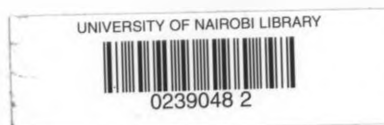


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COMMUNITY PARTICIPATION IN SUSTAINABLE  
URBAN INFRASTRUCTURAL AND ENVIRONMENTAL PLANNING:  
A CASE STUDY OF VOI TOWN.

BY

WILLIAM LAWRENCE LOKA, B.A (HONS), UNIVERSITY OF NAIROBI.  
1992.



A THESIS SUBMITTED IN PART FULFILMENT FOR THE DEGREE OF  
MASTER OF ARTS IN PLANNING IN THE UNIVERSITY OF NAIROBI.

AUGUST 1994

(ii)

**DECLARATION.**

This thesis is my original work and has not been presented for degree in any other University.

Candidate.....

WILLIAM LAWRENCE LOKA.

This thesis has been submitted for examination with my approval as University supervisor.

Supervisor.....

DR. SAMUEL V. OBIERO.

(iii)

**DEDICATION.**

This work is dedicated to my wife Naomi N.Loka and my son Jason Mumba Loka.

(iv)

### ACKNOWLEDGEMENT.

DR. S.V.Obiero deserves special acknowledgement for his tireless and diligent work in ensuring that this study was thoroughly completed. For his constructive criticisms and input, I say thanks.

Members of staff in the Department and Faculty who assisted in one way or another in shaping this work particularly Mr. Maleche are hereby acknowledged. For those who freely gave me access to data particularly the Voi Town Clerk Mr. Gideon Muindi, Joel Mwambela (Voi Municipal Social Welfare Officer), the Internal Auditor Mr. Kennedy D.N.Mwaniki and Donald J.Mzenge (from the Municipal's Town Planning Department), the Area Manager National Water Conservation and Pipe line Corporation, the District Works Officer, and officials of the Ministry of Education, I say thanks.

The Ministry of Local Government through the Green Towns' Project enabled this work to be undertaken by offering financial assistance, for this, I say thanks. The Government of Kenya through the Department of Physical Planning enabled this study to be completed by sponsoring me to study for an M.A (PLANNING) course at the University. For this I'm very grateful.

**ABSTRACT.**

Roads, water and sanitation are among the most important infrastructural packages which form the environment. Improved environment in urban areas depends among other things on the provision, utilization and maintenance of the above infrastructural facilities. The study has therefore examined the infrastructure situation and how it influences the current pattern of urban growth in Voi town. The study has also examined the institutional set up and its capacity for planning and management of the town. The study has shown that despite the importance of roads and water supply on creation of employment opportunities, improvement of incomes and smooth running of urban affairs, the utilization and maintenance of these two facilities is inadequate. This is attributed to lack of adequate resources by the Voi Municipal Council, lack of adequate financial resources by the National Water Conservation and Pipe line Corporation, due to the scattered pattern of development and finally due to the application of imported planning standards which are not in accordance with the existing local conditions.

(vi)

It has been also established in this study that there is no Municipal sewer. Most people use shallow not fully serviced pit latrines. Household waste water is disposed of by shallow trenches which are poorly maintained. The poorly shallow maintained trenches are characterised by stagnant water which form breeding grounds for mosquitoes and also home for other disease causing vectors such as worm infestations, diarrhoea, skin and eye diseases. The reasons as to why people use shallow not fully serviced pit latrines and shallow trenches for disposal of household waste water are the geological structure and lack of financial resources. Topography was found to be a factor affecting the general provision and utilization of infrastructure in the town. To improve the current infrastructure situation, the study examines the role of the community in the planning and management of Voi town. Furthermore, the study recommend ways of using the community as a means to achieving more sustainable development and enviromental quality in the town.

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## CHAPTER ONE. INTRODUCTION.

### 1.1. URBANIZATION AND INFRASTRUCTURAL PLANNING.

Urbanization all over the world is growing rapidly. The causes of this scenario according to UN (Habitat, 1989), include rural-urban migration, natural increase and the conversion of rural villages into urban villages. Great population increase is experienced especially in the third world. This is because most countries in the third world are still in their early stages of development. In Africa, for example, the rate of population growth is doubling every 24 years (Obudho, 1992). He observes further that the contents' population, 370 million in 1992, will increase to 429.2 million by the year 2000 given a growth rate of 2%. This therefore has given rise to a situation where by population is increasing faster than the respective economies can provide for better services in the urban areas. Consequently, there have been heavy demands on basic needs such as housing, roads, water, sanitation, electricity, health and educational facilities. The existing institutional structure and urban fabric are least prepared to meet the challenges.

Urbanization in Kenya is a twentieth century phenomenon



and is mainly a product of British colonization. Prior to the establishment of European administration towards the end of the last century, the existing urban settlements in the country were the Arab trading centres along the coast. (Njau, 1980). Urban centres in the inland were a European creation, evolved by imported notions and planning practices. Ninety percent of the inland centres began as railway centres during the construction of the Kenya-Uganda railway line and grew as basis for administration and commercial activities from the coast to Lake Victoria (Ibid). The present pattern of urban growth therefore reflects the development of British colonization and trade. The British Government paid attention to the gazetted towns in terms of planning and infact it was only the lay out and structural quality of the urban areas that were taken into consideration. Emphasis was not laid to areas just outside the boundaries of many gazetted towns many areas of which are now densely populated and are apparently urban, but without essential services. Moreover, the type of development control that exist in the country does so only on paper, leaving too much room for uncoordinated development to spring up. The share of urban population

increased from 7.8% in 1962 to 20% in 1989. 2007

At the time of the first population census in 1948, there were 17 towns with an aggregate population of 276,240. The urban population was proportionately small (5.2% of the total) and was disproportionately concentrated in Nairobi and Mombasa. Kenya, like most other developing countries has had its own share of urban informal, unplanned settlements. As the urban population has increased, urban workers who are not finding adequate shelter start providing their own housing, largely without approval by urban authorities. Large spontaneous urban unplanned settlements characterized by inadequate supply of infrastructural facilities have developed in a number of Kenya's urban centres. The official response of the urban authorities during the colonial times and the early years of the post independence era was to regard such settlements as eye-sore and raze them down either through the bulldozer or instigated fires. This however, did not solve the problem as the affected residents only moved and settled up in new settlements. The Government realising the futility of this effort changed its stance in the early 70s and made it policy not to demolish any settlements unless alternative areas of relocation were

provided. Given this official policy of tolerance, the number and size of unplanned settlements have continued to increase on both public and private owned land in towns in many parts of the country. Although the provision of basic infrastructure, that is water supply, sanitation, drainage and solid waste disposal is essential for safeguarding health, protecting the environment and promoting the efficient operation of human settlements, it is however widely recognized that the provision of these services to the low income people is badly neglected UN (Habitat,1992). Some of the factors which lead to such a situation relate to inappropriate technologies, weak institutional arrangement and inadequate financial resource mobilization. Water supply, for example, is the most vital resource for human life and has an important influence on the pattern and development of human settlements. But in Kenya, the population served by piped water in Nairobi and Mombasa by 1978 was 890,000 and by the year 2000 the population served in the two towns is projected to be 4,820,000. The inefficient water supply is caused by the contradiction in the decision making process. Programmes are designed to answer the needs of the people and at the

same time required to be profitable. The price charged has put water services out of families which also need to be served. (Human Settlement in Kenya, 1978).

Sewage produced is correlated with water consumption. Most towns in Kenya have no proper sewage disposal network. This has led to an endless problem of pollution. By 1978, for instance, less than 5% of Kenyans had public water born sewers, where as 51% had no sanitary facilities at all. The volume of solid waste increases due to increase in the number of dwellings. Transport, though being a necessary concomitant of the exchange economy and being cause and consequence of economic growth and development is not well developed in Kenya. This has therefore hampered development in most parts of the country.

The study therefore examines how the community in Voi could be involved in the planning and management of infrastructural facilities particularly (water, roads and sanitation) and how the involvement of the community could lead make the town sustainable.

## 1.2. STATEMENT OF THE PROBLEM.

In Voi, urbanization is tied to the irreversible phenomenon of rural-urban migration. Concomitantly, the basic infrastructural services are stretched beyond the limits and the demand for these completely outstrips the meagre resources of the Local Authority. There is unhygienic sanitary conditions associated with high prevalence of water and sanitary related diseases such as diarrhoea, worm infestations, malaria, skin and eye diseases as a result of lack of adequate grey and storm water drainage. Because of the rocky subsoil, it is virtually impossible to dig pits for latrines. This has forced people to use overused and not fully served pit latrines. The population have also opted for 'high rise pit' latrines which if poorly built, they cause considerable environmental hazard, as they can burst and pollute the surroundings. Moreover, infiltration capacity of waste water into the subsoil is greatly restricted by the low permeability of the rocky subsoil.

Currently, there is no organized collection of solid waste in the town by the Voi Municipal Council. Most people use rubbish pits in or near their compound where

domestic refuse and wastes are burned. However, sometimes the refuse is not burned on time and it provides breeding grounds for flies. The town is characterized by scattered pattern of development. This is because of the land tenure system. Provision of roads, water and sanitation facilities is therefore costly.

Most people in Voi fall in the low income bracket. This has an impact in the provision of adequate sustainable infrastructural facilities. Gunn (1978), observes that investments in infrastructural facilities are supportive of informal sector economic activity. He says:

“... infrastructural facilities are important factors for human settlements and also constitute factors for wealth creation both at the local and national level.” (Gunn, 1978:p 25).

The study therefore examines how the investments in infrastructure could improve the income of the people which could be utilized in maintaining the infrastructural facilities. Roads lower costs of production by making movement of goods from point of production to point of consumption easier. Better road surfaces such as bitumenized roads enhance timeliness, reduce vehicle expenses and make new production

activities feasible. The quality and quantity of water affects the range of possible activities that may be carried out in an area (Vagnby, 1980). How these benefits and others play an important role in stimulating urban growth is investigated in the study.

Various factors affect the level of utilization of infrastructural facilities. These factors include the local authority and the local community. Analysis of aspects of the two factors leads not only to possible solutions for them, but also the levels and types of infrastructure needed for small centres can thus be determined.

In summary, the provision of roads, water and sanitation facilities in Voi town is inadequate. This is due to the lack of adequate resources by the Municipal council, low incomes among most of the residents, and the scattered pattern of development. In light of this, the study concerns itself with the operation of the participatory mechanism of the community, application of appropriate approaches to the different population groups, the key ideas requiring attention and a number of useful recommendations which would emphasize the structure of the community, its composition, its organization for

different levels of action and other institutions that support its effort.

### 1.3. OBJECTIVES OF THE STUDY.

The objectives of the study are:

1. To examine the current pattern of urban growth in Voi.
2. To examine the institutional set up and its capacity for planning and management of the town.
3. To examine the existing patterns of infrastructural provision and utilization in Voi.
4. To examine the role of the community in the planning and management of the town.
5. To recommend ways of using the community as a means to achieving more sustainable development and environmental quality in Voi.

### 1.4. ASSUMPTIONS OF THE STUDY.

This study is made with the assumption that:

1. Voi Local Authority which is given the responsibility of providing services, stimulating relevancy of existing services, coordinating, arbitrating and being a broker of community



services is not able to provide efficient services due to lack of adequate resources.

2. Communities can take deliberate action in infrastructural and environmental planning and management by establishing and meeting certain objectives.
3. Decision making can include a broad range of inputs from citizens, organizations and providers in order to provide the key perspectives (checks and balances) necessary for implementation.
4. Roads, water and sanitation will form the major infrastructural packages for improved environmental quality in Voi town.

#### 1.5. THE SCOPE OF THE STUDY.

The study covered the whole town. Emphasis was on how the community could be involved in planning. The structure, composition and income of the population were some of the areas of interest. The physical set up of the town, cases of community participation in water supply, solid waste management and discharge of household waste were well covered in the study. The study also concentrated in examining factors why community

participation in transportation network has not taken place and how the community could be involved in the provision of these important services.

The study also concentrated on the current situation of infrastructure provision in Voi. Household, commercial and industrial characteristics were of particular importance as far as infrastructure provision is concerned. The institutional frame work and its capacity for planning of facilities in the study area was of particular interest.

#### 1.6. JUSTIFICATION OF THE STUDY.

[The concept of top down approach in planning] in Kenya proved ineffective because most of the projects were imposed on the people. Projects were therefore regarded as belonging to the Government hence people could not participate effectively in the implementation and maintenance of the projects. Recently, the bottom up approach of planning has been encouraged by the Government. People at the grassroot level are given opportunity to participate in the implementation and maintenance of various projects which could lead to self [sustenance.] This then has witnessed the exploration of

the concept of community participation which could lead to successful planning and provision of such infrastructural services like roads, housing, water and sanitation, not only in urban areas but also in rural areas.

[ The concept of community participation according to Naiya (1977), has often been used in development literature and its argued that its success depend on political support, existence of formal and institutionalized provisions and the ability of people themselves to participate. The study was therefore carried out in Voi so as to examine whether the above factors really make community participation tick or not. Development normally requires the concerted efforts of the physical, social and economic planners and the co-operation of the public who are the main implementing agents of development plans. Having this in mind, the study was carried out so that planners could see the importance of involving the people they plan for when preparing plans by seeking their needs aspirations.]

The provision of transportation network, water and sanitation facilities in Voi town is inadequate. This is because the Municipal Council has no adequate resources

to finance the provision of the services and at the same time the resources for development purposes are scarce. This therefore made it possible to explore the possibilities of marrying together planners and the local community so that they could share ideas on how they could provide infrastructural services rather than waiting for the Municipal Council to provide the services for them. Voi town was chosen because it is now fast growing. The rapid growth of Voi in terms of physical expansion and population growth make it a typical case of most towns in developing countries. It demonstrates clearly what problems as regards infrastructure towns in developing countries have.

Voi as a service centre has attracted large numbers of rural people from Taita/Taveta District and from other parts of Kenya with an expectation of getting employment. However, most of the people are not absorbed in the various sectors. This leads to high unemployment rate in the town. The study then concerns itself with how to plan and provide sustainable basic infrastructure in a town where most of the people fall in the low income bracket. Voi is predominantly characterized by scattered illegal settlements which are also a typical feature of towns

[mainly in developing countries.] [The study is therefore] examining the planning implications of providing basic [infrastructure in unplanned environment.] The physical form and poor land use organization in the study area would be used in showing how difficult it is to provide adequate basic infrastructure in such situations. The scattered pattern of development is basically related to the increase in costs in provision of services. Voi is a small town and is therefore convenient for this study. It can be managed easily compared to the big towns.

As problems of small communities like in Voi continue to compound, methodology must be developed to assess, procure and evaluate on a continuing basis priority services which sustain the total quality of life.

[Planning aims at the optimum use of resources and the] rational integration of community life. Planning is therefore not something apart from other community activities. Planning is related to and inherent in the operation of various agencies and the actions of the community. Community participation in planning is therefore a means of achieving the optimum use of [resources.] One intention of this study is to provide a more conducive illustration of the importance of public

opinion surveys in urban planning since this mechanism permits a democratic determination of the attitudes, desires and resistances of those who live in cities toward planning problems and proposed solutions. For those who answer the questionnaire and those who review published results must automatically reflect on the issues and proposed solutions involved.

Asking a representative group of individuals what they think about planning matters can assist materially in creating that feeling of a citizen body so essential to practical success. Consequently, urban planning can become more of a community interest and concern and less of a nebulous and misunderstood scheme proposed by a few individuals.

#### 1.7. DEFINITIONS OF TERMS USED.

**Community-** Refers to a local grouping of people with at least enough common interests, common symbols and values, beliefs, aims, aspirations, knowledge common understanding and capacity for organized action.

**Community organization-** Refers to a situation where people have learned to live together. It rests upon customs or traditional ways of regulating social

relationships.

**Community composition-** Refers to age groups, marital status, religious beliefs, income levels, and racial differences.

**Community participation-** The awareness and active involvement either in person or representation of the community in decision making, planning and implementation of infrastructure programmes

**Planning-** A process for laying down of a course of action that is to be followed in order to achieve stated goals in infrastructure programmes. Planning in this context include clear goals and adequate policies, objectives and strategies along with the community participation in the provision of the infrastructural projects.

*Interact Dev. is a very ambiguous concept. Dev. is not just about economic dev. It involves also social, political, cultural etc growth. No environmental part.*

**Sustainable Development-** Involves economic growth, and equitable distribution of the benefits of growth which are due to proper participation of people in implementation and maintenance of projects.

**Service centre-** Is a central place structure which maximizes the interdependency of the peripheries of each polarized region with the respective centre by gathering flows from the periphery and directing them up through

*... That ... the ... of ... the ...*

hierarchy and bringing the benefits of urban life to the smaller centres.

**Household-** This is a family line, people who live together in same house or room and eat together. Inotherwords, they have a common budget.

**Private sector-** Refers to the non-public institutions which are concerned with the establishment of industries and commercial activities.

**Infrastructure-** Refers to transport network, water supply and distribution and sanitation facilities.

[**Top-down approach-** Refers to planning by the central government or local authority whereby views and aspirations of the people are never sought. Inotherwords, it is the imposing of projects to people without judging their capacity to implement and maintain the projects.]

[**Bottom-up approach-** Refers to the involvement of the people at the grassroot level in the planning process. Views, aspirations, interests of the people are accommodated and evaluated in the planning process.]



### 1.8. THE STUDY METHODOLOGY.

The study used both primary and secondary sources of information. For the primary sources of information, data was collected from the field between September and October 1993. A total of 52 household, 40 commercial and 4 industrial questionnaires were administered. The questionnaires were related to provision and utilization of roads, water and sanitation facilities. Interviews were also conducted with the community leaders, council officials (Town Clerk, Municipal Welfare Officer and an official in the Town Planning Department); the District Works Officer, the National Water Conservation and Pipeline Corporation Area Manager; and the Divisional Veterinary Officer. Personal observation was made to scan the environment and get the visual impression. Photographing was made on relevant areas such as pot holes on roads, sanitary facilities and drainage networks for illustrative purposes.

For secondary sources of information, use of library materials, office records and documents was made. maps diagrams, statistical abstracts from the Central Bureau of Statistics were used. The Taita/Taveta District Development Plan and articles on upgrading scheme at

Tanzania and Bomani estate in Voi were used. I also collected information on rainfall and temperatures from the Meteorological Office (Voi), information on education from the Ministry Of Education (Voi office), information on employment from the Ministry Of Labour (Voi office) and information on health from the Moi District Hospital (Voi). Random and stratified sampling techniques were applied when administering the questionnaires.

Data analysis in this study is presented by tables and descriptions. In other words, the data analysis is descriptive and qualitative. Most of the information is secondary in character. This is due to the fact that I didn't get enough data from the field.

#### **1.9. ORGANIZATION OF THESIS.**

The thesis has six chapters. Chapter one gives the introduction of the study. It also highlights the statement of the problem, the study objectives, justification of the study, definition of terms used, the study methodology, organization of thesis and limitations of the study. Chapter two highlights the literature review which is related to pattern of urban growth, water supply, road and sanitary facilities. It also gives the

policy perspectives. Chapter three highlights the physical background of the study area, the socio-economic characteristics and how these affect the provision and utilization of infrastructure in Voi. It also highlights the infrastructure situation and the institutional framework for planning

Chapter four gives the concept of environmental degradation and its causes, the pattern of urban growth, role of the community in the planning process, and the policy implications for future action. Chapter five gives the analysis and findings of the study. Emphasis is given on the contribution of transport water and sanitation facilities to urban growth. Factors affecting utilization of infrastructure and sectoral analysis are highlighted in this chapter. Chapter six highlights summary of the study, policy implications, recommendations and conclusion of the study.

#### 1.10. LIMITATIONS OF THE STUDY.

The town has a poor transport system consequently, the researcher could sometimes walk for over five kilometres in order to conduct commercial or household surveys. In conjunction with the problem of

transport is the scattered pattern of development. The researcher had to travel to places which are distant located from one another. Much time was therefore wasted in walking. The hot and humid climate made it very difficult to carry out the field survey effectively. Fear and suspicion among the general public, the businessmen and the industrialists made it difficult to carry out the field surveys effectively.

