

**ASSESSMENT OF IMPLEMENTATION OF VILLAGE LAND USE PLANS IN
ULANGA DISTRICT, TANZANIA**

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**A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE
REQUIREMENT FOR THE DEGREE OF MASTERS OF SCIENCE IN
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ABSTRACT

Land use plans have been considered as a solution to land use problems. Existing studies have reported cases of non-adherence to the plan though limitedly considered assessing their implementation at village level. Implementation of the land use plan relies on how sufficient are the allocated land use zones, if the land use groups adhere to the plan and whether the available strategies enhance adherence to the land use plan. This study was designed to empirically identify land use implementation problems and suggest solutions relevant to the land users, the government, planners and other stakeholders. Primary data were collected through household survey of 120 respondents from two villages, key informants, focus group discussions and field observation survey while secondary data were collected through review of guidelines for land use planning, village land use plans, district land use framework, books and journals. Information used to assess sufficiency of land use zones and strategies used in Village Land Use Plan (VLUP) from household survey and village records were descriptively analysed. GPS points to examine adherence to VLUPs were analysed using Kappa statistic. Factors influencing adherence to VLUPs were analysed using binary logistical regression and pair-wise ranking. Findings showed that the allocated zones were insufficient for the current and future needs whereby 90% of the respondents declared insufficiency of the allocated zones. Discrepancies were noted in the size of land in the VLUP document and those digitised via Arcview GIS. Kappa analysis resulted to moderate adherence with kappa coefficient of 0.47 and 0.49 for Iragua and Kichangani villages. Corruption of village leaders, failure of village leaders to implement, lack of awareness on land use plans and increased population were the key prioritised factors that affected adherence to land use plans. The study recommends a review of the zoning standards to enhance sufficiency of allocated zones; privatization of grazing land; establishment of communal grazing management plans; and involvement of

communities in developing complete plans. The study also recommends close monitoring; reviewing of VLUPs; enforcement of good governance; establishing incentive schemes; offering continuous education and awareness, and developing participatory implementation framework with clearly stipulated roles, strategies, milestones and indicators as well as resource mobilisation strategy.

DECLARATION

I, Margaret Naimutie Naiposha, do hereby declare to the Senate of Sokoine University of Agriculture that this dissertation is my original work done within registration period and that it has neither been submitted nor been concurrently submitted in any other institution.

Margaret Naimutie Naiposha
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Date

The above declaration is confirmed by;

Prof. Emmanuel Fred Nzunda
(Supervisor)

Date

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DEDICATION

This work is dedicated to my beloved daughters Noreen and Norein for creating an impact in my life in one way or another. Indeed, they put an indelible mark in my heart and life.

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LIST OF ABBREVIATIONS AND ACRONYMS

CCRO	Certificate of Customary Right of Occupancy
FAO	Food and Agriculture Organisation of the United Nations
FGD	Focus Group Discussion
FTSRP	Frontier Tanzania Savanna Research Programme
GIS	Geographic Informatics System
KGCA	Kilombero Game Controlled Area
KILOREMP	Kilombero and Lower Rufiji Ecosystem Management Project
KVTC	Kilombero Valley Teak Company
LU	Livestock Unit
NBS	National Bureau of Statistics
NLUPC	National Land Use Planning Commission
PLUM	Participatory Land Use Management
PRA	Participatory Rural Appraisal
RUBADA	Rufiji Basin Development Authority
SGR	Selous Game Reserve
SPSS	Statistical Package for Social Science
URT	United Republic of Tanzania
UDC	Ulanga District Council
VEO	Village Executive Officer
VLUM	Village Land Use Management
VLUP	Village Land Use Plan
WMA	Wildlife Management Area

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background Information

Land is a primary asset for human survival and development in Tanzania and elsewhere in the world. It is a major source of income and livelihoods for most rural and urban populations (Toillier *et al.*, 2011). Contribution to improved livelihoods depends on how land as a base for other natural resources is sustainably managed despite the vulnerable threats on natural resources and poverty. Land is not only a source of livelihoods; it also carries social, spiritual, cultural and ecological values (NLUPC, 1998; Briassoulis, 2000). Given its importance, access to and availability of land resources are critical to ensuring real and long-lasting improvement in social, economic and political well-being (Barume, 2010).

Tanzania has a total area of 947 300 Km² of which, the mainland constitutes 883 300 Km² while the Zanzibar has a land area of 2 500 Km² and the rest of the area 61,500 Km² constitute water bodies NBS (2017). Whilst the land size remains unchanged human population is increasing at a rate of 2.7% per annum, resulting into an estimated population of 44.4 million people based on 2012 census data (NBS, 2013). On the other hand, the country's land resource remains fixed to accommodate subsequent land demands for cultivation, grazing, forestry, wildlife conservation and development (NLUPC, 2013). All land is under the government's trusteeship whereby 70% constitutes village land, 28% reserved land, and 2% general land (NBS, 2013).

Over decades land was planned in order to harmonise land uses among different users and ensure sustainability in management of land and other natural resources (Lininger *et al.*,

2011). International concern over increasing environmental and development problems Land use planning was recommended as a strategy to be adopted globally in order to address unsustainable land use and natural resource practices towards sustainable development (Bruntlands 1997). According to FAO (1993) land use planning is the systematic assessment of land potential and alternatives for optimal land uses and improved economic and social conditions through participatory processes that are multisectoral, multistakeholder and scale dependent.

Land use plans have undergone different phases (Kauzeni *et al.*, 1993; NLUPC, 2013). In Tanzania, Land use plans have undergone five phases which are land use schemes in 1920s, village settlement schemes in 1960s, layout plans in 1970s, conventional land use plans in 1970s-1990s and participatory land use plans which is the currently the approach used in land use planning (Kauzeni *et al.*, 1993; NLUPC, 2013). Participatory land use plans were adopted across sectors with the recognition of its problem solving ability through grassroots involvement in planning and decision making (NLUPC, 1998). Since land use plans are currently developed in a participatory manner, it is expected that land will be sufficiently allocated according to land user's needs, the plan will be flexible to accommodate influential factors to adherence and the strategies enforced will regulate land users to adhere to the land use plans.

According to NLUPC (2013), the government prepared over 900 VLUPs between 1998 and 2010 while the NBS (2013) reports that 604 VLUPs were prepared between 2008 and 2013. Ulanga District had 91 villages out of which 46 had VLUPs (URT, 2013). Land use conflict incidences between different categories of land users have been reported in various districts in the country (NLUPC, 1998). In spite of initiation of VLUPs to mitigate land use conflicts, the incidences of land use conflicts still exist in some districts including

Ulanga District (Kaswamila and Songorwa, 2009; Mwamfupe, 2015; Nindi *et al.*, 2014). However, inadequate information is available on the implementation of VLUPs in Tanzania (Mndeme, 2011). This study therefore investigated the implementation of VLUPs as one of the strategies adopted in addressing land use conflicts among land users and other sustainable land management practices.

1.2 Problem Statement and Justification of the Study

1.2.1 Problem statement

Village land use planning process is highly recommended towards addressing land management problems. The output of the process, however, depends on how the plan is adapted to local situation and this is reflected during the implementation of land use plans. Existing studies on land use implementation have mostly focused on assessing urban level plans (Calbick *et al.*, 2003; Laurian *et al.*, 2004; Brodly *et al.*, 2007; Loh, 2011; Ge and Ning, 2012). Though land use plans are the mainstay of planning process, their actual implementation has limitedly been investigated at village level resulting in solutions that partially address land use problems (Mndeme, 2011; Kaswamila and Songorwa, 2009; Laurien *et al.*, 2014; Farid *et al.*, 2015 and Yunos *et al.*, 2015). In this regard, implementation of the land use plan depends on how it sufficiently allocates land use zones for land users.

Sufficient allocation of land use zones in the land use plan is considered vital to its implementation. Sufficiency of land use zones, according to Potsiou *et al.* (2010), are determined to a large extent by how the needs of land users are adequately met by the VLUP. Therefore, sufficiency of the zones may vary with the size of the allocated zones. However, appraisal of land sufficiency based on land use zones according to VLUPs has remained at its infancy (Huchzemeyer and Mbiba, 2002). This limited knowledge

available therefore, triggered the need for this research whose main focus was to assess the sufficiency of VLUPs in order to examine the sufficiency of land use zones allocated in the village land use plans.

Regardless of the importance of land use plan, there have been relatively few studies to examine adherence to land use plans, most of which were conducted in developed countries with a focus on the national, district/urban/cities level land use plans (Calbick *et al.*, 2003; Brodly *et al.*, 2007; Ge and Ning, 2012). Even fewer studies have examined adherence to VLUPs some of which were conducted at a time when the plans were at their infancy stages of development and, therefore, reported few incidences of misuse from farmers and pastoralists while others had no any incidence at all (Mndeme, 2011). This study, therefore examined the extent of adherence to VLUPs by the use of both visual and manual inspection between what had been planned and what was being implemented.

Examining adherence to VLUP planned versus implemented will not inform on the driving force for observed adherence incidence. Different studies have established different factors to have influence on implementation of land use plans. Moreover, there are numerous interdependent demographic, socio-economic, technological and institutional factors that affect adherence to VLUPs (Briassoulis, 2000; Mndeme 2011; Hettig *et al.*, 2015). According to Perkins *et al.* (2011), land ownership and tenure are perhaps the most influential factors to adherence to VLUP while Mwambene *et al.*, 2014 found insufficient land use zoning and inadequate enforcement as the most influential factor.

However the actual factors influencing adherence to VLUP in the study area remains uninvestigated. It is, however, pertinent to determine how different factors that influence

adherence to VLUPs might have influence on adherence to the land use zones in the study area.

Strategies are developed to enforce adherence to VLUPs such as by-laws, penalties, and demarcation of boundaries among others in the land use zones. However, rigid and uncoordinated strategies may result in non-adherence to zones as planned (Christensen *et al.*, 2005). Toillier *et al.* (2011) inform that zoning approach provides enforcement strategies in which surfaces of land uses and adherence to VLUPs can easily be visualized. It is not clear whether the strategies developed can adequately enforce adherence to the plans or coherent incentives are required to enforce adherence to land use plans (Christensen *et al.*, 2005). Arguably, these strategies to enforce adherence to VLUPs must be sensitive to local conditions which is yet to be clarified.

1.2.2 Justification of the study

Land use plans may appeal to resolve land related problems; however, this may not be the case during their implementation resulting in a vicious cycle of land use problems. As observed by other studies, incidences of conflicts are recurrent even where land use plans exist. The persistence of the problem has therefore triggered a study to assess the implementation of VLUPs in order to identify the causes and suggest for intervention measures. This study, therefore, discloses some of the implementation hurdles to better inform land users, the government, planners, decision makers and other stakeholders. The findings of this study therefore contribute to the existing theoretical dimensions of land use planning and implementation.

Ulanga district is blessed with quality arable land, attractive grazing land, conserved forests and wildlife resources and partly shares Kilombero valley flood plain among the

world's renowned Ramsar conservation sites rich in biodiversity. The opportunities in the district have attracted various livelihood opportunities leading to the increased population pressure, overgrazing and other anthropogenic activities to the detriment of sustainable land use practices. Parallel with national initiatives including the Millennium Development Goals and National Strategy for Growth and Reduction of Poverty, land use plans were initiated in the district to improve human livelihood opportunities while promoting the conservation of natural resources. There have been reported cases of inadequate allocation of land uses which have influenced encroachment into Kilombero Game Controlled Area (KGCA) and Selous Game Reserve (SGR) and recurrent conflicts between land users. This study, therefore, is vital to come up with causes and solutions to land use implementation problems at village level in Tanzania.

1.3 Objectives of the Study

1.3.1 Overall objective

The overall objective of the study was to assess the implementation of village land use plans in Ulanga District, Tanzania.

1.3.2 Specific objectives

The specific objectives of the study were to:

- i. assess sufficiency of land use zones considered in the village land use plans in Ulanga District;
- ii. examine adherence to village land use plans in the district;
- iii. assess factors that influence adherence to the village land use plans; and
- iv. analyse strategies for enforcing adherence to village land use plans in the district.

1.4 Research Questions

To address the four objectives, the following research questions guided the study:

- i. How sufficient are the land use zones considered in the village land use plans?
- ii. Are the land use zones adhered to according to the village land use plans?
- iii. Which factors influence adherence to the plan for the different zones?
- iv. How effective are the strategies in enforcing adherence to the land use plans?

1.5 Conceptual Framework

The conceptual framework for this study shows the relationship of variables. It starts with the sufficiency of land use zones that spatially are supposed to allocate and permit specific uses, influence the adherence of land users to the planned uses in the study area. It is expected that where the zones do not match the needs of the users, based on the size allocated and accommodation of current and future needs, cases may limit adherence to the VLUPs. Adherence to village land use plans may as well be influenced by the existing and changing circumstances of socio-economic, institutional and ecological factors within the society. Strategies to enforce adherence to VLUP are expected to regulate adherence by land users within each zone. These strategies may be adequate to limit or enhance adherence to the VLUP at specific zones over time. In some cases other strategies may be required to support enforcement of adherence to designated zones. Adherence to VLUPs reflects on the plans product in practical situation which approves on the implementation outcome. Therefore the conceptual framework is specified as in Figure 1.

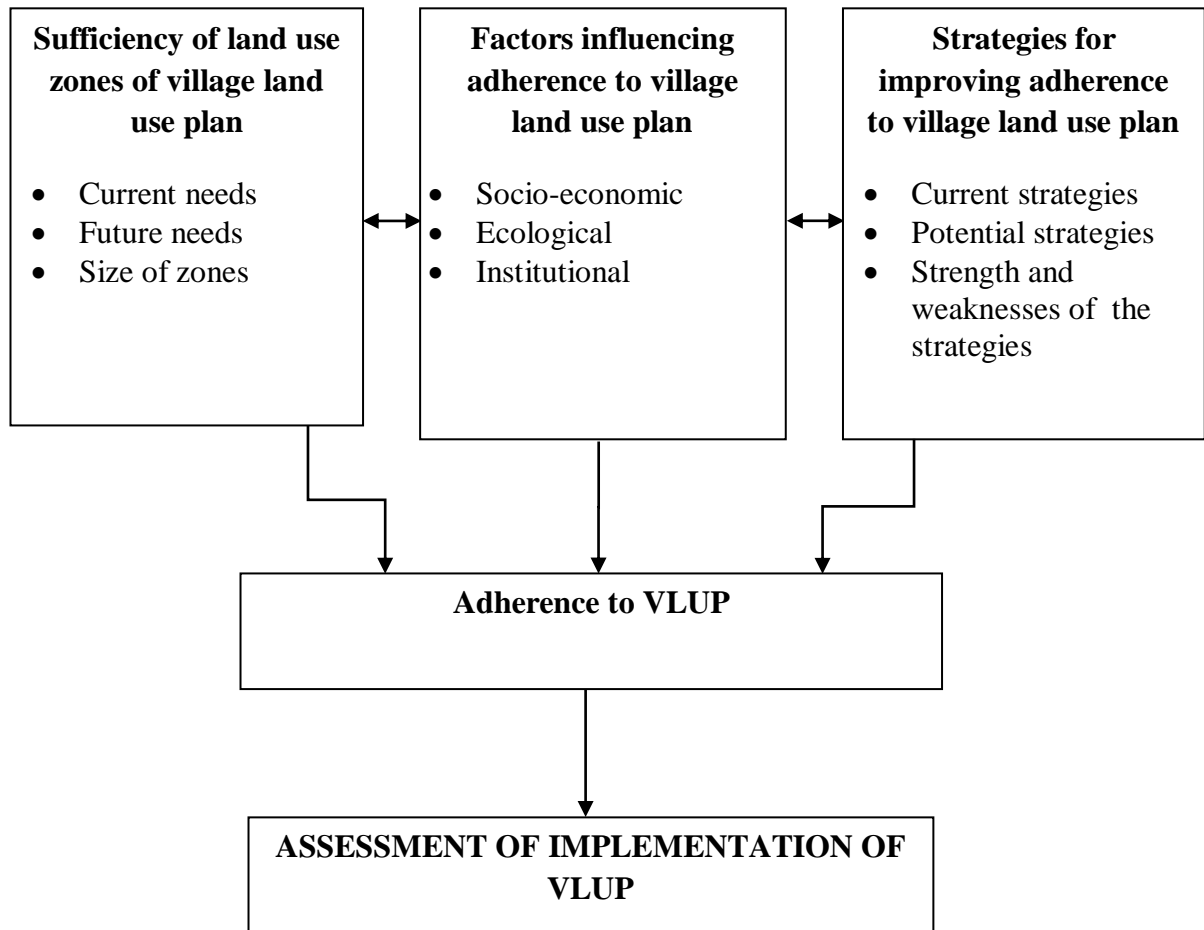


Figure 1: The Conceptual framework of the study

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Introduction

Land is a basic natural resource that sustains livelihood and development throughout human existence. Land, as defined by FAO (1993), is a delineable area of the earth's terrestrial surface encompassing all attributes of the biosphere immediately above or below this surface including those of the near surface, the soil and terrain forms, the surface hydrology (shallow lakes, rivers, marshes and swamps). The near surface sedimentary layers and associated ground water reserve the plant and animal population, the human population settlement pattern and physical result of past and present human activity (FAO, 1993). Humans have always attached social, cultural, economic and spiritual values as they utilise land (Barume, 2010). The utilisation of land amidst population growth, technological advancements, and anthropogenic activities have throughout time manipulated land into various positive and negative outcomes at local and global scale (Brissaoulis, 1999). The need for land use planning and urgent implementation and enforcement of the plans in developing counties was recommended as a strategy to confront land and conservation related issues in the report, Our Common Future (Bruntland, 1987).

