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MASTER OF SCIENCE IN COMMUNITY ECONOMIC DEVELOPMENT

(2007)

**EVALUATION OF A COMMUNITY BASED WASTE OIL RECYCLING
PROJECT IN TEMEKE DISTRICT, DAR ES SALAAM**

BY

DORIS B. KATANA

TABLE OF CONTENT

TABLE OF CONTENT	i
LIST OF ANNEXES	vi
LIST OF FIGURES	vii
LIST OF TABLES.....	viii
SUPERVISOR’S CERTIFICATION	ix
COPYRIGHT	x
DECLARATION.....	xi
DEDICATION	xii
ACKNOWLEDGEMENT	xiii
ABBREVIATIONS	xiv
ABSTRACT	xv
EXECUTIVE SUMMARY.....	xvi
CHAPTER 1: COMMUNITY NEEDS ASSESSMENT.....	1
1.1 Background.....	1
1.2 Community Profile.....	2
1.3 SWOT Analysis	4
1.3.1 Strengths	5
1.3.2 Weaknesses.....	5
1.3.3 Opportunities	6
1.3.4 Threats	6

1.4 Socio-economic Study	6
1.4.1 General objective of the study	9
1.4.2 Specific objectives of the study	9
1.4.3 Study questions	10
1.4.4 Study methodology	10
1.4.5 Study design.....	10
1.4.6 Target population	11
1.4.7 Sampling design.....	11
1.4.8 Data collection methods used in socio-economic study.....	12
1.4.8.1 Primary data collection	12
1.4.8.2 Secondary data collection	12
1.4.9 Data analysis	12
1.4.10 Study results.....	13
1.4.10.1 Methods used in disposal of waste oil in the study area.....	13
1.4.10.2 Stakeholders involved in the management of waste oils	15
1.4.10.3 Local leaders' knowledge	16
1.4.10.4 Community awareness of TEMO activities.....	17
1.4.10.5 Performance rating of TEMO in the management of waste oils.....	18
1.4.10.6 Factors affecting waste oil management in the study area	20
1.4.11 Study conclusion and recommendations	21
1.4.11.1 Study conclusion	21
1.4.11.2 Study recommendations.....	21

CHAPTER 2: PROBLEM IDENTIFICATION	23
2.1 Background of the Problem.....	23
2.2 Problem Statement.....	24
2.3 Target Community.....	24
2.4 Stakeholders.....	25
2.5 Project Goal.....	25
2.6 Project Objectives.....	25
2.7 Organization Structure.....	26
CHAPTER 3: LITERATURE REVIEW	28
3.1 Conceptual And Theoretical Literature Review.....	28
3.1.1 The meaning of waste oil/used oil.....	28
3.1.2 Sources of waste oils.....	29
3.1.3 How to remove used oil from the vehicle.....	30
3.1.4 Dangers of waste oil pollution.....	33
3.1.5 Environmental and economical importance of used oil recycling.....	35
3.1.6 Efforts of Tanzania Government towards environmental protection.....	37
3.2 Empirical Literature Review.....	39
3.2.1 Ways of waste oil recycling and recovery.....	39
3.2.2 Sustainable developments and the environment.....	42
3.2.3 Community participation in environmental management.....	45
3.3 Policy Review.....	45
3.3.1 Overview.....	45

3.3.2 Tanzania Environmental Strategies, policies and plans	49
3.3.3 Used oil management standards	52
CHAPTER 4: PROJECT IMPLEMENTATION	54
4.1 Project Title: Waste Oil Management Project In Temeke District	54
4.2 Project Goal	54
4.3 Products and Outputs	54
4.3.1 Input indicators	55
4.3.2 Process indicators	55
4.3.3 Output indicators	56
4.3.4 Impact indicators	56
4.4 Project Planning	57
4.4.1 Staffing Pattern	59
4.4.2 Budget	59
4.5 The actual Implementation of the project	62
4.5.1 Project implementation report	62
CHAPTER 5: MONITORING, EVALUATION AND SUSTAINABILITY	66
5.1 Project Monitoring	66
5.1.1 Monitoring methods	67
5.1.2 Project monitoring results	69
5.2 Evaluation	70
5.2.1 Performance indicators	71
5.2.2 Project evaluation results	73

5.3 Sustainability	74
5.3.1 Sustainability elements	74
5.3.2 Sustainability plan	74
5.3.3 Institutional plan	75
CHAPTER 6 : CONCLUSION AND RECOMMENDATIONS.....	76
6.1 Conclusion.....	76
6.2 Recommendations.....	77
BIBLIOGRAPHY	78
APPENDICES.....	82

LIST OF ANNEXES

ANNEX 1: INTRODUCTION LETTER	82
ANNEX 2: SWOT ANALYSIS QUESTIONNAIRE.....	84
ANNEX 3: STAKEHOLDERS’ ANALYSIS TABLE	86
ANNEX 4: WAWEPA CERTIFICATE.....	87
ANNEX 5: TEMO ORGANIZATION STRUCTURE	88
ANNEX 6: QUESTIONNAIRE FOR LOCAL GOVERNMENT LEADERS	89
ANNEX 7: QUESTIONNAIRE (Garage, Mechanics and Petrol stations)	93
ANNEX 8: STATISTICAL INFORMATION FROM LOCAL LEADERS.....	96
ANNEX 9: STATISTICAL INFORMATION FROM GARAGE, MECHANICS & PETROL STATION	98

LIST OF FIGURES

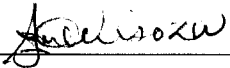
Figure 1: Location of Temeke district in Dar- es -Salaam city	3
Figure 2: Soils contaminated with waste oil in Temeke district	7
Figure 3: Waste oil deposit in Temeke area.....	7
Figure 4: Water contaminated with waste oil in Temeke area.....	8

LIST OF TABLES

Table 1: Methods used by respondents in disposal of waste oils in the study area.....	13
Table 2: Involvement of local leaders in waste oil management	16
Table 3: local leaders' knowledge on the existing environmental laws	17
Table 4: Respondents awareness of TEMO activities in the study area.....	18
Table 5: TEMO contribution in the management of waste oil.....	19
Table 6: Respondents rating of factors affecting waste oil disposal in the study areas...	20
Table 7: Project Implementation Plan	57
Table 8: Project implementation planning budget.....	60
Table 9: Project implementation Gantt chart (Time frame 24 months).....	64
Table 10: Project monitoring matrix.....	67
Table 11: Methods used by respondents in disposal of waste oils in the study area.....	69
Table 12: Stakeholders participation in training on waste oil management	70
Table 13: Summary of evaluation matrix	71
Table 14: Participants involved in training	73

SUPERVISOR'S CERTIFICATION

I, Dr. James L. A. Kisoza, certify that I have thoroughly read this project report titled **“Evaluation of a community based waste oil recycling project in Temeke district, Dar-es-Salaam”** and found it to be in an acceptable form for the partial fulfillment of the requirements for the Master of Science in Community Economic Development of the Southern New Hampshire University and The open University of Tanzania.

Signature: 

Date: 24th October, 2007

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DECLARATION

I, Doris Katana, do hereby declare that this Project paper is the result of my original work, and that it has not been submitted for similar degree award in any other university.

Signature Doris Katana

Date 23 November 2007

DEDICATION

This work is dedicated to my dearly loved husband, Festus N. Patta for his financial, moral and comprehensive encouragement towards the successful completion of my course.

To you my love Festus!

ACKNOWLEDGEMENT

Many people either in groups or individually have made contributions to this study and completion of the report. Whilst it is not possible to mention all of them, it is important to mention the key people who without their contribution, the study and report would not have been completed successfully.

I would like to recognize the valuable contribution made by the leaders and members of WAWEPA organization from providing their time for group discussions, for information gathering, to organizing and coordinating the research activities in the field.

I would also wish to extend my sincere appreciation to my employer, Tanzania Food and Nutrition Center, for allowing me enough time to pursue my studies. Many thanks should also go to my supervisor Dr. James L. A. Kisoza and Program Director Mr. Michel Adjibodou for their encouraging remarks.

Lastly, Thanks to my beloved son and daughter for their support and tolerance for the parental rights missed during those times I was attending the classes and working hard to complete my Master's Program.

ABBREVIATIONS

API	- American Petroleum Institute
BOD	- Biological Oxygen Demand
BTUs	- British Thermal Units
CBO	- Community Based Organizations
DIY	- Do-It-Yourself
EPA	- Environmental Protection Agency
ILSAC	- International Lubricant Standardization and Approval Committee
NEMC	- National Environment Management Council
NEP	- National Environmental Policy
NGOs	- Non-Governmental Organizations
PCBs	- Polychlorinated biphenyls
TEMO	- Tanzania Environmental Management Organization
TNCSSD	- Tanzania National Conservation Strategy for Sustainable Development
U. S EPA	- United State Environmental Protection Agency
URT	- United Republic of Tanzania
UNCED	- United Nations Conference on Environment and Development
WAWEPA	- Waste to Wealth Partners of Tanzania

ABSTRACT

This project is located in Temeke district and hosted by WAWEPA (Waste to Wealth Partners of Tanzania), which is the Non-Governmental Organization registered in 2006. Before the project implementation, A Community Needs Assessment was conducted by the researcher based on TEMO (Tanzania Environmental Management Organization) activities in the same District. TEMO is a non-registered community based organization dealing with waste oil management in Temeke District. The researcher conducted community needs assessment in order to evaluate factors influencing effectiveness of the Organization (TEMO), in operating waste oil management systems. The community needs assessment results and recommendations, form the basis of the waste oil recycling project implementation in the study area. The project implementation started by organizing the organization members and registering the organization as a Non – Governmental Organization, as such the Organization name changed from TEMO to WAWEPA and was officially registered under Non-Governmental Organization Act, 2002 on September 2006, by which, it was therefore, officially authorized as NGO, to deal with environmental management and protection activities.

EXECUTIVE SUMMARY

This work was conducted in Temeke District, which is bounded between 6°48' and 7°10' South and 39°12' and 39°33' East. The district is located in Southern part of Dar-es-salaam city and it was established in 1972 as a District within Cost Region. Basing on the 2002 national census data, Temeke District had a population of 771,500 people with a growth rate of 2.8% per year of which females are 382,255 and 389,245 are males. (2002 Tanzania Population Census)

Poor handling and disposal of waste oils is an increasing environmental problem in Temeke district and in other municipalities in Tanzania. Haphazard disposal of used oils poses pollution risks to soil and water systems with toxic and carcinogenic chemicals, thus posing a serious health risk to human. Waste oils can also negatively affect the biodiversity in aquatic systems - such as plants and fish. It may also disrupt the natural bio-geochemical cycles, which play a key role in break down of solid wastes. Furthermore, waste oils represent a valuable petroleum resource. Collection and recycling of used oil is one of alternative methods for management of waste oils, which is environmentally sound and can generate incomes. Proper managing of used oil will help to protect against environmental damages and safeguard human health, by reducing the amount of toxic chemicals that are absorbed into soil and water systems.

The problem was identified using different community needs assessment tools by the researcher in collaboration with TEMO, which was the CBO hosting the project. The CBO (TEMO) had initiated a recycling system for waste oil management in Temeke

District, Dar-Es-salaam city. However, the adoption and effectiveness of these approaches were not yet evaluated. In order to establish the factors that affect adoption and effectiveness of a community based waste oil management system a social economic study was designed in order to obtain data from the study area. The aim of the study was to evaluate factors influencing effectiveness of TEMO in operating the recycling system for waste oil management system. It was envisaged that the study results would form the basis for recommending and implementing the project of improving waste oil management in the study area.

