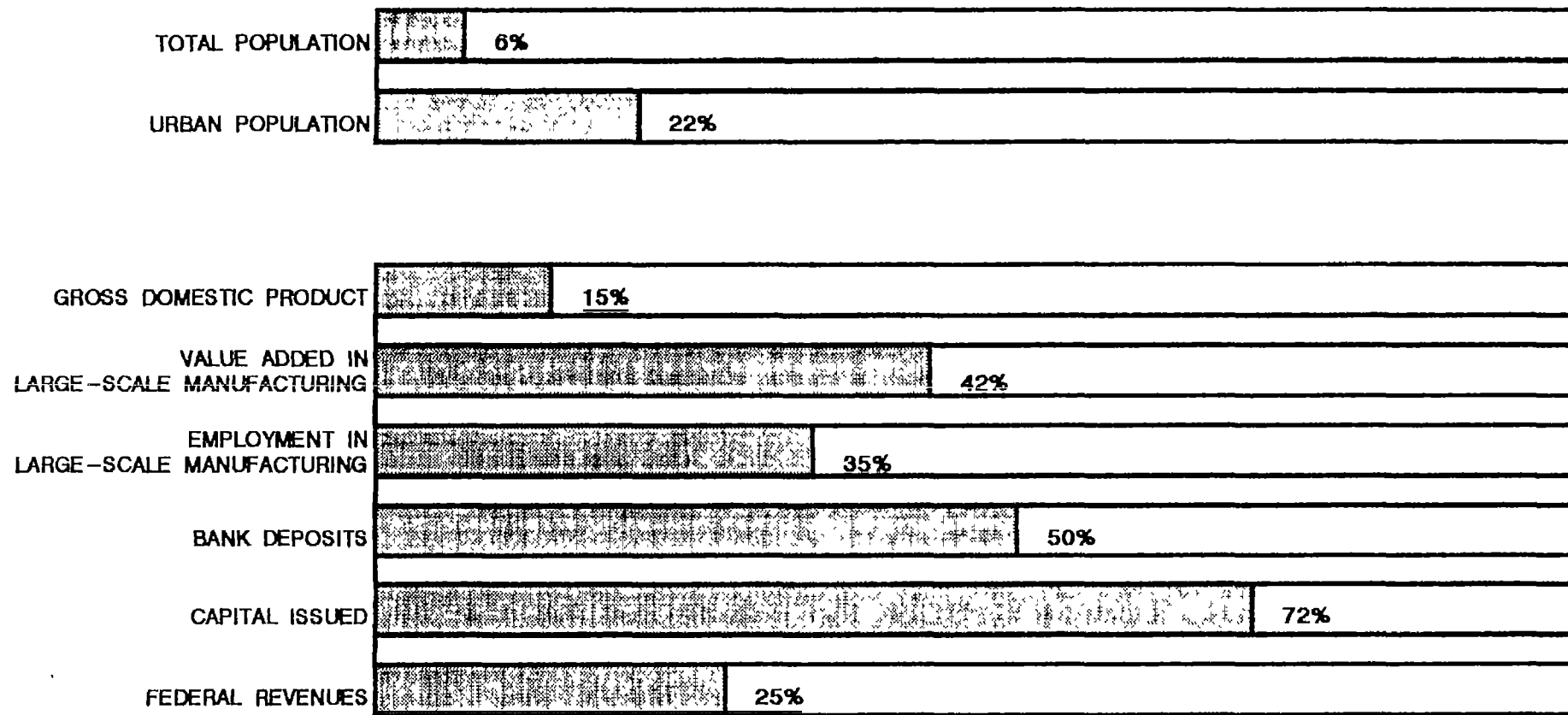
The Karachi division comprised only of one district at the time of the 1972 census. It now stands split into four districts namely Karachi East, West, South and Central. The jurisdiction of each district is shown in the map in Annexure A.13.

The Karachi division lies from 24°-45' to 25°-15' north latitudes and 66°-37' to 67°-37' east longitudes. It is bounded by Dadu district in north east, by Thatta district in south east, by the Arabian sea in the south and by Lasbella district of Baluchistan province in the west. The total area of Karachi division is 3527 sq.km. (PCO 1987).

A.1.2 Role in the Nation: Karachi today is the hub of national activities. It accounts for 6% of the national population, 25% of the population of the province of Sindh, 22% of Pakistan urban population, 47% of the industrial establishments of the country's production, 42% of the workers of the country are employed in large scale manufacturing industries in Karachi. The city contributes to about 25% of the Federal Exchequer, with 50% bank deposits and 72% of the capital issued. It has about 800,000 housing units accommodating over 960,000 households. It is served by the national highways leading to upcountry and other adjoining countries. In view of the facts that it is the only port city in the country and the major International airport together with a solid industrial base, Karachi continue to grow (KMC 1984). Briefly the role of Karachi is depicted from the accompanying figure.

A.1.3 Demographic Background: Although vital registration system has been established since the beginning of this century, the records are grossly incomplete. Population census also has serious shortcomings however it remain relatively the most dependable source of demographic information. One hundred and forty years ago Karachi was a walled township of 14,000 on a site of 35 acres (Nizami 1989). Before independence in 1947, Karachi was still a small city with a population of less the half a million. At that time Karachi's urban area was about 233 sq.km and it was considered as the cleanest city of the sub-continent (KMC 1984).

Between 1947 and 1951 app. 600,000 displaced persons migrated from India to Karachi as a result of the creation of Pakistan in 1947. By the year 1961 the population of Karachi doubled. The post independence strategy strongly emphasized industrialization based on import substitution and this reinforced the growth of Karachi. It is partly because of the most attractive location for industries



KARACHI'S ROLE IN THE NATION

resulting in high rate of rural metropolitan migration.

The only sea port being located in Karachi also helped to accelerate the growth. After the 1971 Indo Pakistan war there has been a rapid influx of people from former East Pakistan over a short span of time (PCO 1987), as well as steady strain of migrants from Pakistan's own country side (Van der Linden 1989). Today Karachi with a population of over 8 million is growing at a rate of 6 percent per annum and ranked 22nd amongst the biggest cities of the world (KMC 1984).

The table shows the phenominal increase in the population during the last 40 years as the area has increased from 72 sq.miles in 1947 to 600 sq.miles (Chisti et al 1989). the Karachi urban area is 1300 sq.km (KDA 1984).

Urban Population of Karachi

Year	Population	Source
1729	1,000	Azemushan 1974
1798	10,000	(Baile 1975 and Haider 1974)
1813	13,000	(Baile 1975 and Haider 1974)
1830	15,000	(Baile 1938)
1839	14,000	(Baile 1975)
1851	12,391	(Haider 1974)
1856	56,879	(Baile 1975)
1872	56,753	Census 1921
1881	73,560	Census 1921
1891	105,199	Census 1921
1901	116,663	Census 1921
1911	151,903	Census 1921
1921	216,883	Census 1921
1931	265,565	Census 1931
1941	430,000	Census 1941 (KDA 1984)
1951	1,064,459	Census 1951 (KDA 1984)
1961	1,912,598	Census 1961 (KDA 1984)
1972	3,498,614	Census 1972 (KDA 1984)
1981	5,440,000	Census 1981 (KDA 1984)
1984	5,800,000	(KMC 1984)
2000	12,380,000 to 15,000,000	Projected (KDA 1984 and KMC 1984)

It was widely felt that 1981 census grossly under enumerated Karachi's population. In spite of past census survey indicating no statistically significant under enumeration, there remains some skepticism about the true population of Karachi (Chisti et al 1989).

The overall urban density is about 79 persons/acre or 1524 person/sq.km with residential densities varying tremendously through the metropolitan area. In some cases they are as high as 1300 person/acre in area with multi storey buildings. According to the 1981 census data the average household size was 6.6 and growth rate of the city was 4.96. The number of rural localities is 84 with a population of 0.23 million (PCO 1987).

Culturally the population of Karachi is heterogeneous in nature. It constitutes of ethnic groups from four provinces of the country as well as migrants from other countries. 97% of the population is Muslim. Besides a small percentage of minorities include 2% Christians and 1% Hindus, Parsis etc. Karachi is thus a conglomeration of various ethnic and religious groups, a cosmopolitan city and is rightly termed as the meeting point of all cultures (KMC 1984).

Karachi is a major contributor to national output. It is a centre for accumulation of capital and a centre of the indigenous technological change that is essential for economic and social growth. It is a focus of foreign investment and technological transfer. It gives sustenance and fresh hope each year to thousands of migrants moving into the city from the rest of Pakistan not only enabling them to make themselves better off than they would be elsewhere but also enabling them to transfer income back to the families they have left in the smaller town and rural areas of origin (Nizami 1989).

From a national point of view even though most of the in migrants begin in marginal occupations as domestic seryants, hawkers, person or unskilled labourers. The metropolis probably is enabling them to be move productive and contribute more to total output than they could elsewhere (Nizami 1989).

Similarly in the case with the migrants coming from other countries like Afghanistan, India, Bangladesh, Srilanka, Burma and Iran who also find informal work and manage their livelihood in Karachi.

A.1.4 Social Role: A corollary that emerges from the prevailing complexion of population in Karachi is the social role that Karachi is playing in the national system. As has already been mentioned, people belonging to different provinces have migrated to Karachi in search of jobs and other opportunities in the secondary and tertiary sectors of economy. On many projects they are working together to achieve common objectives and this naturally give rise to social inter-actions. The sharing of common goals and objectives, working in a team and living in the same neighborhood with time is expected to create a community interest in them. The process of living together also helps in transcending cultural and linguistic barrier. In a way all urban centres provide such opportunities for cultural exchange but not on the scale of Karachi. However, this process of social alchemy, if it is to proceed without any exothermic explosion, requires careful action on the part of the state agencies to ensure that adequate civic services are provided to all cross section of population. There should be no inequities in the distribution of services as well as in the tax burden and that people are encouraged to move out of their ethnic shell and live in a mixed neighborhoods. For this process, the existence of shantly towns poses the great obstacle. If these squatter settlements are allowed to continue in their present state they will create a fragmented social structure with alienated communities. The Government of Sindh having fully

realized the situation and is mobilizing all its resources in the social overheads to ensure availability of municipal services to all citizens regardless of their origin. The work of improvement and upgradation of Katchi Abadis is being undertaken in such a way that they do not give the impression of isolated communities living in urban matrix. Karachi is thus not only a port city, it is also a social experiment and out of it will hopefully, emerge a community whose ideological base, in addition to being Pakistani will have a strong leaning towards universalism and modernization (KMC 1984).

A.1.5 The Dimensions of the Crisis: Karachi is a rapidly expanding metropolis swelling to its ultimate limit. Being flexible in dimensions it is stretching from all of its sides. It is at the threshold of a modernization period that will witness massive urbanization not only in Pakistan but in all the the developing world (Nizami 1989).

Karachi is on the threshold, optimistically of a period of rapid economic recovery which will make heavy demands on the city infrastructure and its administration. The city has to meet with the challenge successfully to become a vital modern metropolis attracting investment from all parts of the world. Karachi has not only to prosper internally but also acting as an engine of development for the entire nation. The concerned authorities are required to prepare for much greater sustained growth the city has ever experienced before. If present policies which allow Karachi to sprawl extravagantly are not changed and if action is not taken to remedy the tremendous inequities, it will still grow but will enter a period of crisis and deterioration that is terrible to contemplate. The dimensions of that impending crisis are perhaps best being portrayed by the metropolitan deficiencies of the infra structures. (Nizami 1989).

A.1.6 Housing: An overall picture of present housing status in Karachi city can be obtained through 1980 Housing Census according to which there were 858,035 units in Karachi division out of which 95% were in urban areas. Nearly 76% of the housing units were small comprising either of one or two rooms. Seven persons/housing unit and three persons/room was the calculated average. 64% of the population in urban areas lived in owned houses while in rural areas this figure is as high as 85%.

Majority of the population constructed their houses during past 11-33 years and nearly 21% houses in this city were constructed during 1976- 80 period. 84% houses were built with backed bricks/ blocks/ stones and cement bounded while only 42% housing having RCC roofs. 69% housing units had separate kitchens and 27% had no kitchens while 5% units had shared kitchens (PCO 1987).

Most of the households used piped water for drinking. Only 5% household used handpumps, 2% rely on spring, river or stream water. 66% households used electricity while Kerosine was used in 32% households. For cooking fuel Natural Gas was used by 37% households, Kerosine by 35% and wood by 25%.

A.2 HOUSING PROBLEMS AND EMERGENCE OF KATCHI ABADIS

A.2.1 Introduction: Most Third World countries are characterized by a shortage of land and housing supply for lower income groups. This has resulted in proliferation of slums and squatter settlements. Upgrading of existing informal settlements (widening and metalling of streets, inexpensive loans for improvements, sewerage/ gas/ electricity and water/connections) has become an increasingly important elements in the provision of housing in developing countries. The physical upgrading of settlements, the subsequent community-wide infrastructure provision, and frequently the legalization of land tenure, comprise a strategy which has been recommended and/or adopted by a significant number of national housing authorities, and by international lending and assistance agencies (Johnson 1987 and Richadz 1988).

Although since Independence a wide range of housing policies have been implemented in Pakistan, national housing policy guidelines were lacking. As recently as 1976, guidelines of the first National Housing Framework were drawn up. This work of the Physical Planning and Housing Division of the Government of Pakistan can be seen as the basis of the housing policies in the fifth Five Year Plan (1978-1983) and the sixth Five Year Plan (1984-1989).

Slums, squatter settlements and squatter are words which are used synonymously. More than fifty definitions have been stated by Vander Linden in chapter II (Van der Linden 1977).

The more practicable definition given by him is "slum is a residential area, where housing conditions in the broader sense are substandard to such an extent that it is clear that for one or more explicit reasons the physical health of the inhabitants is endangered by the conditions". Proposed categorization of slums is also given in reference (Van der Linden 1977).

A.2.2 Exodus from the Rural Areas: The modern urban slum, whose proto-type first appeared in the nineteenth century, came into existence on account of a huge exodus from the rural areas. Two factors were promoting the exodus. There was first the so-called pull factor when industries, employment and urban facilities acted as a great magnet. Secondly, the decline of cottage craft and subsistence agriculture provided the push factor. Villagers saw a better and more comfortable future for themselves not in their backward village but in the progressive city. The pull and push factors seem to be operating with irresistible force in the developing nations. The pioneers of the industrial revolution, after a century of turmoil, have achieved a demographic equilibrium. The great cities of western Europe are not in danger of being overwhelming by Katchi Abadis or by mass exodus from their beautiful countryside. Developing nations like India, Pakistan, Egypt, the Phillipines, etc. are in a state of demographic upheaval. They are facing a very serious challenge (Khan 1985 b).