FAO (1993) defined land use planning as a systematic assessment of physical, social and economic factors in such a way that will assist and encourage land users to select land use options that increase their productivity, sustainability and meet the needs of society. Village land use planning involves weighing land use opportunities against the problems involved, generation of a range of land use options, and making choices between these options (NLUPC, 1998). There are mainly six steps followed when developing VLUPs

which include preparations at district level, participatory rural appraisal, mapping existing village land uses, participatory village land use planning, implementation of village land use plans, enhancement of security of tenure and village land use management (NLUPC, 1998; NLUPC, 2013). Land use plan implementation, according to Calbick *et al.* (2003), is a concrete measurable action towards practical effect. This study defines land use plan implementation as an outcome of planned land uses in practical situation desired to ensure adherence by land users.

The overall goal of land use plan implementation should lead to sustainable land management which refers to land use practices that enhance ecological functions whilst enabling the land users to maximise economic and social benefit (FAO, 2011). According to Brodly *et al.* (2007) and Dawwas (2014), assessment of the implementation of the land use plan, measures the likelihood of achieving the goals, objectives and policies which reflect the quality of the plan. The quality of the plan is however, not a guarantee to the achievement of the intended goals (Kaswamila and Songorwa, 2009), rather it is a theoretical presentation of expected outcomes (Alfasi *et al.*, 2012). Practically, the implementation of the plan as a means to an end may not result to the expected end due to several influential factors such as age, income, education level, security of land tenure and residential status at household level and corruption, lack of awareness, increased population, inadequate enforcement strategies at community level (Briassoulis, 2000; Laurian *et al.*, 2004; Farid *et al.*, 2015).

Village land use plans in Tanzania, as cited in Kauzeni *et al.* (1993), have undergone different phases among them the traditional land use planning before colonial rule where the traditional management and institution were applied. In 1889, the German colonialists imposed formal conditions to acquire and control land from rural areas. In 1920s rural land

use schemes were initiated and centrally implemented by British colonialists through formalizing of land ordinance against traditional (informal) management (*ibid*). This, however, did not succeed. After independence, during the 1960s to 1970s, the government of Tanzania developed layout plans for village settlement schemes in less populated arable areas. These settlement schemes ignored individual land holding and formed communal (*Ujamaa*) land ownership (Lerise, 1993).

The fate of the tragedy of the commons by Garrett Hardin's 1968 was not an exception to the established settlement schemes leading to open access situation where social, economic and environmental crises were triggered (Lerise, 1993). Between 1980s to early 1990s technically developed VLUPs for 303 villages out of 8 174 villages (NLUPC, 1998). However, land use conflicts persisted among different livelihood groups specifically among the farmers, pastoralists, conservationists and the business community (Kauzeni *et al.*, 1993). Land use conflicts was stimulated by increasing population and development activities as well as failure of top down land use planning approach (Kauzeni *et al.* 1993; NLUPC, 1998). This led to a paradigm shift from top-down to bottom-up approach in land management amongst which participatory land use planning was adopted (Kauzeni *et al.*, 1993 and NLUPC, 1998).

The government of Tanzania instituted participatory village land use plans (VLUPs) through the Village Land Act No. 5 of 1999 and Land Use Planning Act No. 6 of 2007. FAO (1993) defines Village Land use Plans as an outcome of a participatory and systematic assessment of physical, ecological and socioeconomic condition that reflect on current and future needs of the community. VLUPs were adopted across sectors with the recognition of its problem solving ability through grassroots involvement in planning and decision making (NLUPC, 1998). The expectations of that were to facilitate allocation of

land according to land use needs, overcoming land use conflicts, and creating a basis for issuing long-term leases to villagers among others (NLUPC, 1998). Although, the above mentioned expectation of recent participatory approach to VLUPs planning process, their achievement depends on implementation of the VLUPs where sufficiency of allocated land use zones, adherence to what was planned by users, factors influencing adherence and strategies enforced to regulate adherence need to be assessed.

2.2 Sufficiency of Land Use Zones in the Village Land Use Plans

A zone is a piece of land designated uniformly to maximise use one particular use though this is sometimes not exclusive to a single use (Matey, 2016). Zones are established in land use plans in order to institute governmental planning policies as well as to enable land users such as land owners and stakeholders to acquire specific rights and interests (Alfasi *et al.*, 2012). VLUPs are predicted on the need to sufficiently allocate land by balancing the needs of all land users (NLUPC, 2013). Sufficiency of allocated land should consider the current land use needs of the society without jeopardising the future land use needs (Nolon, 2007). Hence, VLUPs should comply with sustainable development concept where Goschalk (2004) includes liveable community values. The experience from Orumiyeh area in Iran shows that, inadequate consideration for land use sufficiency has been an obstacle to adherence to land use zones (Neameh, 2003).

Zoning approach in Madagascar has reportedly perpetuated rigid conservation regulations from a multifunctional area into a restricted forested zone without alternative options thus affecting the land use needs of the community (Toillier *et al.*, 2011). In Tanzania, in spite of established land use plans, complexities have been realised over zoning of land use for mobile land users such as pastoralists, hunters and gatherers (UCRT, 2010; Mwambene *et al.*, 2014). In addition, recurrent conflicts between user groups such as farmers and

pastoralists, encroachment and invasion into conserved zones have been reported by various studies (Nindi *et al.*, 2014; Kosyando, 2007; Backhaust, 2014; and Mwamfupe, 2015). It is however not clear whether the land use zones are sufficient for all land use stakeholders.

2.3 Adherence to Village Land Use Plans

The future of VLUPs may well depend on how it harmonises users and creates settlement patterns that are both liveable and sustainable (Godschalk, 2004). Adherence to any plan is a measure of the degree to which outcomes or impacts conform to planned objectives (Laurian *et al.*, 2004; Brodly *et al.*, 2007). Activities such as land use conflict, encroachment, invasion contrary to the planned objective will be considered as non-adherence. These outcomes are as a result of physical/spatial alterations of planned use attributed by anthropogenic and natural factors over time (Briassoulis, 2000). In this regard, examining adherence to land use plans can be done at different levels (national, district and village levels) and using different tools depending on intended objectives. Alfasi *et al.* (2012) used GIS based land use plan evaluation in Israel's built environment and observed non-adherence incidence between the original district plans and the actual development.

Most studies done to physically examine adherence to land use plans have been based on cities and urban areas (Alfasi *et al.*, 2012; Laurian *et al.*, 2004) while limited studies have been done at village level and rural areas. Nonetheless, some studies at village level had physical observations of incidences of adherence to land use plans and reported cases of land use conflicts and encroachment as non-adherence to VLUP (Kaswamila and Songorwa, 2009; Toillier *et al.*, 2011). Mndeme (2011) conducted his study at Kilosa District at a time when the community were still adjusting to the plan which influenced the

outcomes of the study. Considering these shortcomings of other studies, this study assessed adherence through visual inspection and manual comparison between what was planned and the existing land use and the significance of the results for each zone at village level.

2.4 Factors that Influence Adherence to Village Land Use Plans

Investigation of land use objectives and management options in specific zones without understanding the driving force for adherence decisions by users has been observed to be inadequate (Nidumolu *et al.*, 2004). Adherence to VLUPs may be influenced by factors operating on more than one spatial and temporal level (Briassoulis, 2000). These factors might be internal or external within which are political, institutional, demographic, social-economic and ecological factors (Briassoulis, 2000; Tian and Shen, 2011; Yunos *et al.*, 2015). Existing and changing needs, circumstances such as population, climate variability, and poverty, creation of new social and political alignments among others are accompanied by changes in land use practices (Christensen *et al.*, 2005). Other studies have broadly categorised the factors into plans characteristic based on its quality and flexibility to the prevailing situation stakeholders characteristics which considers who are involved in planning and implementation system characteristic that refers to those involved in implementation (Tang and Brodly, 2008; Yunos *et al.*, 2015). Factors influencing adherence may or may not relate to other study findings as they vary in space and time therefore need to be assessed to recommend solutions that address the limiting factors to adherence.

Stakeholders' involvement and understanding of the problem influence on land use plan implementation in Malaysia, on the contrary Laurian *et al.* (2004) found plan characteristics as the most influential factor in implementation of land use plans. In

Madagascar unrealised incentives, rigid rules and insecurity of tenure have stimulated conversion of forested zones into farms (Toillier *et al.*, 2011). Institutions at Boteti in Botswana have inadequately integrated regulatory functions to compel farmers to practice sustainable agriculture and pastoralists to adhere to the carrying capacity of allocated zones (Perkins *et al.*, 2011). Adjacent land tenure systems, land use activities and socio-economic values influenced community based wildlife conservation at Meru Game Reserve and Ngaya Forest Reserve (Kiria *et al.*, 2014). Moreover, gender specific needs and interests of marginalised groups have least been considered during implementation of VLUPs (Bartels *et al.*, 2001; Kaswamila, 2006). Factors influencing adherence to VLUPs vary in time and space, and socio dynamics between land users. Based on these different scenarios, it is specifically vital to assess the factors influencing adherence to VLUP in this study.

2.5 Strategies for Enforcing Adherence to Village Land Use Plans

Besides the maps which have been developed to detail permitted land uses in various zones, adherence to these zones are enforced by putting up a regulatory mechanism. This regulatory mechanism involves by-laws along with other supportive strategies such as sign boards, boundary demarcation and conflict resolution among others. These strategies to enforce adherence to VLUPs may influence adherence to land use plans when the local communities weigh the cost and benefits of the planned strategies (Toillier *et al.*, 2011). Land sharing and land sparing strategies applied in agricultural zones were proved to be ineffective to deliver the required output compared to sufficient allocation of agricultural zone in Indonesia (Law *et al.*, 2015).

In Madagascar, rigid enforcement strategies, inadequate integration of strategies and absence of alternatives as well as incentives to failed to motivate farmers to adhere to

planned forest zones (Toillier *et al.*, 2011). Some strategies have proved costly and ineffective such as erection of fences around Meru Game Reserve and Ngaya forest in Kenya (Mbote, 2005). While Sedentary farmers highly valued zoning, pastoralists found zoning less valuable on communally owned grazing lands as they limit migration between grazing areas in Mbarali District (Hart *et al.*, 2014). ILC (2013) found that there was zoning incompatibility with pastoralists and hunters and gatherers lifestyle and this had limited multiple land use.

Marginalized groups like women have reportedly suffered restriction against livelihood utilities such as firewood where alternative strategies were not considered (Kaswamila, 2006; URCT, 2010). Elsewhere, other measures were biased against minority groups as demonstrated by Kosyando (2007) whose findings averred on unrealistic penalties imposed on pastoralists by the village government. The ability of local groups to enforce resource access and use rules is questionable where the anticipated benefits are not accrued, even where by-laws exist their effectiveness may be limited (UCRT, 2010; Mwambene *et al.*, 2014; Kaswamila and Songorwa, 2009). In other cases specific strategies may be vital to enforce adherence in specific zones (Toillier *et al.*, 2011). Whereas the strength of some strategies may depend on appropriate conflict resolution, institutional and political dimensions and mechanisms adopted among others may as well be used (Bartels *et al.*, 2001). It is worth concluding that strategies may regulate adherence to VLUPs or may limit adherence on factors that this study sought to unveil.

CHAPTER THREE

3.0 METHODOLOGY

3.1 Description of Study Area

3.1.1 Location and size of the areas

Ulanga District is located to the South West of Morogoro Municipality between longitudes 35.4° and 38.0°E and latitudes 8.0° to 10.0°S. It is the largest district in Morogoro region. To the east, it borders Nachingwea District, Liwale District to the South, Namtumbo District to the South-West and Kilombero District to the North. The district area covers 10, 688.89 Sq km. equivalent to 1 068 889.89 ha (hectares). It comprises 21 wards' and 59 villages (UDC, 2013; UDC, 2016). 75% of the total area is covered by Selous Game Reserve, Kilombero Game Controlled Area, Wildlife Management Area and forest reserve about 614 000 ha equated to 25% of the total land is potential for human economic activities including agriculture.

3.1.2 Climate, agro-ecological zones, vegetation type and water sources

Ulanga District experiences a bi-modal rainfall pattern with long rains between the months of March and May and short rains between November and January. The average annual rainfall varies between 800 mm and 1 600 mm. The daytime temperatures range from 18⁰C minimum in July to 26⁰C maximum in November. Vegetation in this district ranges from that of grassland (719 415 ha) in low laying areas and savanna (502 744 ha) in slightly elevated areas to woodlands (1 233 841 ha) in the uplands. The district has three major agro-ecological zones which are highlands, lowlands and mid-altitudes. The major water sources in the district are the four rivers namely Kilombero, Luhombero, Luwegu, and Lukira which drain into Rufiji River. This constitutes 3.58% which is equivalent to 897 Km² of the area covered by the district (UDC, 2013).

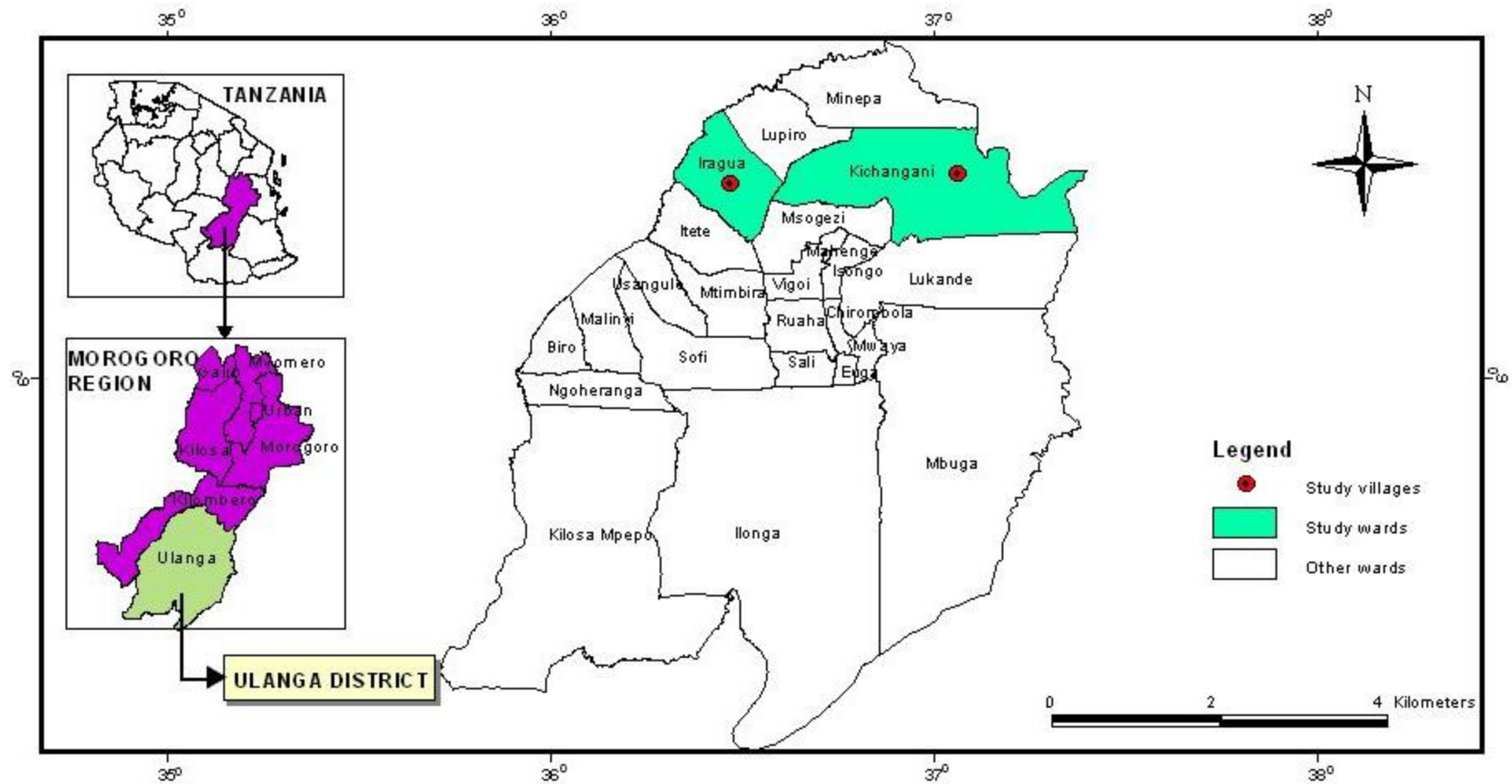


Figure 2: Map of Ulanga District showing study villages (Source GIS Lab Sokoine university of Agriculture)

3.1.3 Population size, growth and economic activities

According to the 2012 population census, Ulanga District was estimated to have 169 294 people projected at a growth rate of 2.9% annually. By the year 2015 a total of 34 550 household were estimated to increase in the district averaging to 5 members per household (UDC, 2016). The main tribes in the district are Wapogoro, Wandamba, Wandwewe, Wayao, Wangindo and Wabena. Others who have moved in to settle are Wasukuma, Wabarbaigi, Wamasai, Wahehe, Wanyakyusa, Waha, Wamwera, Wachaga and Waluguru. In recent years, the district has experienced a significant increase of population due to immigration of people from other regions (UDC, 2016). There are varied pull factors for immigration which include the livelihood opportunities in mining activities, response to employment in government and private sectors while pastoralists from Wasukuma, Wamang'ati and Wanyamwezi come into the district with large numbers of livestock in search of pastures and land for agriculture (Bamford *et al.*, 2010). Currently there are also naturalized citizens from Burundi who have been integrated into other communities. Over 90% of the rural occupants depend on farming as a source of food, income and employment. Other livelihood activities include livestock keeping, fishing, forest logging, and tourism, hunting and mining (UDC, 2013; 2016).

