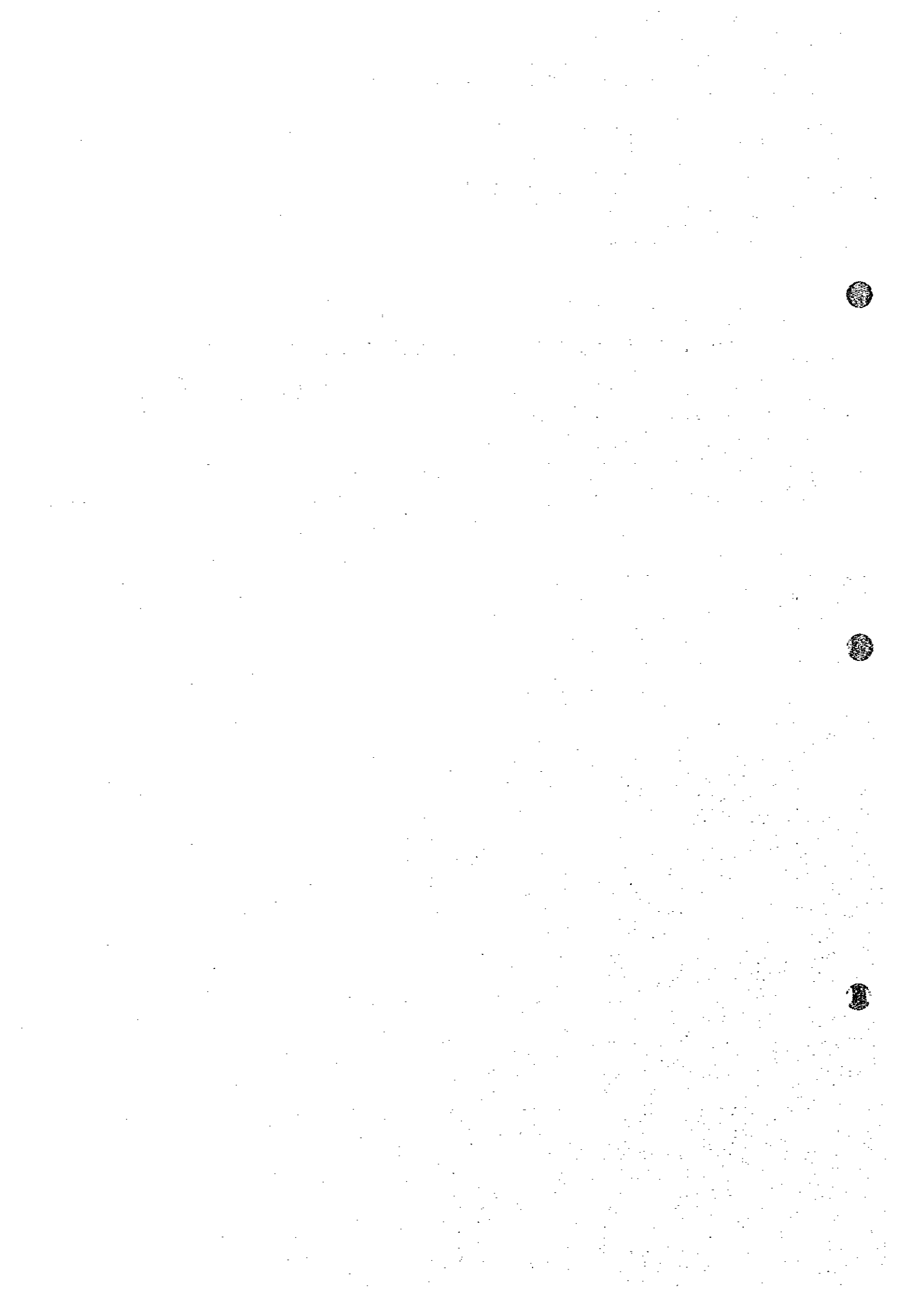


# Chapter 2

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## *Pilot Projects*



## **2 Pilot Projects**

### **2.1 Plan of Pilot Projects**

#### **2.1.1 Objectives of the Pilot Projects**

Pilot projects were conducted in order:

- to demonstrate technologies proposed in the SWM M/P;
- to examine their applicability; and
- to feed back the data obtained through implementation of pilot projects to review the M/P and execution of F/S.

The following four pilot projects were implemented.

- A. Enhancement Experiment of Public Awareness in SWM
- B. Environmental Improvement Experiment of the Vingunguti Disposal Site
- C. Improvement Experiment of the Refuse Collection System in Kariakoo
- D. Improvement Experiment of the Refuse Collection System in Buguruni

Pilot projects were planned in order to examine the applicability of the technologies and plans proposed in the Master Plan as countermeasures to problems identified in the first phase of the Study.

Table 2-1 summarises the causes identified, countermeasures proposed in the Master Plan and pilot projects.

Table 2-1: Contents of Pilot Projects

Current Problems	Proposals in the M/P	Contents of Pilot Projects	Code No.
Inappropriate technical system and lack of resources	Improvement of refuse collection system	<ul style="list-style-type: none"> <li>To examine the workability of skip container collection system in Kariakoo and Buguruni.</li> </ul>	C, D
	Sanitary Landfill	<ul style="list-style-type: none"> <li>Improvement of the environmental sanitary condition of the landfill site and its environs.</li> <li>Demonstration of environmental protection technologies such as gas removal, soil cover, etc.</li> <li>Demonstration and technical transfer of waste amount control system by using the computerised weighbridge system installed by JICA.</li> </ul>	B
	Improvement of street cleaning system	<ul style="list-style-type: none"> <li>Installation of 100 litter bins in Kariakoo ward and collection of litter from them.</li> </ul>	C
Lack of knowledge of dangers by refuse	Education on refuse	<ul style="list-style-type: none"> <li>Production of 20,000 refuse education textbooks.</li> <li>Trial lessons on refuse to primary school pupils.</li> <li>Seminar on refuse education to primary school teachers.</li> <li>Poster competition by primary school pupils.</li> <li>Educational cultural show on refuse.</li> <li>Educational film show on refuse.</li> </ul>	A
Lack of moral concern about refuse	To raise public awareness of refuse problems and to promote public cooperation	<ul style="list-style-type: none"> <li>"Beautify Your City" campaign was conducted. In order to make people perceive DSM as their city and to feel responsible for maintaining the city clean, the catch phrase for public campaign "Beautify Your City" was adopted.</li> <li>Most activities in the pilot projects were concentrated in February with February named as "Beautify Dar es Salaam Month". The contents of the pilot projects were publicised timely.</li> <li>Banners, posters, stickers, TV, newspaper, uniform T shirts, etc. were used in order to advertise "Beautify Your City" and promote public cooperation.</li> <li>An open 10 km Taka Race from the City Hall to the National Stadium took place on 2nd March as the closing event of "Beautify Dar es Salaam Month" in order to raise public awareness on refuse. Every participant ran with seals showing "Beautify Your City" on the front of his/her shirt.</li> </ul>	A

## **2.2 Enhancement Experiment of Public Awareness in SWM**

### **2.2.1 Introduction**

#### **a. Background**

According to the Public Opinion Survey conducted during the first phase of this Study, improvement of SWM is regarded as a high priority by many people but many resident's personal behaviour shows a lack of concern and effort to keep their surroundings and the city clean.

This statement does not apply to residents' own homes and properties which generally are well kept and clean. Every day, it is common to see women sweeping the ground around their homes to remove dust, leaves, etc. that have accumulated since the previous day. However, this high standard of cleanliness generally does not extend beyond the boundaries of their homes for most people. Many people think nothing of littering and throwing rubbish away as everyone does it - it is accepted behaviour.

Some residents would argue that circumstances force them to behave in this way as there are many parts of the city which have no official refuse collection service. Hence, people must dispose of their waste themselves, whether it be in a refuse pit, by burning or by illegal dumping as is often the case.

It is also appreciated that life is a struggle for many people in DSM so that they may be more concerned with the things they need (water, food, money, clothing, etc.) than things they don't need such as waste.

Part of the problem is the sheer size of the city and the lack of a sense of identity amongst people living here that DSM is their city. Many DSM residents do not regard DSM as being their city. They originate from other parts of the country and when asked where they come from, they state their villages of origin.

Many residents in DSM do not regard the lack of cleanliness in the city as their problem as they believe that the responsibility for SWM rests solely with DCC. This is not true. In fact, DCC's current lack of sufficient resources to collect the city's refuse makes it even more important for citizens to cooperate with DCC to keep the city clean.

#### **b. Needs**

There is a need for changed attitudes and behaviour to try to engender in people the idea that every resident is responsible for the cleanliness of the city, to act accordingly and to cooperate in improving SWM.

One way of achieving this is through making residents of the city perceive DSM as being their city. If they feel a sense of identity with DSM, then they will naturally try to maintain it clean and not discard refuse improperly.

Part of such a programme should involve trying to make the residents realise that they are not only refuse producers but also the main beneficiaries of any measures taken to improve SWM.

### c. Programme

In order to address these problems, it was decided to conduct a Public Education and Awareness Raising programme, the main objectives of which were:

- to raise awareness and understanding of waste - its nature, production, methods of disposal in DSM and the problems caused by waste.
- to change attitudes and behaviour in order to (i) reduce poor disposal practices and refuse related problems, thus improving sanitation (major focus); (ii) encourage waste reuse, reduction and recycling (minor focus).
- to increase public cooperation on SWM.

The contents of this programme are tabulated below:

Programme	Events	Content
Public Awareness	"Beautify DSM month"	A public campaign was held during the month of February, with most of the pilot project activities being concentrated within this month. This was advertised in the mass media (television, newspapers) including some newspaper articles and using 16,000 stickers, 300 T-shirts, 20 street banners and the 100 best posters from the poster competition.
	"Taka Race"	An open 10 km race was held on March 2nd for men, women and disabled people using tricycles. This was the closing event for Beautify DSM month.
Adult Education	Educational Cultural Show on SWM by Tanzanian Culture Group	4 Cultural shows featuring songs, drama and dancing about SWM at various venues in DSM.
	Cinema Show on SWM	10 shows, each featuring 2-3 videos on SWM and environmental issues were held at various venues in DSM.
Primary School Education	Production of book for Primary School Students about SWM	20,000 copies of a 28 page book on SWM has been produced for Std 4-7 primary school students in Swahili. An English version of the book has also been produced.
	Trial Lessons on SWM to Primary School Students	Trial Lessons on SWM were conducted with Std 2 and Std 5 classes at 6 primary schools in DSM.
	Seminar for Primary School Teachers	A seminar for 29 primary school teachers, District School Inspectors and District Academic Officers on SWM was held on Feb 19.
	Poster Competition	A poster competition was held on Feb 20 for all primary school students on the theme: "Beautify Your City".

#### **d. Evaluation**

Evaluation of education and awareness raising programmes is inherently difficult. Extensive discussions were held amongst Study Team members and some DCC staff over what form evaluation of the primary school and adult education lessons should take including whether to use quantitative or qualitative methods and exactly what to assess: increased knowledge, greater understanding, changed attitudes, etc.

