ANALYSIS OF LAND USE CONFLICT IN ZANZIBAR: A PARTICIPATORY APPROACH

FLAVIAN MUHULA MASORE

February, 2011

SUPERVISORS:
Drs.J. Verplanke
Dr. M. McCall

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SUPERVISORS:
Drs. J. Verplanke
Dr. M. McCall

THESIS ASSESSMENT BOARD:
Chair: Prof. Dr. A. van der Veen
External Examiner: Drs. R. Becht (ITC, University of Twente)

Disclaimer

This document describes work undertaken as part of a programme of study at the Faculty of Geo-Information Science and Earth Observation of the University of Twente. All views and opinions expressed therein remain the sole responsibility of the author, and do not necessarily represent those of the Faculty.

Dedication to

My beloved late brother Patrick Ezekiel Masore

ABSTRACT

Land use conflict in Zanzibar is the biggest challenge for the responsible authorities and the government due to existing of multiple and interacting driving forces that have led to the conflict. What were the fundamental drivers for the land use conflict? , is the main questions the study aimed to analyse. As an integrative framework analysis, the study applied participatory approach using a case study methodology which considers rich case information on different dimensions of land use conflict. Participatory approach using participatory mapping and PGIS combined with interviews, geo-coded transect walk, focus group discussion were used to elicit local knowledge on land use conflict and the drivers behind the land use conflict. The vertical aerial photograph of 1952, 1977, 2004 and Land sat Image TM of 2009 were used to delineate land use changes. The spatial and non-spatial data obtained facilitated the identification of conflict, conflicting area and spatial pattern of land use conflict and the drivers behind the land use conflict. The result from the study revealed that there is a rapid land use change in the area and that over the past 50 years local people have adopted new land uses coupled with new livelihood in response to changing demand in agriculture products, restrictive access to surveyed land and an emerging opportunities for alternative income through in–migration and tourism development. Five fundamental drivers of the existing land use conflict; demography factors, economic factors, policy and institutional factors, psychological factors and environmental factors were identified through the focus group discussion and stakeholder analysis and these drivers have been the cause of the three main types of land use conflicts in the area; conflict over water source encroachment, conflict over forest reserve encroachment and conflict of agricultural land conversion. The land use conflict is spatially distributed towards the forest reserve, water source conservation and in agricultural land because of incompatible interest and conflicting goals over the use of land by various stakeholders. The study confirm that participatory approach through p-mapping and PGIS is useful in capturing the spatial information embedded in people's mind for analysing land use changes and the drivers that causes land use conflicts, however the study also recognise that participatory approaches in analysing land use conflict is a challenging process that can not be completely flawless. It requires very carefully planning, determination on the part of all stakeholders as well as highly skilled facilitator in ensuring that land use conflicts are addressed and analysed in a participatory manner.

Key words: conflicts, participatory approaches, participatory mapping, participatory GIS, land use, land use conflict,

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LIST OF ABBREVIATIONS

DCCFF	Department of Cash crops, Fruits and Forest
FGD	Focus Group Discussion
GDP	Gross Domestic Product
GIT	Geographic Information Technology
GPS	Geographic Positioning System
LSK	Local Spatial Knowledge
LGO's	Local Government Organisations
MALE	Ministry of Agriculture, Livestock and Environment
MLWEC	Ministry of Land, Water, Energy and Construction
NGO's	Non Government Organisations
PGIS	Participatory Geographic Information System
RS	Remote Sensing
SMOLE	Sustainable Management of Land and Environment
TAP	Three Acre Plots
WDC	West District Council
ZMC	Zanzibar Municipal Council
ZAWA	Zanzibar Water Authority

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

1. INTRODUCTION

1.1. General Introduction

Conflict over land and other natural resources such as water and forests is ubiquitous (Anderson et al., 1996; Ayling & Kelly 1997; Ortiz 1999) in Buckles (1999). People everywhere have competed for the land they need, to ensure their livelihoods. Land use conflicts particularly in rural areas are multi-dimensional and complex in nature. Often national and local governments generates policies in areas in which conflict exists and where laws and policies related to land use conflict are not in place or enforced (Gessa, 2006). Participatory approaches using mapping techniques are seen as a powerful mechanism to transform and possibly identify land use conflicts when accompanied by appropriate institutional building and a broader effort to empower people and communities (Gessa, 2006). The approaches have been increasingly advocated as effective decision-making processes to address complex environment and sustainable development issues(van den Hove, 2006). Participation using the Participatory GIS is recognised as a central element to foster accountability, transparency , legitimacy and other dimension of good governance in land resource management((McCall, 2003).