The study findings indicated that the CBO (TEMO) did not effectively involve the community as among the key stakeholders in their project. The community at large was not aware of the Organization's activities, and therefore the community did not recognize its roles. In addition the study results indicated that majority of community leaders in the study areas were not aware of the existing environmental laws.

The community needs assessment furthermore, pointed out that waste oil pollution was caused by lack of knowledge and community awareness, lack of concrete projects dealing with waste oil management, lack of capital and prevailing poverty and poor governmental policy in the study area. It was my recommendation that TEMO should be officially registered and initiate concrete community- based waste oil recycling project that puts emphasis on community participation in the study area, in order to attain sustainable environmental protection programmes. Furthermore, the organization should try to find other sources of funds rather than depending only on members' contributions.

Other sources could be explored of funds including grants from various institutions (be it local or international organizations) and loans from banks.

All of the above recommendations were implemented, by which the CBO (TEMO) was transformed into NGO called 'Waste to Wealth Partners of Tanzania', also popularly known by the acronym 'WAWEPA', which is the Organization currently implementing waste oil management project that emphasizes on community participation in Temeke district.

CHAPTER 1: COMMUNITY NEEDS ASSESSMENT

1.1 Background

Tanzania Environmental Management Organization (TEMO) was an un-registered Community Based Organization (CBO) involved in waste oil management. Its main office is located in Mbagala Chalambe Street Plot No. 19/20, Temeke district, Dar-Es-Salaam.

The idea to engage into waste oil management programs was conceived by the TEMO directors and other stakeholders. Between May to June 2004 one of the directors worked with a foreign company - Dutch General Enterprises and Shipping Services, which was involved in removing sludge from ships calling at Dar-Es-Salaam port. The company had a capacity to remove 195 tones of sludge from foreign vessels. This implies that if the oil sludge were not removed from the ship, it could have been dumped into the sea, hence polluting marine ecosystem.

TEMO has skilled and qualified personnel managing the project including the Director of Technical Operations who has technical knowledge on waste oil management, and the Director of Finance who has a Postgraduate Diploma in Financial Management. The CBOs physical resources and equipment include oil storage tanks (capacity 20,000 liters), protective gear (helmets, overalls, gloves and nose muffs), a submersible drainage pump, squeezers brooms and shovels and plastic sheets (20 x 20 meters). Others are tanker truck (20,000 liters) for transporting finished products and fire fighting

equipment. As the organization policy TEMO use environmentally friendly solvents only (e.g. Benzene and Kerosene).

TEMO had initiated a recycling system for waste oil management in Temeke district. However, the performance and effectiveness of these innovations were not yet to be evaluated. This necessitated a study to assess the performance of the CBO (TEMO) in operating a recycling system and examining means for initiating a community based waste oil management system. In order to realize these objectives a social economic study was designed in order to obtain information from various stakeholders in the study area, which formed a basis for recommending and implementing a community based project in the study area.

1.2 Community Profile

The reason behind selecting Temeke District as study area was that TEMO started its activities in Temeke District as a pilot area. Furthermore, Temeke is a highly populated district accounting to about half of Dar es Salaam city population; and experiencing rapid population growth compared to other districts. In addition Temeke have the main oil depots like BP, which is the main entrance of oil imports in the country. Other oil depots are Oil Com, TOTAL and NAT OIL and others.

Temeke District is located between latitude 6°48' and 7°10' South of the equator and longitude 39°12' and 39°33' East. The district is located in the Southern part of Dar-es-salaam city and it was established in 1972 as a district within Cost Region (Figure 1).

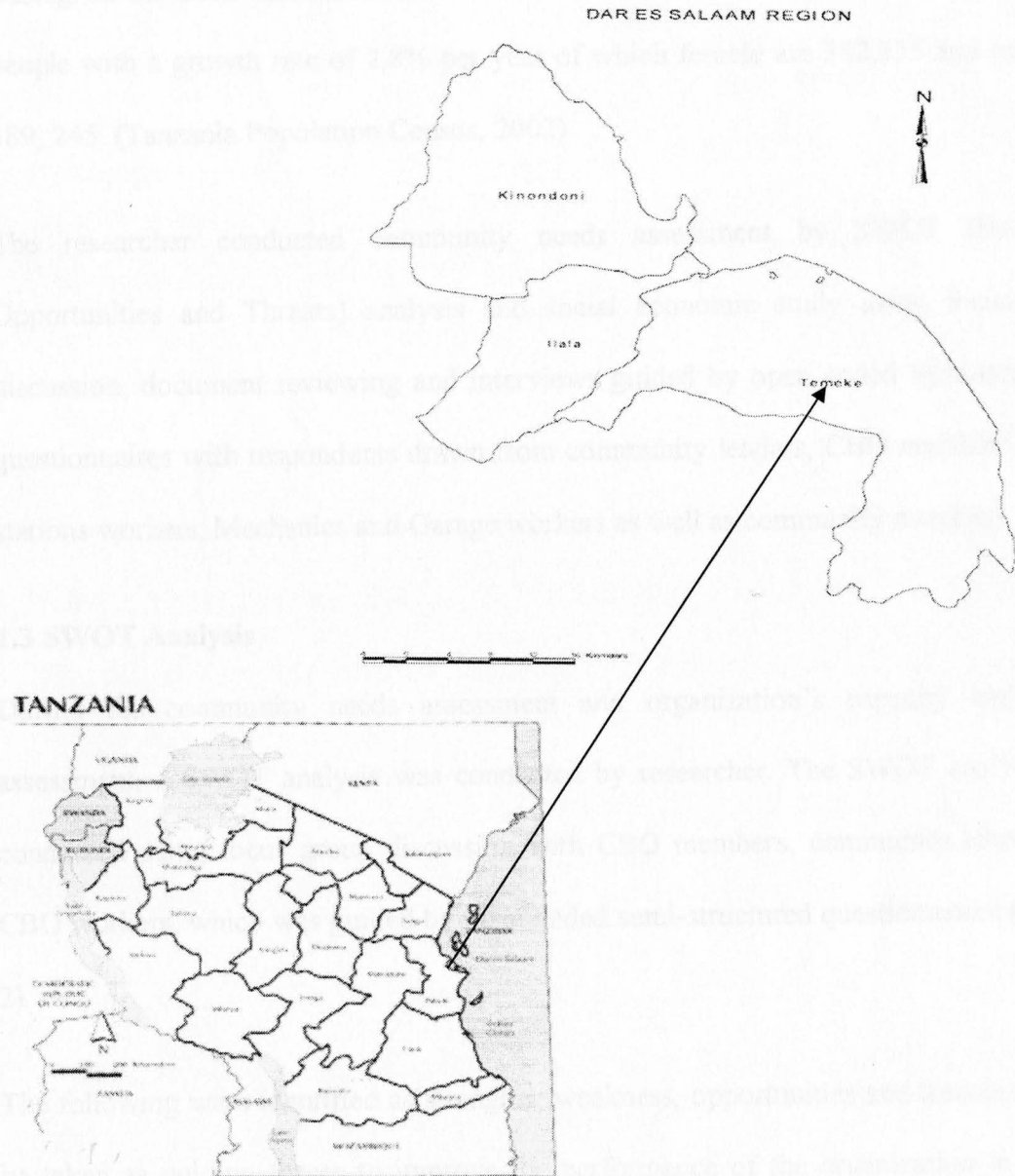


Figure 1: Location of Temeke district in Dar-es-Salaam city

Source: URT, 2003

Basing on the 2002 national census data Temeke district had a population of 771,500 people with a growth rate of 2.8% per year of which female are 382,255 and male are 389, 245. (Tanzania Population Census, 2002)

The researcher conducted community needs assessment by SWOT (Strengths, Opportunities and Threats) analysis and social economic study using focus group discussion, document reviewing and interviews guided by open ended semi-structured questionnaires with respondents drawn from community leaders, CBO members, Petrol stations workers, Mechanics and Garage workers as well as community members.

1.3 SWOT Analysis

During the community needs assessment and organization's capacity and needs assessment, a SWOT analysis was conducted by researcher. The SWOT analysis was conducted using focus group discussion with CBO members, community leaders and CBO workers, which was guided by open-ended semi-structured questionnaires (Annex, 2).

The following were identified as strengths, weakness, opportunities and threats that can be taken as guiding forces to improve the performance of the organization in service delivery at the community level. The strengths and weaknesses found were within the organization's capacity and could be improved and utilized without external assistance. The opportunities are issues surrounding the working environment, which may affect positively and improve the CBO performance if they could be utilized effectively.

Whereas the threats are the conditions seen externally that may hinder the organization progress.

1.3.1 Strengths

The following are TEMO strengths:

- It has a waste oil-recycling plot at Mbagala area.
- Has personnel with experience and necessary skills on waste oil recycling
- Have personnel and some members with financial management skills.
- Has experienced and strong leadership with good interpersonal relationship
- Has contributed own funds (> Tshs 10 million) for the organization's progress.

1.3.2 Weaknesses

The following are the weaknesses of TEMO:

- Inadequate community participation and stakeholder involvement in its activities.
- Lacks transportation facilities, leading to increasing operational costs of hiring waste oil transportation facilities.
- Inadequate strategies in improving community awareness in waste oil disposal systems.

1.3.3 Opportunities

The important opportunity is existence of Community Based Organization focused at reducing environmental pollution, which is supported by the government and has been recognized as one of the cluster strategies of implementing the country second phase of “Tanzania Strategy for Growth and Poverty Reduction”.

1.3.4 Threats

- There are no clear regulations and enforceable by-laws focusing on waste oil management in Dar-es-Salaam city and Tanzania in general.
- Inadequate financial resources.
- TEMO registration process not completed.

1.4 Socio -economic Study

During community assessment, the researcher conducted transect walks and discussions with stakeholders: community leaders, CBO members, Petrol stations workers, mechanics and garage workers and community members in order to have correct understanding of the study area environmental surroundings and to enhance all participant's to share knowledge about waste oil, and develop problems and opportunities which help in waste oil management in the study area. During transect walks the researcher observed that waste oil pollution is a big problem in the study area

and that there are plenty of waste oil deposits in some areas in Temeke District (Figures, 2, 3, and 4).



