

## **1.0 CHAPTER 1: INTRODUCTION**

### **1.1 Introduction**

This chapter discusses the formulation of this research project. It focuses on the problem identification, purpose of the study, objectives, the research questions to be answered as well as the scope of the study. It further looks at the methods and research techniques that were used in data collection, and the justifications. It introduces the study area (Mpika town) of Northern Province. It gives a back ground to the need for the adoption of a GIS based integrated district land use planning process, based on the premise that in order to make improvements to district land use planning, there is need to have an overview of the current district planning process. It further looks at the methods that were used in data collection and analysis.

### **1.2 Problem Identification**

The Local Government Act, Cap 281 of the laws of Zambia, provides for among others, the establishment of Councils, their constitution, finance, functions, manner or regulation and by-laws and appointment of Local Government Administrators. There are currently four (4) City Councils (Lusaka, Ndola, Kitwe and Livingstone) fourteen (14) Municipal Councils, and fifty two (52) District Councils in Zambia. All City and Municipal Councils are planning authorities. In addition, there are also nine (9) Provincial Planning Authorities, in line with the 9 provinces of the country. The 52 District Councils (which includes the study area), are planned for by the relevant Provincial Planning Authorities, in their areas of location.

The land use planning process in Mpika town is beset with several problems ranging from data collection, data analysis, as well as outdated data manipulation and storage facilities. Though GIS and remote sensing technologies are available in the country, the preferred method for land identification in the study area still remains physical ground surveys, while filing cabinets are used for storage of the available plans and maps. The study area also still exists without an up dated development plan. These problems are partly a result of both in adequate funding and qualified human resources, as well as the fact that “the planning system consists of various actors with varying functional authority relating to or affecting spatial planning.” (MLGH.2008, P.3).

Stakeholder participation is not effective and well coordinated. “There is no provision for public participation in the plan making process in the Town and Country Planning Act. Public involvement is limited to placing advertisements in the press and gazette, to which few people have access.” (MLGH. 2008, P.13). In planning like any other field, it is therefore “necessary to accept that in any problem, there are a whole host of partial causes contributing to the ultimate reality.” (Gregory.S. 1963, P.256). In a nutshell, “plan making in Zambia is currently ad hoc, piece meal, compartmentalized and demand driven, and not based on critical analysis of the over-all spatial development process.” (MLGH. 2008, P.11).

It is in view of the fore-going, that this research project was initiated. It explores the utilization of GIS technology, both as an effective tool to orderly development, as well as one that can lead to the development of an integrated district land use planning process in the study area.

Whilst research has been done in Zambia on GIS usage in other related fields such as service delivery and planning control, it is the first time to my knowledge this type of a study is being undertaken at this level of academic study, and specifically relating to land use planning process in Mpika. This is also based on the premise that “each application of GIS is unique. To begin with, each application occurs within a framework of a specific organization mission, and has specific geographical boundaries.” (Obermeyer.N.J. and Pinto.J. 1994, P.68).

The study area is Mpika town, in Mpika district. It was chosen because apart from being one of the fastest growing towns in Zambia, its planning is still being handled by the Northern Province Planning Authority (NPPA). This arrangement has attendant problems such as delayed decision making process.

### **1.3 Objectives**

The main objective of the study is to develop a proposed integrated land use planning process through application of GIS and remote sensing technologies. It is envisaged the process will enhance data collection, analysis and presentation, and review of the products. Due to the many prevailing interests, district level planning is by nature a multi-objective planning process.

Specific objectives of the study were:

1. To examine the current land use planning process in the study area.
2. To assess the possible application of a GIS and remote sensing technologies based integrated district land use planning process in the study area.
3. To develop a proposed GIS based integrated district land use planning process for the study area.

#### **1.4 Research Questions to be Answered**

- What is the current process of land use planning in the study area?
- Can land use planning process be improved through introduction of GIS and remote sensing technologies?
- How can an integrated land use planning process be developed using GIS and remote sensing technologies?

#### **1.5 Scope of the Study**

This research project focuses on the technical aspects of the integration process rather than the participation of different stakeholders, though GIS can facilitate this process as well. The current structural (IDP) planning process was reviewed and the whole process re-designed. However, only the technical aspects of the re-designed process were partially tested.

#### **1.6 Methodology**

Two main methodologies were used. These were case study and survey. Apart from other reasons, a case study method is used “to study some specific characteristics of a rare or extreme situation in which an organization finds itself.” (Ghauri et.al 1995, P.89). It enables comparison and contrasting of various phenomena. In the case of a survey, it is “more concerned with the sampling of different organizations...to generalize our findings to all other organizations of the same type.” (Ghauri et.al 1995, P.88). The research combined qualitative and quantitative approaches based on stratified random sampling. Apart from simplifying data collection, “the idea of stratified random sampling is to ensure that every part of the population, i.e. every stratum gets a better representation.” (Ghauri et.al. 1995, P.78). Interviews, questionnaires and observations were used as the main research techniques.

Collected data was analysed using mainly descriptive analysis. Secondary data formed the bulk of literature review, whilst primary data relevant to the research, formed the core of the study.

Work was organized through work schedules, and assigned timeframes for the completion of each selected task. Supporting services were identified such as Geomatic Engineering Department (UNZA), for soft and hardware that was to be used for analysis of data. Places were also identified for supplies of maps, air photographs and satellite imagery. These included Ministry of Local Government and Housing headquarters, Northern Province Planning Authority, and Mpika District.

In order to determine current process of land use planning in the study area, questionnaires were dispensed to relevant stakeholders in the district. Methods of data collection and analysis chosen were interviews, questionnaires, existing literature at national, provincial and district levels, as well as observations in the field. Questionnaires were dispensed to 14 Council staff, 15 Councillors, 6 Government departments and NGOs, 3 Utility Companies and 26 individuals drawn from the high, medium and low cost housing areas in the study area. Interviews were also conducted targeting heads of departments or supervisors, or their proxy, at district, provincial and national levels. These were considered a representative opinion. Existing literature, lay out plans and topographical maps and field surveys for study area were the other research techniques used.

SPSS was used for data analysis and MS word for word processing. ArcView 3.2a GIS was used in the production of lay out plans. The choice of ArcView 3.2a software was made on the basis that:

- It is one of the world's most popular desk top mapping software, and was readily available in the Department of Geomatic Engineering [UNZA]. Technical help concerning GIS software was also readily available.
- It was best suited for the task at hand in that it is suitable for handling both geographic and attribute data, as well as the drawing of location and land use maps.

- This software has also the major advantages of database connectivity as well as management, display, query and analysis of spatial information.

Research findings formed the basis for development of the proposed model, whilst satellite imagery for study area was used to aid in identification and production of existing land use, as well as proposed land use maps.

The existing relevant pieces of legislation such as the Town and Country Planning Act, Local Government Act, Public Health Act, and the Lands Act were also looked at, in relation to the planning process. The Town and Country Planning Act is the principal Act that regulates land use planning process in Zambia in general.

The entire planning process, from initiation of planning process to implementation of the plan were considered. Stakeholder participation was identified as a cardinal component for the successful planning and implementation of the proposed GIS based planning process.

### **1.7 The Study Area**

The study was focused on Mpika town, the administrative centre of Mpika district, in the Northern Province. It serves as a nerve centre for the district. All functions of the district such as district planning and district administration, are dispensed from here. It is however important to state from the outset that Mpika District Council has limited jurisdiction in terms of land use planning within the district, hence the reason why planning is still being handled by the Northern Province Planning Authority. The community in the district is represented in Mpika town, by area councillors, as well as area development committees and the District Development Coordinating Committee (DDCC). The district is approximately 45 000 sq. kilometres. Figure 1.1, shows location map of Mpika district, in relation to Northern Province and Zambia.

## MPIKA LOCATION MAP

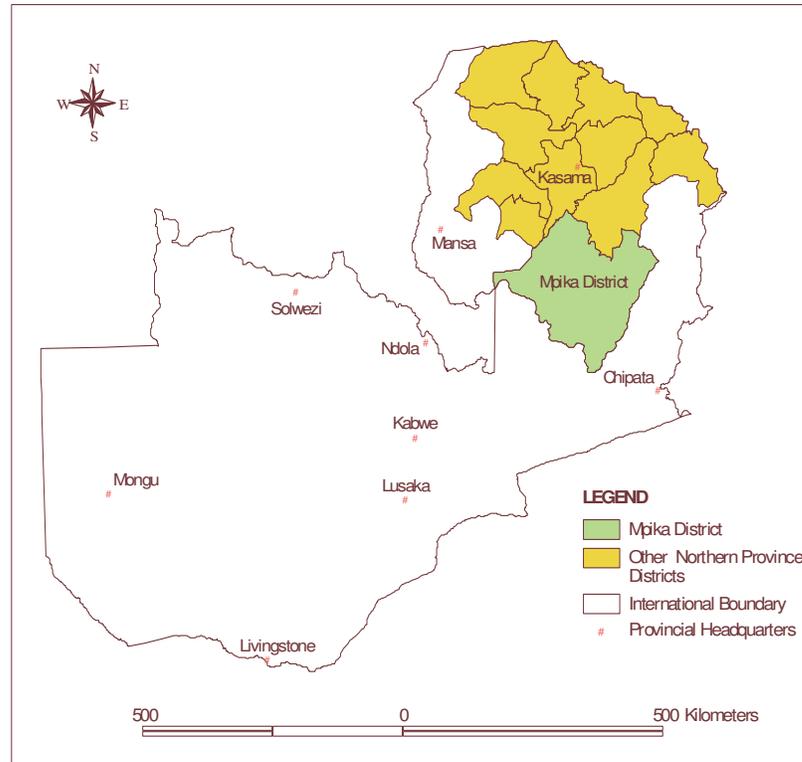


Figure 1.1 .Location of Mpika District in Relation to Northern Province. Source Author, 2009.

### Short History of Mpika Town.

Mpika town started as a village. Its name was derived from the name of the first headman of the village. His name was Mupika Fikansa. He used to stay in the Chibansa area of Mpika. With passage of time, the name changed to Mpika. And this name has been maintained.

### Geography and Social-economic Position of Mpika Town

Mpika Town is located in Mpika district, in the Northern Province of Zambia, and lies between longitude 21°-28° East and latitude 11.50°-11.55° South of the equator. Mean annual temperature ranges between 17.5°C (in winter) and 30°C (in summer). Temperatures are moderated by its height. Mean annual rainfall is 1000 – 1200mm. Mpika town lies on a gently undulating plateau, which forms part of the Muchinga escarpment, with a mean altitude of 1500m above sea level. The main

vegetation is savannah woodland, with *Brachystegia taxifolia* being the main tree species found. Due to its topography, the area is well drained. Major rivers are the perennial Lwitikila river in the west, Mufuchani river in the south, and the Malashi stream in the eastern direction.

The population of Mpika district (as at the year 2000 census) was 146,196 people. It has a population density of 15.2 person per square kilometer (2000 census) with an annual growth rate of 1.7%. The major economic activities of the study area are agriculture, commerce, trade and transportation, the latter comprising of convergence of road and rail network. Just like the rest of Zambia, land tenure system in Mpika town is leasehold, rather than freehold. This implies land may only be held on title for a period of 99 years, after which lease has to be renewed.

## CHAPTER 2: LITERATURE REVIEW

### 2.1 Introduction

This chapter reviews what other researchers have done, in relation to this research project. It looks at land use planning process, GIS structure and functionality, as well as the role of the community in a GIS based integrated district land use planning process. Most of the literature review done, focused on land use planning as well as the role of GIS technology, in such a process. It also considers how this technology may not only enhance efficiency in service delivery, but also encourage community participation, especially at the **needs assessment** stage of the planning process.

It further discusses the historical background to land use planning in Zambia, as well as the legal and institutional frameworks. It concludes by summarizing some problems affecting land use planning process in Zambia.

### 2.2 Land use Planning

Land use generally refers to “man’s activities on, and in relation to land.” (Lo C.P. 1986, P.227). This refers to among others to residential, commercial and industrial uses of land. Land is an important resource in all forms of developmental activities, be it socio-economic or environmental. It is a basis for human development, and consequently, human survival. Land, therefore, serves as a critical factor in the achievement of an optimal, as well as a sustainable planning process. The Post observes that “the utility value of land is manifest when production arising from human enterprise is superimposed over it. Short of this, it remains a sterile wasting asset”. (The Post. 2007,P.VIII).

Planning is defined as “the process of preparing a set of decisions for action in the future, directed at achieving goals by preferred means” (Yohei.S. 2002 P.1). An example here would be decisions taken and costs involved in demarcating land for residential development. Ministry of Rural Development (Zambia), defined planning as “the conscious process of selecting and developing the best course of action to accomplish an objective” (Ministry of Rural Development 1973 P.1). This may be illustrated by the actions that a land use planner takes in deciding on what type of land is suitable for a particular type of development, such as industrial development.

Land sensitivity factors may help in deciding on compatible land uses. Being a process, planning consequently, represents a dynamic, robust and continuously changing set of activities. It is also flexible and future directed. Land use planning therefore also involves an optimal and sustainable use of land. As Obermeyer and Pinto observes, “the major innovation of planning is its underlying assumption that the world is uncertain and unpredictable” (Obermeyer.N.J. and Pinto.J. 1994 P.130), hence, the need for land use planning to be flexible. Fig. 2.1 indicates the importance of planning in general, and land use planning in particular.



**Fig.2.1 The Importance of Planning**

**Source : Adapted from Councillor’s Orientation Reference Manual. 2006. P.5.**

The effectiveness of any planning process must of course be “directly related to a clear and accurate interpretation of the objective. This must be clearly established before any of the planning steps are undertaken.” (Ministry of Rural Development 1973 P.2). Generally speaking, land use planning process of any particular area, normally entails many challenges, and fundamental changes. Some of the major bottlenecks in the planning process are “often inadequate coordination of efforts, a relative absence of policy, and a shortage of expertise, personnel and resources.” (Caldwell.W. 1999 P.1).

### **2.2.1 Effective Land use Planning**

Due to the fact that land is such a valuable economic resource, “land use planning is a complex and controversial process involving competing values and intense power struggles.” (Lilesand.T.M. and Kiefer. R.W. 1979 P.). This is because “any site has a variety of potential uses, each of which would have some advantages and disadvantages from the view points of land owners and the community.” (Burke.G. 1980. P.41). Effective land use planning therefore “seeks to establish a balanced and workable pattern of land uses which will secure optimum economic and environmental advantages with alternative patterns where feasible.” (Burke. G. 1980. P.41). Since the underlying assumption in planning is that it should be a continuous process because the world is uncertain and unpredictable, effective land use planning should consequently be robust, future directed and flexible.

### **2.2.2 Integrated Land use Planning**

In order to consider why it is necessary to propose a GIS based integrated district land use planning process, attention has been drawn to some of problems in the general steps of the current process.

Integrated land use planning “involves planning for all sectors or types of activity within a particular geographical area.” (Hill.P.1984, P.12). Some of the critical aspects of integrated planning include “coordination between different authorities, municipal units and stakeholders....and strong links between spatial planning and financial plans and budgets” (MLGH, 2008, P.30).

### **2.3 Geographical Information Systems (GIS)**

Globally, Geographical Information Systems (GIS) have been defined as “an organized collection of computer hardware, software, geographical data, personnel and procedures, designed to efficiently capture, store, update, analyze and display all forms of geographically referenced information.” (UNCHS.2000 P.10). Whilst remote sensing is defined as “a process of gathering data about the surface of the earth and the environment from a distance, usually by aircraft or space sensors.”(Malczewski.J. 1999. P.348). “Remote sensing by aircraft and satellite depends on the spectral reflectivity of ground features using either the sun as a source or some emission of radiation from the platform itself.” (Peel.R.F. (ed.)

et.al.1977, P.28). “The intimate relationship between remote sensing and information systems suggests that this is the most effective way of integrating data from various sources required for planning and decision making.” (Lo.C.P. 1986, P.248).

A “GIS is designed for collection, storage and analysis of objects and phenomena where geographical location is an important characteristic, or critical to the analysis.” (Belward.A.S. and Velenzuela.C.R. 1991.P.357). Consequently, unlike other systems, GIS deals with spatially referenced data. Table 2.1 summarizes the differences between Geographical Information Systems (GIS), Environmental Management Information Systems (EMIS) and Land Information Systems (LIS).

**Table 2.1: The Difference Between EMIS, GIS and LIS.**

<b>EMIS</b>	<b>GIS</b>	<b>LIS</b>
<b>Environmental Management Information System (EMIS)</b> is a participatory tool for urban environment planning and management, concentrating on the interaction between environment and development activities.	<b>A Geographical Information System (GIS)</b> helps to store and manage large amounts of spatially referenced data. It provides analysis tools and therefore helps a better understanding of the activities on the earth’s surface.	<b>A Land Information System (LIS)</b> focuses on land parcels as the primary unit of information. It maintains, analyses and disseminates information about land registration, land assessment and land evaluation.
Whole city, including peri-urban areas. Scale 1:10,000 to 1:100,000	Depends on the issue. Scale : all scales	Mainly built-up areas Scale 1:500 or 1:5000

**Source : UNCHS. 2000, P.10**

Examples of where these information systems are being used in Zambia, and some challenges being faced are summarised in Table 2.2:

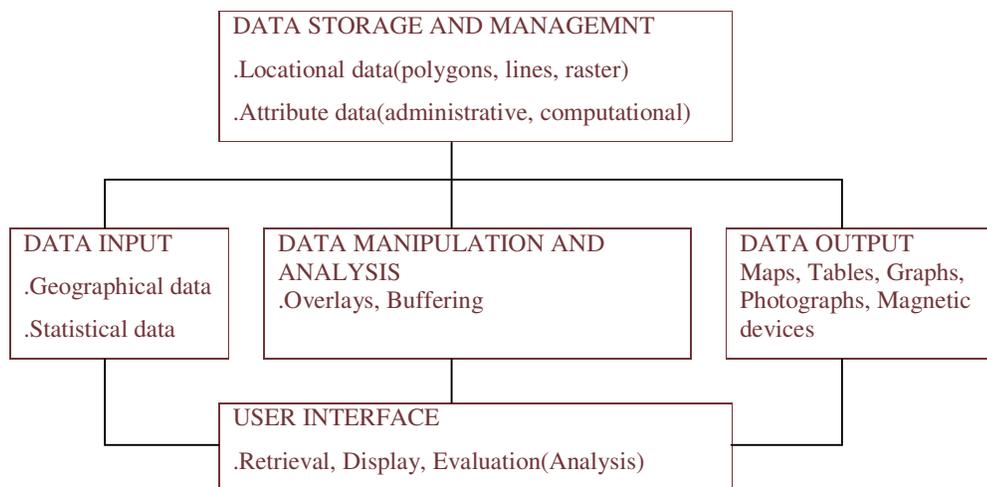
**Table 2.2 :Examples of Institutions Using EMIS,GIS,LIS and Some Challenges Being Faced**

INSTITUTION	DOING WHAT	HOW IT IS BEING DONE	CHALLENGES
ZCCM- Investment Holdings	Copperbelt Environment Management Project (World Bank Funded)	Environment Management Information System (EMIS)	Logistical problems e.g. transport
National Remote Sensing Centre	Land use Planning and Management	Geographic Information System (GIS).	Inadequate number of vehicles and personnel for field work. Inadequate funding from central government
Ministry of Lands	Land Management	Land Information System (LIS).	Inadequate equipment and personnel
Mazabuka Municipal Council	Land use Management	Geographical Information System (GIS).	Inadequate equipment and qualified personnel.

Source: Author 2009

### 2.3.1 Structure and Functions of GIS

Fig.2.2 shows the structure of a GIS in terms of its major components and their linkages.

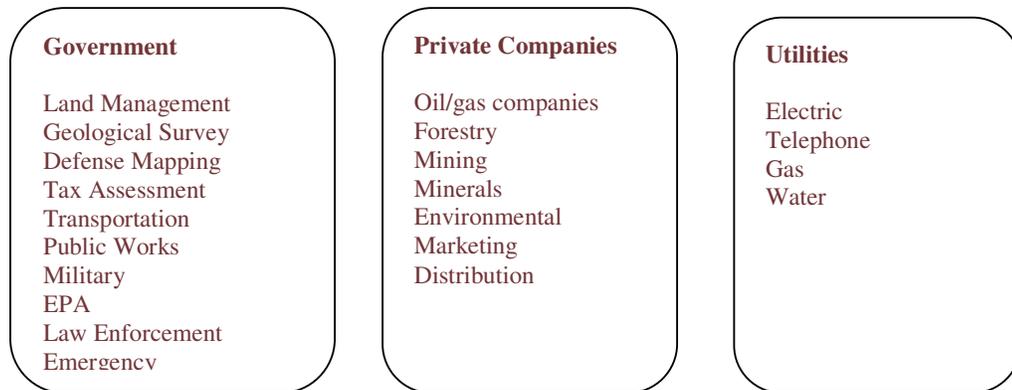


**Fig.2.2: Structure of a GIS. Source: Adapted from Malczewski, 1999 P. 17**

### 2.3.2 GIS Application in Land Use Planning

One of the major problems currently facing Zambian land use planners, is not only the acquisition, but analysis of up-to-date data, on which efficient administration of towns depends. As Estes and Senger puts it “present methods of data acquisition and analysis continues to be time consuming, costly and extremely inefficient.”

(Estes.J.E. and Senger.L.W. (ed) 1974 P. 225).Unfortunately the land use planning process in Zambia in general and Mpika town in particular is also beset by the same problems as alluded to by Estes and Senger. It is therefore envisaged that with the application of GIS technology, land use planning process and indeed the role of the community will be improved. Fig.2.3 depicts potential GIS users worldwide.



**Fig. 2.3 Potential GIS Users Worldwide. Source: Scholten and Stillwell, 1990. P.23**

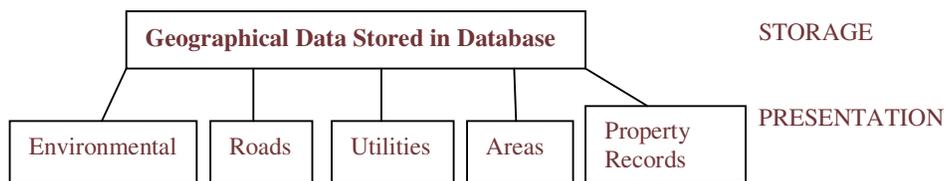
There are various other advantages in the utilization of GIS technology in land use planning process. For instance, “entering data in a GIS entails structured, standardized storage, which simplifies retrieval and collocation.” (Bernhardsen.T. 1992 P.269). On the other hand, “GIS technology has provided relatively instant access to the information via computer terminals which enable locational data to be displayed, and if necessary, updated directly on the screen.” (Jones.C.B. 1987, p.5). Table 2.3 shows GIS strengths in relation to the traditional land use planning process.

**Table 2.3 Comparison Between GIS and Traditional Approaches for Handling Spatial Data.**

GIS OPERATION	TRADITIONAL TASKS
<b>Data Input</b> -map digitizing/scanning -Data entry from keyboard	-Map drafting -writing/typing tables etc.
<b>Map editing</b> e.g. with digitizer	Erase/ redraw map features
<b>Map retrieval</b> from data base	Search in map archive
<b>Map aggregate</b>	Recompilation, usually involving scale change and generalization
<b>Map overlay</b>	Physical overlay of maps, and tracing of relevant combinations
<b>Data display</b> -Map display on monitor -Output tables -Production of charts, graphs	-Map reproduction -Data compilation, typing -Data compilation, hand drawing

**Source: Author. Field Data.2008. And an Adaptation From Belward and Valenzuela. 1991. P.492.**

And “compared to maps, GIS has the inherent advantage that data storage and data presentation are separate.” (Bernhardsen.T. 1992, P.2).It therefore makes it easier to present and view data in different ways. Fig. 2.4 depicts GIS based data storage and presentation.



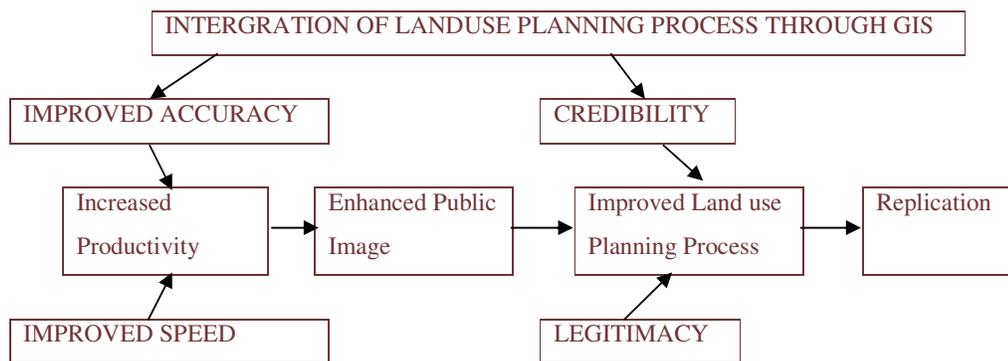
**Fig.2.4 GIS Data Storage and Presentation**

**Source : Adapted From Bernhardsen. T. 1992. P.2.**

In contrast, “a map provides a fixed, static picture of geography that is almost always a compromise between many different user needs.” (Jones.B. 1977, P.15).

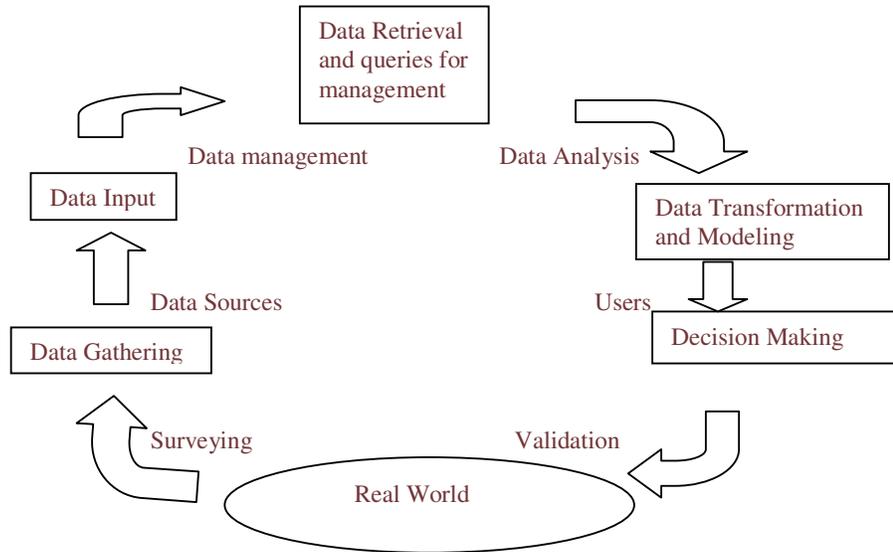
GIS can also “be used to assist in processing planning applications by displaying the site in context...determining automatically whether a particular location lies within the boundaries of zones subject to restrictions, and linking the map data to administrative details of the application.”(Jones.B. 1997, P.15). Planning permission, may then be considered on the basis of whether there are any encumbrances (e.g. on the basis of compatibility of land uses or not).