In this study we explore participatory approaches using mapping techniques (participatory mapping & Participatory GIS combine with other participatory processes such as focus group discussion, and interviews) to elicit local spatial knowledge on land use conflicts in order to identify the drivers of land use conflict and map spatial dynamics of land uses. The results will help in analysing how the inclusion of local knowledge and various stakeholders is of significance in management of land use conflicts. Furthermore the results will increase the capacity of local communities, organisations and institutions in solving land conflicts issues. The participatory approaches and mapping techniques is tested in the peri urban area of the West District in Zanzibar where land use conflicts exists due to rapid encroachment of Masingini forest catchment reserve by communities surrounding the reserve through settlement expansion leading to shortage of water and forest land as well as environmental degradation.

In this chapter, the research context, justification and problem are introduced, followed by the objectives, research questions and the conceptual framework of the study. The outline of the thesis structure is also presented.

1.2. Background information and Justification

1.2.1. Background

Rapid population growth in Zanzibar island over the last three decades has created a significant challenge to land use development in the Isle (COLE, 1995). It is estimated that currently the Island has a population of about 1.193 million people based on a growth rate of people 3.1 percent and a population density of 400 per square kilometre. The growing population has led to a higher demand for settlements, agriculture and other infrastructure developments which had an impact on the resource base, threatening the productive and protective capacity of the resource (Kombo et al., 2006) in Kombo(2010). Spatial expansion of economic activities such as agriculture, tourism, forest development and extension of human settlements, have all brought a tremendous pressure on the development of land and exploitation of other resources. Forest destruction in water sheds and catchments areas has led to drying out of some important

water springs (for example Bububu springs). This has affected the supply of water for household uses, industries and irrigation projects in Zanzibar.

Encroachment in catchment areas in the forest reserve for settlements is another dimension of this problem. Many of the catchments areas especially in suburban areas are threatened by the unplanned expansion of settlements. The use of pit latrines is already causing water pollution and threatening the suitability of water for domestic uses. The uncontrolled encroachment of urban settlements onto good agricultural land, farming in the forest plantations, expansion and intensifications of settlement development into forest and water catchments zones, have all resulted into many conflicts among various implementing authorities in the Island. For example RGZ (2004)) identified that much of the private land allocated for agricultural purposes have housing development or under construction and that many of such areas near to urban area have been subdivided and sold off as small holdings thus creating incompatible land uses. The occurrence of this conflict of interest for land use provides a formidable challenge in the management and utilization of land resources.

The effectiveness and peaceful management of the resource depends on the ability to identify the conflicts and adopt strategies that prevent disagreement from becoming intractable disputes(Kyem, 2006).

1.2.2. Justification

Understanding of the driving forces of land use conflicts is constantly needed. Detailed historically extensive land use change information and its drivers could help to uncover general principles that provide explanation of land use conflicts in the study area. Such local-level approach is necessary since many decisions on forest and water policies as well as land uses are made at local and regional level. The concept of participation has been widely used in development dialogues mostly in social arena, including community and development projects. According to Kikula, et al.,(1993) participatory approaches have been widely used in many countries in an effort to stimulate, support and strengthen the active involvement of individual citizens and communities particularly the resource-poor in planning for resource use and management. Many studies on land issues have proved the usefulness of participatory approaches using mapping techniques in eliciting local knowledge on indigenous land to secure tenure, manage natural resources, strengthen cultures and identification of land use conflicts (Boix Fayos, 2002; Chapin, et al., 2005; Mandara, 2007; Minang & McCall, 2006; Mohamed & Ventura, 2000). The researches have shown that participatory approaches are an alternative mode towards sustainable development to replace policies that placed more emphasis in protection rather than sustainable utilisation of the land resource. Community involvement in land resources provides ideal interventions that emanate from people initiatives hence sustainable plans in management and utilizations. Zanzibar like many other African countries lacks up-to date spatial information of land issues for practising successful analysis of land use conflicts. Lack of this vital information thwarts effective planning, zoning, and overall management of urban and rural land.