Another limitation of the study was the incomplete reports of the field officers which could not give adequate information.

## CHAPTER TWO. LITERATURE REVIEW.

### 2.1. INTRODUCTION.

The first section of this chapter examines the context within which infrastructure facilitates or limits urban and regional expansion mainly in so far as resource utilization is concerned. The general picture is given which is followed by sub-sections dealing with each of the forms of infrastructure particularly roads, water and sanitation as far as community participation is concerned. The final part of this chapter presents the policy perspectives interms of the spatial policies and other policies which involve community participation in infrastructure provision within urban centres in Kenya.

### 2.2. INFRASTRUCTURE, COMMUNITY PARTICIPATION AND URBAN GROWTH.

#### 2.2.1. General Contributions.

For modern industrial activities to take place, there must be great changes in the agricultural and social overhead capital. Social overhead costs in this study include roads, water supply and sanitation. These are very important development factors in Kenya. The involvement of the community in the provision of

infrastructure is very important.

### 2.2.2. Some specific contributions.

During the colonial era, infrastructure in some parts of the country was seen in terms of administrative and strategic roles it played. (Mwanzia,1990). Very little economic consideration was given especially within the African tribal areas. Administrative centres would therefore gain at the expense of active commercial centres. Planning by then was top-down. The local community was not involved in the provision of the urban services. Projects were imposed on the people.

Kenya is dominated by informal settlements. The major problem facing people in these areas is inadequate infrastructure in terms of roads, water supply, sanitation among others (Mwanzia,1990). This leads to production at suboptimal levels and thereby reducing employment and incomes of the people in the informal settlements.

Community participation in infrastructure provision and maintenance can provide employment. Apart from direct employment, the installed infrastructure like roads enhances accessibility to markets. Rural development will imply rising urbanization not in the major cities,

but through the growth of commercial activity in large number of small trading centres. (Kabwegyere, 1976). He argues that by providing adequate infrastructural facilities to these small towns the surrounding farm areas could be developed. This could significantly alter the pattern of migration and provide more even development of the nation as a whole.

### 2.2.3. Issues Related To Utilization of Infrastructure.

#### (a) Finance.

The user may lack the financial resources to pay for the infrastructural services. (Mwanzia, 1990). This may be compounded by lack of clear knowledge as regards the need to pay promptly for the services. Hence, there is a general need to strike a balance between the level of supply and level of demand by affordability. Muhammed (1992) advocates for preparation of structural and local plans which jointly constitute the development plan by involving the community participation at several critical stages. Hence, there is a need for the Local Authorities and the community to work together for the development of towns.

**(b) Cost recovery.**

The costs of infrastructure provided in an area should be paid by the beneficiaries. Investments should therefore be affordable and cost recovery mechanisms should be workable. Keokungwal(1992) calls for a better integration of physical and infrastructural investment measures which could reduce Central Governments subsidies and increase in the role of Local Authorities and the community in the provision of urban infrastructural services by means of benefiting charges and self financing. This shows us that objectives of infrastructural projects apart from being self-financing and having high levels of cost recovery, should provide income generation and employment creation and should be extensive in terms of coverage and reach.

**(c). Maintenance.**

There is need to work modalities of how maintenance can be done given that there is the role of the Central Government, the Local Authority, the community and other Non-governmental agencies to be considered. Maintenance of roads may affect traffic flow and activities taking place. Maintenance of water and



sanitation facilities may attract industries and other commercial activities, hence, there is a need for better organization of major maintenance works, application of the appropriate technologies and materials to ensure that limited resources are well utilized.

(d). Community participation.

[The entire process of providing infrastructure should be worked out with the community rather than for the community.(Hill,1975).] [Lack of consultation and involvement of various communities with regard to the proposed concepts, obtaining their views, felt needs and aspirations during the initial stages of project identification and planning make most of the projects fail.] [Viloria(1992), view community participation as a deemed critical ingredient of programs designed to improve marginal settlements. He advocates two views as to what exactly constitutes community participation. The first view which planners should bear in mind regards community participation as almost the central objective(i.e to increase community self-reliance) and the second views community participation as an instrumental to achieving other programs objectives(i.e

optimising the planning and development of location and lay out of services. If these two views are coordinated in planning for infrastructural facilities self-sustaining of such projects would be experienced.]

1992), says that for community participation to succeed in infrastructural provision, several groups of people should be involved. These should include the community as a whole, the community leaders who organize and motivate community participation, the technical personnel, particularly the planners who initiate and design the projects and the Municipal council which plays an important role of keeping the urban areas clean and providing financial support to the projects.]

**(e). The role of the private sector.**

Credit facilitation may have a great impact in encouraging private participation. A more credit policy and sustained increases in lending resources are required to attract individuals and organizations in infrastructure provision.

**(f). The standards.**

If the standards are reformulated, the smaller and

medium centres will have greater room for flexibility and employment of a variety of local resources and labour. This would drastically reduce costs as was observed in Eldoret during the second urban project where water and road network standards were made flexible to allow for use of available resources (Agevi,1990). Mahler(1976), says that the increase in population and the growing scarcity of resources in urban areas in the developing World can exacerbates situation in which hundreds of millions of people have no access to safe water, lack of proper means for the disposal of their own wastes, suffer basic dietary deficiencies, and are not protected from insect or animal vectors of diseases. The reformulation of standards for these services is important for it could reduce the enviromental problems. Poma(1976), calls for efficient and optimal use of known energy sources and raw materials,the re-establishment of the enviroments natural balance by means of fighting pollution of all types and the return to a harmony between human beings and their cities and their rural enviroments.

**(h). Legal Aspects.**

Planning for infrastructural facilities suffers

from fragmented legislation(Agevi,1990). This situation leads to planners turn to ad hoc and quasi legal control such as relying on the Public Health Act. He points further that interpretation of various acts such as Public Health Act,1972, Town PLanning Act,1931,Building Code 1968, Local Government Act Cap 265 and Land Acquisition Act becomes tedious since they are all scattered. He observes that the smaller centres are disadvantaged since they do not have their own laws. This therefore calls for changes to ameliorate the conflicts that militate against smooth provision of services in urban centres.

**(g).Land Requirements.**

Lack of space for easy development of infrastructural facilities may be a major limitation (Mwanzia,1990). He observes that this may be due to national impediments such as hills, valleys, water bodies,and gullies which make installation expensive.

### 2.3. ROAD NETWORK AND URBAN GROWTH.

Improvement or creation of road network lowers costs of operations in that goods are moved more cheaply through space from points of production to points of consumption. (Mwanzia, 1990).

This easier means of transport increases interdependence between centres and rural areas, hence, acts as a stimulus to both. This improves mobility of people and their goods as they perceive distance as being shortened. (Taita/Taveta District Development Plan, 1989/93).

Provision of roads leads to sound linkages and enhanced integration among the settlement centres and major urban centres resulting to distribution of development related innovation to rural hinterlands. Kabwegyere (1976), says that provision of good roads in trading centres could provide employment, hence, reduce the rural-urban flow. This he says, would not only reduce the burden of urban planners in the major towns in terms of providing employment, housing and other social services, but would ultimately reduce urban squalor. Development of roads in the small and medium towns is due to the influence of new technology. This has made it

possible for improvement of internal mobility of many small and medium towns. (Higgins and Savoie, 1988). They observe that the small and medium size cities are no longer condemned to be more lower order central places or passive recipients of older technologies. The growth and development of these small centres will be more related to the dynamic nature of their internal economic systems than to their hierarchical position within the urban system. The road network therefore may play an important role in regional development processes.

Roads play an important part in improvement of peoples income. For example, roads lower transport costs for producers and facilitates the movement of agricultural products from farms to the markets. Arcot (1981) argues that balanced development of rural and urban areas and equity and justice in sharing of productive resources and the benefits of progress can lead to eradication of poverty. He observes that terms of trade between rural and urban areas will become more equitable if not entirely favourable, if good roads are provided in new or expanded growth centres for this would provide the necessary spatial framework for integrated rural development. Road transport is an agent of change.

Through movements, ideas and innovations diffuse from an area to another. The implication of this statement is that with better transport linkages, people are likely to interact hence getting views and ideas which can contribute positively towards their daily activities be they agricultural or commercial. UN(Habitat,1990). Road transport stimulates growth of physical structures, enhances population concentration, cultivation of hinterland growth of market centres which provide services needed in the agricultural sector thereby enabling modernization of subsistence agriculture.

For successful road development programmes to take place, the local community has to be involved in the planning and siting of the road network. This cause motivation and success of road programmes. The study is basically examining among other things how the community in Voi town could be involved in the planning, provision and maintenance of road services. Cost recovery from investments is crucial for successful proper developed road network. In light of this, the study is examining how low incomes, employment levels and general lack of enough resources by the Municipal Council in Voi hamper the provision of effective road services in the town.

#### 2.4. WATER SUPPLY AND URBAN GROWTH.

Water is essential for domestic use, agricultural use, commercial and industrial use. Water supply normally affects the economic, environmental and ecological conditions of an area (Miller, 1979). He observes that piped and public water schemes are important for they raise or improve farmers production of crops, livestock and milk. Time which would be spent in looking for water is now used in other development activities. Piped and public water schemes are normally free from health hazards. This improves the peoples working capacity hence improving production. Adequate water supply make it possible for location of industries UN (Habitat, 1990). The report observes that if smaller centres are well planned interms of water supplies, water shortages are likely to be brought under control in the future. Increased production attained within commercial and agricultural sectors as a result of increased supply of water act as sources of funds for operation and maintenance of water projects. (Miller, 1979). He argues further that planning for water resources in any given area should pre-occupy itself with issues such as possibility of maintaining usable water, assessing future



needs and management of water supplies.

The study is therefore examining the situation of water supply in the town, the problems faced in the distribution system and given the scattered pattern of development what steps regarding water supply should be taken.

## **2.5.SANITARY FACILITIES AND URBAN GROWTH.**

There is a direct correlation between the level of water consumption and the amount of sewage produced. As water usage increases, there is a parallel increase in the volume of sewage produced(Human settlements book,1978). The book observes that once water supplies are provided and there is no proper sewerage, there is an endless problem of water supplies being drawn from sources which are polluted by sewage. Hence, there is a need to provide adequate sewerage works so as to avoid the contamination of water resources. Uptill recently, the Government has considered sewerage less important than the provision of water supplies. As it is preferable to bring sewerage provision on a par with water supply, it follows that there is a huge backlog in sewerage provision which therefore must be

lessened before balanced development of new integrated water and sewerage systems can be undertaken.

Present day water-born sewerage systems are enormously wasteful of water as well as costly which will probably put them out of reach of the majority of the inhabitants of human settlements in Kenya. Many settlements therefore will have to rely on non-network methods of sewage disposal ranging from basic techniques such as pit latrines to advanced varieties of septic tank. If care is taken not to contaminate water supplies, such simple disposal systems can work perfectly well in small or low density and low income settlements. Refinement of existing systems, the use of new technology, applied research into local conditions, economic appraisal and trial of these would be useful contributions to the solution of providing low cost urban infrastructure for human settlements. Proper solid waste management is important in reducing the environmental hazards in urban areas. Uncollected garbage form the breeding point of flies and is also a source of air pollution. This therefore calls for the practical need for an integrated approach based as far as possible on studies of local conditions and guided by overall urban planning and

programming. The study therefore examines the current situation of sanitary facilities and advocates for community participation in the provision of sanitary services so as to attain a healthy living environment.

## 2.6. COMMUNITY PARTICIPATION AND URBAN GROWTH.

The concept of community participation in the planning process is new. Planners have been involving communities in the planning process after realising that the top-down approach (planning for the people) cannot effectively work. Projects were planned without consultation and involvement of various communities with regard to proposed concepts, obtaining their views, felt needs and aspirations during the initial stages of project identification and planning (GTZ,1993). This witnessed the failure of such projects. [public participation in planning process is a prerequisite for a successful plan implementation, be it physical or economic development plan (Naiya,1977).] He observes that development planning requires the concerted efforts of physical, social and economic planners and its success will depend, among other things, on the cooperation of the public who are the main implementing agents of such

plans.] Consultancy is a way of promoting and developing community work practice (Briscoe and Thomas, 1977). They argue that community workers can help in planning, training, conflict mediation and confirming values and goals. They observe that basic planning of today is to choose a pattern of population distribution that will satisfy as many as possible of the social aspirations of the people.

According to a report on development Patterns of urbanization report (1969), says that the best way of running the system is to allow people to make free choices about the things which determine their values, but to have some modification to allow for the fact that some of their decisions affected other people beneficially or adversely. In water, roads and sanitation, one should be interested in the machinery by which one can persuade people and it is sometimes not very good to change peoples minds. A sort of persuasion in this case is not to force people for the supply of the services, but subsidizing people to such an extent that they can change their minds. The rapid rate of urbanization has strangled the capacity of public authorities to adequately manage and control urban

development (Maganjo,1992). She argues further that public authorities who traditionally played the role of provider of basic services, community facilities and housing can no longer cope, thus creating a divergence between supply and demand. She says that urban development reforms, programmes and strategies and especially as far as human settlements are concerned, should be gender sensitive. The point behind her argument is that women as main users of shelter and related services have the ability to participate and solve shelter related problems.

[Community participation is an important factor in urban growth. This is because the Local Governments are increasingly faced with the need to assume a planning role to ensure that human service programmes will be relevant to changing community needs.] Watkins(1976), observes that Municipal Governments lack the capacity to detect or respond to complex social needs which may be be amorphous, non material and poorly articulated. He argues further that in the past, governments have not planned adequately for social services for the public. He says that this has been even more true of local and central governments part of the reason has been the central

governments domination of social programme. Planning and its rigid categorical grant programmes which have mitigated against service integration and in large measure, discouraged innovation and experiment. Small Municipalities generally lack both experienced management as well as legal and technical expertise, factors which weaken their ability to secure state and local development resources. On the otherhand, the delivery of human services is limited by a lack of local programme information and decision making structure responsive to community needs. Thus, programmes are forced to operate on an underfunded, piecemeal basis, with tasks too great for the resources available. The community can therefore effectively participate in the provision of urban services using the meagre resources. (Brager, George & Harry, 1973).

Quality of life in urban areas is reached with the level and nature of involvement of people in services or organizations (Watkins, 1976). He observes that the quality of life can be reached by involving the people in the planning process. He emphasises that this can be done more specifically by improving communication among consumers, service programmes and Municipal officials in

the assessment, development and delivery of human service programmes. Improved quality of life is seen as making at the local level for this to take place, information must flow reciprocally between those affected by circumstances and those engaged in the process of planning and setting of objectives. Involving the community in preparation of structural and local plans is the basic foundation of the new planning system (Muhammad,1922). This would lead to proper choice of standards for housing and infrastructural services levels that are affordable to a wider range of population and mechanisms that will increase the proportion of public cost recovery (Hanssan,1992).

Gilbert(1972), says that small towns are the main loci for the dissemination of external influences to the majority of the populace and the resulting ground for the incipient elites. He observes that by involving the community in the planning and provision of basic services, the towns may be developed as a framework for delivery of social services which ensures equal distribution throughout the country. The role of small urban centres according to Obudho(1982), is to improve in the transportation and circulation networks and creation

of income generating opportunities such as food processing and agro-based industries. When the community is properly involved in the planning process in these towns, then the small towns can fulfil an important role in integrating urban and rural functions into a national spatial hierarchy to farms and villages as well as upward to cities. Agevi(1991), argues that secondary towns are important in the economic growth of the countries in equitable distribution of resources through careful investment policies, industrial dispersal and reduction of rural-urban migration. But he points that there are constraints which hinder the sound management of these towns and these include inefficiency of the control of financial allocation, the maintenance of basic infrastructure, and the provision of technical expertise. The towns also have weak financial base, they normally operate under heavily prescriptive legal frameworks which demand close supervision from Ministry of Local Government (Central Government). He observes further that they use inappropriate and outdated development control systems such as building code of Kenya, they have health and enviromental problems like squatter settlements, in accessible plots, poor housing,



inadequate schools, lack of open spaces and poor social amenities. Consequently, the involving of the public in the provision of some of the above named services is inevitable. (Campbell, Angus, Phillip, 1972).

Immediately after independence, the Kenya adopted top-down approach of planning. Projects were imposed on the people without consulting or seek their views. This made most of the projects fail. In the 1984/88 plan period, the Government adopted the bottom-up approach of planning. This is coordinated at the grassroot level by forming various development committees. The local community at the grassroot level is now involved in the planning process. Views, ideas, and knowledge of the community is used in solving some of the problems. The study therefore examines how the community could be involved in the planning, provision and maintenance of roads, water and sanitation facilities. Hence, income levels, ideas, knowledge and views of the community on development will be investigated in water supply, solid waste management and road services.

### 2.6.1. Observations Made On Literature Review.

Infrastructure can stimulate urban growth if it is directed to income generating activities such as industries, agriculture, and commercial activities. Provision of employment opportunities and skills depend on the provision of infrastructure especially roads and water supply. Roads improve mobility of people and goods between one point and another and improve the linkage between centres and their hinterlands, hence, improving the value of land thus attracting commercial, industrial and residential activities at a large scale. Roads basically open up areas by improving their productivity. Provision of new roads, water distribution networks, proper sanitary facilities and maintenance of the existing stock of the services named above generates employment especially if labour intensive technologies are used. The financial ability of user to pay for the services and that of the Municipal councils to provide are critical in infrastructure provision and maintenance.

Water and sanitation facilities have economic, health and social benefits. Water for example have high production level since much time and money which would be wasted in looking for water is utilized for other

development purposes. If water supply is adequate and sanitary conditions are in a good condition, the chances of getting infected with water-borne disease are less. Proper standards in the provision of infrastructure make the environment better. Maintenance in this case would be made according to the standards. Hence, if standards are high, then maintenance of the services would be low. If standards are reformulated, hence, applied according to the financial ability of the people, maintenance would be high. Community participation in the planning, provision and maintenance of roads, water and sanitation facilities is critical. If the community is properly involved in the planning process, the environment in the urban areas can be improved.

## 2.7. POLICY PERSPECTIVES.

### (a). Development since independence.

Kenya inherited the British planning system whereby services were provided to the gazetted towns only. Most small towns were neglected. After independence, some measures to improve the provision of infrastructure in the country at large were taken. According to the 1974/78 plan period, transportation was

to rise at a rate of 7.2% per annum. Rural access roads were to be provided. The rate at which transportation was to take place was due to its importance. Transportation can lead to improved agricultural production, location of commercial and industrial activities in the various areas, hence, improve the income of the people. In the 1974/78 plan period, the Master Water Plan advocating for provision of portable water within 4 kilometres of every household by the year 2000 was prepared. However, this is yet to be realised.

Road and sewerage works using labour intensive technologies were encouraged. These could provide employment to those involved. For example, in the construction and maintenance of rural access roads, local people are employed and this improves their income levels. In the 1984/88 plan period, the Government advocated for planning with but not for the people. Planning is done by incorporating ideas and views of the people who would be beneficiaries. This has witnessed a success in water supply, provision of roads and sanitation facilities. Since 1984/88 plan period, planning is done right from the grassroot level. There are Locational, Divisional and District Development

Committees. These committees coordinate the development process in many areas.

**(b). Policy instruments.**

Since independence, most people have been migrating to two major towns in Kenya (Nairobi and Mombasa). This has led to primacy. The concentration of people in these two major towns have led to inadequate provision of infrastructure by the respective Local Governments. Since the rate of urbanization towards these two towns is high, the Government decided to advocate for growth and development of small and medium towns which would reduce the rate of migration to the two major towns. Then it was made a policy that any area with a population more than 2000 should be an urban centre. This therefore witnessed the growth of such centres. Smaller towns with 2000-20,000 population range were stimulated to grow at a rate of over 7.5% and the growth of large towns reduced to 6.5% annually.

In 1970/74, 74/78 plan periods, the concept of growth centres and service centres in planning was introduced. The idea of introducing the growth centre strategy was to achieve self sustaining growth to the point that growth

is diffused outward into the pole/centre region and eventually beyond into less developed region of the nation(Nichols,1969:p 193). As Kabwegyere puts it:

" rural development will imply rising urbanization not in the major cities, but through the growth of commercial activities in large number of small trading centres.....designates rural growth centres as foci of trade social services and communications.....which serve surrounding farm areas and which can significantly alter the pattern of migration and provide more even development of the nation as a whole".(Kabwegyere, 1982:p 32).