Eventually, it was decided to use a simple questionnaire consisting of 3-5 questions for evaluation purposes which would focus primarily on assessing the particular event itself, whether peoples' understanding of SWM issues had increased and what practical action, if any, they would take as a result of what they had learned.

It is important to appreciate that there is an inherent weakness in such questionnaires, especially when questions are asked about people's future actions. Generally, a large number of people will state that they will do something as a result of what they have learned but the number of people who actually do anything is much less.

A summary of the evaluations of each event is found in Appendix \*\*.

### **2.2.2 Public Awareness**

#### **2.2.2.1 "Beautify Your City" Campaign**

Most of the pilot project activities were concentrated within the month of February with February being named "Beautify Dar es Salaam" month. The catchphrase for the month was "Beautify your City" and this was advertised using 300 custom designed t-shirts distributed mainly to DCC staff, 16,000 bumper stickers distributed to the general public and 20 large street banners which were displayed in prominent places around the city. It is intended to display to the general public the 100 best posters from the primary school poster competition at various venues around the city, this being a further means of raising awareness amongst the city's residents.

Activities that took place during the month were publicised in the mass media, especially on television and in both English and Swahili newspapers. A press conference was jointly held by members of the Study team and DCC and several articles subsequently appeared in the newspapers.

#### **2.2.2.2 10 km Taka Race**

An open 10 km race was held on March 2nd as the closing event of "Beautify Dar es Salaam" month for men, women and disabled people using tricycles. A total of 247 people including 86 disabled took part in this race. Every participant ran with seals showing their number and "Beautify Your City" on the front of their shirt. Prizes were awarded to the first five finishers in the following categories: men, women, disabled men and disabled women. The prize giving ceremony for the poster competition was held at the same time with prizes being awarded for the best 20 posters.

## 2.2.3 Adult Education

### 2.2.3.1 Cultural Show

An educational Cultural Show was organised by Mr Mkude, Senior Cultural Officer, in close collaboration with the Study Team. The Culture Show was prepared and performed by members of the Tanzania Peoples' Defence Force Culture Group and featured dancing, singing and drama. Songs were composed, dances were choreographed and the drama was written specifically for the Culture Show. Members of the Study team and City Cultural Office attended rehearsals of the Culture Show and had considerable input into the final content of the show. The Show addresses many solid waste issues and strongly encourages citizens to cooperate in "Beautifying the City".

In particular, the drama contains many strong messages concerning SWM. The drama focuses on one family: Mzee Nyota, the head of the family, his wife (Mama Nyota) and their two sons. The story is summarised below:

*The drama opens with Mama Nyota sweeping around her home and secretly dropping the waste collected on her neighbour's property. Mzee Nyota arrives and stops her from sweeping outside of the house. He then leaves.*

*short time later, the woman who lives next door arrives and notices the rubbish on her property. She consults her husband and then knocks on Mama Nyota's door to complain. A fierce argument ensues as apparently this is not the first time this has happened. This is interrupted by the arrival of a local community leader. He advises the neighbour to forgive Mama Nyota this time but if it happens again, he will take her to Court to be prosecuted. He then instructs Mama Nyota to collect the offending rubbish and dispose of it properly. He also advises her to dig a pit on her property for the disposal of waste. Everyone except Mama Nyota then leaves.*

*At this point, her two sons arrive home fighting. The first son has a partly eaten mango which he claims to have bought. The other son accuses him of lying, saying he found it in a rubbish heap and if he eats it, he will get sick. Mama Nyota takes the mango off the first son. At this stage, Mzee Nyota returns and joins in the argument. Just as Mama Nyota is about to throw the mango away, he snatches it from her and returns it to the accused son, saying that he believes that he bought it. They all go off.*

*Suddenly two people enter and dump bags of rubbish on the ground. Two City watchmen catch them in the act and arrest them. The next scene is in a courtroom where these two people are on trial. Both admit to illegally dumping waste and are told by the Judge that they have broken one of the City's by-laws and are liable to a penalty of either a 5,000 Tsh fine or 6 months imprisonment. One chooses to pay the fine while the other has no money and is sent to jail. The court adjourns.*

*The next scene is back in Mama Nyota's house. Mama Nyota is sweeping again when the two sons and Mzee Nyota all arrive home, complaining of severe stomach cramps and diarrhoea. Mama Nyota does not know what to do but consults her brother who advises her to take them to the hospital. However, Mzee Nyota refuses, saying he wants to go to the witchdoctor. The witchdoctor is a colourfully dressed individual with two equally colourful assistants. He arrives on the scene with much dancing, blowing whistles and waving feathers. His attempts to find a cure for the three sick people*



feature more dancing and whistle blowing which is suddenly interrupted by a Radio Tanzania news broadcast which announces that a diarrhoea epidemic has broken out in the city and advises affected people to go to the local hospital. On hearing this, they give up on the witchdoctor and leave. The witchdoctor is angry and warns them that they will suffer from the consequences of running away from his treatment.

The next scene is set in the hospital. Mzee Nyota and the two sons all receive treatment with the two sons being admitted. The doctor lectures them about the importance of good hygiene.

The final scene is a meeting between two Health officers and the people in that area. One Health officer explains various things about SWM including good ways of disposing of waste (digging a pit, using rubbish bins, etc.) He also talks about making general cleanliness and drinking boiled water.

One woman (the neighbour of Mama Nyota) complains to the Health Officers that her neighbour (Mama Nyota) does not have a rubbish bin nor a refuse pit and is always dumping waste on her property. They advise her to forgive Mama Nyota this time but if Mama Nyota continues such behaviour, they should inform their Office and they will take her to Court for prosecution.

Several other people speak. At the end of the meeting, Mzee Nyota orders his wife to take some money and pay someone to dig THREE pits on his property and to buy a rubbish bin. He warns her that if she doesn't do what he says, he will divorce her. All the meeting participants applauds Mzee Nyota's words and change of attitude.

Four performances of the Culture Show took place during February. All performances took place during the afternoon from around 3:00-5:30 pm. Performance details are specified below.

Date	Show	Venue	Number of People in Audience
Feb 4	1	Kariakoo market	2,000
Feb 14	2	Mnazi Mmoja ground	1,400
Feb 22	3	Vingunguti A Primary School	2,500
Feb 28	4	Uhuru Mchanganyiko Primary School Ground	1,800
Total			7,700

The Cultural Show has been well received and extremely popular with the audience, especially the drama. The Master of Ceremonies, Ibrahim Raha "Jongo", a well-known radio and television personality, was a very popular compere. His jokes and lively banter kept the audience entertained between items and he gave a running commentary on the main points concerning cleanliness throughout the show.

At each Cultural show, the number of people in the audience was counted (tabulated above) and 10 people were interviewed using a set questionnaire. The results of this interview survey are summarised below.

78% and 20% of the people interviewed stated that the Cultural Show was "very good" or "good" respectively because it was entertaining (50% of interviewees) and interesting (50%) and people learned about waste (78%). 93% of interviewees liked the

drama section the most while 35% and 25% of people preferred the dancing and singing sections respectively<sup>1</sup>.

All interviewees stated that they had learned something from the Cultural Show. 65% of interviewees learned that every person has a responsibility to keep the city clean; 63% learned about ways of disposing of waste; 53% learned that there is a by-law concerning waste and 53% learned about the bad effects of rubbish.

When asked about what practical action they would take as a result of today's Cultural Show, 65% said they would explain to others what they had learned; 63% said they would get a rubbish bin; 58% said they would dig a pit for the disposal of waste; 53% said they would have a special place for disposing of waste; 45% said they would clean all the waste in their neighbourhood while 18% said they would pay the refuse collection charge. No interviewee said that they would not do anything.

It is encouraging that such a large percentage of interviewees stated they would explain to others what they had learned. In this way, the number of people reached by such an event far exceeds the number of people in the audience. Some interviewees specifically referred to this when they commented on the "multiplier effect" of events such as this. One participant expressed it this way: "people teaching people".

Events such as this are a good way of reaching and educating a large number of people in a short time. As most of the Cultural Shows were held during week days and in the central city area, it is expected that more people would attend such events if held in residential areas and during the weekend or holiday periods. However, it is important that events such as this must be followed up by action from DCC. Otherwise, as many people commented, it is another case of the DCC talking without acting.

### 2.2.3.2 Cinema Show

An educational Cinema Show on SWM was organised by Mr Mkude, Senior Cultural Officer, in close collaboration with the Study team. At each Cinema Show, 2-3 videos about SWM and environmental issues were shown as well as some light entertainment music videos. Brief details of the screened videos are given below:

1. A video titled "Pendezesha Jiji Lako" (Beautify your City) was commissioned specifically for the Awareness Raising campaign and shot over a 7 day period in early February. The edited and choreographed video was shown for the first time on Tues 18 February at the fourth video show and has been well received by all audiences<sup>2</sup>. This video features excerpts from the Cultural Show, especially large sections of the drama which emphasised the health problems associated with waste. It also features an interview with a Swahili speaking member of the Study Team in which the following issues are discussed:

- the amount of waste produced in DSM per day;
- health and environmental problems caused by waste;
- good and bad methods of waste disposal;

<sup>1</sup> Some interviewees indicated more than one option in this question.

<sup>2</sup> In shows 1-3, a short speech was read to the audience. This contained information on "Beautify Dar es Salaam" month and requested residents' cooperation in the execution of the pilot projects as well as informing people about appropriate methods of waste disposal.

- waste reuse and recycling.
- 2. "A Matter of Habit" describes SWM in Ecuador and deals with many of the same SWM issues facing DSM although this video has a strong emphasis on waste reuse and recycling. The video has an English commentary and English subtitles. It has since been dubbed in Swahili. This work was initiated by DCC but unfortunately was not completed in time to be shown during the programme.
- 3. film about DSM Environmental Conditions (described by Bernus)
- 4. film about SWM in India

10 cinema shows were held at different venues around the city as specified below.

Date	Show	Venue	No of People in Audience	Interviews Conducted (Y/N)
Feb 7	1	Vingunguti A Primary School	6,000	N
Feb 13	2	Buguruni Police Station Ground	2,000	Y
Feb 15	3	Vingunguti B Primary School	1,500	N
Feb 18	4	Mission Quarter, Kariakoo	1,500	Y
Feb 20	5	Kidongo Chekundu	150	N
Feb 21	6	Buguruni Moto Primary School	1,200	Y
Feb 25	7	Tandale Primary School	5,000	Y
Feb 26	8	Tandika market	2,700	Y
Feb 27	9	Ilala Garden	2,500	Y
Mar 1	10	Ilala Boma Primary School	2,000	Y
TOTAL			24,550	

The Cinema Shows were particularly well attended in residential areas outside of the city centre. At places like Kidongo Chekundu and Kariakoo, in the city centre, many people are present during the day but at night, most of these return to their homes in other parts of the city. Residents in Kariakoo are mainly middle to high income and have their own television and sometimes video machines. They are not as interested in Cinema Shows as much as poorer residents, who have no television. These areas are also considered dangerous at night.