Therefore, the study aims at shedding more lights on how local institutions and the community as a whole can address the land use conflict issue. This knowledge is important for strengthening these stakeholders so that they can be able to use and manage the land resource sustainably.

1.3. Research Problem

The land use systems in Zanzibar are rapidly changing, together with a changing social transformation process, due to the information revolution, technological advancement, and market intervention and globalisation processes. Access to land has become concentrated and some groups experiences both social and spatial marginalization which tends to encourage conflicts if rules and regulation regarding resource use and access are not clearly defined (Engel & Korf, 2005). Increasing population is exerting extreme pressure on land resources. Extreme skewed land distribution pattern as a product of socio-cultural, economic and environmental systems are causing poverty, injustice and social exclusion (Upreti, 2004). Due to such disparities a large number of poor people have no access to productive land resources. This

kind of pressure on land access is experienced in the urban fringe of Zanzibar whereby the land upon which the Masingini water catchment forest reserve grows is becoming increasingly vulnerable through illegal encroachments for human settlements (Myers, 2005, p. 88). As a consequence, changes in land-use are promoting in-migration, over exploitation of resources and escalating several conflicts. The conflict exerts an influence on socio-economic space and environmental aspects which has major impacts on the development of the surrounding communities and the Zanzibar city as whole. It also affects planning and management of the resources leading to resource degradation and unsustainable use pattern.
There is no possibility of sustainable development without an integrative effort to understand the drivers behind the land use conflict and solve it. The study seeks therefore to analyse the drivers of land use conflict in Masingini forest reserve and the surrounding communities using participatory approach.

1.4. Research objectives and Questions

The main objective of this research is to explore and analyse the drivers of land use conflict in Masingini forest reserve area using participatory approach.

To aid in achieving this objective, several sub-objectives have been set:

1. To explore local spatial knowledge on existing land use conflicts
2. To analyse the spatial changes of land uses in the conflicting area
3. To identify and analyse the driving forces of and use conflict
4. To explore the challenges of participatory approaches in understanding land use conflict.

1.4.1. Research Questions

To help address these sub-objectives, the following questions have been asked. It deemed that answering these questions is going to help in answering the main objective of this research.

Table 1-1: Research questions

S/No	Research Objectives	Research Questions
1	To explore local spatial knowledge on the existing land use conflicts.	1. What spatial knowledge do local people have on the land use conflicts
		2. How is the conflict been viewed or interpreted?
2	To analyse spatial changes of land use in the conflicting area	1. What spatial pattern of land use changes can be observed over time in forest reserve?
		2. Which areas of forest reserve have high rate of encroachment by local people?
		3. Is there any spatial pattern of conflict and why?
3	To identify and analyse the driving forces of land use conflict	1. What are the driving forces for land use conflicts and how do they relate to each other?
4	To explore the challenges of participatory approach in land use conflict	1. What are challenges of participatory approach in understanding land use conflict?

1.5. Conceptual framework of the study

The research contains three level of analysis which leads to the research questions. The first involves local spatial knowledge, the second involve land use changes and institutions involved and the third is participatory approaches through the use of PGIS and participatory mapping. These levels outline the possible course of action that has been drawn from the research problem of the study, literature reviews and the methodology. Local spatial knowledge helps to find, disseminate and transfer valuable information necessary for understanding land use conflict. It represents local community's capability and therefore constitutes a strong source of knowledge in exploring the trends in land uses, land conflicts and land value in particular area (McCall, 2004). This means that local spatial knowledge can give valuable insights in understanding the land use conflict and also explore important signal and inside information that otherwise might be neglected. Understanding the causes and consequences of land use changes is essential for analysing land use conflict and understanding the drivers behind the conflict. Institutions within the society both formal and informal can help identify these changes and also their attitudes towards the land use conflict. The local spatial knowledge of local people and understanding of land use changes and land use conflict can be elicited and explored through participatory research that involves the use of Participatory GIS to integrate local knowledge into GIS and participatory mapping that aimed at recording spatial knowledge which can then be used to address land use changes and land use conflict in a society. Participatory approach using PGIS and participatory mapping results in the visualization of spatial information that could help understands areas where land use conflict is occurring; spatial relations of those areas (i.e. are they close to each other? Area they close to some competing resources? or human activities? According to Rambaldi, et al.,(2006) participatory GIS if properly utilized can exert an impact on community empowerment, innovation and social change however, the approach in managing the land use related conflicts need to be embedded in the institutional arrangement of the host society. This has a normative impact on the behaviour of individuals as it develops within groups or within the society at large (de Man, 2003).