The other major attraction of GIS “lies in its ability to integrate different forms of geographical data and records, such as maps, data bases of property ownerships and aerial or remotely sensed data.” (The Forum.1991 P. 945). Figure 2.5 shows advantages of integration of land use planning process through GIS.



**Fig.2.5 : Application of GIS. Source: Adapted from the Forum. 1991. P.9**

A GIS also “represents the most effective mechanism of making use of data captured by remote sensing systems, and also enhances the effectiveness of this data capture operation through correlation of remote sensing input with data already stored in a GIS.” (Belward.A.S. and Velenzuela.C.R.1991 P.477). Fig.2.6 shows how GIS may be used as a management tool.



**Fig. 2.6 Geographical Information Systems as a Management Tool**

Source :Belward and Valenzuela. 1991. P.280.

Some scholars have on the other hand argued that despite the advancement and opportunities presented by GIS technology in land use planning process, it would never, for instance completely replace ground surveys. But instead, “it would appear that remote sensing could augment ground methods, thereby saving time and money.”( Estes.J.E. and Senger.L.W. (ed.). 1974 P. 234).

All in all, it cannot be overemphasized that “GIS is a revolutionally technology. It requires flexible flesh thinking and needs to be accompanied by a new generation of spatial analytical techniques, that can make best use of the new opportunities. Tired, old, worn out techniques have no place in this brave world.”

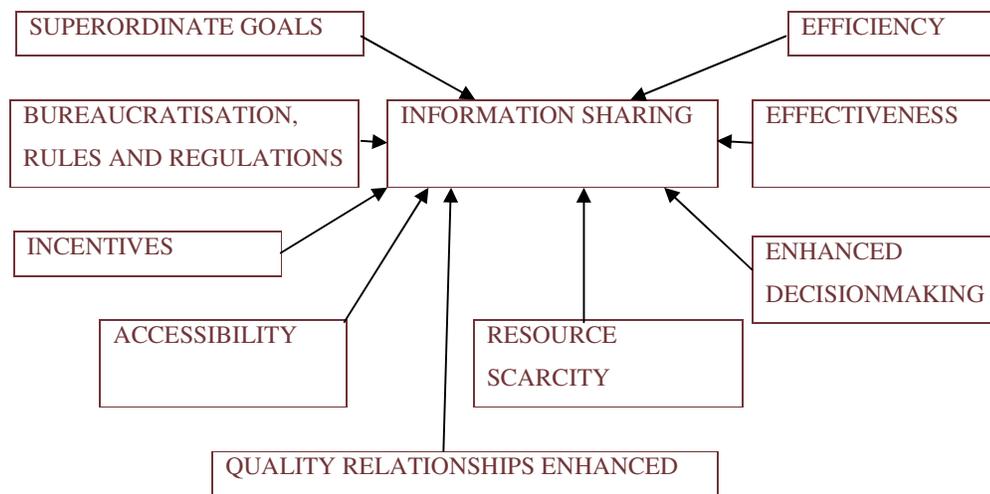
(Scholten.H.J.andStillwell.J.C.H. 1990 P.160).

### 2.3.3 GIS and Information Sharing

Application of GIS technology in land use planning process at world level has the desired effect of information sharing amongst stakeholders. Some of the major advantages with utilization of GIS, as Pratt states is that “with GIS, each organization can completely control access to its data, but maintain data in the form that can be shared.” (Pratt.M. (ed.) 2002 P. 10). In addition, “partnerships can add staff skills, technology, marketing skills and brand image. They can also lead to risk sharing.”

(Longley.A.P.(et.al), 2001. P.414). Collection of data at a single location as

envisaged in the application of GIS could also greatly reduce duplication of effort, and lead to integration of data from various sources. To reinforce this assertion, Obermeyer and Pinto (1994), alludes to the fact that “enhanced information sharing will lead to several desired actions that various organizations seek: efficiency, effectiveness and improved decision making ability.” (Obermeyer.N.J.andPinto.J. 1994 P.125). In the study area, land use planning information is currently shared manually between the local authority and the community through the District Development Coordinating Committee (DDCC) meetings. Information sharing could improve tremendously if GIS usage was adopted. Fig. 2.7 depicts the antecedents and consequences of information sharing.



**Fig. 2.7: Antecedents and Consequences of Information Sharing.**

**Source: Obermeyer and Pinto. 1994 P. 115**

For a GIS to be effective, “it must supply information that is rapid, comprehensive and accurate....the most important aspect of information provided by a system is its usefulness to its end users.” (Obermeyer.N.J. and Pinto.J. 1994 P. 36). However, “benefits can only be realized if funds are spent, policies changed and processes modified. GIS can be the catalyst for change.” (ESRI.2002. P. 10).

Other researchers have however argued that “when one considers the amount of data that a single floppy disk for a personal computer holds, the potential for storing (even smuggling) information becomes readily apparent” (Obermeyer.N.J. and Pinto.J. 1994 P. 191). Since GIS is applied in a value laden environment, value conflict will

also always remain, regardless of the amount of data gathered to resolve it. And in the context of this study where local authorities in general and Mpika District Council in particular, have been existing on the premise of labour intensiveness, workers may also feel threatened, as they may associate the introduction of GIS with the reduction in the labour force. Though of course “in many cases, the low salaries, and poor career prospects of local government make it difficult to attract or keep the appropriately qualified staff.” (UNHCS. 1998 P. 29).

The application of GIS technology in various fields/spheres in general and land use planning process in particular as Drury 1990 explains, will also require one to contend with among other factors the following manifestations of the law:

- Human rights
- Copy right and other intellectual property rights (IPR)
- Public access such as freedom of information legislation, which may delay the speedy and successful introduction and utilization of GIS technology as a land use planning tool.

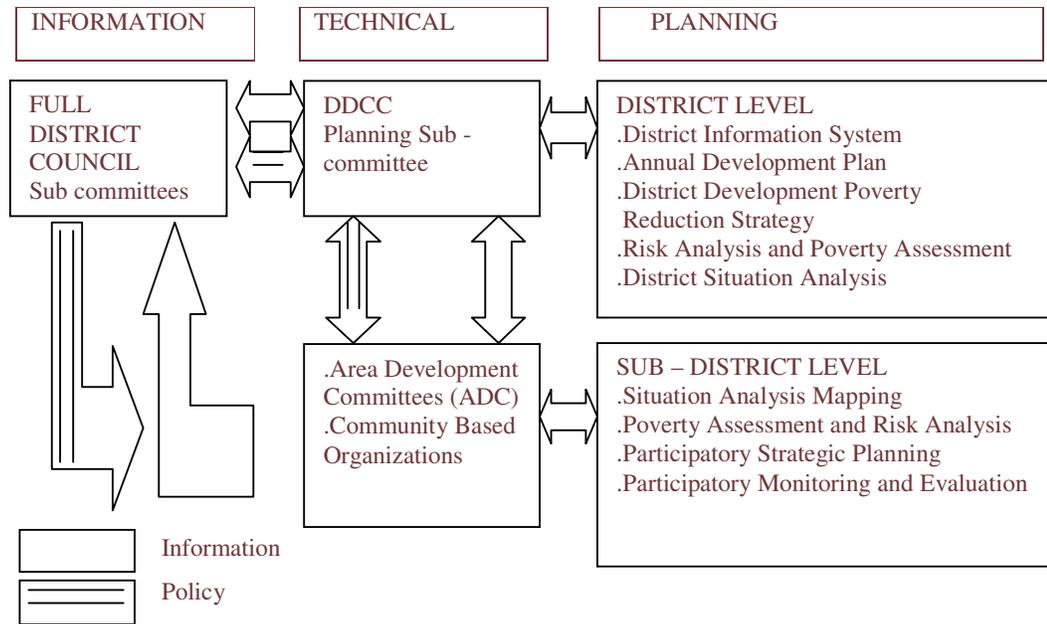
In addition, as Bernhardsen puts it, “GIS has enormous potential, but it can also be abused. Messages to be conveyed may be altered unintentionally through incompetence or intentionally through conscious misuse.” (Bernhardsen.T. 1992 P.17). For example due to the multiplicity usage of GIS, data from a military GIS data bank may be leaked knowingly or unknowingly into the public domain. This may pose a security risk both to the country as well as military personnel.

Despite the drawbacks, what cannot be disputed and should be appreciated however is that “GIS is used every day to help protect the environment, produce maps, inventory species, trace pollutants, protect habitats, and study vegetation. The environmental applications of GIS are almost limitless.” (ESRI. 2000, P..1).

#### **2.4 The Role of the Community in a GIS Based Land use Planning Process**

The role of the community in the introduction of new technology such as GIS, as a tool in land use planning process, deserves consideration. For instance, as De Zeeuw puts it, “needs analysis using GIS requires the participation of the local communities and is part of community based mapping.” (De Zeeuw.H. 2001, P. 28).

The planning process is a community targeted concept, and the introduction of GIS can play a critical role in its realization. Chuunga has accordingly argued that “it is now become a universal principal of administration and development that the more involved people become in an activity, the greater are the energies conducive to its success that can be realized.”(Chuunga.S.M.1968, P.27). Fig.2.8 depicts tools and processes of community participation in planning.



**Fig. 2.8 Tools and Processes of Community Participation in Planning.**

**Source : Adapted from Guidelines for District Planning for Development And Poverty Reduction. 2004. P.10**

Whilst Karl states that “collaborative and development planning process builds trust among the stake holders.” (Karl.K. 2003 P. 2). Other scholars have further argued that “people’s needs drive the planning process... at the out- set, the planner must find out about their needs and also the skills, labour and capital that they can contribute.” (FAO, 1989 P.9). Caldwell also states that “depending on the context, participation may involve detailed communication with a small number of people, or broad communication with many people.” (Caldwell. W. 1999, P. 4).

The above assertions are based on the premise that when people are involved in an activity from inception, and through all the processes, it inculcates in them a sense of

belonging/ownership. And this in the long run, assures sustainability. Community participation may broadly range from non-participation, to the actual sharing of the decision making process with policy makers. Table 2.4 illustrates different levels of community participation.

**Table2.4: Arnsteins Eight Rungs on the Ladder of Citizen Participation (Mitchell. 1979. P. 117).**

No.	RUNGS ON THE LADDER OF CITIZEN PARTICIPATION	NATURE OF INVOLVEMENT	DEGREE OF POWER SHARING
1	Manipulation	Rubber stamp committees	Non-participation
2	Therapy	Power holders educate or cure citizens	
3	Citizens rights and options are identified		
4	Consultation	Citizens are heard, but not necessarily heeded	Degree of tokenism
5	Placation	Advice is received from citizens but not acted upon.	
6	Partnership	Trade-offs are negotiated	
7	Delegated power	Citizens are given management power for selected or all parts of programmes	
8	Citizen control		

**Source: Mitchel. 1979. P.117.**

Overall, “planning must involve the public, and affected communities in decision making. This can help to develop consensus, and motivate community action.” [Caldwell.W.(ed.).1999. P.2].

## **2.5 Historical Background To Land use Planning in Zambia**

Available literature and interviews carried out with various stakeholders (such as Mr. A.D. Simwinga former Town Clerk for the City of Kitwe) at national, provincial and Mpika district and town levels revealed the following

### **Period Before 1964**

Before Zambia’s independence in 1964, the mode of planning was more biased towards physical planning. This was meant to accelerate urban development, which

was to assure the production of more goods that were mainly meant to satisfy the European market.

### **Period 1964 – 1980s**

Soon after the attainment of independence on October 24<sup>th</sup> 1964, the Zambian Government, embarked on economic reforms. The main focus of these reforms was to try and address the development imbalances that were existing in the country at that time. This was later followed by the First, Second, Third and Fourth National Development Plans. One distinct feature about these national plans was that they were regionally focused. In the ensuing years, the National Commission for Development Planning (NCDP) was set up. Its major thrust was to enhance regional planning.

During the early 1980s, there was more focus not only on decentralization, but on district based planning as well. The latter was mainly done by the council, through the departments of works/engineering. The main bottleneck was the inadequacy of qualified manpower at the council to monitor projects in liaison with donors. To pilot this new approach, a number of programmes were launched and implemented. A good example of such a programme was the Integrated Rural Development Programme (IRDP). This programme had worked on the premise that whilst the concerned districts initiated projects, and spearheaded their implementation, the donor(s) provided the funding and carried out monitoring of the said projects in liaison with district staff. Mpika, Serenje and Mkushi, are examples of districts that benefited from the British funded Integrated Rural Development Programme (IRDP).

### **Period 1991 – 2000**

In 1991, the system of local government was changed. It reverted to the post-independence local government system of administration, where Mayors and Town Clerks were re-introduced. The change was to give Council Management an opportunity to provide services. This came into effect when the Local Government Act No. 22 of 1991 was passed by Parliament. With the introduction of multi-party democracy, from one-party state, the following changes were made:-

The Town Clerk or District Council Secretary coordinated sector Ministry activities, an administrative arrangement introduced in 1995. The Council remained body corporate, and operated independently from district administration.

In 1995, the government introduced the National, Provincial, and District Development Coordinating Committees (NDCC, PDCC and DDCC) to coordinate activities at respective levels.

The major experiences under this phase included the following:-

- Centralization of authority continued to be a major bottleneck, for effective decision making at lower levels. For example, provincial heads of departments were controlled from the centre, and their budgetary allocations determined from there.
- The DDCC, chaired by the Town Clerk/Council Secretary, did not perform to government's satisfaction. The major reasons for this scenario were the lack of legal framework to back the operations of the DDCC, as well as the lack of involvement of communities in development programmes.

Among the major decentralization policy objectives were:

- Design and implement mechanisms to ensure a "bottom-up" flow of integrated development planning and budgeting, from the district to the central government.
- Develop the capacity of Council's and committees in development planning, financing, coordinating and managing the delivery of services in their areas.
- Introduce an integrated budget for district development and management.
- Provide a legal and institutional framework to promote authority in decision making at local level.

#### **Period 2000 to 2007**

- The launch of the decentralization policy in 2004, as a way of providing a planning legal framework. This was hoped to kick-start the desired process of bottom-up planning.
- Employment of professional District Planning Officers (DPOs) by majority of districts in Zambia. These were meant to guide and coordinate planning at

district level, through the DDCC. The DPO served as secretariat to the DDCC.

- Proposed provision of a legal framework for the DDCC in order to enhance its work.
- Government started supporting community based programs, through the provision of the Constituency Development Funds (CDF).
- Central government showed willingness to embrace basket funding at district level. This had the desired effects of not only supporting planning at local level, but also local initiative.

## **2.6 Types of Plans and Levels of Land use Planning in Zambia**

There are currently five (5) types of plans and levels of land use planning in Zambia. These plans deal with development in general, and land use in particular. These are:

### **The National Development Plan**

It deals with development planning issues at national level. Whilst some data in the formulation of these plans comes from central government, most of it is derived from the nine (9) provinces of the country. The National Development Coordinating Committee (NDCC) coordinates the activities. Activities covered under these plans involves planned national economic activities such as infrastructure development.

### **The Provincial Development Plan**

Data for the formulation of this plan is derived from districts in a particular province. The Provincial Development Coordinating Committee (PDCC) coordinates government funded district capital projects, such as road maintenance. These plans consolidate the district socio-economic activities such as road maintenance and health services provision.

### **The District Development Plan**

Data for this plan is derived from the different sectors in a district. These activities are coordinated by the District Development Coordinating Committee (DDCC). Activities such as land use and new investments in the district are carried out here.

### **The Sector Plan**

Data is derived from activities within a particular sector in a district. For example, data may be received from the agricultural, health and educational sectors. Examples of data being referred to, is data on agricultural land use, prevalent diseases and mitigation measures, as well as location and number of schools respectively. Coordination of these activities is done by the relevant sectors in the district.

### **The Action Plan**

This plan deals with an issue- specific activity within a sector. For example, capacity building of extension workers in the agricultural sector. Coordination of activities is done by the relevant sector.

## **2.7 Legal Framework for Land use Planning in Zambia**

The legal framework discusses the relevant pieces of legislation that regulate land use in Zambia in general, and land use planning process in particular. These include the following:-

### **2.7.1 The Town and Country Planning Act CAP 283**

This is an Act which may be cited as the Town and Country Planning (Amendment) Act 1997, which commenced in 1998. It came about as a result of the amendment of the Town and Country Planning Act, Cap 475 (1960).

It is the principal Act with regard to land use planning. This is an Act that among others, provides for the appointment of planning authorities, preparation, approval, revocation, or modification of structural and regional plans, and for matters connected with or incidental to the foregoing. For instance, Second Schedule (Part IV), which deals with land use, provides for the control of the use and change of use of land zones and reservations for various purposes, including residential, commercial, industrial and other special uses. It also provides for restriction of land usage on the grounds that the land is physically unsuitable for building or the development would be prejudicial to natural resources, or to public health.

Currently, the Town and Country Planning Act is under review. This is being done in order to harmonize this law with the Statutory Housing and Improvement Areas Act.

Certain provisions of the Statutory Housing and Improvement Areas Act, are in conflict with some provisions of the Town and Country Planning Act (e.g. on the issue of plot boundaries).

### **2.7.2 The Lands Act CAP 184**

This is an Act to provide for the continuation of lease hold and leasehold tenure, continued vesting of land in the president, provide for statutory tenure, and for the conversion of customary tenure into lease hold. It is also responsible for the establishment of a Land Development Fund (LDF), and Lands Tribunal. This is an important act because all spatial and physical planning are connected to, or incidental to land. It also deals not only with land use planning, but also alienation of the said land.

### **2.7.3 The Public Health Act, CAP 295**

This is an Act to provide for the prevention, and suppression of diseases, and generally to regulate all matters connected with public health in Zambia.

In relation to the planning process, Part IX section 66 of this Act, empowers local authorities to take all lawful, necessary and reasonably practicable measures for preventing or causing to be prevented or remedied all conditions liable to be injurious or dangerous to health, arising from the erection or occupation of unhealthy dwellings or premises...or the erection of dwellings or premises on unhealthy sites or on sites of insufficient extent. It therefore basically controls/regulates permissible land use activities or structures with regard to public health. It further empowers the local authority to take proceedings under the law or rules in force in its district, against any person causing or responsible for the continuance of any such condition.

### **2.7.4 Environmental Protection and Pollution Control Act (EPPCA) CAP 204**

This Act is an all- embracing environmental law for the whole country. It provides for the protection of the environment and the control of pollution, to establish the Environmental Council, and to prescribe the functions and powers of the Council and to provide for any other matters connected with or incidental to the foregoing.

The EPPCA is administered by the Environmental Council of Zambia (ECZ), and functions as a coordination and advisory body between ministries on the various

issues concerning the environment. The ECZ was established to execute the provisions of the EPPCA. It may therefore be viewed as a monitoring, coordinating, and regulatory body on environmental issues in Zambia.

From the land use planning point of view, Part II Section 6(j) of this Act, provides for the identification of projects or types of projects, plans and policies for which environmental impact assessment are necessary, and undertake or request others to undertake such assessments for consideration by the Council. Part X Section 76 (a) and (b), provides for conducting or sponsoring research on land use, as well as the establishment and review of land use guidelines respectively.

#### **2.7.5 The Local Government Act CAP 281**

This Act among other functions provides for the establishment and definition of local administration system, and for matters connected with, or incidental to the foregoing. Under the Act, the Minister of Local Government and Housing may establish a City, Municipal, District, Township Councils or Management Board. Section 61 of the Local Government Act lists 63 functions of Local Authorities, whose details are given in the second schedule of the Act. Additional functions of Local Authorities are listed in Cabinet Office circulars, such as the No. 1 of 1965 and No. 10 of 2002.

One major function of the Local Government Act, as relates to the land use planning process, appears under the Second Schedule (Section 61), sub section 29. This clause stipulates the prohibition and control of development, and use of land and buildings and the erection of buildings in the interests of public health, public safety, and the proper and orderly development of the area of the council. These provisions are also covered under the Public Health Act, Part IX, Section 66.

#### **2.7.6 The Statutory Housing and Improvement Areas Act CAP 194**

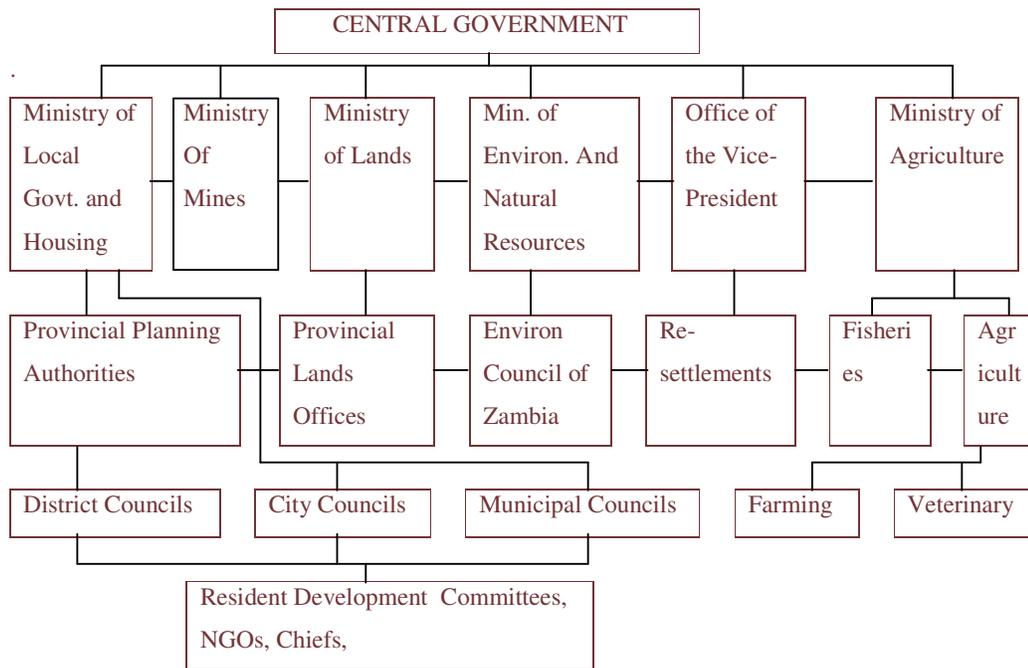
The statutory Housing and Improvement Areas Act, Cap 194, was enacted especially to deal with unplanned areas, commonly referred to as squatter settlements. It represents perhaps the most comprehensive attempt so far to enact a legal framework for regularization. One distinct feature is that whilst land use plans for statutory housing areas contain clearly defined plot boundaries, statutory improvement areas land use plans show the location of buildings, and not plot boundaries.

### 2.7.7 The Agricultural Land Act CAP 187

This is an Act to provide for the establishment of Agricultural Lands Board, to prescribe its composition, membership, powers and functions to provide for tenant farming schemes and to provide for matters incidental to, or connected with the foregoing. This is an important Act as regards land use planning process, especially its provisions under Part III, Section 13, sub sections (1) and (5), concerning alienation of agricultural land.

### 2.8 Institutional Framework of Land use Planning in Zambia

In discussing institutional framework of land use planning process, it is important to note that the “Zambian planning system is...characterized by a multiplicity of actors.”(MLGH P.3). Attention will therefore be drawn to the main actors, in terms of who does what, how it is done, the outputs as well as the major challenges faced by the institution or actor. Figure 2.9 shows summary of the main actors and linkages in the current land use planning process.



**Fig. 2.9: Summary of Main Actors and Linkages in Current Land use Planning Process.**

Source: Author, 2008

### **2.8.1 Central Government**

Central Government is the key player in the land use planning process in Zambia. It does this through relevant government ministries and departments. These are:

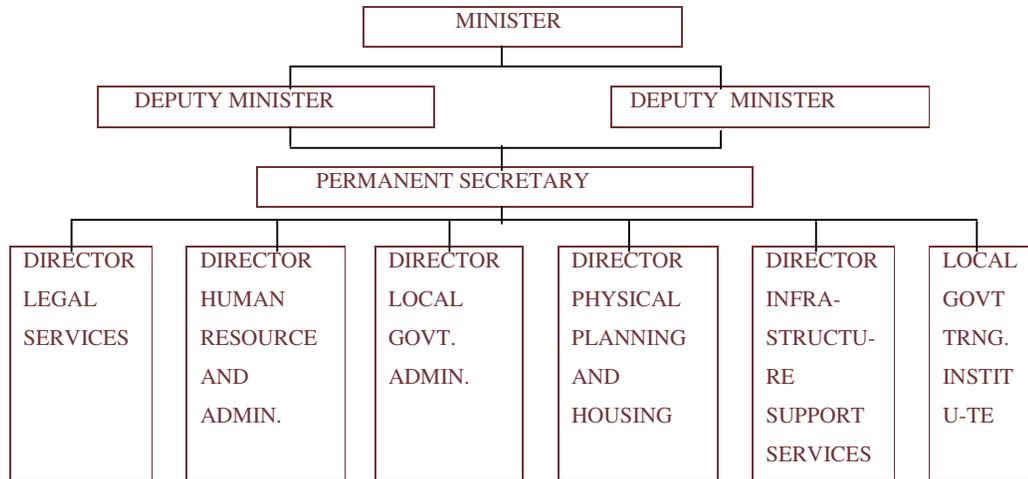
#### **Ministry of Local Government and Housing**

Government discharges the planning function, mainly through the Ministry of Local Government and Housing. The Minister of Local Government and Housing is responsible for the administration of the Town and Country Planning Act, Cap 283, of the Laws of Zambia. The Minister of Local Government and Housing initiates the process of the development of a structural plan. This is in line with the powers conferred on the Minister through the provisions of the Town and Country Planning Act, Cap 283. A Planning Authority however, may in certain cases initiate the planning process.

The Minister has delegated certain functions to Statutory Planning Authorities. The functions relate to the control of development and subdivision of land. All the planning authorities are responsible to the Minister for the following functions, among others:-

- Preparation of Development and layout plans
- Revocation or modification of Development and layout plans
- Granting of planning permission
- Enforcement of planning control
- Payment of compensation relating to planning decisions.

It is this Ministry, through the Department of Physical Planning and Housing, which administers the land use planning process, in line with the provisions of the Town and Country Planning Act. The Minister of Local Government and Housing delegates some of these functions to Provincial Planning Authorities, as well as Local Planning Authorities. Major outputs include among others, district, provincial and national development plans. Fig.2.10 shows organization structure of Ministry of Local Government and Housing.