The idea of growth centres and service centres is basically to establish a major even geographical spread of urban physical infrastructure in order to promote more balanced growth throughout the nation and equitable standard of social services between different regions. The idea was also to adopt standards for urban infrastructure which was closely related to what can be afforded by the the people. In this case, the concepts incorporates ideas on population distribution, existing and future infrastructural needs to make such centres function better. There was a general trend of stimulating growth before independence. For example, in the first population census in 1948, there were 17 towns of population sizes between 5000-9,999 inhabitants. The number of the towns increased to 48 in 1969 with a total

of 1.08 million. During the population census of 1979, the towns had increased to 67 with total population of 2.3 million. However, although most of the urban population is concentrated in Mombasa and Nairobi, the smaller towns have a good share of the population. Through the District Development Fund(DDF), a total of K£48 million was allocated for development of rural trade production centres. The facilities to be developed in these trading centres included water, access roads, sanitation facilities, drainage facilities, electricity, etc. According to the 1989/93 plan period, Rural Trading Production Centre programme was to expand from already 8 selected towns to 12. The number of the trading centres would increase to 16 and 18 in some years to come. It was also stated clearly as a policy that investments that promote growth of production and employment in small scale, agro-industries, manufacturing and commercial activities would be given first priority.

The production of Export based industries in small towns is also an important policy in infrastructure provision. This has led to the development of Export processing zones in towns like Athi River. The industrial activity is soon going to be introduced in

Mariakani urban center in Kilifi District. The introduction of such industrial activities will stimulate urban growth since adequate infrastructure (roads, water and sewerage networks) would be provided. The concept of making towns green is a new policy where by the Ministry of Local Government in conjunction with the Local Authorities tries to find out how small towns in Kenya could be made self sustaining. By involving the people in the provision of services like settlement upgrading, the environment in most urban areas would be made better.

**(c). Summary and Lessons Learned From Policy Frame Work.**

By transferring planning from the Central Government to the District level shows that the Government is ensuring that balanced growth exist in rural and urban areas. This would actually reduce rural-urban migration to the major towns. The Local Governments in the major towns although already lacking adequate resources to cope up with the high rate of urbanization would be in the long run not strained further. This is because the small towns would encourage linkages with farming hinterlands. Hence, most people would migrate to these small towns.



The transfer of planning process to the District level shows that the community can be encouraged in ensuring that services such as water, roads, sanitation facilities are adequately supplied so as to enhance production, employment levels and improve the income levels of most people.

The introduction of Export processing zones in the small towns is a clear way of introducing infrastructure in these towns which would lead to the concentration of commercial, residential and industrial activities. This would stimulate urban growth. Finally, without infrastructure, no development can take place. The study therefore shows that for an area to develop there must be an adequate provision of infrastructural facilities such as roads, water, sanitation among others. Hence, there is a need to develop proper infrastructural facilities in our urban areas. By applying proper revenue raising tactics and involving the community in the planning process we can achieve what is stated as policy for urban areas.

## CHAPTER THREE. THE STUDY AREA.

### 3.1. INTRODUCTION.

This chapter highlights the relationship of the physical and socio-economic characteristics of Voi town to urban growth and provision of infrastructure. The history and institutional set up of the town is also presented in this chapter with the view of exploring the planning issues which are basically related to utilization of current and future pattern and distribution of infrastructural facilities. Infrastructure situation and the factors affecting its utilization are also presented in this chapter






### 3.2. PHYSICAL CHARACTERISTICS.

#### 3.2.1. Location and Extent.

Voi town is located in Taita-Taveta District in Kenya's Coast province. The town is situated 160 kilometres West of Mombasa and 327 kilometres South East of Nairobi on the Mombasa-Nairobi highway. Map 1 shows the location of the town in Kenya. Voi town is the biggest urban centre in Taita-Taveta District with an area of jurisdiction covering approximately 242 square kilometres. It serves as the major commercial centre for the entire District.

608 m



-  International boundary
-  Provincial boundary
-  District boundary
-  Towns
-  Study area (Voi)

### 3.2.2. Administrative Structure.

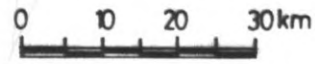
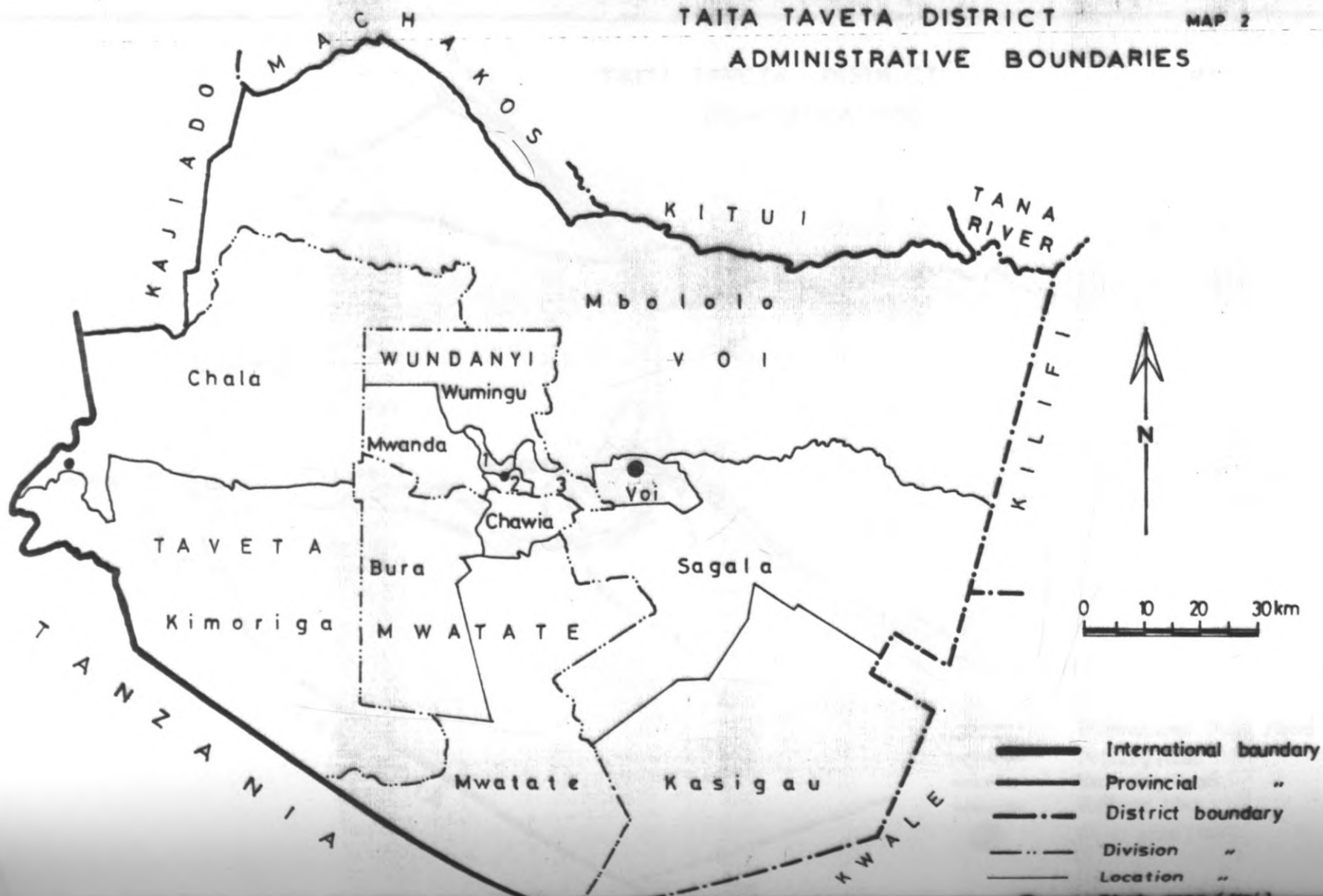
The study area is the Divisional Headquarters of Voi Division. It has only one location (Voi location) and two sub locations (Mwangea and Kaloleni) . There are eight wards which are represented by elected councillors. The wards are Central, Voi South, Voi East, Voi West, Voi North, Biashara, Kigononyi and Kirutai ward. The Town also houses a District Hospital, Police Station and Departments of various Ministries. Map 2 shows the administrative boundaries.

### 3.3. Relief and Drainage.

#### 3.3.1. Relief.

The town is situated at the foot of two hills (Mwakingali in the North and Mwangea in the South). It is located at an altitude of 580 meters above the sea level. The landscape is therefore gentle sloping. Provision of infrastructural services such as roads, and railway lines as shown on map 3 is less costly. Provision of water and housing is also cheaper. However, provision of modern Municipal sewer system which at present is non existent is costly as alot of energy would be required to pump the sewage.

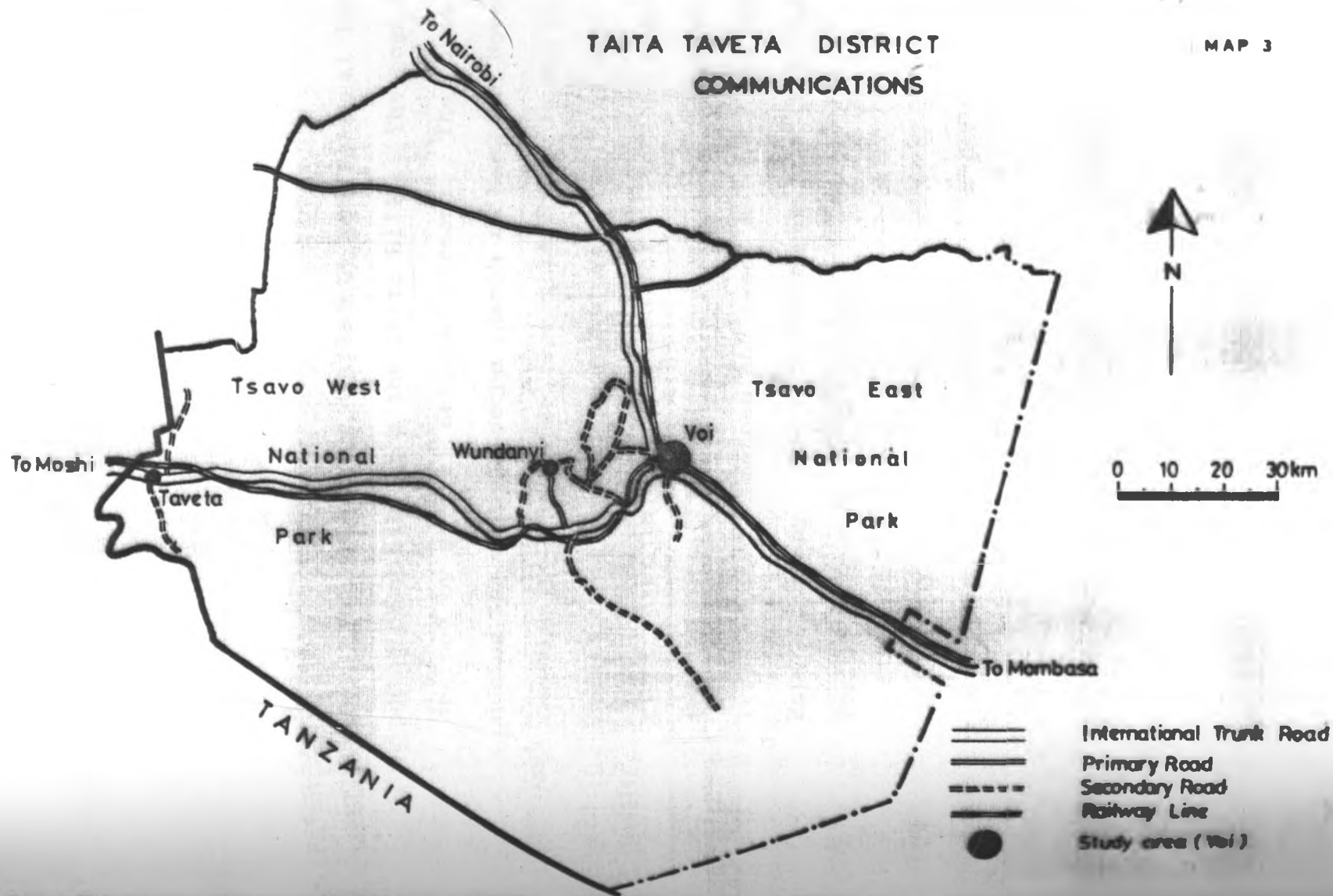
ADMINISTRATIVE BOUNDARIES



- International boundary
- Provincial " "
- - - - -** District boundary
- . . . -** Division " "
- Location " "

TAITA TAVETA DISTRICT  
COMMUNICATIONS

MAP 3



### 3.3.2. Drainage.

Voi is mainly drained by the seasonal River Voi which originate from the Taita Hills. The town is also drained by several seasonal streams. The River floods during the rainy seasons (March to May and November to December). The water from this River is utilized for domestic purposes by people who are residing near it. The river water is also utilized for industrial purposes by the Voi Sisal Estate factory and also for small scale irrigation of tomatoes and sweet melon by the Voi sisal Estate company. However, the river is a limiting factor for urban growth in the town.

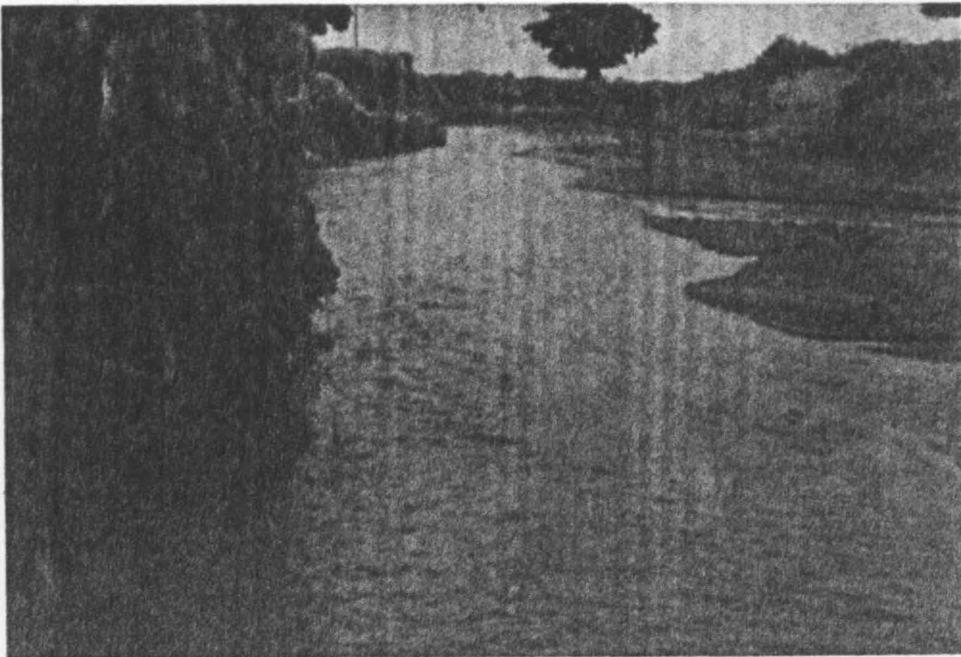


Plate A Shows a Section of The River Voi.

### 3.4. Geology and Soils.

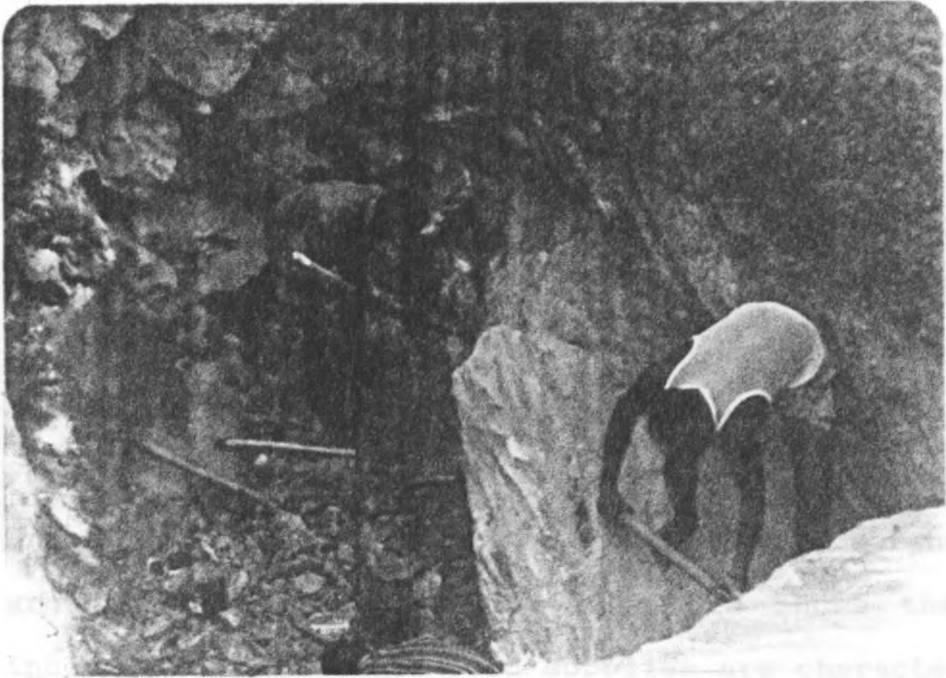
#### 3.4.1. Geology.

There are four types of rocks in the town. One is the Gneisses which is rich in ferromagnesian minerals and Hornblende Gneisses is a source of minerals such as Rubis. Second is the Undifferentiated Basement system rocks (predominantly Gneisses) is a source of minerals and building stones. Sedimentary rocks (Alluvial sediments) from various sources form the third type of rocks in the town. It is found along River Voi and other



seasonal streams. This type of rock is soft thereby enhancing partial bank filtration in the town. Limestone rock is the fourth type of rock in the town. These rocks are hard, consequently, stimulate or hinder the provision of infrastructure. The rocks are conducive for the provision of roads and housing. This is because they have a high load bearing capacity. However, they are a constraint in water supply and sanitation. No single bore hole has been sunk in the town. The underground water resources are therefore underutilized. Moreover, most of the water pipes are laid at superficial depths in the ground. Given the conditions of expansion and contraction, the pipes burst. Wild animals especially Elephants also step on the pipes. This has affected the efficiency of water supply in the town.

Most of the residents in the town (72.9%) use pit latrines. However, the pit latrines are shallow (average depth 6-10 feet) deep. When poorly built these pit latrines are an environmental hazard.



**Plate B: Hard Rocks Which Constraint Provision of Sanitation Facilities and Utilization of Underground Water Resources.**

#### **3.4.2. Soil types.**

Soils in the study area are as a result of five factors. The parent material (rock), the topography, the climate, the living organisms and Man. The five factors have given rise to three types of soils. These are:

- (a). Sandy loams;
- (b). Sandy clay loams;

(c). Loam sand soil.

Sandy loams is found in large parts of the town. Sandy clay loams is found along River Voi while Loam sand soil is found in areas occupied by the Voi sisal Estate company. The three types of soils are basically less fertile. Map 4 shows the ecological zones in the Town. The only cash crops grown in the town is sisal at a large scale. Cotton, sweet melon and chillies at a small scale. Food crops such as maize, cassava, cowpeas, pigeon peas, Green grams, Sweet potatoes, tomatoes and sorghum are grown at a subsistence level. This shows that low incomes and inadequate food supplies are characteristic of the agricultural sector. Soils from River Voi are mined and sold. Sand harvesting therefore is one of the major sources of revenue for the Voi Municipal Council.