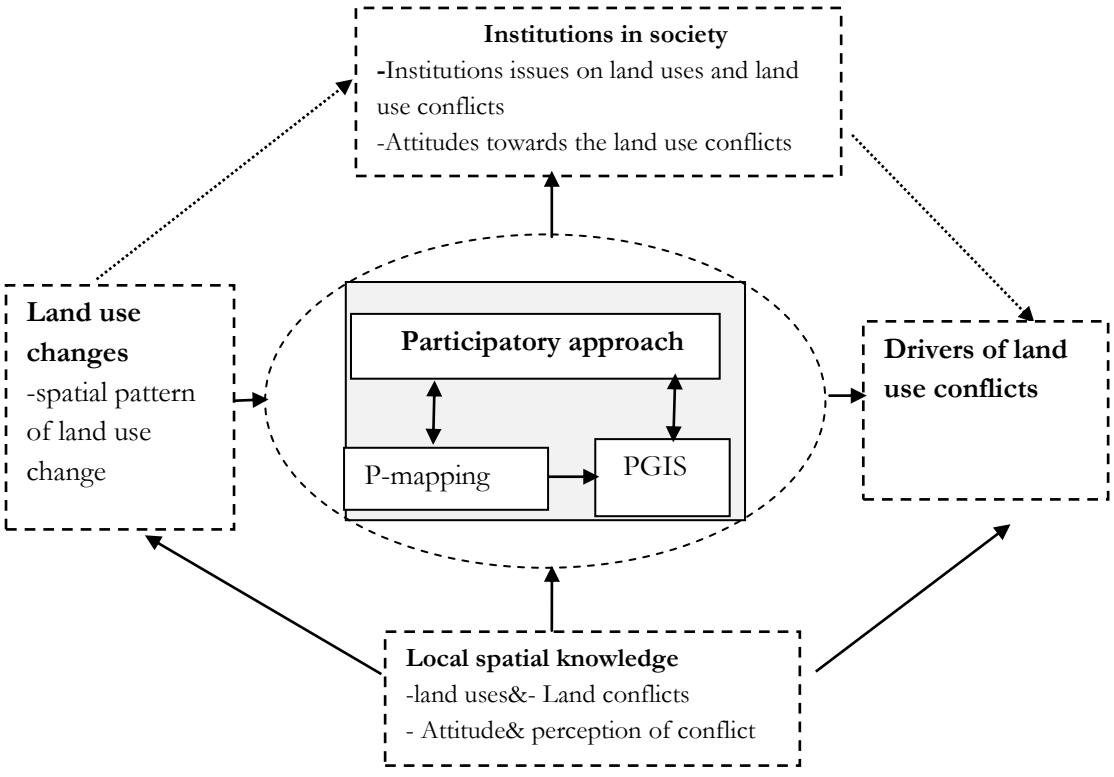

Figure 1-1: Conceptual framework of the study

1.6. Thesis structure

This thesis document is structured by chapters. Chapter one gives an overview of the study area and outlines the key problems that forms the basis of this research. The research objectives, research questions, hypothesis, conceptual framework and the thesis outline. Chapter two gives in detail the concepts of the thesis based on existing literatures to gain insights that may be applicable to this research. Chapter three gives a brief description of Zanzibar and the case study area. Chapter four presents the methodology used, the fieldwork data collection and analysis. It forms the basis of all other chapters. Chapter five presents the findings and results of the analysis. Chapter six discusses the results obtained and their relevance to the study area. Chapter seven outline the conclusions and recommendations arising from this research.