Figure 2: Soils contaminated with waste oil in Temeke district



Figure 3: Waste oil deposit in Temeke area

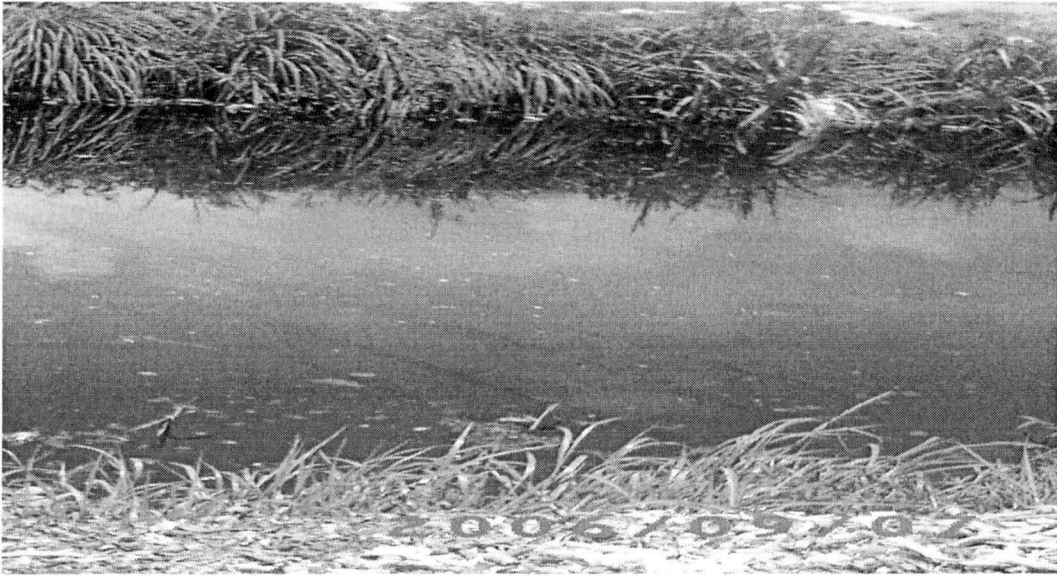


Figure 4: Water contaminated with waste oil in Temeke area

The CBO (TEMO) had initiated a recycling system for waste oil management in Temeke district, Dar-Es-salaam city. However, the adoption and effectiveness of these approaches are not yet to be evaluated. In order to establish the factors that could affect adoption and effectiveness of a community based waste oil management system a social economic study was designed in order to obtain data from the study area. The aim of this study was to evaluate factors influencing effectiveness of TEMO in operating the recycling system for waste oil management system. It was envisaged that the study results would form the basis for recommending and implementing the project of improving waste oil management in the study area.

1.4.1 General objective of the study

The general objective of the study was to evaluate a community based waste oil recycling system in order to recommend effective and sustainable measures and implement the measures for attaining project sustainability in the study area.

1.4.2 Specific objectives of the study

The specific objectives of the study were

1. To examining methods used in disposal of waste oils and community awareness on waste oil disposal problems in the study area.
2. To analyze the stakeholders' involvement in management of waste oils and regulations governing used oil in the area.
3. To determine the performance level of TEMO in management of waste oils and community awareness and attitudes towards the CBO activities.
4. To assess community attitudes on recycling system for waste oil in the study area.
5. To identify factors influencing effectiveness of operating waste oil recycling system in a community
6. To recommend and implement intervention for improving waste oil disposal in Temeke District.

1.4.3 Study questions

1. What are the methods used for waste oil disposal in the study areas?
2. Is the community aware of waste oil disposal problems in the study area?
3. In what ways are key stakeholders involved in waste oil recycling system?
4. What are the factors that affect used - oil disposal system in the study area?
5. What are the factors influencing effectiveness of operating waste oil recycling system in a community?

1.4.4 Study methodology

This chapter presents the methodology employed in the study. Study methodology denotes a systematic process of collecting data for a particular research problem. Thus research design, approach and strategies must be employed to sort out the researched problem technically. It covers the research design, target population, sampling design, study location, sampling techniques, types and sources of data, data collection methods, sample size and data analysis techniques used in the study.

1.4.5 Study design

A cross-sectional survey design, which is descriptive in nature, was used to get information on waste oil disposal system in Temeke District. The tools used in gathering information are structured questionnaires, interviews and observation. The study involved 120 interviewees, 40 participants being community leaders in the study area

while other 80 respondents were representatives from garages, mechanics and petrol stations.

1.4.6 Target population

The target population of this study was all residents of Temeke district. The population was categorized in groups (strata) from which respondents were purposively selected to participate in the study. The study groups were:

- Petrol stations' workers including petrol station owners.
- Oil depots workers
- Community members and government leaders.
- Mechanics and garages operatives.

1.4.7 Sampling design

In order to obtain a representative sample for this study, a purposive sampling method was used to select district and streets. Then stratified sampling technique was used to select respondents. The different strata identified are respondents from petrol stations, community members and government leaders and from mechanic and garage operatives. From each identified strata, simple random sampling was used to select 40 representative respondents.

1.4.8 Data collection methods used in socio-economic study

Both primary and secondary data were collected during this study by employing a number of methodologies. Data collection methods used includes participatory rural appraisal approaches observations, interviews, questionnaire survey, and documentary survey.

1.4.8.1 Primary data collection

Interviews using structured questionnaire were conducted to Temeke district government leaders, petrol station owners, CBO leaders and community members. Each item in the questionnaire was developed to address specific objectives.

1.4.8.2 Secondary data collection

Secondary data were collected from Temeke District, NEMC, University of Dar es Salaam, Open University of Tanzania and TEMO office. Furthermore various reports and documents were reviewed for the purpose of getting official and reliable information related to waste oil management.

1.4.9 Data analysis

Data obtained from the study were compiled and analyzed by using descriptive statistics in form of tables, expressed them into frequencies and percentages using SPSS program.

A validity check for each variable under study was made to check for inconsistencies, illogical entries and improbable values.

1.4.10 Study results

This chapter presents results and discussion of the major findings of the study.

1.4.10.1 Methods used in disposal of waste oil in the study area

The results in table 1 shows that 38.8% of the respondents discard waste oil haphazardly in the environment after removing it from the motor vehicles, another 38.8% of respondents collect and store waste oil for further used in the blast furnace and as wood preservative against damaged by insects. While the remaining 22.4% of respondents use waste oil in control of vector insect in the pit latrines.

Table 1: Methods used by respondents in disposal of waste oils in the study area

Method of waste oil disposal	Frequency	Percentages
Discard to the environment	31	38.8
Collect and store for further use	31	38.8
Used in control of vector insects in pit latrines	18	22.4
Total	80	100

Source: Own survey data (2006)

The waste oils discarded direct to the environment are responsible for waste oil pollution thus posing community health risks and loss of biodiversity. From the study findings 38.8% of respondents collect the waste oils, and sell it to local industries where it used in blast- furnaces. This is some kind of recycling of used oils with a potential for generating incomes. However, the process of waste oil collection, storage and transportation is being carried out by unemployed youth using poor equipment like hand trolleys. Furthermore, the youths who are engaged in waste oils collection lacks the proper protective gears, consequently they neither protect their skins nor their mouths by protection wear. For these reasons the youths involved in the recycling of used oils are increasingly exposed to occupational health hazards.

Yet, under Tanzanian laws, the use of waste oil in blast- furnaces is illegal; since there are standard blast- furnace oils recommended for use in welding industries. However, the standard blast furnace oil is expensive therefore local welding industries use waste oil as a substitute of blast furnace oil. Furthermore, burning of waste oil in the furnace produces a number of chemicals, which are harmful to human, therefore causing health risks and polluting the environment.

The study results show that 22.4 % of respondents collect and use waste oil for control of vector insects (flies and mosquitoes) in pit latrines. This practice, while is beneficial in control of vector insects, it may also give rise to other unintended environmental problems. The waste oils can interfere with the biodiversity by destroying the micro-flora that plays part in decomposition of organic matter including the excrement. This

may in turn lead to anaerobic conditions and incomplete decomposition of excrement; so increasing foul smell as well as increased BOD level in water hence risks to community health.

1.4.10.2 Stakeholders involved in the management of waste oils

Table 2 shows extent of involvement of local leaders in waste oil management in the study area in collaborated with the TEMO. The results show that the majority of respondents (62.5%) acknowledge that local leaders were not involved at any stage in waste oil management, 15% of respondents said that local leaders get involved during inspection, while 17.5% respondents said that local leaders involved only during community sensitization. A small proportion of respondents (5%) were not aware if local leaders were involvement in waste oil management in the study area.

In order to operate a sustainable and community based waste oil management project, participation of the local leaders is a pre-requisite (i.e. from project initiation, implementation and evaluation) as the major stakeholder from the community. Local leaders belong to the community, and as community representatives they command high respect among community members who believes a lot from their local leader. The study results indicate that the CBO does not effectively involve the key stakeholders in their project. This is one of the weaknesses (stakeholders' involvement) that need be addressed by the CBO management.

Table 2: Involvement of local leaders in waste oil management

Local leaders involvement	Frequency	Percentages
Are not involved	25	62.5
Involved in inspection	6	15.0
Involved in community sensitization	7	17.5
Do not know	2	5.0
Total	40	100

Source: Own survey data (2006)

Thus much emphasize need to be given in this area so as to stimulate and motivate communities to achieve active participation and involvement in management services.

1.4.10.3 Local leaders' knowledge on existing environmental laws and regulations

The results in Table 3 shows that 85% of the respondents are not aware of the existing environmental laws and only 15% of respondents understand the existing environmental laws.

Table 3: local leaders' knowledge on the existing environmental laws

Local leader knowledge on the existing environmental laws.	Frequency	Percentages
Understand the existing environmental laws.	6	15.0
Not understand existence environmental laws	34	85.0
Total	40	100

Source: Own survey data (2006)

Local leaders are formal leaders who are elected by the community members as local representatives to the government. Local leaders may have different roles in waste oil management, these includes enforcement of by-laws, sensitization of community for participation in environmental management activities, communication with municipality authority and other levels in he government as well as community based organizations and the community in general. The study results suggest that the status of local leader's participation on environmental issue could be compromised by their ignorance of existing environmental laws and regulations. Therefore the local leaders' capacity building through training on legal matters is one area, which needs to be improved.

1.4.10.4 Community awareness of TEMO activities

The results in Table 4 below show that 75% respondents were not aware of the activities and roles of the TEMO and only 25% of them were aware about the work of the

organization. This shows that the community at large is not aware of the organization activities, and therefore the community does not yet recognize TEMO roles.

Table 4: Respondents awareness of TEMO activities in the study area

Awareness of TEMO activities	Frequency	Percentages
Aware about TEMO	10	25.0
Not aware about TEMO	30	75.0
Total	40	100

Source: Own survey data (2006)

Community participation is an active process by which the community influences the direction and execution of a development activity in order to enhance their well being in terms of income, personal growth, self reliance or other values they cherish (Paul, 1987). The findings show that TEMO did not put large effort into community sensitization and participation on their activities.

1.4.10.5 Performance rating of TEMO in the management of waste oils

The researcher evaluated the level of performance of the organization (TEMO) through performance rating by the community members. Table 5 shows that 75% of respondents were not aware of TEMO.

Table 5: TEMO contribution in the management of waste oil

TEMO contribution to environmental management	Frequency	Percentages
Large extent	1	2.5
Very little, need to improve	5	12.5
Have not helped	4	10.0
Do not know	30	75.0
Total	40	100

Source: Own survey data (2006)

Whereas 10% of respondents indicated that TEMO have not helped, and 12.5% were of the opinion that the organization helped very little and need to be improved. Only 2.5% of respondents said that the organization helped to a large extent in disposal of waste oils. The results suggest that the CBO need a lot of improvement through sensitizing and educating the general public on their activities and the risks associated with waste oils the organization is trying to solve. So far TEMO's contributions to the environment and the community at large are considered by community members as negligible.

1.4.10.6 Factors affecting waste oil management in the study area

The study established the factors that affect used-oil disposal system and causes of waste oil pollution in the study area. The results in table 6 shows that 32.5% of respondents believed that waste oil pollution is caused by lack of knowledge and community awareness, 30% of respondents said that waste oil pollution is caused by lack of concrete project dealing with waste oil management. While 35% are of opinion that lack of capital and prevailing poverty is the cause of waste oil pollution in the study area. Yet, a small proportion (2.5%) said that waste oil pollution is caused by other factor like poor governmental policy.