At each Cinema Show, the number of people attending was counted as tabulated above. 10 people were interviewed at 7 of the 10 video shows, including most of the Cinema Shows featuring the video: "Pendezsha Jiji Iako". The results of this interview survey are summarised below:

52% and 41% of interviewees rated the Cinema Show as "very good" and "good" respectively because it was entertaining (64%), interesting (40%) or they learned about rubbish (61%). One person rated the Cinema Show as poor explaining that the DCC says a lot but does not implement nor enforce what they say.

60% of interviewees stated that they had learned about the bad effects of rubbish; 59% about good ways of disposing of waste; 46% that every person has a responsibility to keep the city clean and 33% that there is a by-law concerning waste. Only two people (3%) claimed they did not learn anything.

All but two people (3%) stated they would do something as a result of the Cinema Show. 56% said they will have a special place for disposing of waste, 56% said they will get a rubbish bin; 56% said they will dig a pit for rubbish disposal; 37% said they would clean all the rubbish in their neighbourhood; 34% stated they will explain to others what they have learned and 26% said they will pay the refuse collection charge.

17% of interviewees stated they would do something else, such as boiling drinking water (7%), not throwing waste away illegally (3%), preventing children from playing near waste (1%), using the waste containers provided in Kariakoo area (1%), obeying the DCC by-laws (1%) and making sure that DCC enforces the laws it has passed.

Some other general comments made have been summarised below:

- Many people commented on the failure of DCC to implement and enforce the by-laws. The by-laws are created for a purpose - if they are not kept, stern measures should be taken against those who break them. Otherwise, the illegal dumping of waste will never cease.
- The number of refuse collection vehicles should be increased in order to increase the amount of waste collected for disposal. This should go hand in hand with a greater commitment and seriousness from all residents throughout the city concerning waste and cleanliness. It was seen as being unfair to ask citizens to change their attitudes without a corresponding improvement in DCC's waste collection performance.
- Several people commented that education and awareness raising on SWM should not end with the current campaign. It should continue until people's behaviour has changed. Other means of spreading the message include displaying posters on different aspects of SWM at road intersections, schools and football grounds throughout the city.

## **2.2.4 Primary School Education**

### **2.2.4.1 Book for Primary School Students**

A book for primary school students titled "Let's Conquer the Rubbish Mountain" has been written and prepared in English and Swahili by members of the Study team in cooperation with the City Commission. A draft version of this book was first produced, photocopied and distributed to 30 primary school teachers for evaluation by them and their students. An independent direct evaluation was also carried out with two classes of Std 5 primary school students at two other primary schools. The book was then extensively revised to produce the final version. 20,000 copies of the Swahili version of this book are currently being printed and will be distributed to primary school students in DSM during March 17-28.

#### **a. Methodology**

The approach and methodology used in the book is summarised below:

- for individual or group use as a text and work book.
- emphasis on learning by reading, looking and doing.
- use of various media: text, pictures, diagrams, games, stories.

- target group is Std 4-5 students in DSM but designed to appeal to a wider age group (Std 4 upwards).
- focus is on DSM, with specific examples being taken from DSM and with little reference to the wider world.

#### b. Topics/Key Ideas

The book contains the following topics and key ideas:

- We use natural resources in order to live - to satisfy our needs and wants. Everything we use comes from the earth and when these things are old or we don't want them anymore, we burn, bury or throw them away. All of these things become waste and return to the earth.
- What is waste?; the amount of waste produced in DSM, types of waste produced in DSM, including hazardous waste.
- Health and environmental problems caused by waste.
- Methods of waste disposal and use in DSM: self-disposal, collection and disposal of waste at the city landfill, illegal dumping, reuse and recycling of waste (including compost making).
- What can we do about waste?: a summary of some key ideas in the book and some suggestions for action.

#### c. Evaluation

The results of the evaluation were very positive. 30 evaluation forms were circulated to teachers. 18 teachers returned completed forms, 12 of whom had given the book to their students to read and use. Of these 18 teachers, 6 (33%) and 10 (55%) rated the book as being very good and good respectively. Corresponding figures from the 12 sets of students who had used the book were 4 (33%) and 6 (50%) respectively. An independent evaluation was also carried out directly by members of the Study team with two classes of Std 5 students at two other schools. These students all rated the book as being either good or very good.

61% of the teachers stated that the book is very different from most Tanzanian primary school books. This is acknowledged as the book deliberately took a different approach from many primary school books in Tanzania being written on one topic and with a focus on one city: **SWM in Dar es Salaam**, but integrating many different learning skills and areas into that topic: problem solving skills, information skills, work and study skills; health, social science, language, mathematics, etc.

In the teacher's evaluation of the book, 72% of teachers stated that the book covers the syllabus content while 50% said it extends the syllabus content as stated above. 89% of teachers said the book was useful for teaching and 78% said it was suitable for Std 4-5 students use.

This evaluation exercise verified that the basic content, ideas and approach of the book were satisfactory and appropriate for upper primary school students (Std 4-7). The comments and constructive criticism offered by both students and teachers were then used to edit and improve the book. The main changes made are summarised below:

- the topics were rearranged to improve the structure and flow of the book. A chapter, section and exercise numbering system, table of contents and introductory paragraph for each chapter were introduced to facilitate this.
- some of the ideas and language in the book were simplified and/or explained in more detail. Some section and chapter headings were changed to be more direct and clear. Examples were changed or added, particularly in the section about reuse and recycling of waste.
- some of the drawings were changed or amended. The clothes of the boy and girl were changed so that they are now wearing DSM primary school uniforms. The cartoon about a girl whose foot was cut by broken glass was made more realistic. Instead of being given crutches by the hospital, her foot was wrapped in a bandage. Some explanations were clarified or added as appropriate. In particular, students had found the detective exercise and picture difficult to understand. The instructions for this exercise were reviewed and an additional picture was added as an example of what the reader is required to do in the exercise.
- the exercises were more closely linked with the contents of the book. Some additional exercises were added while in other cases, the exercise instructions were clarified.
- the answers section at the back of the book was expanded.
- some specific Swahili language problems were remedied. In particular, the word 'ardhi' was substituted for 'dunia' in chapter 1 and some of the crossword clues were changed.

#### 2.2.4.2 Trial Lessons

##### a. Scope

Trial lessons were conducted at 6 primary schools in DSM. Two primary schools were selected in each district. At each school, lessons were conducted with Std 2 and Std 5 pupils. Two members of the Study team and three Tanzanian assistants prepared and conducted the lessons. They divided into two groups in order to reach more students and to experiment with a wider range of teaching material. Each group prepared 2 lessons for Std 2 and Std 5. One group prepared 40 min (1 period) lessons and taught two classes at each school. The other group prepared 80 min (2 period) lessons featuring group work and taught one class at each school. The schools visited and teaching schedule is shown below:

Date	Primary School	District	40 min. lesson		80 min. lesson	
			Std 2	Std 5	Std 2	Std 5
Feb 12	Ilala Boma	Ilala	Y	Y		Y
Feb 13	Vingunguti B	Ilala	Y	Y		Y
Feb 14	Kawe A	Kinondoni	Y	Y	Y	
Feb 17	Mpakani	Kinondoni	Y	Y	Y	
Feb 18	Muongano	Temeke	Y	Y		Y
Feb 21	Azimio	Temeke	Y	Y	Y	

Note: Y indicates classes taught at each school.

## **b. Content**

### **1. Std 2 (One Period lesson):**

The key ideas in this lesson were:

- What is waste?
- We produce lots of waste.
- Problems caused by waste.

A puppet "Mama Safi" (Mrs Clean) was used as the teacher. She taught the students about SWM using a series of 5 hand-drawn coloured pictures, each of which showed a different aspect of SWM as explained below:

1. Waste can not move by itself. We must put it in a rubbish bin.
2. The amount of waste produced increases as the number of people increases.
3. We must do personal cleanliness: clean our hands, body and wash our clothes.
4. It is dangerous to play near heaps of waste. These are dangerous as they contain harmful insects, rats, sharp objects, etc.
5. Waste causes problems - eye disease, stomach ache, diarrhoea, etc.

### **2. Std 5 (One Period) Lesson:**

The key ideas in this lesson were:

1. What is waste?
2. How is the waste of DSM managed?
3. What shall we do about waste?

Three dialogues, each addressing one of the key ideas, involving two people were used together with 8 hand-drawn coloured pictures to teach about SWM. Before each dialogue, students were asked relevant questions to start them thinking about the topic to be covered in the dialogue. Answers were taken and the dialogue then started. The pictures showed:

1. Many kinds of waste are produced from our daily activities.
2. Playing near heaps of waste is very dangerous.
3. Waste dropped carelessly will fly away, block drains and cause other problems.
4. In DSM, many people now dispose of waste by burning, dumping in a pit, or dumping waste illegally.
5. Presently in DSM, only 10% of the waste generated is disposed of at the city landfill.
6. In the case of some foreign countries, waste is sorted and there are street cleaners.
7. In Japan, many types of waste are recycled.
8. We must clean our surroundings, put waste in rubbish bins and make the city clean.

### **3. Std 2 and 5 (Two period) lesson:**

The key ideas in these lessons were:

1. What is waste?
2. Different types of waste, including dangerous waste.
3. How much waste is produced in DSM?
4. Good and bad things concerning waste.

A bag of 10 different kinds of waste was used as a teaching aid to demonstrate to students the first three key ideas. The students were then divided into groups of 5-7 and given one of the following two activities on good and bad things concerning SWM:

- Each group was provided with a set of 12 photos, taken in DSM. 6 photos showed "good things" about waste (good disposal methods, reusing waste, etc.) while the other 6 showed "bad things" (bad disposal methods, problems caused by waste, etc.). Each group had to classify each photo as good or bad and explain why they had done so. Feedback from each group and general discussion followed.
- Each group was provided with a copy of the game "Snakes and Ladders" and taught how to play it. The words on the game corresponding to ladders and snakes related to good and bad aspects of SWM respectively as shown in the photos. After playing the game, the words on the game were related to the photos and a discussion on good and bad things concerning SWM followed.

All lessons concluded with some questions for evaluation purposes.

#### **c. Response to Trial Lessons**

The trial lessons were well received by teachers and students. Overall, a large majority of students rated the lessons as "good" or "very good". "Mama Safi" was popular with Std 2 students, most of whom had never seen a puppet before. The hand-drawn coloured pictures used were colourful, attractive and each conveyed a clear message to students. Mama Safi's teachings and the dialogues were closely related to these pictures, thus reinforcing these messages.

Students also enjoyed working in groups, either doing the photo exercise or playing the snakes and ladders board game. As the photos showed real life situations in many parts of DSM, this added a greater sense of realism to the exercise. However, board games such as Snakes and Ladders are completely new to most students and hence there are a lot of things students must be taught in order to be able to play such a game. Std 5 students learned quickly and successfully played the game while Std 2 students found it difficult and it took them a long time to learn to play it.