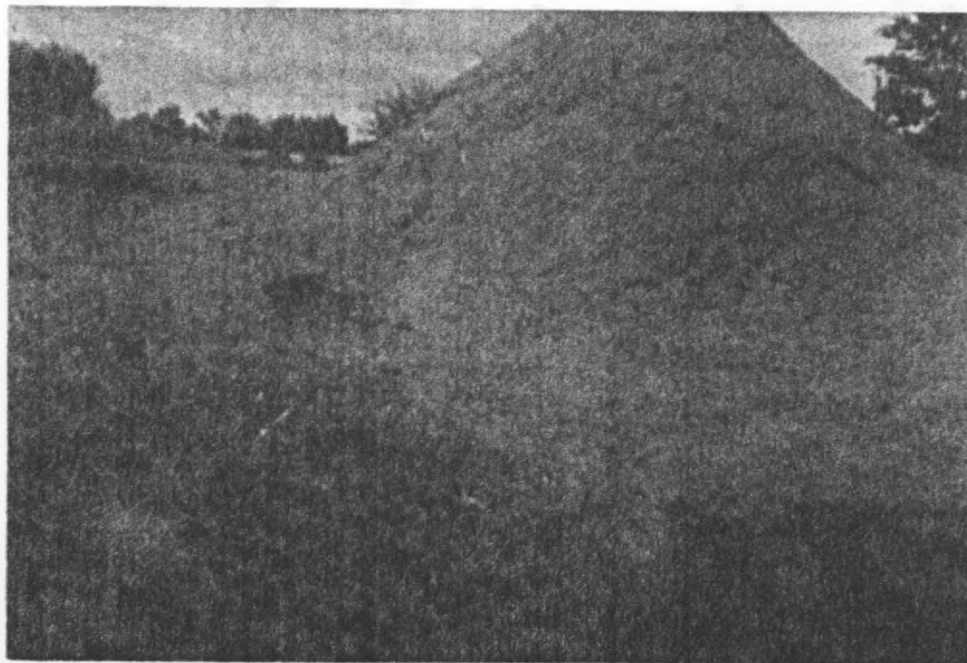
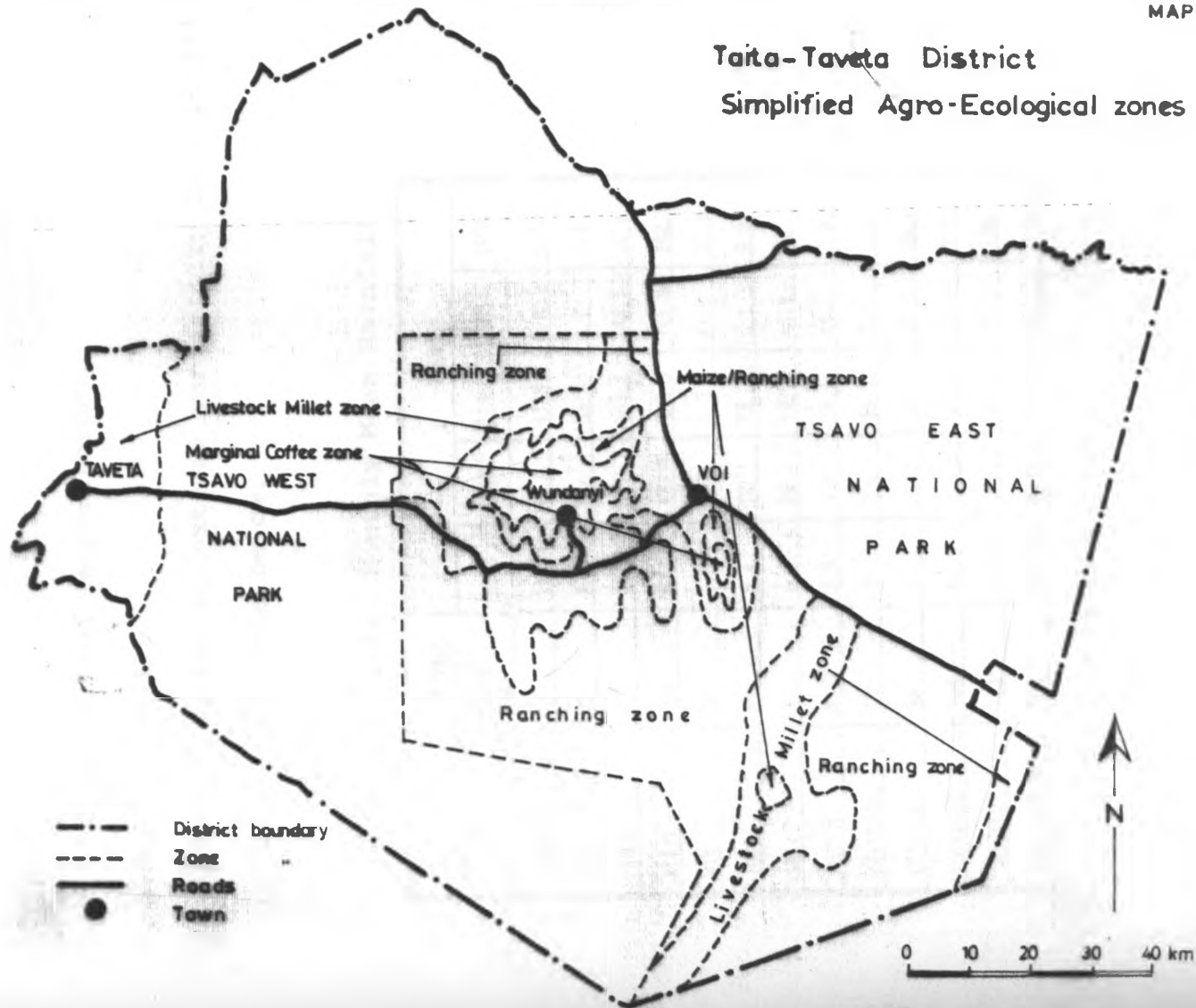


Plate C: Sand Harvesting along the Banks of River Voi

### Taita-Taveta District Simplified Agro-Ecological zones



### 3.5. Rainfall and Temperatures.

#### 3.5.1. Rainfall.

Voi is marked by extreme variability in rainfall as shown in the table below.

Table 3.1. Total Monthly Mean Rainfall.

MONTH	LONGTERM MONTHLY MEANS (MM)	YEARS				
		1988	1989	1990	1991	1992
JANUARY	34	110.4	53.0	11.8	8.6	2.8
FEBRUARY	29	3.5	TR	53.9	2.7	3.3
MARCH	79	95.4	8.5	204.6	186.7	44.8
APRIL	100	63.7	120.9	209.5	147.6	103.0
MAY	30	4.8	9.0	1.3	41.5	31.0
JUNE	6	6.4	TR	TR	5.1	2.9
JULY	3	0.1	TR	TR	13.9	TR
AUGUST	8	9.9	6.9	TR	44.8	1.9
SEPTEMBER	15	29.5	2.2	19.8	2.6	1.2
OCTOBER	26	27.3	68.1	19.4	18.4	20.8
NOVEMBER	106	83.1	114.5	57.0	33.0	192.8
DECEMBER	119	193.4	123.2	165.1	89.5	198.4
ANNUAL TOTALS	555	609.5	506.3	742.4	594.4	602.7

Source: Voi Meteorological Station, 1993

The table indicates monthly mean rainfall for the years 1988 to 1992. Average amounts range between 400-600 annually. The annual rainfall shows a dropping margin per year although the annual average amounts to about

600mm per year. The long rains are received between the months of March and July while short rains are experienced between the months of October and December. The dry spells are experienced between January and February and also between August and September. The humidities are generally high as shown in table 2 below.

**Table 3.2. Monthly Mean Humidities At 0600 and 1200 Hours  
G.M.T.**

MONTH	LONG TERM MONTHLY MEANS		1988		1989		1990		1991		1992	
	0600	1200	0600	1200	0600	1200	0600	1200	0600	1200	0600	1200
January	78%	46%	71%	45%	83%	57%	75%	45%	75%	42%	77%	43%
February	75	42	69	36	74	41	79	47	69	41	70	37
March	74	43	69	38	68	39	76	50	72	45	70	37
April	74	50	74	51	74	56	77	65	72	47	71	49
May	73	52	64	44	68	52	72	51	75	62	70	52
June	69	45	70	48	62	43	68	43	69	48	64	43
July	69	44	67	41	65	40	65	40	72	46	64	41
August	70	45	68	47	66	48	68	46	73	50	63	43
September	69	44	72	55	64	43	66	42	68	43	65	39
October	74	47	73	51	72	55	67	43	70	44	73	54
December	79	51	77	58	81	64	78	54	82	59	78	54
Annual Mean	73	46	70	46	70	49	71	44	72	47	69	44

Source: Voi Meteorological Station. October, 1993

### 3.5.2. Temperatures.

The long mean temperatures range between 15-30°C. The temperatures in the town are therefore high. Table 3 below shows the long term mean temperatures while table 4 shows the monthly maximum and minimum temperature means for the years 1988/92.

**Table 3.3. Longterm Mean Temperatures.**

MONTH	MAXIMUM	MINIMUM	RANGE	MONTHLY MEANS
JANUARY	31.6°C	20.1°C	11.5°C	25.9°C
FEBRUARY	32.9	20.2	12.7	26.6
MARCH	33.3	20.8	12.5	27.1
APRIL	31.8	20.4	11.4	26.1
MAY	29.9	20.0	9.9	25.0
JUNE	29.0	18.3	10.7	23.7
JULY	28.1	17.5	10.6	22.8
AUGUST	28.0	17.2	10.8	22.6
SEPTEMBER	29.2	17.6	11.6	23.4
OCTOBER	31.1	18.9	12.2	25.0
NOVEMBER	31.4	20.1	11.3	25.8
DECEMBER	30.6	20.4	10.2	25.5
ANNUAL	30.6	19.3	11.3	25.0

Source: Meteorological office, Voi 1993.

**Table 3.4. Monthly Maximum and Minimum Temperatures**

MONTH	1988		1989		1990		1991		1992	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
JANUARY	33.0	21.6	29.4	20.6	32.0	20.5	32.8	21.3	32.0	20.2
FEBRUARY	34.5	21.8	32.4	20.0	33.9	21.5	33.0	20.1	34.1	20.6
MARCH	34.5	21.7	34.1	21.1	31.4	20.9	34.0	20.5	34.2	20.7
APRIL	31.2	21.4	30.7	20.7	30.3	21.1	32.2	21.5	32.3	22.0
MAY	30.9	20.2	29.8	19.8	30.5	20.2	29.0	20.5	29.8	20.4
JUNE	29.1	19.2	29.4	18.5	29.4	18.1	29.5	18.8	29.5	19.2
JULY	28.9	18.3	28.8	17.7	28.6	17.4	28.2	17.8	28.3	17.9
AUGUST	28.4	18.3	27.5	17.6	27.8	17.4	27.4	17.5	27.8	17.3
SEPTEMBER	28.3	18.5	30.1	18.5	29.8	18.2	29.6	17.6	29.6	18.2
OCTOBER	32.2	19.2	31.2	19.2	31.4	19.3	32.2	19.2	31.5	19.0
NOVEMBER	31.3	20.3	30.8	20.5	32.2	20.5	32.5	20.5	31.2	20.4
DECEMBER	30.0	20.8	29.8	21.1	30.5	20.9	30.1	20.6	30.5	20.7

Source: Meteorological Department, Vol.

The little amount of rainfall and high temperatures hinder the utilization of ground water resources. This is because when it rains, water is lost to the atmosphere through evaporation. Some amount of water is also lost to the ground through the rocks. Given high temperatures and seasonality of rainfall, the water table drops. Roof catchment (rain water harvesting) which could augment the water supply system is not a major activity due to the seasonality of rainfall. The high temperatures make the soil lose moisture to the atmosphere. When it rains, the dry soils are washed away leaving behind gullies which



make provision of services costly. Loss of water to the atmosphere by evaporation make the soil dry and loose. Strong wind therefore blow off the soil leading to enviromental degradation.

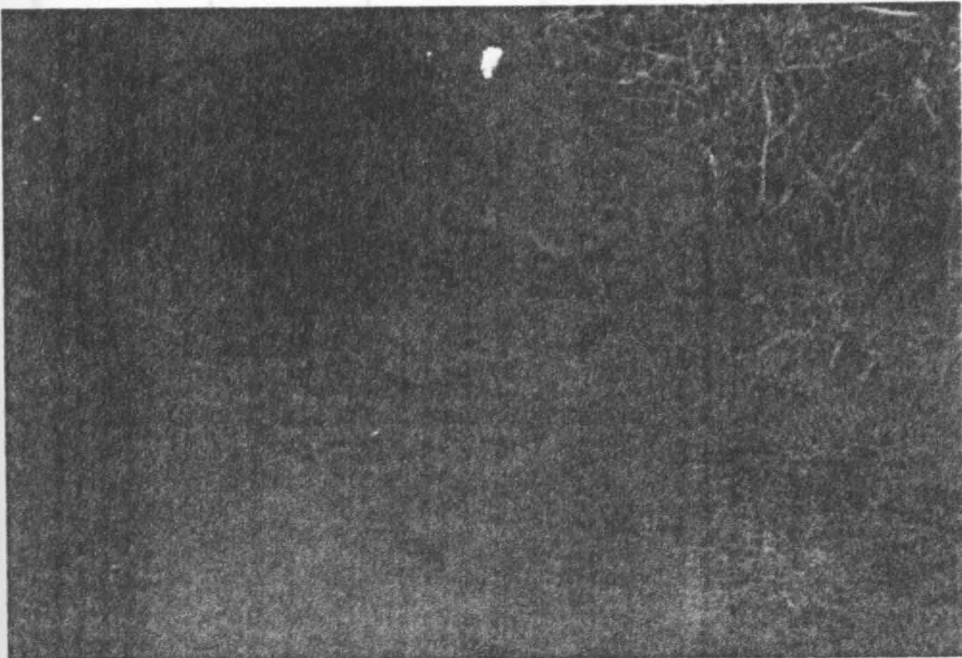


Plate D: One of the gullies which are prominate in the town.

### 3.6. Wind.

Voi town is affected by strong wind which blows from East to West during the day while during the night it blows South West to East. Table 5 shows the wind run and speed.

Table 3.5. Wind Run and Speed.

MONTH	DAILY WIND RUN IN MILES	WIND SPEED IN KNOTS		CALMS	
		0600GMT	1200GMT	0600GMT	1200GMT
JAN	92.5	5	8	1	1
FEB	95.1	4	9	2	0
MAR	100.0	4	7	2	
APR	116.9	7	8	1	2
MAY	149.6	9	9	1	1
JUN	161.4	9	10	0	0
JUL	168.3	9	11	0	0
AUG	179.3	8	11	0	1
SEP	156.8	8	11	1	1
OCT	137.5	6	9	2	1
NOV	103.2	4	8	2	1
DEC	87.0	4	7	2	2
ANNUAL	129.0	6	9	14	11

Source: Voi Meteorological Station. October, 1993

### 3.7. Vegetation.

Climatic conditions (rainfall and temperatures), soil and living organisms particularly Man influence the type of vegetation in the study area. Most parts of the town are covered by a variety of sparsely distributed deciduous bush lands and thickets with widely scattered trees. Some of the dominant trees are the commiphor SPP, and Acacia tortills. Evergreen and semi-evergreen bush lands are scattered around River Voi, streams and seepage lines. Evergreen forests occur on alluvial soils and deep sandy loam. The type of vegetation described above is not a protective shield of the soil against the forces of strong wind and rainfall.

### 3.8. Land tenure.

There are four categories of land tenure in the town. One is the Government owned land(state land). This comprise a big percentage of the total land in the town. The Commissioner of Lands administers all Government land on behalf of the Government. This entails invoking various legislation, including but not limited to Government Land Act, Land Control Act, Land Planning Act, Land Acquisition Act, etc. With regard to disposal of

Government land, the Commissioner of Lands is therefore required by law to advertise all Government Land in the Kenya Gazette. For alienation purposes in the the study area, applications are considered by the District Allocation Committee which is chaired by the District Commissioner. Second is the Council owned land. Currently, the Voi Municipal Council owns 1100 acres of land at the Vindo Multipurpose Cooperative society. This land is used and controlled using the Local Government Act, in addition to all other Acts used in administering the Government land.

Third is privately owned or leasehold land. The residential, commercial and industrial land is leased for 99 years. Leasehold for agricultural land is for 999 years and this applies to land owned by Voi Sisal Estate Company and the Voi Development Company. An important Legislation Act in this respect is the Land Acquisition Act which is used to acquire privately owned land for public purposes. The last category of land tenure is the land owned by the Railways Corporation. The Corporation owns a total of 46.6 hectares of land. This land is normally used to meet functions of the corporation but subject to the laws of the country. In Voi, the

railways' land includes all that found along the railway line and that served by railway sidings. Serious land registration exercise has not taken place in the town. Only few people who live in or near the town centre have title deeds. The majority of the residents are landless (squatters). Landless (squatters) are located in pockets within the town. This has contributed to the scattered pattern of urban growth in Voi. Provision of roads, water, sanitation, electricity and telephone facilities to the scattered settlements is basically costly. Moreover, the land tenure has resulted to lack of land zoning. Residential, commercial and industrial premises are mixed up together at the CBD leading to environmental degradation (air pollution). The location of major commercial and industrial activities at the town centre will with time hinder the expansion of the town physically. Most of the people will settle at the centre while the outskirts will be dominated by temporary housing structures occupied by the squatters. The existing infrastructural facilities at the CBD are therefore overutilized.

### 3.8.1. Land Use Patterns.

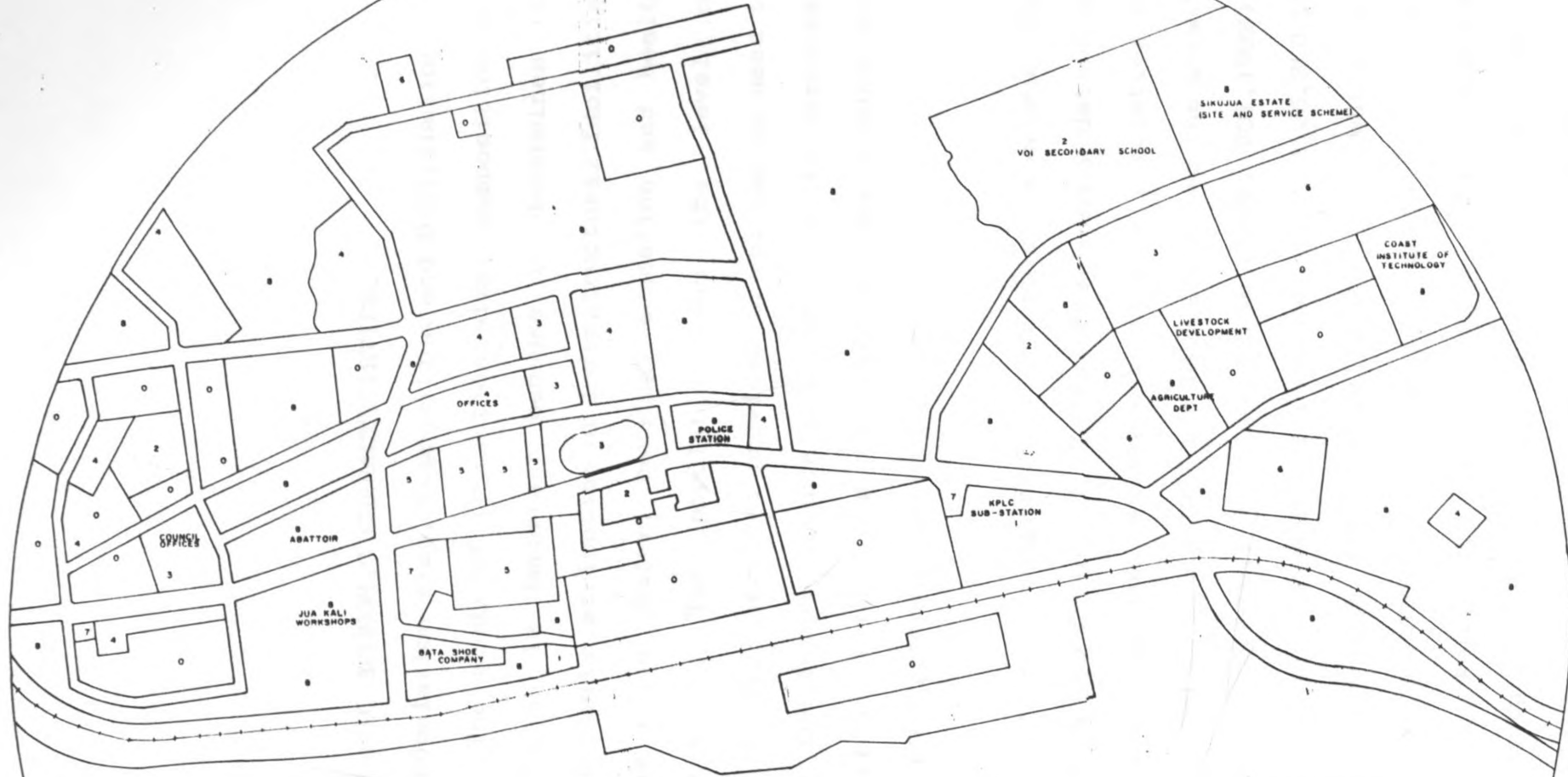
Voi town be divided into 8 broad land use

patterns as shown on map number five. According to the land use map, residential land use is the most predominant in the study area. Residential settlements are scattered within the Municipality. Public utilities and public purposes form the second most dominant land uses in the town. These are also scattered within the town. Commercial land uses are particularly at the town centre where Shops, Hotels, Markets, etc. are found. Isolated commercial pockets are found within the Municipality.