Table 6: Respondents rating of factors affecting waste oil disposal in the study areas

Cause of pollution	Frequency	Percentages
Lack of knowledge/ awareness among community members	26	32.5
Lack of effective project dealing with waste oil disposal	24	30.0
Lack of capital and poverty	28	35.0
Others	2	2.5
Total	80	100

Source: Own survey data (2006)

1.4.11 Study conclusion and recommendations

1.4.11.1 Study conclusion

Basing on the study results lack of concrete and effective project dealing with waste oil management, lack of capital and lack of community awareness and knowledge about waste oil management, had been identified as the major causes of waste oil pollution in the study area. The communities in the study areas lack knowledge of the environmental hazards nature of waste oil pollution and associated community health risks.

Also the study show that local leaders and other stakeholders' involvement in the waste oil management activities initiated by TEMO is very poor. Most of the stakeholders were not aware about organization activities and its performance.

1.4.11.2 Study recommendations

The following recommendations have been made from socio-economic study.

- TEMO should be registered officially and initiate concrete community- based waste oil recycling system project, which emphasize community participation in order to attain sustainable environmental protection.
- The organization should try to find other sources of funds, rather than member's contributions such as grants and loans from banks.

- The study results emphasize on a need for citizens and policy makers to develop alternative management strategies for used-oil, possibly through waste oil recycling and by supporting markets for recycling waste oil products.
- The government should modernize the waste oil management activities for the environmental and community health protection in Dar- es- Salaam city and the whole nation at large.
- Government and non-governmental organization should provide credits facilities to the CBOs and NGO's dealing with waste oil recycling projects, because shortage of funds is the one of the main cause of low performance on the waste oil management project in the study areas.
- Government should promote waste oil management by educating the communities and all stakeholders on the environmental hazards of waste oil and needs for proper management programs.
- The government and non-governmental organization should provide funds to youth groups especially those dealing with waste oil management that will enable them to operate more efficient waste oil management projects.

CHAPTER 2: PROBLEM IDENTIFICATION

2.1 Background of the Problem

Poor handling and disposal of waste oils is an increasing environmental problem in most cities and municipalities in Tanzania. Waste oils contain toxic and carcinogenic substances. Haphazardly disposal of used-oils pose pollution risks to soil and water systems, thus posing a serious health risk to human. Waste oils can also negatively affect the biodiversity in aquatic systems - such as plants and fish. It may also disrupt the natural bio-geochemical cycles, which play a key role in the break down of solid wastes. Yet, waste oils represent a valuable petroleum resource. Thus collection and recycling of used oil is one of alternative methods for management of waste oils, which is environmentally sound and can generate incomes.

Proper managing of used oil will help to protect against environmental damages and safeguarding human health, by reducing the amount of toxic chemicals that are absorbed into soil and water systems. Furthermore, recycling and re-use of waste oils represents a judicious and efficient use of finite and valuable resource, which is advocated in the agenda 21. However, safe handling and recycling of waste oils systems are not well developed in sub-Saharan countries including Tanzania. Only limited processing is carried out in Kenya, where one company - East African Oil Management Company - deals with collecting and disposal of waste oil. Whereas no any company that specializes on these processes in Tanzania.

The communities through their CBO stand a good chance to carry out a cost effective waste oil management system in Tanzania. A technical assistance to community based organization could lead to institutional development and capacity building at local levels, to handling waste oils.

2.2 Problem Statement

A community needs assessment conducted in Temeke district had established that the majority of community members were not awareness of the magnitude of waste oil problem in the area; also they lack knowledge on environmental hazards of waste oil pollution. This suggests that the initiatives taken to address the problem of waste oil management did not fully involve the stakeholders. In particular there was a need to put in place a mechanism that stakeholders' involvement in waste oil management activities. Also Temeke District lacks an official registered organization to initiate concrete community- based waste oil recycling project which emphasize community participation in the study area in order to attain sustainable environmental protection from waste oil pollution.

2.3 Target Community

The project was designed for Temeke District community. The project's main target group comprises all community members involved in daily handling of waste oil.

2.4 Stakeholders

Other major players that are stakeholders in this project are staffs working with the Organization, National Environment Management Council (NEMC), Garages and Mechanics Operatives, Government leaders and community members in Temeke. NEMC acting as an advisory body to the government on all matters relating to the environment, supported the project by providing waste oil management training facilitator, also assists in seeking donors and interested organizations to support the project. The Garages and mechanics play major roles in the project as the major sources of waste oil in Temeke District.

Government leaders as the project stakeholder may have different roles in waste oil management, these include enforcement of by-laws and sensitization of community participation in environmental management activities, communication with municipal authorities and other levels in the government as well as community based organizations and the public in general.

2.5 Project Goal

The main project goal is to protect environmental from waste oil pollution through initiating waste oil management project in Temeke District, Dar Es Salaam.

2.6 Project Objectives

1. Organizing community members and other stakeholders.
2. To mobilize stakeholders and community for the adoption of the project.

3. To provide knowledge and skills on waste oil management to the project stakeholders.
4. Officially register the project.
5. To raise funds
6. To collect all waste oil produced in Temeke District.
7. To produce goods from waste oil recycling.
8. To market the products from waste oil recycling.

2.7 Organization Structure

The management of this project is going to be under a community-based organization - Tanzania Environmental Management Organization (TEMO), which is a non-profit making community based organization established in the year 2005.

The Managing Director who is the Chairman of the Governing Committee and the General Assembly chairs TEMO. Managing Director is the Overall Manager of the Head Office. Deputy Managing Director assists the Managing Director in all functions and to act for him/her in his/her absence.

The organization also has Secretary General who is the secretary to all official meetings of the Governing Committee and is the Secretary in all General Assembly meetings. Deputy Secretary General assists the Secretary General in all functions and to act for him in his absence. The Treasurer is responsible for collecting and accounting for all monies, accountable for the use of these monies under the direction of the Managing Director and the Governing Committee and he/she is required to submit accounts report

at the General Assembly. The Treasurer is assisted by Deputy Treasurer in all duties and act for him in his absence. The CBO organization structure is attached as Annex 5.

CHAPTER 3: LITERATURE REVIEW

This chapter shows different literature reviewed with a focus on waste oil management. Literature review entails what other people have done or conceptualize on the same topic. The major areas covered include theoretical, empirical and policy review. The theoretical part of the literature review covers the general information collected from different sources on the same topic while empirical literature summarizes information cited from different authors who studied the topic on waste oil management. The policy review section summarizes existing regional and national policies and the way it influences community development. Most of the literatures are cited from European, American and Asian countries because those countries have advanced practices on waste oil management. In addition, a lot of projects and research in the area has been done in those countries compare to African countries especially in East Africa where there are almost none or they exist only a few organizations that are officially registered as practitioners in waste oil management.

3.1 Conceptual and Theoretical Literature Review

3.1.1 The meaning of waste oil/used oil

According to the U.S. Environmental Protection Agency (EPA), used motor oil is any petroleum-based or synthetic oil that has been used for vehicle lubrication. As a result of normal use, motor oil becomes contaminated with various impurities such as dirt, water, chemicals or metals from engine. Some governmental jurisdictions classify used motor oil as hazardous. It may contain additives (e.g. rust inhibitors), contaminants e.g. heavy

metals generated through engine wear, or externally introduced materials such as Polychlorinated biphenyls (PCBs) from old transformer oils, potentially carcinogenic, polycyclic, aromatic compounds (from the fuel combustion process), or glycol leaked from the cooling system. Because of these impurities, used motor oil should be handled with care and disposed of correctly to ensure the safety of the local community, environment and waterways (American Petroleum Institute, 2006).

3.1.2 Sources of waste oils

According to the American Petroleum Institute (API), over 50 percent of all motorists in America change the oil of their motor vehicles themselves. By Do-It-Yourself (DIY) program in America oil changers generate about 150 millions gallons of used motor oil each year. This is approximately a quarter of all used motor oil that has the potential to be reused or recycled.

DIY oil changers give the individual opportunity to directly impact their local environment by properly handling their used motor oil and recycling it at local collection programs or facilities. By recycling used motor oil, and taking the time to make sure that individual limit spills and leaks it can prevent damage to environment and ensure the quality of the environment for future generations (API, 2006).

Other literature show that waste oil that enter the ocean come from many sources, some being accidental spills or leaks, and some being the result of chronic and careless habits in the use of oil and oil products. Most waste oil in the ocean consists of oily storm water

drainage from cities and farms, untreated waste disposal from factories and industrial facilities, and unregulated recreational boating (American Marine, 2004). Oil and other petroleum products like gasoline and kerosene can find their way into water and land from ships, oil drilling rigs, oil refineries, automobile service stations, and streets. In Tanzania large amount of waste oil are from automobile service industries.

We depend on oil, and oil products such as kerosene and petrol (gasoline), for much of the energy used in modern life, as well as to keep motors and machines working properly. Unfortunately it seems we cannot help to spilling some of it while we use it, and it can thus get into the water. Since oil products arrive in the islands by ships, the risks of oil spills are greatest in the vulnerable lagoons, harbors and coastal waters, either in accidents while unloading the oil, or in spills from storage tanks or facilities, or more rarely in the grounding of ships carrying oil (American Marine, 2004).

3.1.3 How to remove used oil from the vehicle

Before changing oil from the vehicle it is important to refer to vehicle manual for specific instructions on changing motor oil. Typically, oil changes are completed in a series of steps as shown below.

First step: Locate the drain plug underneath the vehicle, remove it as directed by owner's manual, and drain the oil from the engine into a pan that is large enough to hold the entire contents of the crankcase (most passenger cars hold about 5 quarts of oil). Make sure the drain pan is positioned properly to catch all of the used oil from the

engine. (Note: The oil may be hot, so use caution when draining it from the engine. Wearing rubber gloves for protection is recommended).

Second step: Once the oil has been completely drained, change the oil filter. Note that it may be necessary to use a filter wrench to remove the old filter. Install the new filter as directed by the owner's manual.

The filter will contain residual oil, so take steps to prevent spilling this oil as the filter is removed. Place the open end of the filter face down over the drain pan or the used oil recycling container to allow the oil to drain from the filter. If possible, allow the filter to sit in this position for at least 12 hours.

Third step: Once the used oil has drained from the engine, replace the drain plug as directed by the manual. Wipe up any drips with rags or paper towels.

Fourth step: After the used oil has been drained, the old oil filter removed, and the new filter installed, add the new oil. The manual provides recommendations on the viscosity grade, performance level, and amount of oil required for each vehicle. Most automobile manufacturers recommend that oil meeting the latest International Lubricant Standardization and Approval Committee (ILSAC) specifications shall be used. Oils certified by API as meeting this specification may display the API Certification Mark "Starburst" (API's Engine Oil Program) and API Service Symbol "Donut." Diesel engine manufacturers typically recommend oils meeting a specific API diesel oil service

category. Oils certified by API as meeting one or more of these categories may display the API Donut.

Vehicle manual will also help to find the oil fill cap. Remove the oil cap and add the amount of oil required by the instructions in the manual. Do not overfill. Use a funnel to prevent drips and make sure to empty completely each container of oil.

Fifth step: Carefully remove the oil drain pan from under the vehicle (take care not to burn yourself with hot oil or spill any on the ground). Using a funnel, pour the used oil into a clean container with a lid that screw on tightly (for example, an empty milk or water jug or the empty oil bottles from the oil just added to the engine). You can also use oil drain pans that double as used oil containers.