A.2.3 The Push Factor in Pakistan: The rate of rural migration has

been increasing in every decade since the birth of Pakistan. More and more villagers are coming to the cities. There are two main reasons for this exodus; one reason is the inability of the village economy to provide them with satisfactory employment. The other reason is the rapid increase in population. The two reasons are closely interlinked (Khan 1985 b).

A.2.4 Housing in Karachi: The ability and willingness of low income groups to pay for housing and related services cannot easily be estimated as they do not depend on mere income. Other factors, like the security of income, the situation and the composition of the household and its priorities are at least as important as determinants of what the household can and will spend on housing (Van der Linden 1977).

CSO national data indicate that income groups below Rs. 500/- per month spend approximately 15% of their income on housing, lighting and fuel, but should spend less, as they were also found to consume an insufficient diet of calories and nutritional value by minimum International Standards (KDA 1987). Another recent survey conducted in 1988 depicts that an average household in a Katchi Abadi spends 13% on rent for housing, 58% on food, 8% on clothing, 6% on transport, 2% on recreation, 1% on remittances and 12% on others (AERC 1988).

Karachi city has perhaps a unique status in terms of land ownership. It has been estimated that 400,000 acres (93.5%) of 425,000 acres comprising the Karachi Metropolitan Area is under public ownership. Land under private ownership or freeholds 27,682 acres constitutes 6.5% of the total land. The land/housing can be classified into formal and informal housing sectors. All housing carried out under a planned format being sanctioned under the law has been classified as formal housing, whereas housing development not having a legal status is categorised as informal housing (Kalim et al 1990).

KDA is the major land development agency which allocates plots to individuals or areas to cooperative housing societies. Commonly 99 year leases are granted. Low income people hardly have any possibility to settle legally. This is one more reason to be excluded from formal ways of obtaining loans for house building. The HBFC, a state owned institution that provides loans for house building, does not give loans for building on unauthorized plots (Van der Linden 1977). The HBFC and other commercial banks have only been able to help middle and lower middle income families. The rules and recovery difficulties have not allowed any assistance to the very low income group for low cost housing (Kazmi 1975).

Finding no choice for support, the low income people resort to informal sources of acquiring loans. Vander Harst found that almost 50% of the low income houses had come about with the help of small loans (over 60% of the loans amounted to less than Rs. 1000). Sources from which loans were obtained were mainly friends and relatives (69%) employers (39%) and supplier of building materials (18%) (KDA 1974).

It is indeed difficult to describe the role of the Government

regarding the housing situation in Karachi. Beside national and provincial authorities at the local level, there are over 60 government and semi-government organizations involved in planning and execution in the fields of public work, house building, services and economic development (Segaar 1975).

A.2.5 Emergence of Katchi Abadis: The urban crisis in Karachi has many aspects, but perhaps the most dangerous aspect is the growth of Katchi Abadis. According to Karachi Development Authority's estimate in 1980 there were 362 Katchi Abadis (unauthorized settlements) in Karachi. Now there are more than 450, and most probably in the coming years there would be many more (Khan 1985 a). The Katchi Abadis are growing faster in number and population than the affluent sections of the cities. At present 40% of the people of Karachi live in Katchi Abadis. It is feared that by the year 2000 they will be 50% (Khan 1985b). This is the result of the inability of the government to provide the urban poor with houses or regularized land with urban services on affordable price (Verheijen 1990). In general it can be said that:

- The earlier "Katchi Abadis" were located in the centre of the city; like Ghousia Colony" the more recent ones on the periphery like Orangi Town.
- As opposed to the earlier settlement, the more recent ones are planned.
- In the earlier colonies the houses were of poor construction like mat and reed, and it took a long period of time to improve. The recent ones however, have a uniform technology and are immediately better constructed, mainly using concrete blocks.
- As opposed to the earlier "Katchi Abadis" the recent ones are mixed settlements, not only ethnically, but also socially and economically (Verheijen 1990 and Hasan 1985).

The emergence of Katchi Abadis is caused by powerful economic and social trends which first appeared with the industrial revolution, and are now moulding the developing countries in Asia. It is a problem whose magnitude has grown with each decade in Pakistan as in other developing countries (Khan 1990b, Khan 1985a and Rahman et al 1990).

Katchi Abadis or squatter colonies or slums are not peculiar to Karachi. They are found in the big cities of Latin America, India and Africa. In fact cities like Calcutta, Bombay and Cairo are in a much more dismal condition than Karachi (Khan 1985b).

A.2.6 From Bulldozing to Upgrading: For a long time, the government has not recognized the informal system of low income housing and has attempted to remove the illegal settlements. The main reasons for this attitude as Segear (1975) mentions were:

- The danger to public health these settlement pose.
- Their unaesthetic appearance which sometimes affects the quality of the immediate surroundings.
- Their occupying economically valuable land that can be more profitably used.
- Their occupying land that is needed for other more urgent

purposes.

- Their illegal status, the dwellers have no (formal) right to occupy the land they live on.

At first our planners thought that they could get rid of the Katchi Abadis by bulldozing them and settling the squatters in official colonies like Korangi and Landhi. But the number of squatters assumed enormous proportions and the capacity to build colonies dwindled. Moreover, the squatters acquired political prestige on account of their numbers, while most of them could not be settled in official colonies, neither could they be bulldozed with impunity. Different attempts have been made by the government like simple bulldozing or removing the illegal settlements; bulldozing plus offering an alternative house/plot, on the spot re-housing in flats, legalizing of existing illegal settlement, site and services project (Van der Linden 1983). Bowing to the doctrine of necessity Katchi Abadis were to be regularized and upgraded. The national planners had to follow international precedents. (Khan 1990b) As the international opinion also become more favourable recommending legalization and upgrading instead of shifting and bulldozing (Khan 1985b). In its development plan, the MPD concludes. "The low income groups are denied access to housing credit, cannot obtain plots in locations of their need and are subjected to resettlement and harassment when they live in unauthorized area (KDA 1987). As almost 60% of Karachi's current urban population is housed in the city's informal sector. The most recent estimate by the Karachi Master Plan (1988) puts the figures as 3,972,800 people (Kalim et al 1990).

A.2.7 Upgrading, Improvement and Regularization: If bastis (settlement, slums) develop well, there is a point in their development, when the settlement cannot be called a slum anymore. Regularization means that the right of occupancy is recognized as a principle, but subject to certain conditions (standards of plot size, street width etc.) which implies that allotting or leasing of the land may eventually be carried out in future (Van der Linden 1977).

In official terminology, reference is made to IRP, (Improvement and Regularization Programme). The word "Improvement" refers to physical - and perhaps also other kinds of improvement. The word "regularization" is reserved for the legal side of the case. But again, this regularization is subject to certain conditions on the improvement said, so that in fact the position of the individual basti dwellers his house is not being changed by the mere act of "Regularization" of a basti (Van der Linden 1977).

The idea behind this policy is that at very low or no costs to the Government the physical conditions of these settlements can be improved and this may stimulate the inhabitants to start improving their own houses. Another reason of this phenomenon can be expected in the increased security of tenure; people are no longer reluctant to invest money in their shelter as they no longer have to fear the demolition of their dwellings.

Upgrading and legalization projects can provide more low-cost

housing than the costly alternative of eradicating slums and constructing high-standard public housing. They are also said to be accessible to the lowest income groups, for all inhabitants of squatter areas are treated equally. Basic infrastructure, services and security of tenure are offered to all owners of structures in the settlement at relatively low (or even no) costs (Richardz 1988).

Because of the better conditions of the area and the corresponding increased value of land and houses such settlements may be fully incorporated into the capitalist market as they have become a wanted commodity. One can expect middle income groups to get interested in these areas, as in the majority of the big cities in the Third World there is a continuous shortage of middle-income housing as well. The minimal demands middle income groups require their living environment to meet (security of tenure, presence of basic infrastructure) are now fulfilled. Therefore they can, due to their better economic position, try to buy themselves into these improved areas.

The projects can only be called successful when, after upgrading and/or legalization of the area, no important changes have taken place in the population structure. However, in practice, sometimes this assumption turns out to be wrong, because of displacement taking place. This unwanted mobility-effect has led to the study of the mechanisms behind this process. For, if displacement of the original (low-income) inhabitants takes place on a big scale, then the upgrading/legalization policy has reached its physical target but, at the same time, has failed to reach its actual target.

The benefits of upgrading are many, most of which goes to the owner-occupiers, who may under the presence of circumstances (poor people always need to cover the incidental expenditures like marriages, illness etc.) tends to sell their plots and houses and find shelter elsewhere. Tenants seem to have no benefits resulting in increase in rent or vacation (Nientied et al 1982).

Squatter owners going twice from upgrading. Not only do they gain access to urban infrastructure and services but their property may also command a higher price in the market (Nientied et al 1985). Renters in such settlements are first victims (Burgess 1978). Calcutta's Metropolitan Development Authority's programme is an instance where displacement of renters was found on a significant scale (Chakarvorty 1985).

Also as the settlements matures (after upgrading and legalization) without a necessarily corresponding rise in the household income, the majority of units should begin to appear to the right of the diagonal. This new position places the dwelling in a vulnerable position with regard to raiding by higher income groups (Johnson 1987). Densification is usually the result of the legalization process.

The Legalization and/or Upgrading

Can lead to :

- Rising housing costs (energy costs, improvement costs, municipal charges);

- Integration into process of capitalist valorization of land and higher market prices of land and houses;
- Displacement of original residents/influx of new (richer) inhabitants;
- Forced sub-letting or splitting of plot in order to meet higher expenditure (densification);
- Stimulation of improving houses by inhabitants themselves;
- Prevention of lower income groups to enter the area;
- Voluntary moving (one wants to cash in the profits of higher real estate value).

Is Dependent on:

- Levels of poverty of inhabitants;
- Tenure status (owner/renter);
- Dependency on socio-spatial network;
- Employment opportunities;
- Internal organization of the population;
- Migration pattern to the city;
- Project standards (high-low);
- Degree of cost recovery (what part is to be paid by inhabitants);
- Location of the area (city centre-periphery);
- Dynamics of the housing market (area there enough alternatives);
- Shortage of the housing for middle income groups (how big is their pressure on low-income areas);
- Urban policy towards housing the poor (in favour of what income group?);
- General income distribution within the country.

A.2.8 Recognition of Katchi Abadis: During the seventies, condition for regularization of katchi abadis started changing with in different government agencies. The idea slowly gained ground that squatter settlements could be regularized and transformed into decent quarters of the city. In the Fifth Five Year Plan (1976-81) the Government of Pakistan proposed new guidelines for dealing with the housing problem, it propose that the existing housing stock be preserved wherever possible. (GOP 1976 and Van der Linden 1985).

For the first time listed the following policy areas were considered for adoption: slum improvement, low- income housing, planning standards, planning of sites and services, housing finance (Kalim et al 1987). Regarding slum improvement it says: "It will not be possible to replace all the substandard housing as well as to meet the additional annual requirements in the short term. Therefore all the existing houses in slums and katchi abadis (substandard urban areas), irrespective of the quality, should be preserved. Slum areas and katchi abadis not occupying land for public purposes should be regularized to give ownership to residents and to pave the way for environmental improvement" (Kalim et al 1987 and Richardz 1988).

In 1976, KMC published a policy document entitled " A New Approach to Sub Standard Urban Areas" in which an outline of a city wide regularization and improvement programme is presented. Besides, within KMC, the Central Planning Team was formed to perform improvement planning for illegal settlements. The team has been

renamed as Directorate of Katchi Abadis & Evaluation (DKAE) (Van der Linden 1985).

In 1978, Martial Law Order No. 67, was issued called "Regularization and Development of Katchi Abadis", which was reconstituted in 1979 (MLO 110) and again in 1982 (MLO 183) and complemented by the Sindh Katchi Abadis Rules of 1982. Basic in these orders is that the Government may declare an area to be a Katchi Abadi, and the Katchi Abadi so declared shall be regularized and developed in accordance with the provision of this Order. With the permission of MLO and Katchi Abadis Rules, regularization and improvement programmes had got a firm legal basis.

Another change stems from the reinstatement of a municipal council in 1979. Councillor's are elected area wise for a period of four years. Thus, inhabitants of an area now have one representative through whom the populations needs and wished can be properly voiced.

A.2.9 The Dilemma of Upgrading: Upgrading means providing the same facilities to the Katchi Abadis as are provided to the affluent quarters of the city i.e. roads, piped water, electricity, and above all sanitation and underground sewerage.

Upgrading is necessary and urgent for many reasons: first, of course, is the human reasons, the imperative of social justice. Secondly, as international experience has shown that it is dangerous to have large and neglected slums, which may become the breeding ground for class conflicts. The early immigrants from rural areas may be quite docile, but their children or the second generation may become militant and may become the raw material for revolution (Khan 1985b and 1990b).

However, the conventional cost of civic facilities is quite high, specially of underground sewerage. Official or commercial agencies can release this high cost from affluent consumers, but cannot do so from low-income squatters. The improvement of Katchi Abadis in terms of providing water supply and sewerage involved large sums of money. The government agencies who are responsible for this task, firstly the Karachi Development Authority and since July 1981, KMC have faced difficulties with regards to funding these improvement projects. The hope of optimistic planners to upgrade Katchi Abadis with foreign loans ignores the fact that the beneficiaries cannot repay the cost (Khan 1985a and 1990b).

The difficulty has not been so much in finding a lender as much as in finding the ways and means of recovering the loan money for repayment. The government would have to either repay the loan from its own resources or recover it through the beneficiaries (local residents of Katchi Abadis). When large sums are involved none of this seems to have been easily possible. Experience from Baldia Improvement Project Karachi shows that recoveries from loan charges lag behind expenditure. In the first three years, KMC recovered only 33% of the amount from the residents who are reluctant to pay loan charges as long as they do not see improvement works actually carried out (Anzorena 1986).

ANNEXURE A.3

A DEFINITION OF URBAN SOLID WASTES IN DEVELOPING COUNTRIES

Categories of Urban Solid Waste

A waste is a material which is thrown away or aside as worthless. The definition of "solid" waste encompasses all those wastes which are neither wastewater discharges nor atmospheric emissions. A so-called solid waste may therefore be a semi-solid, solid or even a liquid.

The entire concept of waste is subject to the value judgment of the primary owner or potential consumer. A waste is viewed as a discarded material which has no consumer value to the person abandoning it.

For purposes of this document, urban solid waste (also commonly referred to as municipal refuse) is defined as: material for which the primary generator or user abandoning the material within the urban area requires no compensation upon abandonment. (1) In addition, it qualifies as an urban solid waste if it is generally perceived by society as being within the responsibilities of the municipality to collect and dispose of.