3.1.4 Land ownership, land tenure and land use conflicts

There are basically four types of land ownership in Ulanga district. These are village land which constitutes 311 714.59 ha (29.2%) reserved land 504 958.06 ha (47.2%), general land 58 208.95 ha (5.45%) and open areas (no man's land) 194 007 ha (18.2%). Most of the village land and partly urban land are traditionally owned. The village land ownership is still not secured with certificate of customary right of occupancy (CCROS) to land owners. Land can be accessed through inheritance, allocation by village council, buying, renting or in some areas by invasion through encroaching and clearing of forests and bushes and establishing new farms and settlements (UDC, 2013).

There are basically 3 types of land use conflicts which include:

- i. Boundary conflicts: which is between neighbouring villages, between villages neighbouring conservation areas such as Selous Game Reserve and Kilombero Game Controlled Area
- ii. Land use conflicts: mainly between farmers and pastoralists
- iii. Conflicts over land ownership

3.1.5 Village land use plans

Ulanga District has been preparing VLUPs in collaboration with various stakeholders such as National Land Use Planning Commission (NLUPC), Belgium Technical Cooperation (BTC) through Kilombero Valley Ramsar Site Project (KVRS), KILOWREMP projects, and RUBADA (UDC, 2013).

So far, 42 villages had land use plans at varying implementation periods (UDC, 2016). The village land use plan for Kichangani village was supported by Frontier Tanzania Savanna Research Programme while Iragua village was supported by Kilombero Valley Ramsar Site project.

3.2 Study design

This study employed cross-sectional design whereby data collection was undertaken once due to limited time and budget constraints (Msabila and Nalaila, 2013). The study contains information which was collected between January and June 2016. The study also describes village land use implementation at household level with due consideration of socioeconomic, demographic and physical factors.

3.3 Sample design

The study focused on households on households from selected villages in Ulanga District. The sampling frame for villages was based on a list of villages with operationalland use

plans implemented for more than three years. At village level the sampling frame for the households was obtained from an updated list of registered household from the village office. At field level a list of points established on selected village land use map were used for observation. At field level, list of Global Positioning System (GPS) points were established on selected village land use map were used for field observation of adherence.

3.3.1 District sampling

Ulanga District was purposively selected due to persistent incidence of land-based conflicts despite initiation of VLUPs. Initially, the district was purely occupied by farmers but in recent years there has been an influx of immigrants from agro pastoral communities who were attracted to the large arable land in the district suitable for grazing and farming. The impact of this immigration has affected the socioeconomic and ecological components in the district. There is increased reported land degradation caused by neighbouring villages adjacent to Kilombero Valley Ramsar Site which is shared between Ulanga and Kilombero Districts (Nindi *et al.*, 2014). Furthermore, land use conflicts between farmers who are mostly natives and pastoralists who have emigrated from other districts have rendered land use unsustainable both within village land and outside village land (Bakari *et al.*, 2014). This incidence has instigated government interventions including resettlement of agro pastoralists in 2012 to Lindi Region as well as establishment of land use plans. The implementation of the plans towards safeguarding natural resources and enhancing community livelihood is limitedly known as land use conflicts still prevail in the district.

3.3.2 Village sampling

Two villages were purposively selected from a list of villages with operational VLUP that was obtained from the district land office. The selection of these villages was also based

on the major socioeconomic production system (farming and pastoralism) and VLUPs implemented for over three years of time when the community will have adjusted to the changes in planned land use. Other criteria for selection included a village adjacent to a communally managed wildlife conservation area while another not adjacent and accessibility of the villages by the research team.

3.3.3 Focus group sampling

At the village level, independent groups of female and male farmers as well as female and male pastoralists were drawn randomly from the updated village registers. Each group comprised of at least eight individuals since this is a manageable size of group recommended for FGD (Davies *et al.*, 2008). Other groups for FGDs included Village Land Use Management Committee (VLUMC) while Participatory Land Use Management team (PLUM) were involved at district level.

3.3.4 Key informants sampling

Key informants were purposively selected from the district and village levels. At village level, the key informants comprised Ward Executive Officer, Village Councillor, Village Executive Officer, Village Chairman and Extension Officer.

3.3.5 Household sampling

At least 120 households (60 from each village) as recommended by Msabila and Nalaila (2013) constituted a representative sample for the study. Farmers, pastoralists, male and female headed households were randomly obtained from updated household register of each village with facilitation from the Village Executive Officer.

3.3.6 Global Positioning System Point sampling

A VLUP map was scanned and geo-referenced in order to be able to create coordinates using the Arcview GIS. A spacing of 500m by 500m grid with consideration of the size of the land use zones and heterogeneity from the VLUP was established (Garnesjodet *et al.*, 1980). The x and y coordinates were generated forming grids in which the sampling points were established at the intersection of each coordinate. The sample size for the survey was determined using the formula with finite population correction factor (Eq. 1) since it allows adjustment of the sample size accordingly (Knaub, 2008).

$$n = \frac{4N (CV)^2}{E^2N+4(CV)^2} \quad n = \frac{4N (CV)^2}{E^2N+4(CV)^2} \dots\dots\dots(1)$$

Where:

n=Sample size

N= Population size

CV=Coefficient of variation

E= allowable error

A total of 114 points were sampled for Kichangani village while 95 points were sampled for Iragua village. Weighted stratified sampling technique was used to determine the number of points from each zone (stratum). In order to avoid bias during selection, simple random sampling was used to select points from each stratum, thereby giving an equal chance of each point to be selected. Formula for weighted stratification (Eq. 2) is as specified by Kothari (2004).

$$n_i = n \frac{N_i}{N} \quad n_i = n \frac{N_i}{N} \dots\dots\dots(2)$$

Where:

n= sample size

n_i = number of sampling unit allocated to stratum i

N_i = sampling frame for stratum i

N = Area frame

3.4 Data Collection and Analysis

Data was collected through household level survey, key informants, focus group discussion, field survey observation and document review.

3.4.1 Assessment of sufficiency of land use zones in the village land use plan

The District Land Officer was first interviewed in order to facilitate in providing the list of villages with VLUPs which were sorted according to levels of completion and time of implementation, and then two villages were selected randomly. The District Land Officer organised the PLUM (Participatory Land Use Management) team for focus group discussion (FGD). Key informants' interview was first conducted with individuals from each village who were knowledgeable and experience of the issue being discussed Charmaz (2005). The reason for using individual interview was to facilitate in getting first-hand information which assisted in selecting FGDs participants, writing interview guides, moderating FGDs effectively and maximizing the effectiveness of full set of interviews. A checklist of questions was used to direct the interview.

At household level, respondents were asked to give their views on the land use needs and future plans to expand land size to cater for their needs. The information collected using a semi-structured questionnaire included socioeconomic information, age and sex of household members, size of land occupied, main economic activity, duration of stay, access to land, land ownership, income, land sufficiency, land use types, land use needs, factors influencing adherence to land use plans and strategies to enforce adherence. In

order to solicit community opinions and probe for more information in an open and participatory approach it was important to apply participatory rural appraisal approach in this study. Five focus group discussions (FGD) in each village were conducted and one at the district.

Shape files for Iragua and Kichangani village land maps were obtained from the District Land officer and were used to spatially determine the size of the allocated zones which were further compared to the documented size of the land use zones. These shape files were also used to examine the adherence to land use plan. Documents from village and district including VLUPs, maps, records and reports were reviewed to get information on population data, rate of population increase, livestock units versus size of zone allocated, the number and size of zones and strategies for enforcement. Other sources of information were from literature reviewed from journals which provided approaches for comparison and backing up results obtained on sufficient allocation of land use in VLUPs, examining the extent of adherence, factors influencing implementation and strategies to enforcement of adherence.

The information generated from focus group discussion was analysed using content analysis. Information from household's survey and village records was descriptively analysed. SPSS programme was used to analyse data from household respondents. Descriptive analysis was mainly used to analyze data into frequencies, percentages, mean. Current household population data were collected from Village Executive Officers for both Iragua and Kichangani villages. While the population data during the time the planning was done and forecasted population data were reviewed from the respective village land use documents and presented in tables. Additional information of factors that may influence sufficiency were presented in tables representing percentage land

acquisition (inherited, buying, rented, invaded others) and main economic activities (Agriculture, livestock keeping, forestry). While content analysis was done by summarizing the content of the FGDs into essential contents of the data collected. The information were further interpreted and structured according to data collected on land sufficiency in terms of needs, current situation of land sufficiency and future requirements.

3.4.2 Examining adherence to land use plans

The study considered comparing the zoned land uses and the actual utilization of land through field observation survey method modified from Mndeme (2011). The sampled points (Fig. 3 and 4) were tracked by using a Global Positioning System (GPS) assisted by a local guide, VLUP map and topographical map. The observed incidences of adherence were recorded in a data collection form. The collected data were analyzed using Kappa statistics technique in GIS software as described by adherence in each land use zone were organized into a table using Microsoft excel, then converted into text file and then converted to shape file using Arcview GIS. In Arcview GIS software, the points were spatially presented by overlaying on the respective VLUP map and then subjected to Kappa statistics. The Kappa statistics output included Kappa coefficient and percentage of adherence of each zone as was determined. The Kappa coefficient (K) measures pair wise agreement (observed v/s actual land use) among a set of coders making category judgment (Carletta, 1996; Jenness and Wynne, 2007; Samardžić-petrović *et al.*, 2013).

The interpretation of Kappa coefficient according to Viera and Garrett (2005) is presented in Table 1. The Formula for Kappa coefficient is as presented below (Eq. 3):

$$K = \frac{P(A)-P(E)}{1-P(E)} \frac{P(A)-P(E)}{1-P(E)} \dots\dots\dots(3)$$

Where:

K=Kappa coefficient

P (A) = presents observed agreement of planned versus actual land use

P (E) =is the proportion that may be expected to arise by chance.

The result for Kappa analysis is then interpreted with reference to Table 1.

Table 1: Interpretation of Kappa coefficients

Kappa	Agreement
<0	Less than chance agreement
0.01-0.20	Slight agreement
0.21-0.40	Fair agreement
0.41-0.60	Moderate agreement
0.61-0.80	Substantial agreement
0.81-0.99	Almost perfect agreement

Source: Viera and Garrett (2005)