Transportation, although playing an important role in the town's growth account a small but effective proportion of the total land area. There is the railway line which proceeds to Nairobi, Mwatate and Taveta. The Mombasa-Nairobi highway and other secondary roads play an important land use. The industrial land use is not intensive in the town as there are only three major industries and several informal industrial activities. The Educational and recreational land uses form an important part of the town's development. There are adequate number of primary schools. There are only two secondary schools which cater mostly for the town's population.

**LEGEND**

EXISTING	PROPOSAL
0	RESIDENTIAL
1	INDUSTRIAL
2	EDUCATIONAL
3	RECREATIONAL
4	PUBLIC PURPOSES
5	COMMERCIAL
6	PUBLIC UTILITIES
7	TRANSPORTATION
8	DEFERRED



### 3.9. SOCIO-ECONOMIC CHARACTERISTICS.

#### Population size, Composition and Distribution.

The study of population size, composition and distribution is important because it determines the provision and distribution of infrastructural facilities such as roads, water, housing, education and health facilities. The population and the level of infrastructural services provided in Voi can be used to project the future demands and supply of the services. This could in the long run lead to sustainable and coordinated pattern of development.

3.9.1. Size. According to the 1979<sup>19624</sup> population census, the town had a population of 7397. Preliminary data from 1989<sup>889</sup> National Census estimates Voi town's population to be 11,700 persons. In 1992 the LADP estimated the growth<sup>2009-1962</sup> rate at approximately 6.5% per annum (LADP, VOI, 1992), giving Voi town a projected population of about 25,350 in 1993. The average family size is 6 persons while the population density is 4 persons per square kilometres. The high population growth make the existing infrastructural services such as water, education, health and roads beyond the capacity of the Voi Municipal



Council.

### 3.9.2. Composition and distribution.

47.9% of the population are male while 52.1% are female. 72.9% of the people are christians while 27.1% are muslims. The difference in religious beliefs has no negative attitude towards development unlike other places like Mombasa and Malindi. 35.4% of the people migrated to Voi from other parts of Taita-Taveta District such as Wundanyi, Sagalla, Mwatate, Taveta, etc. 29.2% were born in Voi town while 14.6% originated from other parts of Coast Province (Mombasa, Lamu, Tana River, Kwale and Kilifi District). 20.8% migrated from other parts of Kenya such as Machackos, Makueni, Kitui, Kiambu, Nyeri, Kakamega, Kitale, Kisumu, etc. This basically shows that most of the residents(70.8%) are migrants. This therefore shows that migration is the major contributing factor to urban growth in Voi. The population is generally unevenly distributed. This has been caused mainly by the land tenure system, the nature and pattern of distribution of infrastructural facilities such as roads, water, electricity the existence of minerals such as Rubis and the nature of employment opportunities.

### 3.9.3. Income Levels and Sources.

37.6% of the are unemployed. 45.7% are self and casual employed while 16.7% are employed in the formal sector(Municipal Council, Administration, Health, Education, Labour, Lands, Railway Corporation,etc). 37.1% of the population earn below Ksh.1000 per month. 11.4% earn less than Ksh.2000, 17.1% earn below Ksh.4000, 5.7% earn below Ksh.5000 while 14.3% earn above Ksh. 5000. According to the labour rules, Voi is classified as a small town hence a general labourer gets Ksh.1501/50 per month. This include basic salary and house allowance. An employee who is above 18 years and doesn't get house allowance is supposed to be paid Ksh.756 per month which is equivalent to 31/75 per day. An employ who is below 18 years gets Ksh. 539. A grade 1 Artisan gets Ksh.3407/= per month while an artisan with grade 2 gets Ksh.2541/50 per month, Ksh.2210 as basic salary and 15% house allowance(331/50). A grade 3 Artisan gets Ksh. 2028/60, Ksh. 1764 being basic salary. A person who is not trained gets 85/= per day. This shows that people are poorly paid. Low incomes generally affect the quality of infrastructural services provided.

The sources of income in the town include the service

sector(Hotels, Bars, Lodges, Shops, Petrol stations, etc), the industries (Voi sisal estate factory, Voi mill industries Bata shoe company factory), the Central Government (ministries), the Municipal Council, sand harvesting, mining of minerals, etc. Livestock keeping is also another source of income. Cess from the ranches, slaughter house and auction rims, are major sources of revenue for the Council, while ranches provide employment to the people. However, most youth in the town don't like the hard labour type of jobs like cutting of sisal leaves. This is mainly due to cultural values. This shows that male job seekers are more than female job seeker. However, the trend of job seekers both male and female goes down which shows that people don't get the jobs they are looking for.

#### **3.9.4. Educational facilities.**

There are 12 primary schools which have a total of 5481 students as table 10 below shows.

Table 3.6. Enrolment By Sex 1993.

Boys	2748
Girls	2688
Total	5436

Source: Ministry of Education, Voi Office.

There is no significant difference in enrolment of both boys and girls. Schools which are located at the town centre have large number of students hence forced to increase the number of streams. There is a total of 168 teachers out of these only 22 are not trained. This shows that the study area has a qualified manpower. The teacher student ratio is 1:32 which is fine. The problems facing primary schools in Voi include inadequate teaching facilities and poor building structures.

There are two secondary schools. These are: Voi secondary school and Mwangea secondary school. Voi secondary school is a the Government school and has a total number of 470 students and 27 teachers while Mwangea, being a harambee school has a total of 27 students and 8 teachers.

### 3.4.5. Health facilities.

Voi houses a District Hospital. It has a 110 bed capacity. Male ward has 28 beds, female ward 29 beds, maternity ward 17 beds and children ward has 36 beds. The table below shows admissions and discharges for the period 1985 to 1992.

**Table 3.7. Admissions and Discharges 1985-1992.**

Year	1985	1986	1987	1988	1989	1990	1991	1992
Admissions	4163	4186	4924	6111	6421	5335	5987	5236
Discharges	4014	4015	4664	5950	6019	1949	5630	4973

**Source: Moi District Hospital, Voi.**

The bed capacity is not adequate given the high admission numbers each year. Patients are therefore sharing beds. Table 12 below shows births for the period 1991 to 1993.

**Table 3.8. Births In 1991-93.**

Year	Figure
1991	1087
1992	1122
1993	871

**Source: Moi District Hospital, Voi.**

The maternity ward however is inadequately equipped with

beds. Common morbidity diseases in order of importance are malaria which is caused by poor drainage system, accidents as the town is located along the busy Mombasa-Nairobi highway, Anaemia, Enteritis, Pneumonia, Hypertension, Pulmonary tuberculosis, Mental disorders, Febrile convulsions and Abortion. Most common mortality diseases in order of importance include Anaemia, Dehydration, Neoplasm, Pneumonia, Immunosuppression, Kwashiorkor, Diabetes mellitus, Malaria, Convulsions and Pharyngitis.

**Table 3.9. Deaths 1985-92.**

Deaths	1985	1986	1987	1988	1989	1990	1991	1992
Children	99	57	46	69	85	121	74	75
Adult	72	90	99	99	150	175	155	165

**Source: Moi District Hospital, Voi.**

The Hospital has no Ambulance. Moreover, it has an inadequate number of personnel. For example, there is only one doctor and one dentist, two enrolled midwives, 17 registered nurses and 91 community nurses. The Hospital has only 2 public officers, 14 public health technicians, 11 clinical lab technicians, 1 clinical lab technologist

and 3 ento lab technicians. There are only 2 physiotherapist, 4 occupation therapists, 2 plaster technicians, 1 pharmaceutical pediorologist, 3 pharmaceutical technicians, 2 radiographers and 3 radiographers film processors. There are 2 storemen, 1 Hospital secretary, 6 clerical officers, 2 nutritionists, 3 field workers, 3 health records and information officers.

### **3.10. Institutional set up and Planning of infrastructure.**

The first part of this section gives the historical background of the town. The historical background is important for it influences the current pattern of development. The second part attempt to show the institutional frame work and its capacity for the planning and provision of services.

#### **3.10.1. Historical Background.**

Historical background of Voi town is important because past continues to exercise a subtle but pervasive influence upon our perception of present realities. History of Voi town must be studied if the patterns of

thought and action we inherit are to be understood or even recognized and in any case those patterns cannot simply be exercised at will from our present lives.

Voi started as a settlement in 1897 when the Mombasa-Kisumu railway line made it a resting place by establishing a camp. The inhabitants by that time were largely Indians who were mainly railway builders. Human settlement by that time was limited because of the fear of wild animals (especially lions). The natives by then were living on the hills. It was much later in the century when people migrated to Voi from Sagalla. Those from Sagalla were basically farmers who tilled the land along River Voi while more Indians migrated to Voi for business purposes. In 1979, as shown in the beginning of this section, the population in the town was 7397 while by 1993 the population had increased to 25,350. The annual population growth rate has changed from 3.4% in 1979 to 6.5% in 1993. The increase in population has been mainly due to rural-urban migration from the surrounding areas such as Wundanyi and Kasigau in Taita-Taveta, Machakos, Makueni, Mombasa, Kwale District, etc.

The town's population is composed of Mijikenda, Tanzanians, Masaai, Kamba, Kikuyu, Arabs, Indians, Taita,



etc. The Kikuyu, Arab and Indian communities are the chief businessmen in the town. For quite along time uptill 1978 Voi was an urban council. By that time the town was characterised by unplanned settlements such that it was difficult to provide infrastructural services such as water and roads. The urban council had no adequate resources to facilitate growth and development. Moreover, it was under the direct control of Taita-Taveta County Council. In 1978, Voi became a Town council. Provision of infrastructural services was inefficient due to lack of adequate resources. In 1989, Voi acquired Municipal status. The Ministry of Local Government encourages the local council to invest in income generating projects such as slaughter houses, social halls and market sheds. Service charge, fees and other charges were introduced so as to get more resources but still the resources are inadequate to support the provision of services.

### 3.10.2. The Institutional Set Up.

Voi Municipal council is the responsible Local Authority and is charged with the duty of providing a wide range of services including health, primary

education, road construction and maintenance, sewerage, drainage, markets, solid waste management and social services. There are statutory provisions which are supposed to enhance efficient running of the administrative, management and financial obligations of the Voi Municipal Council. These legislations include, among others: the Local Government Act, the Building Code, the Public Health Act, the Land Planning Act, the Acquisition Act, etc. Voi Municipal council has a legislative arm, the major function of which is policy formulation and executive arm dealing with implementation of policies. It is comprised of 8 elected Councillors each representing a ward and 2 Councillors nominated by the Minister for Local Government. The council operates on a committee system basis. Each committee performs a specific function like health, education, planning, finance and consists of members of the council (Councillors and staff members).

Voi Municipal Council has the following standing committees:

- (a). Town Planning Committee.
- (b). Finance Committee.
- (c). Public Health Committee.

(d). Social service/education Committee.

The committees consider matters pertaining to their functions which are passed on to the full council which in turn ratifies and adopts the discussions as resolutions for implementation. The chief officers of relevant department and professionals act as advisers to committees. The duties of council officers and committees are stipulated in the Local Government Act. The executive arm of the council is divided into two major departments. These are the Town clerk Department which is concerned with administration and the Treasuries Department which is incharge of finance. Under the Town clerk Department, there are three sub Departments. These are the Town planning Department, the Public Health Department, the Education and social services Department.

Like all other Municipalities, Voi council is dependent directly or indirectly on the Central Government for most financial matters. Inorder to undertake capital projects and other functions, the council relies on various sources of finance including:

- (a). Internal sources (Land rates, rents, licences, bus park, user and service charges, slaughter house, cess from hides and skins, royalties from common

minerals, exhauster services etc).

(b). External borrowing from financial institutions, banks, etc.

(c). Central Government through LGLA.

(d). International agencies like GTZ.

Voi Municipal council like other councils is characterized by shortages of finance, labour and materials. The table below shows the Departments' revenue and expenditures for 1992-93 financial year.

Table 3.10. Departments income and expenditures 1992/93

Department	Income generated (Ksh)	Expenditure (Kshs)	Shortfall (Khs)
Clerk and Mayor's Dept.	1,266,452	1,583,738	317,286
Treasurers Department	3,035,218	1,611,572	1,423,646
Town Planning Department	172,640	627,378	454,738
Education and Social Services Department	141,630	585,256	443,626
Public Health Department	668,182	534,418	133,764

Source: Municipal Council of Voi, 1993

Total revenue generated for the period 1992/93 was ksh 5,284,122. While the expenditure was 4,942,362. This

shows that the Municipal financial base is weak.

On roads for example, the budget for the 1992/93 financial year was £250. which is equivalent to (ksh 5000). 3/4 of this amount was used for maintaining the roads. This shows that little amount of money is allocated for roads maintenance. Moreover, this shows that roads maintenance is not given a priority by the council.

Borrowing from Local Government Loans Authority (LGLA) offers the best terms from councils' point of view because it is at low interest rate, 6.5% per annum and long repayment period, 25 years. However, in all cases regarding council projects, the planning, implementation and financing have to conform with Central Governments' requirements. Hence, the Government ministries determine policy guidelines on the development, while participating mult-and bilateral agencies help in the planning, implementation and monitoring aspects. This therefore shows that Municipal day to day affairs are interfered with by the Central Government and other agencies. Land administration (allocation, registration, leasing and management) which is use and control within Voi is undertaken by the commissioner of Lands on behalf of the

Government. The District Land Registrar performs the function of Commissioner of Lands at the local level in liason with the physical planning Department and the Voi Municipal Council.

Urban infrastructure and community facilities, are funded from the councils finances. The international trunk road is maintained by the Ministry Of Public Works while water supply is under the National Water Conservation and Pipe line corporation. The provision of basic services in Voi has lagged behind the rate of urbanization which is 6.5% per annum. This has caused planning, health and enviromental problems like squatter settlements, inaccessible plots, poor roads, inadequate water supply, etc. There are some institutions which undertake selected aspects of urban management so as to improve the enviroment of Voi town. In housing, majority of the housing units are provided by individuals. Voi Sisal Estate and the Kenya Railways are among the institutions which provide housing to their employees. The Voi Municipal Council WID (Women in development) have guest and residential housing projects. However, these women groups are faced by the problems of lack of funds and skills. The GTZ which has been in Voi since 1989 is

helping in the settlement upgrading at Bondeni and Tanzania Estates. Provision of primary and secondary roads is done by the Voi Municipal council. Where plots have been illegally or unprofessionally subdivided, the roads have either been inadequately provided for or are absent altogether.

Sanitation and garbage collection is done by the Voi Municipal Council and individuals. Street lighting and energy supply is planned and provided by Municipal council. The Kenya Power and Lighting Company is the statutory institution responsible for the supply of electricity in the whole country. Institutions providing income generating opportunities include retail and wholesale trade, juakali activities ( vehicle repairs, carpentry, welding), construction, transport, etc.

### **3.11. INFRASTRUCTURE SITUATION IN VOI.**

#### **3.11.1. Roads.**

There are three types of roads as shown in table 10 below. The widths of classified roads range between 9 to 15 metres. The total road milage of the classified roads is 15 km. The roads widths in most parts of the town range between 2 to 6 metres. These secondary

roads are therefore too narrow.

**Table 3.11. Class, surface type, length and average daily traffic**

Road code	Description from/to	Road length	Surface dressing	Surface type		Avg. daily traffic	
				Gravel	Earth	Total	Heavy
C105	A109/A109 Voi	6.5	6.5			930	240
G1	Town/District Hospital	2.0		2.0		0	0
G2	Tow/DO's House Voi	1.0		1.0		0	0
G3	Town/Coast Inst. of Technology	1.1		1.1		0	0
K682	Town/National Park	4.4		4.4		43	10

Source: Ministry of Public Works.

The town has only one bitumenized road. The A109 (Mombasa-Nairobi) highway. The average daily traffic on this road is 930 vehicles out of which 240 are heavy traffic. The Government roads (G1,G2,G3) are gravelled. The average daily traffic on these roads is almost nil. These roads are mainly used by human traffic. People move from their homes to the hospital, to the DO's office, to the market, students and staff to the Coast



institute of technology etc. The road from the town to the National park is a class E road (E682). This road has an average of 43 vehicles per day out of which 10 are heavy traffic. The traffic on this road constitute mainly vehicles ferrying tourists to the Hotels at the Park. This road is also used by the Kenya Wildlife Service vehicles and lorries transporting food stuffs to the Hotels.

The internal road distribution is mainly characterised by Earth roads and foot paths. These types of roads are mainly used by human traffic. These roads are poorly maintained. All the roads except the A109 are characterized by pot holes and gullies. They also lack proper drainage channels such that their shoulders have been weakened. Hence, their design periods are reduced and also costs for maintenance are also likely to be higher if these condition persist.