Categories of materials discarded in urban areas and generally viewed as a municipal responsibility include: household garbage and rubbish, residential ashes, commercial refuse, institutional refuse, construction and demolition debris, street cleaning and maintenance refuse, dead animals, catch-basin and drain cleaning wastes, bulky wastes, abandoned vehicles, and sanitation residues. Solid wastes from mining and agriculture are typically generated outside an urban area, and do not fall within the generally perceived responsibilities of a municipality. Industrial solid wastes require the attention of a municipality, and fall within municipal responsibility to manage in a manner that protects the public's health and safety. However, industrial wastes may be collected and hauled by the private sector. The following paragraphs briefly discuss major urban waste categories, and their particular significance within the overall context of municipal refuse in developing countries.

Household garbage and rubbish. Also referred to as residential refuse or domestic waste, this category comprises wastes that are the consequence of household activities. These include: food preparation, sweeping, cleaning, fuel burning and gardening wastes. They also include: old clothing, old furnishings, retired appliances, packaging and reading matter. Where diapers or bucket latrines are used, household wastes include faecal material. In developing countries, this category consists largely of kitchen wastes; while in developed countries, there is a large portion of paper and an appreciable quantity of glass, metal and plastics. The garden waste and bulky waste component of residential refuse often cannot be accommodated by the optimal system for regular storage and collection of residential refuse and may require a special system. (Cointreau 1982)

A.4 ORANGI PILOT PROJECT

Orangi Pilot Project was sponsored as an NGO by the BCCI (Bank of Credit and Commerce International) Foundation in April 1980. Since 1984 OPP is also receiving help from other donors from time to time and on different projects like Population Division (through NGO Council) Women's Division, Govt. of Pakistan, Federal Bank of Cooperatives, Canadian Embassy SPO, Aga Khan Foundation, NDFC (National Development Finance Corporation), CEBEMO of Holland, Swiss Development Corporation, Rockefeller Foundation and Norwegian Embassy (NORAD).

Dr. Akhtar Hameed Khan was appointed as Director of the Orangi Pilot Project on 2nd April 1980. At first he explored the possibilities of finding a solution to the sewerage problems, he first thought that the Government could be persuaded to pay more attention to the needs of the councillors, mobilizing the existing local organizations (in particular the All Orangi United Federation), and meeting with the high officials of KMC, KDA, & local government in order to draw their attention to the plight of the people of Orangi. Dr. Khan discovered that the problem of sewerage system is not the lack of effective lobbying but of constraints of a very different nature. The alternative strategy had been to overcome the problems that it had to be developed from below in which local residents would be organized and their resources should be mobilized. By this method, the creation of effective local organization and utilization of technical skill among local people was to be the key to the improvement of Orangi. And above all the success of the methodology was to depend on a sound low cost technology, technical competence and professional approach (Anzorena 1986).

From 1980 to 1985 most energies of OPP were spent on holding lane meeting, organizing and motivating people to lay their own sewerage system. In 1983, a conflict on the approach arose between OPP staff and UN advisors. The advisors criticized among other things the OPP's work programme and choice of technology. This resulted in a division of Orangi into two separate parts by Bank of Credit and Commerce International, which not only financed OPP but at the same time also had an agreement with the UNCHS. The OPP area consisted of about 4000 acres, 3181 lanes and about 43,000 housing units. In a short time UN-experts were not able to manage and develop sewerage system in sufficient lanes. They were also unsuccessful to get the invested money back from the people. OPP was then allowed to work in the whole of Orangi area (Hasan 1986).

OPP consider itself a research institution, with the prime objective being to analyze the outstanding problems of Orangi through prolonged action, research and extension education and discovering some workable solutions. OPP itself does not set up welfare clinics or schools or industrial homes etc. instead OPP promotes community participation and self management. Through research and education it tries to change the attitudes of the people so that the practise of cooperative action can grow among the Orangi residents. OPP has a dedicated team of paid full time

social organizers and technicians. Since 1980 the following action research programme have been organized to develop models of community participation and self management.

1. Low cost sanitation programme started in 1981.
2. Women's work centres programme started in 1984.
3. Housing programme starting in 1986.
4. Education programme started in 1986.
5. Economic programme for family enterprise started in 1987.

During this period OPP programmes have become successful models and since 1988 OPP has been upgraded into the four following autonomous institutions having their own governing bodies like OPP Society, OPP- RTI, KHASDA, Orangi Charitable Trust and the Work Centres. Below is a brief description of their work.

a) OPP Society: It's foundation as a funding agency was registered in July 1989.

b) OPP-RTI: In 1988, the Planning Commission, Government of Pakistan evaluated the sanitation model and recommended that OPP be converted into a Research and Training Institute with Orangi Serving as a demonstration (Rahman et al 1984). OPP-RTI was registered in April 1988 with the main aim to undertake the programmes in Orangi, undertake research as well as training and networking for an understanding of the development issues and alternatives. It is managing the following programmes:-

A.4.1 Low Cost Sanitation Programme: The sanitation and sewerage problems in the urban slums in general and Orangi Town in particular presents a dilemma that with the absence of sanitation facilities and sewerage system both the health and property of the residents are endangered. On the other hand the cost of the conventional system was not affordable by them. Before 1980 the bucket latrines or soak pits were being used for the disposal of human excreta and open channels for disposal of waste water. Due to this medieval sanitation system, typhoid, malaria, diarrhoea, dysentery and scabies were rampant. The children who played in the filthy lanes were the main victims. Besides substantial portions of the family incomes were spent on medicines. The standing stagnant waste water was damaging the houses and reducing the value of the property.

OPP found the house owners willing and competent to assume the responsibility of constructing and maintaining all sanitary arrangements inside the house (the sanitary latrines), in the lane (underground sewerage lines with manholes and house connections) and secondary or collector drains. These facilities constitute 80 to 90% cost of the system. The main drains and treatment plant were planned to remain like roads and water lines, i.e. the responsibility of a central authority. In order to eliminate the problem of mistrust, Dr. Khan started with the lane as the unit of organization. On an average there were between 20-30 houses in each lane. The head of the household get together, discussed the problem and the needs to rectify it. When they all agreed and were willing to contribute their share of cost they then made a formal application to OPP. OPP in return used to send its technical team

for surveys, design and cost estimates. The residents meanwhile collected the money and gave it to the elected managers (from area units). The managers bought the material and organized the work keeping all the account of expenses. By making lane as the unit of organization it makes possible to organize people into an effective structure of collective action (Anzorena 1986). Through R&E approach it become possible to drastically reduce the cost of construction and to persuade the residents to accept the full responsibility. Research consisted in simplifying the design, fabricating the standardized steel shutterings, surveying and mapping, preparing models, slides and audio visual aids, preparing instruction sheets, posters etc. While the extension consisted in funding the activists in the lanes, training lane managers and masons, providing accurate plans and cost estimates, lending tools and shutterings, social and technical guidance and supervision.

OPP spent a lot of time in research for finding a solution to lower the cost of facilities and making it affordable to the residents. The results showed that it can be only achieved by simplifying the designs, methods of construction, eliminating the contractor/builder, middleman and by providing free technical guidance to the lane managers and activists.

Before OPP, many associations, societies, clubs or "anjumans" etc. existed mostly for lobbying and canvassing with the officials and not for construction work. Thus a new kind of organization was created in which the lane was made as the unit of construction. OPP technicians surveyed the lanes, ascertained the levels, prepared maps, plans and estimates. OPP's social organizers explained to the residents that for the sake of their health and well being they could themselves construct the sanitary latrines and sewers. OPP cooperative unit was formed in which an activist was selected in the lane who become the lane manager and hold meetings with the lane residents. OPP provided a technical guidance, tools and shutterings. OPP Created consensus, settled disputes, collected individual contributions and supervised the work. Thus OPP sanitation programme is a model of self managed, self financed and self maintained system. From 1982 till 1989 OPP's sanitation programme was restricted to only half of Orangi as another NGO was allotted the rest of the area. Since 1989 the remaining area also came under OPP.

The R&E approach has drastically reduced the cost and widely mobilized the local managerial and financial resources. OPP's investment in R&E from July 1981 to March 1990 has been Rs. 2.8 million as compared to peoples investment of Rs. 48.12 million with a ratio of 1:17. If conventional contractor's rate of six times the peoples investment rate is taken then the ratio becomes 1:100. The sewerage lines and the sanitary latrines built with their own money and under their own management are being maintained by the house-owners at their own cost. There has been no need for revolving fund and no expensive botheration about recoveries and defaults. Health survey has also shown that 50% diseases have been controlled (Khan 1989).

With sewerage lines laid in the lanes, an informal association has

developed among the lane residents. People's attitudes have changed. Confidence has been developed that problems can be solved by themselves. Thus roads have been laid in the lanes by the municipality and garbage disposal has improved by 25%.

At present the progress of survey work in Sector-5 is as follows:

-	Total lanes	:	75
-	Total houses	:	882
-	Lanes without sewerage	:	7
-	Lanes with sewerage	:	50
-	- OPP Supervised	:	33
-	- Self Supervised	:	16
-	- KMC Supervised	:	1
-	Lanes with sewer, rectified by OPP	:	2

LANE SEWERAGE

S.No.	Supervision	Length Rft.	House	Cost in (Rs.)
1.	OPP	8250	576	124,125
2.	Self	4000	248	60,000
3.	KMC	250	14	22,500
4.	People investment (OPP Rectified)	500	30	7,500
<u>Secondary Drain</u>				
1.	Self	75	--	1,500
2.	KMC	1500	--	135,000

A.4.2 Low Cost Housing Programme: There are more than 90,000 houses in Orangi built by the people themselves and more houses are being built all the time. OPP's research showed that the process of construction is incremental. Common mode is the concrete block masonry with tin or asbestos sheet roofing. Local thallas (building components manufacturing yards) provide material and building material on credit as well as advise for construction also. Masons who are skilled labourers advise the house owners on construction and design.

A survey conducted in 1983 by the students of Architecture. Dawood College of Engg. & Tech. Karachi showed that 40% houses in Orangi are damaged by severe cracks and increasing number of foundations have been weathered by sulphate attack. The low quality of construction and improper design has resulted in substandard structures and poorly or non-ventilated houses (Rahman et al 1990). The programme was started in 1986 with the aim of improving the condition of housing and keeping the people to construct themselves. The R&E approach has been applied to improve the quality of housing materials and various components, utilizing

alternative and appropriate alternatives, maximizing ventilation. The research included:-

- Upgrading local thallas through R&D.
- Evolving standard construction design and techniques.
- Preparing standardized steel shutterings.
- Writing manuals, instruction sheets, posters and preparing audio visual aids.
- Constructing demonstration models.

Extension Consisted in:-

- Finding local thalla owners willing to participate in R&D.
- Training masons on use of improved tools, construction and design techniques.
- Lending tools and shutterings.
- Technical guidance and supervision to residents.

Besides the following steps were taken:-

Quality of concrete blocks are improved due to use of sulphate resistant cement, use of proper ratio and appropriate mode of production, mechanization of production of blocks, introduction of better quality bajri (natural mix of sand and aggregate), production of blocks in standardized sizes (16"x 8"x 12" & 4"x 8"x 12"), increasing the ratio for 1:25 (cement:bajri) to 1:12 & 1:14, curing from none to a minimum of 4 days. This yielded the availability of concrete blocks 4 times stronger at no increase cost.

With OPP assistance and technical advice 4 mechanized thallas operated which recorded selling of 3.8 million blocks by June 1990. 70% of which are sold outside Orangi, making Orangi the biggest supplier of cheap and good quality mechanized blocks (Rahman et al 1990). There are now a total of 27 mechanized thallas in Orangi out of which 6 have been given loans by OPP, others have copied the OPP pioneered thallas. After improvement in blocks, attention was focused on introduction of precast concrete baton/ tile roofing in 1989. Till January 1990, 14 housing units have been supervised. Precast slabs for staircases have also been introduced requiring less space and cost of which was half as compared to RCC staircases. Time required for construction is also reduced from a minimum of 15 to 3 days.

Thus the full package of advice on load bearing technology is provided consisting of in situ foundations, load bearing walls, baton/till roofing and precast staircases. This construction cost 1/3rd of the cost of RCC. Training is also imparted to masons through meetings, leaflets, manuals and on site supervision. Till June 1990, 96 masons have been trained (Rahman et al 1990).

A.4.3 Social Forestry Programme: The programme started in September 1989 with the technical support of International Union for Conservation of Nature (IUCN). Through this programme:

- A survey of forest and fruit trees has been set up.
- Individuals as well as institutions are being persuaded to plant trees.
- Programme is being extended to the adjoining villages. Setting up of nursery and development of a package of advice has been the

first step. With the help of a team of social organizers and technicians a survey was conducted to determine the species of trees required and those available in Orangi. 14 species of forest plants, 5 of fruit plants and 13 of decoration plants have been grown.

Through action research at the OPP nursery a package of advice has been developed by the OPP forester with forest and fruit trees available at the OPP survey. Extension work has been undertaken to motivate residents for plantation of trees in houses, schools, public places like mosques, madrasas and parks. Leaflets and audio visuals have been prepared. Besides Orangi, the programme is also extended to four villages of Sohrab Goth, Dildar Goth, Ramzan Goth and Haji Goth (Rahman et al 1990).

A.4.4 Women's Division Training Programme: The programme started in June 1987 with the collaboration of Women's Division, Govt. of Pakistan. The aim of the programme is to train the personnel of Women's Division projects operated by official agencies or NGO's in Karachi, visits of such projects, duplicating the OPP's work center model in other areas and organizing the women in Orangi to form cooperatives. Till June 1990, 42 training groups consisting of 487 participants were trained. 60 women division sponsored centers have been visited, 22 NGO's have been contacted and women have been organized to form consumer stores. Stores are functioning till now from where the women get their daily consumption items at 15% less price than the market. In June 1990 the programme was confined to Orangi only allowing expanding of women programmes for the uplifting by Orangi women entrepreneurs and extending supervised credit to them. Agreement has also been made with the First Women Bank for credit facilities. In 1990, 7 women entrepreneurs have been given loan to promote production and employment (Rahman et al 1990).

A.4.5 Research, Evaluation, Publication and Audio-Visual Section:

These three sections collect and record the data, conduct surveys, prepare and publish reports and monographs, prepare case studies of programmes and profiles of activists, make video and slides and publish bulletins. Till June 1990, 42 reports, 47 monographs, 268 case studies, 363 profiles, 12 bulletin, 40 video cassettes, 43 slide sets, 212 album and 6 manuals have been prepared (Rahman et al 1990). Regular quarterly progress reports are also published in English and Urdu containing financial statements and cumulative tables of work.

A manual on the principles and practice of peoples participation development as demonstrated in Orangi during last ten year has been prepared. Besides undertaking programmes in Orangi, OPP-RTI's role is to duplicate the OPP models outside Orangi by organizing research, training and extension. The model of low cost sanitation demonstrated in Orangi is now being replicated by other NGO's, foreign donor agencies like UNICEF and World Bank and provincial agencies like Karachi Metropolitan Corporation (KMC) & Sindh Katchi Abadis Authority (SKAA). In 1990 UNICEF formally appointed OPP-RTI

as a Consultant for its urban services in other cities.