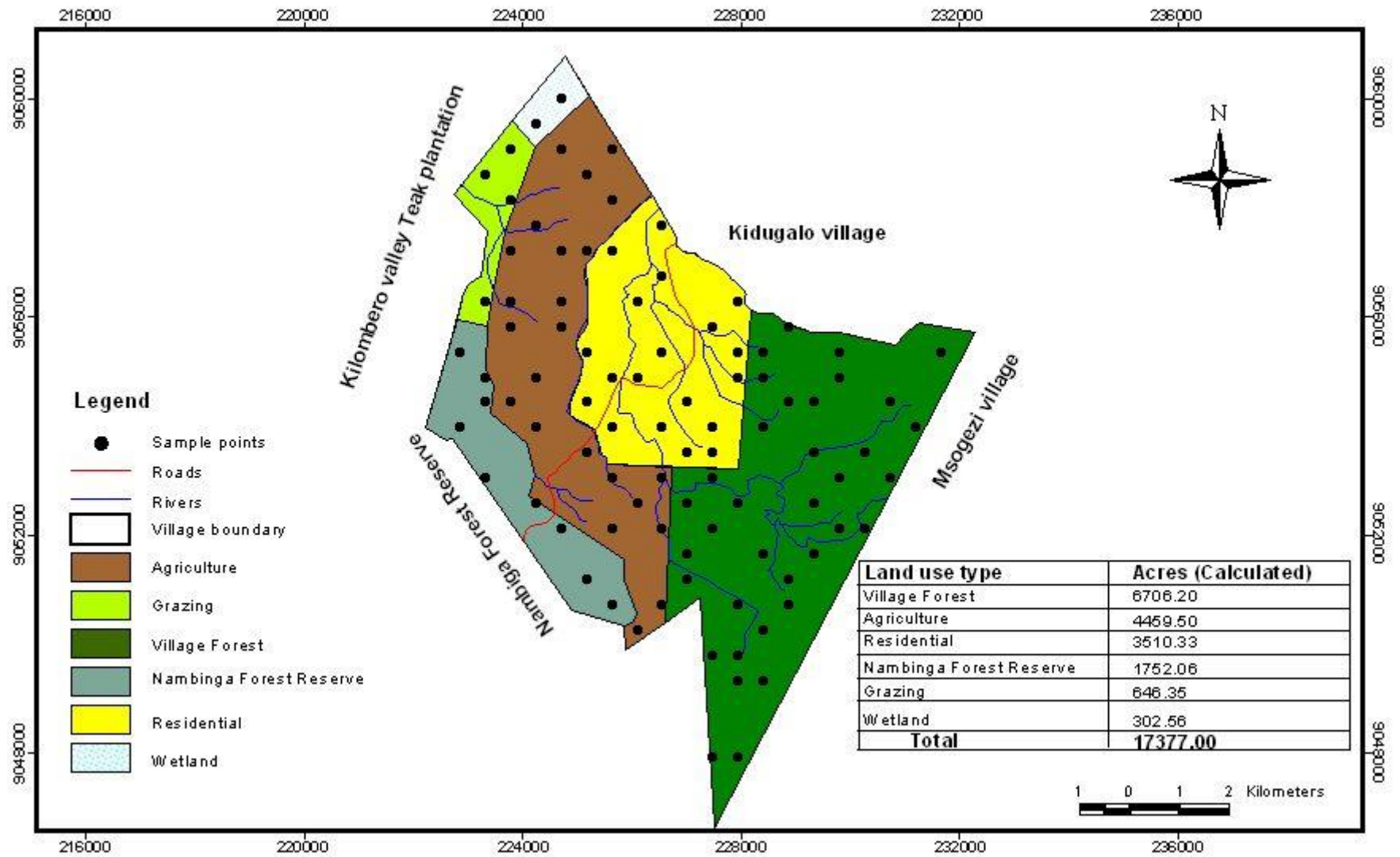


Figure 3: Iragua land use map 2008-2018 with sampled points

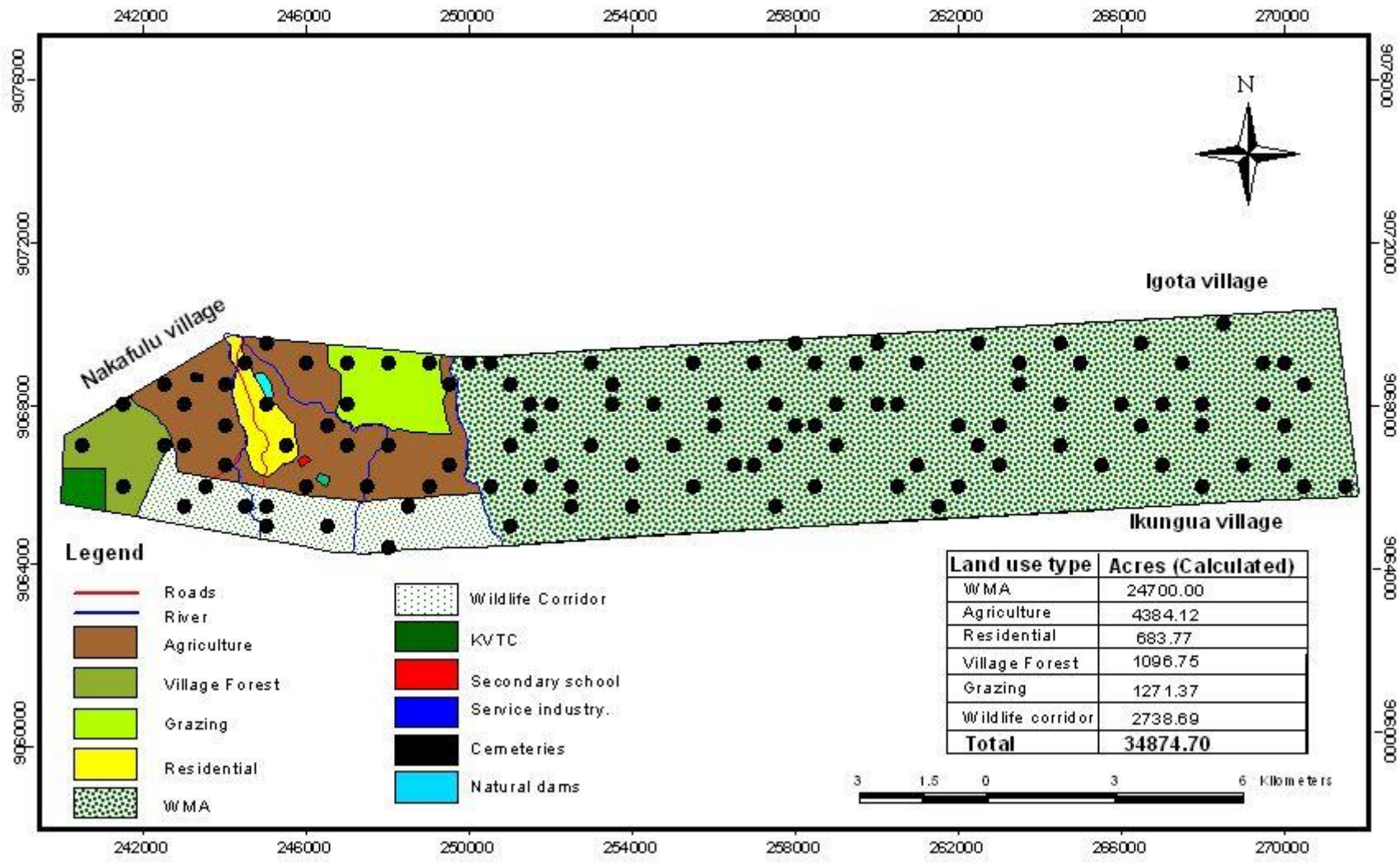


Figure 4: Kichangani land use map 2011-2021 with sampled points

3.4.3 Assessment of factors that influence adherence to village land use plans

The FGD was conducted prior to household survey in order to get the most influential factors influencing adherence to VLUP. In the FGD, the participants listed and ranked the factors influencing adherence to VLUPs. These factors were leadership, zonation, corruption, population, awareness of land use plans, enforcement of by-laws, sufficiency of zones, overstocking, transparency, inadequate penalty, and lack of land security and invasion of land. A dummy table comprising of boxes whereby each box represents intersect (or pairing) of two factors out of the listed factors. For each pair there was group consensus oriented discussions to determine which of the two factors won against the other and suggested reason for the choice. The factors were written in the appropriate box until the matrix was filled. The collected data through FGDs was analysed by land use groups through ranking the factors using pair wise ranking in order of priority from the most influential to the least influential factor based on the score in the matrix. Potential also solutions were sought through discussions.

Then the household questionnaire was administered to the household respondents to determine factors influencing adherence to VLUP at the household level. While logistic regression model (Eq. 4) was used to analyse which influence adherence to VLUP at household level using SPSS (Table 2).

The model was specified as;

$$\text{Logit}(Y) = \text{Ln}\left(\frac{p}{1-p}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 \dots \dots \dots + \beta_n X_n + \varepsilon \dots \dots \dots (4)$$

Where:

$\frac{p}{1-p}$ = The odds ratio is in favour of adherence to the VLUPs. That is the ratio of the probability that the respondents will adhere to the VLUPs to probability that respondents will not.

Y = Adherence (1=yes, 0=No) as applied to each land use zone

β_0 = Intercept (constant) of the equation,

$\beta_1 - \beta_n$ = Coefficient parameter of logistic equation,

X_1 - X_7 = set of independent variables,

ε = Error term

Table 2: Variables used in the logistic regression equation

Variable	Description
Y	Incidence (0 = Not adhered, 1 = Adhered)
X_1	Age (years)
X_2	Education level (0=no formal education, 1=formal education)
X_3	Household size
X_4	Economic activity
X_5	Farm size (acres)
X_6	Income (TZS.)
X_7	Residential status (1=Native, 0=Immigrant)
X_8	Duration of stay (1=Whole lifetime, 0=Not whole lifetime)
X_9	Land ownership (1=Inherited, 0=Other means of ownership)

3.4.4 Strategies for enforcing adherence to the Village Land Use Plan

Household respondents were interviewed on the strategies to enforce adherence to VLUPs whereas FGDs and Key informants were conducted in order to triangulate what was communicated. Analysis of information from FGDs was done by the help of the participants (land use groups, VLUMC and PLUM team). Singleton *et al.* (1993) and Mayeta (2004) refer to content analysis as a technique used for analysing symbolic content of any communication. Information from key informants was recorded summarized and categorized into meaningful contents.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

4.1 Sufficiency of Current and Future Land Use Zones Considered in the Village

Land Use Plans

4.1.1 The extent to which the land use zones cover all zones needed by the people

The study observed that the land use zones were allocated according to the needs of the people during land use planning. The zones were residential, grazing and agricultural, village forest, wildlife management area, wildlife corridor and wetland (Table 3). Discussion with different land use groups revealed that despite the allocated land use zones, the zones were insufficiently allocated with specific needs to enable adherence to VLUP. During FGD, agro pastoralists mentioned that they missed areas for residence within the grazing zone since for security they could not reside far from their livestock. Nevertheless, agro pastoralists (Wasukuma tribe) voiced that the established zones for grazing and agriculture were also insufficient.

Insufficiency of the mentioned zones were due to the fact that they immigrated into the villages after VLUPs were established and their customary communal way of life was not in adherence to the formal zoned land use. The customary communal way of life of agro pastoralists considered settlement within the same area to allow for communal tilling of land and grazing thereby saving time and energy. Other areas mentioned were livestock paths, water points and cattle dip. Discussion with farmers who occupied the residential zone identified missing areas for expansion of village hospital, markets, construction of new schools brick making for construction of houses and expansion of farms. Serpantie *et al.* (2011) suggested that zoning based management scheme would be implementable only if a more detailed grass-root level land use zoning approach was applied.

ILC (2013) asserted that land use pattern by pastoralists who are nomadic may not match the government initiated land use zones similar to agro pastoralists in the study villages that are communal. Flexibility in zoning grazing land should be put into consideration based on differences in socio-cultural behaviour of pastoralists, (ILC, 2013). Studies by Kosyando (2007) and Mwambene *et al.* (2014) also identified missing stock routes, water points and cattle dip within the grazing zone. The study villages Mndeme (2011) disclosed that missing land use categories including woodlot to provide for wood product utilization, while villagers sought for alternative farm land outside the village due to insufficiency of the allocated agriculture zone. The projected future human population documented in VLUPs did not allocate sufficient land for future needs. The population has changed at a different rate contrary to the projected rates of increase. In addition, this study concurs with arguments by Kauzeni *et al.* (1993) and ILC (2013) who noted that incomplete planning process may lead to inadequate security of tenure and sustainable management of land. It is also proper to argue that insufficiency of the land use needs within the zones is among the deficiencies of incomplete planning process that affect adherence to VLUPs.

Table 3: Observed zones covered in the Village Land Use Plan

Category	Observation
Zones identified in Iragua VLUP map	Kichangani
Residential	Yes
Agriculture	Yes
Grazing	Yes
Village forest	Yes
Reserved forest	Yes
Wetland	Yes
Zones identified in Kichangani VLUP map	
Residential	Yes
Agriculture	Yes
Grazing	yes
Village forest	Yes
Reserved forest	Yes
Wildlife Management	Yes
Wildlife corridor	Yes

The perceived sufficiency of land use zones allocated in VLUP during the study is as presented in Table 4. When respondents were asked to comment on the sufficiency of land use zones allocated under VLUPs, 90.0% of the respondents said that the allocated zones were insufficient. Additionally, when they were required to give their views on sufficiency of specific land use zones, most respondents across the villages surveyed indicated that residential zone (95 %), agriculture zone (89.2 %) and grazing zone (96.7 %) were insufficient for the current and future use. 75.8 % of the respondents from the study area said that the allocated land use zone for forestry was sufficient. Other zones (WMA, wildlife corridor and wetland) were considered to be sufficient.

Table 4: Perception of sufficiency of land use zones considered under Village Land Use Plans

Category	Iragua Village		Kichangani Village		Mean percentage
	Frequency	Percentage	Frequency	Percentage	
Are the zones sufficient for land use needs					
Yes	2	3.30	10	16.70	10.00
No	58	96.70	50	83.30	90.00
Total	60	100.00	60	100.00	
Residential and social services land use zone					
Sufficient	0	0	6	10.00	5.00
Insufficient	60	100.00	54	90.00	95.00
Total	60	100.00	60	100.00	
Agriculture land use zone					
Sufficient	1	1.70	12	20.00	10.85
Insufficient	59	98.30	48	80.00	89.15
Total	60	100.00	60	100.00	
Grazing land use zone					
Sufficient	1	1.70	3	5.00	3.35
Insufficient	59	98.30	57	95.00	96.65
Total	60	100.00	60	100.00	
Forest zone					
Sufficient	42	70	49	81.60	75.80
Insufficient	18	30	11	15.40	25.20
Total	60	100.0	60	100.00	
WMA					
Sufficient	0	0.00	60	100.00	100.00
Insufficient			0	0.00	
Wildlife Corridor					
Sufficient	0	0.00	60	100.00	100.00
Insufficient	0	0.00	0	0.00	
Wetland					
Sufficient	60	100.00	0	0.00	100.00
Insufficient	-				

The study established that currently the grazing zones for both villages were insufficient for current and future land use (Table 5). The sufficiency of the grazing zone was assessed by the number of livestock units' verses the area allocated during planning. A livestock unit is the total number of different types of livestock (cows, goats, sheep and donkey) in relation to feed requirement used to maximise land use potential by determining the carrying capacity or stocking rate (FAO, 2011; NLUPC, 2013). The zoned grazing land for Iragua village (633.34 acres) was insufficient since planning this is because there were 975 livestock units (LU) demanding 4 290.00 acres of grazing zone. At present there are 8 453 livestock units requiring 16906.00 acres of land which exceeds the forecasted livestock units (316.5) and size of zoned area (633.34). This shows insufficiency of the allocated which is beyond the carrying capacity of the allocated zone. While at Kichangani currently there are 406 livestock units demanding 1015.00 acres of land while the forecasted livestock units were 2 305 with 5764 size of zoned grazing land documented in the village land use plan (UDC, 2008). In this regard, there is more than enough land zoned for grazing at Kichangani village.

Table 5: Number of livestock unit versus size of grazing zone

Iragua village 1LU=2acres		
Year	Livestock units	Size of land (acres)
2008	975.00	4230.00
2016	8 453.00	16906.00
2018	316.50	633.34
Kichangani village (1LU=2.5 acres)		
Year	Livestock units	Size of land (acres)
2011	39.00	78.00
2016	406.00	1015.00
2021	2 305.00	5764.00

Source: UDC (2008; 2011) and Iragua and Kichangani Extension Officer

Village Land use plans that were prepared in Kilwa and Lindi Districts was sufficient to accommodate the number of LU as a result, only few number of cattle were resettled into this districts due inadequate forage to sustain the livestock in dry season and inadequate infrastructures (cattle dips, water points, stock routes) necessary for allocated grazing zone (Mwambene *et al.*, (2014). Similar to this study finding, the grazing zones allocated at villages in Songea and Tunduru Districts were rendered insufficient as a result of overstocking as more immigrants settled illegally and multiple land use behaviour by agro pastoralists who settled, farmed and kept their livestock within the same zone for security of their livestock. Grazing zone system by the NLUPC only considers single use within a zone contrary to multiple uses by agro pastoralists. Based on the behaviour adherence to formal zoned land uses are limited.

Table 6: Number of households and size of residential and agriculture zones

Iragua village			
Year	Number of household	size of residence zone	size of agriculture zone
2011	925	1652.9	201.37
2016	2500	8485.17	10646.79
2021	1035	3512.86	4407.77
Kichangani Village			
Year	Number of household	Size of residential zone	size of agriculture zone
2008	980	688.78	2961.28
2016	1350	1379.34	4793.23
2018	1267	1294.54	4498.54

Source: UDC (2008; 2011) and Iragua and Kichangani Village Government

The current household data (Table 6) for both villages have exceeded the forecasted number of household (UDC, 2008; 2011). This study found that in Iragua village, the numbers of households were projected to be 1 267 by 2021 UDC (2011), but currently the number of household stands at 1 350 has exceeded the forecasted number of households. Similarly at Kichangani village, currently there are 2 500 households though the projected

number of households was 1 035 used to project the size of residential zone and agriculture zone. Based on these findings the residential and agriculture zones were insufficiently allocated therefore a major cause of non-adherence to VLUPs and land use conflicts in the near future.

A different approach using satellite images was used in a study by Bourgoin (2012) in four villages in Lao Peoples Democratic Republic. This study, determined the sufficiency of the allocated agriculture zones in comparison with what was planned and observed that the actual size of agriculture land use had highly exceeded the planned agriculture zone in four villages. According to Bourgoin (2012) the allocated land was insufficient due to shifting cultivation practice. On the contrary this study found that underestimation of forecasted number of households contributed to insufficient allocation of agriculture and residential land use zones. The procedure for projecting population data may have to be tested to ensure that it includes uncertainties. The number of households in 2006 presented in the study by Bourgoin (2012) could not clearly support the satellite data obtained in 2011 since this were different time periods.

Moreover, other studies did not critically assess the sufficiency of the zoned land used rather assessed the strategies in place and socioeconomic factors that influenced sufficiency of land use zones. Mwambene *et al.* (2014) established the cause of insufficiency of grazing land to be inadequate control mechanism of the number of stock kept in the grazing zone while (Kosyando, 2007) showed that farmers who were the majority group influenced the size of the allocated grazing zone for minority pastoralist group. On the contrary, the village government from the study villages highlighted that the population of pastoralists and their livestock during the time the plans were developed was

low. In recent years there has been a high immigration of pastoralists causing insufficiency of the allocated zones.

Table 7: Size of planned zones documented in Iragua Village Land Use Plan versus size of calculated zones mapped and proportion of each zone

Land use zones	Size of land by 2018 Documented (acres)	Size of land Calculated in 2016 (acres)	Proportion (%) of land use zone
Village Forest	6 800.80	6 706.20	39.07
Agriculture	4 407.77	4 469.50	25.33
Residential	3 512.86	3 510.33	20.18
Naminga Forest			10.08
Reserve	1 755.08	1 752.06	
Grazing	633.34	646.35	3.64
Wetland	294.73	302.56	1.69
Total	17 404.58	17 377.00	100.00

Table 8: Size of land use zone documented in Kichangani Village Land Use Plan versus size of calculated zones mapped and proportion of each zone

Land use zone	Size of land documented in 2011 (acres)	Size of land calculated in 2016 (acres)	Proportion (in %) of planned land use zone
WMA	20 057.62	24 700.00	56.10
Agriculture	4 498.54	4 384.12	12.58
Residential	1 294.55	683.77	3.56
Village forest	1 123.83	1 096.75	3.14
Grazing	5 764	1 271.37	16.12
Wildlife corridor	2 740.92	2738.69	7.67
KVTC	270.03	265.79	0.74
Total	35 754.75	34 874.70	100.00

When the sizes of the allocated zones documented in the VLUPs were verified against the size of zones determined using Arcview GIS discrepancy were noted (Table 7 and 8). The size of zones documented in the VLUP differed from the actual calculated size of the mapped zones for both villages. Greater discrepancies were observed in grazing, agriculture, residential and wildlife management zones. At Iragua village (Table 7) the

documented size (6 800.80) of village forest differed with the calculated size of zoned village forest (6 706.20). At Kichangani village the Wildlife management zone, grazing zone and residential zone had the highest discrepancies (Table 8). The documented area for WMA (20 057.62) was less than calculated size (24 700.00), Grazing zone (5764) was documented while 1271.37 was calculated which is three times less than calculated size and the residential zone (1294.55) documented which is less than (683.77) the calculated. The insufficiency of grazing and residential zones may have been triggered by the difference in the zoned area which is less than the calculated size of land use zone. Insufficiency of other zones may have also been affected by zones which had more than what was documented such as the Wildlife management zone.