When selecting a container to hold used oil, avoid plastic bottles or containers once used for bleach, cleaners, or other automobile fluids such as antifreeze. These containers may contain residues that would contaminate the used oil. Also avoid paint cans and other metal containers or containers used for gasoline. Storage container must have secure lid so motor oil will not spill or leak. It is important always to clearly label the container "Used Motor Oil" and also keep collected used motor oil out of reach of children and pets at all times. Additionally, do not mix other lubricants such as brake fluid or transmission fluid or other liquids with the used oil.

3.1.4 Dangers of waste oil pollution

Used motor oil is insoluble, persistent and can contain toxic chemicals and heavy metals. It's slow to degrade. It sticks to everything from beach sand to bird feathers. Used motor oil is a major source of oil contamination of waterways and can result in pollution of drinking water sources (U.S EPA, 2007).

One study done at Tarawa Lagoon shows that, oil spills present the potential for enormous harm to deep ocean and coastal fishing and fisheries. The immediate effects of toxic and smothering oil waste may be mass mortality and contamination of fish and other food species, but long-term ecological effects may be worse. Oil waste poisons the sensitive marine and coastal organic substrate, interrupting the food chain on which fish and sea creatures depend, and on which their reproductive success is based. Commercial fishing enterprises may be affected permanently (American Marine, 2006).

Wildlife other than fish and sea creatures including mammals, reptiles, amphibians, and birds that live in or near the ocean, are also poisoned by oil waste. The hazards for wildlife include toxic effects of exposure or ingestion, injuries such as smothering and deterioration of thermal insulation, and damage to their reproductive systems and behaviors. Long-term ecological effects that contaminate or destroy the marine organic substrate and thereby interrupt the food chain are also harmful to the wildlife, so species populations may change or disappear.

Coastal areas are usually thickly populated and attract many recreational activities and related facilities that have been developed for fishing, boating, snorkeling and scuba diving, swimming, nature parks and preserves, beaches, and other resident and tourist attractions. Oil waste that invades and pollutes these areas and negatively affects human activities can have devastating and long-term effects on the local economy and society. Property values for housing tend to decrease, regional business activity declines, and future investment is risky (API, 2006).

A study done at Tarawa Lagoon shows that water pollution can kill people by spreading diseases. It can also cause poisonings, and make food like fish taste bad, or even be dangerous to eat. Some kinds of pollution in water may not be strong enough to hurt humankind immediately, but they may slowly collect in human bodies until there is enough poison to make us sick. Since it happens slowly, we may not even know why we are sick.

Pollution also damages natural systems. It may hurt the productivity of mangroves, lagoons and coral reefs that are important island resources. It can upset the delicate balance between different kinds of life, as when excess nutrients encourage algae to grow (American Marine, 2004).

Waste Oil spills kill aquatic life (fish, birds, shellfish and vegetation). Birds are unable to fly when oil loads the feathers. Shellfish and small fish are poisoned. If it is washed on the beach, the oil requires much labor to clean up. Fuel oil, gasoline and kerosene may leak into ground water through damaged storage tanks (American Marine, 2004).

Oil also reaches the sea from rivers where industry lines the banks. It kills seabirds, fish and other marine life and can damage whole communities that rely on fishing and tourism. Oil does eventually break down, but it can take a long time and even when a slick has disappeared, the oil dissolved in the water can slowly poison.

The best way to stop water pollution is to keep potential pollutants from getting into the water, or if the waste is the result of washing or some other use of water, treat the water to remove the pollutants before it is released back into the natural environment (American Marine, 2004).

3.1.5 Environmental and economical importance of used oil recycling.

Recycled used motor oil can be re-refined into new oil, processed into fuel oils and used as raw materials for the petroleum industry. One gallon of used motor oil provides the same 2.5 quarts of lubricating oil as 42 gallons of crude oil (U.S. EPA, 2006).

Recycling used motor oil keeps it out of our rivers, lakes, streams and even the ground water. In many cases, that means keeping it out of our drinking water, off our beaches, and away from wildlife. We all share the responsibility of protecting our environment and keeping our waters safe. Recycling used oil allows us to continue to enjoy what many of us take for granted every day – clean water.

In U.S, by do-it-yourselfers (DIYers) campaign, one of millions of peoples change their own oil help to save energy and valuable resource by recycling the used motor oil from their own cars, trucks, boats, recreational vehicles, and lawnmowers. (DIYers) campaign

emphasize that “Recycling is one way you can demonstrate your commitment to maintaining a clean environment. By taking your used motor oil to a collection center you are keeping it out of your drinking water, off the beaches, and away from wildlife”(American Marine, 2004).

Also re-refining used oil takes only about one-third the energy of refining crude oil to lubricant quality. It takes 42 gallons of crude oil, but only one gallon of used oil, to produce 2 ½ quarts of new, high-quality lubricating oil. One gallon of used oil processed for fuel contains about 140,000 British Thermal Units (BTUs) of energy.

In today’s world, automobiles are an important and necessary part of everyday life. Most automobiles require motor oil and other fluids like transmission and brake fluid to run properly. To keep a vehicle running well, an owner should change the vehicle’s motor oil and fluids regularly as defined by the manufacturer.

With regular maintenance comes a responsibility to know how and where to properly recycle used motor oil and associated vehicle fluids within your local community.

Nationally in U.S.A there are more than 12,000 community-based oil recycling locations provided by either local government or private businesses such as auto parts stores or service stations. According to the American Petroleum Institute (API), over 600 million gallons of motor oil is purchased each year. Over half of this amount (345 million gallons) is purchased by the “do-it-yourself” vehicle owner (DIYers) – those that change their own oil (American Marine, 2004).

3.1.6 Efforts of Tanzania Government towards environmental protection

The government of Tanzania realised the danger facing such resources including clean air, fossil fuels, whales, hardwoods and endangered species by taking appropriate measures ranging from policy, legal framework and institutional arrangement which are conforming to socio-political and economic system.

The government in collaboration with various stakeholders has put emphasis on promoting, strengthening and sensitizing communities and individual's participation as a strategy to invigorate environmental conservation and management. Together with these strategies there were awareness campaign, environmental education and skills development that complemented on various initiatives on environmental conservation and management.

Emphasize for the environmental conservation and management is to raise the capacity and ability of the communities and individuals in sustainable management for own benefits and for the future generations. It is vividly evident that the efforts have raised public awareness, interests and actions as more than 159 Community Based Organisations (CBO) and non-Governmental Organisations (NGOs) have been formed as well as private sector and individuals joining the process (URT, 1999).

Growing awareness of the general public and individuals, advantages of sound environmental conservation and management strategies/policies form the basis for sustaining the resources and environment. This goes together with implementation of

sound strategies on poverty eradication as poverty is highly tied with unsustainable resources utilization and environmental degradation and promotes joint gender efforts. Furthermore, the government has committed itself in environment conservation and management and poverty eradication with full support of individuals, CBO, NGOs and Donor Agencies (Njau, 1995).

Furthermore, the government and other collaborating institutions and agencies such as CBOs/NGOs are implementing various programmes in rural and urban areas. The media institutions (radio, TV, press, newspapers) has played a significant role in sensitizing and undertaking various education programmes on environmental issues thereby cultivating public/private interest, commitment and awareness on environmental management and conservation aspects.

Environmental and economic activities may affect human welfare either positively or negatively. Environmental protection has been considered as a typical example of 'defensive' rather than welfare or true income generating activities. Those activities are to defend society against deterioration in environmental quality and its effects on human health and well-being.

Too often human activities damage the environment's capacity to satisfy human demands; when this happens the quality of life inevitably suffers. No nation is free of environmental problems. Poverty, overpopulation, and emphasis on short-term economic gain without regard for environmental consequences are some of the factors which accelerate environmental degradation. Throughout the world, national governments and

private groups have begun to realize that protection of nations' natural resources has a positive effect in improvement in the lives of their citizens (Moser, 1989).

3.2 Empirical Literature Review

3.2.1 Ways of waste oil recycling and recovery

Oil originates from fossil fuels and is a valuable resource both in its original form and as a recyclable substance. Recycling used motor oil keeps oil out of landfills. Used Oil can be reused or recycled through reconditioning, reprocessing and re-refining. These recycling efforts help to conserve natural resources, protect the environment, reuse an existing resource, save energy and save money (American Marine, 2004).

From a purely environmental point of view, the best thing that the motor oil consumer can do is to buy longer-lasting oil. In that way, less used oil is generated in the first place. Over 380 million gallons of used oil is recycled each year according to the U.S. EPA, which equates to over 50 percent of all motor oil purchased annually. Currently, used motor oil can be re-used or recycled by one of three ways – reconditioning, reprocessing or re-refining. It is important to note that each process can be important in helping to manage the overall volume of used motor oil (API, 2006).

(i) Reconditioning

Involves removing impurities from the used oil and using it again. While this form of recycling might not restore the oil to its original condition, it does prolong its life. In some

industries, oil is filtered through a commercial filtration system or otherwise cleaned. This process helps remove insoluble impurities so the oil potentially can be used again and again. Although the cleaning process does not always bring the oil back to its original quality, such cleaning, when combined with replenishment of key additives, does extend the oil's life and use.

(ii) Re-refined

Involves treating used oil to remove impurities so that it can be used as a base stock for new lubricating oil. Re-refining prolongs the life of the oil resource indefinitely. This form of recycling is the preferred option because it closes the recycling loop by reusing the oil to make the same product that it was when it started out, and therefore uses less energy and less virgin oil. Currently for instance 14% of used motor oil in USA is re-refined and the consumer demand for this product has not made re-refining economically efficient for oil manufacturers. The result is that in some cases re-refined motor oil may be more expensive than virgin motor oil, when purchasing re-refined motor oil it is advised to ensure that the oil specifications for the product meet those required by a specific vehicle manufacturer.

(iii) Processed and burned for energy recovery

Involves removing water and particulates so that used oil can be burned as fuel to generate heat or to power industrial operations. This form of recycling is not as preferable as methods that reuse the material because it only enables the oil to be reused once.

Nonetheless, valuable energy is provided (about the same as provided by normal heating oil).

(iv) Re-use and reprocessing

Both lubricants, such as motor oil, and fuels, such as heating oil, are petroleum products. When oil can no longer perform its original lubrication job, it may be perfectly suitable for re-use and a second life as a fuel petroleum product in, say, a power plant with little or no treatment. If some treatment is needed, reprocessing of used motor oil removes some water and particles so that the oil can be burned and used as fuel to generate heat or electricity for commercial operations. For example 74% of all oil re-used/recycling in the U.S.A is for burning in turbines, incinerators, power plants, cement kilns and manufacturing facilities (asphalt, steel, etc...). An additional 11% of used motor oil is burned in specifically designed industrial space heaters. This creates a valuable form of energy, which helps the economy by avoiding the need to refine new commercial heating oil from imported crude oil. Also used oil can be inserted into a petroleum refinery, which involves introducing used oil as a feedstock into either the front end of the process or the coker to produce gasoline and coke.

Do-It-Yourselfers (DIYs) campaign from American shows that if do-it-yourself oil changers were recycled, it would be enough motor oil for more than 50 million cars a year. Imagine how much foreign oil that would eliminate. Used motor oil from cars, trucks, boats, motorcycles, farm equipment and lawnmowers can be recycled and re-refined (API, 2006).