A.4.6 KHASDA: Karachi Health and Social Development Association (KHASDA) was registered in 1989. It undertakes the women's health education and family planning programme in Orangi.

In June 1984, OPP started a pilot project (Khan 1989) for imparting basic health education to the Orangi housewives on women health and birth control. Research showed that in Orangi the incidence of disease was incredibly high due to lack of sanitation, open drains, exposed excreta, garbage dumps etc. spreading harmful germs, mosquitoes and flies reaching food and water. Another reason was ignorance of the housewives of the modern principles of hygienic, causes and prevention of diseases. Thus the low income families of Orangi were paying a high price for the lack of sanitation and the blight of ignorance; typhoid, malaria, dysentery, diarrhoea, scabies were very common. Measles, T.B and polio were frequent with very high infant and mother mortality. A sample survey conducted showed that a substantial portion of the family income was spent on doctors, clinics, and quacks. Clinics and quacks were doing their best to cure the diseases but not up to the required level due to the obvious short comings in knowledge and experience. With the start of OPP activities, people became gradually aware of the connection between filth and disease (Khan 1990b).

The target women of Orangi are fortified by traditionalism and segregation for which mobile training teams, women activist and women sales agent for the supply of family planning aids have been introduced. Besides regular scheduled meetings at activists home and formation of neighbourhood group have been initiated to obtain real access to the target women. Thus creating a bond of trust, building a convenient delivery system, spreading the knowledge and practice of disease prevention and family planning (Rahman et al 1990).

The package of advice and services include training about causes and prevention of common diseases prevailing in Orangi, immunization services, family planning training, delivery of family planning supplies and services, kitchen garden advice on nutrition and children.

From June 1984 till December 1989, 80 women activist centres are working, 5422 meetings have been held, 3000 families have participated, 36 women sale agents have been working for family planning programme.

Since January 1985 the service was confined to 3000 families to test the approach and ascertain the response of target women. The results depict that 90% children are immunized, 44% families practice birth control, epidemic diseases have been controlled, nutrition and hygiene has also been improved. In 1990, 30/40 activists have been selected to get the training.

A.4.7 Orangi Charitable Trust: The Economic programme for promotion of family enterprise units was started in September 1987 for the uplift of these family enterprises offering the quickest and

cheapest scope for expansion as it employ the largest number of workers in Orangi. Previous experience of small loans programme have not been very encouraging as the workers have no tradition of loyalty to the credit institution or cooperative action (OPP 1986b).

A.4.8 Women Work Centres: Women's role in the upgrading has also been significant. They have realized that in spite of social bindings they can participate in development. Women in Orangi have shown this in sanitation by undertaking motivation, money collection and maintenance. With this confidence they have increasingly taking up economic activities (Rahman et al 1990).

In 1984, OPP getting familiar with the social and psychological features of Orangi decided to start model building research with economic field, by protecting the interest and upgrading the skills of women and child labour who were engaged in some kind of 'gainful employment'. The largest categories were stitchers earning little money through their sewing machine usually through contractor.

A central supporting institution was set up like the contractor for procurement of orders from expositors. Provision of machines and fixtures, training and supervision, coordination between centres etc. serving the interest of the stitchers.

Till to date there are 13 well established independent work centres with more than 800 women each having five sub centres set up in various localities of Orangi. The work centre is operated and managed by a family and is located in their houses. These centres have now produced a cadre of managers, supervisors as well as competent and disciplined workers.

As the work centres are now dealing directly with the exporters, OPP has disbanded their support since 1st. June 1989. These work centres also provided a venue for frequent meeting of stitchers for health education and family planning programme (Khan 1990a). OPP is indeed in the fortunate position of having strong women section with very talented staff who have organized probably the largest programme in Pakistan of women entrepreneurs. More than 157 units are supervised being managed by the women entrepreneurs. Besides from BCCI self help revolving fund loans have also been given to 61 units managed by women outside Orangi. Till now 39 women consumer stores are working for which loan has been given by OPP as financed by NORAD.

A.4.9 Education Project: There are more than 509 primary and secondary schools in Orangi maintained by private enterprises without any aid from the Government. An education pilot project was started in 1986 with the assistance of Aga Khan Foundation. The objectives of the project were to upgrade the academic standards and physical condition of schools in Orangi.

Physical improvement was to be made with loans from OPP. Advice from OPP-RTI while academic improvement was to be made through teacher training, use of libraries, audio-visual methods and publication of manual and guides. Till 1990, 13 schools have joined

and managed the project (OPP 1986b).

An independent study conducted on OPP activities by IUCN showed that 74% of the sample HH were of the opinion that OPP's contribution was positive and helpful in sanitation, 88% responded in positive contribution in nutrition, 64% in food products, 12% in education, 56% in tree planting, 79% in supplying seeds products, 92% in health and family planning; 86% in educating people about environment. Besides 63% of respondents physically contributed to OPP programme (Sultan et al 1989).

ANNEXURE A.5

POSTER 1: BURN THE GARBAGE AND THROW IT IN THE DUSTBIN

Before burning your household garbage please ensure that the following items like glass, bones tin, iron, plastic, aluminium etc. are separated. These items can be sold at a good price so why not you earn some money from selling these items.

Caution After separation of items please keep it in a box at a height at which children cannot reach.

Two Methods of Burning Garbage

1. If the courtyard of your house is not paved then excavate a small hole of app. 1.5 ft. diameter and 1.5 ft. deep and burn the daily generated garbage in it.

2. If the courtyard of your house is paved then make three holes by nails at the bottom of the canister. These holes will enable the air to pass through the garbage and will burn the garbage of the house.

When the garbage is fully burnt the ashes and the residue should be thrown into the street dustbin.

Instruction

1. The canister in which garbage is burnt should be covered.
2. Till the time the garbage is completely burnt the elders should be present at the location.
3. Keep the children away from the canister till the time the garbage is completely burnt.

Note: The household member who intends to throw the ashes and the residue to the dustbin should carefully note that it should not be spilled over on other places.

POSTER NO.2 GARBAGE - A HEALTH PROBLEM

Solid waste is an important aspect of human health. The waste is generated not only from waste water but also includes solid waste. You throw the garbage generated in your houses in the lanes or to the nearest open ground or storm water drain, yet you think that the waste is away from your sight. If you carefully see the accumulated heaps of garbage you will notice the dangerous germs and bacteria like

Garbage heaps contain flies, mosquitoes and dangerous insects. Besides the heap also generates offensive odours and smell. This air when you will inhale into your lungs can cause several dangerous diseases. So the important aspect is that you should never throw your garbage out of the house instead....

Getting rid from garbage can best be done either by making a ditch in your open courtyard and burying it. Otherwise burn it in a canister. If the garbage will be accumulated and not disposed then it will generate offensive odors which will be dangerous for health. The burnt garbage when disposed off in the dustbin, then due to the less material deposited the dustbin will occupy less space and will be disposed off by the KMC refuse vans easily. For this matter you should better coordinate with your area councillor.

We are confident that your elected area councillor will fully cooperate with you in improving the health of the community.

INFORMATION & PUBLICATION SECTION

ORANGI PILOT PROJECT

ANNEXURE A.7.1 SURVEY TABLES: GHOUSIA COLONY

TABLE 1: STATUS OF INTERVIEWEE

S.No.	Interviewee	Percentage
1.	Head of Household	92
2.	Wife of Head of HH	6
3.	Son	2

TABLE 1A: ORIGIN OF THE HEAD OF HH

S.No.	Origin	Percentage	
		(Van der Linden 1985)	(Richardz 1988)
1.	Karachi	5	6
2.	India	54	48
3.	NWFP	21	19
4.	Punjab (Muslim)	11	19
5.	Punjab (Christian)	8	6
6.	Others	2	2

(N = 111) (N = 107)

TABLE 2: LENGTH OF RESIDENCE

S. No.	Length of Stay in Years	Period	Percentage			This Study
			(Ahmed 90)	(Linden 85)	(Richardz 88)	
1.	Upto 5	1985-90	4	-	-	5
2.	6 - 10	1980-85	4	5	7	7
3.	11 - 15	1975-80	9	12	7	13
4.	16 - 20	1970-75	8	11	10	30
5.	21 - 25	1965-70	9	25	21	18
6.	26 - 30	1960-65	19	24	19	20
7.	31 - 35	1955-60	22	15	10	5
8.	36 - 40	1950-55	7	8	27	5
9.	Morethan 40	before 1950	18	-	-	2

(N=120) (N=111) (N=107) (N=141)

TABLE 3: HH SIZE AND COMPOSITION

S.No.	No. of Household Members	Percentage	
		(Ahmed 1990)	This Study
1.	1 - 2	2	-
2.	3 - 4	7	10
3.	5 - 6	15	22
4.	7 - 8	18	27
5.	9 - 10	28	23
6.	11 - 12	17	5
7.	13 - 14	7	5
8.	15 & above	6	8

TABLE 4: OCCUPATIONAL PROFILE

S.No.	Occupation	Percentage	
		(Ahmed 1990)	This Study
1.	Labourer	13	23
2.	Public & Private Service	34	30
3.	Self Employed	39	43
4.	Retired	11	2
5.	Unemployed	3	2
		(N=120)	(N=141)

TABLE 4A: PLACE OF WORK

S.No.	Place of Work	Percentage	
		(Van der Linden 1985)	(Richardz 1985)
1.	Not Applicable	7	4
2.	Ghousia Colony	8	13
3.	Nearby Colony	17	16
4.	Sabzi Mandi	7	12
5.	PECHS	11	4
6.	City Centre	11	5
7.	SITE, Sher Shah	3	3
8.	Nazimabad	3	-
9.	Others	23	26
10.	No Fixed Place	11	8
		(N = 111)	(N = 107)

TABLE 6: OCCUPANCY STATUS

S.No.	Status	Percentage		
		(Van der Linden 1985)	(Richardz 1988)	This Study
1.	Owned	92	89	93
2.	Rented	4	10	5
3.	Free	4	1	2

TABLE 6A: RELATION BETWEEN INCOME AND TYPE OF HOUSES

S.No.	Income Categories	House Type			
		IV	V	VI	TOTAL
1.	0 - Rs. 750	13	8	-	9
2.	Rs. 760 - Rs. 1500	36	34	6	30
3.	Rs. 1510 - Rs. 2250	20	18	33	22
4.	Rs. 2260 - Rs. 3000	18	16	22	18
5.	Rs. 3010 - Rs. 4000	2	10	17	8
6.	Rs. 4010 - Rs. 5000	4	10	17	9
7.	Rs. 5010 >	7	3	6	5
		45	38	18	101

TABLE 7: PLOT SIZES:

S.No.	Area of Plots in Sq.Yds	Percentage	
		(Ahmed 1990)	This Study
1.	Upto 20	10	3
2.	21 - 40	41	57
3.	41 - 60	31	28
4.	61 - 80	10	7
5.	81 - 100	2	2
6.	101-120	3	-
7.	More than 120	3	3

TABLE 8: NUMBER OF STOREYS

S.No.	No. of Storeys	Percentage	
		(Ahmed 1990)	This Study
1.	One	76	78
2.	Two	26	22

TABLE 9: NUMBER OF ROOMS

S.No.	No. of Rooms	Percentage		
		(Linden 85)	(Richardz 85)	This Study
1.	One	53	42	31
2.	Two	41	35	40
3.	Three	5	17	15
4.	Four	2	4	10
5.	Five	-	-	-
6.	Six	-	2	2
7.	Seven	-	1	2
		(N=111)	(N=107)	(N=141)

TABLE 10: PRESENCE OF COURTYARD

S.No.	PRESENCE	PERCENTAGE
1.	Yes	80
2.	No	20

TABLE 11 : PRESENCE OF GARBAGE CONTAINER

S.No.	Type of Garbage Container	Percentage
1.	Plastic	8
2.	Canister	23
3.	Tokri	7
4.	Balti (Old Bucket)	10
5.	Wooden Crate	52
		(N=141)

TABLE 12. TYPE OF GARBAGE CONTAINER USED.

S.No.	Type of Garbage Container	Percentage
1.	Plastic	8
2.	Canister	23
3.	Tokri	7
4.	Balti/Old Bucket	10
5.	Wooden Crate	52

TABLE 13. PERSONS DISPOSING THE GARBAGE OUT OF THE HOUSE.

S.No.	Persons	Percentage
1.	Children	78
2.	Wife	10
3.	Head of Household	3
4.	Sweeper (Jamadar)	9

TABLE 14. FREQUENCY THAT THE GARBAGE IS FILLED

S.No.	Frequency of Removal of Garbage	Percentage
1.	Once a day	95
2.	Twice in a day	3
3.	Once in two days	2

TABLE 15 :CLEANING OF GARBAGE CONTAINER

S.No.	Frequency	Percentage
1.	Daily	82
2.	Weekly	10
3.	Two Weeks	3
4.	Month	2
5.	No Reply	3

TABLE 16 :REPLACING THE GARBAGE CONTAINER

S.No.	Frequency	Percentage
1.	One Week	23
2.	Two Weeks	15
3.	One Month	27
4.	Two Months	15
5.	Three Months	8
6.	Six Months	3
7.	When Required	10

TABLE 17:PLACE OF GARBAGE DISPOSAL

S.No.	Place of Disposal	Percentage
1.	Taken by Sweeper	65
2.	Open Space	23
3.	Road Side/Lane	12
4.	Manhole	-

TABLE 18. NEARNESS TO THE FORMAL DUSTBIN

S.No.	Nearness to Dustbin	Percentage
1.	Far	95
2.	Near	2
3.	Do not know	3

TABLE 19. PRESENCE OF PESTS

S.No.	Pests	Percentage
1.	Flies	77
2.	Mosquitoes	83
3.	Cockroaches	73
4.	Rats	58

TABLE 20. ITEMS RETAINED AND SOLD

S.No.	Items	Percentage
1.	Newspapers	7
2.	Magazines	43
3.	Books and Copies	15
4.	Glass Bottles	76
5.	Tin Cans/Canister	58
6.	Plastic	38
7.	Iron/Steel Scrapings	16
8.	Bones	32
9.	Old Bread/Roti	40

TABLE 21. FREQUENCY OF SELLING THE MATERIALS

S.No.	Frequency	Percentage
1.	One week	28
2.	Two weeks	11
3.	One month	54
4.	Two months	5
5.	Three months	2

A.7.2 SURVEY TABLES: ORANGI TOWN SECTOR-5

TABLE 1: STATUS OF INTERVIEWEE

S.No.	Interviewee	Percentage
1.	Head of Household	86
2.	Wife of Head of HH	4
3.	Son	10