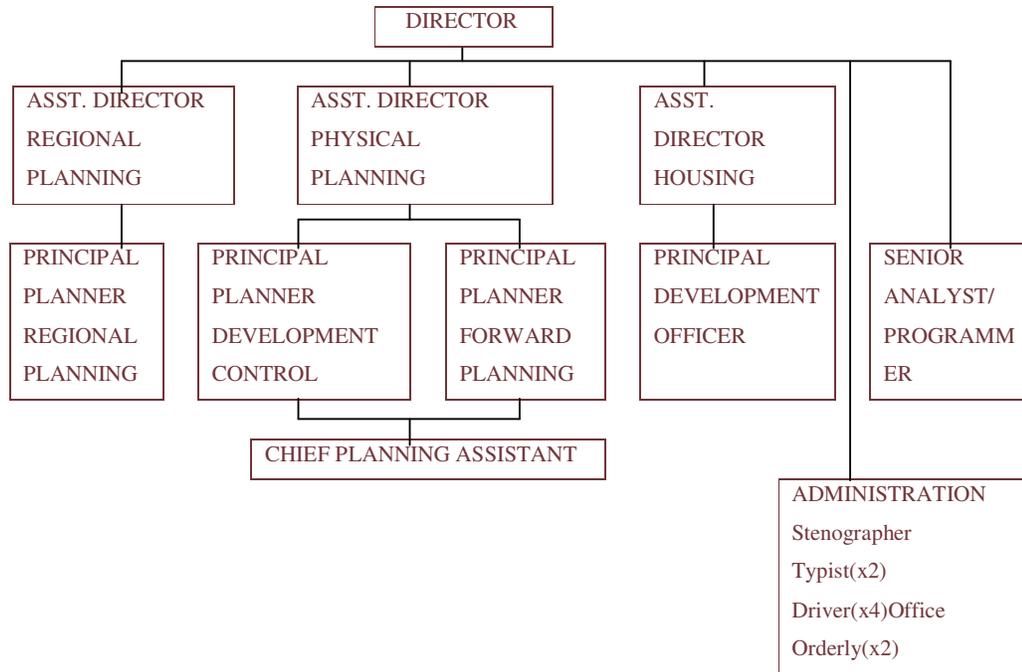
**Fig. 2.10: Organization Structure of the Ministry of Local Government and Housing**

Source: Ministry of Local Government and Housing. 2008.

Challenges faced by the Ministry of Local Government and Housing include inadequate qualified manpower, coupled with inadequate equipment and dilapidated infrastructure. The following planning actors fall under the Ministry of Local Government and Housing :

### **Department of Physical Planning and Housing**

The organization structure of the Department of Physical Planning and Housing (DPPH) is shown in Fig.2.11



**Fig. 2.11: Organization Structure of Department of Physical Planning and Housing.**  
**Source: Ministry of Local Government and Housing, 2008.**

The initiation process of the development of structural plan by the Minister of Local Government and Housing, through the Department of Physical Planning and Housing may arise as a result of a need for orderliness in land use development. There may also be need for the provision of basic social services to residents, such as health, education and shelter. The “need” serves as a driving force in the initiation of the planning process.

After the Minister gives consent, drafting of a development plan then commences. This exercise takes into account all the socio-economic, and physical aspects of a particular region. Development plans are one of the major outputs of the Department of Physical Planning and Housing.

Public review of a proposed plan takes place after an advertisement is placed in national paper(s) inviting comments from members of the public. Comments concerning a proposed development plan are sent to the Minister, with a copy to the relevant planning authority.

In accordance with part IV, section 21 of the Town and Country Planning Act, the Minister of Local Government and Housing will notify the relevant Planning Authority of approval of the proposed structural plan. This may be done with or without modifications. In the event that the Minister rejects approval of the proposed structural plan, reasons for such a rejection will be given. For the structural plan to be approved, the Minister considers the fulfillment of certain planning factors and standards. These include:-

- whether the plan has met minimum planning standards
- whether the plan has provided for basic needs of the residents such as: sites for churches, police post, community centre (s), schools and a properly designed road network

The Minister, still has the powers to instruct a planning authority to re-advertise the proposed structural plan. This is done in order to give members of the public more time to make submissions, whether for or against the proposed structural plan. This may happen for instance, when in the Minister's view, there has not been enough representations from members of the public.

The implementation of an approved structural plan must always ensure adherence to planning standards and regulations. The Ministry of Local Government and Housing, through the Department of Physical Planning and Housing, is also involved in the monitoring and evaluation of structural plans for the various cities, municipalities and district councils in the country. Its involvement is through the Provincial Planning Authorities.

Part III section 18 (i) of the Town and Country Planning Act provides for the review of a structural plan. This is supposed to be done every after five (5) years, after the date of approval of the said plan. The review which can either be initiated by the Minister of Local Government and Housing, or a relevant planning authority, is done in order to ensure that the implementation of an approved structural plan continues to be relevant, in line with standards and provisions, for which it was set to achieve.

Major challenges faced by the Department of Physical Planning and Housing includes inadequate manpower to monitor planning and development control in all parts of the country, coupled with inadequate transport.

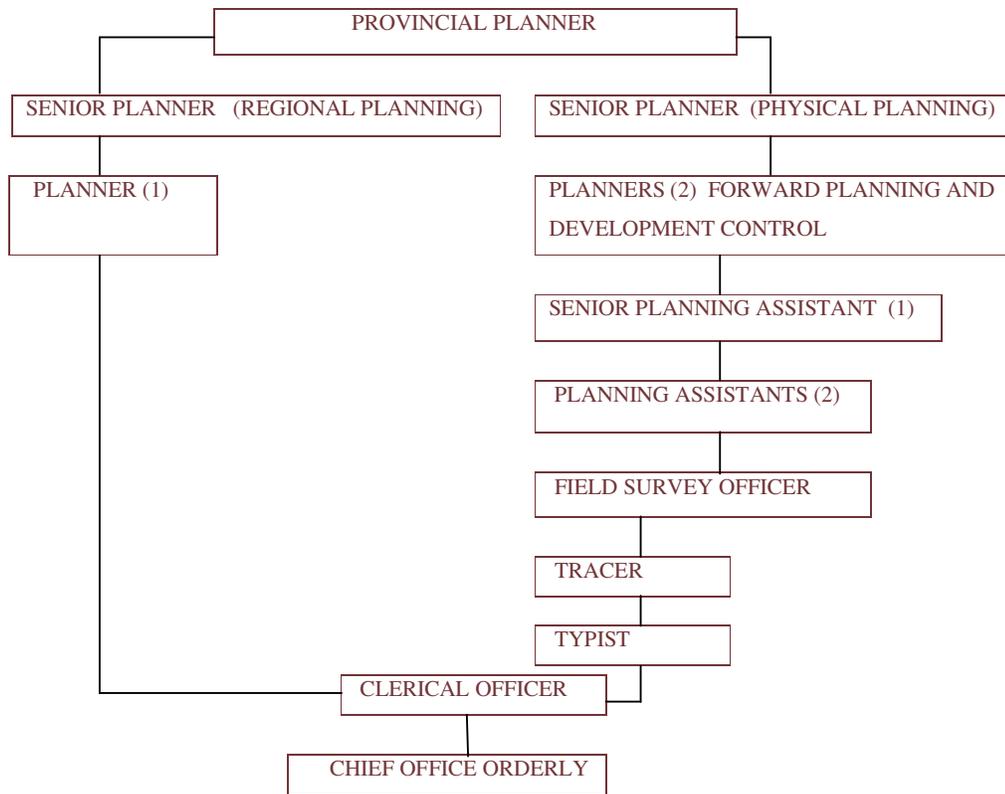
### **Provincial Planning Authorities**

Provincial Planning Authorities (PPA) are statutory bodies empowered by law to implement the provisions of the Town and Country Planning Act. They perform this function through delegated powers from the Ministry of Local Government and Housing. The main functions of PPAs in Zambia are to provide and implement a planning framework, to control development and the sub-division of land in line with the Town and Country Planning Act.

### **Northern Province Planning Authority (NPPA).**

The Northern Province Planning Authority (NPPA) is a statutory body which is guided and regulated by the Town and Country Planning Act, Cap 283 of the laws of Zambia. It performs this function through delegated powers from the Ministry of Local Government and Housing. Apart from other duties, the NPPA performs the function of planning for districts in its area of jurisdiction, which are not planning authorities. This includes Mpika, the study area.

The NPPA is composed of the Chairperson (who is the Provincial Permanent Secretary), and other appointed members. The Provincial Planning Officer is the Chief Executive of the NPPA. The Provincial Planning Authority is comprised of Physical Planning and Regional Planning. The former serves as secretariat to the NPPA. (Fig. 2.12 shows the organization structure of the Northern Province Planning Authority).



**Fig. 2.12: Organization Structure of Northern Province Planning Authority**

Source : Northern Province Planning Authority, 2008.

### **Objectives of the NPPA**

The main objective of the NPPA is to provide and implement a planning framework to control development, and the sub-division of land. This is done in line with the provisions of the Town and Country Planning Act, Cap 283, as well as other relevant pieces of legislation, such as the Public Health Act and the Local Government Act.

The NPPA covers ten (10) districts, namely; Mpika, Chinsali, Isoka, Nakonde, Mpulungu, Kaputa, Mporokoso, Chilubi Island, Mungwi and Luwingu. The other two (2) remaining districts in the province i.e. Kasama and Mbala, fall under the jurisdictions of the Kasama and Mbala Municipal Councils' planning authorities respectively.

Nine (9) out of the ten (10) districts have no development/structural plans, but only layout plans. Kasama, is the exception. Worse still, Nakonde does not currently have a layout plan. The main reason being that it does not yet have a gazetted boundary.

### **Land use Planning Process by the NPPA**

The NPPA undertakes planning and development control functions delegated to it by the Minister of Local Government and Housing. It does this through;

- Preparation of structural and regional plans, as well as district layout plans in its area of jurisdiction. This is done in order to guide development.
- Consideration of applications for planning permission, to develop and sub-divide land. This ensures development control.
- Recommendation of applications for change of land use/re-zoning to the Ministry of Local Government and Housing for consideration.
- Consideration of any other planning matters originating from districts under its jurisdiction, or other times, by the Minister of Local Government and Housing.

With the current arrangement the planning process is initiated in two (2) ways;-

- The district may initiate the process. This is important because the district is the source of the need.
- The Provincial Planning Authority may also initiate the process. This is of course done in liaison with the relevant district.

The duration for initiation of the planning process is normally a minimum of one (1) month. It is determinant on type of work to be done, the number and type of personnel to be involved as well as availability of transport. In order to expedite the collection of data from districts, the NPPA at times utilizes services of a surveyor from the Resettlement Unit, at Provincial Level.

Approval of layout and building plans from districts that fall under the NPPA is done during its scheduled meetings. The NPPA may meet as often as need arises, but at intervals of not more than three months (90 days). Members of the public may attend

meetings of the authority, but are not allowed to take part in any proceedings. The minutes of the meeting always indicates the name of the Authority, venue of the meeting as well as date and time when the meeting took place.

The NPPA scrutinizes all applications submitted to it. The following decisions can be made: approval; approval with conditions; deferment or refusal of application. The applicant is then informed through a notification of approval or refusal. Major factors that determine granting of planning permission by the NPPA are :

- Zoning – compatibility of the proposed development to the land use zoning of the area in question.
- Provision of basic services –such as schools, clinics, hospitals, or playing fields, i.e. if the matter under consideration is the approval of a layout plan for a particular district.
- Environmental issues (e.g. the impact of the proposed development on the environment – both immediate and outlying), are taken into consideration as well.

The only major problem is that sittings are few (held quarterly), resulting in delayed decisions making process.

Preparation of detailed layout plans begins with respective district councils identifying land. Then surveyors from the NPPA go to take measurements and do perimeter survey(s). The NPPA then prepares layout plans, which are later sent to the respective Council(s), who in turn forward the same to the Commissioner of Lands for numbering. After numbering has taken place, layout plans are then taken back to respective Councils. District Councils then proceed to advertise the numbered plots, conduct interviews of the applicants and then recommend three (3) applicants per plot to the Commissioner of Lands. The Commissioner of Lands office finally allocates these plots to deserving applicants. The major considerations taken into account by the Commissioner Lands when allocating these plots are the nationality and capacity of the applicant to develop land. The entire process takes between 6-12 months.

Successful applicants then proceed to submit their proposed building plans directly to the NPPA, or through the District Councils, who in turn forward the same to the NPPA for consideration, and eventual approval. The entire process takes between 4 to 6 months. In order to ensure compliance, the NPPA monitors constructions taking place in the various districts under its jurisdiction. Relevant district Councils normally do this work on behalf of the NPPA, and the offenders for non-compliance are sanctioned accordingly.

After a layout plan has been done and is being implemented either the NPPA or the District Council may initiate the process of the review of an approved layout plan. A review process is done, in order to ensure that whatever developments that are taking place are in line with the provisions of the Town and Country Planning Act, as well as other relevant pieces of legislation. It is also important to note that the NPPA has never sanctioned any district council in the province, for non-compliance to the provisions of an approved layout plan.

The NPPA conducts monitoring and evaluation, but most of the times, it relies heavily on district Councils to perform this function. The frequency of district monitoring and evaluation is normally once per month. But at times, it takes the NPPA between three (3) to six (6) months to conduct monitoring and evaluation in a particular district. Frequency of monitoring and evaluation by the NPPA, is normally determined by the amount of activities taking place in a particular district.

Inadequate manpower has been the biggest challenge for the NPPA, coupled with inadequate transport, office equipment and furniture, as well as Geographical Information System (GIS) hard and soft ware, which though already purchased is not yet installed.

Main outputs from the Northern Province Planning Authority are layout plans for districts that are not planning authorities, and which fall under its jurisdiction, including Mpika.

## **Local Authorities**

The Local Government Act, Cap 281 of the laws of Zambia, provides for among others, the establishment of Councils, their constitution, finance and functions. Local authorities are involved in initiation of the planning process, in liaison with local planning structures such as RDCs and the DDCC.

Local authorities which are planning authorities do their own planning, in consultation with the Minister of Local Government and Housing, whilst those that are not planning authorities e.g. the study area, are planned for by relevant Provincial Planning Authorities. Outputs from local authorities that are planning authorities are relevant layout plans e.g. those to do with creation of plots in line with the zoning of a particular area.

With regard to major challenges, the capacity by local authorities in general and Mpika District Council in particular has been adversely affected by government policies. These stretch as far back as the 1970's. Some of the problems that were alluded to during my interviews at the Ministry of Local Government and Housing, Mpika District Council, as well as with Mr. A.D. Simwinga (the Town Clerk for Kitwe City Council, and the longest serving town clerk in Zambia), in a brief historical perspective, include:-

### **1960 – 1972**

This period may be viewed as the most successful in Local Government in Zambia. It was during this period that grants were disbursed to Councils, on the basis of a predetermined formula. The Council also managed/controlled electricity supply.

### **1973 – 1980**

Service delivery started declining in this period as local authorities income bases started to deteriorate due to:

- Withdrawal of housing unit grant by Government.
- The Rent (amendment) Act No. 12 of 1974, requiring Councils to give at least three (3) months notice to the tenants, before any evictions could be effected.

- The watershed speech of 1975, which removed value on land, rendering it not ratable. Property was still ratable.
- The transfer of the electricity undertaking to Zamia Electricity Supply Corporation (ZESCO).

### **1981 – 1990**

The introduction of the One-Party participatory system under the Local Administration Act, 1980 which saw the introduction of Governors in lieu of elected mayors. This period brought its own problems which included:-

- The political structures in the Councils were strengthened, whilst weakening the administrative structures
- Local Authorities became employment agencies.
- Council employees awarded hefty housing allowances, at the expense of service delivery.
- Councils embarked on additional and usually unprofitable commercial ventures, such as running of farms and buses. Though the principle was alright, there was however too much mismanagement, making the success of such ventures a pipe dream.
- Introduction of the One Party State System, left no room for divergent views from those of the ruling party.

### **1991 – 2001**

This period saw the advent of the Third Republic. During this period, a number of pieces of legislation and policies, which clearly were detrimental to the operations of the Councils, were passed. These included among others:-

- Local Authorities Superannuation Fund Amendment No. 27 of 1992 Act, which made it mandatory for Council employees who had served for 22 years or more in the service of Local Authorities to retire. Central Government gave the responsibility of payment of retirees to Councils, without any back up for funds. By the time this piece of legislation was repealed in 2000, a lot of damage had already been done, and the impact is still being felt to-date. For instance, a lot of qualified and experienced staff was lost in the process.

- The transfer of the motor vehicle licensing function to the Road Traffic Commission (RTC), which is now the Road Traffic and Safety Agency (RTSA), from local authorities in 1994. Meanwhile, responsibility of maintenance of roads was left with the Councils.
- In 1996, the sale of Council housing units to sitting tenants at give- away prices, robbed Councils of one of their major sources of revenue, in form of rentals.
- The Rating Act No. 12 of 1997 which made wholesale exemptions of the properties from rates, resulting in a considerable drop of revenue coming to Councils.
- The transfer of water undertakings from Councils to the commercial utilities on the 2<sup>nd</sup> May, 2000. This law transferred all the assets to the commercial utilities, whilst leaving all liabilities with Councils.
- The imposition of 50% salary increases by Government in November 2001, just before the 2001 general elections. This was for all Council unionized workers, and were back dated to September 2001, without matching budgetary provisions. Most Council to date, have been struggling to implement these salary increases, and those that did implement them fell into arrears.
- The delays or non- release of the decentralization policy, which is very critical in giving direction to the Local Government sector, and for the attraction of donor support.

All the above factors, among others, have impacted negatively on the performance of Councils in general and Mpika District Council in particular.

### **Ministry of Environment and Natural Resources**

The Environmental Council of Zambia (ECZ), which falls under the Ministry of Environmental and Natural Resources (MENR), is a body corporate, established in 1990, as provided for in the Environmental Protection and Pollution Control Act (EPPCA) of 1990. It handles land use planning matters, especially those to do with environmental impact assessment. The ECZ may delegate all or any of its duties to a local authority, as may be necessary in accordance with section 82 of the EPPCA.

One of the major functions of the ECZ as regards land use planning process, is the conducting of Environmental Impact Assessments (EIA's). Consequently, one of its major outputs are environmental assessment reports. Its major challenge has been inadequate manpower and infrastructure. This has made it difficult for its presence to be felt countrywide.

### **Ministry of Tourism**

Plans and grants planning permission in game management areas and reserves as well as national parks.

Outputs include: number of hunting licences issued, data on number and location of game parks and reserves as well as types of animal species found.

Challenges faced by this Ministry include inadequate manpower (e.g. game guards and rangers) and inadequate transport, as well as competition from private game ranches.

### **Ministry of Lands**

The Ministry of Lands handles land use and land alienation matters in liaison with local planning authorities. It is represented in each province by Provincial Lands Offices.

Outputs from Ministry of Lands includes among others, production of lay out plans, issuance of letters of offer for state land as well as issuance of title deeds. Challenges include inadequate personnel coupled with inadequate transport.

### **Ministry of Agriculture**

The Ministry has two main branches namely fisheries and agriculture, the latter comprising farming and veterinary components. A land use branch of the Ministry deals with agricultural land use planning.

Main outputs from this ministry includes agricultural land use maps, suitability maps, rainfall and temperature pattern maps, prevalent area animal disease maps. Its major

challenges include inadequate manpower and equipment, inadequate support from central government, inadequate office accommodation and training facilities.

### **Ministry of Health**

From the land use planning point of view, the Ministry of Health is involved in issuance of building permits and establishment of cemeteries, in liaison with local authorities. This is done through health personnel representatives in local authorities.

Outputs include erection of infrastructure by developers that meets public health standards. Challenges include inadequate manpower and equipment, and the fact that health personnel are not adequately represented in all parts of the country.

### **Ministry of Mines**

This Ministry is responsible for issuance of mining rights and licences. This is done through the Ministry of Mines Head Quarters.

Outputs includes among others, issuance of certificates for mining rights and licences. One of the major challenges faced by the Ministry of Mines is inadequate personnel to monitor illegal mining, especially for building sand and quarrying.

### **Office of the Vice- President**

The Office of the Vice- President is involved in land use planning through the Department of Re-settlements. In liaison with local planning authorities, the Department of Re-settlements is involved in planning for land meant for re-settlements. Some of its major challenges are inadequate manpower and transport.

Apart from government ministries and departments, other players in the current Zambian land use planning process include:

### **2.8.2. Chiefs**

Chiefs grant planning permission for land in their chiefdoms, in liaison with local district councils. Among the outputs include the making available of traditional land for development. The fact that chiefs by law are only allowed to make land for development measuring in extent of 250ha.(maximum) poses as a challenge, as they

cannot cater for bigger investors. Worse still some of the land allocated by chiefs is already occupied by their subjects, leading to evictions.

### **2.8.3 Resident Development Committees (RDC's)**

RDC's are involved in initiation of planning process in liaison with area councillors, and local authorities. Outputs include orderly development in areas where RDC's are actively involved. This is because their participation inculcates in them a sense of ownership of the planning process. Major challenge of RDC's is the fact that they are not a legal entity. Consequently, there is no legal recourse in the event that their activities are overlooked or challenged by either the area councillor, or the local authority.

### **2.8.4 Non- Governmental Organisations (NGOs)**

An example of an NGO involved in influencing land administration in Zambia is the **Zambia Land Alliance (ZLA)**. One of its functions is to lobby policy makers to ensure a fair and equitable access to land by all Zambians. However, by virtue of its status (NGO), it is quite a challenge for it to influence government policy on land administration.

## **2.9 Summary of Major Problems in Land use Planning in Zambia.**

Major problems affecting land use planning in Zambia in general, and Mpika Town in Particular, include the following

- Though most of the towns in Zambia are planned, the majority of them are still using outdated plans that have never been reviewed. "The lack of updated plans has resulted in uncoordinated and dis-orderly development, and contributes to the establishment of un-planned settlements." (ECZ.2008. P.xxv). This situation can be attributed mainly to scaled-down allocation of financial resources from central Government to fund district plans and programmes. Other towns (for instance, the study area), are planned for by Provincial Planning Authorities. This arrangement, however, comes with several of its attendant problems, such as delayed decision making process.
- The fragmented nature of the relevant pieces of legislation, where there are seven (7) different pieces of legislation, and all having provisions on land use planning has contributed to the problem in land use planning. These

provisions need to be reconciled, so that even implementers speak with one voice. The large number of players, has in turn led to lack of clarity, with regard to the institutional arrangements and functions. This has contributed to among other problems, the duplication of efforts and at worst, has led to haphazard development taking place.

- Currently, most local authorities in general and Mpika District Council in particular, are still using ground surveys as the main method of land use planning and in the identification of new areas. Apart from being cumbersome, this method is too time consuming and hence costly.
- Due to over reliance on the top-down rather than bottom-up approach to land use planning in the study area, the role of the community is also not well defined. In the context of this study, community refers to the residents of Mpika.
- Other major problems cited as specifically affecting the current land use planning process in the study area, included the weak legal and institutional framework, hence planning process being done at provincial level, inappropriate land use planning tools in use, inadequate effective public participation as well as scaled down central government funding (through grants and other incentives) for district plans and programmes. This to large extent, reduces the effective participation of both the community and district staff in land use planning process

Possible solutions cited in order of importance were: land use planning to be done at district level, utilization of new technology such as computers, increased funding to council, community participation and stakeholder coordination, as well as reconciliation of relevant pieces of legislation.

As a way forward, government has also so far made some tangible decisions, which are aimed at revitalizing Local Government in Zambia. These include:-

- Launch of the Decentralization Policy in 2004 by the late president, Dr. Levy P. Mwanawasa.
- Reverting of bus stops and markets to Councils.

- Banning of political parties and other associations, from collecting levies in markets and bus stops and stations.

## **CHAPTER 3: RESEARCH RESULTS AND DISCUSSION**

### **3.1 Introduction**

This chapter focuses on research results, and a discussion of the said results. It further offers a critique of the legal, institutional and technical frameworks in relation to land use planning process. The chapter further considers the design of a proposed integrated district land use planning process, before discussing steps in the proposed planning process, the expected outputs, proposed roles and functions to be played by various stakeholders, as well as benefits of the proposed ILUPP.

### **3.2 Research Results**

This section discusses research results in the context of research objectives by considering the generation, collection, analysis, management, usage, as well as the sharing of data in the study area. This is in order to assess viability of introducing a GIS based integrated district land use planning process in the study area.

Under listed were the research objectives considered in the study

- To examine the current process of land use planning in the study area.
- To assess the possible application of a GIS and Remote Sensing technologies based integrated district land use planning process in the study area.
- To develop a proposed GIS based integrated district land use planning process in the study area.

The first objective was aimed at examining the current land use planning process in the study area. This involved examining the institutional and legal frameworks of the current process. The second objective considered the proposed possible introduction and application of a GIS based integrated district land use planning process in the study area. This involved examining the current planning process in relation to the proposed application of GIS technology. Whilst the last objective was aimed at developing a proposed GIS based integrated district land use planning process in the study area.

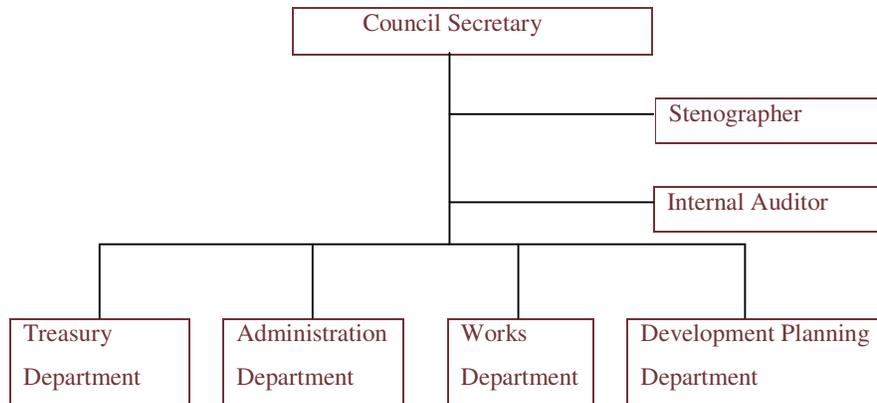
### 3.2.1 To Examine the Current Process of Land use Planning in the Study Area

#### Mission Statement

The operations, and development agenda of Mpika District Council is enshrined in its mission statement which states thus: **“Mpika District Council as a local authority, ensures effective, responsive and efficient provision of social and economic services, through community participation and partnerships with other stake holders, for a quality standard of living for the people of Mpika district.”**

#### Departments in the Mpika District Council

Mpika District Council has four (4) departments, namely:- Administration, Finance(Treasury), Works, and Development Planning. As at August, 2008 the Council establishment stood at 74 employees. This is comprised of 69 permanent employees and 05 employees on contract. Fig. 3.1 depicts the organization chart of Mpika District Council, whilst Table 3.1 depicts the roles and functions of Council departments.