3.2.2 Sustainable developments and the environment

Sustainable Development is a term used by its proponents to describe their recommended methods of creating economic growth which protect the environment, relieve poverty, and do not destroy natural capital in the short term at the expense of long term development (UNCED, 1992).

While many definitions of the term have been introduced over the years, the most commonly cited definition comes from the report "Our Common Future", more commonly known as the Brundtland Report. The report states that sustainable development is development that "meets the needs of the present without compromising the ability of future generations to meet their own needs".

Sustainable development does not focus solely on environmental issues. More broadly, sustainable development policies encompass three general policy areas: economic, environmental and social. In support of this, several United Nations texts, most recently the 2005 World Summit Outcome Document, refer to the "interdependent and mutually reinforcing pillars" of sustainable development as economic development, social development, and environmental protection (URT, 2006).

However, technologies such as renewable energy, recycling and the provision of services can, if carried out appropriately, provide for growth in the economic sense, either without the use of limited resources, or by using a relatively small amount of resources

with a small impact. In the latter case, even the use of small amounts of resources may be unsustainable if continued indefinitely (McMichael, and Powles, 1999).

Environmental problems have socio-economic consequences. Poor environmental quality of cities can deprive citizens of a high standard of life as it affects their health and well being (Geenhuizen and Van Nijkamp, 1995). Sustainable development is related to the quality of life in a community, meaning that the environmental, social and economic systems that form the community must provide a healthy, productive, meaningful life for all community residents, both in the present as in the future (Mitlin and Satterthwaite, 1994).

Applied to cities, the multiple goal of sustainable development can be described as; “Keeping wastes from cities within absorption capacity of local and global sinks. These include renewable sinks (e.g. capacity of rivers to break down biodegradable wastes) and non-renewable sinks (for persistent chemicals)”. So, sustainable development combines improving the quality of life and controlling or limiting the harmful impacts of human activities on the environment (Hardoy, 1992).

The management of the environment in Tanzania has been undertaken on the basis of a plethora of laws and regulations. Almost the whole corpus of environmental law is statutory based. Few cases have been decided on the basis of these laws. However, the common law of torts on nuisance and negligence are applicable in Tanzania. It should be noted, however, that much of the existing environmental legislation is outdated. Furthermore, since these laws are widely scattered, their enforcement (or non-

enforcement) has often led to conflicts between different governments departments, thus undermining their effectiveness. Legislation aimed at regulating the use and management of natural resources has evolved along sectoral lines, governing specific environmental media. Agenda 21, stresses the importance of enhancing local capacities for sustainable development in developing countries. National environmental legislation and related institutions form the nucleus in the building of capacity to grapple with the challenges of sustainable development (UNCED, 1992). The first tangible result of NEAP has been the drafting of an environmental law and policy. In addition, and as mentioned earlier, a number of sector policies and legislation are currently under review.

One of the challenges facing Tanzania is taking necessary legislative steps to ensure sustainable development. Of late, the country's environment has been heavily affected by the influx of refugees from Rwanda, Burundi and Zaire. Again, important aspects like air pollution and environmental disaster preparedness are virtually unlegislated. The existing legal framework was not molded to absorb such challenges.

Chapter 8 of Agenda 21 on policy-making for sustainable development recognizes that country specific laws are among the major important instruments for transforming environment and development policies into action. This can be accomplished not only through "command and control" methods, but also by using a framework for economic planning and market instruments. Major constraints facing environmental management in Tanzania include the lack of capacity to enforce environmental laws and lack of working tools.

3.2.3 Community participation in environmental management

In the 1990s community-based approaches to environmental problems have become widespread, since there is an emerging global consensus that the implementation of sustainable development should be based on local-level solutions and community participation.

Community participation may comprise varying degrees of involvement of the local community. It may range from the contribution of cash and labor to services offered or consultation, changes in behavior, involvement in administration, management and decision-making (Moser, 1989).

3.3 Policy Review

3.3.1 Overview

As stated in the National Environmental Policy 1997 and concretized by Development Vision 2025, the local communities as well as business entities has the responsibilities of planning, implementing programmes / projects that are reflecting their needs and foster efficiency in resource utilization including reuse, recycling and reduction of waste. In addition the private sector has the role of participating in different forum including policy and legal formulation process related with environmental management (URT, 1999).

In this policy the word environment refers to the conditions and influences under which any individual or thing exists, lives or develops. These conditions and influences include:

- The natural environment including renewable and non-renewable natural resources such as air, water, land and all forms of life.
- The social, political, cultural, economic, working and other factors that determine people's place in and influence on the environment.
- Natural and constructed spatial surroundings, including urban and rural landscapes and places of cultural significance, ecosystems and the qualities that contribute to their value.

Culture, economic considerations, social systems, politics and value systems determine the interaction between people and the environment, the use of natural resources, and the values and meanings that people attach to life forms, ecological systems, physical and cultural landscapes and places. People are part of the environment and are at the centre of concerns for its sustainability.

The National Environment Management Council Act falls into the last category and is perhaps one of the most significant laws, which pertain to environment, and one which demonstrates government interest in sustainable economic development that includes environmental considerations. The Act created the National Environment Management

Council (NEMC) in 1983 for the purpose of "acting as an advisory body to the government on all matters relating to the environment."

As part of its advisory capacity, NEMC is given the duty to formulate and recommend policy, coordinate activities, evaluate and improve existing policies, stimulate public and private participation in programs and activities for national beneficial use of natural resources, specify standards and norms, establish and operate a system of documentation, formulate proposals for legislation, establish and maintain liaison in other national and international organizations, and undertake general environmental education programs.

Intervention by governments through policies and tax instruments can provide a framework for resolving conflicts over resource use. Government tackles environmental problems by passing laws, setting standards, promulgate bans and imposing regulations.

However, these measures are not always effective. Governments have now begun to introduce the market based tax instruments and incentive schemes. Governments have to intervene in environmental affairs when market forces fail to align the interests of individuals with those of the society at large; the role of governments in this case is to align the private cost with social cost (URT, 1999).

The way in which the governments have traditionally aligned private cost and social costs is by setting standards. Standards have important advantages in part of developers and general public. Tanzania has a National Environmental management Council

(NEMC) since 1983. It has produced a National Conservation Strategy in the mid-1983s based on the World Conservation Strategy; after the 1992 United Nations Conference on Environment and Development, it was modified to become Tanzania's National Conservation Strategy for sustainable Development. In development continues the historical emphasis on top-down, centralized natural resource management.

The overall objectives of the National Environmental Policy 1997 are:

- To ensure sustainability, security and equitable use of resources for meeting the basic need of the present and future generations without degrading the environment or risking health or safety;
- To prevent and control degradation of land, water, vegetation, and air which constitute our life support systems;
- To conserve and enhance our natural and man-made heritage, including the biological diversity of unique ecosystems of Tanzania;
- To improve the condition and productivity of degraded areas including urban and rural settlements in order that all Tanzanians may live in safe, healthful, productive and aesthetically pleasing surroundings;
- To raise awareness and understanding of the essential linkages between environment and development, and promote individual and community participation in environmental action, and
- To promote international co-operation on the environmental agenda, and to expand our participation and contribution to relevant bilateral, sub-regional,

regional, and global organization and programmes, including implementation of treaties.

The policy furthermore defines the essential nature of sustainable development as the combination of social, economic and environmental factors. It takes ownership of sustainable development as the accepted approach to resource management and utilization in Tanzania, thus entrenching environmental sustainability in policy and practice (URT, 1999).

3.3.2 Tanzania Environmental Strategies, policies and plans

Tanzania has a number of other statutes sometimes referred to as environmental laws, but which are actually resource exploitation statutes. These include the Mining Act (1979), Fisheries Act (1974), Water Utilization and Control Act (1974), and the Forest Ordinance (1959). All these Acts are currently under review to reflect sustainable utilization of resources. The challenge ahead is to incorporate the requisite institutional machinery and enforcement authority, including effective judicial procedures and compliance with international agreements into these laws, and to ensure their periodic review. The government will also try to direct fiscal and economic policies to reflect environmental costs in the daily decision making processes (URT, 1997).

A compilation and evaluation of sectoral environmental laws has been undertaken by the Division of Environment. A national workshop to initiate the formulation of a framework environmental legislation and review of sectoral laws was held in September

1995. The workshop proceedings have been prepared, as well as a project proposal to develop the framework and review. Efforts are underway to secure funds to support the preparation process with the Division of Environment now working on new comprehensive environmental legislation. Individual sectors have also taken the challenge of initiating reforms in policies and laws relating to sustainable development and environment. Examples in addition to those discussed above include: Marine and Coastal Areas; Land Management; Forest Ordinance, Cap. 389; and Forest Ordinance Rules (URT, 1999).

The National Environmental Policy provides a framework for making fundamental changes that are needed to bring environmental considerations into the mainstream of decision making in Tanzania. It also seeks to provide policy guidelines and plans and gives guidance to the determination of priority actions, for monitoring and regular review of policies, plans, and programmes. It further provides for sectoral and cross-sectoral policy analysis thus exploiting synergies among sectors and interest groups.

The overall objectives of the National Environmental Policy are, therefore, to ensure sustainable and equitable use of resources without degrading the environment or risking health or safety; to prevent and control degradation of land, water, vegetation, and air which constitute the essential life support systems; to conserve and enhance natural and man-made heritage, including the biological diversity of the unique ecosystems of Tanzania; to improve the condition and productivity of degraded areas including rural and urban settlements in order that all Tanzanians may live in safe, productive and

aesthetically pleasing surroundings; to raise public awareness; to promote individual and community participation; and to promote international cooperation.

The National Environmental Policy also provides for the execution of a range of strategic functions using policy instruments such as environmental impact assessments, environmental legislation, economic instruments and environmental standards, and indicators. A framework is also provided for institutional arrangements and coordination. The role of major groups such as non-governmental and community based organizations, and the private sector is underscored. Capacity building and human resource development are emphasized.

The National Environmental Policy provides a unifying set of principles and objectives for an integrated and multi-sectoral approach addressing the totality of the environment. With the enunciation of the Policy, the main challenge is to ensure that all sectors and interest groups take priority actions in a mutually supportive manner. It is in this regard, therefore, that an action plan has been developed as a first step towards the incorporation of environmental concerns in the national development planning process.

The NEP seeks, among other things, to integrate the environmental policy and the conservation strategy into the planning process; involve stakeholders in environmental management; promote environmental education and public awareness; promote research and technology initiatives; evolve and strengthen a national environmental information system; promote environmental impact assessments; guide the development of a

framework environmental legislation; and prepare a long term investment plan to address major environmental concerns (URT, 1997).

Until recently, environmental issues were the responsibility of sectoral ministries. However, institutional structures and strategies are changing towards cross-sectoral coordination with the growing awareness of the importance, severity, cross cutting, and complex nature of environmental issues. In line with this new thinking, the government is currently reviewing all sectoral policies to ensure that they are consistent with current macro-economic reforms and national environmental policy. The underlying premises of the sectoral policy reviews are the need to balance accelerated economic growth with more efficient and sustainable use of the environment and natural resources; and the need to integrate environmental management into all sectors (URT, 1997).

3.3.3 Used oil management standards

Businesses that generate or handle used oil should recognize that there are certain good housekeeping practices that must be followed. These required practices called "management standards," were developed by EPA for businesses that handle used oil. The management standards are common sense, good business practices designed to ensure the safe handling of used oil, to maximize recycling, and to minimize disposal.