TABLE 2: LENGTH OF RESIDENCE

S.No.	Length of Stay in years	Period	Percentage
1.	Upto 5	1985-90	30
2.	6 - 10	1980-85	26
3.	11 - 15	1975-80	12
4.	16 - 20	1970-75	23
5.	21 - 25	1965-70	8
6.	26 - 30	1960-65	1

TABLE 3: HOUSEHOLD SIZE

S.No.	No. of Household Member	Percentage	
		(66)	This Study
1.	1 - 2	12	3
2.	3 - 4		16
3.	5 - 6	23	16
4.	7 - 8	32	22
5.	9 - 10	16	12
6.	11 - 12	17	17
7.	13 - 14		7
8.	15 & above		7

TABLE 4: OCCUPATIONAL STATUS

S.No.	Occupation	Percentage
1.	Labourers	9
2.	Public & Private Service	63
3.	Self Employed	21
4.	Retired	4
5.	Unemployed	3

TABLE 4.b EDUCATIONAL STATUS

S.No.	Education Status	Male	Female
1.	Illiterate	41	46
2.	Read & Write (House Taught)	6	4
3.	Primary School	38	36
4.	High School	14	14
5.	College/University	1	1

TABLE 4.c MONTHLY INCOME

S.No.	Monthly Income In Rupees	Percentage	
		(AERC 1988)	(NESPAK 1991)
1.	Less than 1000	15	12
2.	1000 - 1999	41	46
3.	2000 - 2999	19	23
4.	3000 - 3999	16	12
5.	More than 4000	9	6

TABLE 5. INCOME AND EXPENDITURE OF A FAMILY IN KATCHI ABADI
(AERC 1988)

S.No.	Income	Amount in Rupees	Percentage
1.	Wages and Salaries	1676	77.7
2.	Business Profits	363	16.8
3.	Remittances	78	3.6
4.	Pensions	7	0.3
5.	Rent	6	0.3
6.	Other Income	28	1.3

S.No.	Expenditure	Amount in Rupees	Percentage
1.	Food	1230	58.3
2.	Clothing	166	7.9
3.	Rent	276	13.1
4.	Transport	132	6.3
5.	Remittances	22	1.0
6.	Recreation	31	1.5
7.	Others	252	11.9
		2109	100

TABLE 6. OCCUPANCY STATUS

S.No.	Status	Percentage	
		(NESPAK 1991)	This Study
1.	Owned	93	81
2.	Rented	6	17
3.	Free	2	2

TABLE 7. PLOT SIZES

S.No.	Area of Plot in Sq. yds	Percentage
1.	Upto 20	-
2.	21-40	3
3.	41-60	1
4.	61-80	10
5.	81-100	8
6.	101-120	72
7.	More than 120	6

TABLE 7a. HOUSING TYPOLOGY

S.No.	Housing Typology	Percentage	
		All Katchi Abadis (AERC 1988)	Orangi (NESPAK 1991)
1.	Pucca	19	14
2.	Semi Pucca	78	85
3.	Katcha	3	1

TABLE 8. NUMBER OF STORYES

S.No.	No. Storyes	Percentage
1.	One	90
2.	Two	

TABLE 9. NUMBER OF ROOMS

S.No.	No. of Rooms	Percentage	
		(AERC 1988)	This Study
1.	One	19	3
2.	Two	40	31
3.	Three	25	41
4.	Four	16	21
5.	Five		2
6.	Six		2

TABLE 10: PRESENCE OF COURTYARD

S.No.	Presence	Percentage
1.	Yes	96
2.	No	4

TABLE 11: PRESENCE OF GARBAGE CONTAINER

S.No.	Presence	Percentage
1.	Yes	96
2.	No	4

TABLE 12. TYPE OF GARBAGE CONTAINER USED

S.No.	Type of Garbage Container	Percentage	
		(Sinatamby 1984)	This Study
1.	Plastic	1	4
2.	Canister	63	73
3.	Tokri	--	8
4.	Balti/Old Bucket	5	1
5.	Wooden Crate	--	13
6.	In a pile on floor	29	--
7.	Others	2	--

TABLE 13. PERSONS DISPOSING THE GARBAGE OUT OF THE HOUSE

S.No.	Persons	Percentage
1.	Children	63
2.	Wife	1
3.	Children/Wife	13
4.	Head of Household	1
5.	Sweeper (Jamadar)	22

TABLE 14. FREQUENCY THAT THE GARBAGE IS FILLED

S.No.	Frequency of Removal of Garbage	Percentage	
		(NESPAK 1985a)	This study
1.	Once a day	45	88
2.	Twice in a day	--	9
3.	Once in two days	15	3
4.	Once in three days	11	--
5.	Once in four days	17	--
6.	Once a week	10	--
7.	Other	2	--

TABLE 15. CLEANING OF GARBAGE CONTAINER

S.No.	Frequency	Percentage
1.	Daily	72
2.	Two Days	8
3.	Weekly	3
4.	Don't do	17

TABLE 16. REPLACING THE GARBAGE CONTAINER

S.No.	Frequency	Percentage
1.	As required	17
2.	One month	14
3.	Two months	24
4.	Three months	12
5.	Four months	12
6.	Five months	6
7.	Six months	15

TABLE 17. PLACE OF GARBAGE DISPOSAL

S.No.	Place	Percentage	
(NESPAC 1985a) This Study			
1.	Taken by Sweeper	--	23
2.	Road Side	16	41
3.	Open Space/Road	44	32
4.	Dustbin	2	4
5.	In the Nullah	11	-
6.	Others	27	-

TABLE 18. NEARNESS TO THE FORMAL DUSTBIN

S.No.	Nearness to Dustbin	Percentage
1.	Far	76
2.	Near	11
3.	Do not know	8
4.	Not present	5

TABLE 19. PRESENCE OF PESTS

S.No.	Pests	Percentage
1.	Flies	79
2.	Mosquitoes	99
3.	Cockroaches	95
4.	Rats	22

TABLE 20. ITEMS RETAINED AND SOLD

S.No.	Items	Percentage
1.	Newspapers	10
2.	Magazines	57
3.	Books and Copies	21
4.	Glass Bottles	83
5.	Tin Cans/Canister	62
6.	Plastic	23
7.	Iron/Steel Scrapings	13
8.	Bones	29
9.	Old Bread/Roti	46

TABLE 21. FREQUENCY OF SELLING THE MATERIALS

S.No.	Frequency	Percentage
1.	One week	1
2.	One month	34
3.	Two months	55
4.	Three months	10

A.8 Housing Typologies:

The current housing typologies and their definitions of a dwelling unit as mentioned in chapter 9 are:

a) Pucca House

- i) Made of bricks or cement blocks with reinforced cement concrete roof (Siddiqui 1971).
- ii) Unit with all its walls and roof made entirely of cement concrete, stone or fire bricks (KDA 1972).
- iii) Unit with all its wall and roof made entirely of bricks, stone and concrete (Hashmi 1965).
- iv) House with roof of either RCC or RCC slabs (JRP-IV 1975).

b) Semi Pucca House

- i) Walls made of cement blocks, bricks or stone with roof of asbestos cement, galvanized iron sheets, wood or mud (Siddiqui 1971).
- ii) Unit made partly of pucca material and partly of mud (Siddiqui 1971 and Hashmi 1965).
- iii) House of which atleast one wall (of the room) has been made of cement blocks (JRP IV-1975).

c) Kucha House

- i) Construction with mud as its principal component (Siddiqui 1971).
- ii) Unit whose walls and roof is made of mud, thatch, bamboo etc. (KDA 1972).
- iii) House of which the walls (room) have been made either of mud or of stones (JRP-IV 1975).

d) Jhuggie

- i) Shanty made of reed, bamboo, matting, jutesacks, tin or wood (Siddiqui 1971).
- ii) Unit made of straw, bamboo, canvas, sacks or mats and some mud plaster (Hashmi 1965).
- iii) House of which the the wall have not been made of RCC, blocks, bricks, stones and any of the above mentioned materials (JRP-IV 1975).

In Orangi town the definition represents the following (AERC 1988).

- Pucca:** RCC roof and plastered cement block walls
Semi Pucca: Tin/asbestos/mud/thatch/chatai roof and plastered/
unplastered cement block walls
Katcha: Mud/thatch/chatai roof and walls

A.9 LIST OF EXISTING MUNICIPAL VEHICLES

SNO	VEHICLE TYPE	CAPACITY TONS/ TRIP	NO IN '86	NO IN '91
1	ARMROLL VEHICLE	3.0	1	16
2	COMPACTOR	5.0	12	22
3	REFUSE VAN	5.0	97	136
4	DUMPER	6.0	-	12
5	LOADER	1.5	-	2
6	BULLDOZER	NA	-	1

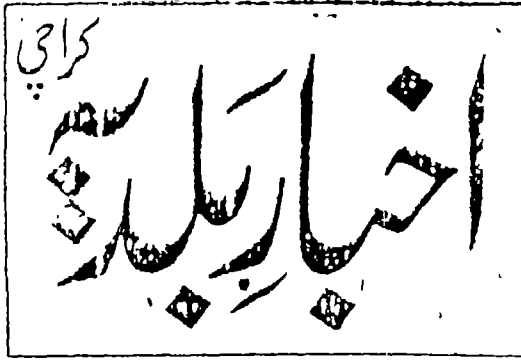
NUMBER OF EMPLOYEES RESPONSIBLE FOR SANITATION SERVICES IN KMC

SNO.	CATEGORIES	NUMBER
1	CHIEF SANITARY INSPECTOR	9
2	INSPECTOR	49
3	SUB INSPECTOR	100
4	MOTOR VEHICLE INSPECTOR	1
5	SUPERVISORS	1
6	MUNSHI	84
7	MUQADDAM	226
8	SWEEPER	8544
9	HALAL KHORES	284
10	COOLIES	1098
11	CART DRIVER	189
12	DRAIN CLEANER	100
13	DRIVER	283
14	CLEANER	42
15	MOTOR MECHANIC	2
16	CARPENTER	3
17	TIME KEEPER	4
18	QASID	17
19	HAMAL	19
20	CLERK	6
21	WATCHMAN	102

A.10

GARBAGE COMPOSITION OF KARACHI

S.NO	PHYSICAL COMPONENTS	PERCENTAGE KARACHI	PERCENT ORANGI
1	FOOD WASTES	12.5-30.4	21.87
2	GARDEN WASTES	8.2-37.4	8.65
3	ANIMAL MANURE	NIL	NIL
4	PAPER & CARDBOARD	12.9-22.5	14.67
5	TEXTILE	42.8-17.3	4.66
6	GLASS	0.5-10.6	10.61
7	PLASTIC & POLYTHENE	3.6-7.7	3.79
8	CERAMICS	0.1-2.2	1.63
9	METALS	0.8-5.2	3.03
10	EGG SHELLS	TILL 2.5	1.86
11	BONES	TILL 4.7	0.51
12	LEATHER	TILL 2.5	0.15
13	WOOD	TILL 2.2	0.70
14	STONES AND DUST	1.1-21.4	12.71
15	MISCELLANEOUS	4.9-18.2	15.16



ہضودی ضمیمہ { ۱۹۷۶ء }
 ۱۹۷۶ء

KARACHI METROPOLITAN CORPORATION

NOTIFICATION

Karachi, dated the .../.../1977.

PREAMBLE

In exercise of the powers conferred by Section-91 of the Sind Peoples Local Government Ordinance, 1972, read with item-15 of Schedule IX to the said Ordinance and having obtained the sanction of the Government of Sind, the Karachi Metropolitan Corporation is pleased to make following By-Laws :-

SHORT TITLE AND COMMENCEMENT

1. (i) These Bye-Laws may be called the Karachi Metropolitan Corporation (Prevention of Nuisance) Bye-Laws, 1976.
- (ii) They shall come into force at once.
2. (iii) In these Bye-Laws, unless the context otherwise requires, the following expressions shall have the meanings hereby respectively assigned to them, that is to say

DEFINITIONS

"Developer" means any person or company, association or body who or which constructs or causes to be constructed any building, block of flats, housing estate, shopping centre or a commercial or industrial complex.

"footway" includes foot ways and verandaway at the sides of the streets,

"garden refuse" means the refuse from garden and agricultural operations;

"health officer" means the Health Officer of the Corporation or any other person authorized by him to act on his behalf.

"house" includes a dwelling house, ware-house, office, shop, school, factory, workshop, building or enclosed place used or constructed or adopted to be

used ordinarily or occasionally as cinema hall, theatre, public hall, public concert room, public ball room, public lecture room, or public place of assembly for persons admitted thereto by tickets or otherwise or for other public purpose.

"latrine" means a place for defecating and urinating, including bucket latrine, bare hole latrine, water-seal latrine and pit latrine but does not include toilet or urinal.

"lavatory" means a place with toilets or urinal or with both and includes wash basins,

"ordinance" means the Sind Peoples Local Government Ordinance, 1972 (Sind Ordinance No 11 of 1972).

"premises" means any messuage, building, land and any place or structure, or any part thereof, used or intended to be used for human habitation or for employment or any other purposes, and includes easements and hereditaments of any tenure whether open or enclosed, built or not, or public or private.

"private street" means any street not being a public way.

"sanitary conveniences" includes latrines, lavatories, toilets, urinal, water-closets, their accessories, fittings, and wash basins;

"street" includes any road, fly-over, square, footway, back-lane or passage, whether a thoroughfare or not, over which the public has a right of way, the way over any public bridge, footway or passage, open court or open alley, used or intended to be used as a means of access to two or more holdings, whether the public has a right of way thereover or not, and includes all channels, drains, ditches and reserves at the side of any street shall be deemed to be part of the street,

"swimming pool" means a swimming pool in which the public has access whether or not admission is on payment or otherwise and includes any swimming pool managed, operated or run by a hotel, club, association or other organization,

"toilet" means a place for urinating and defecating which is water flushed and connected with a private or public sewage disposal system.

"trade refuse" means the refuse of any trade, manufacture or business or of any building operations;

"urinal" means a place for urinating which is water flushed connected with a private or public sewage disposal system.

"wash basin" means a facility for washing the hands and face which is water supplied whether or not connected with a private sewage disposal system or with the public sewage disposal system.

DUTY OF OWNER AND OCCUPIER TO KEEP CLEAN PRIVATE STREETS ETC, ABUTTING ON THEIR PREMISES.

3 (1) The occupier of any premises abutting upon any private street to which he has access or the right of access from such premises shall cause such portion of the street as fronts, adjoins or abuts on his premises including the footways, to be properly swept and cleaned so far as is reasonably practicable and the dust, dirt, ashes, rubbish and filth of every sort found thereon to be collected and removed, and such cleaning, sweeping and removal shall be undertaken at such time or times as may be required by the Health Officer by a notice in writing, provided that the Health Officer may enter into contract for any period with the occupier for sweeping and cleaning such street and for collecting and removing the dust, dirt, ashes, rubbish and filth therefrom.