**Fig. 3.1: Organization Chart of Mpika District Council**

**Source: Mpika District Council. 2008.**

**Table 3.1:-Council Departments and Their Functions**

<b>NO.</b>	<b>DEPARTMENT</b>	<b>FUNCTIONS</b>
1	Treasury Department	Handles Council finances In charge of Council rest houses In charge of Council markets
2	Works Department	Land use Planning Road works/drainages Fire Brigade Solid waste management
3	Administration Department	Day to day running of administrative functions of the Council -Secretariat to all standing committees of the council, and council meetings. - Handles staff matters, viz - employment - training - promotions/demotions - retrenchments
4	Development Planning Department	Advises Council on Planning matters Services the Plans, Works and Development Committee Secretariat to the DDCC

Source:-Mpika District Council, 2008.

**Note:**

- One distinct feature about Mpika District Council is that whilst the department of Development Planning advises Council on planning matters, the Department of Works is in charge of land use planning.
- In exceptional circumstances, minutes of the full council, are taken by the Council Secretary, rather than Director of Administration. This happens for instance, if the item under consideration, is a proposed impeachment of the Council Chairperson.

**Policy**

The Council has 25 Councillors, who include three (3) members of Parliament. Of these 3 are female, whilst the rest are male. As regards Councillor-officer relationships, in terms of their status, roles and functions, these are shown in Tables 3.2 and 3.3

**Table 3.2: Principle of Separation of Powers**

<b>COUNCILLOR</b>	<b>OFFICER</b>
Makes Policies Monitoring and control Represent electorate Provides leadership	Gives advise on policies Implements Provides (technical) information Day to day management of Council operations

Source:- LGAZ- 2006, P.55

**Table 3.3: The Status of Councillors and Officers**

<b>NO.</b>	<b>SUBJECT</b>	<b>COUNCILLORS</b>	<b>OFFICERS</b>
1	Assuming office	Electoral process	Appointed by the Council
2	Accountability	Electorate/Government	The Council
3	Engagement	Part time	Full time
4	Remuneration	Allowance	Conditions of service
5	Type of contract	Social contract with electorate	Conditions of service

Source: LGAZ 2006 P. 55

### **Authority of the Council**

The authority or powers of the Council, rests in the Council itself, as a corporate body, rather than the individual Councillors comprising it. Consequently, for it to exercise its powers, it must be legally constituted, in line with the provisions of the Local Government Act, Cap 281 of the laws of Zambia.

### **Limitations of the Authority of the Council**

As earlier alluded to, Council's power and authority must be within the confines of the law. Its powers, as well as activities, are therefore subject to the supreme law of the land.

## **Council Meetings**

There are three types of Council meetings, namely:

### **Annual Council meeting**

This is a full council meeting, held at the beginning of each calendar year. It is during such meetings, that council chairmen and their deputies are elected. New standing committees of the council are also re-constituted.

### **Ordinary Council Meeting**

These are also full council meetings, which are normally held quarterly, in line with Local Government Act provisions. However, they may be held often, if, and when need arises.

### **Special Council Meeting**

As the name suggests, these are full council meetings, held to look at specific issues, that may require a council decision. It normally applies to urgent issues that may not await the holding of an ordinary council meeting. Two-thirds of the total number of councillors, forms a quorum for such a meeting.

## **The Committee System**

Standing committees of the Council, discharge certain functions of the Council.

Usually, items are discussed by these committees, before being presented to a full council, for further deliberations and/or final ratification.

Though these standing committees have the major advantages of having members extensively discuss an issue, unlike in a full council setting, they however, have their own disadvantages. Apart from the prolonged discussions that may ensue, it makes the decision making process cumbersome. This is because, whatever is discussed at committee stage, has still to be forwarded to the full council for approval/ratification.

## **Financial Matters**

With regard to salaries and wages, the Council's wage bill currently stands at K74,000,000.00 per month, whilst its collection efficiency on average, is K85,000,000.00 per month. The Council also still owes its retirees their retrenchment and repatriation allowances in the sum of K523,441,949.00. As at September, 2008 the Council was still in arrears, in terms of payment to its workers by 12 months.

Table 3.4 below shows some examples of discretionary funding agencies, and strategies available in the district. As Table 3.4 shows, this funding is targeted at the district in general, rather than the local authority per se.

**Table 3.4: Examples of Some Discretionary Funding Agencies and Strategies in Mpika District**

FUNDING AGENCY	TYPE/SECTOR OF SUPPORT	FUNDING METHODS	CONDITIONS
UNCDF/UNDP/DDP	- ALL	District Council Demand driven	25% contribution MOU
FINIDA	Education Forestry Environmental	DEO,PEO,DFO GRZ Departments	Contribution of skilled workers
IDA	Health/Agriculture ASSIP BESSIP	GRZ Departments	Counterpart funds Staff at district level
CIDA	- Health - drugs	District Health Management Team(DHMT).	District staff
ROADSIP	- Roads	- To Councils - Demand Driven to communities	50% contribution
Community Health Investment Fund (CHIF)	- Health	- DHMT to communities	25% community contribution
JICA	WASHE ALL	Demand driven to individuals, Institutions and Groups	10% WASHE, Institutional contribution (staff etc)
IRELAND AID	WASHE Education Health HIV IGA	Demand driven to Institutions (GRZ)	Counterpart funding RDCs exist.

Source:- Adapted from MoFNP. 2004 .

**Observations from table 4:**

- Less funding, specifically targeted at the Council. Hence, the need for its

collaboration and coordination with other stake holders in the district.

- More funding to the Health, Agriculture and Education sectors.
- Most of the discretionary funds/strategies require community contribution. Hence the need for community participation in the entire planning process at district level.
- The district, is also a beneficiary of several Government and donor funded programmes. These include:
  - Rehabilitation of feeder roads in the district, done through the Road Development Agency (RDA).
  - Constituency Development Fund (CDF) programme in the district worth K60,000,000 per constituency per year. This funding caters for various development projects in each constituency.

### **Legal**

Like the rest of other towns in Zambia, the principle Act that regulates local government administration in Mpika town is the local government Act, Cap 281 of the laws of Zambia. Other subsidiary pieces of legislation applicable, especially to do with land use planning includes the following:

- The Town and Country Planning Act provides for land use planning, development control, as well as the granting of planning permission to intending developers in Mpika town.
- The Public Health Act provides for building regulations, as well as public health regulations, and provisions.
- The Rent Act provides for the regulation, as well as control of rents in the study area.
- The Environmental Protection and Pollution Control Act (EPPCA) provides not only for regulation, but also the monitoring and treatment of the various types of waste, be it domestic or industrial, generated in town.

### **Land use Planning Process in the Study Area.**

Though Mpika District Council has a planning unit, the same is however understaffed. Worse still, land use planning is being done by the Department of

Works, rather than the Department of Planning. There are very few computers at the District Council offices. Most of these are being used for word processing and not for land use planning purposes. Enforcement of existing by-laws is also seriously lacking. Table 3.5 depicts Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis for Mpika Town in general, whilst Table 3.6 analyses Mpika town land use in particular.

**Table 3.5: SWOT Analysis for Mpika Town in General.**

<b>Strengths</b>	<b>Weaknesses</b>
Plenty of land, within and around the district. Existence of the perennial Lwitikila river. Centre of major roads(Great North Road and Kasama Road), and railway transport through the Tanzania Zambia Railways(TAZARA). Proximity to East Africa(advantageous for trade). Historical and heritage importance.	Inadequate service delivery. Inadequate coordination by service providers. Inadequate waste management. Inadequate expertise at the local authority. Uncontrolled, and uncoordinated land use planning process
<b>Opportunity</b>	<b>Threats</b>
Existence of legal and institutional framework. Existence of abundant natural resources. Political stability. Existence of educational institutions, e.g. Mpika Farm College.	Inadequate maintenance of roads. Prevalence of HIV/AIDS, and malaria, leading to high mortality rates. Deforestation Inadequate and untimely release of grants from central government.

**Source: Author. Field Data.2008.**

**Table 3.6: SWOT Analysis of Study Area Land use**

<b>STRENGTH</b>	<b>WEAKNESS</b>	<b>OPPORTUNITY</b>	<b>THREAT</b>
Mpika has an approved layout plan	Mpika layout plan is out dated	Existence of an institutional and legal framework	Inadequate Community and stakeholder participation.
Existence of a Department of Planning	Land use planning is anchored in the department of Works ,rather than Development planning.	There is still plenty of land not yet planned for.	Planning for the district is being done by the Northern Province Planning Authority. This arrangement delays decision making process.
Development is taking place towards the West and North-West of the CBD, where there is still adequate land.	Development to the East has been restricted by mountain ranges, which are part of the Muchinga Escarpment	Has a lot of potential for rapid growth. It is also well served by road and rail transport network.	Mushrooming of unplanned settlements.

**Source: Author. Field Data. 2008.**

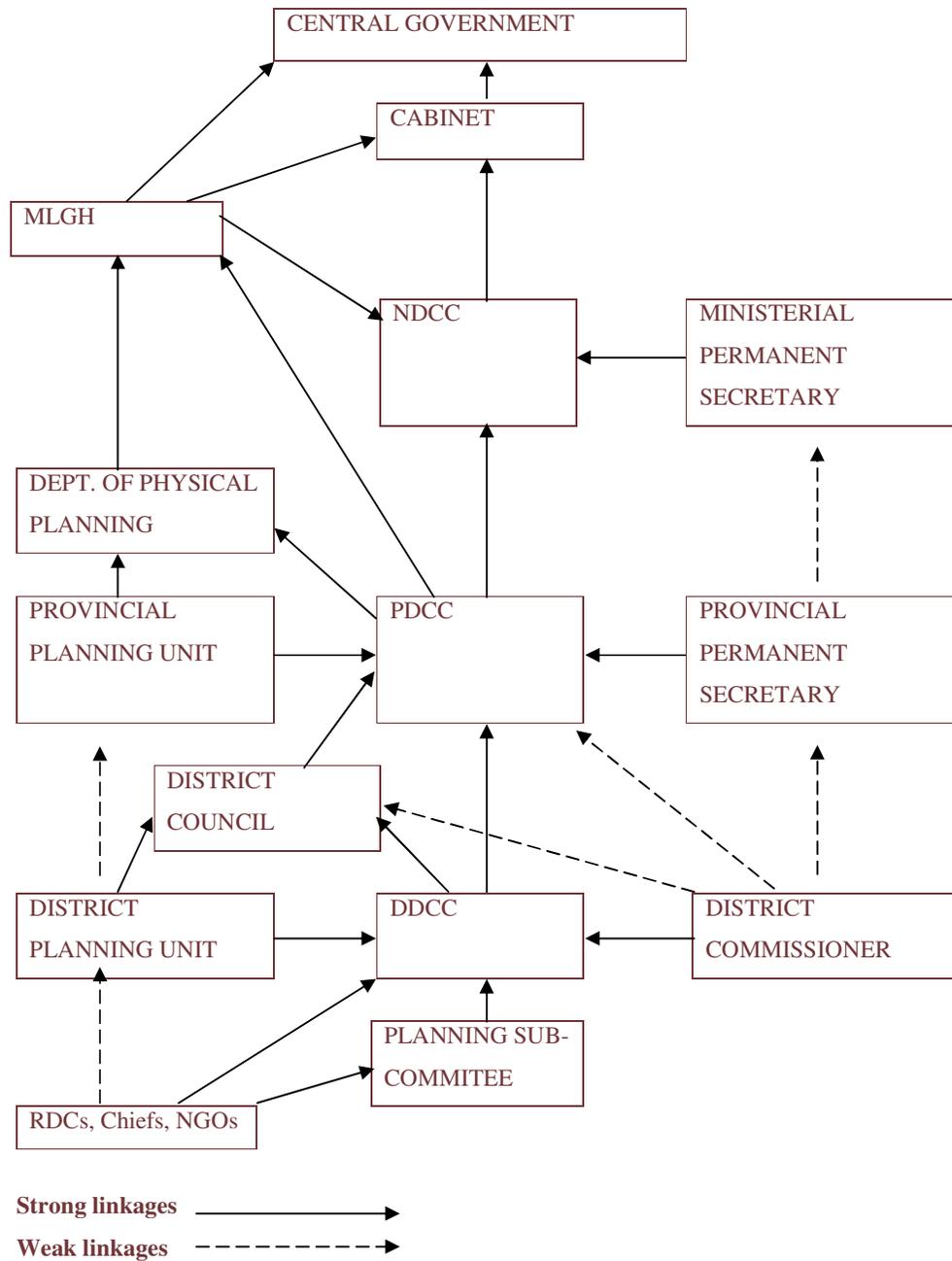
There is also very little coordination between the Council and the community as well as other stakeholders in the current district land use planning process. Whilst the district does not have enough capacity for planning control, planning standards are also usually too high, and thereby making enforcement for compliance difficult. This has resulted in haphazard development taking place in the district. Though most people who got plots from the council did it formally, others got their plots informally through headman Chitulika, a potential source of conflict between the two parties. Headman Chitulika however only allocates land within Chitulika residential area.

The whole district land use planning process is also too cumbersome. It takes such a long time (usually between 6-12 months), for one to acquire a plot from the council. This is despite statutory time frames set in the Town and Country Planning Act. This has been worsened by the fact that most activities in the planning process are being done manually, and at provincial level. As a result of the existing scenario, “plan making cannot cope with or meet the high number of planning applications, resulting

in long delays, high number of illegal developments and retrospect plan approval.” (MLGH. 2008, P.11).

Non-participatory methods are being used, in that the district council conducts planning process in liaison with the NPPA, but to the exclusion of major stakeholders in the district. Apart from this, “there is no provision for public participation in the plan making process in the Town and Country Planning Act or in the Housing Act. Public involvement is limited to responses to placing advertisements in the press or gazette, to which few people have access.” (MLGH. 2008, P.13). This creates problems when it comes to implementation of approved layout plan, and also contributes to making set goals become un-achievable.

Despite the existence of so many pieces of legislation, regulating land use planning process, problems have however worsened. One of the explanations is that apart from the highly fragmented pieces of legislation, there are also too many uncoordinated players in the planning process, who “are guided by overlapping and conflicting legislation.” (MLGH. 2008, P.14). The process is consequently “riddled with power struggle between local authorities and other players. This renders implementation difficult and goals unachievable.” (MLGH. 2008. P.13). “These actors have different interpretations, and have set up ad hoc structures for planning and interpret the law to suit their interests...there exists a disjoint and chasm in the national planning system and sometimes uncoordinated and opposed with regard to their mandates and goals of planning.” (MLGH. 2008, P.11). Figure 3.2 depicts structures and linkages in the current land use planning process, whilst Table 3.7 depicts Land use Planning Process Problem Analysis of Mpika Town.



**Fig. 3.2: Structures and Linkages in the Current Land use Planning Process**

Source: Author, 2009.

**Table 3.7: Land use Planning Process Problem Analysis of Mpika Town.**

<b>PROBLEM</b>	<b>CAUSE</b>	<b>EFFECT</b>	<b>POSSIBLE SOLUTION</b>
Top-down approach	.Centralized governance system .Planning being done at provincial level (NPPA)	.Works against local initiative, and community participation	.Implementation of the decentralization policy. This encourages a bottom-up approach.
Too many actors in the planning process	.Fragmented pieces of legislation	.Duplication of work	.Reconciliation of relevant pieces of legislation. .Coordination
Haphazard land use planning process	.Non-enforcement and non-compliance to the provisions of the relevant pieces of legislation	.Illegal settlements. .Incompatible land uses. -Inadequate waste disposal sites.	.Reinforcement of planning control .Community participation.
Unskilled staff manning planning roles	.Inadequate capacity by local authority to employ and retain qualified personnel	.Sub-standard service provision	.Training of staff in GIS .More funding from central government
Reliance on out-dated methods in the planning process	.Inadequate investment in new technology and techniques. .Eroded financial base of the Council, mainly due to constant policy shifts by central government	.Cumbersome and costly planning process	.Invest in new GIS technologies and techniques in the land use planning process
-Council liquidity problems.	Eroded financial base Inadequate and often untimely release of grants by central government.	General inadequate performance in service delivery	Improved and more funding from central government. Decentralisation with matching resources.
-Old infrastructure, water leakages and lack of maintenance and treatment	Inadequate funding from central government.	-Inadequate water and sewerage services	Invest in new infrastructure development. Invest in GIS as a way to effectively monitor leakages in the supply system

Table 3.7 Contd.			
No networking / inadequate coordination in Mpika town	Fragmented pieces of legislation	No sharing of district data	Invest in GIS to improve on networking and coordination among stakeholders. Harmonise legal and institutional frameworks

**Source: Author. 2009.**

The research findings have revealed that Mpika has no capacity to manage an effective district land use planning process. This is one of the major reasons why this activity is still being handled at provincial level, where land use planning is still being done manually.

The existing land use planning processing in Mpika, can therefore at best, be described as not only inadequate, but also lacking in new technology and coordination among stakeholders. GIS/RS technologies can play a major role in addressing most of the existing district land use planning bottlenecks.

### **3.2.2 To Assess the Possible Application of a GIS and Remote Sensing Technologies Based Integrated District Land use Planning Process in the Study Area**

In trying to investigate possible application of GIS based integrated district land use planning process in the study area, several constraints were encountered. Among the main ones included data collection being difficult due to non-availability of some key stakeholders during the time of the study, a limited number of respondents/interviewees, and due to financial and time constraints.

The most prevalent land use planning method in the study area is manual. Even identification of new areas earmarked for development, is done through physical site inspections, as the preferred means. Land use planning is done at provincial level,

whilst the district is mainly involved in the implementation of approved lay out plans. Currently, it takes an average of 15 hours for one simple lay out plan to be produced. Drawing equipment, such as drawing pens, tracing paper and drawing personnel, form the main requisites for the current planning process, which is done manually. Currently, it takes an average of 1-6 months for one to acquire a plot.

### **Status of Data Generation in the Study Area**

Large amounts of data, both geographical and non-geographical is generated in the study area by various stakeholders as part of their main functions. However, the said data is rarely shared mainly due to inadequate mechanisms for data sharing. Table 3.8 below shows data collected, processed and disseminated by various stakeholders in Mpika Town.

**Table 3.8: Data Collected, Processed, and Disseminated by District Stakeholders**

NAME OF STAKEHOLDER	TYPE OF DATA COLLECTED, PROCESSED AND DISSEMINATED	
	GEOGRAPHICAL	NON-GEOGRAPHICAL
Local Authority	Land use planning Grant of planning permission Planning control Land survey Road works and drainage Cemetery(location, number of burials)	Preparation of title Licenses Waste management Fire services (prevention and control)
Zambia Wildlife Authority (ZAWA)	Wildlife conservation and management Environmental conservation and management	Hunting licences
Education	Location and number of schools	School standards and enrolment figures Teacher/ pupil ratio Passing percentages Teachers academic qualifications Funding (types and source)
Health	Location and number of health centres	Health personnel staffing levels and academic qualifications Prevalent diseases and mitigation measures Mortality

Table 3.8 Contd.		rates in the district, and major causes
Agriculture (a)Department of Agriculture	Agriculture land use, resource surveys and inventory Soil location, types and suitability Location and number of farmers in the district	Annual crop production Crops grown in the district Number and availability of extension workers in the district
(b)Veterinary Department	Location of disease prone areas	Type of livestock diseases, prevalence and mitigation measures Number and availability of livestock extension workers
Social Welfare	Location and number of Area Welfare Assistance Committees(AWAC)	Number of bursaries and medical schemes to the vulnerable Activities and funding sources of youth groups
Community Development	Location, membership, activities and funding sources of community based projects Location and attendance of literacy classes	Orphans and vulnerable children (OVC) status numbers, coping strategies and programmes Activities and funding sources of youth groups
Department of Resettlement	Location, size and land use types available for resettlement	Number of resettlements and settlers
NGOs (a)DOPE	Location and number of community based projects	Funding sources
(b)World Vision(KOPA ADP)	Location and number of infrastructure development projects(schools, clinics, bridges, culverts)	
(c)Africare Rapids	Location and number of youth skills training programmes Location and number of home based care programmes	Funding sources

Table 3.8 Contd.		
Utility Companies (a)ZESCO	Location and size of sub-stations, overhead and underground cables Location and size of areas with and those without electricity supply	Availability and efficiency of electricity supply
(b)Chambeshi Water And Sewerage Company	Distance to safe water supply,by location Distance to sewerage services, by location	Availability, access time Sewerage services provision(type, availability).

**Source : Author. Field Data.2008.**

Despite the existence of an institutional framework provided by the existence of the local authority and the District Development Coordinating Committee, most of the data collected in the district remains a preserve of the institutions that collected it. Whilst some of the stakeholders in the district are able to share their data with others, especially through the DDCC, the rest do not share data. Compromising data privacy, coupled with data misuse, were cited as the major reasons why some stakeholders are reluctant to share their data. Other problems are that of different data formats and difference in software formats. Of course, the majority of the respondents were willing to share data about their operations, and also to participate in the district land use planning process. There is also the problem of inadequacies in the data collected. This especially relates to the amounts, as well as the quality of the data collected (i.e. in terms of its accuracy).

Collection of data which is relevant to the needs and aspirations of the district, requires time, as well as special skills such as technical and analytical. This is however inadequate, especially in the Department of Works, which is charged with the responsibility of land use planning. Apart from the inadequate relevant qualifications, there is no one at the operative level in this department, who has had formal training in GIS utilization and application.

## **Data Storage and Management**

The following issues were observed and others mentioned by some interviewees, as regards data storage and management:

- The filing space for layout plans, most of which were found in the Director of Works office, was both unsuitable and inadequate. Maps and layout plans were placed on open shelves. What quickly comes to mind, is that such layout plans may easily be accessed by whoever enters the office. This makes them prone to a likelihood of misuse.
- The quality of the layout plans found was poor. Some of them were torn. This was partially due to the fact that apart from old age, the same plans were also being used during fieldwork exercises. This is risky because, apart from facing the risk of being torn accidentally, they also face the danger of being soaked, especially during the rainy season.
- Updating of the said layout plans is also done manually. This involves the cumbersome process of the usage of drawing boards, drawing pens, drawing stencils and tracing paper.
- The other problem found was that there were no backup copies for the layout plans being kept by the council. Except the extra copies kept by the Northern Province Planning Authority(NPPA).This is risky, in case such data is lost through calamities, such as fire.
- Some of the data, as well as layout plans found at the local authority, were not only outdated, but also unreliable. For instance whereas on the map some areas were being shown as unoccupied, a physical check revealed existing structures on the said areas. Also planning standards were being compromised in that some developments were taking place on top of water and sewer lines. One of the explanations being that planning staff in the Department of Works rarely coordinate with other service providers such as the water and power companies when demarcating land. They also have no access to the internet, for updated information on planning process. Not a single computer was found in this department, though it was alleged that computers were bought for this department, and were being kept somewhere.
- Worse still, some data is not available at district level. Such data may therefore only be accessed at provincial or national levels. Examples are most

data from Central Statistical Office, Ministry of Health, as well as from security wings of government, such as the Army and Zambia Police. Such a scenario, though understandable, delays speedy decision making process.

One major achievement found, however, was that there was a manual register in the Director of Works office. This register is used to record building plans from residents, before their onward transmission to the Northern Province Planning Authority, for consideration/approval.

### **Data Sharing**

Some of the issues that were mentioned by some interviewees, whilst others were observed as regards data sharing in the study area were that due to increased data inflow, as a result of increased activities in the district, coupled with the keeping of data by individual stakeholders, data search is a labour intensive exercise. During research, individual stakeholders had to personally be approached for relevant data. In the process, speedy decision making becomes difficult, as most data may not be easily accessed, and worse still, difficult to be shared.

Coupled with the above, is that some data in the district was said to be of confidential nature. There is unfortunately no legal backing, compelling entities who have such data to share with other stakeholders at district level. For instance, some organizations, especially NGOs, for no special reasons at all, other than not wanting other stakeholders to fully understand their operations, (especially when it comes to funding), stated that they were not willing to share their data with other stakeholders. This however, works against the spirit of enhanced district development through coordination, as well as the tenets of the decentralization policy. Table 3.9 depicts planning stage, stakeholders involved and approximate duration of the current district land use planning processes.

**Table 3.9: Planning Stage, Stakeholders and Duration of Current District Planning Processes.**

PLANNING STAGE	STAKEHOLDERS INVOLVED					DURATION			
	Community	District Council	NP PA	Min. Of Lands	Central Govt.	Less Than 1month	1-6 Months	More Than 6months	On-going
Initiation of Planning Process.		•	•		•	•			
Perimeter Surveys.			•				•		
Design of layout plan.			•				•		
Approval of layout plan.			•				•		
Sending layout plan for numbering.		•					•		
Numbering of layout plan.				•			•		
Sending back numbered plan.				•			•		
Recommendations for allocations		•					•		
Allocations.				•			•		
Submission of building plans.	•	•							•
Approval of building plans.			•						•
Building supervision.		•	•				•		•

Table 3.9 Contd.									
Occupation certificate.		•	•			•			
Monitoring and evaluation( M&E).		•	•		•				•

**Source : Author. Field Data. 2008.**

Observations from table 3.9 above.

- In the current land use planning process, there is little or no role by the community.
- There are fewer roles performed by the district, as compared to those done by the NPPA.
- Duration for most activities in the current land use process, takes between 1-6 months.
- Some activities in the current planning process, may be done concurrently. For example, submission of proposed building plans; approval of building plans; as well as monitoring and evaluation.
- The entire planning process (i.e. from initiation stage, to issuance of occupation certificate), currently takes more than one(1) year. Issuance of title deeds takes on average, a minimum of 6 months.

The study area also experiences inadequacies in water and sewerage services. For the former, this is mainly attributed to leakages and wastage, whilst the latter is mainly due to inadequate maintenance and proper treatment.

Inadequate disposal of both commercial and household waste, especially by the local authority is yet another hurdle being faced by the study area. This has resulted in a generally polluted environment. Burning of waste (especially domestic), as one of the preferred methods of waste disposal by the community also contributes to air pollution. All this is happening however, despite the existence of various relevant pieces of legislation, such as the Town and Country Planning Act, the Local

Government Act, Public Health Act, as well as the EPPCA. One explanation for such a scenario is that enforcement of the said laws is seriously inadequate.

Other major problems in the district include poor drainage, poor road network especially in rural parts of the district, inadequate housing stock, as well as cross-cutting issues such as HIV/AIDS. Table 3.7 depicts summary of problem analysis for study area.