Influence on donor supporting development of land use plans may contradict government policies and guidelines during planning, where inadequate coordination between sectoral authorities and land users perpetuate non-adherence incidence during implementation (Kauzeni *et al.*, 1993). Such a scenario is observed in this study where the proportion of allocated land for conservation influenced sufficiency of other zones to land users increasing incidences of non-adherence. The total proportion of conserved areas for Iragua (39.07, 10.08 and 1.68) was 50.83% while Kichangani (56.10, 3.14 and 7.64) was 66.88% where the rest of land were allocated for other uses. Similarly the proportion of conserved area in the district is more than 75% which is covered by Selous Game Reserve and Kilombero Game Controlled Area with exception of forests and Wildlife management areas, wildlife corridors, wetland which lie within the village land whereas less than 25% of the rest of land used for human activities (UDC, 2013). In order for land use plans to be implementable the zones have to be established with an integrated approach of all sectors and land users.

Further review of the land use plan document for Kichangani village revealed that there is discrepancy in census population figures applied in the population projection formula used for land use zoning. The village government proposed amendment of household figures in the document but the necessary changes were not taken into consideration (UDC, 2011). This may have affected the size of land use zones allocated especially for farming and residence which depend on the projection of population figures. Discrepancies were also noted in the applied population projection formula whereby 2.6% district annual population increment was applied for Kichangani village while 2.4% for Iragua based on 2002 census data. The other inconsistency existed in the size of land for residential and agriculture uses whereby the average land size for both villages differed. Various factors may influence the size of land used at a specific time and this may vary in the future NLUPC (2013). The projection formula for allocating land use zones for residential and agriculture had inadequate consideration for uncertainties in population growth in allocation of land use zones for the different users. This therefore may have influence on the sufficiency of the allocated land use zone. A study by Hart *et al.* (2014) conducted at Mbarali District also noted insufficiency of allocated land use zones caused by increased population relative to the allocated land use zone in their study. Land use projections should not rely on fixed rate of increase rather the trend of land use may be established and projected in order to sufficiently allocate land. Other measures need to be enforced such as registration of livestock to maintain the carrying capacity.

Table 9: Views of respondents on plans to expand land size to cater for their needs

Land size	Frequency	Percentage
Plans in future to expand land size		
Yes	108	90.00
No	12	10.00
Total	120	100.00
Reasons for expanding land size in future		
Increase agriculture production	39	36.10
Inheritance for family members	28	25.90
Improve livelihood	19	17.60
Increase income	22	20.40
Total	108	100.00
Land size currently needed to cater for needs		
1 to 10 acres	83	76.90
11 to 30 acres	18	16.70
31 to 60 acres	4	3.70
61 to 100 acres	3	2.80
Total	108	100.00
Land use zones to cater for extra land needs		
Reserved forest	10	14.50
Wildlife Management Area (WMA)	40	58.00
Village forest	19	27.50
Total	69	100.00
Alternative area considered to cater for needs		
Buffer zone	14	27.50
Kilombero Game Controlled Area (KGCA)	17	33.30
Kilombero Valley Teak Company (KVTC)	7	13.70
Neighbouring villages	13	25.50
Total	51	100.00

Majority of the respondents (90.00%) said that they were willing to expand their land size to cater for their needs (Table 11). The major reason for expansion included increase of agricultural production (40.80%), inheritance for family members (31.70) and increased income (16.70%). Majority of respondents (76.90%) needed land size between 1 to 10 acres while 16.70% needed land between 11 to 30 acres. Few respondents (6.50%) needed land between 31 to 100 acres (Table 10). When asked further on the land use zones which they considered to cater for their land needs, most of the respondents (50%) considered the WMA while (38.30%) opted for reserved forest. In Kichangani village (58.00%), respondents mentioned the wildlife management area zone followed by village forest

(27.5%) and reserved forest (14.50%). The alternative areas like Kilombero game controlled area (KGCA) (33.30%), buffer zone (27.50%), neighbouring villages (25.50%) and KVTC (13.7%) were pointed out by respondents from Iragua village. Tanzania has a land insufficiency rate of 63% which is exceeded by land utilisation rate of 78% for farming. This implies that, while more land is increasingly being used for agriculture the lesser land will suffice for farming in the future. This is a threat to conserved zones which have arable virgin land. Discussion with land use groups in both villages revealed that the zones designated for conservation of wildlife and forests were still virgin land; hence, highly productive and therefore, less cost of controlling pests and weeds. Conversely, the conserved village forest at Iragua is located on a mountainous landscape which is not suitable for paddy cultivation however agro pastoralists have invaded the zone by conducting grazing activities since there is reliable water for cattle from the mountainous forest.

Interview with the Extension Officers brought to understanding the fact that rice was a staple food crop and cash crop for the natives who were mostly small scale farmers who practise shifting cultivation to minimise production cost while maximising yields. He further said that small scale farmers invaded into conserved zones as they abandoned their unfertile land to regain fertility over a period of time. However, the urge to maximise profit under communal norms were thought to have influenced large scale farmers (agro pastoralists) to opt for other zones. This scenario influenced sufficiency of other allocated zones due to increasing number of households. Similar to these findings Bamford *et al.* (2010) and Nindi *et al.* (2014) reported of non-adherence incidence through observed encroachment in the buffer zone and Kilombero Game Controlled Areas which has recurrently led to land use conflict. This study concurs also with argument by Kaswamila (2006) who argued that unclear framework to regulate access and use of buffer zone and the perceived notion that buffer zones were no man's land instigated open access situation creating land use conflicts with neighbouring communities.

4.1.2 Reasons for insufficiency of the specific allocated land use zones

The reasons given by the respondents on why they thought the allocated zones were not sufficient to cater for their needs are summarized in Table 10. The majority (66.7% and 54.1%) of the respondents in the district said the main reason for insufficiency of residential and agriculture allocated zones were due to increased human population relative to the available zones respectively. Moreover, poor land acquisition procedure (16.7%) was the second main factor that caused land insufficiency for residential zone. In addition to increased population, the agriculture zone was affected by limited agriculture potential areas specifically for paddy production and mixed uses within the same zone.

The main reason for insufficiency of grazing zone (Table 10) was said to be due to mixed uses in allocated zone for grazing (55.0%), invasion by immigrants (18.4%), overstocking of livestock (15.0%) and insufficient land allocated for grazing (6.2%). The insufficiency of the area allocated during planning increased level of encroachment and deforestation (75.0%), population increase (15.0%) and poor agricultural practices (10.0%). The forest zone was considered insufficient mainly due to deforestation (48.3) and missed woodlot (46.7%).

Table 10: Reasons for insufficiency of the allocated land use zones

Category label	Frequency	Percentage
Residential zone		
Increased population	55	66.70
Illegal land acquisition procedures	39	26.30
Poor land use implementation	26	7.00
Total	120	100.00
Agriculture zone		
Increased population	65	54.2
Limited agriculture potential areas	40	33.3
Mixed uses	15	12.5
Total	120	100.00
Grazing zone		
Mixed uses in allocated zone	66	55.00
Invasion by immigrants	22	18.40
Overstocking of livestock	18	15.00
Insufficient land allocated for grazing	14	11.60
Total	120	100.00
Forest zone		
Increased deforestation	58	48.30
Missed woodlot	56	46.70
Increased population	4	3.40
Poor agricultural practices	2	1.60
Total	120	100.00

A single use zoning procedure is applied in the country without consideration of the land users' social and cultural values that may influence adherence to the plan. In order to save time and labour force, the agro-pastoralists groups expressed their cultural and communal behaviour of residing, tilling land and looking after livestock together which led to insufficiency of specific allocated land use. Native farmers groups (pure farmers) accused illegal immigrants (agro-pastoralists) of invaded into the allocated zones without following the required land acquisition procedures.

During FGD with land use groups, the village authority was accused of corruption in allocation of land whereby some agro pastoralists were accused of bribing the leaders to

acquire land without following the required procedures. Interview with the District Land Office further revealed that zoning criteria were sector guided and in certain circumstances donor initiated VLUP had influenced allocation of zones. The District Land Officer gave an example of the WMA zones which were established prior to the actual zoning process during land use planning. Lack of clear zoning regulation that would harmonise socio-economic and ecological uses within each zone rendered insufficiency of some land use zones as observed in this study. Review of the land use plan does not show the size of village land leased to investors such as the Kilombero Valley Teak Company (KVTC) even though it was within the same mapped village boundary.

Based on the same argument, increased population increases land use demand which in turn leads to insufficiency of the allocated zones; thereby, calling for revision of allocated zones to ensure that VLUPs are adhered (Matey, 2016). In a study by Manivong and Sophathilath (2009), findings established that the illegal land use and transfer rights led to insufficiency of the allocated zones in some of the study villages while the agriculture zones were affected by shifting cultivation practices. A study by Mwambene *et al.* (2014) found that insufficiency of the livestock zone was mainly attributed to lack of infrastructures and inadequately allocated livestock zone to cater for the number of stock. Corruption was a key factor identified to influence sufficiency in allocation of land to different users (ILC, 2013).

Additionally, Kosyando (2007) earmarked that the village officials and residents misallocate zoned land uses to other users through selling while lack of security of tenure rendered communally owned zones such as livestock keeping zone, to be vulnerable to change in uses by village council. Sufficiency of allocated grazing zone is limited by mobility and flexible behaviour of pastoralists as an adaptation to climate change and resources (ILC, 2013).

4.2 Extent to which the Land Use Zones are adhered

The results (Table 10 and 11) show adherence along the shaded area and the non-adherence in the unshaded area. Total values in columns are the sampled points according to planned land use zones while total values in rows are the observed sampled points. The results further depict that the least adhered to land use zone is the livestock keeping with 25% adherence for both villages while the most adhered to land use zone is wildlife management area with 74.5% for Kichangani and village forest with 66.7% for Iragua village.

Table 11: Observed sampled points for Kichangani village land use zones

Planned Land use	Zone	Observed land use					Total	
		Wildlife management	Residential	Wildlife corridor	Village Forest	Agriculture		Grazing
Wildlife management		59.00	0.00	0.00	0.00	0.00	0.00	59.00
Residential		3.00	2.00	0.00	0.00	3.00	1.00	9.00
Wildlife corridor		0.00	0.00	4.00	0.00	0.00	0.00	4.00
Village Forest		0.00	0.00	0.00	2.00	0.00	0.00	2.00
Agriculture		10.00	1.00	3.00	1.00	11.00	2.00	28.00
Grazing		7.00	0.00	1.00	1.00	2.00	1.00	12.00
Total		79.00	3.00	8.00	4.00	16.00	4.00	114.00
Percentage Adherence		74.70	66.70	50.00	50.00	68.70	25.00	

Table 12: Observed sampled points for Iragua Village land use zones

Planned Land use	Zone	Observed land use					Total	
		Grazing	Nambinga Forest	Residential	Village Forest	Wetland		Agriculture
Grazing		1.00	3.00	2.00	9.00	0.00	3.00	18.00
Nambinga Forest		0.00	5.00	1.00	0.00	0.00	0.00	6.00
Residential		1.00	0.00	11.00	1.00	0.00	3.00	16.00
Participatory Village Forest		0.00	0.00	0.00	24.00	0.00	4.00	28.00
Wetland		0.00	0.00	0.00	0.00	1.00	0.00	1.00
Agriculture		2.00	2.00	5.00	2.00	1.00	14.00	26.00
Total		4.00	10.00	19.00	36.00	2.00	24.00	95.00
Percentage Adherence		25.00	50.00	57.90	66.70	50.00	58.30	

Table 13: Overall adherence rate to Village Land Use Plans

Overall score	Adherence rate	Non - adherence rate	Kappa	P values for Kappa	Confidence Interval	
					Upper	Lower
Iragua	0.41	0.59	0.47	0.001	0.34	0.60
Kichangani	0.31	0.69	0.49	0.001	0.36	0.61

The Kappa results in (Table 13) shows adherence rate for Iragua and Kichangani villages are 0.59 and 0.69 respectively. Kappa coefficient for Iragua and Kichangani were 0.47 and 0.49 respectively indicating moderate agreement. The results (Table 13) from the Kappa statistic showed that adherence incidences in all land use zones were highly statistically significant at $p < 0.001$. Kappa values from a study conducted by Samardžić-petrović *et al.* (2013) at three municipalities in Belgrade portrayed least adherence incidence in green zones and agriculture zones due to illegal construction of houses. Contrary, to this study finding, this study the least adhered zone was the grazing zone due to multiple land uses by agro-pastoralists where farming, grazing and settlement was done within the same zone.

Analysis of satellite images for a study conducted in four districts Paklao, Bouami, Phoukong and Phakok in Lao Peoples Democratic Republic similarly showed non-adherence incidence (Bourgoin, 2012). The analysis revealed that the actual average size of agricultural land use per household exceeded the average size of agricultural land per household displayed on the wooden board (Bourgoin, 2012). Findings by Tian and Shen (2011) established that adherence to land use plan was high at open space on the contrary no zones are classified as open space rather even the occupied zoned revealed non-adherence incidences. In Ashiyie Ghana, the overall non-adherence incidence was 50% for the different land uses (Matey, 2016). This however, doesn't clearly show adherence at individual land use zone which may vary depending on different factors. Adherence

incidence observed by different studies varies with context which cannot only be analysed by spatial means rather further results from socioeconomic factors influencing adherence to VLUPs were relevant to establish the cause of examined adherence incidence in the observed in the field.

4.3 Factors Influencing Adherence to Land Use Plan

4.3.1 Socio-economic factors influencing adherence to Village Land Use Plans at household level

Socio-economic factors which influenced adherence to VLUP at household level were age, residential status, means of land acquisition number of dependants and income (Table 14). Respondents with ages ranging between 22 to 47 years had the highest non-adherence rate to VLUP. Most of the immigrants (41.7%) did not adhere to allocated land use zones. The findings further revealed that majority of the respondents who had acquired land from inheritance (25%) adhered to VLUPs and most of the respondents (25%) who cleared their own land least adhered to allocated VLUP. Households with 5 to 8 members least adhered to VLUP while Majority of the respondents with income ranging from 2 000 000 to 4 000 000 had the highest percentage (19.1%) of non- adherence compared to adherence rate (5.9%) to VLUP.

Table 14: Socioeconomic characteristics of respondents and their adherence to Village Land Use Plan for different zones

Variable	Yes		No	
	Frequency	Percentage	Frequency	Percentage
Age category				
<22 years	2	1.70	3	2.50
22 to 35 years	12	10.00	20	16.60
36 to 47 years	7	5.80	39	32.50
48 to 55 years	7	5.80	7	5.80
>56 years	13	10.90	10	8.30
Total	41	34.20	79.0	65.80
Residential status				
Immigrant	15	12.50	50	41.70
Native	29	24.10	26	21.60
Total	44	36.60	76	63.40
Means of land acquisition				
Inherited	30	25.00	14	11.70
Rented	6	5.00	10	8.30
Village allocation	7	5.80	8	6.70
Bought	5	4.20	7	5.80
Illegal Clearance (invasion)	3	2.50	30	25.00
Total	51	42.50	69	57.50
Number of dependents				
1 to 4 members	36	30.00	34	28.30
5 to 8 members	10	8.30	30	25.00
9 to 32 members	2	1.60	8	6.10
Total	48	39.90	72	60.10
Annual income (TZS)				
<1 000 000	28	23.30	18	15.00
1, 000 000 to 2 000 000	15	12.50	24	20.00
2 000 001 to 3 000 000	5	4.20	15	12.50
3 000 000 to 4 000 000	2	1.70	8	6.60
>4 000 000	1	0.80	4	3.40
Total	51	42.50	69	57.50

The findings (Table 15) indicated that the model accurately classified 69.2 percentage accuracy of classification. Further the results showed that the model performance was statistically significant ($p < 0.001$). The model fits very well as indicated by Omnibus Test of model coefficients being below 0.05 ($p = 0.004$) and Hosmer and Lemeshow Test being above 0.05 which support the model goodness of fit (Table 15).

Table 15: Socio-economic factors influencing adherence to Village Land Use Plans at household level

Variables used in the equation	B	S.E.	Wald	df	Sig.	Exp(β)	95.0% C.I. for Exp(β)	
							Lower	Upper
Age	0.037	0.019	3.886	1	0.049*	1.038	1.000	1.077
Education level	0.590	0.445	1.759	1	0.185	1.803	0.755	4.310
Household size	0.042	0.058	0.523	1	0.034*	1.043	0.931	1.168
Economic activity	-0.530	0.557	0.905	1	0.342	0.589	0.198	1.754
Farm size	-0.009	0.012	0.545	1	0.460	0.991	0.967	1.015
Income	0.025	0.000	0.268	1	0.005**	1.025	1.000	1.000
Residential status	1.593	0.572	7.756	1	0.005**	0.919	1.603	15.092
Duration of stay	0.265	0.608	0.190	1	0.663	1.304	0.396	4.292
Land acquisition	1.017	0.513	3.934	1	0.047*	0.765	1.012	7.552
Constant	-2.659	1.101	5.834	1	0.016*	0.070		
Test:			χ^2	df	p-value			
Model evaluation (Overall)								
Likelihood ratio test (Omnibus Tests of Model Coefficient)			23.955	9	0.004			
Goodness-of-fit test								
Hosmer and Lemeshow test			7.774	8	0.456			

Note: *Indicates statistically significant at $p < 0.05$

**Indicates statistically significant at $p < 0.01$

Note: PAC Null Model= 69.2, Cox and Snell R^2 0.181, Nagelkerke R^2 : 0.243, Sample size used in the analysis (n=120)

Results from the binary logistic equation indicated that the variables influencing adherence to VLUPs by 18.1% and 24.3% as explained by Cox and Snell R square and Nagelkerke R square values in Table 15 were age, household size, income, residential status and land tenure. These contributed significantly in influencing adherence to VLUPs because their p-values are below 0.05 (0.049, 0.034, 0.005, 0.005 and 0.047, respectively). All the other predictors did not contribute significantly to the model because they had probabilities that were greater than 0.05.