(2) The occupier of any premises shall cause the immediate vicinity of such premises, including the footways and backyards abutting thereon, and the airwells, courtyards and quadrangles thereof to be kept clean and free of garbage, refuse, litter or other matter or any accumulation of water.

4 (1) The Health Officer, may, for temporary depositing of dust, dirt, ashes, and rubbish cause movable or fixed dust bins or other convenient receptacles to be provided and placed in proper and convenient places in public streets and private streets and in such other places as he may think fit and may cause vehicles to go round to collect the same. The dust bins or receptacles so provided shall not be damaged, demolished, or removed.

(2) No dung, night-soil or human excreta or trade refuse, stable refuse or garden refuse shall be deposited in any such receptacle or vehicle:

Provided that such garden refuse comprising grass, small twigs and the like as may reasonably be accommodated in such receptacles may be placed therein.

HEALTH OFFICER MAY APPLY SYSTEMS FOR COLLECTION AND REMOVAL OF REFUSE

5. The Health Officer may, with the approval of the Corporation and after one month's prior notice published in a local news paper or served on the occupiers concerned at any time, apply any system which he thinks fit for the collection and removal of night soil, human excreta, dust, dirt, ashes, offal, rubbish, refuse and waste matter of every description from all houses, lands, buildings and other erections within such area or areas as are from time to time delineated by him for this purpose.

REMOVAL OF TRADE REFUSE ETC.

6. The Health Officer may, by notice in writing require the person carrying on a trade, manufacture or business or occupying any stables, cattle-shed or

place for keeping sheep, goats, or poultry, to remove the trade refuse or stable refuse within such period and in such manner as may be specified in the notice.

REMOVAL OF OFFENSIVE MATTER

7. The Health Officer may prescribe.

(a) the arrangements in vehicles carrying offensive matter in order to prevent the escape of any portion of such matter or stench therefrom;

(b) the hours and route for plying such vehicles including the vehicles used for removal of decaying or waste fish, decaying cereals or other offensive matter.

HEALTH OFFICER MAY REQUIRE DEVELOPER ETC, TO PROVIDE DUST BINS AND REFUSE BIN CENTRES.

8. (1) The Health Officer may, by notice in writing require any developer or occupier of any premises to provide or construct within such period as may be specified in such notice, and, if the Developer or occupier does not provide or constructs, cause to be provided or constructed at the expense of such developer or occupier dust bins or other convenient receptacles conforming to such specifications as the Health Officer may require, which shall be placed in such appropriate places within the premises as the Health Officer may think fit, therein shall be deposited any dust, dirt, ashes, litter, rubbish and refuse from such premises.

(2) Where any dust bins or receptacles have been provided under clause (1) the Health Officer may, by notice in writing, require the developer or occupier of any premises to convey as often as may be necessary any dust, dirt, ashes, litter, rubbish and refuse from such premises to the dust bins or receptacles so provided.

MAINTENANCE OF REFUSE CHUTES IN BUILDINGS

9. (1) The occupier of any building or part thereof served by a refuse chute and chute chambers shall be responsible for the repair, replacement and maintenance of every such refuse chute and chute chamber.

(2) The Health Officer may, by notice in writing, require the occupier of any such building or part thereof to carry out any repairs, replacement or maintenance of, or in connection with, any such refuse chute or chute chamber as the Health Officer may consider necessary, and every such notice shall, unless extension of the period is granted by the Health Officer, be complied with within such period as is specified in such notice.

OCCUPIER OF HOUSE NOT REMOVING THE REFUSE

10 Any occupier of any house or premises shall not keep or allow to be kept in any part of such house or premises any dirt, dung, bones, ashes, night

soil, filth refuse or any noxious or offensive matter for more than forty-eight hours and otherwise than in proper receptacle so as to be a nuisance, or suffer such receptacles to be in filthy or noxious state, or neglect to employ proper means to remove the filth therefrom and to clean and purify the same.

HEALTH OFFICER MAY REQUIRE DEVELOPER TO PROVIDE CERTAIN SERVICES

11. The Health Officer may, for such period and subject to such conditions and requirements as may be specified in the notice in writing require the developer of premises to cause such portion of the street as fronts, adjoins or abuts on those premises to be properly swept, cleaned and watered, and the dust, dirt, building debris, garbage, refuse, rubbish or other matter of this kind found thereon to be collected and removed.

PROHIBITION ON SALE OF NIGHT SOIL

12. No person shall sell night soil.

PROHIBITION ON USE OF NIGHT SOIL AS MANURE

13. (1) Night soil, human excreta or untreated sewage shall not be used as manure.

(2) If any night soil, human excreta or untreated sewage is found in any place collected in pits or receptacles of any kind such as would in the ordinary course be used for preparing such night soil, human excreta, untreated sewage for purposes of manuring, this shall be deemed conclusive evidence that the land on which such pits or receptacles are situated or contiguous thereto has been manured with night soil, human excreta or untreated sewage.

PROHIBITION OF CULTIVATION OR USE OF MANURE OR IRRIGATION WHICH IS A NUISANCE.

14. (1) If at any time it appears to the Health Officer that the method of cultivation of any crop or the use or storing or method of preparing or dealing with any kind of manure (including prawn, dust, chicken droppings and stable refuse) not prohibited by byelaws 13, on the irrigation of land any specific manner in any area is a nuisance, the Health Officer may prohibit such method of cultivation or such use or storing or method of preparing or dealing with such manure or such manner of irrigation within such area or may regulate any of the aforesaid by imposing such conditions thereon as the Health Officer may deem necessary for the prevention of this nuisance.

(2) The prohibition or regulation under clause (1) may be effected after prior notice published by the Health Officer in a local news paper.

PROHIBITION AGAINST DEPOSITING REFUSE ETC., IN ANY PUBLIC PLACE.

15. No person shall do, cause or permit to be done, the following -

- (a) placing, depositing or throwing any dust, dirt, paper, ashes, carcass, refuse, boxes, barrels, bales or other articles or things in any public place;
- (b) keeping or leaving any articles or thing whatsoever in any place where it or particles therefrom have passed or are likely to pass into any public place;
- (c) drying any article of food or other article or thing in any public place;
- (d) throwing, placing, spilling or scattering any blood, brine, swill, noxious liquid or other offensive or filthy matter of any kind in any manner as to run or fall into any public place;
- (e) dropping, spilling or scattering any dirt, sand, earth, gravel, clay, loam, stone, grass, straw, shavings, sawdust, ashes, garden refuse, stable refuse, trade refuse, manure, garbage or any other thing or matter in any public place whether from a moving or stationary vehicle or in any of;
- (f) stoving, shaking, cleaning, beating or otherwise agitating any lime, ashes, sand, coal, hair, waste paper, feathers or other substance in such manner that it is carried or likely to be carried by the wind to any public place; or
- (g) throwing or leaving behind any bottle, glass, can, food wrapper, particles of food or any other article or thing in any Public Place

PROHIBITION AGAINST DEPOSITING BUILDING MATERIALS ETC., IN ANY PUBLIC PLACE.

16. During the erection, construction, alteration or demolition of any building or at any time whatsoever:-

- (a) no person shall deposit, drop, leave or place, or cause to be deposited, dropped, left or placed in or into any public place, any stone, cement, earth sand, wood or other building material, thing or substance; or
- (b) reasonable precautions shall be taken to prevent danger to the life, health or well-being of persons using any public place from flying dust or falling fragments or from any other material, thing or substance.

**POWER TO DIRECT OWNERS OR OCCUPIERS
INTER ALIA TO CLEAN PAINT, LIME-WASH
AND COLOUR WASH BUILDINGS**

17. (1) Where the Health Officer is of the opinion that any house or building or any part thereof is in an unclean, grimy, neglected, unkept or in insanitary condition, he may by a notice in writing direct the occupier thereof to take all or any of the following measures within a time and date to be specified in the order:

- (a) remove all refuse, rubbish or garbage within that house, building or part thereof or in the immediate vicinity of the house or building, to such place, or other wise dispose it of at such place, as may be specified in the order;
- (b) clean the house, building or part thereof internally or externally, or both internally and externally, and if necessary disinfect it;
- (c) paint, lime wash or colour-wash the house or building or part thereof internally or externally, or both internally and externally, and
- (d) carry out such minor repairs and renovations as are necessary or incidental to the measures undertaken under sub-clause (c).

(2) Where any order made under the provisions of clause (1) contains any direction for painting, lime-washing or colour-washing of the external part of any building which consists of three or more story including the ground floor, and the occupiers thereof are unable to agree on a colour scheme for the painting, lime-washing or colour-washing of the external part of the building, the Health Officer may, after ascertaining the wishes of the majority of the occupiers direct all the occupiers to adopt a particular colour scheme.

18. (1) Where the Health Officer is of the opinion that any premises are so infested with rats, mice, insects or other vermin as to be a danger to the health of the persons in the premises or in the vicinity thereof, he may serve notice in writing on the occupier of such premises calling upon him to take such measures and within such time and date as may be specified in such notice, for the destruction of the rats, mice, insects or other vermin and for the removal of their breeding places and for preventing their re-appearance.

(2) If in any premises, wasps, bees, hornets or other insects capable of stinging exist and the Health Officer is of the opinion that there is a probability, risk or danger that the persons in those premises or in the vicinity thereof may be stung by them, he may serve a notice in writing on the occupier as the

Health Officer considers necessary, within such time and date as may be specified in the notice for the destruction of the insects, for the removal of their breeding places and for preventing their re-appearance.

(3) Where such insects exist in any public premises and the owner cannot by the exercise of reasonable diligence be found, and the Health Officer is of the opinion that persons in the vicinity of the premises are in imminent danger of being stung by insects or if any such persons have been stung by them, he may upon the written consent of the Corporation being first obtained, enter upon the premises and take such measures as he considers necessary for destruction of the insects, removal of their breeding places.

19. No house shall be so overcrowded as to be injurious or dangerous to the health of the inhabitants. Explanation :- For the purposes of this by-law shall be deemed to be so overcrowded as to be injurious or dangerous to the health of the inhabitants thereof, if it or any room therein is found to be inhabited in excess of the proportion of one adult to every three hundred and fifty cubic feet of clear internal space and in such calculation every person over ten years of age shall be deemed to be adult and two children under ten years of age shall be counted as an adult.

**INSUFFICIENT AND DEFECTIVE SANITARY
CONVENIENCES**

20. (1) If it appears to the Health Officer:
- (a) that any building or part thereof is without sufficient sanitary conveniences; or
 - (b) that any sanitary conveniences provided for or in connection with a building or part thereof are in such a state as to be prejudicial to health or a nuisance and cannot without reconstruction be put into a satisfactory condition.

the Health Officer may, by notice in writing to the owner of the building, require him to provide the building or any part thereof with sanitary convenience as may be necessary.

(2) The Health Officer may, by notice in writing to the owner of any building or part thereof, require him to resite any latrine attached thereto.

21. If it appears to the Health Officer that any sanitary conveniences provided for or in connection with a building or part thereof are in such a state as to be defective or prejudicial to health or a nuisance, but that they can without reconstruction be put into a satisfactory condition, the Health Officer shall by notice in writing, require the owner or the occupier of the building to execute such works or to take such steps by cleansing the sanitary conveniences or otherwise as may be necessary for the purpose.

AMBIENT CONVENIENCES IN WORK PLACE

22 (1) Any building which is used as a work place shall be provided with such adequate and satisfactory sanitary convenience as the Health Officer may deem fit, having regard to the number of person employed in, or in attendance at, the building, and where persons of both sexes be employed or be in attendance, with adequate and satisfactory separate sanitary conveniences for persons of each sex, unless the Health Officer is satisfied that in the circumstances of any particular case the provision of such separate sanitary conveniences is unnecessary.

(2) If it appears to the Health Officer that the provision of clause (1) have not been complied with in the case of any building or part thereof, he shall, by notice in writing, require the occupier of the building to make such alterations in the existing sanitary conveniences and to provide such additional sanitary conveniences as may be necessary.

REPLACEMENT OF LATRINES BY TOILETS

23. (1) Where a building has sufficient water supply and a sewer available, the Health Officer may in his discretion, by notice in writing to the owner of the building require that any latrine or chemical closet provided for or in connection with the building shall be replaced by one or more toilet as he may deem necessary.

CARE OF SANITARY CONVENIENCES.

24 (1) The occupier of every building in or in connection with which a toilet or urinal is provided shall cause the flushing apparatus thereof to be kept supplied with water sufficient for flushing.

(2) Where sanitary conveniences are used in common by the members of two or more families or by members of the public or by employees, the owner, the occupier, the chief or principle tenent or the person in charge of the premises concerned, as the case may be shall maintain the sanitary conveniences in a clean and hygienic manner without causing any nuisance to sight or smell.

LATRINES AT THE WORK SITES.

25. The Health Officer may, by notice in writing, require any person employing workmen, labourers or other persons exceeding ten in number in any temporary worksite other than a factory or mine to construct such number and type of latrines or other form of sanitary conveniences as the Health Officer may deem fit.

BATH ROOMS.

26. If it appears to the Health Officer that any building or part thereof is without any bathroom or without adequate facilities for bathing, he may,

by notice in writing to the owner thereof, require him to provide therein one or more bathrooms or such facilities for bathing as the Health Officer may consider adequate.

OBSTRUCTIONS OF PUBLIC DRAINS PROHIBITED

27 No person shall divert, obstruct, cover or in any way interfere with any public drain or public watercourse without the prior approval in writing of the Corporation, which may, in granting such approval, impose such conditions or requirements as it deems fit.

Explanation. For the purpose of this Bye-Law a public drain includes a drain common to, or serving more than, one house or building.

CONSTRUCTION AND MAINTENANCE OF PRIVATE DRAINS.

28. The Health officer may by notice in writing require the owner of any land at his expense.

(a) to construct such drain or drains in accordance with such specifications as the Health Officer thinks fit, and

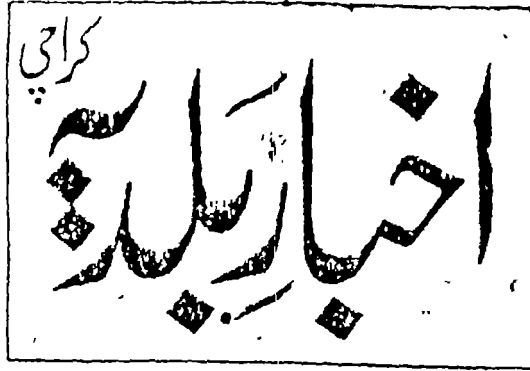
(b) to maintain and keep in a clean and sanitary condition any drain or drains so constructed or any other existing drain or drains in such land.

RESTRICTION ON CONSTRUCTION OF WELLS.

29. No person other than the occupier of an agricultural holding shall, without the previous permission of the Health Officer, open, dig or otherwise construct any well, tank or reservoir, the water in which is likely to be used for drinking or domestic purposes, and for the purposes of this clause, any well within the curtilage of an dwelling-house shall be deemed to be likely to be used for drinking or domestic purposes.