The constraints discussed above are a pointer to how current district land use planning process could be improved through usage of GIS/RS technologies. The existence of a legal and an institutional framework, coupled with the existing political will, is an indication that it is possible for GIS/RS technologies to be integrated in the planning process. Integration of these technologies in the planning process would improve data collection, data storage and management, as well as data sharing through networking. Decision making process would also be quickened, as land use planning would be done at district rather than at provincial level, which coincidentally is in line with the decentralization policy. Ultimately, this would result in land use planning data being managed for improved district land use planning in a coordinated and sustainable manner, with strong stakeholder participation.

### **3.2.3 To Develop a Proposed GIS Based Integrated District Land use Planning Process in the Study Area.**

Land use planners need up dated and accurate data for them to guide the development of Mpika town. The said data should in turn be stored in a standardized format that can easily be accessed by all stakeholders. Introduction of GIS and its functionalities can to a large measure address most of these bottlenecks.

#### **Initiation of planning process**

The study area currently relies on lay out plans prepared by the Northern Province Planning Authority. Initiation of the land use planning process is done by the district council, and is prompted for example, by a need for residential plots to cater for intending developers. A request is then made to the NPPA to start the planning process. On average initiation of the planning process takes 6months.

### **Land identification for planning purposes**

Identification of land for planning purposes is done by the local authority, to the exclusion of other stakeholders in the district. This normally takes an average of six months, after which the NPPA is requested to do draft plans.

### **Preparation of lay out plans**

Preparation of lay out plans is based on existing land use, topographical maps for the study area, coupled with physical measurements in the field. The NPPA takes an average 6 months to manually prepare layout plans. It is important to note that apart from the study area, the NPPA also prepares lay out plans for 8 other districts in the province.

### **Approval of lay out and building plans**

The major requirement for approval of a proposed layout or building plan by the NPPA, is the fulfillment of minimum planning standards as determined by the NPPA. These include compliance to land use zoning, plot size, building lines and coverage of proposed building in relation to plot size and location. This process on average takes 6 months. Approval of building plans by intending developers also takes an average of 6 months. This is done during the ordinary scheduled meetings of the NPPA. Non-compliance with minimum building regulations and incompatibility of land use, were cited as the main reasons for non-approval of certain building plans.

### **Implementation of lay out plan**

Actual implementation of approved lay out plan is done by the district, whilst the NPPA plays a supervisory role. This is to ensure that all the developments taking place in the district are in conformity with the approved lay out plan. Implementation of lay-out plan is an on-going process.

Majority of residents in the study area that were interviewed revealed that it takes between 6months to 1 year for one to acquire a plot. The main reason cited for such a scenario, was the cumbersome nature of the current land use planning process.

Major problems cited as influencing implementation of a district plan were: inadequate financial resources, inadequately trained council personnel performing planning roles as well as non- availability of new technology, such as computers.

### **Monitoring and evaluation**

The NPPA does monitoring and evaluation of district layout plans on a quarterly basis, and also in special cases, if, and when need arises. The local authority monitors land use planning developments taking place in the district, as part of their routine works.

### **Duration of planning process**

The main factors that usually determine duration of the planning process includes number of plots proposed for creation, availability of suitable planning equipment (currently this involves manually using equipment such as drawing pens, tracing paper, drawing ink and drawing boards), as well as planning skills of planning personnel. On average, 1-5 lay out plans are prepared per year, and it takes approximately 15hours for one of such lay out plan to be made manually.

### **Community participation**

Currently, the community does not participate in the district land use planning process. It was a general feeling that there was need for the community's participation, as they are the major beneficiaries of the planning process. During interviews, majority of respondents stated that the community's participation would mainly be in data collection and data usage.

Most district respondents indicated their willingness to share data in an integrated land use planning process. They cited improved coordination, reduction in duplication of work and improved efficiency, as the major advantages of such an arrangement. Those that did not favour sharing of data at district level cited data misuse by other stakeholders, as the main reason. Other advantages of community participation alluded to during the study were that the process would be more sustainable and cheaper due to shared costs and risks. Community participation would also entail more expertise being made available.

### **Major problems**

Major problems cited as affecting the current land use planning process in the study area, included the process being done at provincial level, inappropriate land use planning tools in use, inadequate community participation as well as inadequate funding to the council. Possible solutions cited in order of importance were: land use planning to be done at district level, utilization of new technology such as computers, increased funding to council, community participation and stakeholder coordination, as well as reconciliation of relevant pieces of legislation.

The above cited problems therefore calls for efficient methods to be applied, in order to ensure that data is not only available, but the same is up-to-date, accurate and easily accessed. This would ensure speedy decision making in the land use planning process. GIS can serve as an indispensable tool in the formulation of an efficient and effective integrated district land use planning process.

For an effective integrated land use planning process to come to fruition, GIS should therefore be introduced in the study area. Some of the major benefits that could be derived from the usage of GIS in the district's land use planning process, includes the following:-

- The usage of GIS speeds up works, that may otherwise be too tedious or cumbersome to be done. For instance, the land use planning process.
- Usage of GIS enables verification and accessibility of data by many users. This is in contrast to data filed manually.
- It allows joint usage of data from dissimilar sources. This may be achieved through interconnections.
- GIS also optimizes resource usage and management.

Some of the problems that would however to a certain extent, inhibit Mpika district in its current state, from taking full advantage of benefits of GIS usage, and therefore needs to be urgently addressed includes:

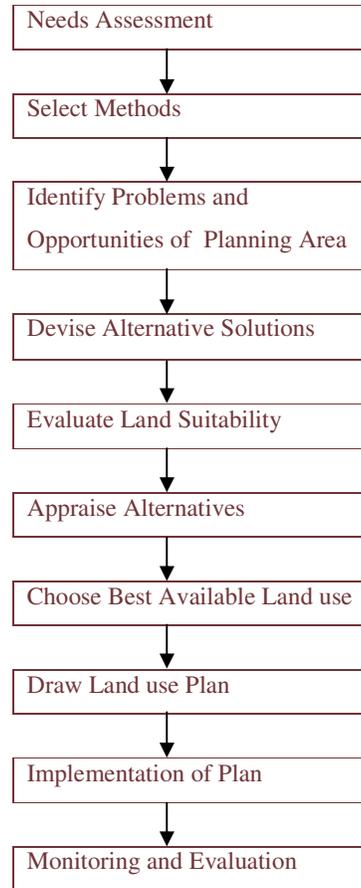
- Inadequate qualified personnel to meet the demands and technical skills required to successfully run a GIS. This is because usage of GIS requires expertise.

- Financial constraints may also hinder the successful implementation of a GIS. The study area has a very weak financial base, and worse still, even government grants are usually inadequate and normally untimely in their provision to the district.
- Organizational difficulties. For instance data to be utilized in the district may be in accessible, unreliable or worse still, unavailable.
- Operational pitfalls. Some organizations may not be willing to share data with other stakeholders in the district. This may be due to the sensitive nature of such data. For example, data from Zambia Police and the Zambia Intelligence Services, is shared only in very exceptional circumstances. Worse still, other stake holders in the district do not have the required and appropriate equipment to enable them share data in a GIS based integrated district land use planning process.
- Potential uses of remote sensing is not widely known. This is a major disadvantage, especially if one considers the fact that remote sensing is one of the major sources of data for a successful GIS.

It is in view of the above mentioned opportunities and the need to address existing challenges associated with land use, that necessitates the vital integration of GIS and RS technologies in the planning process. When one looks at an integrated district land use planning process, what comes to mind is massive data being available from various stakeholders. In order for this data to be useful, it has to be analyzed, processed, stored and retrieved in an efficient and up- dated manner. GIS is an indispensable tool in such an arrangement.

The existing institutional and legal framework at district level can support the proposed GIS based integrated district land use planning process. The existence of the local authority, as well as committees, such as DDCC and RDCs, serve as a solid administrative framework, on which the proposed process can be anchored. Existing relevant pieces of legislation, such as the Town and Country Planning Act, Local Government Act, as well as the Public Health Act, also serve as a suitable framework, within which the proposed process can be streamlined. It is imperative that as much as possible, the existing institutional and legal framework be

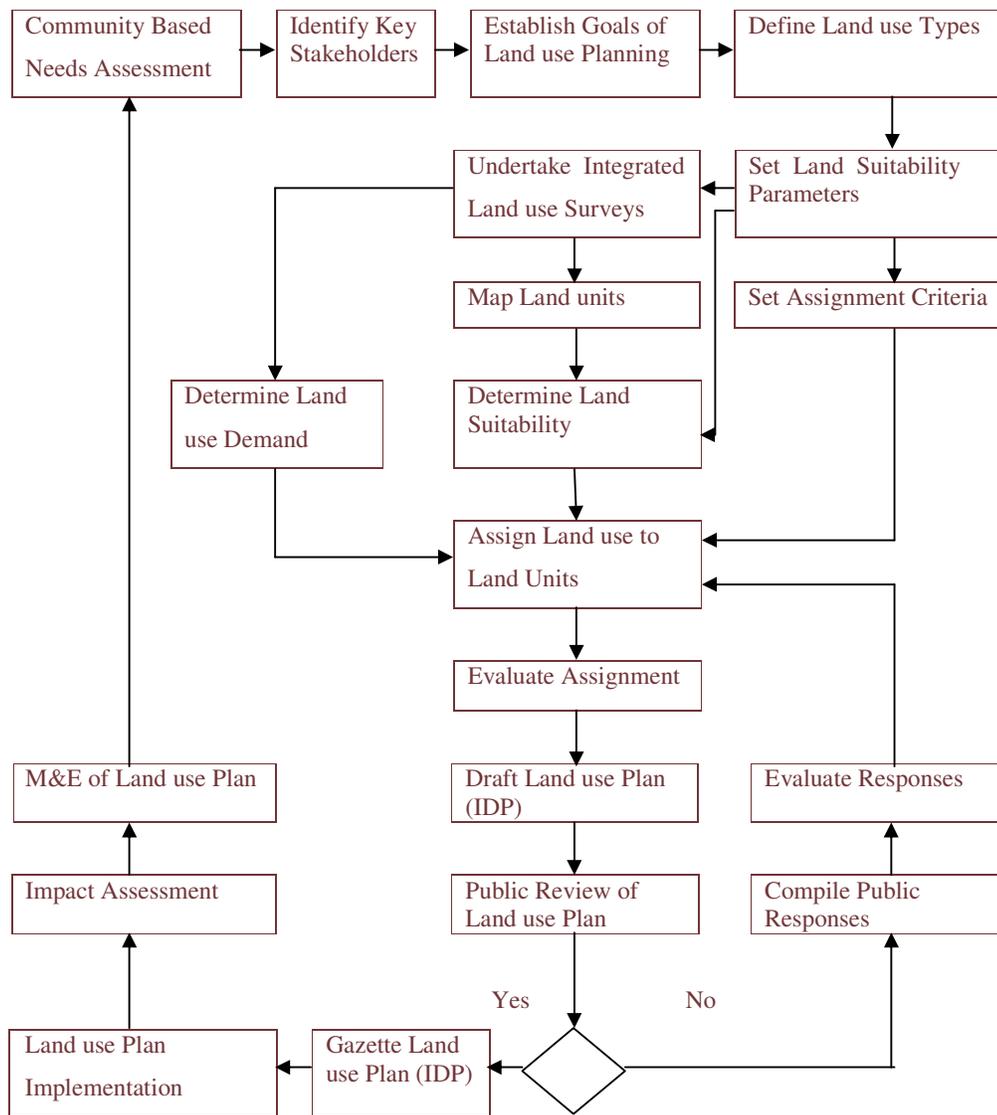
maintained. This would make the proposed process less disruptive, and hence, less costly. What makes the proposed GIS based planning process different is that unlike the conventional planning process shown in Fig. 3.3



**Fig. 3.3 Conventional Land use Planning Process**

**Adapted from F.A.O. 1989 P.16**

the proposed integrated process entails consolidating data from various stakeholders through usage of GIS/RS technology functionalities in all stages of the planning process. (see Table 3.12). And unlike the conventional process where data is fragmented amongst different stakeholders, the proposed GIS based integrated process enhances coordination and collaboration among stakeholders, as well as facilitating easy access to data through networking. Fig.3.4 depicts the proposed GIS based integrated district land use planning process.



**Fig. 3.4: Proposed GIS Based Integrated District Land use Planning Process**

Source: Author 2009.

### 3.2.3.1 General Steps in the Proposed GIS Based Integrated District Land use Planning Process.

Despite the fact that each planning project is different as a result of variations in local conditions, steps in land use planning process are basically the same. The under listed are the steps in relation to the proposed GIS based Mpika district land use planning process.

### **Needs Assessment**

The starting point for any meaningful land use planning is the community at which the planning process is targeted. This is so because land use planning is by its very nature, a community centred exercise, hence the need for the community's involvement from inception. In the context of this study, the main need was the assessment of how the current land use planning process may be improved through GIS application.

### **Establishing Goals and Ground Rules of Planning Process**

At this stage, the planning area and scope of study are defined, goals and criteria of planning process established, major constraints in planning process such as social, institutional and legal framework are identified.

### **Surveys**

In order to structure problems and opportunities, Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis of the study area was done. The major factors considered at this stage, among others, were the extent and location of planning area, district administrative structures, as well as surveys for existing land use/cover, economic, household and infrastructure.

### **Land Capability Analysis**

This stage was for identification of alternative suitable land uses, through chosen social, economic and physical conditions. It involved land use analysis, economic analysis, household analysis and infrastructure analysis. Buffering of selected attributes was employed. Each buffer has its own defined boundaries. For the purpose of this study, suitable land earmarked for residential development needs to be 500m within an existing road for ease of travel, 100m away from dambo areas, as well as 50m from railway line. This analysis resulted in availability of data on economic status, household situation and infrastructure status.

Land capability analysis through utilization of overlaying function of GIS, also helped in coming up with land compilation. This compilation of suitable land for a particular usage was determined on the basis of an area meeting specified environmental, social and economic conditions. Overlaying involved factors such as

- land use versus economic status,
- land use versus household situation and
- land use versus infrastructure status

The buffering, overlaying, merging, union and query functions of GIS, helped in evaluating land suitability. Through overlaying function of GIS of different themes, it enabled appraisal of alternative land uses, and consequently determination of the type of land suitable for different type of uses. Through appraisal of alternative land uses, it was also possible to predict the consequences of incompatible land use practices, such as soil erosion.

This is based on the premise that the proposed usage should yield envisaged benefits commensurate to what would be invested in such an area. The end result of this stage was availability of data on land suitable for economic activities, housing and infrastructure development.

In coming up with the best land use option, various factors were taken into account such as planning standards, building regulations and implications for future land usage. This was achieved through buffering, merger, and union of various relevant themes, and then applying the query function.

Through application of query function, it was possible to classify best land for residential development, ranked on the basis of suitability through a code system. For example, 1-for most suitable, 2-for moderately suitable, 3- for suitable, 4- for unsuitable, and 5- for most unsuitable. After this type of ranking, the best alternative land usage for a particular area is chosen.

In a nutshell, this stage helped not only in coming up with priorities in terms of land usage, but also in making well informed land use decisions.

### **GIS Based Data Integration**

This stage involved a GIS based compilation of land suitable for economic activities, housing and infrastructure development. It also helped in coming up with land use options that best suits the goals set in needs assessment stage. It encompasses both geographical and attribute data of a variety of attributes.

Land use zoning is an important component at this stage of the land use planning process. This is because it helps in identification of land, in terms of its proposed usage. Zoning “sets apart different areas in the town for specific purposes.” (Hiraskar.G.K. 2003. P.43). Consequently, any proposed developments should be compatible with the zoning of a particular area. For instance, to ensure compatibility, land zoned for residential developments, should be used as such. All things being equal, land use zoning also helps in orderly development. Draft plans in this context, serve as a prelude to the production of an integrated land use plan.

### **Integrated Land use Plan**

This stage involved production of a plan that encompasses various socio-economic sectors of the district, in an integrated manner.

### **Plan Implementation**

This stage was not covered under the scope of this study. It relates to plan implementation activities that includes land demand, allocation criteria, planning permission, building regulations.

In view of the proposed land use planning process, implementation of a land use plan should take a multi-sectoral integrated approach. This can effectively be done through the already existing district institutional and legal framework. For example, through the District Development Coordinating Committee (DDCC). It is therefore imperative that the DDCC is given a legal framework. This would give it powers for instance to sanction members who willfully and purposely fail to attend its scheduled district developmental meetings. It is further suggested that existing sub-committees of the DDCC, such as the Planning Sub-committee, should be strengthened. Resident Development Committees (RDCs), should also be supported as a way of also strengthening developmental activities of the DDCC. Since the current Town and Country Planning Act vests powers of land use planning in the local authority, it should therefore play a co-ordinating role in the proposed land use planning dispensation.

### **Impact Assessment**

Impact Assessment is done by the Environmental Council of Zambia (ECZ), based on provisions of the EPPCA. This is done in order to assess the impact the various developmental activities may have on both the physical and natural environment.

### **Monitoring and Evaluation (M&E) of Land use Plan**

Monitoring, evaluation and modifications were also not covered by the scope of this study. The existing Town and Country Planning Act, stipulates that a land use plan should be reviewed every after 5years. However, with the proposed usage of GIS, it is possible that monitoring implementation of proposed land use plan may be done even quarterly, in line with the sittings of the DDCC. Such activity should precede the holding of DDCC meetings. This is to ensure that any proposed changes to the plan are first reported for ratification, in the next DDCC meetings.

This is an important stage in the planning process because it enables the district to assess whether land use activities taking place in the district, are in line with the proposed land use plan.

Depending on the outcome of the monitoring process, it may not only be necessary to revise the proposed land use plan, but also vary or enhance the methods of implementation. With utilization of GIS and its functionalities, land use plan review may take few weeks, unlike the present scenario, where it takes months.

### **3.2.3.2 Expected Outputs of GIS Based Integrated District Land use Planning Process.**

The following are some of the expected outputs from the proposed GIS based integrated district land use planning process.

- Creation of an integrated land use planning data base
- Land suitability and land use maps and statistics
- Strategic interventions. This may include creation of land information systems, as well as its usage in GIS training workshops.
- Land use analysis results.
- Public review comments and responses.
- Enhanced facilitation of policy and legal and institutional framework formulations.

### **3.2.3.3 Proposed Roles and Functions to be Played by Various Actors in the Proposed Integrated District Land use Planning Process**

The following are the key players/ planning sectors, and their proposed roles and functions in the implementation of the proposed integrated district land use planning process.

#### **Stakeholders**

Stakeholders in the context of the proposed land use planning process, comprises actors, as well as beneficiaries. They will therefore serve as the main sources of data, as well as its usage, When DDCC meetings are held, the community, will be represented through RDCs and area councillors. The community will play a critical role at the needs assessment and plan implementation stages. Major stakeholders in the district, comprises the local authority, government departments(Education, Agriculture, Health, Community Development, Social Welfare and Resettlement), NGOs(DOPE, World Vision and Africare Rapids), parastatals (ZESCO and Chambeshi Water and Sewerage Company) and the community at large.

#### **Planning Sub-Committee**

The Planning Sub-committee of the DDCC, comprises technocrats, who represent major stakeholders in the district. These include among others, land use planners, land surveyors, sociologists, environmentalists, geographers, civil engineers, doctors and biologists. These technocrats will be involved in data analysis, computation and integration. This committee will also serve as a major linkage between stakeholders and policy makers.

#### **The District Development Coordinating Committee (DDCC)**

The DDCC, will comprise representatives from all stakeholders referred to above. Suffice to point out that apart from people that may attend DDCC meetings by special invitation, the rest will be those stipulated in DDCC guidelines. Though the DDCC was established with the sole purpose of overseeing district development, it has however remained ineffective in its current state. One of the major reasons, being that it has no legal framework. Consequently, it has no powers for instance, to sanction its members e.g. for non-attendance of its scheduled meetings.

In the context of this research, the DDCC, will be involved in data authentication. The justification for this role, is that its membership comprises representatives of institutions where data originated. The DDCC, has to confirm the authenticity of the data presented before it, before its onward transmission to the Full Council. Wide consultations will also have to take place, at this very critical stage, where some representatives, who may not be members of the DDCC, may be co-opted. This would be so, especially if data being considered, is in their realm of specialization. Data approval/rejection, will also have to take place at this stage of the proposed land use planning process.

### **Council**

Mpika Council is composed of council management and councillors (policy makers). This also includes the three (3) members of parliament in the district. Data ratification, will take place during scheduled meetings of the council. What is rejected, will be referred back to the DDCC, for further clarification. If need arises, the DDCC may in turn send certain types of data to the planning sub-committee for further consideration by technocrats. What is ratified by the Council, is then forwarded to the secretariat.

### **Secretariat**

The secretariat in the context of this proposal, will be the Planning Department of the council. The current arrangement where planning process, is being done by the NPPA, and through the Department of Works at district level, should be discontinued.

Coincidentally, Planning Department currently serves as secretariat to the DDCC, and therefore, there will be no major shifts in the existing administrative framework. The major role of the secretariat in the proposed dispensation, will be computation of approved data. This is in readiness for inputting in GIS. It will be the duty of the secretariat to ensure that at this stage, available data should be compatible to the formatting of the rest of the data.

### **Geographical Information Systems (GIS)**

This stage will involve the actual data input, processing and management. Major inputs here will be approved geographical and attribute data. Of course as earlier alluded to, the said data will have to be in a format that is compatible. This stage will also involve relevant networks, as well as computer hardware and software. For the latter, MS Word, ArcView (3.2a) and ArcInfo, are recommended. These would serve as a starting point. Major activities to be carried out here are: integrating land use planning data, integrated analysis, production of status reports, production of draft plans, review plans, as well as production of revised plans. Fig.3.5 depicts a conceptual design of how the integrated district plan would then be linked and integrated into the provincial and national integrated plans.

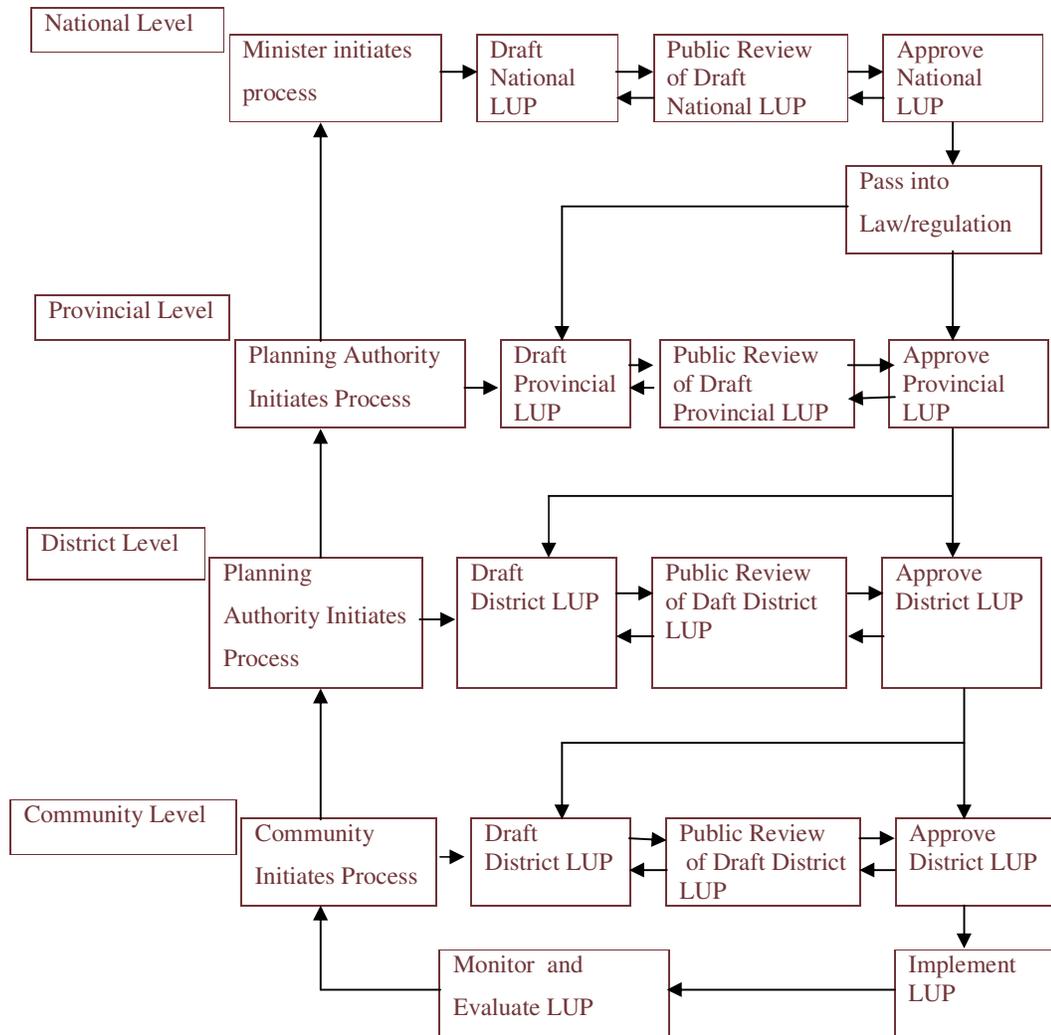


Fig. 3.5 Conceptual Design of ILUPP. Source: Author 2009.

### 3.2.3.4 Benefits of the Proposed IDLUPP

What has come out of this study is that change is desirable in the current district land use planning process. And various things need to be looked at, such as the current mode of data collection, analysis and data management. The study recognizes the fact that Mpika district, as well as other major stakeholders involved in land use planning process, have given the use of GIS inadequate attention. Consequently, for the proposed changes to have an impact, it needs a GIS based integrated land use planning process that will assist in ensuring that data is being managed in a sustainable manner, coupled with enhanced stakeholder participation. Some major benefits that are envisaged to be derived from the proposed integrated district land use planning process includes the following:

- The proposed system will be different from the existing process in the sense that currently, all works are being done manually, hence taking long to accomplish most of the planning activities. The proposed GIS based integrated approach to land use planning process would be quicker, and hence, help in improving efficiency by addressing the current cumbersome land use planning process. It would also facilitate and ease sharing of data by relevant district stakeholders.
- The proposed system could improve land use planning process in the study area, in that with installation and usage of GIS equipment, the district would be able to handle the planning process at district level, rather than the current reliance on the NPPA. This would not only cut on the current lengthy process, but would also encourage local initiative.
- It would help in identifying institutions at district level, as well as definition of their roles and responsibilities. This would in the process, assist in the development of an appropriate institutional and legal framework for land use planning at district level.
- Land use conflict resolution would be enhanced, and so would be information management and exchange, through networking.
- Lastly but not the least, the proposed model, denotes an enhanced district land use planning process that is participatory. This would have the desired effect of inculcating a sense of ownership by all stakeholders in district development. This would in turn enhance chances of a successful implementation of the decentralization process.