According to Norouis (1990) and Powers and Xie (2000), the non-zero Wald statistic values (Table 15) indicate the presence of relationships between the dependent and

explanatory variables. Thus, on the basis of the results of this study, the socio-economic factors have significant influence on the adherence to VLUPs at 5% level of significance.

Age

Table 15 shows that, age has a positive regression coefficient (0.037) which implies that an increase in age influenced adherence to VLUPs by a factor of 1.038 (odds ratio). This means that a unit increase in age while keeping all other factors constant will increase the odds of adherence VLUPs by 38%. This is because age has influence on knowledge and behaviour of people; hence, relevant in influencing adherence to VLUPs (Briassoulis, 2000). The results indicated that household age had statistically significant influence on adherence to VLUP ($p < 0.049$). This study is in support with findings from Nangware (2019) where most of the respondents were in the active labour age the subsequent impact was more land was cleared from Kilombero flood plain for farming.

Household size

Household size (Table 15) has a positive regression coefficient which implies that an increase in one unit of household size increases adherence to VLUP by a factor of 1.043 which is the odds ratio as reported in the Table 15. This implies that a unit increase in household size has statistically significant influence on adherence to VLUP ($p < 0.05$). Household size influences a number of factors. For instance, large household size may influence income earnings and expenditure; thus, it may influence the level of labour force and may as well influence the diversification in economic activities (Christensen *et al.*, 2005). According to Fekade (2000), as cited by Matey (2016), bigger households demand more space sufficient to food production for their families, therefore are unlikely to adhere to allocated land use zones if it was insufficiently allocated.

Income

The results in Table 15 indicate that there is a positive regression coefficient of annual income (0.025) with a log of odds ratio of 1.025. Therefore, a unit increase in household income increased the odds ratio for adherence to VLUP by about 25% *ceteris paribus*. The increase in household annual income influenced households to demand for more land and employ advanced technology in order to increase income. Therefore a unit increase in income, has statistically significant influence on adherence to VLUP ($p < 0.05$). Income influences current land use decisions while land use decisions influence income, where alternative source of income may reduce dependence on income from agriculture or may be reinvested into agriculture (Hettig *et al.*, 2015). People with high income earnings can afford to employ modern technology and increase their land size for both commercial and subsistence agriculture unlike those with low income who utilise land for subsistence farming and use hand hoe to till their land. According to Lininger *et al.* (2015) and NBS (2013) subsistence farmers in Tanzania utilise average land size of 2 – 2.2 hectares for agriculture as they employ hand hoe annually. Income could also give power to individuals to influence decision in their favour through buying, bribes and invasion into land in zones not designated for farming or grazing (Briassoulis, 2000; Nzunda *et al.*, 2013). The need to generate income from land was among reasons established for non-adherence to allocated land use plan implementation (Matey, 2016).

Residential Status

Residential status has a positive regression coefficient (b) of 1.593 and the odds ratio ($\text{Exp}(\beta)$) of 0.919 (Table 14). This implies that a unit increase in residential status, which was statistically significant at the probability of 5% increased influence on adherence to VLUPs. Residential status has been hypothesized in many studies to affect household land use decisions. For example, increased immigrants in Kilombero led to change in

population thereby influencing encroachment into Kilombero wetland (Nangware 2019). Discussion with agro pastoralists groups informed that they immigrated after VLUPs were established and hired land allocated by village leaders for TZS 20 000 per acre per year without any formal procedure. This study is in support of Codjoe and Bilsborrow (2011) argument, whereby migrants employed unsustainable agricultural practices such as encroachment, and deforestation in conserved forest zones thereby influencing adherence to VLUPs. Moreover, Dolisca *et al.* (2007) found that illegal migrants are more likely to invade into forested areas than the native communities.

Land acquisition

The results in Table 15 indicated that an increase of one unit of household land tenure insecurity increased the odds ratio for adherence by a factor of 0.765. The mode of land acquisition reflects on land tenure and property rights (Hettig *et al.* 2015). Similar to a generalisation made by Hettig *et al.* (2015), this study found that households with insecure property rights and tenure (farmers and agro pastoralists) informally established de facto rights through clearing or invading conserved areas or unclaimed land. Insecure land tenure stimulated conversion of marshland to rice fields in Madagascar (Toillier *et al.*, 2011). Other studies have reported persistence of traditional land use ownership despite established formal ownership (Lambin and Meyfroidt, 2010; Nzunda *et al.*, 2013).

4.3.2 Socio-economic factors influencing adherence to Village Land Use Plans at group level

Focus group discussion with different land use groups prioritised several factors (Table 16) influencing adherence to VLUPs. Corruption ranked first at Iragua village, inadequate awareness ranked second, leaders failure to implement VLUPs and unclear zones tallied in the third position. Leadership implementation failure, corruption and

increased population were prioritised at Kichangani village. Corruption and leadership implementation failure appeared to be a key factor influencing adherence ranked in both villages. In support of this results discussion by different land use groups brought to light that the government's notice of 2012 to evict pastoralists from Kilombero valley Ramsar site to Lindi region Mwambene *et al.* (2014), was not affected at Iragua village. The farmers group claimed that substantial amount of money was collected and used to bribe the District Officials so as to sabotage eviction of agro pastoralists from Iragua village.

Corruption

Corruption was a major factor influencing adherence to land use plans leading into conflicts between farmers and pastoralists groups in Kilosa District (Mwamfupe 2015). Similarly, corruption was not only observed at village level plans but also it was mentioned as major factor influencing adherence to land use plans leading to many conflicts in the urban areas in Tanzania (Lugalla, 2010; ILC, 2013). Corruption ranked first and second in Iragua and Kichangani respectively.

According to discussion quoted from farmers groups, *“Village leaders have been taking bribes and acting in favour of pastoralists because they know that they are just serving a term of 5 years. Corrupt leadership had influenced effective implementation of VLUPs and decisions taken were not accounted to the community. Land is not allocated to agro pastoralists in a transparent procedure whilst violating the land use zones in VLUPs. As a result we have been experiencing recurrent land use conflicts occurring between farmers and agro pastoralists especially during the rainy season KGCA is flooded making the area conducive for grazing”*. While pastoralist groups in both villages acknowledged land was sold to them by village leaders as quoted during discussion, *“the procedure for acquiring land for farming, settlement and grazing was through the village leaders who allocated land at a price of TZS 20 000 per hectore. The conserved area were still unoccupied by natives hence a household could be allocated as much land as they needed.*

Table 16: Factors identified to influence adherence to Village Land Use Plans during pair wise ranking

s/n	Factors	Male Farmers	Female farmers	Male pastora lists	Female pastora lists	Total score	Over all Rank
Iragua Village							
1.	Corruption by village leaders	11	13	12	10	46	1
2.	Inadequate awareness / knowledge on VLUPs	6	12	13	10	41	2
3.	Leaders failure to implement VLUP	13	10	8	7	38	3
4.	Unclear zoned land uses	12	8	9	9	38	3
5.	lack of land security (CCROs)	8	5	10	10	33	4
6.	lack of transparency by village leaders in allocation of land	8	11	6	7	32	5
7.	Increased population	7	10	5	9	31	6
8.	Illegal invasion of land	8	6	8	9	31	6
9.	Insufficient allocated land uses	5	3	9	12	29	7
10.	Inadequate enforcement of VLUP	1	9	5	4	19	8
11.	Overstocking of livestock	6	1	4	3	14	9
12.	Inadequate penalties on non-adherers	6	3	2	0	11	10
13.	Land users failure to implement	0	0	0	1	1	11
Kichangani village							
1.	Leadership failure to implement	10	12	13	11	46	1
2.	Corruption by village leaders	11	13	8	12	44	2
3.	Increased population	7	9	12	9	37	3
4.	Insufficient allocated land use zones	9	8	9	8	34	4
5.	lack of transparency by village leaders in allocation of land	9	10	8	6	33	5
6.	Inadequate awareness / knowledge on VLUPs	8	4	7	13	32	6
7.	lack of land security (CCROs)	7	9	6	6	28	7
8.	Overstocking of livestock	5	6	7	7	25	8
9.	Inadequate enforcement of the plan by village leaders	5	0	10	8	23	9
10.	Illegal invasion of land	2	7	6	4	19	10
11.	Inadequate penalties on non-adherers	6	11	0	0	17	11
12.	Land users failure to implement	12	0	1	1	14	12
13.	Unclear zoned land uses	0	2	4	6	12	13

Village leader's failure to implement VLUPs

During pair wise ranking exercise land use groups argued that most of the other factors influencing adherence stem from leadership failure to implement VLUPs. Such factors include; Corruption and lack of transparency reflecting poor governance, overstocking due to inadequate control and enforcement measures by village leaders, inadequate awareness and knowledge expected to be provided by village leaders consequently land users do not adhere to VLUPs. Interview with VEOs of both villages revealed that there were no succession plans in the implementation of VLUPs due to change of leadership who serve a term of 5 years while plans are made for 10 years. The VEO at Iragua who was just transferred to the village said that the VLUPs plan lies in their office as a document but they had limited capacity to interpret and implement the plan. Strong leadership is a vital component within stakeholders' characteristic that was emphasized as a major factor influencing adherence in Iskadar Malaysia (Yunos *et al.* (2015). In support of this argument, failure of leaders to lead others to adhere to the VLUPs was due to unclear implementation roles for stakeholders from the village (Brissaoulis, 2000; Kaswamila and Songorwa, 2009; Kauzeni *et al.*, 1993). From the above discussion it is proper to argue that failure of village leaders influenced adherence to VLUPs to a great extent. This is because leaders are expected organize users to adhere to the plan yet they themselves do not take the lead in implementing the plan.

Inadequate awareness / knowledge on VLUPs

Inadequate awareness of VLUPs ranked second in Iragua village influenced the implementation of the plans. This is because the land use groups were inadequately involved during the planning process. Review of the land use documents showed that the representative quorums from both villages were not reached since 142 households out of 925 in Iragua village and 18 households out of 980 in Kichangani village were involved in the

exercise (UDC, 2008; 2011). Inadequate involvement in the planning process signifies insufficient time spent for preparation and the planning process; subsequently, influencing its implementation. Discussion with VLUMC highlighted that VLUP planning process was conducted in a rush limiting awareness to native farmers who were present during planning. While discussion with agro pastoralists who immigrated after the plan was developed said they were not aware of VLUPs.

Similarly, a study conducted at Babati and Monduli districts by Kaswamila and Songorwa (2009) also registered inadequate awareness and knowledge by villagers on conservation along with sustainable land use practices as a factor that significantly influenced the implementation of the plan. Similarly in Central Rift Valley of Ethiopia little awareness by farmers and local government in developing land policy led to ineffective implementation of land use policies (Ariti *et al.*, 2017). Those supposed to implement the plan should be aware and knowledgeable on VLUPs in order to enforce adherence to VLUPs during implementation.

Population increase

Increase in population both by birth and immigration increased demand for land thereby causing insufficiency of allocated zones. High quality arable land and cheap farmland attracted immigrants into Ulanga District from Mwanza, Shinyanga, Arusha, Kilimanjaro, Singida, and Tabora regions (Bamford *et al.* 2010. About 62% of the immigrants were from pastoral communities alleged to be Maasai, Barbaig and Sukuma tribes (Bamford *et al.*, 2010). The polygamous behaviour of agro pastoralists (mainly Wasukuma tribe) and extended family was a key factor pointed out by the VEO of Kichangani village to have increased the population thereby influencing adherence to the allocated zones. Moreover, increased population relative to allocated land use zones, increased non-adherence

incidences of encroachment and land use conflicts due to expansion of farms, grazing areas and residence as observed during this study.

Other studies by Mndeme (2011) found that compensation for lost land was a major reason influencing adherence to the VLUPs. On the contrary this study found that during the time when the plans were made, land was abundant; hence, no compensation for lost land was required. The implementation of the national land policies and laws have since not only depended on the government's own funding but also funding provided by partners or donors (Kauzeni *et al.*, 1993). Considering that donors have their priorities depending on their own mandates, it is, therefore, questionable on the ownership of the planning process and its sustainability during implementation (Kironde, 2012). Likewise, most plans are developed to meet government targets. As a result, a top-down approach leads to inadequate involvement of local communities and time allocated for monitoring (Keoketsy *et al.*, 2000). Poor involvement during planning leads to poor implementation of the plan due to lack of sense of ownership of the plan by recipients (Bartels *et al.*, 2001).

4.4 Strategies for Enforcing Adherence to Village Land Use Plans

4.4.1 Current strategies, strengths and weaknesses

According to the PLUM team, the strategies used to enforce adherence to VLUPs included signboards and boundary demarcations, by-laws, zoning, community action plan and conflict resolution. Respondents identified different zones and whether there were clear demarcations between the different zones under VLUPs (Table 17). Field observation further approved of the deficiency within the different zones. Majority of the respondents (70.00%) from Iragua village agreed that there were signs that were put up to demarcate the different zones under VLUPs though most of them had been vandalised to permit misuse of the allocated zone. However, at Kichangani village, most of the respondents

(83.30%) disagreed to have had signs erected in the different zones. When respondents were asked if the zones had been demarcated, most of the respondents (75%) said that the zones were least demarcated.

Table 17: Presence of signs and clear demarcated within the zones

Category label	Iragua		Kichangani		Mean %
	n	%	n	%	
Presence of signs at different zones					
Yes	42	70.00	10	16.70	43.35
No	18	30.00	50	83.30	56.65
Total	60	100.0	60	100.00	
Are all the land use zones clearly demarcated					
Yes	46	23.30	16	26.70	25.00
No	14	76.70	44	73.30	75.00
Total	60	100.0	60	100.0	

During FGD with VLUMC and interview with VEO at Kichangani village, it was revealed that the signboards were prepared during planning stage and were still left in the office since there had been no initiatives taken by the village to put up the signboards against the land use zones after the project phased out. Discussion with the different groups further revealed that the zones for different land uses were clearly demarcated at Iragua village while most zones for Kichangani village were not clearly demarcated. The only zone at Kichangani village that was clearly demarcated was the WMA zone, whereby roads and beacons were put up. Nambiga forest reserve, agriculture zone and the residential zone had clearly established roads in Iragua Village.

The findings (Table 18), revealed that majority (59.20%) of respondents were not aware of the by-laws, while most of the respondents (62.50%) were least involved in developing the by-laws. Low participation in the village assembly meeting further justified their least involvement in development and approval of the by-laws. Most of the respondents

(84.20%), said that penalties imposed were inadequate to enforce adherence to VLUPs. The key reason by most of respondents (35%) for inadequacy of penalty was due to weak enforcement of by-laws. Other reasons were inadequate involvement of land users in developing by-laws (30.00%) and inadequate fines and penalties (30.00%). The low fines imposed failed to deter repetition of the offences committed. Calbick and Gunton (2003) recommend that fines should reflect on land use impact caused by non-adherers by costing the mitigation of impact caused by non-adherence activities. Reference to VLUPs document and local government legislation, it was found that a fine not exceeding TZS 50 000 would be charged for any violation of land use plan at village level (UDC, 2008; 2011). Additionally, weak enforcement of the by-laws the village government was a reason given for the offences during a discussion with VLUMC committee whose roles ceased to continue after the planning stage. It was further reported that inadequate coordination among committees involved in enforcement of adherence at specific zones (Natural resource committee) or generally in all zones (VLUMC) paralysed effectiveness in enforcement of by-laws.

It was further disclosed that despite the fact that contraveners of by-laws were supposed to be prosecuted most of their cases were handled by village leaders. This typifies a fused power where laws are made, enforced and judged by a single body subjecting decisions to biasness, corruption and unjust rulings (Kajembe *et al.*, 2009). The stipulated fine of TZS 50 000 for non-adherence to VLUP in the study villages did not consider the magnitude of the offences. This provided a loophole for recurrent of incidences since, as discussion with VLUM Committee, “the fine of clearing acres of a forest is the same as the fine charged for a single tree.”