(2) If the occupier of any agricultural holding opens, digs or otherwise constructs or permits or allows to be opened, dug or otherwise constructed any well, tank or reservoir, he shall report the opening, digging or construction of the well, tank or reservoir, as the case may be, within one week thereof to the Health Officer.

(3) The Health Officer may give to the occupier of any premises notice to close any well, tank or reservoir, the water in which is likely to be used for drinking or domestic purposes and may by such notice specify any works to be executed for such purpose within a time and date to be specified in such notice, and the occupier shall comply with the terms of such notice.



جلد نمبر ۳ } ۱۹ ستمبر ۱۹۷۵ء } شمارہ نمبر ۱۸

COPY OF 404 THE SIND GOVERNMENT
GAZETTE

EXTRA ORDINARY MONDAY
SEPTEMBER 22, 1975

PART I

GOVERNMENT OF SIND

HOUSING, TOWN PLANNING AND LOCAL
GOVERNMENT DEPARTMENT

Karachi, the 19th September 1975

NOTIFICATION

No. MC-1/15 (48)/73.—In exercise of the powers conferred by sections 71 and 92(2) of the Sind People's Local Government Ordinance, 1972 read with paragraph 8 under heading "Animals" of part II of Schedule II and item 26 of Schedule IX thereto, the Government of Sind are pleased to sanction the following bye-laws of the Karachi Municipal Corporation, Karachi.—

1. Short title and extent.

These Bye-laws may be called the Karachi Municipal Corporation (Disposal of Animal's Carcasses) Bye-laws, 1975

(2) They shall extend to the whole of the limits of the Corporation.

2. *Definitions:* In these Bye-laws, unless the context otherwise requires the following expressions shall have the meanings hereby respectively assigned to them, that is to say,

(i) "Carcass" means the carcass of any animals defined in the explanation below paragraph 8 under heading "Animals" of part II of Schedule II to the Ordinance,

(ii) "Chief Executive Officer" means the Chief Officer Incharge of the administration of the Corporation;

(iii) "Corporation" means the Karachi Municipal Corporation;

(iv) "Dumping ground" means a place fixed by the Corporation for the disposal and burial of refuse;

(v) "Fee" means the fee prescribed in the Schedule for removal and disposal of a carcass.

(vi) "Health Officer" means the Health Officer of the Corporation;

(vii) "Ordinance" means the Sind People's Local Government Ordinance, 1972;

(viii) "Schedule" means the schedule of fees to these bye-laws.

3. CARCASSES WHEN, WHERE AND BY WHOM REMOVABLE AND FEES LEVIABLE

(1) Every person, within whose premises any animal dies of natural causes, shall, within three hours after its death or if the death occurs at night within three hours after day light, either remove the carcass at his own expense to the dumping ground or make a report of the death of such animal by addressing an application to the Health Officer and delivering the same to any officer, Inspector, Muccadam or Head Clerk of the Health Department (at the office of Corporation).

COMPULSORY FUNCTIONS

PART II

FUNCTIONS TO BE PERFORMED BY CORPORATIONS, MUNICIPAL COMMITTEES AND TOWN COMMITTEES

Public health

1. Responsibility for sanitation.—A corporation, municipal committee or town committee shall be responsible, for the sanitation, and may for that purpose cause such measures to be taken as are required by or under this Ordinance.

2. Removal, collection and disposal of refuse.—A corporation, municipal committee or town committee shall make adequate arrangements for the removal of refuse from all public streets, public latrines, urinals, drains and all buildings and lands vested in the council concerned and for the collection and proper disposal of such refuse.

3. Births, deaths and marriages.—A corporation, municipal committee or town committee shall, subject to any other law for the time being in force, register all births, deaths and marriages within the local area and information of such births, deaths and marriages shall be given by such persons or authorities, and shall be registered in such manner as the bye-laws may provide.

4. Infectious diseases.—A corporation, municipal committee or town committee shall adopt such measures to prevent infectious diseases and for restraining infection within the local area as the rules and bye-laws may provide.

Water supply and drainage

5. A corporation, municipal committee or town committee shall, within the limits of the funds at its disposal provide, or cause to be provided, a supply of wholesome water sufficient for public and private purposes.

6. Private sources of water supply.—All private sources of water supply within the local area concerned shall be subject to control, regulation and inspection by the corporation, municipal committee or town committee.

7. Drains.—A corporation, municipal committee or town committee shall, within the limits of the funds at its disposal provide adequate system of public drains in the local area and all such drains shall be constructed, maintained kept repaired and emptied with due regard to the health and convenience of the public.

Slaughter house

8. A corporation, municipal committee or town committee shall provide and maintain at such site or sites within or without the local area as may be approved by Government one or more slaughter houses for the slaughter of animals generally or of any specified description of animals for sale.

STREETS

9. A corporation, municipal committee or town committee shall provide and maintain such public streets and other means of public communication as may be necessary for the comfort and convenience of the inhabitants of the local area concerned and of the visitors thereto.

Public streets

10. No new street shall be laid out except with the previous sanction of the corporation, municipal committee or town committee, and in conformity with the terms and conditions of such sanction.

Street

11. A corporation, municipal committee or town committee shall take such measures as may be necessary for the proper lighting of the public streets and other public places vested in the council concerned by oil, gas, electricity or such other illuminant as the council may determine.

Street lighting

12. No person shall keep or let, for hire or use or propel with in the local area any public vehicle, other than a motor vehicle, except under a licence granted by the corporation, municipal committee or town committee and in conformity with the conditions of such licence.

Public vehicle

OPTIONAL FUNCTIONS

1. (1) The occupiers of all buildings and lands within the local area shall be responsible for the removal of refuse from such buildings and lands subject to the general control and supervision of the corporation, municipal committee or town committee, as the case may be.

Removal, collection and disposal of refuse

(2) The council concerned may cause public dustbins or other suitable receptacles to be provided at suitable places including streets or other places conveniently accessible to the public, and where such dustbins or receptacles are provided, the council concerned, may by public notice, require that all refuse accumulating in any premises or land shall be deposited by the owner or occupier of such premises or land in such dustbins or receptacles and be removed by the council.

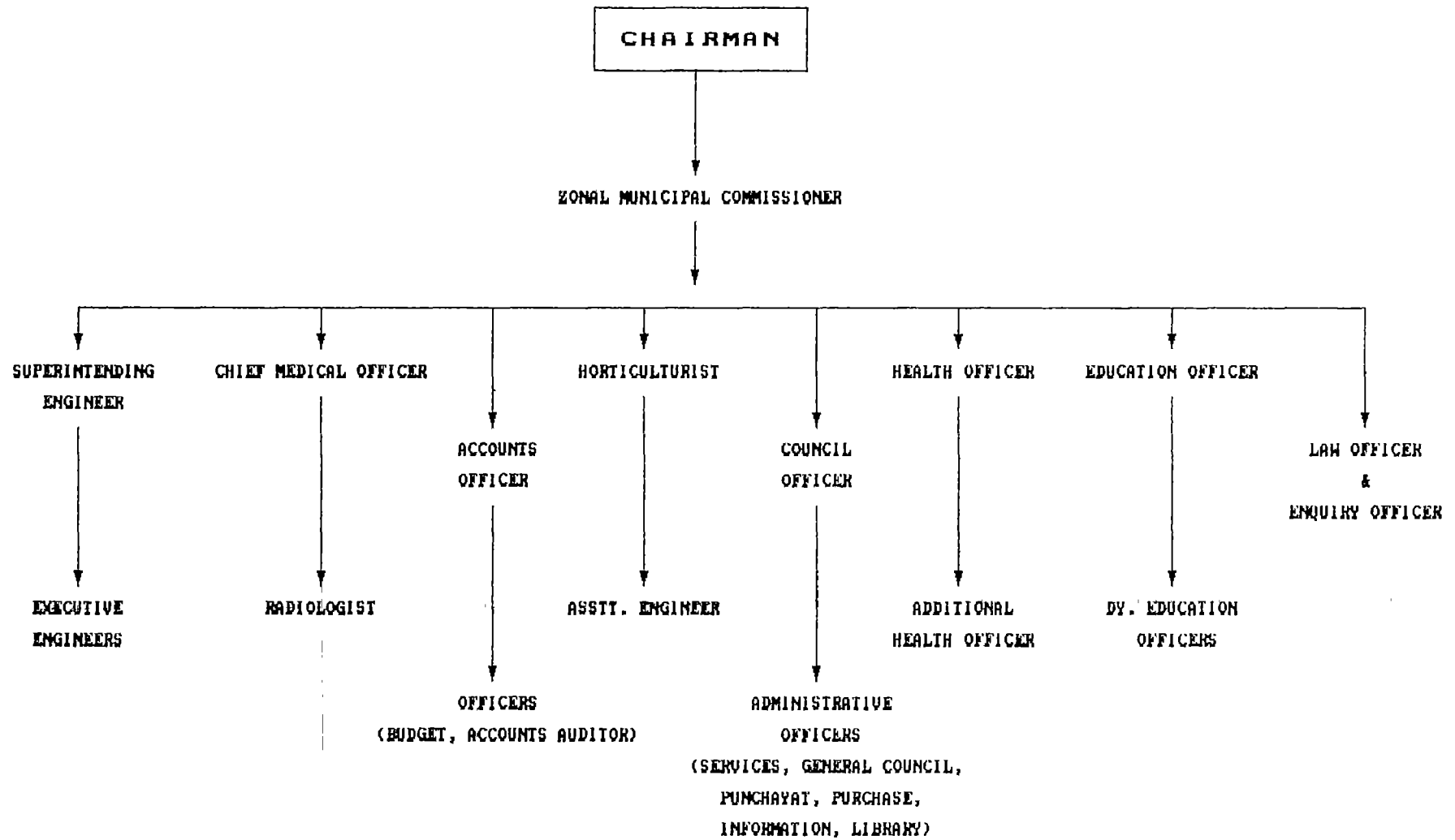
(3) All refuse removed by or under the supervision of the staff of the council concerned shall be the property of the council.

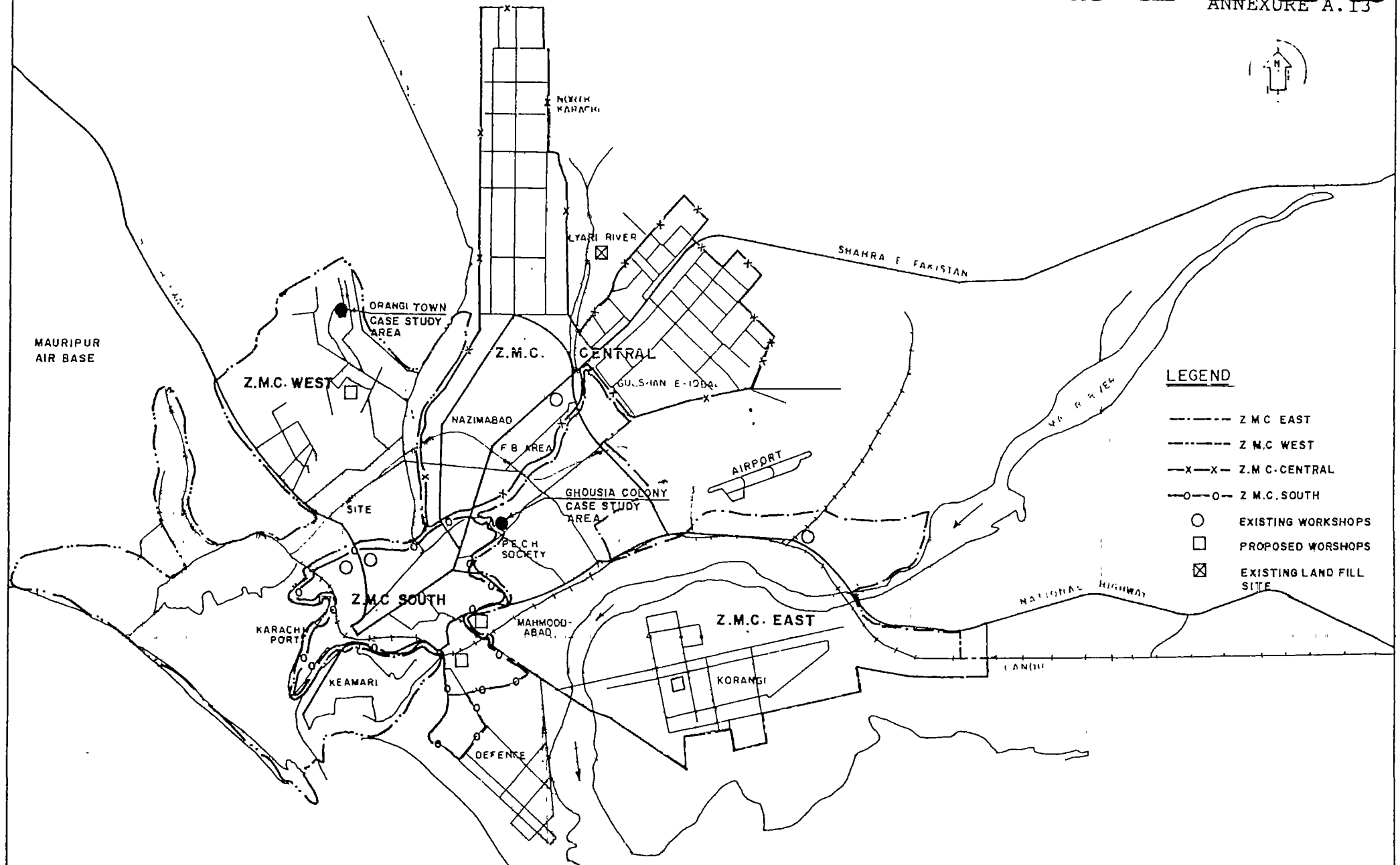
2. (1) A corporation, municipal committee or town committee may, if required by Government, shall provide and maintain sufficient number of public latrines and urinals for separate use of each sex at appropriate places, and shall cause the same to be kept and maintained in proper order of cleanliness.

Latrines and urinals

(2) The occupier of any public premises or land in which any latrine or urinal pertains shall keep such latrine or urinal in a proper state to the satisfaction of the council concerned and shall employ such staff for the purpose as may be necessary, or as may be specified by the council.