On the conclusion of the trial lessons, as a large number of resources had been prepared for the group work lessons, most of these were distributed to the schools visited and to the three Primary School Teachers Centres (one in each district).

#### **d. Evaluation**

A simple questionnaire consisting of 3-4 questions was used for evaluation purposes, primarily to assess if students understanding of SWM issues had increased and what



practical action, if any, they would take as a result of what they had learned. Each group devised their own questionnaire suited to their particular lessons but taking into account these aims. Each evaluation is summarised separately below:

**1. Std 2 (One period) lesson:**

After the lesson, 90% of the total number of 493 students taught stated they understood why waste is dangerous (Q.1) and 87% stated they know what happens to us if our surroundings are dirty (Q.2). Reasons given include waste allows harmful insects to breed and it causes disease (eyes, stomach ache, etc.). 89% of students stated they know why we put waste into the rubbish bin or pit (Q.3). This is done to store waste, to keep our surroundings clean, to avoid bad smell, harmful insects breeding and to avoid diseases.

When asked what they will do about waste and cleanliness, their answers focused on personal cleanliness (washing my body, hands, clothes), home hygiene (mopping the floor, sweeping, washing dishes) and digging a refuse pit.

**2. Std 5 (One period) lesson:**

91% of the total number of 394 students taught stated they understood what waste is. 90% said they know what happens to us if our surroundings are dirty and 93% said they know how waste is dangerous to us. Stated reasons were that waste causes the production of harmful insects, rodents and bacteria; waste causes the eruption of diseases such as malaria, cholera and diarrhoea; waste also increases the risk of injury to people.

The actions which students stated they could take about waste and cleanliness include general cleaning (35%), use of a rubbish bin (12%), use of a rubbish pit (10%), washing clothes and dishes (4%), mopping (2%) and burning waste (1%).

**3. Std 2 and 5 (Two periods) lesson:**

88% and 7% of the 451 Std 2 and Std 5 students taught stated that the lesson was "very good" and "good" respectively.

Std 2 students answered Q.2 and Q.3 in groups. Q.2 asked them what they had learned. Most groups stated that they had learned about cleaning and beautifying the city, good ways of waste storage and disposal and the bad effects of rubbish and diseases caused by waste.

Q.3 asked them what they will do about waste and the problems which it causes. Most groups answered that they would use proper methods of waste disposal such as storing waste in a bucket or drum, disposing of it in a pit or by burning. The second most popular answer to Q.3 concerned trying to clean and beautify the city, including our surroundings. Some students also added about avoiding the bad effects of rubbish and bad behaviour such as littering, collecting food from rubbish heaps and illegally dumping waste.

Std 5 students answered Q.2 and Q.3 individually. For Q.2, 53% of the Std 5 students taught stated they had learned about good methods of waste storage and disposal (e.g. using a rubbish container, digging a refuse pit, burning waste); 24% about cleaning and beautifying the city and 16% about the bad effects of rubbish, diseases caused by it and bad behaviour (e.g. not to eat food found in rubbish heaps, not to play near dumps). A

further 3% stated they had learned that some rubbish was beneficial and could be used for other purposes. 15% of the students either did not answer this question or their answers were illegible.

For Q.3, 68% of Std 5 students stated they would use proper methods of disposal (e.g. use of a rubbish container, refuse pit, burning). 20% said they would avoid bad behaviour (not playing near rubbish, not picking up things from rubbish piles, not littering) and 9% said they would try to make the city clean and beautiful. 13% of the students either did not answer this question or their answers were illegible.

#### **4. General:**

Although no assessment of the student's knowledge and understanding of SWM was made prior to the lessons, the evaluation results are very encouraging as they suggest that students did learn a lot and have clear ideas of what they can do about waste. Furthermore, they had been motivated by the lessons to do these things.

Students were also given the opportunity to ask questions at the end of each lesson. Some of their questions addressed some of the fundamental issues of SWM in DSM and provides further evidence that students had gained from the lesson and that it is appropriate to teach students of both Std 2 and particularly Std 5 about SWM. The relevant questions have been divided into two categories and are summarised below:

##### *Personal behaviour:*

1. why are we dirty?
2. why do we heap waste in our areas?
3. why don't we bother making cleanliness?
4. what can citizens do if the City Commission doesn't provide vehicles to remove waste in their areas?

##### *Responsibilities of the City Commission:*

1. What will happen if the City Commission fails to keep the city clean after the campaign "Beautify your city" is over?
2. What rules/by-laws are there to apply against those who make the environment dirty?
3. Why doesn't the City Commission punish all those who make our environment dirty?

Some comments received from teachers are stated below:

1. Teaching on SWM should not end with the campaign but be a continual practice not only for students and at schools but also in other areas and for all citizens.
2. By-laws should be enforced against whoever makes the environment dirty.
3. Schools should be provided with rubbish containers.

### **2.2.4.3 Comparison of Book and Trial Lessons with Domestic Science Syllabus Content**

SWM issues come under hygiene, health and sanitation which are taught as part of the Domestic Science Primary School syllabus. According to this syllabus:

- Std 1-2 students are mainly taught about cleanliness of the home, toilets, classroom and school and disposing of rubbish in approved places such as in a refuse container or drum or refuse pit.
- Std 3 students learn about disposal of waste by burial or burning. They also learn about the symptoms, means of infection and prevention of common diseases such as cholera, malaria, eye diseases, etc.
- Std 4 are taught about flies, mosquitoes, rats and bacteria including the breeding places favoured by these vectors and the problems caused by them.
- In Std 5, places for waste disposal are discussed in more detail.
- In Std 6, students learn about preventing and eliminating flies and mosquitoes. The students are supposed to inspect rubbish pits and cover all places having dirty water within the school grounds.
- No specific reference was found to SWM issues in the Std 7 syllabus.

Both the book and trial lessons cover all these topics. They also introduce new material including the amount of waste produced in DSM, hazardous types of waste, collection and disposal of waste at the landfill and the reuse and recycling of waste. The book and lessons are written specifically for DSM and hence there are many specific references to the SWM situation in the city.

The content of the lessons for both Std 2 and Std 5 is comparable to what is contained within the syllabus for these classes although some Std 3 material was included in the lesson for Std 2.

### **2.2.4.4 Seminar for Primary School Teachers**

The seminar was held at Ilala District Teachers Centre, Uhuru Girls Primary School, from 9am-2pm on Wednesday, 19th February 1997. It was organised by members of the Study team in conjunction with Mr Mbegu (City Education Officer) and Mr Abdallah (City Academic Officer). 37 participants attended the seminar, 29 of these being primary school teachers; the remainder being 3 District school inspectors, 3 District Academic Officers, a District Health Officer and the City Academic Officer.

The seminar was opened by the Education Commissioner, Mr Rajabu. In welcoming the participants to the seminar he made a number of important points:

- he greatly appreciates the efforts JICA is making concerning education and awareness raising about SWM. He felt that a seminar such as this is an excellent way of passing on knowledge and information concerning SWM to primary school teachers as well as for discussing various teaching methods with primary school teachers. As such, the JICA Study team is acting as "teachers of the teachers".

- he stressed the importance of participant teachers passing on what they gain from the seminar to their fellow teachers and pupils. In turn, he hoped that they will pass on what they learn to their families and friends so that the seminar has a large “multiplier effect” and reaches many people.

The first part of the seminar consisted of a presentation of teaching material and lessons conducted by members of the Study team including comments on the responses of the students to the lessons. The participants greatly enjoyed this part of the seminar, especially watching the puppet “Mama Safi” at work teaching. Several teachers asked for copies of the Snakes and Ladders game.

The second part of the seminar consisted of an evaluation of the draft version of the book on SWM for primary school students that has been produced by the Study team. Copies of this book and evaluation forms had been circulated to seminar participants prior to the seminar for their inspection and to trial with their students. At the seminar itself, the evaluation forms were summarised and the results presented to seminar participants. An opportunity for some general discussion on the book was also provided. Some useful feedback on the book was provided to the Study team through both the evaluation forms and general discussion and this was used extensively to edit the book to produce the final version for printing.

In the final part of the seminar, participants were split into groups and given the task of preparing some educational/awareness raising material on the theme of solid waste. Groups used a variety of methods including poems, role play and teaching aids. Presentations from each group were of a high quality, especially the poems, some of which have subsequently been published in local newspapers.

Feedback from participants was very positive with 84% and 16% of the participants rating the seminar as being “very good” and “good” respectively.

The Study team’s presentation was judged the most popular part of the seminar by 51% of participants while 35% of participants stated they liked the participants presentation the most and 14% the book evaluation.

All participants stated they had learned something from the seminar. 62% had increased their knowledge on SWM; 35% had learned about the problems caused by waste and 73% had learned about different ways of teaching about SWM.

Participants were asked whether they would use anything from the seminar in their teaching. 54% said they would use the book while 40% said they would use what they had learned about waste. 11-16% of participants said they would use the pictures or dialogue or games or photos in their teaching while 5% said they would use the puppet.

A large number of general comments were made by the participants. 54% of participants suggested that more seminars should be introduced to teachers and the general public. 22% added that by conducting seminars more often it can motivate people to improve their habits concerning cleanliness. 19% of participants suggested that the seminar should be conducted monthly and that the allocated time should be increased from half a day. 19% encouraged the Study team to take their opinions concerning the book into consideration in producing the final version of the book.

11% of participants suggested that teaching materials such as drawing paper and pens be provided to participants to enable them to prepare teaching aids. 11% of participants

suggested that this topic be introduced into the primary school syllabus. 8% of participants advised that this project should be extended to cover all primary schools in DSM. 5% of participants suggested that the JICA Study team should introduce this project to all primary schools in DSM. 5% of participants advised producing more copies of the book.

#### **2.2.4.5 Poster Competition for Primary School Students**

The competition took place on Thurs 20th February from 10am-4pm at three venues around the city (one in each district): Kinondoni Teachers Centre (Mzimuni Primary School, Mkumi Street, Magomeni); Ilala Teachers Centre (Uhuru Girls Primary School, Uhuru St, Kariakoo) and Temeke Teachers Centre (Wailes Primary School, Likwati St, Temeke). Each student was provided with paper and crayons for drawing and received a "Beautify Your City" sticker and soft drink. The competition was advertised to schools through the City Commission and District Education Offices as well as on Radio Tanzania DSM.

The theme for the poster competition was "Beautify Your City". Pupils were provided with a number of suggested topics on this theme which they could choose from:

1. Clean your Neighbourhood
2. Clean DSM
3. Dispose of Waste in a Good Manner
4. Waste is Dangerous to our Health
5. Your Own Choice related to the theme.