The standards apply to all used oil handlers, regardless of the amount of the oil they handle. Although different used oil handlers may have specific requirements, the

following requirements are common to all types of handlers. These requirements relate to storage and to cleaning up leaks and spills, as follows.

- Label all containers and tanks as Used Oil.
- Keep containers and tanks in good condition. Don't allow tanks to rust, leak, or deteriorate. Fix structural defects immediately.
- Never store used oil in anything other than tanks and storage containers.

Used oil may also be stored in units that are permitted to store regulated hazardous waste, however, as long as they are labeled and in good condition. Storage of used oil in lagoons, pits, or surface impoundments that are not permitted is prohibited. (U.S.EPA, 2005)

CHAPTER 4: PROJECT IMPLEMENTATION

4.1 Project Title: Waste Oil Management Project in Temeke District

Basically, this project intended to initiate concrete community-based waste oil recycling project, which emphasizes on community participation as recommended in the community needs assessment. Project implementation process followed after the initial project planning that involved human, financial and physical resources. The implementation of the project emphasized on the involvement of all project stakeholders.

4.2 Project Goal

The main goal of the project was to protect environment from waste oil pollution by initiating a concrete community- based waste oil recycling project in Temeke District Dar Es Salaam city. Based on the study recommendations, specifically, the project intended to organize the CBO members and other stakeholders in order to formally register their organization, mobilize stakeholders and community members for the adoption of the project, to provide knowledge and skills on waste oil management to all stakeholders and community members. Others were to prepare the proposal for official project approval by NEMC to raise the project funds, to collect all waste oil produced in Temeke District, to produce waste oil recycling products and to market the products.

4.3 Products and Outputs

The output of the project was measured through the indicators which initiated by the officially registered organization, awareness campaign conducted, numbers of trainings conducted, consultative meetings with community members and other stakeholders

convened before and during the implementation of the project to deliberate the essence of the project to the community. Other indicators were proposal for project approval by NEMC, fund raised, numbers of collecting site initiated, numbers of product produced and marketed. During project implementation the above indicators were categorized as input, process, output and impact indicators.

4.3.1 Input indicators

Input indicators are quantified and time-bound statements of resources to be provided. Information on these indicators comes largely from accounting and organization management records. Input indicators are often left out of discussions of project monitoring, though they are part of the management information system. A good accounting system that keep track of expenditures and provide cost data for performance analysis of outputs are the key personnel during monitoring and evaluation of the input indicators. Input indicators are used mainly to the tasks of implementation, and are consulted frequently, as often as daily or weekly.

These include waste oil management training costs, campaign costs, stationeries cost (during different meetings and workshops) and cost of material used during waste oil recycling and appointment of staff.

4.3.2 Process indicators

Process indicators measure what happens during implementation. Often, they are tabulated as a set of contracted completions or milestone events taken from an activity

plan. These include monitoring the time by which each activity take place such as the organization registration and project approval, time for collection of waste oil, recycling and market time. Information on these indicators was obtained from organization technical operation records.

4.3.3 Output indicators

Output indicators show the immediate outputs of the project: physical quantities, organizational strengthening, and initial flows of services. They include performance measures based on cost or operational ratios. These are official registration, organization certificate, project approval certificate, number of stakeholders involved in all project activities, amount of waste oil collected, recycled and marketed. Also this information came from organization project records.

4.3.4 Impact indicators

Impact indicators refer to medium or long-term developmental change. Some writers also refer to a further class of outcome indicators, more specific to project activities than impact indicators, which may be sectoral statistics, and deal more with the direct effect of project outputs on beneficiaries. Measures of change often involve complex statistics on the economic or social welfare and depend on data that are gathered from beneficiaries. Early indications of impact should be obtained by surveying beneficiaries' perceptions about project services. This type of indicator has twin benefits of consultation with stakeholders and advance warning of problems that might arise.

For this project impact indicators considered were stakeholders' perception and involvement in the project activities, availability of clean environment, and participation of community members in waste oil management activities.

4.4 Project Planning

Planning is a process, which involves describing what is to be implemented. The following project plan includes the project objectives and its planned activities; also it includes resources needed for each of the activity and its expected output (Table 7).

Table 7: Project Implementation Plan

Objectives	Activities	Resources/Inputs	Time frame	Expected output
Organizing organization members and other stakeholders	-Conducting meetings with organization members. -Process organization for registration.	Organization members, Project stakeholders, project coordinator and stationeries.	1 st to 2 nd month	-Organization members organized and officially registered.
To mobilize stakeholders and community for the adoption of the project.	-Conduct awareness campaign.	Organization members, Project stakeholders and project coordinator	3 rd to 5 th month	-All the stakeholders sensitized & support the project.
To provide knowledge and skills on waste oil management to the stakeholders.	-Prepare training program outlined on waste oil management.	Project coordinator, organization members, stakeholders and stationary.	6 th to 7 th month	-Training outline prepared.

	-Conduct training on waste oil management to all stakeholders.	Project coordinator, organization members and other stakeholders.	8 th to 10 th month	-Training conducted
Officially approval of the project by NEMC.	-Develop and submit proposal for project approval by NEMC.	Project coordinator and organization members	11 th to 12 th month	-Project approved by NEMC.
To raise the funds.	-Develop proposal for fund raising.	Project coordinator and organization members	13 th to 15 th month	-Fund raised
To collect all waste oil produced in Temeke district.	-Identify waste oil collection point.	Project coordinator, organization members and other stakeholders.	16 th month	-Waste oil collection point identified.
	-Establish collection tank at each collection point identified.	Project coordinator, organization members and other stakeholders.	17 th to 19 th month	-Collection tank available at each collection point identified.
	-Collect all waste oil available.	Project coordinator, project stakeholders.	20 th to 22 nd Month	-Waste oil collected.
To produce waste oil recycled products.	-Transport waste oil to recycling point.	Project coordinator and organization members.	23 rd month	-All waste oil collected transported.
	-Prepare material used for recycling process.	Project coordinator and organization members.	23 rd month	-All needed material available.

	-Recycle collected waste oil.	Project coordinator and organization members.	24 th month	-All waste oil recycled.
To market the products.	-Transport product to the market point.	Project coordinator and organization members.	24 th month	-All products marketed

4.4.1 Staffing Pattern

The implementation of the project has been made possible because the CBO have specialized and skilled personnel who offered their technical competencies in the project's implementation. These include the Director of Technical Operations who has the technical knowledge on waste oil management, and the Director of Finance, who has a Postgraduate Diploma in Financial Management.

The CBO have physical resources, materials and equipments, namely Oil storage tanks (about 20,000liters); protective gear, tanker truck for transporting of finished product (20,000 liters); fire extinguishers; and environmental friendly solvents (Benzene and Kerosene).

4.4.2 Budget

The total budget for project implementation is given in Table 8.

Table 8: Project implementation planning budget

s/n	Activities	Description of the item	Cost per item	Total cost
	Conducting meetings with organization members.	Meeting for 20 stakeholders. a) 2 Tea break 20 @ 1000Tshs b) Lunch 20 @ 2000Tshs.	40,000Tshs 40,000Tshs	80,000 Tshs
	Conduct awareness campaign.	a) Hire 2 vehicle @ 600,000 b) Petroleum oil 50 lts @ 1300Tsh c) Allowance for 2 people @ 25,000Tshs	1,200,000 Tshs 65,000 Tshs 50,000 Tshs	1,315,000 Tshs
	Prepare training program outline on waste oil management. Conduct training on waste oil management to all stakeholders.	a) Allowance for 5 people @ 50,000 Workshops for 300 people. a) Allowance 300 people @ 25,000Tshs b) Lunch 300 people @ 2000Tshs c) 2 Tea breaks for 300 people @ 1000 d) Stationeries 50,000 Tshs.	250,000Tshs 7,500,000 Tshs 600,000 Tshs 600,000 Tshs 50,000 Tshs	9,000,000Tshs
	Develop and submit proposal for project approval by NEMC.	a) Stationary 20,000 Tshs b) Allowances for 5 people @ 50,000 Tshs	20,000 Tshs 250,000 Tshs	270,000 Tshs

	Develop proposal for fund raising.	c) Stationary 20,000 Tshs d) Allowances for 5 people @ 50,000 Tshs	20,000 Tshs 250,000 Tshs	270,000 Tshs
	Identify waste oil collection point. Establish collection tank at each collection point identified.	a) Purchase 50 tanks (400lts) @ 400,000Tshs b) Install collecting tanks to the 50 collection points @ 100,000 Tshs	20,000,000Tshs 5,000,000 Tshs	25,000,000Tshs
	Transport waste oil to recycling point. Recycle waste oil to produce grease and lubrication oil.	a) Purchase 2 tankers @ 60,000,000 b) Allowance for 10 workers @ 100,000 a) Recycling material cost 5,000,000 Tshs	120,000,000Tshs 10,00,000Tshs. 5,000,000 Tshs	130,000,000 5,000,000Tshs
	Transport product to the market point.	a) 15 Worker allowances @ 100,000Tshs for 4 month b) Management cost 1,000,000 Tshs. c) Transportation cost 1,000,000 Tshs.	6,000,000 Tshs 1,000,000 Tshs 1,000,000 Tshs	7,000,000Tshs 1,000,000Tshs
	Grand	Total		178,935,000Tshs

Funding needed 178,935,000 Tshs.

4.5 The actual Implementation of the project

4.5.1 Project implementation report

After accomplishing the community needs assessment study, which was conducted between December 2005 and April 2006, the researcher held a meeting with TEMO members to strategize a way forward. The members of the organization decided to embark on the concrete community- based waste oil recycling system project, which emphasizes on community participation in Temeke District and the researcher was appointed as the project coordinator.

The implementation of the project was initially budgeted to cost Tshs 178,935,000 to cater for the project activities' costs as shown in table 8 above. The implementation plan was rescheduled to accommodate changes due to limited time and funds. For instance, organization members and stakeholders' mobilization and the project coordinator worked without payment and one of organization member provided venue for all meetings conducted.

The project coordinator in collaboration with organization members worked hard (by volunteering) to ensure that the organization get officially registered. The organization was registered in September 2006 as NGO under the Non-Governmental Organization Act, 2002 with registration number OONGO/1694 bearing the name of 'Waste to Wealth Partners of Tanzania (WAWEPA), (WAWEPA certificate attached as Annex 4). TEMO

was then changed from CBO to NGO, which was possible only through the personal efforts of the research, which influenced the members to see the advantages obtained by operating as registered NGOs. Thereafter the NGO was officially authorized to deal with environmental management and protection activities in the country, thereby effectively implement the first objective of the project, which was to organize community members and other stakeholders and register the organization.

A number of activities were carried out in order to achieve the other objectives. The activities include: conduct three trainings on waste-oil management. The Project coordinator in collaboration with organization members, coordinated with NEMC to organize trainings for one hundred stakeholders (20 organization members, 10 government leaders, 25 participants from petrol stations, 30 from garages and mechanics and 15 community members) on waste oil pollution and the hazards of waste oil pollution. The training was intended to realize objective number 2, which was to provide knowledge and skills on waste oil management to the project stakeholders.

Contrary to the projected budget, the facilitator from NEMC come up with all materials needed, so there was no need to prepare training program outline and the hosting organization (WAWEPA) hired the venue and provided 20,000 Tshs for each participant, for the first day, as allowance. At the end of the first day, all participants discussed on the session and agreed not to take the allowance for other days, and instead

agreed to contribute 30,000Tshs each for tea and lunch for the remaining two days. The project implementation Gantt chart is shown in Table 9.