ORGANIZATION CHART
ZONAL MUNICIPAL COMMITTEE

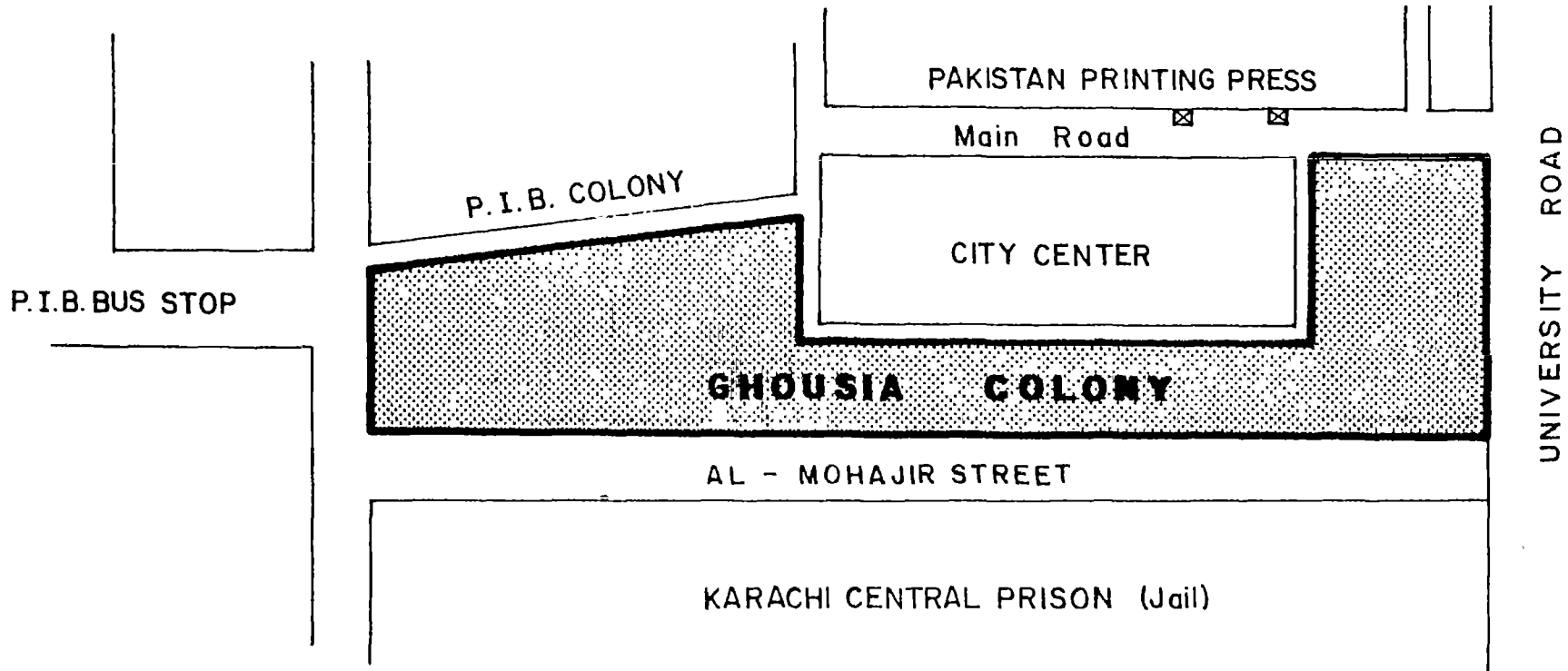
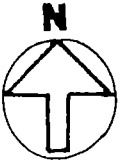




LEGEND

- Z.M.C. EAST
- Z.M.C. WEST
- X-X- Z.M.C. CENTRAL
- O-O- Z.M.C. SOUTH
- EXISTING WORKSHOPS
- PROPOSED WORKSHOPS
- ⊗ EXISTING LAND FILL SITE

KARACHI METROPOLITAN CORPORATION
 SOLID WASTE MANAGEMENT
 ZONAL MUNICIPAL COMMITTEES' LIMITS &
 LOCATION OF WORKSHOPS.

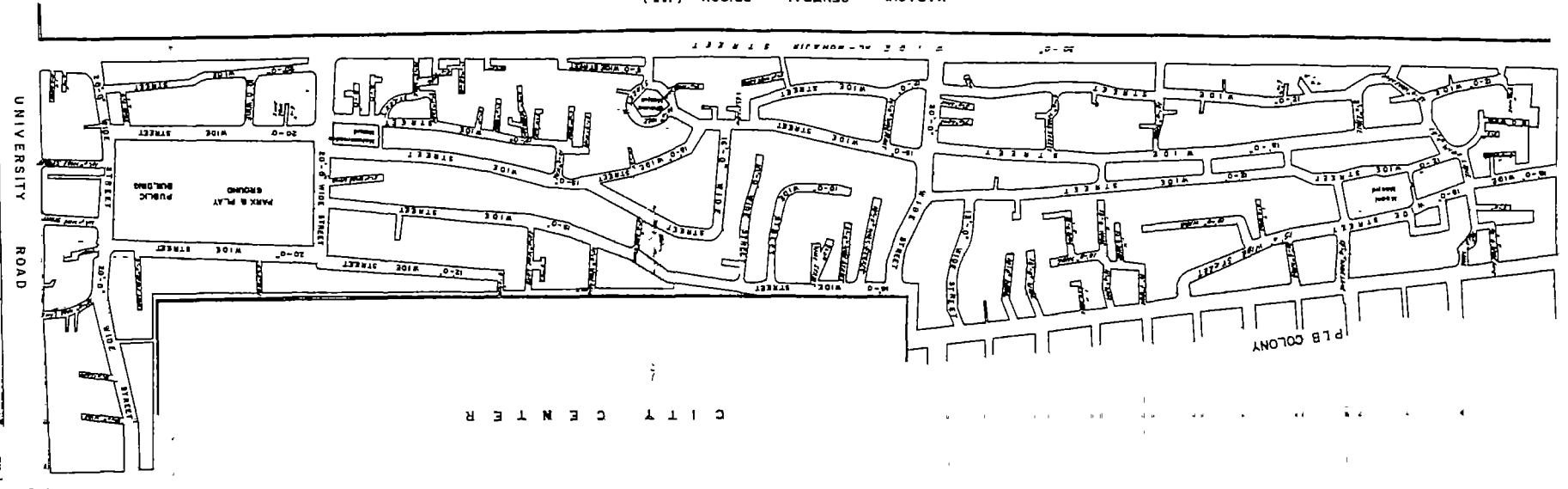


SITE & KEY PLAN
(N.T.S.)

LEGEND
☒ MUNICIPAL DUST BIN

GHOSIA COLONY
LAYOUT PLAN

UNIVERSITY ROAD



CITY CENTER

PLB COLONY

KARACHI CENTRAL PRISON (J.M.R.)



100'-0" WIDE ROAD

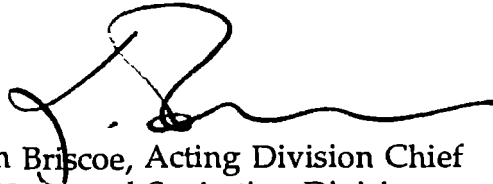
August 20, 1992

Dear Colleague:

I am pleased to attach the third in the UNDP-World Bank Water and Sanitation Program's Program Report Series, *Household Demand for Improved Sanitation Services: A Case Study of Kumasi, Ghana* by Dale Whittington, Donald T. Lauria, Albert M. Wright, Kyeongae Choe, Jeffrey A. Hughes, and Venkateswarlu Swarna.

This case study describes a survey conducted in Kumasi to estimate household willingness to pay for two types of improved sanitation services. The findings indicate that such surveys can be successfully conducted in cities in developing countries, and the surveys can yield reliable information on household demand for different sanitation technologies.

Sincerely,

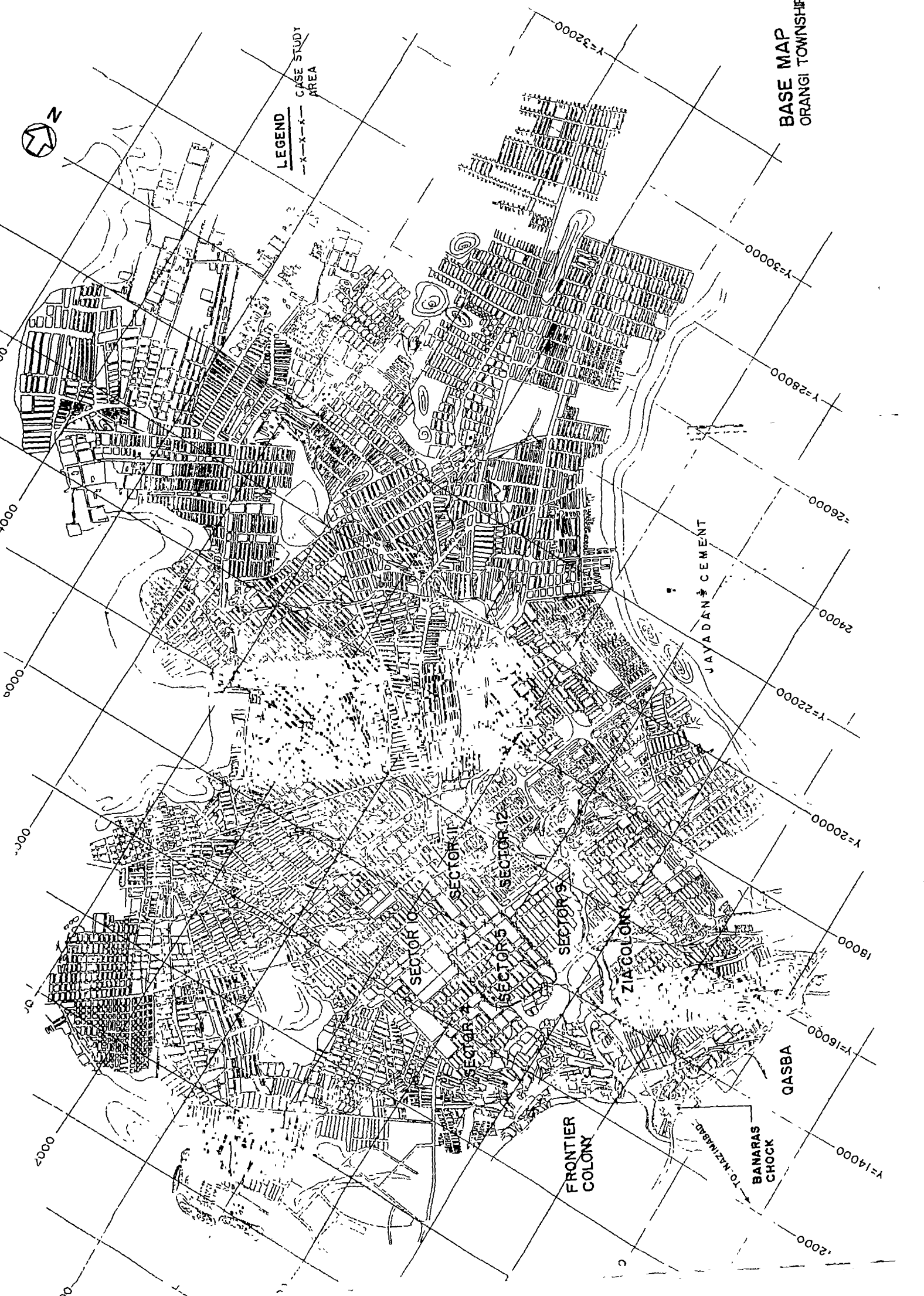


John Briscoe, Acting Division Chief
Water and Sanitation Division
Infrastructure and Urban Development Department
The World Bank



LEGEND
-x-x-x- CASE STUDY AREA

BASE MAP
ORANGI TOWNSHIP



FRONTIER COLONY

ZIA COLONY

SECTOR 10

SECTOR 11

SECTOR 12

SECTOR 9

JAVADAN CEMENT

GASBA

BANARAS CHOCK

TO KETIMBAR

Y=32000

Y=30000

Y=28000

Y=26000

Y=24000

Y=22000

Y=20000

Y=18000

Y=16000

Y=14000

Y=12000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

0000

150'-0" WIDE ROAD

SECTOR II

70'-0" WIDE ROAD

40'-0" WIDE ROAD

40'-0" WIDE ROAD

40'-0" WIDE ROAD

40'-0" WIDE ROAD

100'-0" WIDE ROAD

WELFARE CENTER

8 3
5 4
36 D 19

MATERNITY HOME ST 4/0
ST.4

526 (E) 513
527 (E) 536

507 (E) 516
506 (E) 497

286 (E) 293
287 (E) 296

267 (E) 256
266 (E) 257

64 (E) 55
65 (E) 54

P.B ST.12

546 (E) 537
547 (E) 536

487 (E) 496
486 (E) 497

306 (E) 397
307 (E) 396

247 (E) 256
246 (E) 257

84 (E) 75
85 (E) 74

566 (E) 553
567 (E) 553

485 (E) 470
484 (E) 470

326 (E) 317
327 (E) 336

227 (E) 236
226 (E) 217

104 (E) 95
105 (E) 114

524 (E)

P. SCHOOL ST 5
PLAY GROUND ST. 6

MOSQUE ST 7
P SCHOOL ST 8

125 (E) 115
126 (E) 130

146 (E) 137
147 (E) 136

626 (E) 613
627 (E) 636

447 (E) 456
446 (E) 437

346 (E) 337
347 (E) 336

207 (E) 216
206 (E) 197

646 (E) 637
647 (E) 636

427 (E) 436
426 (E) 417

366 (E) 357
367 (E) 376

187 (E) 196
186 (E) 175

666 (E) 606
667 (E) 606

407 (E) 416
406 (E) 597

386 (E) 377
367 (E) 396

167 (E) 176
166 (E) 157

71
72

20 (E) 11
40 (E) 31

18 (E) 1
30 (E) 21

1 (E) 17
34 (E) 18

60 (E) 81
80 (E) 71

50 (E) 41
70 (E) 61

ST 10

N.A.L.A
96 49
48
81 20
31 12
43 45
54 39
31 30
26 24
11
P.B. ST.14
P.B. ST.15
10
ANNEXURE A.17

SECTOR 4
53
52
P.B

- LEGEND
 ◻ KMC DUST BN
 ◻ INFORMAL GARBAGE DUMP
 △ CATTLE YARD

ORANGI TOWNSHIP
 SECTOR 5
 BASE MAP





GHOUSIA COLONY



ORANGI TOWN



FINAL DISPOSAL SITE OF GARBAGE



SCAVENGING



WASTE MATERIAL TRADE





WASTE HANDLING AT COMMUNAL BIN



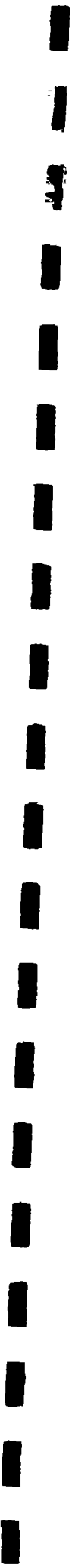
AN AFGHANI SCAVENGER COLLECTING PAPER IN ORANGI TOWN



NARROW AND WINDING STREET OF GHOUSIA COLONY



GARBAGE BURNING IN THE COMMUNAL BIN



1-28-1948

1-28-1948