The total number of posters handed in by students for judging was 1353. Many of the posters showed scenes of people cleaning around their homes or around their neighbourhoods or schools. Other posters showed people disposing of waste, waste being collected by truck or scenes of a clean city. A few posters copied the design on the official "Pendezesha Jiji Iako" t-shirt or showed pictures of rubbish bins or were not related to the theme.

Judging was carried out by Mr Bakari Mziray (Muazi Mmoja Primary School Teacher), Ms. Sifa Mgaya (Ilala District Health Officer) and Mrs Hatsue Maeda (JICA Study team member). Winners were contacted by DCC through their schools and District Education offices. Prize winners were invited to the National Stadium on March 2nd to receive their prize at the 10 km "Taka Race". Prizes were awarded to the best 20 posters. The approximate monetary value of each prize is listed below: 1st: 6,000; 2nd: 5,000; 3rd: 4,000; 4th: 3,000; 5th: 2,000; 5 prizes to "Very Highly Commended" entries: 1,500 ea.; 10 prizes to "Highly Commended" entries: 1,000 ea. The best 100 posters were displayed at the National Stadium on March 2nd.

It is intended to use the best 100 posters as a tool to improve awareness amongst the general public as well. These posters will subsequently be displayed at different venues around the city.

The judges commented that there was a general lack of understanding on what constitutes a poster. Generally, the pictures drawn were small, especially the size of people relative to the size of houses and other objects. The colours used were not strong

enough for posters. This may partly be attributed to lack of experience at drawing pictures and unfamiliarity with crayons. For example, many students opted to use pencils rather than the crayons provided. The judges also noted that there was an experience and ability gap between the students of Std 1 and Std 7. It was suggested that if there is a future competition it should be divided into two sections: lower and upper primary school students, possibly with separate sub-sections for boys and girls.

### 2.2.5 Concluding Remarks

The full programme of events scheduled as part of the Clean DSM project was successfully completed and some tangible resources in the form of the video "Beautify Your City" and the book, "Conquer the Rubbish Mountain", for primary school students have been produced. The evaluation process carried out for each event showed that participants had enjoyed the event, learned something about SWM and expressed a willingness to do something about waste as a result of the event. This is encouraging and in this sense, the programme may be judged a success.

However, an assessment of whether individual attitudes and behaviour has changed is much more difficult to make. Realistically, on a city wide basis, no change is expected, given the short time frame of the programme and the small number of residents reached relative to the city's population.

Further education and awareness raising programmes are required. Several people commented directly on this, saying that education and awareness raising on SWM should not end with the current campaign. It should continue until people's behaviour has changed.

A major problem with any future campaigns is the perception many residents have of the City Commission. In the words of one participant: "DCC says a lot but does little". This is the main reason why many residents thought it was unfair to ask citizens to change their attitudes without a corresponding improvement in DCC's SWM performance, particularly in the areas of waste collection and by-law implementation and enforcement. It is vital that the general public's perception of DCC be improved and this will primarily be achieved through improved SWM performance, not by education and awareness raising campaigns. In fact, the two elements must proceed hand in hand in order for any real progress to be made.

In this context, it is appropriate to refer to education and awareness raising campaigns from other countries, which contain some important lessons for Tanzania:

1. New Zealand has for many years had one of the highest road accident death rates per capita in the world. Many of these road accidents and fatalities were caused by people who had been drinking alcohol and then driving home. A massive public education campaign using the mass media (especially television advertisements), police spot checks and regular blitzes to catch offending drivers, and heavy fines has been taking place over approximately a ten year period to try to change attitudes and reduce the number of drink-driver related accidents and deaths. This programme has gradually resulted in a change of attitudes over this period. Many people now will not drink if they are driving home afterwards or if they do drink they will get a taxi home. Last year, the road death toll in New Zealand was actually reduced for the first time.

2. In Japan, the introduction of the segregation of domestic refuse at source (i.e. people sorting their domestic waste into categories for recycling purposes) was accompanied by large scale public education programmes in many cities to educate the public on what they must do. For example, a SWM expert in Suita city stated that a total of 997 meetings were held with city residents over a three year period. A quarter of city residents attended at least one of these meetings. He stated that "without such contact with the people it is difficult to change attitudes".

These two examples demonstrates many key elements of education and awareness raising programmes:

- A long time period of many years is required to achieve changes in attitudes and behaviour.
- some way of getting the message across to as many people as possible is needed. Generally, this takes the form of an organised programme featuring meetings, campaigns, advertising, etc.
- the content and style of the programme must take into account factors such as customs, politics, education level, etc.
- resources are needed to fund and conduct such programmes.
- positive or negative incentives may be used to make people change their behaviour.
- the concerned authority must implement and enforce such programmes. This means that the relevant institutional, financial, administrative and judicial systems and infrastructure must work properly.

These points may be taken into consideration in planning further public education and awareness raising programmes on SWM in DSM.

## **2.3 Environmental Improvement Experiment of the Vingunguti Disposal Site**

### **2.3.1 Objectives of the Pilot Projects**

### **2.3.2 Background**

The Vingunguti disposal site is the only existing official waste disposal site in DSM operated by DCC. It is located on the banks of Msimbazi valley, 8.7 km southwest of the city centre, and is surrounded by a densely populated unplanned residential settlement. The site was opened in 1992 in response to the requests of several residents in the area who wanted to protect their respective properties from seasonal floods, and following the closure of the Tabata, Mbagala-Kilungule, and Kunduchi disposal sites, due to local residents' protests.

The site area is approximately 6 hectares and is estimated by the Study Team in the beginning of July 1996 to have a reserve volume of 166,000 m<sup>3</sup>.

Wastes are collected at the check point at the disposal site entrance for a dumping fee of 800 Tsh per tonne. As there is no weighbridge at the site, the dumping fee per vehicle is calculated by estimating the total amount of waste carried by each vehicle.

Few environmental protection measures are established in the site. Soil cover is hardly applied at present, resulting in the outbreak of offensive odour, breeding of flies, mosquitoes and rats, and sometimes the production of smoke. Due to crude dumping operations, the landfill is unhygienic, an environmental nuisance to the residents in the vicinity, and often the subject of their complaints.

The route of the Msimbazi River was diverted in 1995 to increase the capacity of the disposal site. This development, however, is only a short term solution as the present disposal site will be full in 1 to 2 years time. Furthermore, there are concerns about the long term environmental impact and security of the Vingunguti disposal site as it is located in the Msimbazi river flood plain. Since there are currently no plans to construct a future landfill, the city is left with no recourse but to use the present landfill for the time being.

### **2.3.3 Plan of Pilot Projects**

#### **a. Major Problems**

The following are the major problems identified based on the results of the field reconnaissance carried out by the Team in the Vingunguti:

- Since the access road from Nyerere Road to the site is not paved, people often complain about the dust, noise, etc. caused by the transit of refuse trucks.
- Although tipping fee is collected, the control of incoming wastes and vehicles is not well established.
- The landfill has no environmental protection facilities, such as gas removal, surrounding drains, etc. and soil cover is scarcely applied.
- Though previous reports on landfill improvement stressed the necessity of sanitary landfill operations, no actions have been actually taken. Only a few of the people concerned in SWM and virtually none of the residents in the vicinity know anything about sanitary landfill operations.

#### **b. Improvement Plan**

In order to mitigate the current situation, obtain the approval of the residents on the continuous operation of the current disposal site until a new sanitary landfill is established, and to make the people concerned in SWM understand the importance of sanitary landfill operations, the following improvement measures were planned:

- Improvement of the access road from Nyerere road to the landfill;
- Development of a computer programme for weighbridge operations to identify and control incoming wastes, manage tipping fees and control refuse collection vehicles;



- Implementation of sanitary landfill operations such as installation of gas removal facilities, construction of drainage canal, application of cover soil, construction of protection bank and on-site road;
- Improvement of relations between the people concerned in SWM and residents in the vicinity of the landfill.

#### **2.3.4 Execution of the Project**

The Vingunguti road from the Nyerere road to the entrance of the Vingunguti disposal site, which has 1.2 km in length, was paved.

In the Vingunguti disposal site, the drainage system, temporarily road were constructed. Embankment were filled with refuse along the edge of the disposal site.

The Vingunguti weighbridge started its operation and the control system for the weighbridge was developed. The operation method was transferred to DCC's operators.

#### **2.3.5 Findings**

The following benefits were found through the implementation of the Vingunguti Sanitary Landfill Project and they were supported by the result of public opinion survey conducted by the Study team.

- 1) Improved landfill sanitary and environmental conditions
- 2) Decrease in complaints from residents of the vicinity
- 3) Extension of landfill operation period
- 4) Establishment of controlling system for incoming vehicles and wastes, tipping fees, and collection vehicles
- 5) Increased awareness of the importance of sanitary landfill operation among the people concerned with SWM in Tanzania
- 6) Increased resident awareness and cooperation in proper SWM operations
- 7) Acquisition of new technology for sanitary landfill operations