### **3.3 Discussion**

#### **3.3.1 Examining the Current Process of Land use Planning in the Study Area**

Due to low and negative political commitment to planning, formulation of plans to guide development was abandoned especially between 1991-2001. This resulted in districts struggling in isolation to domesticate decentralized and participatory planning systems with little support from central government. The effects of this are still being felt to-date, as evidenced by the incompatible land uses, as well as in adequate development control by the local authority.

The present structure at provincial, district and local authority level to a large extent shows overlapping responsibilities. For instance whilst Provincial planning authorities do planning for districts that are not planning authorities, they are not empowered by law to do planning for districts and towns that are planning authorities in a particular region.

There is also very little coordination between the Council and the community as well as other stakeholders in the current district land use planning process. Whilst the district does not have enough capacity for planning control, planning standards are usually too high, and thereby making enforcement for compliance difficult. This has resulted in haphazard development taking place in the district.

The current land use planning process is anchored in an established legal and institutional framework. Outlined below are some observations on legal and institutional provisions regarding current land use planning in Zambia.

#### **Legal framework**

##### **The Town and Country Planning Act Cap 283**

- The fact that there is no harmonization between this Act and other relevant pieces of legislation, such as the Public Health Act, makes the Town and Country Planning Act deficient in its provisions, as regards land use planning process. The Public Health Act takes precedence over other relevant Acts, whose regulations tend to be in conflict with it, including the Town and

Country Planning Act, on issues such as sub-division of land. Harmonization would therefore lessen overlaps in responsibilities and duplication of work.

- The Town and Country Planning Act vests most of its powers in the Minister of Local Government and Housing, making the implementation of relevant provisions of the Act, quite cumbersome. This is because implementation of the various provisions of this Act normally awaits a Ministerial go-ahead. This scenario to some extent therefore tends to inhibit local initiative as the planning authority always awaits consent from the minister even on administrative matters.
- Most of the legislation requirements are too broad based, and hence difficult to implement.
- Penalties for offences committed e.g. building without planning permission, normally are a preserve of the individual local authorities, and are quite low, hence making them not deterrent enough.
- In a nutshell, current Town and Country Planning Act does not reflect contemporary approaches in land use planning process, in that it does not address core planning issues of shared land use information system, integrated land use planning regulation, as well as effective stake holder participation and coordination.

#### **The Lands Act Cap 184**

- This is yet another relevant piece of legislation, as its core business is mainly to do with issues associated with land use planning and its usage. Even most of the provisions of the Act on land issues, such as land demarcation and allocation, relates to what is provided for under the Town and Country Planning Act.
- There is need therefore that relevant provisions in this Act, should be harmonized with provisions of other relevant pieces of legislation (e.g. the Town and Country Planning Act). This would lessen duplication of functions. For example, Part II, Section 3, subsection (1) and (5) of this Act refers to the control and use of land as being vested in the President of the Republic of Zambia. Whilst Part IV, Sections (1), (2), and (3), of the Town and Country Planning Act, empowers the Minister of Local Government and

Housing (through delegated powers from the President), to administer the use of land, through planning authorities and local authorities.

- There should be a clear cut distinction between state and customary land.
- There is need for a speedy review of the current lands policy. This is in order to address some of the pending contentious issues in the Act, such as the non-provision in the Act for community participation in the land use planning process, and to what extent should traditional leaders be involved in land allocations.

### **The Public Health Act Cap 295**

- The Act prescribes penalties for various types of offences, such as illegal subdivision and general outlay of land intended to be used as building sites (Part IX Section 75 (h) refers). However, where penalties are indicated in the Act, they are too low, and consequently, not deterrent enough for the would be offenders, (especially in monetary terms). For example, the maximum penalty for offences committed under this Act is K200 or six (6) months of imprisonment or both.
- There is need therefore for the Act to be revised in order to increase not only the monetary fines, in line with inflation levels, but the jail terms as well.
- The Public Health Act takes precedence over other relevant Acts, whose regulations tend to be in conflict with it.

### **Environmental Protection and Pollution Control Act (EPPCA) Cap 204**

- There are no clear guidelines set for the cooperation or coordination between ECZ and local authorities. This is ironical as local authorities are the key players in land administration. It is however important to mention that under Part XI, section 82, the ECZ, may delegate all or any of the duties of the inspectorate to a local authority, in such area as it may designate.
- The ECZ is not involved in the approval of structural plans, (except during the time when the same is advertised in the national paper(s) for comments). There is need for the ECZ to be involved in the entire land use planning process. By doing so, ECZ may play a critical role in ensuring that a structural plan conforms to acceptable planning standards and regulations.

- The inability of ECZ to access most parts of Zambia. This is mainly due to understaffing, coupled with inadequate funding from central government. This factor limits its area of operation, and consequently its effective participation in the planning process.
- Some functions of the ECZ may suitably be handled by individual local authorities. This is notwithstanding the fact that the ECZ may delegate all or any of its duties to a local authority e.g. the issue of regulating the location of waste dumping sites.

### **The Local Government Act Cap 281**

This Act has two major weaknesses, when one considers enforcement.

- The penalties under this Act for non-compliance, for instance of building regulations, are too low, and therefore, not deterrent enough. They do not go beyond one thousand kwacha (1000) or six (6) months imprisonment. Of course, local authorities go around this problem by enacting by – laws.
- There is duplication of some provisions in this Act, with what is appearing in other Acts, e.g. the Public Health Act, and the Town and Country Planning Act, as regards land use. For example its provisions under the Second Schedule (Section 61), sub section 29, relates to the same provisions as that of Part IX, Section 66 of the Public Health Act, and that of Part IV, Sections 1,2 and 3 of the Town and Country Planning Act.

There is therefore need for reconciliation of the Local Government Act with other relevant pieces of legislation.

### **The Statutory Housing and Improvement Areas Act Cap 194**

- Need to harmonize relevant provisions of the Act, with that of the Town and Country Planning Act, as regards land use planning. For instance when it comes to illegal settlements, the Statutory Housing and improvement Areas Act normally advocates for regularizations, whilst the Town and Country Planning Act advocates for demolitions.
- Provisions/sanctions for non-compliance, should be stiffened in order to be more deterrent.

### **The Agricultural Lands Act Cap 187**

- This Act has similar provisions to that of the Town and Country Planning Act, as regards land use planning.
- It would therefore be imperative to harmonize the provisions of this Act with those of the Town and Country Planning Act, as well as the Lands Act. This would minimize overlaps in responsibilities, as well as duplication of work. For example, whilst this Act empowers the Minister of Agriculture (through a Board), to approve an application for the allotment of a holding, and thereafter alienated by the President, the Town and Country Planning Act, empowers the Minister of Local Government and Housing (through local authorities) to alienate council land, and even give title for the same. The Lands Act on the other hand empowers the Commissioner of Lands to alienate state land on behalf of the President.

The above stated legal framework, denotes that there exists a multiplicity of relevant pieces of land use legislation currently in use. For instance, whilst the Statutory Housing Areas Act addresses housing needs by advocating for regularizations, the Town and Country Planning Act excludes those in informal settlement, and calls for demolition of structures in these areas. There is need for reconciliation of relevant pieces of legislation. This would ensure that “the final product is coherent, implementable, clearly understood, and free of the contradictions that plague the current system.” (MLGH. 2008, P.14). GIS would play a critical role in such a dispensation, not only through production of lay out plans and plot design, but in ensuring a coordinated land use planning approach.

### **Enforcement of bye-laws**

Enforcement of existing by-laws is also seriously lacking in the study area, hence the reason why some developers are even able to build on top of sewer lines, without being sanctioned by the council. This is worsened by the fact that “enforcement notices that may be made by other entities that have responsibilities that relate to land use, such as the Medical Officer under the Public Health Act are not mentioned in the Town and Country Planning Act or Housing Act.” (MLGH. 2008, P.9).

Section 91 of the Public Health Act also empowers the Minister of Health to select and appoint sites for cemeteries without reference to a relevant planning authority.

In order to ensure compliance by developers, there is also need to revise building regulations and standards such as plot size, coverage, building lines, as well as building materials and any other relevant appropriate technology, in order to make them more flexible. There is also need to allow for greater use of cheaper materials and intensive and sustainable use of land. This should however be done without compromising basic health and safety standards

**Strengths and Weaknesses of Legal Structure in the Current Mpika District Land use Planning Process**

Table 3.10 depicts strengths and weaknesses of legal structures in the current district land use planning process.

**Table 3.10: Strengths and Weaknesses of Legal Structures in the Current Mpika District Land use Planning Process.**

PLANNING	STRENGTH	WEAKNESS
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STRUCTURE		
Resident Development Committees(RDCs)	<ul style="list-style-type: none"> <li>.Allows for direct consultation with the community.</li> <li>.Community motivated to solve own problems.</li> <li>.Provides linkage between residents and local authority.</li> <li>.Allows coordination of development activities at community level.</li> <li>.Councillors become more accountable to the electorate.</li> </ul>	<ul style="list-style-type: none"> <li>.Inadequate capacity for RDCs to plan, mobilize the community and resources.</li> <li>.Poor information flow between the RDCs and the community on one hand, and the RDC, DDCC and other higher structures on the other hand.</li> <li>.Influential people in the community, may push projects that are to their advantage, at the expense of the general good.</li> <li>.Currently, RDCs have no legal framework.</li> </ul>
District Development Coordinating Committee(DDCC)	<ul style="list-style-type: none"> <li>.Coordinates all the developmental activities in the district.</li> <li>.All major stakeholders in the district, are supposed to be members of the DDCC.</li> </ul>	<ul style="list-style-type: none"> <li>.Chaired by the District Commissioner, but secretariat is still with the Council.</li> <li>.Currently, the DDCC has no legal framework.</li> </ul>
COUNCIL	<ul style="list-style-type: none"> <li>.Council, is a legal entity, which has powers to formulate policy.</li> </ul>	<ul style="list-style-type: none"> <li>.Little or no coordination with the community, except through councillors.</li> <li>.Reliance on out-dated methods in the planning process.</li> </ul>

Source: Author. Field Data. 2008.

The DDCC is the main stakeholder coordinating structure at district level. Its major weakness however is that the DDCC lacks a legal framework. This is a vital ingredient if this committee has to have the powers of enforcement of its resolutions. A legal framework could also enable it sanction members for non-attendance of its scheduled meetings.

The DDCC would to a large measure assist in the realization and implementation of an integrated district land use planning process. This could be done by coordinating the various stake holders in the district, for instance through regular meetings and consultations. This is because apart from land use planning process being their common goal, stakeholders coordination could also solve the problem of duplication of efforts, not to mention the benefits of group work. GIS/RS technologies would play a major role in stakeholder coordination.

### **Institutional framework**

Several institutional factors emerged during the study as affecting the planning process in the study area, among which were that there is lack of clarity with regard to institutional arrangements and functions. This is one of the major reasons why the current district land use planning process is beset by the problem of involvement of too many un-coordinated players, who “are guided by overlapping and conflicting legislation.” (MLGH. 2008, P.14). The process is consequently “riddled with power struggle between local authorities and other players. This renders implementation difficult and goals unachievable.” (MLGH.2008. P.13). Not to mention the fact that “control by central government through the Ministry of Local Government and Housing on administrative matters, are (also) factors which further inhibit local initiative” (TNDP (1979 – 1983).1979. P10).

There is therefore a need to “clarify division of powers and functions to avoid conflicts between agencies operating at national, provincial and district levels.” (Siyunyi.F.K. 2004, P.2). These problems could to a large measure be resolved, if there was a coordinated and integrated approach to land use planning by all stake holders in the district. GIS/RS technologies application would play a critical role in such a dispensation.

Some of the major issues and problems, facing Mpika District land use planning include the fact that Mpika is one of the fastest growing towns in the country. This is both in terms of population numbers and areal extent. This in turn, comes with some of its attendant problems, such as emergence of unplanned settlements, with little or no hope of being upgraded, due to liquidity problems being faced by the Council. This is mainly as a result of an eroded Council financial base, coupled with inadequate and often untimely release of grants from central Government.

### **3.3.2 Assessing the Possible Application of a GIS and RS Technologies Based Integrated Land use Planning Process in the Study Area**

Overall objective of this study was to assess how introduction of GIS/RS technologies at district level may improve land use planning process through data

collection, analysis, presentation and sharing. Assessment of possible application of a GIS/RS based integrated land use planning process can broadly be looked at, in the context of a technical framework.

### **Technical framework**

At national level, the Ministry of Local Government and Housing implements the planning process through the Department of Physical Planning and Housing. There is however, no direct collaboration and coordination of activities between the Department of Physical Planning and Housing, with other related institutions, such as the University of Zambia (UNZA), Copperbelt University (CBU). National Institute for Scientific and Industrial Research (NISIR) and the National Remote Sensing Centre. Such an arrangement would be cardinal, in the sense that these institutions are major players not only in the provision of suitable manpower in land use planning, but also in the field of research. This is based on the premise that shared knowledge and costs, would make the planning process not only cheaper, but also more sustainable. GIS/RS technologies would not only facilitate but enhance collaboration and coordination among these stakeholders.

Table 3.11 shows a summary of issues identified in some key sectors of the district and how GIS usage can serve as possible solution to their problems.

**Table 3.11: Summary of Issues Identified in Some Key Sectors of the District**

<b>Sector</b>	<b>Core Problem</b>	<b>Opportunities</b>	<b>Possible Solution</b>
Local Government	Haphazard land use	.Existence of relevant pieces of legislation, e.g. Town and Country	.Need for enforcement of relevant laws/by-laws.

	planning process	<p>Planning Act.</p> <p>.Existence of an institutional framework i.e. the Mpika council, through the office of the District Planning Officer.</p>	.Coordination among stakeholders through employment of GIS as a modern technique and tool of planning.
	Inadequate finances	<p>.Large reservoir of labour force.</p> <p>.Donor funding through central government.</p>	<p>.Improve on revenue collection efficiency.</p> <p>.Stakeholder coordination through GIS.</p>
	Inadequate qualified manpower.	.Existence of qualified manpower, at district level.	.GIS usage to facilitate coordination among stakeholders.
Water and Sanitation	Inadequate water supply.	Government funding.	<p>.Need to overhaul water and sanitation network.</p> <p>.Community sensitization on better methods of water usage and conservation</p>
	Inadequate waste disposal.	<p>.Existence of D-WASHE.</p> <p>.Government funding through the “Keep Zambia Clean Campaign, ”through the local “Keep Mpika Clean Campaign”</p>	<p>.Need for community participation, and sensitization, on better methods of waste disposal.</p> <p>.Stakeholders coordination</p>
Health	Inadequate funding, for operations, and purchase of drugs and equipment.	<p>.Participation of other players in the sector.</p> <p>.Donor funding through central government.</p>	<p>.Sensitization of community on basic health matters.</p> <p>.Need for more mobile clinics.</p> <p>.Need for more funding</p>
Table 3.11 Contd.	Inadequate school places.	.Entry of private practitioners in the sector.	.Due to increased number of players in the sector, there is need for a regulatory body. This would ensure that education quality and standards are not compromised.
	Inaccessible school places(i.e. in terms of cost and distance).	.Donor funding through central government, e.g. BESSIP.	
	Inadequate teaching staff.		

Agriculture	Inadequate funding.	.Large reservoir of labour force. .Reliable rainfall pattern. .Liberalized economy. .Existence of the government supported fertilizer support programme. .Donor funding.	.Need for more reliance on appropriate technology. .Re-introduction of cooperatives. .Need for training and employment of more extension workers.
Roads and Transport	Inadequate funding.	.Large reservoir of labour force .Government funding through RDA, e.g. funds under ROADSIP.	Need to use appropriate technology, and more labour intensive methods but without compromising on quality. GIS usage critical especially at the planning stage of road routing and construction.

Source: Author. Field Data.2008.

At district level, planning for Mpika is being done by the Northern Province Planning Authority. On average, 1-5 lay out plans are produced per year, each of them taking approximately 15 hours to produce manually. GIS application would not only speed up the process, but also tremendously improve on the quality of the end product. Table 3.12 shows relation of current land use planning process to GIS functionality.

**Table 3.12: Relating Current Land use Planning Process to GIS Functionality**

PLANNING	CURRENT METHODS	USING GIS FUNCTIONALITY	COMMENTS
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<b>ACTIVITY</b>		<b>LITY</b>	
<b>Data collection</b>	.Physical Ground surveys. .Visual collection of map and associated data	.Remote sensing/ aerial photography .Spatial search for data base	.Usage of GIS and Remote Sensing faster and more convenient
<b>Data input</b>	.Map drafting .Graphs, tables, typing	. Map digitizing, scanning .Data entry from keyboard .Map aggregate	.Though a demanding process to input data, it is faster using GIS compared to the current manual process
<b>Data analysis</b>	.Physical overlays of maps .Tracing of final product from different combinations	.Map overlay	.With the usage of GIS functionalities, it is easier both to analyze and update data
<b>Data storage</b>	.Storage cabinets for maps .Manual files stored in filing cabinets	.Storage devices( disk, tape, CD, flash disks) .Computer files	.High storage capacity both in computer, and in storage devices such as flash disks .Occupies less space .More convenient
<b>Data retrieval</b>	.Physical retrieval of maps and files from filing cabinets.	. Desk top display of stored data .Print outs for maps, tables graphs	.Takes few minutes to retrieve data from GIS database .Aids quick decision making .Current process very cumbersome

Table 3.12 Contd.			
<b>Data sharing</b>	.Done through physical sharing of maps and files	.Shared files on computer connections .Flash disks .MODEM usage	. Data sharing through computer connections is much faster and more convenient, compared to the current physical sharing process of files and maps, which is very cumbersome. .Usage of MODEM quickens process of transmission of data to be shared, making it a vital device in the field of networking

**Source: Author. Field Data. 2009.**

The average duration of 6 months for approval of both lay out and building plans by the NPPA, is also a cause for concern. This arrangement does not only delay decision making process at district level, but also inconveniences developers in that it takes long for planning permission to be granted. To resolve this calls for political will, as well as capacity building at district level through investment in new technology such as computers, and training of district staff in GIS skills.

It is imperative that initiation, identification of land for planning purposes as well as preparation of lay-out plans be done at district level. The plans would then be forwarded to the NPPA for scrutiny and eventual approval. Such an arrangement would shorten the current average duration of 6months for each planning stage, and there by speeding up decision making process which in turn would contribute to efficiency. “Further, all councils with adequate capacity should be planning authorities with powers to initiate and review plans- which are currently stagnant.” (MLGH. 2008, P.11). In order for this to come to fruition, it would require the scaling down of financial resources to fund district plans and programs, as well as the entire district planning process, in line with the decentralization policy. There is therefore need for central government to facilitate devolution of planning and budgeting administration framework to district level, in order to support current district planning and budgeting efforts. GIS usage would make a great contribution in speeding up the process.

### **3.3.3 Development of a Proposed GIS/RS Based Integrated Land use Planning Process for the Study Area**

The current arrangement of district planning being done at provincial level, comes with attendant problems such as delayed decision making process. There is therefore a need for heavy investment by central government in capacity building at district level, in human financial as well as in GIS/RS technology. This would as well as broadened community participation. This would consequently entail the need for formulation of rules and regulations to enforce accountability by personnel and various agencies involved in land use planning process at district level. One of the major problems however concerning human resource in the study area, as well as other local authorities is that “in many cases, the low salaries and poor career prospects of local government makes it difficult to attract or keep the appropriately qualified staff.” (UNCHS. 1998, P.29). Consequently, once GIS/RS equipment is acquired and installed, the other cardinal thing that would need to be done is to improve the GIS/RS skills of the planning personnel, in order to ensure availability of a well-trained and motivated workforce. Personnel may be motivated through incentives such as high salaries. Though costs are high during installation of GIS, it is cheaper in the long run.

There is also a continuous reliance on old technology and methods of land use planning process in the study area. For instance, field surveys are still being used as the main method of identifying new areas for development. This is in contrast to the usage of new and more efficient methods and technology, such as GIS and remote sensing. The problem of out-dated equipment and planning tools being used in the planning process, both at provincial and district levels, is mainly attributed to “inadequate investment...leading to deterioration in the existing infrastructure and poor services.” (MLGH. 2008, P.13). There is therefore need for more investment in district capacity building. Apart from funding from central government, this can also partially be achieved through the concept of PPP. Investment in GIS introduction would play an important role in addressing the issue of out-dated equipment and planning tools currently in use.

Though a lot of data is collected in the district, most of it is kept by various stakeholders, and is rarely shared. Reasons for such a scenario are varied. They range

from data privacy, to difficulties in data sharing. It is imperative to coordinate the utilization of these huge amounts of data, if meaningful development has to be achieved in the district. Central government should therefore “support the creation of a well-defined, organized, integrated and accessible data base and information management system at district level.” (Siyunyi. 2004, P.2).GIS application, would play a very critical role in such an arrangement.

It is therefore against this background, that GIS should be viewed as an integral part in the proposed integrated district land use planning process. Apart from fostering coordination amongst stakeholders, GIS could also facilitate linkages between planning authority, and other institutions involved in land use planning process. Formulation of land use plan at district level, should therefore not only end at stipulating the various land uses, but also the means by which huge masses of data generated at district level would be managed. It should also give a pointer to how the lay out plan formulation process could be expedited, and make it readily available to all stakeholders. The usage of new technology, especially computers, would serve as a suitable catalyst here. Herein therefore lies the all important proposed entry point of GIS in the proposed integrated Mpika district land use planning process.

## **CHAPTER 4: TESTING OF THE PROPOSED IDLUPP**

### **4.1 Introduction**

This chapter considers steps tested and those not tested in the proposed ILUPP, its partial testing through the production of existing land use and land use suitability maps, with the aid of a satellite imagery and ArcView 3.2a software. This chapter is necessary because it shows how application of GIS and remote sensing technologies may improve the planning process in the study area. This is depicted by the production of an existing land use map, and a map showing suitable land for residential extension, the main outputs from this testing. Apart from speeding up the process, the testing shows that usage of GIS functionalities and remote sensing technologies would also make it easier for the planning process to be handled at district rather than provincial level.

### **Choice of Land Suitability Map for Testing Proposed IDLUPP**

It is important to note that for the purpose of this study, the aspect of land use suitability was used as an example of how apart from fostering coordination among stakeholders, GIS could also facilitate linkages between planning authority and other institutions involved in the land use planning process. The same principle and process applies if we were to draw another GIS based proposed suitability map e.g. for agricultural purposes. The only difference would be the variables that may determine suitable land usage, such as soil types. In line with the scope of the study, focus was also on the technical aspects of the integration process, rather than the participation of different stakeholders, though GIS can facilitate this process as well.

Land suitability is a critical component to all stakeholders involved in land use planning process. Different stakeholders may want to put land to different uses. Each usage involves consideration of various factors. For instance, land suitable for agricultural purposes takes into account among other factors, the soil type, texture and structure. Different stakeholders may therefore view land suitability not only by physical conditions, but also according to their needs and aspirations. Consequently, with the proposed GIS based integrated land use planning process, all stakeholders will have to agree on the suitable usage of a piece of land out of all the competing needs during DDCC meetings. This would then serve as a prelude to the production

of a GIS based integrated development plan, that would be adhered to by all stakeholders. An integrated land use plan would in turn help to address the issue of competing needs over land by various stakeholders.

#### **4.2 Process Objectives of the Proposed Model**

Process objectives of proposed model may generally be classified in three major components. These are :

- To **survey** the current situation. This involved study and recording of the status quo on land use process in the study area. This is in relation to land use by various stakeholders, economic, household and infrastructure surveys.
- To **identify** existing patterns. This entailed analyzing land capability, and reasons for current land use process patterns, as well as identification of existing trends.
- To **plan**. This focused on design of the proposed land use planning process.

#### **4.3 Stages of Partial Testing of Proposed Process**

Static testing was adopted. This involved not running the program, but inspecting on screen and on printed copy, of a land use map, as a product of the designs in ArcView 3.2a. This technique was helpful in assessing the content and level of comments in the design as well as the scope and how the software matched the design. Partial testing of the proposed model was done at two stages. These were:

##### **Integration Testing**

This involved five stages of the proposed model i.e. from Needs assessment by the community to testing of proposed GIS based integrated land use planning process. It was on the basis of this that a layout plan of existing land use of the study area was produced by using satellite imagery, and ArcView 3.2a GIS software.

##### **Acceptance Testing**

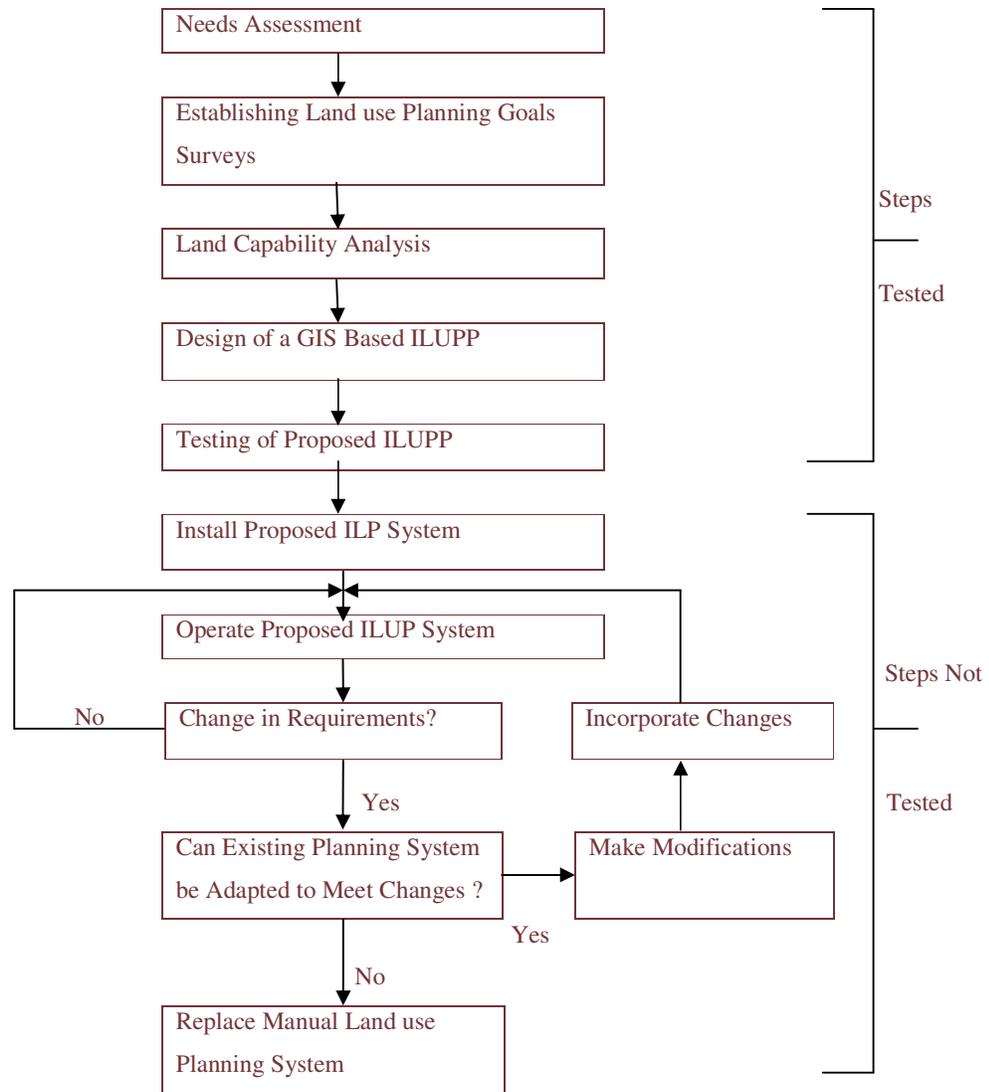
Acceptance testing was only done through structured questionnaires at Mpika District Council. (Appendix A). The Council was selected on the premise that they served both as client as well as user of the proposed planning process. The process involved the council staff looking at specific parts and stages of the proposed

process. This was with a view to assess its workability, and how the various components of the process could be used as an integrated system.