Due to time limit; at submission of this project report the process of preparing a project proposal for approval by NEMC was underway, as it is a legal requirement that before any environmental project is implemented, it must be approved by NEMC.

Table 9: Project implementation Gantt chart (Time frame 24 months)

Activities aiming to achieve	1 st - 4 th month	5 th - 8 th month	9 th - 12 th month	13 th -16 th month	17 th - 20 th month	21 st - 24 th month
-Conducting meetings with organization members.	X					
-Conduct awareness campaign.	X					
-Prepare training program outline on waste oil management.		X				
-Conduct training on waste oil management to all stakeholders.			X			
-Develop and submit proposal for project approval by NEMC.			X			
Develop proposal for fund raising.				X		
Identify waste oil collection point.				X		
Establish collection tank at each collection point identified.				X		
Transport waste oil to recycling point.					X	

Prepare used material for recycling process.				X		
Recycle waste oil to produce grease and lubrication oil.					X	X
Market the product					X	X
Monitoring	X	X	X	X	X	X
Evaluation			X			X

CHAPTER 5: MONITORING, EVALUATION AND SUSTAINABILITY

Monitoring and evaluation was conducted to ensure that the project stays on track and achieves its objectives. Monitoring was done routinely to gather information needed to keep the project on track, identify constraints and formulate solutions, document best practices and measure progress. Evaluation was conducted to assess the impact of the project on the target community.

5.1 Project Monitoring

Monitoring is a systematic process which provides regular feedback that helps an organization track costs, personnel, and implementation time, and organizational development, economic and financial results to compare what was planned to actual events. In its simplest terms monitoring is collection and analysis of information to track what's going on. Monitoring was particularly conducted to gather information on project progress. Information obtained assists in determining whether the activities are progressing as planned and if it is leading to the objectives of the project. The monitoring done was participatory involving key stakeholders in every stage. In order to enhance participatory project monitoring, this project employed several techniques on gathering the information.

5.1.1 Monitoring methods

The monitoring activities were undertaken to ensure that project stay on track and achieves its objectives. Monitoring was conducted using focus group discussions that involved different stakeholders, observation and reviewing organization records. Table 10 presents logical sequence for the systematic project monitoring. The table summarizes the list of activities planned to be monitored (derived from the plan), time duration for each activity to be completed (derived from the plan) and the monitoring indicators for each monitoring item.

Table 10: Project monitoring matrix

Objectives	Monitoring items	Indicators	Responsible	Planned timeline	Actual timeline
Organizing 20 organization members and other stakeholders	Organizing 100 stakeholders and 20 organization members.	Members perception and organization registration	Project coordinator	1 st to 2 nd month (May 2006- June 2006)	May 2006 to September 2006.
To mobilize 100 stakeholders and community for the adoption of the project.	Number of stakeholders mobilized.	Stakeholders involvement and perception	-Organization members, Project stakeholders and project coordinator.	3 rd to 5 th month (August 2006- October 2006)	October 2006 to December 2006

To provide knowledge and skills on waste oil management to 100 stakeholders.	Number of participants, availability of facilitators and material needed.	Stakeholders' perception towards project.	-Project coordinator, organization members, stakeholders and stationary.	6 th to 10 th month (November 2006 – December 2006)	January 2007 to May 12 th , 2007
Officially approval of the project by NEMC.	Preparation of project proposal for approval	Project approval certificate	Project coordinator and organization members	11 th to 12 th month (April 2007 – May 2007)	May 13 th 2007 ongoing
To raise the funds.	Funds raised	Availability of Fund	Project coordinator and organization members	13 th to 15 th month (June 2007 – August 2007)	Not yet done
To collect all waste oil produced in Temeke District.	Collection material/input and process	Collected amount	Project coordinator, organization members and stakeholders.	16 th month (September 2007)	Not yet done
To produce waste oil recycled products.	Recycling process	Product produced. Pollution reduced	Project coordinator and organization members	23 rd month (April 2008)	Not yet done
To market the products.	Marketing process	Pollution reduced	Coordinator and members.	24 th month -May 2008	Not yet done

The activities identified below started to be implemented in May 2006 because community needs assessment end up on April 2006. June 2006 was the first month for implementing the identified activities.

5.1.2 Project monitoring results

Table 11 show that organization members was sensitized on the project and organization activities in a sense that all organization members 20(100%) participated fully in organization registration process. This was aimed at speeding up community organization towards achievement of project objectives.

Table 11: Methods used by respondents in disposal of waste oils in the study area

Number of organization members	Frequency	Percentages
Organization members participate full in organization registration process.	20	100
Organization members not participate full in organization registration process.	0	0
Total	20	100

Source: Own survey data (2006)

Table 12 shows that 90% of stakeholders participated on training were available at all time at training venue and contributed in discussion and only 10% of stakeholders were not available at all time at training venue. Also the project coordinator ensured that all required materials were available in the training venue for each participant.

Table 12: Stakeholders participation in training on waste oil management

Number of stakeholders	Frequency	Percentages
Stakeholders participate full on training.	90	90
Stakeholders not participate full on training.	10	10
Total	100	100

Source: Own survey data (2006)

5.2 Evaluation

The formative evaluation was conducted quarterly to assess the impact and accomplishment of the project objectives. Primary and secondary data were collected in order to have enough evaluation information. Primary data were collected directly using focus group discussion and interviews with different group of stakeholders guided by evaluation questions checklist which are:

- i. What is the stakeholders' perception on the project activities?
- ii. What is the stakeholder involvement on the project?

- iii. Is the stakeholder able to explain the environmental effects of waste oil?
- iv. What is the stakeholders' contribution to project progress?
- v. How many stakeholders attended all training sessions?

The discussions and interviews focused on the stakeholders who attended the training, because this was the first quarterly evaluation stage intended to evaluate the perception of the stakeholders towards project implementation, and their level of involvement in the project initiation after attending training.

5.2.1 Performance indicators

Table 13 summarizes project evaluation process, including indicators used in data collection for project evaluation including both direct and indirect indicators.

Table 13: Summary of evaluation matrix

Objectives	Direct indicators	Indirect indicators	Methods	Evaluators
Organizing organization members and other stakeholders	Activities assigned, contribution of views and ideas and involvement	Perceptions of the people on the project activities, Organization certificate	Meeting reports reviewing and focus group discussion.	Project Coordinator
To mobilize stakeholders and community for the adoption of the project.	Stakeholders' involvement and participations towards the project.	Stakeholders' perception and involvement on the project.	Record reviewing, Participant observation and group discussions	Evaluation Team

To provide knowledge and skills on waste oil management to the stakeholders.	Socio- economic benefits gained out of training.	Stakeholders' perception towards project.	Participant observation and focus group discussions.	Evaluation Team
Officially approval of the project by NEMC.	Proposal prepared and submitted to NEMC	Project is approved by NEMC.	Interview, community meetings	Evaluation Team
To raise the funds.	Availability of funds.	Project performance.	Review records and organization reports.	Evaluation Team
To collect all waste oil produced in Temeke District.	Availability of waste oil to the recycling site.	Waste oil pollution reduced.	Observation, interviewing and reviewing records and activity reports	Evaluation Team
To recycle waste oil	Product produced.	Waste oil pollution reduced.	Activity reports reviewing, Observation Community needs assessment, interview	Evaluation Team
To market the products.	Market availability	Product marketed	Participant observation, interview, group discussions	Evaluation Team

5.2.2 Project evaluation results

The CBO members and other project stakeholders selected the evaluation team with project coordinator as a team leader. A formative evaluation was conducted by the evaluation team, the information analyzed and discussed to the stakeholders. The first and the second project objectives were accomplished as the community members organized themselves to register a CBO. Also stakeholders' were mobilized to attend training on waste oil management. The table 14 shows that all participants 100 (100%) who were involved in training pointed out the importance of waste oil management and declared that they are willing to be involved in every project implementation stage, and as a matter of understanding, they started by paying training contributions instead of taking training allowances. The unaccomplished objectives are not yet to be evaluated, and a summative evaluation was expected to be conducted at the end of the project.

Table 14: Participants involved in training

Participants involved in training	Frequency	Percentages
Stakeholders willing to be involved in all project stage.	100	100
Stakeholders willing not to be involved in all project stage.	0	0
Total	100	100

Source: Own survey data (2006)

5.3 Sustainability

The project sustainability is ensured by the fact that everyday waste oil is produced; as such there is a need of a sustainable and efficient system for waste oil management. Socially, at this stage, stakeholders' participation is high and the project is acceptable by the majority of community members as showed in project evaluation table (Table, 14).

5.3.1 Sustainability elements

This project is considered sustainable due to the reality that it was proposed by the community. It originated from the demand of the community, which was established during community needs assessment conducted by both the researcher and the organization members. The members of the organization and some of stakeholders were trained on waste oil management, so the organization and community had developed capacity to manage the project. The skills and knowledge acquired through their participation in the trainings will enable the community members to participate fully in the project development, because they are aware of and have accepted their role in the project.

5.3.2 Sustainability plan

The organization members were involved in every stage of the project from planning, implementation, monitoring and evaluation; to ensure knowledge acquisition and familiarize with the technicalities used in the project operations. Therefore, in the

absence of external facilitator (project coordinator) the organization can run the project by itself.

5.3.3 Institutional plan

The organization is legally registered and has the government support and it is collaborating with NEMC, which puts it in a better position to get support in terms of funds, loans and grants from the Government, Banks and other Organizations. Furthermore, all stakeholders are involved in planning to promote sustainable measures for the project development.

CHAPTER 6: CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

The project has, up to this point, achieved some of its objectives such as initiating a community based waste oil recycling system project, which emphasizes community participation in Temeke District, mobilization of group members to formally register their CBO as an NGO. Also by training organization's members and other project stakeholders on waste oil management. So the knowledge acquired has been very useful and timely as it sensitizes the community on waste oil management.

A project proposal that will be approved by NEMC is being prepared, that will improve the capacity of the NGO for fund raising and embark fully in waste oil collection and recycling processes. The project proposal approval if delayed will, as a result, impeditment the completion of the project's aspirations.

The main objective of the project is to protect environment from waste oil pollution, so that at the end of the project implementation, the surroundings in Temeke District is expected to be free from waste oil pollutions to a large extend, each year Tanzanians purchases billion of liters of motor and lubricating oil which as a result of mismanagement after use ends up in landfills, in sewers, or directly in the environment where it contributes to non-point source pollution, spoiling water resources and degrading the ecosystems.

6.2 Recommendations

This project, which emphasizes on community participation in its implementation stages, can be considered successful and sustainable as it is driven from the community itself as it was expressly shown in community needs assessment. Moreover, as it was indicated in the evaluation, all the stakeholders were willing to be involved in all the project implementation stages.

In undertaking projects of this kind, it is recommended to employ partnership initiatives to increase awareness of the general public, regulated persons, and small/large quantity waste oil generators through cooperative education and compliance assistance initiatives, including workshops to be held throughout the country. Also NEMC should set standards within the industry for the management of used oil such as minimum spill control standards.

It is recommended that the international funding agencies and government, private sectors, NGOs and the community at large to support this project, because it will reduce poverty and keep our environment clean. The project is potential and economically sound, financially viable, socially desirable, environmental friendly, and locally manageable. I recommend the similar project to other districts in Dar-Es-Salaam and all over the country.

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