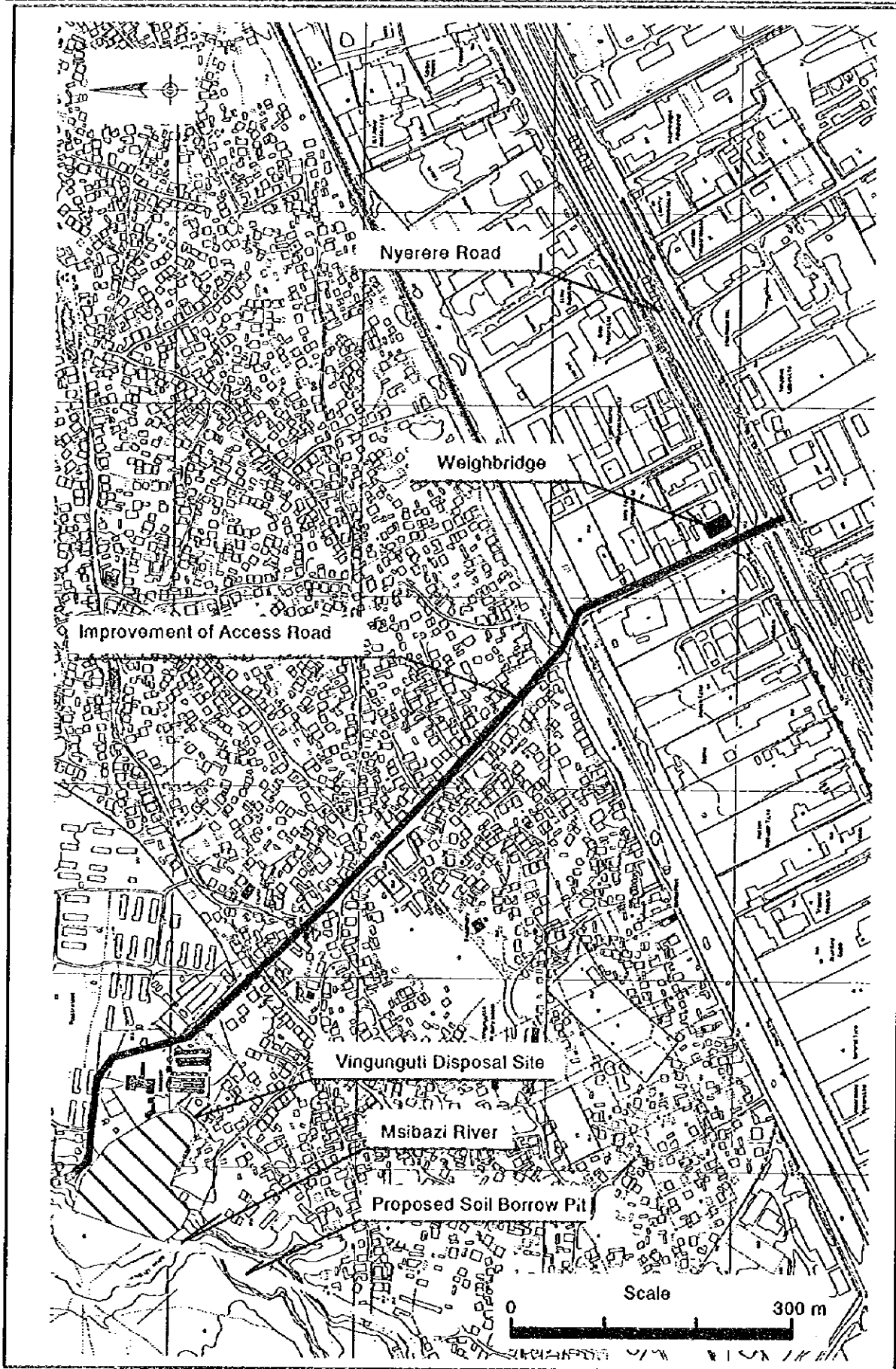
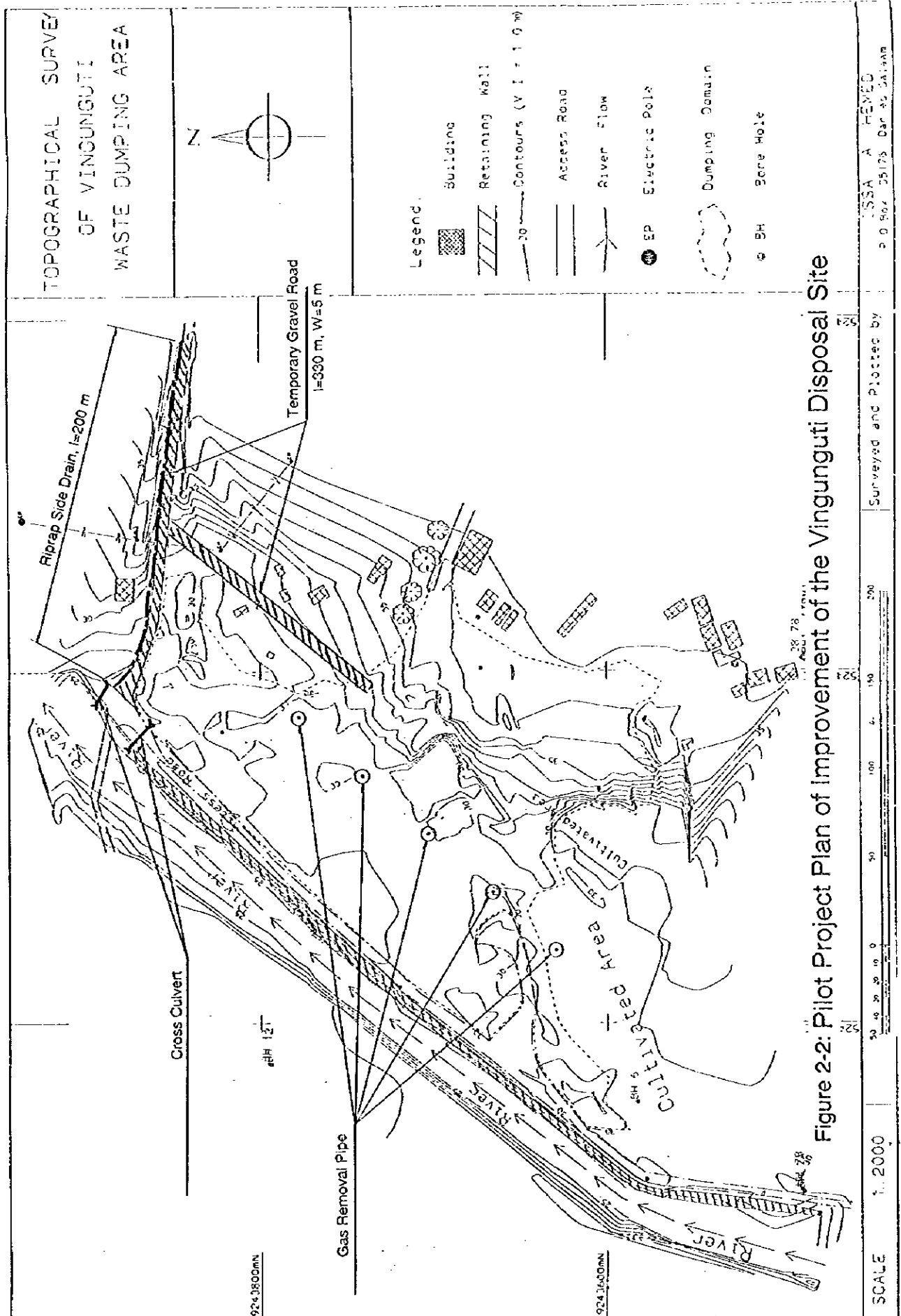


Figure 2-1: Location Map of Vingunguti Sanitary Landfill Project



## **2.4 Improvement Experiment of the Refuse Collection System in Kariakoo**

### **2.4.1 Background**

Kariakoo ward is located in the central part of DSM next to Mchafukoge ward, and is made up of business offices, housing, shops and small scale industries. It is adjacent to the port of DSM and the DSM TAZARA Railway terminal, which links Tanzania with neighbouring African countries. There are also several bus terminals in this area for local, national and international services.

Kariakoo Market is the largest market in the country. Accordingly, the area is a major point for commercial activities in DSM, acting as a reception and distribution centre for goods from all parts of Tanzania, Africa and overseas. Everyday, the area is full of petty traders, tradesmen, merchants, shoppers, and bus passengers.

Kariakoo is bordered by two main roads, the Morogoro Road and Bibititi Mohamed Road, and is transversed by the regional road, Msimbazi Street. In accordance with city plans, other roads are laid out at right angles.

Although an open drainage system was built around the Kariakoo market in 1995, these drains are primarily used as waste dumping ditches. Similarly, the sewer system along Msimbazi Street does not function properly, being clogged with refuse and sand. Because of these inefficiently maintained systems, rain water and drainage fill the streets during the rainy season. The disposal of waste in vacant lots has also resulted in the accumulation of heaps of waste, which litter the streets when strong winds blow. The dumping of waste in the streets, open places and drains has seriously rendered Kariakoo very insanitary.

This condition is partially due to the lack of an official refuse collection service in the area. The only reliable waste collection service that has been operating in the area for some time is the collection of the Kariakoo market waste by private contractors. Multinet, a private contracting company, was collecting refuse from Kariakoo until Jan. 1996. In July 1996, the company resumed its services in Kariakoo following the expansion programme of private collector service, however, it withdrew from Kariakoo ward again in November 1997 due to the lack of people's cooperation for RCC and also too much waste generation. Following the withdrawal of Multinet, DCC took over Kariakoo ward and mobilised Tanzanian Environmental Cleanliness Association (TECA), which is a community based organisation, for street sweeping. However, without the cooperation of the public and the enforcement of anti-littering legislations, the refuse collection services of DCC will not be enough to clean up the area.

Kariakoo is the most problematic area in DSM in terms of SWM due to too many population and too many petty traders.

### **2.4.2 Plan of Pilot Projects**

#### **a. Major Problems**

The following are the major problems identified based on the results of the field reconnaissance carried out by the Team in the Kariakoo area:

- Although street sweeping service is conducted every day except Sunday, the roads, including Msimbazi Street, are still scattered with wastes due to heaps of swept waste left on the roadside and littering by the public.
- There are many petty traders doing business near the Kariakoo market. Their waste are heaped in collection station which are specified on roads. Refuse are scattered and streets are looked to be ugly. The considerable amount of waste generated makes loading refuse work difficult.
- Drain cleansing wastes are not immediately collected, making the area unsanitary.

#### **b. Improvement Plan**

Upon consideration of the results of the public opinion survey and the findings of the field reconnaissance, the following improvement measures were planned to improve refuse collection system in Kariakoo

- Installation of litter bins along streets in Kariakoo.
- Trial introduction of skip container collection system with five skip containers around the Kariakoo market where many petty traders are doing business.
- Encourage public cooperation in scheduled drain cleansing;
- Control of littering and enforcement of bylaws on violation.

### **2.4.3 Execution of the Project**

#### **a. Installation of litter bins along streets in Kariakoo**

80 fixed type litter bins and 20 unfixed type litter bins which were made of empty drums were placed along streets in Kariakoo.

#### **b. Trial introduction of skip container collection system**

Five skip containers were placed at the refuse collection stations around the Kariakoo market where many petty traders are doing business and skip containers were collected and transported to the Vingunguti site for emptying.

#### **c. Encourage public cooperation in scheduled drain cleansing;**

The meeting were held on 13th of February 1997 following the implementation of the pilot projects, by which one of them is "the improvement of the refuse collection system in Kariakoo". Based on the fact that, improvement of the refuse collection system it highly depends on how cooperative the people are, and also taking in account that people has their own views on how to improve the system, the JICA study team prepared two main agendas in a form of question and as a request respectively to guide the meeting.

**Agendas:**

1. Opinion views on what refuse collection system can work properly in the Kariakoo area ( with reference to the former performance etc.) and what is the personal views on the use of skip containers and litter-bins.
2. Request to petty-traders, shop-keepers, residents etc. to clean the storm water drains passing along their premises.

### *Discussions*

#### *1. The systems which were mentioned by the Kariakoo members are as follows.*

- House to house collection
- Each street to have a common collection point where by one permanent DCC staff will clean the street and make sure all the refuse from his area i.e. street litters, house hold wastes and trade wastes are loaded in the collection truck which should collect from each collection point of each street, also the DCC staff should make sure that, no waste from other street/areas than the one he/she is cleaning that will be brought illegally.
- Container and street litter bins system are good, but the collection efficiency is doubtful. The refuse collection is not expected to be done properly anymore from their experiences. They expressed their worries that, these community containers may change into dumping areas, nuisance and dangerous to their health due to insufficient collection capacity.
- To reduce the amount of waste generated in the city, all farmers whom do bring their crops ( especially fruits and vegetables) to the Kariakoo market should be educated on a proper packaging way for their produce, and they should stop using grass because these increases the amount of unnecessary waste imported in the city.
- Petty- traders should be removed from the Kariakoo area and resettled to any other place which will be suitable to that kind of business.
- The people are ready to cooperate to the systems accepted basically if the refuse collection services will be frequently and sufficiently provided.