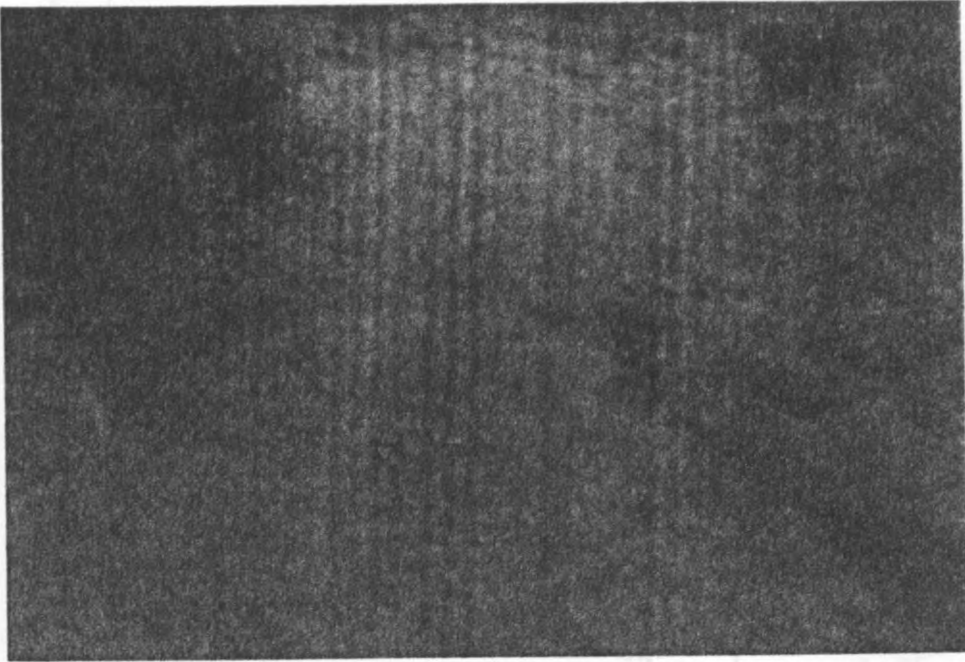


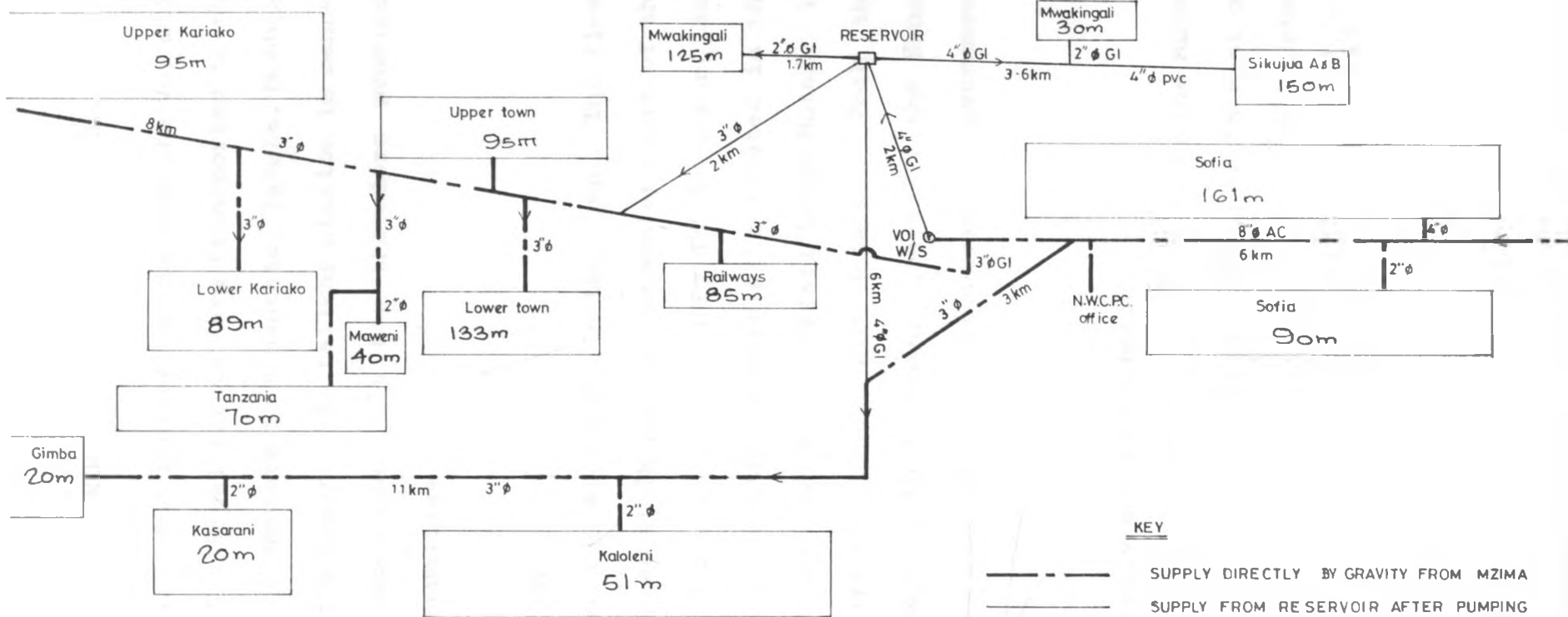
Plate K. Weakened shoulders of one of the poorly maintained secondary roads

### 3.11.2. Railway Line.



Voi has a railway station. The town lies at the junction of the line proceeding to Mombasa, Nairobi, Taveta and to Tanzania. All the major commodities such as Maize, Beans, Peas, etc from Mombasa to the National Cereal Board Depot at Voi are transported by railway

# VOI WATER SUPPLY ZONES

FIG. 1



**KEY**

	SUPPLY DIRECTLY BY GRAVITY FROM MZIMA	60.4
	SUPPLY FROM RESERVOIR AFTER PUMPING	39.6
1	METRES SUPPLIED BY GRAVITY DIRECTLY FROM MZIMA	60.4
2	" " AFTER PUMPING	60.0
3	" " BY BOTH 1 & 2	90
TOTAL NUMBER OF CONNECTIONS		129.4
% OF WATER SUPPLIED WITHOUT PUMPING		46.7

line. Raw materials and finished goods from the Voi mill industries, the Voi Sisal Estate are transported to the market by train. Commuters from Mwatate, Taveta, Mombasa and Nairobi use the train. The railway station is manned by about 1000 employees. It has therefore provided employment opportunities.

### **3.11.3. Air strips.**

There are two Airstrips in the town. The first Airstrip is located at Ikanga in the Western part of the town. This is under the Ministry Of Transport and Communications. The other Airstrip is located in the Northern part of the town at Voi Safari Lodge Hotel. It is under the African Tours and Hotels. Both the Airstrips are used by businessmen, tourists, the Kenya Wild Life personnel for practical purposes and Government functions

### **3.11.4. Water supply and Distribution.**

The major source of water in the town is the Mzima springs which are situated 90 kilometres North West of the town. Figure 1 shows the National Water Conservation and Pipe line Corporation water supply. At

the take off point in the town, water is supplied by gravity forces to the two town reservoirs by a 10 inch diameter pipe. The capacity of the biggest reservoir is 10,000 gallons(45.5m<sup>3</sup>). From the two reservoirs, water is pumped using two vertical (Grundfos) Alpac induction motor pumps which were installed in 1981 to the Mwakingali reservoir which has a capacity of 10,000 gallons (45.5 m<sup>3</sup>). The diameter of pipes used to supply the water to the Mwakingali reservoir is 6 inches. Galvanized iron pipes are used in this stage. In 1972, the purchase of water in the town reached 36,209,400 gallons. The sale of water reached 34,215,100 gallons. The balance unaccounted for was 1,994,300 gallons. The capacity of the reservoirs was 10,000 gallons. Today, the same reservoirs with the same capacities are used for water supply. Given the ever increasing population, the water supply is therefore inefficient. For example, the current towns'water demand is 95,000m<sup>3</sup> per month (316 m<sup>3</sup> per day) while the supply is 91,000 m<sup>3</sup> per month. (303 m<sup>3</sup> per day). This gives us a deficit of 4,000m<sup>3</sup> per month (13 m<sup>3</sup> per day). The water demand for livestock is 36,000m<sup>3</sup> while the supply is 38,000m<sup>3</sup> per month. Hence, the water supply to this sector is 110%. 46.7% of water

from the Mwakingali reservoir to the consumers is supplied by Gravity forces while 53.3% is supplied by pumping.

The population served by piped water from this source is 16240. If water used in the Hospital, Hotels, Schools, Bars, industries etc is included, then the total population served is about 23,000.

#### **Water Quality.**

Turbidity = 0 NTU (No turbidity).

PH = 7.5 (Nearly neutral)

Hardness = 60mg/L  $\text{CaCO}_3$  (60 parts per million).

Amonia NHU = 0.5MG/L (0.5 parts per million).

#### **Water Treatment.**

Water is treated at the point of abstraction. Chlorine is the only chemical used. The dosage is 1 part per million. The red chlorine ( $\text{Cl}_2$ ) used equals to 0.2 parts per million. The water supplied to the people by the National Water Conservation and Pipeline Corporation is fit for human consumption.

**Table 3.12. Water Charges.**

The table below shows the amount of water consumed and the charges made.

Amount of water(cubic m)	K shillings
0 - 10	65
20	165
35	340
60	715
100	1515
113	1840

Source: National Water Conservation and Pipeline Corporation office, Voi.

The table above shows that water in the town is very expensive. The problems which face this source of water supply include pipe bursting, due to the hot climate and Wildlife menace (especially Elephants) that step on the pipes. Other problems include disconnections due to lack of payment, water rationing which is caused by inadequate water supply due to drought, old pumping facilities, inadequate storage facilities, power failure and the shortage of staff.

Currently, the water supply is manned by one technician, one subordinate staff and four pump attendants.

### **Other Sources of Water.**

#### **The Kighombo Water Supply.**

The major source of this water is Sagalla Hills and some parts of Musau. The water is not treated. There is no meter system. This used to be the major source of water for the railway employees. Currently, they are supplied with water from the National Water Conservation and Pipeline Corporation. Residents of Ikanga (Voi West) still use the Kighombo water. Water from River Voi is used by people who live near it. Holes are dug in the sand of the River bank (partial bank infiltration) especially during the dry season and when there is a serious water shortage. Voi Sisal Estate factory use the river water for production purposes and also for small scale irrigation of Sweet Melon and Tomatoes. Rain water harvesting is done when it rains. The unreliability of rainfall make this source of water underutilized. However, the average water consumption in Tanzania and Bomani settlement according to GTZ (1993) is 22 litres per day which is below the accepted



international standard of 70 litres per day. The above consumption rate of water may be applied to most parts in the town.

### 3.11.5. Sanitation facilities.

Voi town has no Municipal sewer system. This is because the Council lacks adequate resources to provide such an important service. Simple family and communally pit latrines with average depth of between 6 to 10 feet are used. These pit latrines are normally not fully serviced. 72.9% of the population in the town use pit latrines. 25% use flush toilets which are fed to shallow septic tanks while 2.1% have no toilet facilities at all. The rocky sub soil make it virtually impossible to dig pits for latrines. This situation has led to 'high-rise' pit latrines which if poorly built, they can burst and pollute the surroundings. (GTZ,1993). Infiltration of waste water into the subsoil is restricted by the low permeability of the soil and this leads to air and water pollution.

Due to lack of Municipal sewer, People discharge household waste water by digging shallow trenches. The shallow trenches are normally blocked by solid waste.

The trenches are therefore characterised by grey water which serves as breeding grounds for mosquitoes and other water related diseases vectors.

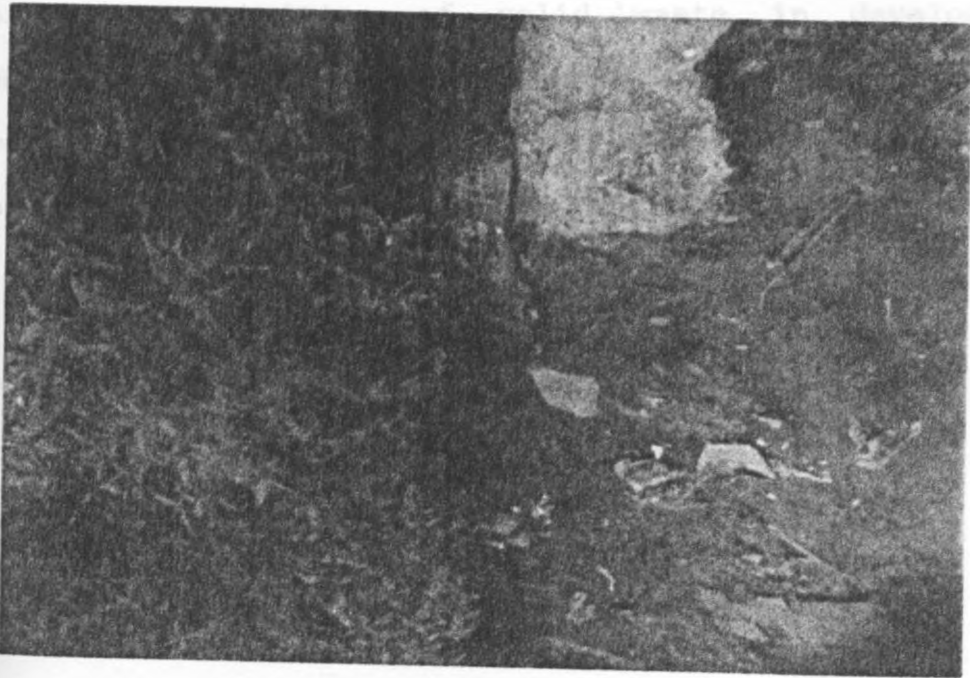


Plate F. Grey water shallow trench which serves as the breeding grounds for mosquitoes.

The lack of adequate household waste and storm water

drainage network have affected the quality of environment in the town. As shown in chapter one, there is no organized collection of solid waste by the Voi Municipal Council. 95.8% of the population use rubbish pits . Only 4.2% of the population is served by the Municipal refuse truck services. Most people therefore use pits in or near their compound where domestic refuse and wastes are burned regularly. Cointreau, (1983), gave a break down of the composition of solid waste in developing countries. The table below shows his break down of solid waste. What is presented in the table below may be the same with the current nature of solid waste in Voi town.

**Table 3.13. Composition of Solid Waste.**

	(% by wet weight)
Vegetable/organic	40-85%
Paper	1-10%
Glass, ceramics	1-10%
Metals	1-5%
Plastics	1-5%
Leather, Rubber	1-5%
Wood, Bones, Straw	1-5%
Textiles	1-5%
Miscellaneous	1-40%

**Source:** (Cointreau;1983;iv).

This shows that vegetation and organic wastes form a large percentage of domestic solid waste in urban areas including Voi. The refuse collected from dustbins from the household served by the Municipal refuse collection services, commercial and industrial premises at the CBD is disposed at the Municipal disposal site (Timbwani) where it is burned regularly. The burning of the refuse at the disposal site cause air pollution to some of the residents in such Estates like Kaloleni, Mwingoni, Msambweni and Birikani. However, the management of solid waste by the residents have made the town clean compared

to other towns in Kenya.



**Plate (G): Municipal Disposal Site.**

## CHAPTER FOUR. URBAN DEVELOPMENT AND MANAGEMENT IN RELATION TO THE ENVIROMENT.

### 4.1. INTRODUCTION.

The first section of this chapter highlights enviromental degradation and its causes. Section two examines the role of community in the planning process and also demonstrate case studies of community participation. Factors for and against successful community participation in water supply, roads and sanitation in the town are given. The final section of this chapter highlights the major policy implications for future provision of infrastructural facilities mainly water, roads and sanitation.

#### 4.1.1. General Overview.

Enviromental degradation is a situation whereby the human enviroment including air,water and land are mismanaged. Moreover, enviromental degradation is a situation by which air and water are polluted while land is mismanaged leading to soil erosion. (Miller,1979). The causes of enviromental degradation in any given area include MAN. The poor farming systems often lead to overgrazing or overutilization of the soil. Such soil

once subjected to the forces of wind or rainfall is washed away leading to formation of gullies. The improper sewage and refuse disposal is also another cause of environmental degradation. Smoke from factories and from vehicles form a major source of air pollution. The use of agro-chemicals such as fertilizers is another source of pollution for surface and underground water resources. Other causes of environmental degradation include deforestation, quarrying, uncollected garbage, dead animals such as dogs and cats in urban areas.

#### 4.1.2. Environmental Problems In Voi.

In Voi, the causes of environmental degradation include the simple pit latrines. Due to lack of Municipal sewer, most people use Communally and single family pit latrines which are not fully serviced. As shown in chapter one and three, most of the population use pit latrines. Very few people use flush toilets which are connected to shallow septic tanks, while a small number of people have no toilet facilities at all. Because of the rocky subsoil, it is virtually impossible to dig pits for latrines. This therefore has led to 'high rise' pit latrines (GTZ,1993). If poorly built,

these latrines are a cause for considerable hazard as they can burst and pollute the surrounding. In addition, due to the very low permeability of the soil, the infiltration capacity of waste water into the subsoil is greatly restricted. There is lack of adequate grey water and rain water drainage. When this combines with the low permeability of the rocky subsoil, unhygienic sanitary conditions results. These unhygienic sanitary conditions results to water and sanitation related diseases such as diarrhoea, worm infestations, mosquito-born diseases, skin and eyes diseases. We have already seen that there is no organized collection of solid waste by the Voi Municipal Council. Most of the people use pits in or near their compound where domestic refuse and wastes are burned. However, sometimes the refuse is not burned regularly and this pits provide breeding points for flies and rats which cause an outbreak of flies and rats related diseases.

Seasonality of River Voi and the resulting erosion of the river banks is a major environmental problem particularly to those who are living near the river. Settlements and goods worth thousands of shillings might be washed by the flooding river during the rainy season.



A study carried out in Voi by the GTZ in 1993 showed that the railway line is also an environmental problem especially to the residents of Estates which are close to it. It was found that some people especially the elderly and the children have lost their lives through accidents. They have been run over by trains. Another problem associated with the railway line is that people at night are arrested by policemen for trespassing. The railway line has therefore been an environmental problem to the people in Voi. Air pollution is also a major environmental problem. The cause of this is the mixed land uses. In Voi, commercial, industrial and residential land uses are mixed. 43.8% of the respondents cited Voi Sisal Estate factory as the major source of pollution. The industrial waste from the factory is fed into lagoons before being discharged to the River. This causes air pollution especially to the southern parts of the town. 28.1% cited uncollected garbage as a source of pollution. Other sources of air pollution in the town include the Voi mill industries, the open household waste water drains, the Municipal refuse disposal site and the Bata Shoe Factory.

There is lack of proper internal road network.

Government roads in the town are gravelled while the rest of the roads are Earth. Due to lack of proper maintenance, these roads are normally worn out. Most of them are characterized by gullies, lack culverts and drainage network. This has reduced their designed periods. Another environmental problem is related to the human settlements. Most of the Estates in the scattered settlements in the town are characterized by temporary structures of mud and wattle. These temporary housing structures are associated with lack of adequate roads and inefficient water supply. Other environmental problems include inefficient water supply caused mainly by pipe bursting and wild animals.

#### **4.2. The Role Of Community In The Provision Of Water, roads and sanitation facilities.**

##### **4.2.1. Water Supply.**

The concept of community participation is currently given an important test in development programs of most developing countries. This is because when people are involved in any project, such a project is ought to succeed. This is because the people would be

willing to maintain it especially if the community's objectives are similar to those of the project managers.

In Voi, the community has participated in the supply of water. The National Water Conservation and Pipeline Corporation is responsible for the supply of water in the town. The water Board identifies a water problem in a given locality by studying the total population and distance of that place from another. The community participate by digging trenches for the laying down of pipes. After this is done, one person is assigned the responsibility of supplying the water. The community then participate by paying for the water. The money collected at the water point is later utilized for the maintenance of the pipes. This has made the town to have a total of 10 communal water pipes. One of the reasons for successful community participation in this sector is the fact that settlements are scattered all over the town such that provision of piped water to some of them is costly. Consequently, people in such Estates like Mwingoni, Msambweni, Majengo and Kaloleni have participated in the supply of water to reduced distances.

The lack of reliable rainfall and the seasonality of River Voi have contributed much to the success of

community water projects. The lack of adequate reliable rainfall has meant that no proper rain water harvesting can take place. The seasonality of the River and the lack of bore holes make the National Water Conservation and Pipeline Corporation be the major source of water supply. Low incomes among the residents have also contributed to successful community participation. Most people cannot afford individual water connections. 60.4% of the population is served by communal taps while 39.6% have individual water connections either inside or outside the houses.

#### 4.2.2. Sanitation.

Lack of adequate resources by the Municipal council has led to the absence of Municipal sewer system. Most people cannot afford septic tanks. The community has however participated in disposing the household waste water by digging trenches. However, the trenches are normally blocked by solid waste and this lead to collection of grey water. The stagnant grey water as seen in chapter three serve as breeding grounds for mosquitoes. The rocky subsoil also make the provision of the above services difficult. There is no organized

solid waste collection by the Voi Municipal Council as we have already seen in chapter three. Nevertheless, the community with the help of the Department of Public Health have successfully participated in solid waste management. Solid waste is disposed in pits and burned regularly and this has made the town clean.

#### 4.2.3. Roads.

The community has not effectively participated in the provision of road network. The Mombasa-Nairobi highway is maintained by the Ministry of Public Works. The Government access roads are under both the Ministry of Works and the Voi Municipal Council. Roads are therefore provided and maintained by the Ministry of Public Works and the Municipal Council. The local community is paying service charge hence direct community participation has not taken place. People don't see the reason why they should participate in maintaining the roads while they are paying service charge which is to be used in maintaining the roads among other things. The two institutions have also not involved the community in this sector due to lack of adequate resources. Since there is no funds people are not involved in filling of

pot holes and gullies. In summary, the community has not been involved in the road construction and maintenance sector due to lack of resources by the Council and the Ministry of Public Works. Another reason is the scattered pattern of development which make the provision of services difficult. People are paying service charge hence they dont see the reason to participate maintaining the roads. An analysis on how the community could be involved in the planning and management of this important sector is therefore made in the next chapter.

#### 4.2.4. Settlement Upgrading At Bondeni and Tanzania

##### Estate By GTZ

The settlement upgrading exercise in the two low income Estates is being done by GTZ, the Ministry Of Local Government and the Voi Municipal council. The implementation of the project is being carried on. The project managers identified the main problems and preferences of the residents of Tanzania and Bondeni, regarding their neighbourhood enviroment and the level of service provision by the Voi Municipal council. The main problems noted included lack of proper sanitation and drainage, an intermittent water supply and the poor

awareness of health issues. Those deficiencies lead to the incidence of infant and child mortality and morbidity in the two Estates where the infant mortality rate is 98 per 1000 born children.