What came out was that the proposed model can function with data at district level, and under normal working pressures. With this system, land use maps can easily be drawn with minimum delays. The process of data retrieval, if and when required, is also enhanced. The only major problem is that currently, the District Council is incapacitated both in terms of qualified personnel, as well as GIS equipment. A lack of GIS equipment at the Mpika District Council therefore, made it difficult to do a practical evaluation of the proposed process.

#### **4.4 General Steps Tested**

Due to time factor and inadequate financial resources, only certain parts of the proposed ILUPP were tested. Fig.4.1, a summary based on the concept of a system life cycle, depicts steps tested and those not tested.



**Fig. 4.1 Proposed Planning Stages Tested. Source : Author. 2009**

### **Needs Assessment**

By its very nature, land use planning, is a community centred exercise, as the community is the main beneficiary. Hence the need for the community's involvement from inception of the planning process. In the context of this study, the main need was the assessment of how the current land use planning process may be improved through GIS application. The community was involved through interviews and questionnaires. (Appendix A).

### **Establishing Goals and Ground Rules of Planning Process**

Setting of planning goals was based on the premise that “while it is impossible to plan for optimum conditions for every current or future inhabitant or user, the plan proposals should aim to provide the best solution for as many requirements as possible, or the greatest aggregate net benefit for all concerned.” (Hall.P. (ed.) 1970.P.153).

The planning area and scope of study were defined, goals and criteria of planning process established, major constraints in planning process such as social, institutional and legal framework were identified.

### **Surveys**

In order to structure problems and opportunities, Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis of the study area was done. The major factors considered at this stage, among others, were the extent and location of planning area, district administrative structures, as well as surveys for existing land use/cover, economic, household and infrastructure. This was done by relying on satellite imagery, lay out plans, available literature, structured interviews, as well as field surveys.

### **Land Capability Analysis**

This stage is for identification of alternative suitable land uses, through chosen social, economic and physical conditions. It involved land use analysis, economic analysis, household analysis and infrastructure analysis. Buffering of selected attributes was employed. Each buffer had its own defined boundaries. For the purpose of this study, suitable land earmarked for residential development was chosen in order to depict how GIS functionalities may be applied not only for land suitability determination, but also for other uses. (see Table 4.2). Land for residential extension development was determined to be 500m within an existing road for ease of travel, 100m away from dambo areas, as well as 50m from railway line. This analysis results in availability of data on land capability for the proposed usage.

Land capability analysis through utilization of overlaying function of GIS, also helps in coming up with land compilation. The compilation of suitable land for a particular

usage is determined on the basis of an area meeting specified environmental, social and economic conditions. Overlaying will involve:

- land use versus economic status,
- land use versus household situation and
- land use versus infrastructure status

The buffering, overlaying, merging, union and query functions of GIS, helps in evaluating land suitability. Through overlaying function of GIS of different themes, it enables appraisal of alternative land uses, and consequently determination of the type of land suitable for different type of uses. Through appraisal of alternative land uses, it is also possible to predict the consequences of incompatible land use practices, such as soil erosion.

Land capability analysis is based on the premise that the proposed usage should yield envisaged benefits commensurate to what would be invested in such an area. The end result of this stage is availability of data on land suitable for economic activities, housing and infrastructure development.

In coming up with the best land use option, various factors are taken into account such as planning standards, building regulations and implications for future land usage. This is achieved through buffering, merger, and union of various relevant themes, and then applying the query function.

Through application of query function, it is possible to classify best land for residential development, ranked on the basis of suitability through a code system. For example, 1-for most suitable, 2-for moderately suitable, 3- for suitable, 4- for unsuitable, and 5- for most unsuitable. After this type of ranking, the best alternative land usage for a particular area is chosen.

In a nutshell, this stage helps not only in coming up with priorities in terms of land usage, but also in making well informed land use decisions.

### **Design of a GIS Based Integrated Land use Planning Process**

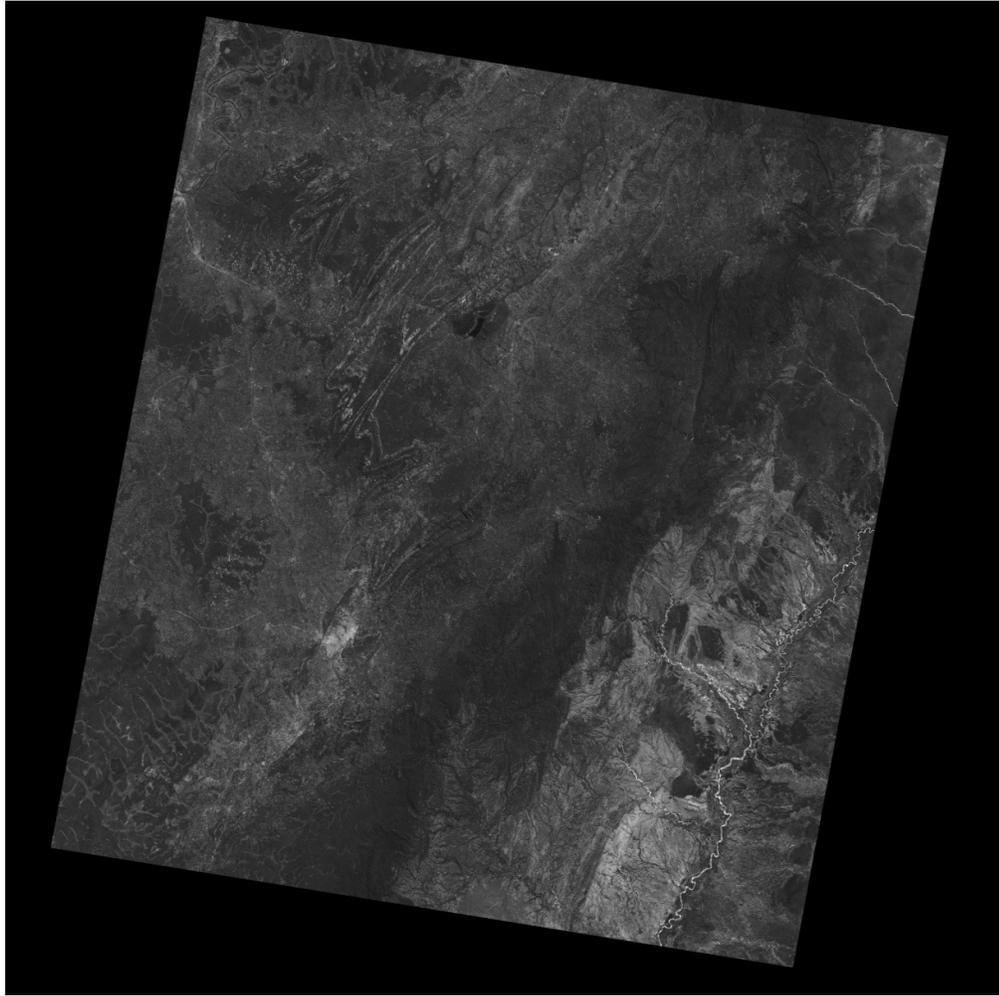
Proposed design of a GIS based ILUPP was done. It related to the conventional stages of a planning process

### **Testing of Proposed ILUPP**

Apart from testing through structured interviews, the production of existing land use and land suitability maps referred to below were part of testing a GIS based integrated planning process.

### **4.5 Production of Existing Land use Map**

In order to produce a map of the existing land use, a geo-referenced satellite imagery of the study area was used. This was sourced from the Department of Geomatic Engineering (UNZA). at no cost, and for which I am greatly indebted. There are numerous advantages of satellite imagery data for land use planning. The biggest strength of satellite born sensor data is not only its speed and efficiency, but also “the wide and repetitive coverage afforded by the satellite platforms are especially important with regard to the cost effectiveness of collecting and the ease of up-dating the land use data.” (Lo. C.P. P.248).Fig.4.2 shows geo-referenced satellite imagery that was used.



**Fig.4.2 Satellite imagery showing study area and outlying areas. Source: Geomatic Engineering Department. (UNZA). 2009.**

Interpretation of the satellite imagery in order to come up with distinct land units was based on my knowledge of the study area, as well as my skills in GIS, air-photo and satellite imagery interpretation and photogrammetry. Through the application and analysis of image characteristics of size, shape, texture, shadows, tone, pattern, site and association, vegetation cover and land use were identified. Texture, tone and pattern helped in interpretation of land cover, whilst association was helpful in determining land use. It was on the basis of this that approximate boundaries of various themes such as areas for residential usage were determined.

### **Defining land units Land use types**

In order to determine land units (cover) from the satellite imagery, the spatial resolution played a major role. The imagery had a coarse resolution, which consequently affected accuracy in determining distinct feature boundaries. Through utilization of ArcView Image Analysis extension, image enhancement was achieved, and in the process enabling a clear vision impression. Image enhancement techniques included sharpen, smoothen and edge detection. The zoom function of GIS to enlarge or reduce the area of attention under display was also applied.

### **Assignment of Land use to Land Units**

Assignment of land use schemes as Lo (1986) puts it, was based on the premise that “a good classification scheme should be easy to use, with no ambiguity in defining each land use and land cover category.” (Lo.P. 1986, P.228). Classification took both the functional and morphological approaches. The former is activity oriented and uses terms such as forestry, agricultural, whilst the latter emphasizes land cover, with terms such as arable land, grassland, built up area.

Land use zoning is an important component at this stage of the land use planning process. This is because it helps in identification of land, in terms of its proposed usage. Zoning “sets apart different areas in the town for specific purposes.” (Hiraskar.G.K. 2003. P.43). Consequently, any proposed developments should be compatible with the zoning of a particular area. For instance, to ensure compatibility, land zoned for residential developments, should be used as such. All things being equal, land use zoning also helps in orderly development. Draft plans in this context, serve as a prelude to the production of an integrated land use plan.

### **Digitizing**

On-screen digitizing was applied due to its convenience in that ArcView3.2a version of GIS was being used. Table. 4.1 shows pros and cons of the two main types of digitizing.

**Table 4.1 Pros and Cons of the Two Methods of Digitizing**

	<b>PROS</b>	<b>CONS</b>
<b>DIGITIZING BOARD</b>	<ul style="list-style-type: none"> <li>.Allows highly accurate digitizing</li> <li>.An entire map sheet can be placed on the board for a better over view</li> </ul>	<ul style="list-style-type: none"> <li>.Expensive equipment and space needed</li> <li>.Need to always cross-check between the digitizing board and screen</li> <li>.Takes more time to prepare</li> <li>.With some GIS software the set-up of a digitizing board is difficult or even impossible.</li> </ul>
<b>ON-SCREEN DIGITIZING</b>	<ul style="list-style-type: none"> <li>.Allows fast digitizing and quick production of maps</li> <li>.Output can be seen immediately</li> </ul>	<ul style="list-style-type: none"> <li>. A lot of RAM is needed because the scanned files are extremely large.</li> <li>.Scanning can distort information.</li> <li>.It requires more effort to geographically reference the map.</li> </ul>

**Source: Adapted from UNCHS. 2000 P.35**

**To digitize** features into a new theme, choose New Theme from the view menu to create the new theme.

**To edit** an existing theme, make it active and choose Start Editing from the Theme Menu

**To add** graphics to a new view without creating a theme, go ahead and digitize

### **Digitizing in ArcView**

Digitizing in ArcView follows the following process:

**Start** ArcView. Set the **extensions. New View. Add** button (top bar) to add theme to the view

**N.B.**

**To add maps** to the view, change **Data Source** type to **Image Data Source**

**To add shape files** to the view, change **Data Source** type to **Feature Data Source**

**To add images** to the view, change **Data Source** type to **Image Analysis Data Source**

**View** (top bar) Properties. **Change** map units to meters and change distance units to meters. Press **OK. View** ( top bar). **New Theme. Choose** Feature type (point,

line, polygon). Press **OK**. **Save** the Theme under the name of the feature selected for digitizing (e.g. road, if line is chosen as the feature type). Press **OK**

The feature's name is displayed on the left side of view (the dotted line around the box shows that it is in edit mode, and ready for digitizing). **Theme** (top bar)

**Properties. Editing**(left column) to set the Snapping Tolerance

**General** – set snapping tolerance 0.5m. **Inter active** – set snapping tolerance 0.5m

Press **OK**. **Zoom** in the required view / scale. **Click** on the Digitizing Tool (top bar)

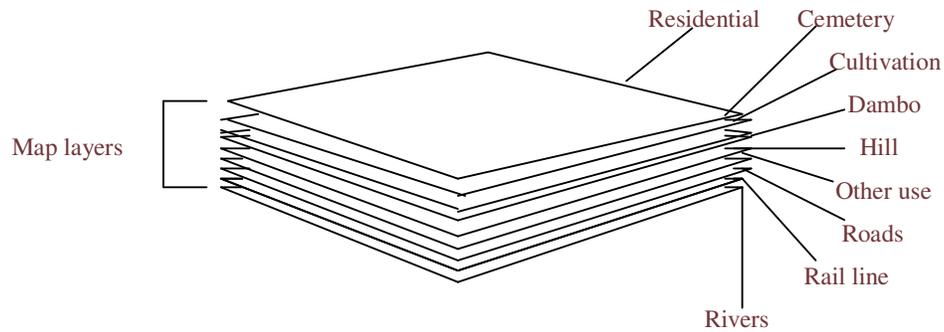
**Start** digitizing by following the feature while clicking the Left Mouse Button at intervals. **Save** edits while digitizing to avoid loss of data in case of computer problems or power failure. **To stop** the line / feature being digitized, **double click** at the end. **Stop** editing when **Finished**

### **To Add Colour, Line Type or Adding Pattern to the Feature**

In order to add colour to the digitized themes

**Double click** on a particular **Theme in View 1**. In the **Legend Editor**, **double click** on the symbol .**Select** line, colour or pattern. **Apply**. The feature will **change** accordingly

After digitizing and adding colour to them, distinct themes of land uses that were derived from the imagery were: **Residential** (Low, Medium and High Cost), **Cultivation, Roads, Rivers, Railway line, Hills, and Other Uses** that could not distinctively be classified. These classifications are usually referred to as map layers. “A map layer is a set of data describing a single characteristic of each location within a bounded geographical area.” (Malczewski.J. 1999. P.34). Consequently, only one theme is available for each location within a single layer. These themes are then combined through utilization of overlay function of ArcView GIS, as illustrated by Fig. 4.3 below.



**Fig. 4.3 GIS Map Layers Overlays .**

**Source: Author, 2009**

### **Converting a theme to a shape file**

Make the theme **active**. From the theme menu, **choose convert to shape file**

In the dialog that appears, specify a name and location for the new shape file. Press **OK**. You are prompted to see if you want to add the new shape file as a theme to the view you are currently working on.

Digitizing, overlay and union functions, the retrieval and display functions of GIS, with the help of user interface of computer, led to production of Fig.4.4, showing existing land use in the study area. The entire process of digitizing the study area took 1 week.

## MPIKA LANDUSE MAP

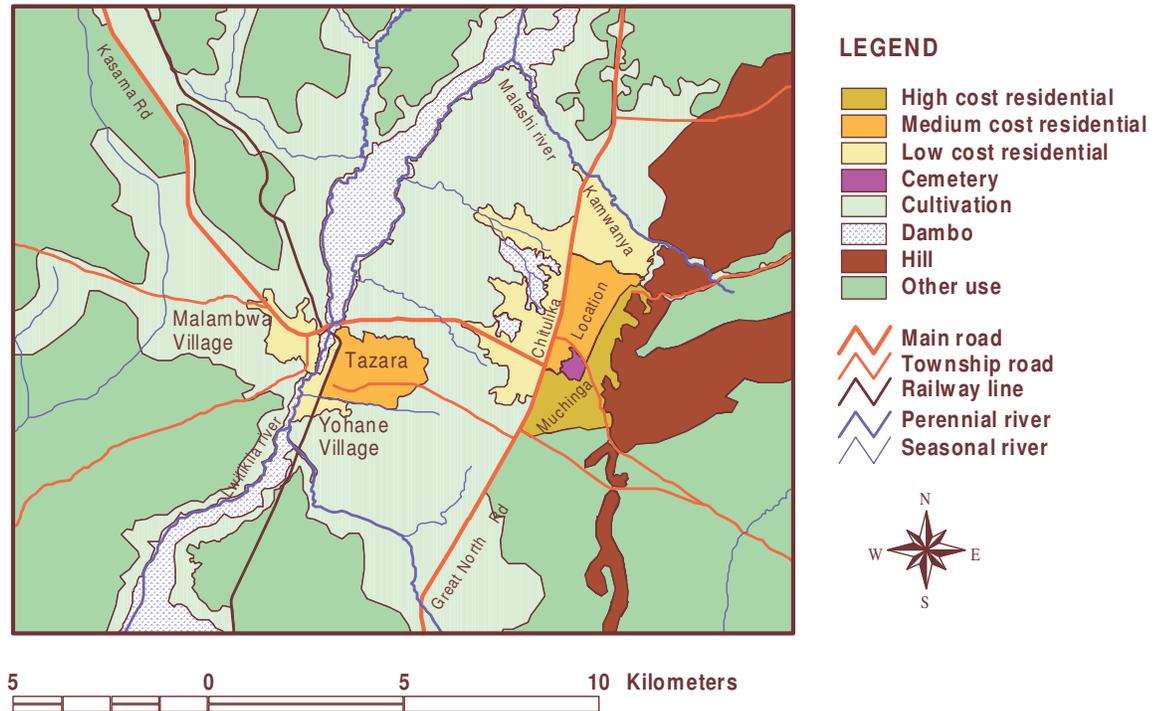


Fig.4.4 Mpika Town Land use Map. Source: Author, 2009

### Analysis of land suitability

The process of overlaying function in GIS to determine land suitability, follows the same steps as manual overlaying. The only difference is that the light table is replaced by the computer monitor.

**Load** the respective maps to be overlaid into view, and **activate the Geo Processing Wizard**. Under **Extension**, Choose **Geo Processing**. Click **OK**

Under View there is the **Geo Processing Wizard**, which contains six Geo Processing operations. For **overlaying** choose the operation **‘Intersect Two Themes’** or **‘Union Two Themes’**. Choose a **Geo Processing** operation. Click **‘Next’** button to choose options. Choose **‘Union Two Themes’** from the options.

**NB.** Union operation combines features of an input theme with the polygons from an overlaying theme to produce an output theme that contains the attributes and full extent of both themes. **Press/Choose Next**

The wizard asks which shape files to combine, and what the new shape file will be called. **Press ‘Finish’** button

#### **4.6 Production of Proposed Suitability Map for Residential Extension**

##### **Definition of Land Suitability Parameters**

Definition of land suitability parameters was on the basis of

- Distance from existing infrastructure (such as roads, rail line)
- Existing land cover
- Existing land use
- Slope
- Proximity to residential areas
- Distance from physical features (such as hills, rivers, dambos)

##### **Buffering of Themes**

Production of Fig. 4.5, was based on the themes shown in Fig.4.4. These themes were buffered by applying the conditions listed below, based on various planning standards, such as environmental, social and economic reasons.

- Land 50m away from railway line
- Land 500m adjacent to existing main and township roads, merged as one theme.
- Land 100m outside existing dambo area
- Land 1000m outside exiting cemetery
- Land 100m away from foot hill
- Land 50m away from perennial and seasonal rivers, merged as on theme.
- Land 500m adjacent to existing low, medium and high cost residential areas, merged as one theme.
- Land 100m inside and outside other use and cultivation respectively.

It was on the basis of these conditions that buffers were created for various themes.

In order to create a buffer on a particular theme,

**Select** a particular **theme** in **View 1. Theme** (top bar). **Create buffers** (feature of the

theme will show). Press **Next. Specify** –  
**distance** e.g. 500m from a specific feature  
-number of rings e.g. 1

-distance between the rings e.g. 500m

-distance units e.g. metres

Press **Next. Dissolve** barriers between buffers – **Yes - No** (Tick on appropriate)

**Create buffers** so that they are

- **Inside** and **Outside** the polygon(s)

- Only **outside** the polygon

- Only **inside** the polygon

(**Tick** on appropriate)

**Where do you want the buffers to be saved ?**

- As **graphics** in the view (select the theme to be buffered)

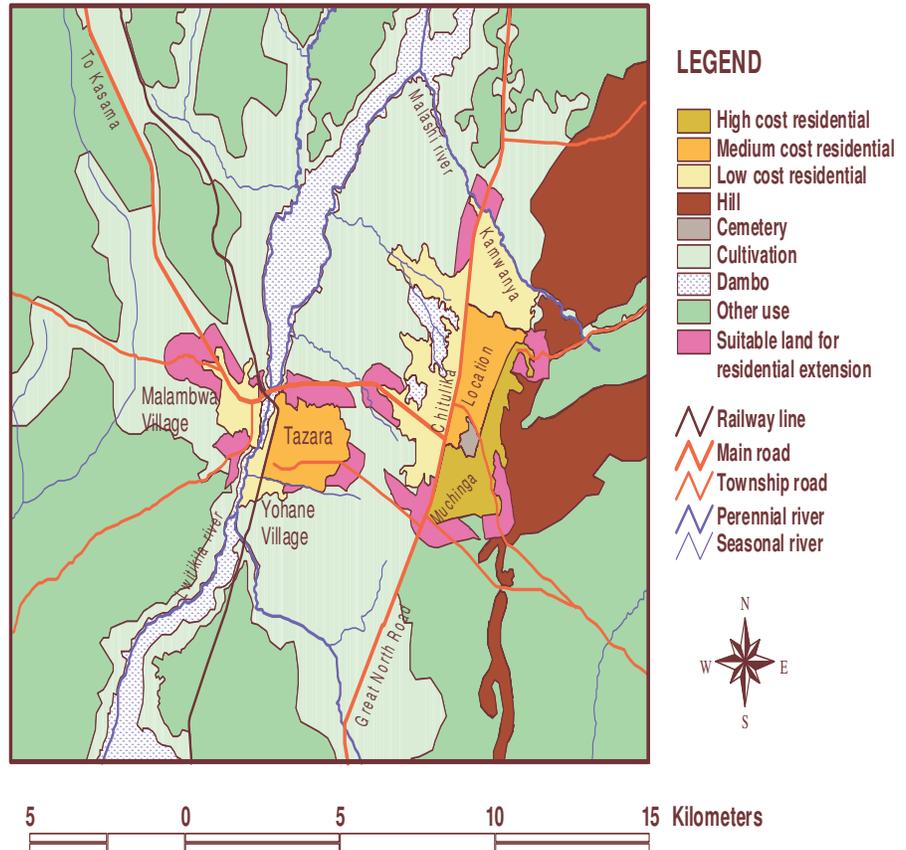
- In an **existing theme**

- In a **new theme** (select drive and folder where to save the buffer)

(**Tick** on appropriate)

Then the merger, union and query functions of GIS were applied. The final product was then converted to shape file, in order to come up with the proposed map showing suitable land for residential use extension (Fig. 4.5)

## MAP SHOWING SUITABLE LAND FOR RESIDENTIAL EXTENSION



**Fig. 4.5: Land Suitability Map for Residential Extension. Source: Author, 2009.**

Through the usage of retrieval function of GIS, retrieval of this map takes only a few minutes. This is in contrast to the current cumbersome manual system of map retrieval, where one has to physically search for maps from filing cabinets. The use of GIS therefore simplifies land management, which is cardinal for an improved district land use planning process. Table 4.2 shows examples of other possible land

suitability maps that may be produced from a GIS based integrated district land use planning process for the study area.

**Table 4.2: Examples of Possible Land Suitability Maps from a GIS Based Integrated District Land use Planning Process for the Study Area.**

<b>TYPE OF MAP</b>	<b>SOURCE(S) OF DATA</b>	<b>TOPICS TO BE PORTRAYED</b>
<b>Basic Map</b>	Topographical maps and satellite imagery of the study area	To depict major features of Mpika town and Mpika district. These may include major district roads, rivers and administrative boundaries
<b>Thematic Maps</b>	Institutions and various sectors of the district, e.g. Department of Agriculture.	Specific topics from various sectors of the district. These may include farm locations and sizes, environmental conservation and management, district game parks and their management.
<b>Sensitivity Maps</b>	Map Overlays	To depict areas of Mpika town and Mpika district, sensitive to certain types of environmental issues, such as flooding, water logging and soil erosion.
<b>Suitability Maps</b>	Map Overlays	To show areas suitable or not suitable for various types of economic activities taking place in Mpika town or district e.g. agriculture or residential use.
<b>Service Delivery Maps</b>	Utility companies, such as ZESCO, ZAMTEL and Chambeshi Water And Sewerage Company.	To show types and extent of infrastructure or services available in the district. These may include water and sewerage services, electric power supply, solid waste management, transport and communications, as well as education and health services.

**Source: Author. Field Data. 2009.**

### **Evaluation of Land use – Land unit Assignment**

Various physical, socio-economic factors are considered when assigning land uses. For instance, land meant for industrial development is usually located on windward side in relation to areas meant for residential development. This is in order to avert effects of pollution from industrial areas. Other variables that may determine land use include among others, topography, drainage, vegetation, as well as soil type and texture. Suffice to point out that the Town and Country Planning Act provides for change of land use zoning, if and when need arises. For instance portions of land

zoned for industrial development may be re-zoned for residential use if there is demand for more housing.