#### *2. People's cooperation on cleansing of storm water drains, the responds were as follows*

- They can clean and they do clean, the DSM residents by nature they have cleaning manner, but the only big problem and by which they want it to be solved first is removal/ collection of the refuse swept from the drains, these should be removed from the streets immediately or otherwise the cooperation won't be fair.
- Drainage should at least be covered to prevent sand and rubbish to access into the system.

### *Conclusion:*

The Kariakoo community representatives requested the JICA study team and DCC to seriously consider their views on whatever they remarked during the discussion and also they expressed their positive feelings to the present strategies to improve solid waste management in their areas.

Although they appreciated the idea of conducting the today's meeting, but they still strongly accuse the responsible authorities that, it doesn't inform them before until when it become stuck some where, they say these may lead to unfair final decision because that is their area where perhaps they stayed for whole of their life, so they can have the most important points to be considered for any program involving their place. To be more strictly on this they asked the JICA study team to contact them whenever they want

#### **List of Members**

Peter J. Buguye	ASBO Chairman
Magellanga W.E.M	TECA Secretary
Nasibu Seleman	ASBO Member
Athanas Laurence	ASBO
Dangama H. Dangama	ASBO V/Chairman
Abdallah Juma	Representative NCCR & Chairman Kariakoo Ward
J. Swai	Cleansing superintendent, Kariakoo market
Mr. Shamsham	Street Secretary
Mr. J. O. Mfaaume	H/Teacher, Lumumba P/School
S. Mandwanga	CCM Secretary, East Kariakoo
Mr. Masoud	Street Secretary (Meeting Chairperson)
Mkono R.J	Ilala district's cleansing Officer
J. Maginga	Education Coordinator, Kariakoo Ward
J. C. Ndaro	Ward Executive Secretary, Kariakoo
Sifa. I. Mgaya	Health Officer, Kariakoo Ward
Elias Chinamo	Health Officer, City Cleansing Officer
Akira Doi	JICA Study Team
Hatsue Maeda	JICA Study Team
Kizito Nkwabi	Health Officer, Full time C/P of JICA Study team.

#### **d. Control of littering and enforcement of bylaws on violation.**

to be completed

#### **2.4.4 Findings**

It is difficult to gain public co-operation for the prevention of littering if a sufficient refuse collection service is not provided. For example, the litter bins installed in Kariakoo ward were used not only for litter but also for the discharge of residential and commercial wastes. Most of them became refuse collection points as a result. This shows that litter bins (which requires public co-operation for the prevention of littering) can not function according to their purpose without the provision of a sufficient refuse collection system. This also indicates that the skip collection system can work in Kariakoo ward, i.e. in the SUPA.

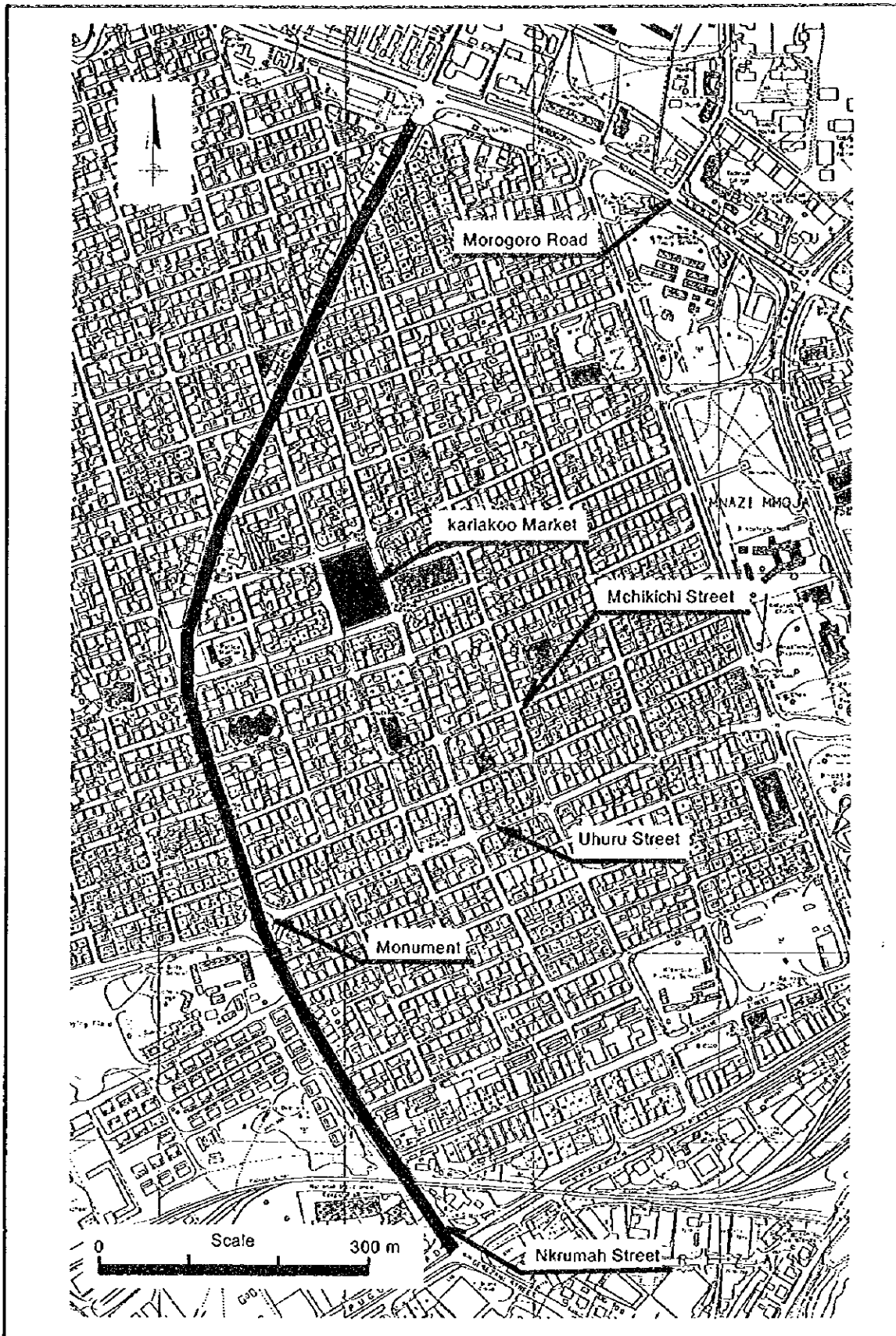


Figure 2-3: Location Map of Kariakoo Pilot Project



## **2.5 Improvement Experiment of the Refuse Collection System in Buguruni**

### **2.5.1 Background**

Buguruni Ward is located about 3 kilometres west from the centre of DSM. Nelson Mandela Street passes through the western part of this ward, and Uhuru Street which runs off Nelson-Mandela Street divides the ward approximately in half.

Although Buguruni is located near the metropolis, it is an unplanned developed area, (SUUA), hence infrastructure is relatively poor. The majority of roads are unpaved and narrow, preventing cars from advancing further inside the ward. There is no drainage system and few households have electricity. Even fewer households have water pipe connections and many people buy water from water vendors.

Presently, DCC collects refuse from the market, but very infrequently. The waste collection point is approximately 200 m<sup>2</sup> in area and is located in a depression (resulting from the use of a wheel loader for refuse collection) near the canteen section of the market. It is subject to flooding and the conditions are generally unsanitary due to leachate seeping out from the waste heap, numerous flies, and foul odour.

Residents of this ward do not receive refuse collection service. Instead, residents manage their refuse themselves using various methods. People having some space within their premises practice self-disposal by digging a pit for their waste which they usually burn. Others, especially those living near roads, illegally dump their refuse in hollows or potholes in the roads. Some of those living near the market dump their refuse at the market waste collection point. Another method involves the hiring of people, usually hand cart operators, to remove refuse; payment is usually based on the number of trips. In view of these conditions, the establishment of a community based refuse collection system would be most suitable for this ward.

Buguruni is classified as a typical DCC refuse collection area (Area B: SUUA) in the proposed SWM M/P. Although refuse collection service is provided for Buguruni market, it cannot cope with the huge amount of market waste generated. Consequently, it is necessary to examine if the proposed improvement plan for the DCC collection areas in DSM would be feasible in Buguruni.

### **2.5.2 Objectives of the Pilot Projects**

### **2.5.3 Plan of Pilot Projects**

#### **a. Major Problems**

The following are the major problems identified based on the results of the field reconnaissance carried out by the Team in the Buguruni area:

- The residential area is not provided with refuse collection services
- Since the residential area has been developed without a city development plan, it has limited infrastructure, including few access roads.

- Buguruni market is very unsanitary due to the filthy condition of the waste collection point (WCP), poor natural drainage and access road conditions.

#### **b. Improvement Plan**

Upon consideration of the results of the public opinion survey and the findings of the field reconnaissance, the following improvement measures were planned to improve refuse collection system in Buguruni.

##### **Provision of refuse collection services to the present non-collection service area:**

- Primary transport of refuse to the collection point by the residents (beneficiaries) with the cooperation of NGOs, CBOs or individual collectors;
- Installation of public containers by DCC at waste collection points (WCP) accessible to container trucks;
- Secondary collection from WCP to Vingunguti disposal site by DCC and establishment of a beneficiary partial payment system for secondary collection expenses.

##### **Improvement of market waste collection:**

- Construction of a WCP with a bay for waste storage and two containers (improvement of WCP);
- Improvement of the market access road and WCP;
- Improvement of the drainage system to avoid leachate generation at WCP;
- Collection of RCCs (refuse collection charges) from market operators.

#### **2.5.4 Execution of the Project**

##### **a. Trial introduction of skip container collection system**

Two containers were placed at conventional refuse dumping points along the Uhuru road which is a trunk road in Buguruni ward and they were collected and transported with a skip container truck regularly.

The locations where skip containers were placed had some distance from the residential areas. Initially our plan was to place near the residential area and to leave the community responsibility to maintain it. However, we found this aim can not be applied for the actual situation because the most concern by majority of community members was to avoid refuse discharge by people from nearby communities. If we follow the original idea, the finding won't match to what we expected. Therefore we changed the original aim in this trial.

The aim which we took was to examine whether people bring and discharge their waste into skip containers which were placed along the trunk road with some distance from residential areas. In terms of collection and transportation efficiency, the nearer the better for the location of skip containers. In addition, the other aim of this trial was to

examine the magnitude of necessity of NGO and/or CBO's involvement for refuse primary collection service.

**b. Improvement of market waste collection:**

The construction works including an direct access road from the market to the Uhuru road, pavement of the centre square, drainage, skip container yard, refuse stock bay, etc. were implemented. Following that a skip container was placed and collected and transported with DCC's skip container truck.