An attempt is made particularly by the GTZ to improve the current deficient conditions of the neighbourhood environment and community health in the near future. All interventions are built on a high level of community participation among the residents of the two Estates. In the upgrading process, the communities of the two Estates have agreed to have block title deeds such that nobody could grab their land nor individual could sell the land. Individuals agreed to pay Ksh 3000 as survey fees.

There are residents committees in both Estates which participate in discussing the major issues facing the communities. In each meeting, there is a youth who represents the interests of the youth. There is also a lady in each meeting who represents the interests of the women. Housing Research Development Unit of the University of Nairobi has trained youth in making bricks. People have participated in the settlement upgrading project without being given any financial assistance. This therefore shows that community participation has

succeeded in the settlement upgrading.

#### 4.3. Policy Implications For Future Action.

The study has developed the involvement of the community in the planning process which can assist the local Authorities in dealing with provision of roads, water and sanitary facilities throughout Kenya. One basic principle of the use of community in participation is that the local Authorities which are providers of basic services generally lack adequate resources. The community therefore can be used to provide some of the basic services such as water, roads, and sanitation. These would be assets for the community and also for the respective local Authorities.

Recently, the Kenya Government introduced the policy of cost sharing. The provision of infrastructure by involving the people is in line with the Government policy of cost sharing. The beneficiaries (the community) must meet the costs of providing the services. In line with this, the local community in Voi can be effectively involved in solid waste management scheme. Collection of non-degradable waste can be done at least twice a week from communal bins by the Municipal Works



Department while the community would pay elected community members for the responsibility of keeping areas around bins clean especially after every collection. The community can be involved in effective water supply. In 1974, the Government came up with the National Water Master plan policy. It was stated that by the year 2000 water would be supplied to the people at a distance of 4 kilometres. This policy is yet to be realized. This can be enhanced by training community leaders who would in turn convince their people to effectively participate in water supply. For rain water catchment scheme which would ease the water problem, there is general need to train the community and fundis on the construction of low cost ferro-cement rain water tanks to improve water supply. This would help in achieving the Government policy of supplying water to people at a distance of 4 kilometres.

Since independence, the Government of Kenya has been fighting three major problems: Poverty, ignorance and diseases. The fight against disease has seen the provision of medical facilities to many parts of the country. Health is an essential component of overall development. The quality of life in human settlements,

invariably depends on the state of health care which inturn is linked with and dependent upon the availability of adequate food, water, waste disposal, transportation and housing. As a policy therefore, there is need for community based health programmes. This would help in spreading community health education training which would emphasis domestic and personal hygiene, diarrhoea , worm infestations, malaria skin and eye diseases by involving the Voi Public Health Technician. On household waste disposal and use of pit latrines, there is a need for participatory drainage system where by people would improve human waste disposal by encouraging double pit latrines and VIP latrines. Construction of proper drains for the disposal of waste water would be good for the improvement of the enviroment.

In 1974/78 plan period, transportation was to rise at a rate of 7.2% per annum. The Government later saw the need of improving the transportation sector. Various programmes on access roads were introduced so that they could improve the mobility of both goods and people. As a policy for future development of roads in Voi, the concept of food for work can be applied. The people can be given food inturn for construction or maintenance of

roads. By so doing, the community will be involved effectively leading to improved conditions of roads in the town. Labour intensive technologies such as clearing of vegetation along roads by using pangas, filling pot holes by using buckets, etc can actually make people maintain the roads. Community leaders can be assigned the task of grouping their people for communal work related to roads maintenance. For the Earth roads, people can be told to water the sections which are close to them. This would reduce the degradation of the roads.

#### 4.4. summary.

This chapter has shown that the the causes of enviromental degradation in Voi include the overutilized pit latrines, lack of adequate storm and household waste water drainage network, the Voi sisal Estate factory, the railway line and floods from River Voi. The rocky subsoil, lack of adequate resources by the Municipal council and the low incomes among the population, have been shown as major bottleneck for current and future provision of infrastructural facilities such as roads, water and sanitation. The existing infrastructural facilities are therefore characterised by pipe bursting,

pot holes, weakened shoulders and lack of proper drainage facilities. The chapter has also demonstrated sectors where community participation has taken place and where it has not and the factors for that have also been given. The policy implications for future action is also given.

## CHAPTER FIVE. ANALYSIS AND FINDINGS.

### 5.1. INTRODUCTION.

This chapter combines the findings from field data and secondary data. The first section will attempt to show the contribution of roads, water supply and sanitation facilities in terms of employment, income levels, availability of raw materials, improvement of market and the pattern of growth and development of Voi town. Factors affecting the utilization of the installed infrastructure are revisited in this section. The second section of this chapter will attempt to show the sectoral analysis (relationship between certain types of activities and the availability of infrastructural facilities in the study area.

### 5.2. CONTRIBUTION OF ROADS, WATER AND SANITATION FACILITIES TO URBAN GROWTH.

#### 5.2.1. Roads.

The three types of roads identified earlier have an important influence in socio-economic and physical development of Voi Town.

**(a). Annual employment levels and incomes.**

Most of the major commercial activities such as shops, hotels, petrol stations, lodges, etc are located along the A109 Mombasa-Nairobi high way. Since the road is bitumenized, transportation of goods is efficient. Most commercial activities along this road are therefore doing very well. The existence of this road has therefore led to high levels of employment in the service sector. Industries such as Voi Sisal Estate Factory, Voi Mill, Bata Shoe Factory, etc, use the road for the transportation of their raw materials and finished goods.

The road from Voi to Mwatate and Wundanyi is bitumenized. It enhances transportation of goods from Mwatate and Wundayi to Voi. The internal circulation is characterised by gravelled and earth roads. Most businessmen located far away from the town centre have problems of supplies because of poor roads. Consequently, employment opportunities and improved income levels of the commercial oriented people in the scattered settlements have been reduced.

**(b). Availability of raw materials and finished goods.**

Most of the finished goods to Voi from Mombasa, Wundanyi and Mwatate are transported by road. The road network has therefore made Voi town have adequate food supplies. The Bata Shoe company, metal and wood workshops, jua kali workshops, petrol stations, etc, use the road network for the transportation of raw materials and finished goods to and from Voi. The transportation of finished goods to the scattered settlements is however poorly coordinated due to the poor internal road network.

**(c). Pattern of Development.**

Linear pattern of development is characterised along the A109 Mombasa-Nairobi high way. Scattered settlements in the town are served by gravelled and Earth roads which are more or less like foot paths. The lack of proper road network in the areas outside the town centre has led to the absence of serious commercial activities.

### 5.2.2. Water supply.

(a). Average daily water consumption is 22 litres. People served with individual water connections inside the house or in the compound are 39.5% while those served by communal taps are 58.2%. There are ten communal taps in the town. The provision of adequate water to industries and commercial activities have led to creation of employment opportunities. Monthly rates costs in areas with piped water are higher than in those areas without. The commercial premises with individual water connections such as Hotels, Bars, and Petrol stations pay more for the water consumed than the commercial premises in the scattered settlements most of which have no individual water connections. Household rents at the CBD and some areas in or within the town centre are high than in those areas without water supply. This shows that areas served with piped water are paying relatively higher monthly rents than those without piped water.

### (b). Availability of Raw materials and Consumer Goods.

Crops such sweet melon and tomatoes are grown using river water.



**(c). Pattern of Development.**

The town centre is linear in character. One of the factors for this scenario being that most immigrants settle at the centre because water is cheaply available.

**5.3. FACTORS AFFECTING UTILIZATION OF INSTALLED INFRASTRUCTURE.**

There are several factors which affect the utilization of installed infrastructure in the study area.

**(a). Topography.**

The gentle sloping land scape has stimulated construction of roads. It has also stimulated cheap water supply. For example, 46.7% of the water consumed in the town is supplied by gravitational forces. Energy which would be used in pumping the water is therefore conserved.

**(b). Geology.**

Voi is characterised by rocky subsoil. This makes it ideal for the construction of roads. However, the rocky subsoil is a constraint to the provision of proper sanitary facilities. For example, most of the people in the town use pit latrines but the rocky subsoil

make it hard to dig pits for latrines to the accepted standards. Provision of septic tanks is also constrained. The average depth of septic tanks is 9 feet. Digging of trenches in order to lay down water pipes is also constrained. Most of the pipes are therefore found on the ground where they are subjected to the forces of expansion and contraction and also stepped upon by wild animals particularly Elephants which make them burst. This has led to temporary water shortages in the town.

**(c). Finance.**

The Municipal Council has no adequate resources to finance roads, Municipal sewer and proper storm water drainage network.

**5.5. SECTORAL ANALYSIS.**

(i). The sectors identified in this study are:

- (a). Sector A - Retail, Wholesale, Bars, Hotels, Restaurants, Butcheries.
- (b). Sector B - Metal works, wood works, posho mills.
- (c). Sector C - Private clinics, petrol stations, hair saloons

(d). Sector D - Institutions such as schools,  
banks, offices, churches,  
Hospitals

**(ii). Types of Roads and Performance of Different Sectors.**

Activities in sector A and C are located in areas with bitumen or gravel roads. This shows that shops, Bars, Hotels, Butcheries, Petrol stations, and hair saloons, require more accessibility due to frequency of customers/clients. Sectors B and D are also located along the bitumenized A109 Mombasa-Nairobi high way. Kiosks in sector A are located in the interior parts of the town. Sector C is non-existence in the interior parts and in sector D only schools and churches do exist in the interior parts of the town.

**(iii). Water supply and Performance of Different Sectors.**

(a). In sector A, retail, wholesale and butcherries do not use alot of water. In the study area, the average water charges per month in the three activities range

between ksh 20-300. Hotels, Bars, and Restaurants use large amounts of water and the water charges per month range between ksh 200-2000. Sector B is not consuming alot of water. Sector C is one of the largest consumers of water. The water charges range between ksh 500-3000 per month. In sector D, water is consumed in large amounts in boarding schools. Banks, offices and churches use little amount of water.

(b). Monthly returns per sector depends with the degree of the activity of each sector but not water supply. Water consumption therefore has nothing to do with the monthly incomes of each sector.

(c) Employment generation per sector also depends with the degree of activities taking place. Some of the sectors like metal workshops, banks and offices consume little amount of water but they employ many people. Some like Hotels, Bars, Hair saloons, consume large amounts of water but they employ few people. Consequently, water consumption in any given activity does not determine the number of employees.

(d). In sector D, most of the educational institutions, are located near roads and in areas where there is water supply. Health facilities like the Moi

District Hospital is located in the town centre because of good means of transport and adequate water supply. Administrative, public and private offices, DO's office. Banks, insurance offices, police station, etc are located in the town centre.

### **The Industrial Sector.**

Small scale industries use little amount of water (about 540 litres) and pay about Ksh 300 per month. Large scale industries such as the Voi Sisal Estate Factory, the Bata Shoe Factory and the Voi Mill Industries use large amounts of water hence, pay about Ksh. 2000 per month. On electricity, the large industries pay between Ksh. 60,000-120,000 per month while smallscale industries such as the Voi Division Women Group Bakery, Metal and Wood workshops pay upto Ksh. 20,000 per month.

Telephone charges for large industries range between Ksh. 20,000-71,000 per month which shows that there is constant communication between the customers and the industrialists. The large industries in the town employ large number of personnel. For example, Voi sisal estate has a total number of 553 employees while Bata shoe factory has a total of 75 employees. Small scale industries like the Voi Division Women Group has 12

employees.

Residential developments were previously concentrated in the town centre mainly because of good means of communications and adequate water supply. Currently, housing units are being built far away from the town centre where water supply is not a determinant factor for settlement. Private residential developments are taking place in the northern parts of the town. This is because this area is accessible and there is adequate water supply. Industries such as Voi Sisal Estate Factory, Bata Shoe Factory, Voi Mill, etc are located in the town. Financial institutions such as Kenya Commercial Bank, Barclays Bank and Kenya Agricultural Finance Cooperation are also located in the town centre where means of transportation are cheap. The slaughter house is located at the centre of the town centre. It is accessible and has adequate water supply. However, it has become a pollutant and need to be relocated.

**(a). Solid waste management.**

95.8% of the population use pits. Only 4.2% are served by the Municipal refuse truck. Since there are

people of various income levels, this shows that income does not influence community participation in this sector. What influences community participation are other factors such as the lack of adequate Municipal refuse disposal service, the lack of access roads, the rural nature of some of the scattered settlements in the Municipality ( such as Birikani, Kaloleni, Msambweni, etc) and the great work of the officials of Public Health Department who encourage the community to dig pits for the disposal of the garbage. This has basically made Voi town a clean town

**(b). Water supply.**

More than 3/4 of the population is served with piped water from the mzima springs by the National Water Conservation and Pipeline Corporation. However, not all people have individual water connections either inside or outside the houses. 60.4% of the population get their water from communal taps. There is a total of 10 communal taps. The Estates where the community rely on communal taps include Birikani, Mwingoni, Msambweni, Tanzania, Bomani and Maweni. The people in these Estates have succeeded in participating in digging of trenches

for the laying down of pipes, they have participated in buying the water.

The reason why community has succeed in this sector include the nature of the localized water problem and the peoples perception of their common needs.

**(c). Domestic waste water trenches.**

Most parts of the town except the CBD, Sikujua Estate (site and service scheme), and some high income residential premises have household waste water drainage. Open trenches for the disposal of household waste water are therefore used. Lack of Municipal sewer and the the great work of the officials of the Department of Public Health have made the community succeed in this sector.

**5.6. Summary.**

Through the analysis of this chapter, the following was revealed. Roads contribute significantly to creation of employment opportunities and improving the income levels of businessmen. They also influence the location of commercial and industrial activities in the town. The sectoral analysis revealed that water is a major local determinant in location of activities such as Bars, and



Hotels compared to sanitary facilities. Educational, health and offices are located in relation to one or more of the infrastructural facilities under investigation.

## CHAPTER SIX. SUMMARY, POLICY IMPLICATIONS AND RECOMMENDATIONS.

### 6.1. SUMMARY OF FINDINGS.

The main problems noted in this study include the lack of proper sanitation and drainage, an intermittent water supply, poor awareness of health issues and the poor nature of road network.

Most of the commercial and all industrial activities are located along the A109 Mombasa-Nairobi highway. This road has therefore created employment opportunities thus improving the income levels of the people. It has also led to linear development of the town centre. The interior parts of the town are characterised by foot paths which affect adequate supplies of commercial goods to these areas. However, the few roads in the town are poorly maintained.

Average daily water consumption is 22 litres. Most people are served by communal taps. The availability of water have influenced location of commercial and industrial activities creating employment opportunities thereby improving the incomes of the people. Household rents in areas where water is cheaply available is high. Factors influencing utilization of infrastructure include

topography. Gentle sloping terrain stimulates road construction. It enhances cheap supply of water. Rocky subsoil enhances construction of roads while at the same time it is a constraint to provision of proper sanitary facilities (pit latrines and septic tanks) to the accepted standards. Lack of adequate finance by the Municipal Council contribute to the poor maintenance of the infrastructural facilities in the town. Community participation has effectively taken place in solid waste management and supply of water in the scattered low income settlements. The community has also participated in disposal of household waste water by digging trenches. However, this has not been effective due to the geological structure. Community participation has not taken place in the provision of road network.

## 6.2. POLICY IMPLICATIONS.

Utilization and further provision of water and road network is likely to be affected by prevailing incomes. Consequently, there is need to consider credit facilities and extension services. The Ministry of Labour therefore should train more people and give them jobs. The Ministry of Lands and Urban Development should give

people in squatter settlements title deeds. The various NGOS in Voi should explore the possibilities of sinking bore holes in the town.

### 6.3. RECOMMENDATIONS.

The planner must play an active role in guiding people's choices and stimulating wants. He should make the community secure, defensive and not harassed by making their wants known. The planner must brake the tendency within himself to rely over much on the mass of people's ability to help themselves in our complex world.

Strong citizen support and participation is essential to successful comprehensive local planning. Good public participation should therefore start even before the planning process with wide publicity as to why there should be any planning at all.

Professional planners should develop effective two-way relations with the people by whose mandate and where benefit they are planning. This is done through the use of advisory committees, issuing of attractive and readable reports and citizen initiative which invite study by groups or local town meetings which would act as a sounding board for public opinion. Public polls can be

used to stimulate discussion. Residents to be fully involved in the provision of infrastructure. They should be requested to form 'Residents Committees' to cautiously represent their interests.

The infrastructure improvement should be based on the idea that only basic investments should be made in order to allow cost recovery and replicability of the program. The proposals should be thoroughly harmonized with the residents in order to make them aware of the implications.

Proposals both short, medium and long term should aim at improving the general living conditions in the town. All the measures should include a high degree of community participation. The participation in form of consultation, implementation and labour inputs should prove successful as the benefits of each of the recommendation accrues directly to those who contribute and participate. The measures should contribute to:

- (a). improving public health, personal and domestic hygiene,
- (b). reduced costs of curative health services,
- (c). proposed measures aiming at improving the living conditions of wananchi by meeting their basic human needs, through a regular supply of clean water, providing

for the safe disposal of human solid and fluid wastes and roads. With the above ideas in mind, it is recommended that the following actions have to be taken to enhance the utilization of infrastructure in Voi.

If we compare the building of a city to the wearing of a shoe, we can suggest some aspects of citizen participation in planning. The shoe is most likely to fit if the wearer's measurements are taken. This might indicate that the city planner does well to consult the people for whom he is planning. Moreover, the wearer of the shoe knows where it pinches or when the soles are worn through. He is therefore in the best position to exercise initiation.

### 6.3.1. Roads.

Repair of the existing road net work need to be undertaken. Cess from ranches, factories, mines etc and service charge can be used in road maintenance. Youth to participate in roads maintenance. They can be paid for filling pot holes and gullies on the gravelled and earth roads. Roads should be constructed in such Estates like Mwingoni and Msambweni so that internal mobility could be enhanced. There is also a need to produce up to date

codes regulations and standards for roads services that are suited to the requirements of the local community in the town.

### 6.3.2. Water supply.

The local community should be encouraged to practice roof catchments. The staff required should include 1 peace corps volunteer from coast province specialized on low cost rain water tanks. The time scope should be 2 weeks training for construction of a demonstration rain water tank. The costs involved should include PVC training costs and materials for tank. The monitoring team input should be financing and organizing the holding of 2 week workshop in Voi. There should be water analysis due to the fact that rain water might be polluted by dust and dirt lying on mabati roofing.

Community based health programme should be encouraged. The staff required is should be 1 Public Health Technician. The staff tasks should include community training on domestic and personal hygiene, malaria and disease control. People should be encouraged to use the River water. The Kighombo water supply should be improved so as to augment the existing

water supply.

Leak detection in the distribution systems should be looked into. This is because it provides a useful method of upgrading existing services and an opportunity for extending the service to new areas. The 40-60% water loss through leakages can therefore be contained.

### 6.3.3. Sanitation.

#### (a). Solid waste collection and Composting scheme.

For short and medium term recommendations, the community should be encouraged to burn garbage regularly. The staff required for this exercise should include existing Voi Public Works Department, selected members of the community. The staff input should include community training on domestic and personal hygiene, malaria and on disease control. The costs involved should include Public Health Technician inputs, certain materials (mosquito nets, insecticides, and medicine). Time scope for this exercise should be six months. The monitoring team input would be to identify and not working with NGOS or Agencies in the field and not working with Voi and Public Health Officer, contacting medical offices of Health in Voi and Public Health Technician. The costs



involved would include acquisition of pilot communal refuse bins. Time scope for this exercise should take 1-2 collection trips per week. The monitoring team input this case should be given the responsibility of current Municipal waste management scheme and analyze possible future improvement. This should be done with the supervision of the officials of the Department of Public Health and the local leaders. Ventilated pit latrines (VIP) to be constructed. Figure 2 present a proposed ventilated improved pit which should be adopted by the residents of Voi town. This type of latrine requires little or no water as the excreta is deposited directly into the pit and the ventilation column ensures that odours within the latrine are minimized. Figure 3 shows an alternative pit latrine after the first one is filled.