When designing land use map, colour type assignment is based on the standards as stipulated by the colour code in the Town and Country Planning Act. For instance, water bodies such as rivers, lakes and dambo areas, are represented by the colour blue. Whilst residential areas are represented by the colour yellow.

## **CHAPTER 5.0: CONCLUSIONS AND RECOMMENDATIONS**

### **5.1 Introduction**

This chapter covers conclusions and recommendations, and then considers research limitations and suggests possible areas of future research.

### **5.2 Conclusions**

The aim of this research was to consider possible application of a GIS based integrated district land use planning process in the study area. This is in view of the failure by Mpika District Council to effectively manage the district land use planning process. Consequently, land use planning has continued to be done at provincial level, by the NPPA.

A proposed GIS based integrated district land use planning process was designed. This model depicts the major relevant process stages involving initiation of planning process, data collection, processing, storage, plan formulation and implementation, culminating in an envisaged improved district land use planning process.

The research established the failure by Mpika District Council to manage district planning, and further established that even at provincial level where planning is being done for the district, there is no enough capacity to manage an effective land use planning process. This is especially so when one considers the fact that other than the study area, the NPPA has also to do layout plans for the other districts in the province (except for Kasama and Mbala, which are planning authorities).

It further established that even the manual planning methods being used at both provincial and district levels, are not adequate to ensure a sustainable land use planning process, worse still, an integrated one. The Council's failure to administer an effective planning process, has been attributed to several reasons. These include:

- Inadequate funding from central government to the district. This is despite the fact that local authorities operate as appendages of central government.
- Fragmented nature of relevant pieces of legislation, coupled with a large number of players in the planning process.

- Inadequate community participation.
- Planning is still being done at provincial level. This is despite the fact that the local authority is left to determine various land uses, as well as district needs and priorities. This type of arrangement not only delays decision making process, but also defeats local initiative.
- Planning is still being done with inadequate, and out dated planning methods, both at provincial and district level.

For all the above problems to be tackled, it needs not only decentralization of land use planning process from province to district level, but also an integrated approach, where all stakeholders will have a role to play. The majority of the respondents (especially the councillors) acknowledged the crucial role that new technology in general, and GIS in particular, would play in such an arrangement. In fact all the councilors interviewed supported the idea of new technology usage, coupled with stakeholder participation, as a viable route to resolving bottlenecks in the current district land use planning process.

GIS would therefore not only assure a coordinated approach to district planning problems alluded to above, but would also enhance capacity at district level. This would be realized through the major roles that GIS can play in an integrated planning process. This is through data collection, processing, storage, retrieval and sharing. For the security and protection of data, there would be need to use passwords. This would ensure that only authorized persons have access to particular computer terminals, or to certain files. This arrangement would to a large extent also protect both soft and hardware from physical damage, as well as protect data from being stolen.

GIS would not only enhance efficiency through service delivery, but also provide a coordinated approach to district land use planning process. Coordination at district level, is in fact one of the cornerstones of the long awaited implementation of the decentralization policy. As Scholten and Stillwell puts it, GIS “is a dynamic technology with enormous potential for the future. However, this potential will only be realized if those in the planning profession, in senior administrative and executive positions are prepared to meet the challenges which GIS adoption entails, and are

able to demonstrate the vision necessary to create a suitable environment for successful GIS application.”(Scholten.H.J. and Stillwell.J.C.H. 1990, P.13). Consequently, “benefits can only be realized if funds are spent, policies changed, and processes modified. GIS can be a catalyst for change.” (UNCHS. 1998, P.10).

Despite the challenges alluded to above, it is possible to integrate GIS/RS technologies in Mpika. This can be justified by the following factors

- There is an existing legal and institutional framework in which introduction of GIS/RS technologies can be anchored
- Large quantities of un- integrated data is readily available in the study area from different stakeholders. This would justify the heavy investment that would be put in the integration of GIS/RS technologies in the planning process.
- The concept of introducing GIS/RS to facilitate the easy and quick handling of land use planning data at district level is in line with the decentralization policy. There is a lot of political will in implementing this policy by central government.
- Apart from central government, funding for integration of GIS/RS in the planning process may also be sourced through Public Private Partnerships (PPP).

In a nutshell, with GIS application at district level, coupled with district stakeholder coordination, an integrated district land use planning process is therefore not only feasible, but attainable.

### **5.3 Recommendations**

Clear guidelines, as well as policy changes are required to facilitate an entry point in the utilization of GIS in an integrated district land use planning process. GIS is cardinal not only to assure stakeholder/community participation, but a coordinated and integrated approach to land use planning. After all, the ultimate aim of GIS is to support spatial decision making.

Though GIS is expensive to install, it has limitless and sustainable benefits. This however calls for political will, as well as massive investment in district capacity building.

The under listed, are some of the major recommendations that may facilitate the entry of a GIS based integrated district land use planning process in Mpika.

### **Decentralization of Planning from Province to District Level**

There is need to decentralize land use planning from provincial to district level. This would enhance local initiative, and justify the heavy investment that would be put in GIS introduction at district level. It would also ease and speed up decision making process at district level.

### **Collaboration Among Stakeholders**

There is need for collaboration between the local authority and district stakeholders. The advantage with this arrangement is that while the local authority will be formulating policy, the stakeholders, through their participation, would be ensuring that these policies are in line with people's needs and aspirations. Measures should be taken to ensure a more coordinated and participatory approach to planning. As Chuunga puts it, "not only would integrated local government attract maximum citizen participation and support, it would also ensure that the unity is a visible instrument for implementation of policy." (Chuunga 1968, P. 26). In the final analysis, this may enhance the planning process. There is therefore need for harmonization of roles and functions of various stakeholders through integrated planning.

GIS is an indispensable tool for effective district stakeholder networking and coordination.

### **Amendment of Town and Country Planning Act, Cap. 283**

The Town and Country Planning Act, should further be amended in order to put more emphasis on new technology application, coupled with stakeholder participation, in the entire planning process. This would ensure that whatever is done is not only in line with technological advances in the contemporary world, but is also

in line with people's needs and aspirations. This is cardinal, because the entire land use planning process is a people centered exercise.

In the same vein, other relevant legal provisions on land use planning process, such as Local Government Act, Public Health Act and EPPCA, should be harmonized with this Act, in order to remove elements of contradiction and duplication. This is also important because other pieces of legislation contain critical provisions relevant for an effective management of land use planning process.

### **Building Capacity in the Local Authority**

The local authority, rather than continuing to operate as a closed community, should open up, and involve other stakeholders in its operations. This may be done through the adoption of the concept of public private partnerships (PPP). Such an arrangement, could to a large measure, reduce on the strain currently put on council's meager resources. There is an urgent need to take immediate steps to improve the financial status of the Councils, in order to enhance service delivery. Other sources of income that may be considered include:-

- Fuel Levy - Councils should be allowed to collect at least 50% of the fuel levy in their respective areas.
- Value added Tax (VAT) – Government through ZRA should give Councils at least 20% of the VAT collected in the respective areas.
- Motor vehicle Licenses – The Government should revert the responsibility of issuance of motor vehicle licenses to Councils.
- Toll gate fees – Government should allow Councils to construct toll gates in their respective districts, and charge a fee to vehicles entering and leaving their areas of jurisdiction.

In order for the above to be feasible, other supplementary measures need to be taken. These include:

- More, and consistent funding to the district Council.
- Provision of incentives to the Council, especially by Central Government, could also help in retaining qualified staff in the Council.

- Other major needs, that have to be addressed, if district development has to become a reality, are: enhanced investment in new technology (provision and usage); training (especially in house); formation of a planning control inspectorate to work in liaison with district stakeholders, as well as improved data management.

Human resource development in new techniques and methods of land use planning process (in this case, GIS usage) would be an indispensable undertaking.

### **Enforcement of Existing Relevant Legislation**

There is need for the local authority to improve on its administrative and management capacities, in order to efficiently enforce existing relevant by-laws. Sensitization of stakeholders, on the provisions of the said acts, would enhance chances of compliance.

### **Introduction of GIS in School Curricula**

GIS should be introduced as part of school curricula at secondary school level. This would ensure the community (though pupils coming from various homes) is exposed to GIS concepts and strategies at an early stage.

It is also imperative to note that though ArcView 3.2a was used for this study because it was approved and readily available in the department of Geomatic Engineering at UNZA, it is an old version which is slowly being phased out. It is therefore recommended that ArcView 9.2 which is a newer version be used for GIS mapping and analysis.

The way forward therefore is that in order to make improvements to the current land use planning process, there is need to incorporate in the process, an integrated policy and institutional frame work. This should take into account all socio-economic, technical, financial and environmental aspects of the district land use planning process.

In order for all the above to be achieved, there is need for coordination of all sectors in the district, not to mention political will and government support. After all, local

authorities in general and Mpika District Council in particular are a creation of central government, and a service organ of government. GIS is an indispensable tool, and can play a very critical role in such a dispensation.

#### **5.4 Research Limitations**

Due to time limit, it was difficult to do an exhaustive research on implications at provincial level, if district land use planning process was to be transferred to district level. Of course, one immediate impact would be job losses, due to resultant scaled down functions.

Time factor, coupled with inadequate financial resources, also impacted negatively on sample size, and testing of the proposed model.

#### **5.5 Areas of Future Research**

GIS based integrated land use planning in general, and land use planning process in particular, is a very broad field. Consequently, the following topics are suggested for future research if a similar study was to be conducted in another district.

- GIS based district planning control
- GIS application as catalyst to sustainable district land delivery system.
- GIS based district service delivery system

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**7.0 APPENDICES**

**7.1 APPENDIX “A” SAMPLE QUESTIONNAIRES**

**GEOGRAPHICAL INFORMATION SYSTEM (GIS) BASED INTEGRATED  
DISTRICT LANDUSE PLANNING PROCESS: A CASE STUDY OF MPIKA**

**Questionnaire for Mpika District Council Staff**

**SECTION A: PERSONAL DETAILS**

1.What is the name of Department.....

**SECTION B: THE LANDUSE PLANNING PROCESS**

**INITIATION OF THE PLANNING PROCESS**

2.Do you have a District Land use / Structural plan?

- a. Yes  b. No

3.If yes, how old is it?

- a. 1 – 5 years.....   
b. 6 – 10 years.....   
c. 11 – 15 years.....   
d. 16 – 20 years.....   
e. Above 20 years.....   
f. Not applicable.....

4.If no, on what basis do you prepare layout plans?

- a. The Provincial Planning Authority does it on our behalf..   
b. Drawn based on existing topographical maps.....   
c. The council does it based on existing physical  
environment.....   
d. Not applicable.....

5.Who initiates the land use planning process in the District?

- a. The Provincial Planning Authority.....   
b. The District Council.....   
c. The Community.....   
d. Any other (specify).....

6. What prompts the initiation of the planning process?
- a. Demands from the Provincial Planning Authority.....
  - b. District Council sees the need.....
  - c. Demand for plots from residents.....
  - d. Any other (specify).....

7. How long does this process take?
- a. 1 week.....
  - b. 1 month.....
  - c. 6 months.....
  - d. 1 year.....
  - e. More than 1 year.....

DEVELOPMENT OF A LAYOUT PLAN

8. Who are involved in the development of a layout plan?
- a. Provincial Planning Authority.....
  - b. The District Council.....
  - c. The Community.....
  - d. Any other (specify).....

9. Who identifies the land for planning purposes?
- a. Provincial Planning Authority.....
  - b. The District Council.....
  - c. The Community.....
  - d. Any other (specify).....

10. How long does the land identification process take?
- a. 1 week.....
  - b. 1 month.....
  - c. 6 months.....
  - d. 1 year.....
  - e. More than 1 year.....

DESIGN OF A LAYOUT PLAN

11. Who drafts the layout plan (s) for the District?
- a. Central Government.....
  - b. Provincial Planning Authority.....

- c. The District Council.....
  - d. Any other (specify).....
12. How is the layout plan prepared?
- a. By taking measurements in the field.....
  - b. Based on topographical maps.....
  - c. Based on existing land use maps only.....
  - d. By combination of field measurements and  
existing maps.....
13. What factors do you consider in the preparation of a layout plan?
- a. Existing infrastructure.....
  - b. Topography.....
  - c. Existing land use.....
  - d. Environmental impact .....
  - e. Any other (specify).....
14. How long does this process take?
- a. 1 week.....
  - b. 1 month.....
  - c. 6 months.....
  - d. 1 year.....
  - e. More than 1 year .....
15. What factors determine the duration of the process?
- a. Number of plots being created.....
  - b. Number of planning personnel involved.....
  - c. Availability of suitable planning equipment .....
  - d. Adequacy of planning skills by the  
planning personnel.....
16. How many proposed layout plans are made in a year?
- a. Less than 1 .....
  - b. Between 1 – 5 .....
  - c. Between 5 – 10 .....
  - d. Between 10 – 15 .....
  - e. Between 15 – 20 .....
  - f. More than 20 .....

17. How many man hours are spent on making one of these layout plans?
- a. Less than 1 hour.....
  - b. 1 – 5 hours.....
  - c. 6 - 10 hours.....
  - d. 11-15 hours.....
  - e. More than 15 hours.....

18. What are the inputs?
- a. Drawing equipment.....
  - b. Drawing personnel.....
  - c. Man hours .....
  - d. Others (specify).....

APPROVAL OF LAYOUT PLAN

19. What are the requirements / standards for approval of a layout plan?
- a. Minimum planning standards as determined by the Provincial Planning Authority.....
  - b. Minimum planning standards as determined by the District Council.....
  - c. Any other (specify).....

20. Who approves the district layout plan (s)?
- a. Central Government, through Ministry of Local Government and Housing.....
  - b. The Provincial Planning Authority.....
  - c. The District Council.....
  - d. Any other (specify).....

21. How long does approval of District layout plan take?
- a. 1 week.....
  - b. 1 month.....
  - c. 6 months.....
  - d. 1 year.....
  - e. More than 1 year.....

## APPROVAL OF BUILDING PLANS

22. How long does approval of proposed building plans take?

- a. 1 week.....
- b. 1 month.....
- c. 6 months.....
- d. 1 year.....
- e. More than 1 year.....

23. What are the main reasons for non- approval of building plans?

- a. Incompatibility of land use to the proposed development (s).....
- b. Non-compliance with building regulations.....
- c. Failure to meet minimum planning standards.....
- d. Any other (specify).....

## IMPLEMENTATION OF LAYOUT PLAN

24. Who implements the Layout Plan?

- a. The Provincial Planning Authority.....
- b. The District Council.....
- c. The Community.....

25. What is the role of the Provincial Planning Authority in the implementation of a layout plan?

- a. Checking compliance with approved layout plan.....
- b. Supervisory role.....

26. How long does implementation of a layout plan take?

- a. Less than 6 months.....
- b. Between 6 months and 12 months.....
- c. On-going process.....

27. What factors have influenced implementation of a layout Plan?

- a. Non availability of adequate financial resources.....
- b. Inadequate modern technology (e.g. computers).....
- c. Inadequate trained personnel at the council.....

MONITORING AND EVALUATION

28. Do you as a district monitor implementation of layout plans?

- a. Yes  b. No

29. If yes, who are involved?

- a. Council staff only.....   
b. The District Development Coordinating Committee..   
c. Not applicable.....

30. If no, why?

- a. Work is done by the Northern Province  
Planning Authority.....   
b. Not applicable.....

31. Who are involved in the Monitoring and Evaluation of the implementation of a lay out plan?

- a. Central Government, through the Ministry of  
Local Government and Housing.....   
b. The Provincial Planning Authority.....   
c. The District Council.....   
d. The Community.....

32. At what stage is Monitoring and Evaluation done by the Provincial Planning Authority?

- a. Monthly.....   
b. Quarterly.....   
c. Yearly.....   
e. On - going process.....

33. How frequently is Monitoring and Evaluation done specifically by the District?

- a. Monthly.....   
b. Quarterly .....   
c. Once every 6 months.....   
d. Yearly.....   
e. On-going process.....

SECTION C: HUMAN RESOURCES

34. What is the total establishment of personnel in the department responsible for land use planning?

- a. 1.....
- b. 2.....
- c. 3.....
- d. 4.....
- e. 5.....

SECTION D: COMMUNITY PARTICIPATION

35. Does the community participate in the district land use planning process ?

- a. Yes
- b. No

36. Do you think the community should be involved in land use planning process? a. Yes  b. No

37. If yes, why?

- a. They are major beneficiaries.....
- b. Process will be sustainable.....
- c. Cheaper due to shared costs and risks.....
- d. More expertise will be made available .....
- e. Not applicable.....

38. If no, why?

- a. Process will take longer.....
- b. It will be more costly.....
- c. Not applicable.....

SECTION E: GENERAL

39. What would you attribute the problems in the current district Land use planning process to?

- a. ....
- b. ....
- c. ....
- d. ....
- e. ....

40. What are the possible solutions?

- a. ....
- b. ....
- c. ....
- d. ....
- e. ....

THANK YOU FOR YOUR COOPERATION

GEOGRAPHICAL INFORMATION SYSTEM (GIS) BASED INTEGRATED  
DISTRICT LAND USE PLANNING PROCESS: A CASE STUDY OF MPIKA

**Questionnaire for Councillors (Policy Makers)**

1. Name of ward.....
2. Is the township expanding? a. Yes  b. No
3. Which area is expanding most ?
  - a. ....
  - b. ....
  - c. ....
  - d. ....
  - e. ....
4. How is the expansion like?
  - a. Planned.....
  - b. Unplanned / haphazard.....
  - c. Any other (specify).....
5. Any explanation for such a scenario? 
  - a. Inadequate land use planning taking place.....
  - b. Involvement of too many stakeholders.....
  - c. Council's failure to enforce the law.....
  - d. Any other (specify).....
6. How do people acquire plots? 
  - a. Formally.....
  - b. Informally.....
  - c. Both of the above.....
  - d. Not sure .....
7. How long does it take for one to formally acquire a plot (duration) ?
  - a. Less than 1 month.....
  - b. Between 1 – 6 months.....
  - c. 1 year.....
  - d. More than 1 year.....
  - e. Any other (specify).....
8. What is the reason for such a scenario?
  - a. land use planning is done at Provincial level.....

- b. Inadequate council staff.....
- c. Unqualified council staff.....
- d. Irregular meetings.....
- e. Any other (specify).....

9. What is the major problem being faced in land use planning process in the study area ?

- a. Involvement of too many players at district level...
- b. Inadequate community participation.....
- c. Inadequate funding for the council.....
- d. Inadequate land use planning tools/technology.....
- e. Fragmented relevant pieces of legislation.....
- f. Land use planning for the district being done at Provincial level.....

10. What is the possible solution ?

- a. Coordination.....
- b. Community participation.....
- c. Increased funding to the council.....
- d. Land use planning to be done at district level...
- e. Utilisation of new technology (e.g. computers)...
- f. Reconciliation of relevant pieces of legislation...

11. Do you think the community should be involved in

land use planning process ? a. Yes  b. No

12. If yes, why do you think the community should be involved in the process of land use planning?

- a. They are the major beneficiaries .....
- b. Process will be more sustainable.....
- c. Cheaper due to shared costs and risks.....
- d. More expertise will be made available.....
- e. Not sure.....

13. If no, why should the community not be involved in the process of land use planning?

- a. Process will take longer.....
- b. It will be more costly.....
- c. There are no disadvantages.....

- d. Not applicable .....
14. What is the other major land use activity in the district, other than residential use ?
- a. ....
- b. ....
- c. ....
- d. ....
- e. ....
15. How is this activity integrated in the district plan?
- a. Through District Development Coordinating Committee.....
- b. Through Resident Development Committees..
- c. Through full council meetings .....
- d. Any other (specify).....
- 16 .In view of the problems being experienced in the current land use Planning process, can introduction of new technology help?
- a. Yes                       b. No
17. If yes, what is the reason?
- a. Improved coordination.....
- b. Reduced duplication of effort.....
- c. Efficiency.....
- d. Cheaper due to shared costs and risks.....
- e. Any other (specify).....
18. If no, what is the reason?
- a. Data misuse.....
- b. Data smuggling.....
- c. Have to contend with legal issues  
(e.g. copyright laws).....
- d. Loss of jobs due to reduced labour force.....
- e. Not applicable.....

THANK YOU FOR YOUR COOPERATION

GEOGRAPHICAL INFORMATION SYSTEM (GIS) BASED INTEGRATED  
DISTRICT LANDUSE PLANNING PROCESS: A CASE STUDY OF MPIKA

**Questionnaire for Government Departments and NGOs**

1. Name of the institution / organization.....
2. What is the main function of the institution / organization?
  - a.....
  - b. ....
  - c. ....
  - d. ....
  - e. ....
3. Do you own this plot / building? a. Yes  b. No
4. If yes, how did you acquire it?
  - a. From the local authority.....
  - b. Bought from another person / organisation..
  - c. It is family property.....
  - d. Renting.....
  - e. Government building.....
5. If you got it from the local authority, how much did you pay for it?
  - a. Less than K50,000.....
  - b. Between K50,000-K100,000.....
  - c. More than K100,000.....
  - d. Not applicable.....
6. How did you apply for it?
  - a. Formally .....
  - b. Informally.....
  - c. Not applicable.....
7. If you bought it from another person, how much did you pay for it?
  - a. Less than K50,000.....
  - b. Between K50,000-K100,000.....
  - c. More than K100,000.....
  - d. Not applicable.....

8. What kind of title do you hold for this property?
- a. 14 year lease.....
  - b. 30 year lease.....
  - c. 99 year lease.....
  - d. Occupying license.....
  - e. Farm permit.....
  - f. No title.....
9. How long did it take you to get this plot / building?
- a. Less than 6 months.....
  - b. Between 6 months – 1 year.....
  - c. More than 1 year.....
10. What were the obstacles in getting this plot / building?
- a. Process is too cumbersome .....
  - b. Plots / buildings not readily available.....
  - c. Did not apply in good time, hence the delay..
  - d. Plots / buildings too expensive to get.....
11. Would you be willing to participate in the land use planning process in the district? a. Yes  b. No
12. If yes, what would be your role?
- a. Data collection.....
  - b. Data processing.....
  - c. Data storage.....
  - d. Data utilisation.....
  - e. Not applicable.....
13. If no, what are the reasons?
- a. It is not our function.....
  - b. Council does it on our behalf.....
  - c. Council is in the process of integrating us....
  - d. Not applicable.....
14. What would you attribute the problems in the current district land use planning process to ?
- a. Involvement of too many players.....
  - b. Inadequate community participation.....
  - c. District land use planning is done by the province..

- d. In adequate funding to the council.....
  - e. Inappropriate land use planning tools being used..
  - f. Fragmented relevant pieces of legislation.....
15. What are the possible solutions ?
- a. Coordination.....
  - b. Community participation.....
  - c. Increased funding to the council.....
  - d. Land use planning process to be done at district level..
  - e. Utilization of new technology (e.g. computers ).....
16. Why do you think the community should be involved in the process of land use planning process ?
- a. They are the major beneficiaries.....
  - b. Process will be sustainable .....
  - c. Cheaper (due to shared costs / risks).....
  - d. More expertise will be made available.....
17. What would be the disadvantages of community participation in district land use planning process?
- a. Process will take longer.....
  - b. It will be more costly.....
  - c. There are no disadvantages.....
18. What do you think would be the role of the community in a GIS technology driven land use planning process?
- a. Data collection.....
  - b. Data processing.....
  - c. Data storage.....
  - d. Data utilisation.....
19. Would you be willing to share / contribute data about your operations, to an integrated district land use planning process?
- a. Yes.....
  - b. No.....
20. If yes, what would be the advantages?
- a. Improved coordination.....
  - b. Reduced duplication of work.....
  - c. Efficiency.....

- d. Cheaper due to shared costs and risks.....
- e. Not applicable.....

21. If no, what would be the disadvantages?

- a. Data misuse.....
- b. Data smuggling.....
- c. Have to contend with legal issues (e.g. copyright laws).....
- d. Loss of jobs (due to reduced labour force).....
- e. Not applicable .....

THANK YOU FOR YOUR COOPERATION

GEOGRAPHICAL INFORMATION SYSTEM (GIS) BASED INTEGRATED  
DISTRICT LANDUSE PLANNING PROCESS: A CASE STUDY OF MPIKA

**Questionnaire for Individuals outside council staff**

1. Name of residential area.....
2. Type of residential area
  - a. High cost.....
  - b. Medium costs.....
  - c. Low cost.....
3. Plot / House number.....
4. Are you the owner of this plot / house? a. Yes  b. No
5. If yes, where did you get it from?
  - a. Local Authority.....
  - b. Bought from another person.....
  - c. Got it from my family.....
  - d. Government building.....
  - e. From a headman.....
  - f. Not applicable.....
6. If you got it from the council, how did you apply for it?
  - a. Formally.....
  - b. Informally.....
  - c. Not applicable.....
7. How long did it take you to acquire this plot / house?
  - a. Less than 6 months.....
  - b. Between 6 months – 1 year.....
  - c. More than 1 year.....
  - d. Not applicable.....
8. If you bought it from another person, how much did you pay for it?
  - a. Less than K50,000.....
  - b. K50,000-K100,000.....
  - c. K101,000-K150,000.....
  - d. More than K150,000.....
  - e. Not applicable.....

9. If you are renting from a landlord, how much are you paying per month ?
- a. Less than K50,000.....
  - b. K50,000-K100,000.....
  - c. K101-K150,000.....
  - d. More than K150,000.....
  - e. Not applicable.....
10. Is this plot / house on title? a. Yes  b. No
11. If yes, what kind of title?
- a. 14 year lease.....
  - b. 30 year lease.....
  - c. 99 year lease.....
  - d. Occupying license.....
  - e. Farm permit.....
  - f. Not applicable.....
12. What was the main obstacle to getting this plot / house?
- a. Process was too cumbersome.....
  - b. Plots / houses not readily available.....
  - c. Did not apply in good time, hence the delay...
  - d. Plots / houses too expensive to get .....
  - e. Not applicable.....
13. What are the possible causes?
- a. Involvement of too many players.....
  - b. Lack of community participation .....
  - c. Inadequate funding for the council.....
  - d. Inappropriate land use planning tools being used...
  - e. Fragmented relevant pieces of legislation.....
14. What are the possible solutions?
- a. Coordination.....
  - b. Community participation.....
  - c. Increased funding to the council.....
  - d. Utilisation of new technology, such as computers..
  - e. Reconciliation of relevant pieces of legislation.....

15. Why do you think the community should be involved in land use planning process?

- a. Major beneficiaries.....
- b. Process will be more sustainable.....
- c. Cheaper (due to shared costs/risks).....
- d. More expertise will be made available.....

16. What would be the disadvantages of community participation in land use planning process ?

- a. Process will take longer.....
- b. It will be more costly.....
- c. There are no disadvantages.....

THANK YOU FOR YOUR COOPERATION