**2.5.5 Findings**

Public co-operation for primary refuse collection to a skip can be obtained if refuse collection services are sufficiently provided. For example in Buguruni ward, although skip containers were placed just beside the Uhuru road which is some distance from residential areas, it was observed that considerable amounts of household wastes were discharged into them. This proved that a considerable number of people would bring and discharge their wastes into skips to be installed along a trunk road even without primary collection services in the SUUA.

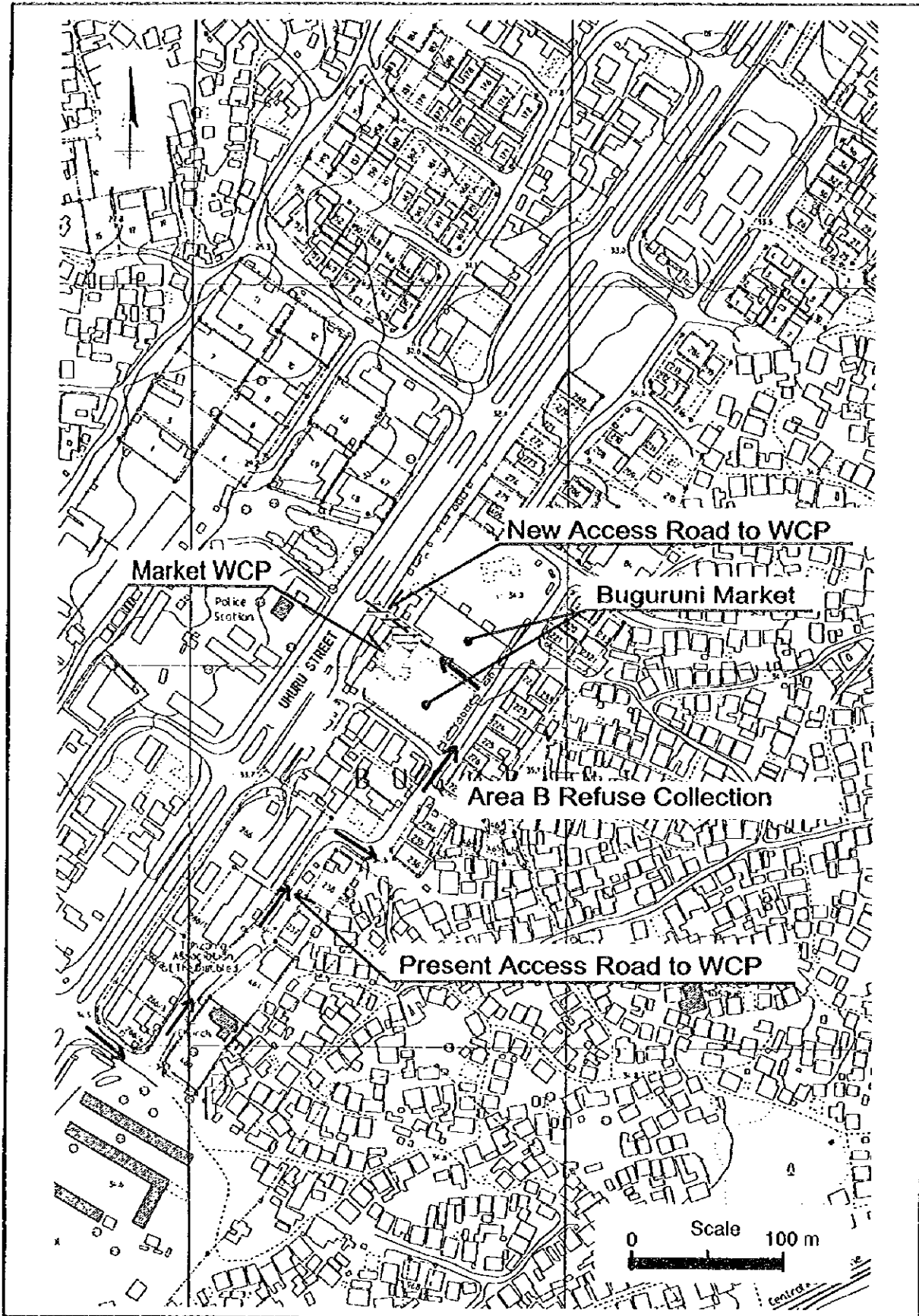


Figure 2-4: Location Map of Buguruni Pilot Project

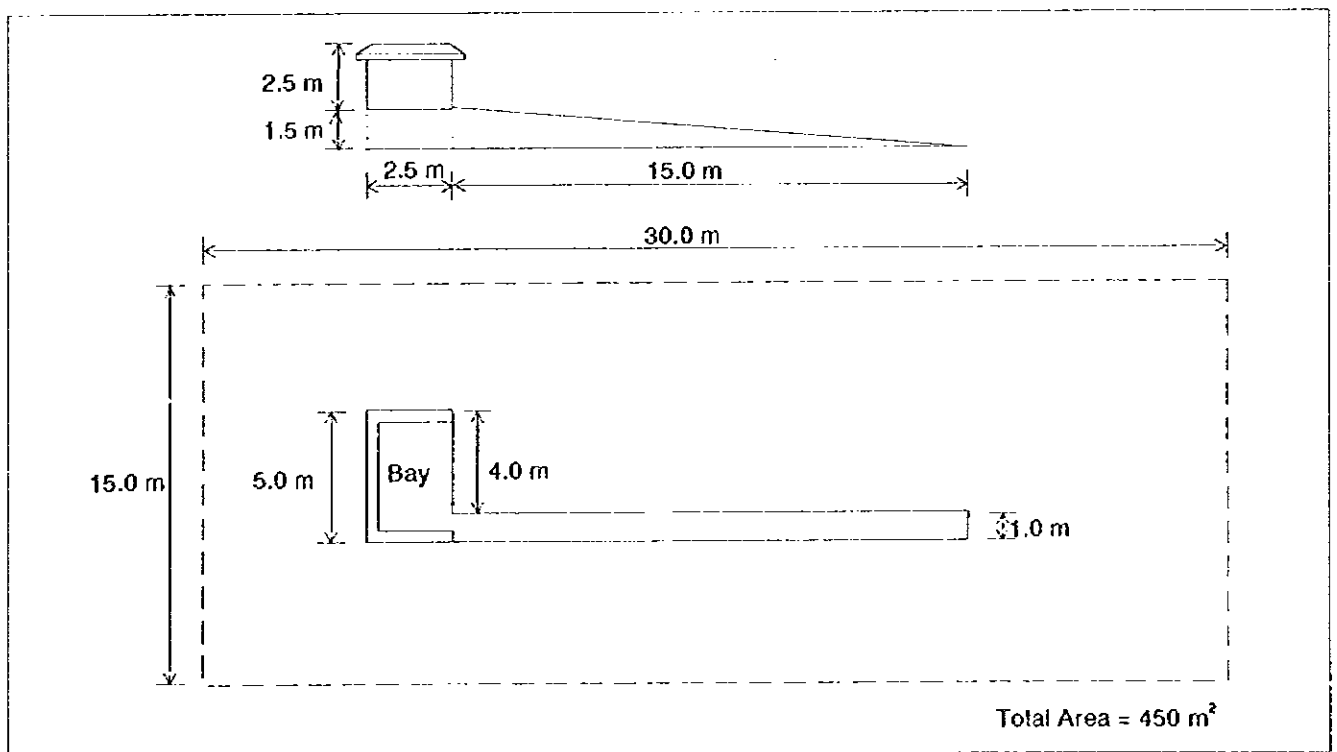
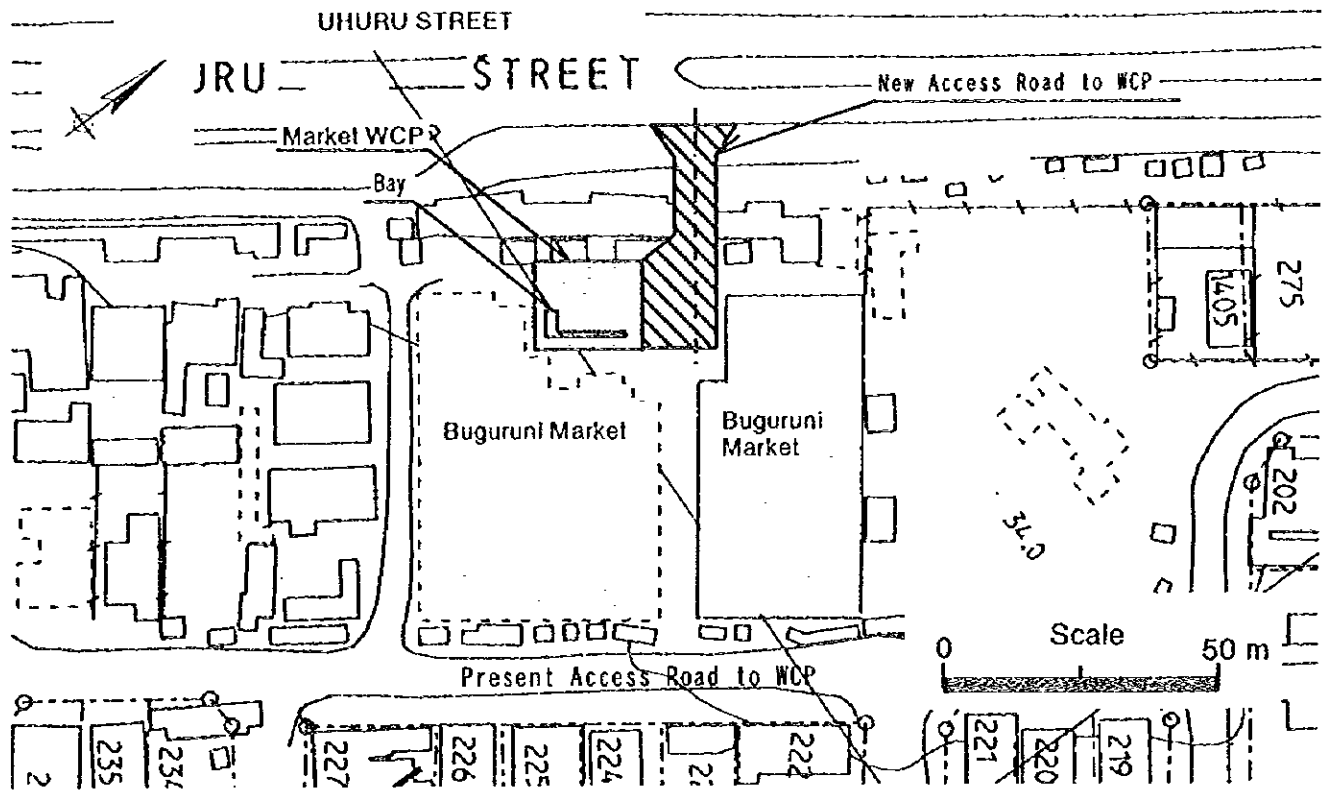


Figure 2-5: Improvement Plan for Buguruni Market and Access Road