Provision of on-site sanitation systems for excreta disposal will automatically result in the discharge of other household waste waters into the drainage systems, but the flow resulting from this discharge may be minimal compared with the run-off from rainfall. Hence, in planning a drainage network, it is necessary to ensure the provision at the invert of the drainage channel of a small section which will ensure the conveyance of waste

water at a rate adequate to prevent the stagnation of water.

**(b). Participatory Drainage System Project.**

This would need long term recommendations. The staff required would be 1 community sanitation coordinating officer. The monitoring team and Engineers should coordinate in the community drainage project, monitoring of construction of drains, formation of community maintenance teams. The time scope for this be should 6 months. The costs involved would include coordinator input, materials and tools for construction. The monitoring team input would include preparation of drainage project together with Voi Municipal Council, assessing technical and financial options for drainage.

The improvement of sanitation and drainage lies at the heart of an improved environment and human welfare for the residents of Voi. Planning should address human waste (excreta) grey water drainage (sullage), storm water drainage and solid waste (so far as it blocks drains and sewer). As a first step, the user preference and willingness to pay for different technologies should be assessed, followed by recommendations.

Recommended options for improved disposal  
of human waste

## VIP

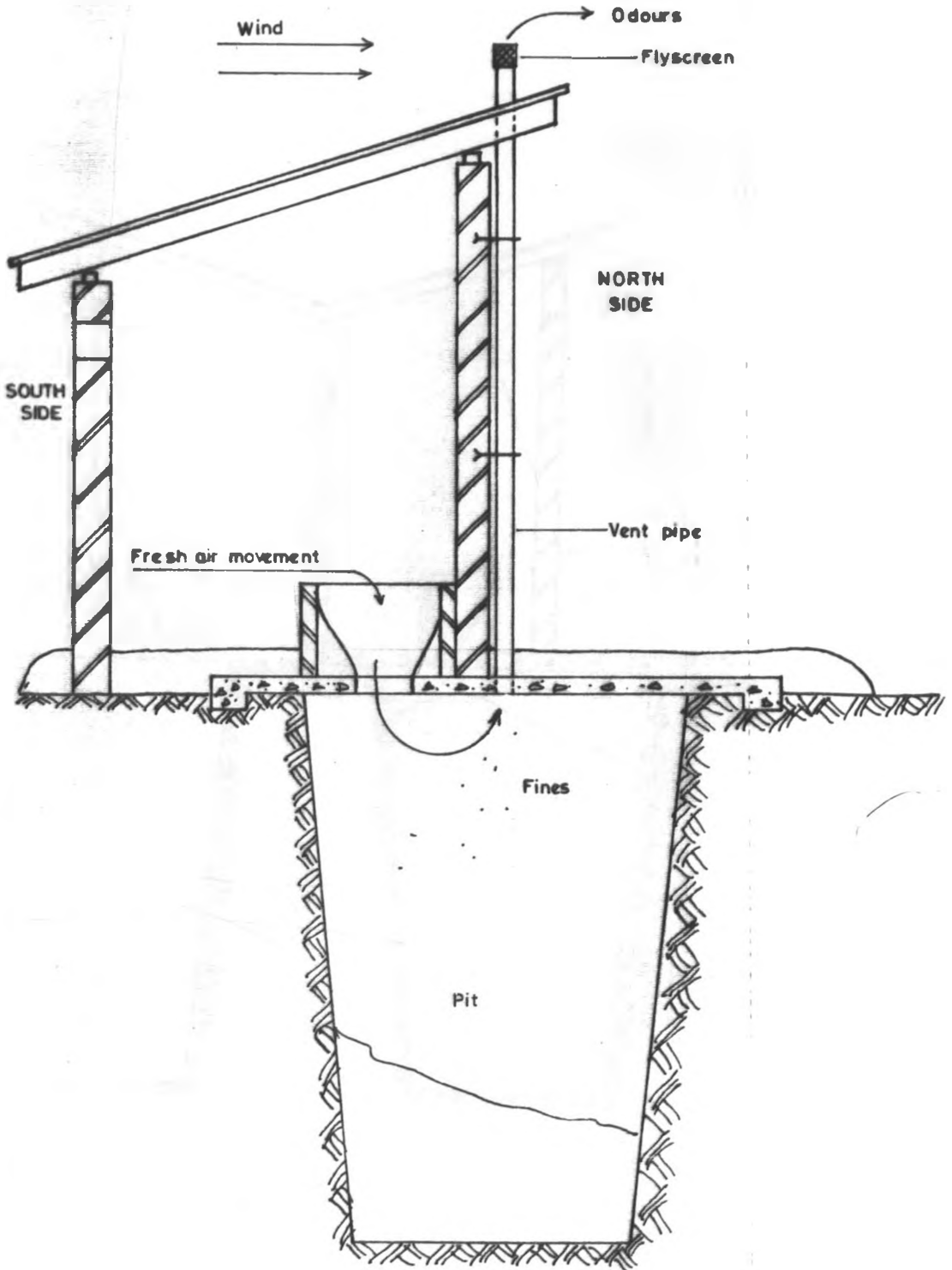


Fig.2

Double pit Latrine  
( Second latrine built when 1st is full )

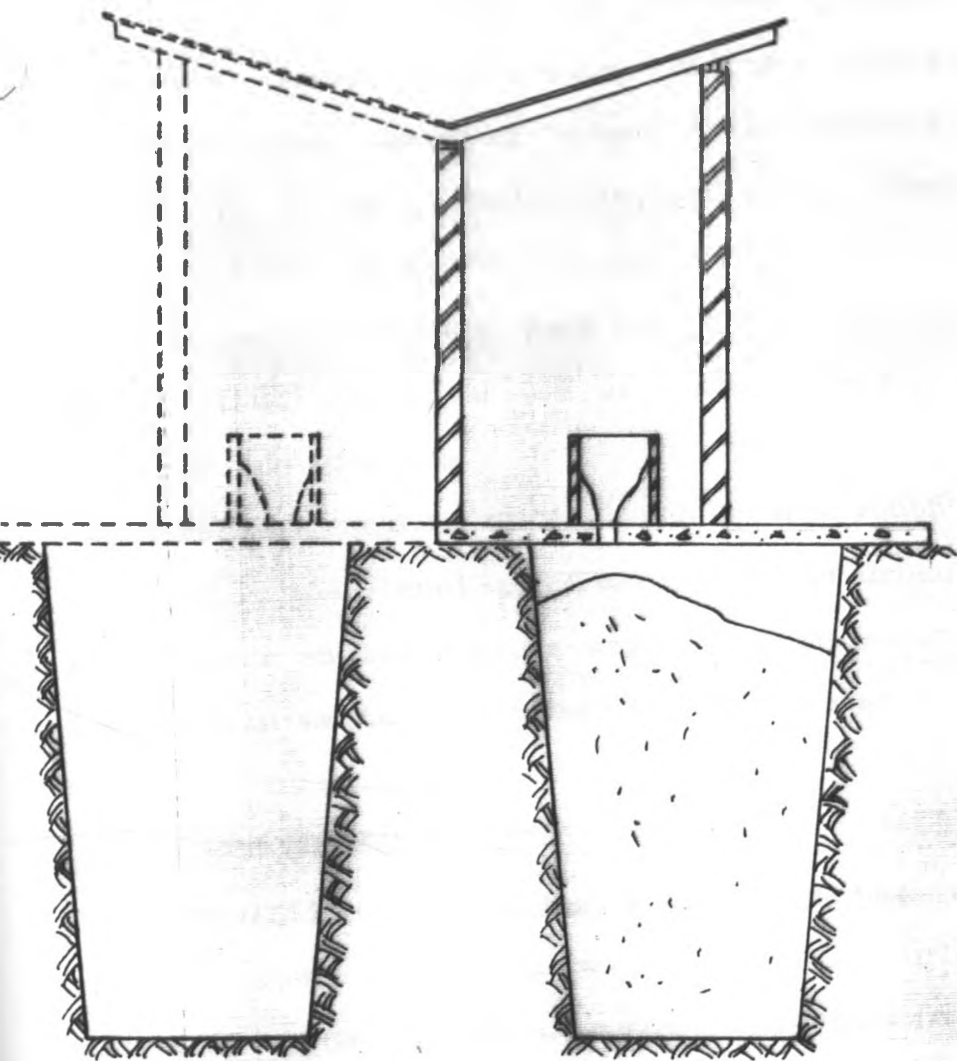


Fig. 3

#### 6.4 RECOMMENDATIONS FOR FURTHER RESEARCH.

The study of infrastructure is important for it entails how environment can be improved. There is therefore a need to encourage further research on how community could participate in the provision of infrastructural services in our urban centres. There should be a need therefore of doing research on organizational framework of any given urban centre i.e panel, council, citizens body etc. One should understand the institutional framework of a given council, and its capacity for planning.

There is a need to do research on how youth could be involved in the planning and management of urban affairs. Researchers should explore ways by which youth could be involved in maintaining roads in urban areas.

#### 6.5. CONCLUSION

Population is growing rapidly in the developing world. There has been an increase of urbanization particularly in the third world mainly because of rural urban migration, population increase and the expansion of urban boundaries. As people settle in urban areas, they become more and more service oriented such that local

governments are increasingly faced with the need to assume a planning role to ensure that human service programmes will be relevant to changing community needs. With little experience in the the human services field, most local governments lack the capacity to detect or respond to complex social needs which may be amorphous, non-material and poorly articulated.

Small municipalities, Voi being one of them lack both experienced management as well as legal and technical expertise, factors which weaken their ability to secure regional development resources. Moreover, the delivery of human services in Voi town is limited by lack of local programming, information and decision making structures responsible to community needs. Programmes are forced to operate on an underfunded, piecemeal basis with little constituency support and with tasks too great for resources available.

In Voi, there are some factors which affect the provision and utilization of infrastructure. These include the topography, the geology, the low incomes among the towns' residents and the lack of effective community participation in the planning and management of the crucial infrastructural facilities like roads. The

study therefore is an avenue for the examination of the role of which ordinary people can play through their elected local government, voluntary groups like the GTZ and in their neighbourhoods toward the planning of their own futures.

For effective community participation in the provision of roads, water and sanitation facilities, the following guiding principles should be followed.

- (a). Principle of coordination. This means that the Voi elected local authority can harmonise services and plan for the area as a whole.
- (b). Democratic participation. The Voi elected council should help to teach people both elected representatives and electors to understand each others just demands to order their priorities within the limits of what is practicable.
- (c). Principle of responsibility. The Voi community, the Voi Local Authority, the planners, and the NGOS should be responsible for the proper planning and maintenance of the services provided.

## BIBLIOGRAPHY.

- AGEVI, E (1991) The Study of Eldoret Town Management of Secondary Cities In Subsaharan Africa: Traditional and Modern Arrangements.  
UN (Habitat,1989).  
Nairobi.
- ARCOT, R (1981) Development of Rural Settlements and Growth Centres.
- BERRY, L & KATES, R.W (1973) Enviromental Problems: Aview From East Africa.
- BRAGER, GEORGE & HARRY SPECHT (1973) Community Organization.  
New york. Columbia University Press.
- CAMPBELL, ANGUS, PHILLIP,E.& CONVERSE (1972) "Social Change and Human Change"in Campbell and Converse (eds). The Human Meaning of Social Change.  
New york, Russel Sage.
- EPSTEIN, G, GIBSON, J.E, JONES, P.H & LUOTO, U.  
(eds) The Enviroment of Human Settlements.  
Pergamon press.
- FUNNEL, D.C. (1976) The Role of Small Service Centres In Regional and Rural Development: With Special Reference To Eastern Africa.  
John Wiley & Sons Ltd
- GUNN, A. M. (1962) Habitat: Human Settlements In an Urban Age.
- HANSEN, N.M. (Editor) Criteria For A Growth Centre Policy. (1922).
- HIGGINS, B & SAVOI, D.J (Eds) Regional Economic



Development.

Unwin Hyman (1988).

**HUMAN SETTLEMENTS IN KENYA: A Strategy For Urban and Rural Development**

Physical Planning Department

1978 Edition.

**KABWEGYERE, T.B (1976) Socio-Economic Transformation In East Africa. The Growth of Trading Centres In Rural Kenya (PHD Essex)**  
 .....(1978) Small Urban Centres and The Growth of Underdevelopment In Kenya.

**KUKLINSK, A (Editor) Growth Poles and Growth Centres In Regional Planning (Volume 5).**  
 Mouton-Paris. The Hague (1972).

**KEOKUNGWAL, C (1992) Current Human Settlements Situation In Thailand and Related Policies.**  
 Regional Development Dialogue Vol 3 NO 4  
 Nagoya, Japan.

**HANSEN, M.Y.(1992) Urbanization and Human Settlement Policy In Egypt.**  
 Regional Development Dialogue Vol3 NO 4.  
 Nagoya, Japan.

**HILL, D.M.(1975) The Planing and Management of Human Settlements With Special Emphasis On Participation.**

**MEMON, P.A (1973) The spatial Dvnamics of Trade and Urban Development In Kenya During The Early Colonial Period of 1925.**

**MUHAMMAD, H.D (1992) The role of Community Participation In Development Planning In Malavsia.**

Regional Development Dialogue Vol 3 NO 4  
Nagoya, Japan.

NAIYA, P.W (1977) Public Participation In Planning  
Process In Kenya: A case Study of Githunguri  
Division.

Unpublished MA Thesis.

VAGABY, B.O(1980) Using Infrastructure As an  
Indicator of Urbanization In Kenya.

VILORIA, L.V(1992) Community Participation In  
Marginal Settlements In The Phillipines.  
The Case of Metro Manila.

Regional Development Dialogue Vol 3 NO 4.  
Nagoya, Japan.

OBUDHO, R.A (1982) National Urban and Regional  
Planning Policy In Kenya.

THE QUALITY OF MAN'S ENVIROMENT. Smithsonian  
Institution Symposium.

Smithsonian Institutions Press, 1968.

TAITA TAVETA DISTRICT DEVELOPMENT PLAN 1989-1993.

Ministry of Planning and National Development.  
Government Press.

TIMBERLAKE, L. (1985) Africa In Crisis: The Causes  
and the Cures of Enviromental Bankraptcy.

UN (Habitat,1989) Community participation In  
Problem Solving and Decision Making.

Basic Principles.

Nairobi, Kenya.

UN (Habitat,1989) Solid Waste Management In Low-  
income Housing Projects: The Scope For  
Community Participation.

UN (Habitat,1989) Water Supply In Low-income

Housing Projects: The Scope For Community Participation.

UN (Habitat, (1987) Shelter.

Infrastructure and Services For The Poor In Developing Countries.

Some Policy Options.

UN (Habitat, (1992) Delivery of Basic Infrastructure To Low-income Settlements: Issues and Options.

SOEYONO (1992) The Role of Community Participation In Human Settlements Planning In Indonesia: Fucus On Kampung Improvement Projects and Programmes.

SIMMONS, A.B (1976) Opportunity Space, Migration and Economic Development: A Critical Assessment Of Research Migrant.

WATKINS, D.A (1976) Community Services Planning and The Small Municipality: A Quality of Life Framework For The Development of Rural Human Services.

WIENER, A (1982) The Role Of Water In Development: An Analysis Of pinciple Of Comprehensive Planning.

McGraw-Hill Book Company.

## APPENDIX 1. HOUSEHOLD QUESTIONNAIRE.

1. Where were you born?
2. What is your age?
3. How long have you lived in Voi?
4. What is the total number of all persons who live with you permanently?
5. What are their ages?
6. How many different parts of Voi town have you lived since you came here?
7. What have been the major causes of your shifts?  
.....  
.....  
.....  
.....
8. What is your occupation?  
(a) unemployed  
(b). self employed  
(c). casual worker  
(d). formal employment
9. Please could you indicate the level of income  
(a). below 1000  
(b). between 1001-2000  
(c). between 2001-3000  
(c). between 3001-4000  
(e). above 5000
10. What services are provided in this household?  
(a) piped water in the house  
(b). piped water outside the house  
(c). communal tap  
(d). electricity
11. What type of toilet is used in this household?

- (a). flush water
- (b). pit latrines
- (c). others (specify)

12. How is the refuse collected?

- (a). dust bins/refuse trucks
- (b). rubbish pits

13. What is the frequency of refuse collection by the municipal council?

14. What community facilities are provided in this estate?

- (a). shopping centre
- (b). school
- (c). library
- (d). health clinic
- (e). bus routes and parking facilities
- (f). nursery schools

15. What are their causes?

.....  
.....  
.....  
.....

16. What do you think could be done in order to arrest the problems you have identified?

.....  
.....  
.....

17. Do you think that you can participate in the planning and management of this town?

18. If yes, how and if no, why?

19. What do you think could be done in order to improve the living environment of this town?



11. If poor roads, what do you think could be done in order to alleviate this problem?
12. How much do you spend on each of the following per month?
  - (a). water
  - (b). telephone
  - (c). electricity
  - (d). labour
  - (e). transport
13. What do you think could be done to improve the business environment in Voi?

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**SECTION B. QUESTIONNAIRE FOR INDUSTRIALISTS.**

1. What is the name of this industry?
2. What is the ownership of this industry?
3. When was this industry started?
4. Why was it located in Voi?
5. What raw materials do you use and where do you get them from?
6. Within your industry, what is the expenditure on:

utilities/inputs	expenditure
electricity	
water	
telephone	

rents

raw materials

labour

7. How many workers are employed within your industry on the following terms:
  - (a) permanent
  - (b) casual
8. What is the water demand for your factory?
9. What is the supply of water per day?
10. Do you have other sources of water apart from the National Water Conservation and Pipe Line Cooperation? If yes, what are these sources?
11. Do you face any problems in transportation of your raw materials and finished goods?
12. If yes, what are those problems and how do you think they can be solved?
13. What is the nature of your waste and how is it disposed?
14. Is the waste treated before disposal? If yes, how and if no why?



**APPENDIX 3. INTERVIEW SCHEDULE WITH THE TOWN CLERK.**

1. What is the administrative organization of the town in terms of sublocations, locations, wards and divisions?
2. What is the total number of departments within the Municipal Council?
3. What is the total number of development committees/boards within the council?
4. What is the function of each committee?
5. What is the number of elected and nominated councillors in the town?
6. What are the council's sources of revenue?
7. What is the Municipals' total population?
8. What is the Municipal's total area?
9. How did the town come into existence?

**APPENDIX 4. INTERVIEW SCHEDULE WITH THE DISTRICT WORKS OFFICER.**

1. What are the types of roads in this town?
2. What is the total road mileage in the town?
3. How do you repair the existing roads and how do you plan for new roads?
4. What is the total annual expenditure on roads maintenance?
5. What is the Departmental annual budget?
6. What do you think are the major problems faced by the Voi transport systems?
7. Has the community participated in roads construction and maintenance? If yes, how and if no what do you think are the constraints that make community participation in this important service fail?

**APPENDIX 5. INTERVIEW SCHEDULE WITH THE AREA MANAGER  
NATIONAL WATER CONSERVATION AND PIPELINE CORPORATION.**

1. What is the town's sources of water?
2. What is it utilized for?
3. What is the estimated total Municipal water demand?
4. What is the total Municipal water supply?
5. How is the water supplied from the sources to the consumers?
6. What is the quality of the water?
7. Is it true that available water resources can be exploited to much greater advantage by involving the community?
8. For small community water projects, how do you explore the problem?
9. How do you involve the community in such a project?
10. How many communal taps are there per head of population?
11. How are these being used at present?
12. What is their state of repair?
13. What do you consider when planning for communal water projects?
14. What is the population served with piped water?

**APPENDIX 6. INTERVIEW SCHEDULE WITH THE PUBLIC HEALTH OFFICER.**

1. How do you dispose of solid and liquid wastes?
2. What types of containers do you use for solid waste disposal?
3. What is the population served with the municipal solid waste collection services?
4. What is the volume of waste generated per day/month?
5. What is the major waste generated?
6. For the case of liquid waste, do you treat it before disposal? If yes, how and if no, why?
7. What methods of disposal are planned for future use?
8. What is the departmental annual budget?
9. What is the departmental annual expenditure?
10. How could the community be involved in the planning of sanitation facilities in this town?

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