Table 18: Presence of by-laws for enforcing adherence to Village Land Use Plans

Category label	Frequency (n=120)	Percentage
Awareness of by-laws		
Yes	49	40.80
No	71	59.20
Total	120	100.00
Involvement in developing By-laws		
Yes	45	37.50
No	75	62.50
Total	120	100.00
Adequacy of penalties		
Yes	19	15.80
No	101	84.20
Total	120	100.00
Reasons for inadequacy of penalties		
Weak enforcement of by-laws	42	35.00
Inadequate involvement in developing by-laws	36	30.00
Inadequate fines and penalties	36	30.00
Corruption	3	2.50
Inadequate knowledge	3	2.50
Total	120	100.00

According to Manivong and Sophathilath (2009), weak implementation of rules increased open access of forested zone in Silalek and Mai-Natao villages. Mwambene *et al.* (2014) reported a similar case in Lindi and Ruvuma regions. Information from key informants also revealed that there was no strategy for motivating VLUMCs to facilitate in the implementation of the plan and as a result, most of the members opted for other opportunities to facilitate in sustaining their livelihood. Durey and Mwangi (2014) found that non-adherence to spatial plans was mainly triggered by lack of means to implement incentive and penalty schemes.

Zoning

Zoning is among the strategies mentioned during FGDs with PLUM and VLUMC. Discussion with PLUM team on the zoning criteria used to enforce adherence on the

VLUP and review of the land use document disclosed that some zoning criteria were known to the respective sectorial expert (Table 19). At village level, though the VLUM team was involved in zoning activity, they had inadequate know-how on the criteria used to allocate the different zones. In the absence of transparent and participatory implementation strategies, the cultural values of the community were not adequately represented.

This finding corresponds to those in studies done by ILC (2013) and Matey (2016). Sufficient zoning of agriculture zone was an effective strategy over land sparing and sharing (Law *et al.*, 2015). In this regard, sectorial-regulated and donor-influenced zones may limit adherence to allocated zones. For example at Kichangani Village where the land use supporting project was wildlife conservation based, this influenced the allocation of the wildlife management zone which covered most of the village land. Limited adherence had been observed in some of the zoned areas due to insufficiently allocated land use zone.

Community Action plan

Review of the land use documents (UDC, 2008; 2011) and interviews with District Land Officer, Village Executive Officers and Extension Officers (Table 20) revealed that Community Action Plan documented during planning where problems, implementation actions, timeframe and outcomes were identified for each land use zones. The implementation had not been effected to improve the proposed zones infrastructures since the planning process ended at the fourth step. The District Land Officer explained that it was a sectorial responsibility to advance each respective zone with infrastructures necessary to enforce adherence to VLUP. Discussion with PLUM team comprised of experts from the different land use sectors informed that land use plans which were developed during donor had limited sustainability after the projects phase out due to

inadequate funding to support effective implementation of the VLUPs. During planning, resources for implementation of actions plans towards completion of planning steps should clearly be coordinated between government and donors in order for VLUPs to be complete and implementable.

Land use security

Interview with the District Land Officer revealed that the alleged complete plans ended up at the fourth step of having an approved document of village land use plan. Missed out details included acquisition of land security of tenure (acquiring certificates of customary rights of occupancy-CCROS) and this further advanced the zoned used by putting up the necessary infrastructures. This, according to the VEO and discussion with VLUM committee, had greatly influenced adherence to planned land use zones causing recurrent conflicts between farmers and pastoralists. It was also noted that acquisition of land was often informal and therefore land use conflicts were often inevitable. Discussion with land use groups and VEO on modality of acquiring land disclosed that a person cleared a bush and paid only TZS 20 000 to the village for an acre of land.

Reviewing the plans

Planning is considered a continuous process of interaction that will shape as well as be shaped by those affected by the plan. According to Miller and Perry (2015), there is need to review zoning maps to accommodate recommendations, improve predictions and balance interests among users. Monitoring VLUP implementation was another potential strategy suggested during FGDs (Table 19). This was proposed in order to assess adherence to VLUPs, accommodate changes and develop actions plans to enforce adherence.

Conflict resolution

A plan is not a blueprint; it has to be flexible to accommodate changes. Conflict is an engine of change that has positive and negative repercussions. Conflict resolution therefore is among the important strategies which facilitate enforcement of adherence to VLUPs (Table 19). In both villages, the VLUM committee and the land use council said that they were least involved in resolving land use conflicts. Even when they were involved, their recommendations were least considered in the final decision/ruling by the village government. Land use conflicts occur when land users do not adhere to allocated land use zones leading to disputes.

Conflict resolution is among tasks of VLUMC stipulated in NLUPC (2013) guidelines. The discussion with VLUMC committee revealed that no training was imparted to appraise them with negotiation and mediation skills which are important to resolve non-adherence incidences among land users. Likewise, inadequate capacity to resolve conflicts among the environmental committee comprising of farmers and pastoralists was a factor highlighted by Mwamfupe (2015). Inadequate coordination of different committees at village level as suggested by VLUMC team led to failure of effective enforcement of adherence to the land use plan. Moreover, conflict of interest among different committees also affected the implementation of VLUP.

Table 19: Current Strategies, Strength and weakness in enforcing adherence

Strategies	Strength	Weakness	Source: field work January-June 2016
Build capacity at Village Level	1. VLUM were trained 2. Awareness was raised to villagers	1. Unclear roles 2. Inadequate capacity and remuneration 3. Inadequate awareness to land use groups	Household survey, VLUMC, VEO
Signboards	1. Available in both villages	1. Missing the sign boards in some zones due to vandalism in Iragua village 2. No signboards were in all zones rather they were kept in the village office	Household survey, FGD, VLUMC, VEO
Boundary demarcation	1. Clearly established in Reserved forest and wildlife management zones	1. Inadequate maintenance of boundaries 2. lack of beacons or clear demarcations in most zones	Household survey, FGD, VLUMC, VEO
Zoning	1. Both villages have land use zones as per the VLUP	2. The used standards are sectorial and donor influenced 3. Missed specific needs within the zones to harmonise land use 4. Limitedly known to most land users 5. Inadequate consideration of cultural values and behaviour	VLUMC, PLUM team
Community Action Plan	Documented within VLUP for each village	1. No implementation due to inadequate coordination and budgetary constraint 2.	PLUM, VLUMC, VEO, Extension officers, District Land Officer
Land use Security	Customary rights of occupancy still exists	1. Non adherence to formal allocation of land 2. Lack of transparency 3. No formal rights of occupancy implemented	FGD, VLUMC
Conflict Resolution	Conducted by village leaders	1. Conflict of interest between village land council, VLUM and village government 2. inadequate capacity in resolving conflicts at village level	VEO, VLUM, VLC

4.4.2 Potential strategies, strengths and weaknesses

Potential strategies used to enforce adherence to VLUPs (Table 20 and 21) were elicited using household questionnaires, FGD, interviews as well as review of documents. These strategies include education and awareness programmes, capacity building, benefit sharing, review and evaluation of VLUP.

Education and awareness programme

Ownership of a plan by targeted users is vital to its implementation (Calbick *et al.*, 2003). This study established that in order for the community to adhere to VLUPs they have to be involved in planning and implementation. As a result of inadequate involvement during planning, most plans do not receive the approval of the people and, therefore, their implementation is extremely difficult (Kauzeni *et al.*, 1993). In both villages, only 18 and 142 household's representatives respectively attended the village assembly meeting to approve VLUPs at Kichangani and Iragua villages. Awareness and education campaign had the highest percentage of potential strategies proposed during household survey (Table 20).

Table 20: Potential strategies to enforce adherence to VLUPs at household level

Category	Frequency	Percentage
Conduct awareness campaigns/education	87	48.3
Re-demarcate land use zones	48	26.7
Enforce good governance	18	10.0
Review VLUP	15	8.3
Build capacity to VLUMC	6	3.3
Reallocate land use zones	6	3.3
Strategies to enforce adherence to VLUPs		
Total	180	100

This was due to inadequate involvement during planning process as further justified by the few number of households representatives from Kichangani (18) and Iragua (142) villages which were below the required quorum involved in developing the land use plans for both villages (UDC, 2008; 2011). The need for sustainable education programme was also suggested during FGD with the different land use groups who suggested the need to acquire knowledge on improved farming practices and livestock keeping, thereby avoiding practices that limit adherence to designated zones. Raising awareness and knowledge on village land use would, therefore, empower the community to enforce good governance as further suggested during FGD with land use groups.

Raise capacity of VLUMC

Capacity building of VLUM committee was among potential strategies suggested to empower VLUMC to enforce adherence to VLUPs (Table 21). Weak capacity to enforce adherence to VLUP was highlighted during discussions with VLUMC. This was because of inadequate knowledge and skills to enforce adherence as well as use of tools such as GPS to allocate land, and appropriate weapons to detain non-adherers. Often, due to weak capacity, some of them fell victims of violent attacks and were injured. In support of this study Kaswamila and Songorwa (2009) found that VLUM could not use GPS and Maps to allocate land according to the VLUPs in villages at Babati and Monduli. Likewise, Matey (2016) highlighted inadequate equipment, staff and limited technical know-how as key factors that limited enforcement of land use regulations for adherence. The map at selected villages at Babati and Monduli lacked coordinates which could direct the location of various designated zones and allocate them to users according to VLUP (Kaswamila and Songorwa 2009).

Remuneration

Inadequate funding during planning and implementation of the plan was a key limiting factor mentioned by the district PLUM team. The implication of limited resources according to the District Land Officer was that VLUPs were prepared in a rush and rarely got beyond step 4 of the planning process as per the NLUPC guidelines which have six steps. Therefore, most plans implemented were incomplete and therefore unable to achieve the intended goals. Inadequate resources also resulted in insufficient follow up on the implementation of the plan, thereby advancing to other stages relevant for enabling adherence to VLUPs. These stages include the implementation of village land administration through enhancement of security of land tenure and a detailed village land management where measures for improved land management are formulated (NLUPC, 2013).

Table 21: Potential Strategies, Strength and weakness in enforcing adherence

Strategies	Strength	Weakness	Source: field work January-June 2016
Potential			
Raise awareness and knowledge	1. knowledge and awareness of land use issues to reduce conflicts, enhance good governance and sustainable land management practices	1. No continuous education and awareness programme since planning 2. No plan established for awareness and training	FGD land use groups, VEO and VLUMC
Raise capacity of VLUMC	1. To enable VLUMC to enforce adherence to VLUPs 2. Allocate land according to VLUPs 3. Facilitate in awareness creation to land use groups	1. VLUC role ceased to be continuous after planning 2. No coordination with District	FGD VLUMC
Remuneration	1. If implemented it will ensure plan are completed and VLUMC remunerated	1. No sustainable source of fund at village level 2. No resource mobilisation plan for supporting implementation of VLUP after planning process	District Land Officer, VLUMC, VEO
Monitoring and evaluation	1. Follow up on implementation and enhance adoption of the plan to the community	1. No monitoring and Evaluation plan 2. Weak implementation due to inadequate coordination between NLUMC, district and village leaders. 3. Inadequate capacity at village level	FGDs with land use groups, VLUMC, PLUM team
Benefit sharing scheme	1. Improved value for conservation of specific zones	1. No user rights provided in the Wildlife management zone 2. Under developed opportunities in conserved zones 3. Inadequate technical know-how developing opportunities at village. 4. Lack of transparency in income acquired from forest utilisation	District land Officer, FGD land use groups, VLUMC
Resource Mobilisation	1. Sustain implementation of VLUPs even when projects phase out	1. Weak implementation of other strategies due to constrained funds 2. No financial plan to implement VLUPs	PLUM, VLUM, DLO

At the village level, funding to support enforcement of by-laws, motivate village game scouts and VLUM committee to conduct patrols, follow up on the implementation of the plan as well as build capacity further crippled the implementation of the VLUP. Similar observation was made by a Ugandan study team when they visited villages with VLUPs at Kigoma and Tabora Districts (Ugandan Study Team, 2008).

Monitoring and Evaluation

A plan has to be flexible in order to accommodate changes and therefore it requires short term and long term reviews to adjust accordingly (Alfasi *et al.*, 2012). Sufficient allocation was highly recommended towards improved agriculture production and conservation instead of land sparing and sharing (Law *et al.*, 2015). Instead of developing new plans, Hart *et al.* (2014) recommend that Mbarali District should review existing plans to observe if they are adhered to and address implementation problems. Monitoring and evaluation of the plan was a potential strategy to enable implementation of the VLUPs through adjustment to prevailing situation and future situation in implementation of the VLUPs.

Benefit sharing

Some of the zones required specific strategies to enforce adherence to VLUPs. Tangible benefits accrued from conserved zones are expected to promote socio-economic development while enhancing ecological conservation (Kiria *et al.*, 2014). According to the VEOs, even with the large designated areas for forest and wildlife management zones, substantial tangible benefits which were expected to be reaped by the community had not yet been realised. The essence of a working WMA was to acquire a user rights which would enable the community to realise tangible benefit out of conservation. The desire of the district council towards realisation of a working WMA at Kichangani village through donor support had ever been realised before and after planning (Bamford *et al.* 2010).

Even after developing the VLUP, the WMA zone was still not upgraded to allow user rights of wildlife resources. Farmers in Madagascar did not comply with regulations imposed to support conservation of forested zones due to inadequate incentives provided for conservation over agriculture. As a result, illegal settlement, forest fragmentation and expansion of agriculture fields into zoned forest were observed by Toillier *et al.* (2011) during their study. A similar situation is observed in this study where non adherence incidences of encroachment and invasion into conserved zones were observed though the magnitude of the non-adherence was limited to the methodology employed in examining adherence to VLUPs.

Resource mobilization

Inadequate funding during planning and implementation of the plan was a key limiting factor mentioned by the district PLUM team. The implication of limited resources according to the District Land Officer was that VLUPs were prepared in a rush and rarely got beyond step 4 of the planning process as per the NLUPC guidelines which have six steps. Therefore, most plans implemented were incomplete and therefore unable to achieve the intended goals. Inadequate resources also resulted in insufficient follow up on the implementation of the plan, thereby advancing to other stages relevant for enabling adherence to VLUPs. These stages include the implementation of village land administration through enhancement of security of land tenure and a detailed village land management where measures for improved land management are formulated (NLUPC, 2013). At the village level, funding to support enforcement of by-laws, motivate village game scouts and VLUM committee to conduct patrols, follow up on the implementation of the plan as well as build capacity further crippled the implementation of the VLUP. Similar observation was made by a Ugandan study team when they visited villages with VLUPs at Kigoma and Tabora Districts (Ugandan Study Team, 2008).

CHAPTER FIVE

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

Based on the findings of this study, it is apparent that the implementation of village land use plans in both Iragua and Kichangani villages in Ulanga District was not done as expected. Further, the study assessed sufficiency of the allocated zones and found that land use zones were insufficient in terms of the allocated size and needs within the zones. The study observed that the allocated land use zones were insufficient for current and future situation because of increasing population, overstocking, and lack of infrastructure necessary within specific zones. Other factors included inadequate consideration for uncertainties in population projection standard, unclear zoning regulation and discrepancy in population data.

Moderate agreement was obtained from spatial comparison between planned and actual land use using kappa statistic. The grazing zone was the most affected zone by incidence of non-adherence attributed by the fact that it was communally owned. Socio-economic factors influencing adherence to the land use plan were analysed at household level using logistic regression model and at communal level by pair wise ranking. Age, household size, residential status, land tenure and household income were significant factors influencing adherence at household level. At community level corruption and leadership failure were key factors ranked in both villages; others include inadequate awareness, unclear zoned land uses and increased population.

The strategies that were currently used to enforce adherence to land use plans included by-laws, boundary demarcations, zoning, community action plan, and conflict resolution while potential strategies were education and awareness, capacity building, and benefit

sharing, resource mobilisation strategy. The current strategies which were used to enforce implementation of VLUPs were ineffectively implemented and enforced due to inadequate awareness, inadequate fines and penalties, funding limitations, weak governance and inefficient coordination and monitoring. One size fit strategy such as bylaws applied to all zones influenced adherence to some allocated zoned especially zones for conservation.

5.2 Recommendations

Based on the findings and conclusions, this study makes the following recommendations:

- a) This study established that sufficiency of the land use zones was affected by insufficient needs within land use zones due to incomplete planning process. The study, therefore, recommends that the National Land Use Planning Commission should devise mechanisms to ensure that all the six steps of land use planning are completed towards implementable land use plans.
- b) The National land use planning commission should review zoning standards to sufficiently allocate the land use zones. The population projections used for future allocation of land had influence on the sufficiency of the zones where the rate of population increase is assumed to be fixed throughout the ten years implementation period without consideration of uncertainties. It is worth incorporating GIS to establish trend of land use and forecast future land use to sufficiently allocate land during the 10 years lifespan of the VLUP.
- c) The National land use planning commission need to validate spatial data and population data at village level to avoid discrepancies which affect implementation of the village land use plans.

- d) Short term review of land use plans should be conducted in order to accommodate changes and unaccounted circumstance as well as address factors that influence the implementation of village land use plans. GIS may be used to monitor adherence trend of mapped land uses.
- e) The NLUPC should consider developing implementation strategies during planning that are flexible to accommodate different circumstances within the community. Specific zones may require specific strategies which will allow adherence to the plan. These strategies have to be developed at local level to ensure that they are achievable.
- f) Continuous education and capacity building should be part of implementation strategy to increase awareness and knowledge among land users, Village leaders and VLUMC on sustainable land use management practices, conflict resolution, land use legal procedures and rights.
- g) This study recommends that the Ministry of Natural resources and Tourism facilitate in establishment of direct tangible benefits as a strategy to enhance conserved zones (WMA or forest zone). This can be through exploiting opportunities for bee keeping projects, tourism as well as payment for ecosystem services. A global approach of payment for carbon storage in forest plantation and reserves through Reduction of Emission from Deforestation and Degradation (REDD) Programme under the United Nations Framework Convention on Climate may be adopted. Once this is implemented, the land users will benefit from economic opportunity from the conserved zones hence promote sustainable land use practices in conserved zones.

- h) There is need for coordination not only during planning but also in implementation of the plan between the organization hierarchy vertically from the central, district, ward and village level and horizontally across sector officials, village organs and committees. Integrated implementation approach may be considered and coordinated from Ministerial, District to village level.
- i) The government should privatise ownership of grazing land to replace the existing communal zoning to limit the number of herds kept within the carrying capacity of individuals/private land holding. Alternatively, the government may empower the community to manage the grazing land by establishing a communal grazing management plan to ensure sustainable utilisation of resources in this zone and hence adherence to the plan.
- j) There is need for the resource mobilisation strategy to be considered at National, District and Village levels in order to support implementation of village land use plans even after donor projects phase out. Implementation of Village Land Use across the hierarchy was constrained by financial resources where most of activities in the action plan but none was implemented.

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APPENDICES

Appendix 1: Sampled points data collection form

Name of Village.....Date.....

Point	GPS coordinates		Observed incidence	Remarks
	X	Y	1=Adhered; 0=Not Adhered	
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				

Appendix 2: Questionnaire for household survey

TITTLE: Assessment of Implementation of Village Land Use Plans in Ulanga

District.

**Name of VillageName enumerator.....Date
of Interview.....**

A. Household demographic and socio-economic factors

1. Sex of household head
 - Male [] Female []
2. Age of respondent.....years
3. What is your residential status
 - i. Native []
 - ii. Immigrant []
4. If immigrant what is your duration of stay in this village?
5. Number of dependents
 - i. Adult Male []
 - ii. Adult female []
 - iii. Children []
6. What is your level of education?
 - i. Non formal []
 - ii. Primary []
 - iii. Secondary []
 - iv. College []
 - v. Others (specify) [.....]
7. What is your major occupation?
 - i. Crop farming []
 - ii. Livestock keeping []

- iii. Crop farming and livestock keeping []
 - iv. Other (specify) [.....]
8. What are the major crops grown/ livestock kept?
- a. Major crops [.....]
 - b. Major livestock [.....]
9. What is your other source of income?
- i. Crop farming []
 - ii. Livestock farming []
 - iii. Crop and livestock farming []
 - iv. Off farm activities []
 - v. Other (specify) [.....]
10. What is the your annual income
11. What size of land do you own
- i. < 1 hectare
 - ii. 1-2 hectares []
 - iii. 2-3 hectares
 - iv. >3 hectares
12. How did you acquire your land
- i. Inherited []
 - ii. Rented []
 - iii. Village allocation []
 - iv. Bought []
 - v. Others specify [.....]
13. Where is your land located?

B. Sufficiency of land use zones in VLUP

14. Are you aware of VLUP?

Yes [] No []

15. Were you involved in the development of the VLUP?

16. Which types of zones were allocated in the VLUP?

1		7	
2		8	
3		9	
4		10	
5		11	
6		12	

17. What land use needs did you consider in the VLUP?

18. Were the allocated types of zones sufficient for your land use needs?

Yes [] No []

19. What were the missing land use needs that should be considered in the VLUP?

1	
2	
3	
4	
5	

20. Tick in the appropriate option as provided in the box

Type of land use zone	Sufficient	Insufficient	Remarks

21. Is the area of land you currently own sufficient for your needs

Yes [] No []

22. If not sufficient what is the reason?

23. How much land do you currently need to sufficiently cater for your land use needs?

24. How much land was under your possession in the past 5 years?

Year	Size of land in acres
2010	
2011	
2012	
2013	
2014	
2015	

25. Do you have plans to expand on your future land size? Yes [] No []

26. If yes why do you think of expanding your future land size?

27. By how much land area do you think the expansion would sufficiently cover your needs?

28. Which zones do you think need to cater for the land area required and why?

Appendix 3: Checklists for Focus Group Discussion with female farmers, male farmers, female pastoralists and male pastoralists as separate focus groups

a. To assess sufficiency of land use zones considered in the village land use plans

1. Do you think the land uses provided in VLUP are sufficient in relation to your needs?
2. Were the land uses zoned necessarily important for each zone?
3. What additional land use zones would you need in addition to available ones?
4. Was the allocated land sufficient for your needs?
5. Does the land allocated meet the current land use needs?
6. Are the specific land use needs considered for allocating the land?
7. Did the allocated to land use zones consider land sufficiency for future land use needs?
8. What land use needs are to be considered in the VLUPs?
9. Which areas do you suggest for reduction to cater for the land use needs?
10. What are the possible potentials future land use needs based on the current circumstances?
11. What factors may influence sufficiency of the allocated land use for future situation?

b. To assess factors influencing adherence to village land use plans

12. Please list factors which influence adherence to VLUPs?

S/N	Factors influencing adherence to VLUPs
1	
2	
3	
4	
5	
6	
7	

13. By Pair-wise ranking which of the following pairs of listed factors has more influence on adherence to VLUPs

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1														
2														
3														
4														
5														
6														
7														
8														
9														
10														
11														
12														
13														
14														

c. To examine strategies for improving adherence to village land use plans.

14. Are there incidences of contravention despite the existing strategies for enforcing adherence to VLUPs?

15. Which land of the use zones are mostly contravened by users?

16. What do you think should be emphasized to enforce land use adherence to VLUPs?

17. Were you involved in setting up strategies for enforcing adherence to VLUPs

18. What strategies are enforced to enhance adherence to VLUPs?

19. Are these strategies known to all land users?

20. Who are particularly responsible for implementing these strategies?

21. What are the reasons for such contraventions?

22. What strategies have been set up for the zones which are prone to contravention?

23. Do consider these strategies suitable to deter non-adherence to VLUPs?

24. What do you consider the strength of the strategies for enforcing VLUPs?

25. What are the shortcomings of the strategies to enforce adherence to VLUPs?

26. What other strategies can be adopted to enforce adherence to VLUPs?

27. What are the strengths and weaknesses of the suggested strategies?

Appendix 4: Checklist for Participatory Land Use Management team

1. How many VLUPs operate in your District?
2. Who initiated the development of the VLUPs?
3. Why were the VLUPs initiated?
4. What are the implementation levels of the VLUPs?
5. Who were responsible for developing and control of the VLUPs implementation?
6. Who facilitate the implementation of VLUPs at village level?
7. What role do you have in the implementation of VLUPs?
8. Are these roles continuous or limited to certain implementation stages of the VLUPs?
9. How were occupation groups considered in the implementation of VLUP (men and women farmers and pastoralists)?

a. To assess sufficiency of land use zones considered in the village land use plans

10. What criteria were used to allocate land use zones?
11. How were the needs for farmers and pastoralists (men and women) considered in zoning?
12. How did you assess the sufficiency of the allocated land use zones?
13. Were the land groups above involved during zoning?
14. Are there reported cases in the villages about insufficiency of zones and land needs
15. How did your office address such incidences?
16. What time was set to determine land demand?
17. How do you assess the time that was used as a basis of determining land?

b. To assess factors influencing adherence to village land use plans

18. What factors affect adherence to VLUPs?
19. Which zones are the most affected and why?
20. How were these factors considered during planning?
21. How do you plan to address these factors?

c. To examine strategies for improving adherence to village land use plans.

22. What strategies were developed to ensure adherence to land use zoning?
23. How involved were the communities in setting up strategies for implementation?
24. Were all groups of land users equally involved in setting up and approving the strategies?
25. How do you assess implementation of the strategies?
26. Have the village level been mandated to implement the VLUPs?
27. What are the constraints to implementing the strategies?
28. How often have the strategies been reviewed?
29. Do you consider the need for other strategies suitable to enforce adherence VLUPs?
30. What other strategies do you propose and why?
31. What do you think would limit the implementation of these proposed strategies?
32. How does the District plan to address these limitations?
33. Which village have successfully implemented VLUPs and why the success?

Appendix 5: Checklist for Village Land Use Management Committees

1. When was VLUPs developed?
 2. What are the land use types distributed in the VLUPs?
 3. Were they involved in zoning and developing strategies?
 4. Were land use groups involved in VLUP implementation?
 5. Were farmers, pastoralists (men and women) considered in the plan?
- a. To assess sufficiency of land use zones considered in the village land use plans**
6. Were the needs of all land users considered during land use planning?
 7. Do you think the land use areas were sufficiently allocated?
 8. What makes you think the allocated land use was sufficient or not?
 9. Are the land use types sufficiently allocated for the current needs of land users?
 10. What criteria were used in allocating the land uses among the land users?
 11. Do you consider the time allocated for the plan adequate?
 12. If not what time do you recommend as adequate for the plan and why?
- b. To assess factors influencing adherence to village land use plans**
13. How do you ensure that the community adheres to the VLUPs?
 14. How many incidents of contravention to VLUPs have been reported for each of the zones?
 15. How are these issues or incidences resolved?
 16. Is there any difference in the conduct of land users in adhering to VLUPs?
 17. Which factors influence adherence to VLUPs?

S/N	Factors influencing adherence to VLUPs
1	
2	
3	
4	
5	
6	
7	
8	

18. By Pair-wise ranking which of the following pairs of listed factors has more influences on adherence to VLUPs

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1														
2														
3														
4														
5														
6														
7														
8														
9														
10														
11														
12														
13														
14														

19. Which zone is the most affected by these factors and why?

20. How are these factors addressed in your village?

c. To examine strategies for improving adherence to village land use plans.

21. What strategies are there to enforce adherence to VLUPs?

22. Were the land users involved in developing the strategies?

23. How effective are the strategies to enforce adherence in each zone?

24. What are the shortcomings of the strategies VLUPs put in place?

25. Have these strategies been reviewed since they were established?

26. Do you think there is the need for other strategies to enforce adherence to VLUPs?

27. What other strategies do you propose to enforce adherence?

28. Why do you think these strategies should be emphasized to enhance adherence to VLUPs?

29. What do you think are the possible future challenges for enforcing these strategies towards adherence to VLUPs?

30. What other opinions can you suggest to improve future strategies to VLUPs implementation

Appendix 6: Checklist for Key Informants (Village Executive Officer, Village Leaders, Extension officer)

a. To assess sufficiency of land use zones considered in the village land use plans

1. What type of land uses did the village distribute in the VLUP?
2. Were the needs of all land users (farmers, pastoralist's men and women groups) considered in the VLUP?
3. Are there missing land use needs in the VLUPs?
4. Were the land uses zoned according to the needs of the land users?
5. Are land users in agreement of the size of zoned land uses?
6. Is the time allocated sufficient for VLUP implementation?
7. If otherwise what is the appropriate time frame for better result?
8. Why do you consider that time appropriate?

b. To assess factors influencing adherence to village land use plans

9. Is there any change in conduct among land use groups in adhering to VLUP?
10. What are the factors influencing adherence to VLUPs in your village?
11. Which among land use zones are mostly affected by non-adherence to by users?
12. What do you think are possible main factors influencing adherence to the mentioned zones?
13. How does your office resolve incidences of non-adherence to VLUP?
14. Why do you consider the needs to ensure adherence to VLUP?

c. To examine strategies for enforcing adherence to village land use plans.

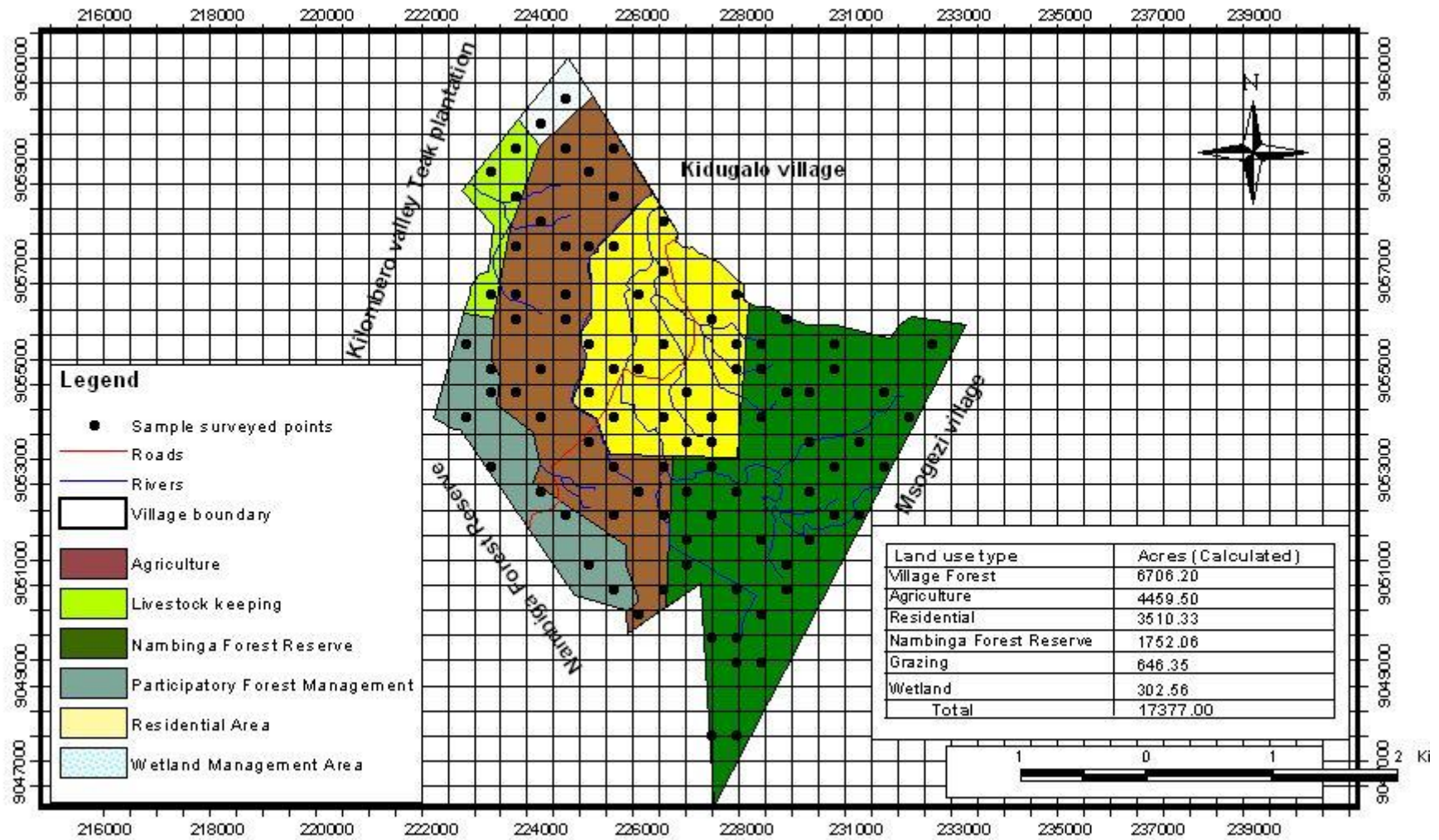
15. What are the strategies to enforce for adherence to VLUP?
16. How were the strategies developed?
17. Who are responsible to enforce these strategies?
18. How do you think the strategies encourage adherence to VLUPs by land users?
19. Are there zones where the strategies have proved ineffective in enforcing adherence?

20. Are the enforcement strategies adequate to enforce adherence in each zone?
21. What are the strengths of the strategies adopted to enforce adherence to VLUPs?
22. If they are not adequate what are the weakness of the strategies to enforce adherence?
23. Have these strategies been reviewed since they were developed?
24. Which other potential strategies do you think are needed to enforce of adherence to VLUPs and why?
25. What do you think should be emphasized in order to improve implementation of VLUPs?
26. What are your remarks/ opinions for implementation of VLUPs?

Appendix 7: Socio-economic characteristics not statistically significant in influencing adherence to Village Land Use Plan

Variables	B	S.E.	Wald	df	Sig.	Exp(B)	95.0% C.I.for EXP(B)	
							Lower	Upper
Education	.590	.445	1.759	1	.185	1.803	.755	4.310
Economic activity	-.530	.557	.905	1	.342	.589	.198	1.754
Farm size	-.009	.012	.545	1	.460	.991	.967	1.015
Duration of stay	.265	.608	.190	1	.663	1.304	.396	4.292

Appendix 8: Iragua village land use map used for assessment of extent of adherence in each land use zone



Appendix 9: Kichangani village land use map used for assessment of extent of adherence in each land use zone