2. OVERVIEW OF LAND USE CONFLICT AND PARTICIPATORY PRACTICES

2.1. Understanding conflicts

The conflict which is dealt in this study is not violent aimed conflict which covers most of conflict literatures but the study focuses on the conflict which has been as a result of land use change or pressure on land use. Conflict is an emotive term that is based on differences in things such as interests, perceptions, power and goals (Daniels & Walker, 2001). It transforms over time and leads to different outcomes with a multitude of short term and long term effects (these may be positive but may also be negative to society). According to Upreti (2004) conflict occurs because of difference in values, beliefs and interests, ambiguity over responsibility and authority, poor communication, and unwillingness to respond to social, political, cultural, technological, economic and social changes. Oli (1998) in Upreti (2004) emphasizes that contradictions and inconsistencies in the application of formal legal procedures and customary practices, diversity in local norms and beliefs, and management differences also contribute to conflict.

There are several sources of conflicts; these sources can be grouped into three categories; factual disagreement, conflicting goals and relation aspects (Mostert, 1998). Factual disagreement is due to uncertain facts, lack of or poor information and limited capacity to process information. Conflicting goals is related to difference interest and values while relation aspects is due to problem in relation between the parties involved hence distrust and power struggle. According to Kyem, conflicts involving governments, their agencies, private sector and local communities generally arise because of disagreement over the use of and control over natural resources such as land, forest and water (Kyem, 2004).

Walker & Daniels (1997) portray the origin of conflicts as a triangle of three interrelated dimensions: substance, procedure and relationship. The substance dimension of conflict concerns the sources of conflicts and what the conflicts are about (money, power, emotions etc.) The procedure dimension concerns the way in which conflict has occurred, aspects of space and time, how it develops (institutionally or personally), and the possible consequences for policy development. The relations dimension includes actors and relations between them, power distribution, and the knowledge and skills they possess. They argue that any conflict situation includes all three dimensions, and one can address a conflict situation initially through any of the three dimensions.

Presently rural and peri-urban areas of Tanzania; Zanzibar as semi-autonomous country included are experiencing rapid socio-economic and environmental changes (United Republic of Tanzania, 2003) in Mandara (2007). Because of such changes it is not possible to avoid conflicts in practical human society life (Upreti, 2001) and that conflicts occur in different dimensions from micro-micro; micro-macro, and macro-macro at local, regional, national and international levels (McCall, 2004).

Therefore, this study considers conflict as inevitable and defines conflicts as incompatible interest, goals and disagreement on the course of action taken that interferes the access, use, and control of land among land users and the managers as well with other actors such local and the central government.

2.2. Conflicts in land uses and other natural resource

Land conflict can be defined as a social conflict in which at least two parties are involved, the root of which are different interests over the property right to land; right to the use of land; to manage the land, to generate income from land, to exclude others from land, to transfer it and the right to compensate for it (Wehrmann, 2008).

Mohamed & Ventura (2000) explained that conflict in land and other natural resources is a result of dispute inside and outside the communities such as; boundary dispute between the community and outsiders, boundary dispute between members of the community, resource use dispute between community and outsiders, resource use dispute between community members, land use dispute between community and outsiders as well as land use dispute between community members. This means that conflicts in land uses and other natural resources is associated with opposing interests over land uses, limited access and uses, unclear ownership and unclear boundary delineation. Population pressure and poverty are the root cause of most land resource conflicts. Land and forest resources are over-exploited because of heavy dependence of the ever-growing population (both human and animals) in the natural resource base (Upreti, 2001).The growing population need more land and forest resources. This leads to competitions among actors turning into disputes. McCall(2004) identified competition to be associated by direct control of land and other natural resources, access to land resources, using the land resource and indirect impact of use.

Land use conflict occurs when the same land can support different uses and those with interest in the land disagree to which use is the best. According to Mann & Jeanneaux (2009), land use conflict occurs between or within stakeholders groups and is characterised by a common dispute over interests and conflicting goals, thus can be regarded as an indicator for detecting diverse interests, non-effective land resource allocation, and land use systems.

Human behaviour in land uses is influenced by a range of formal and informal institutions. According to Röhring & Gailing (2005) the formal institutions can be divided in three categories; those concerned with utilization of land (agriculture, forestry and settlement activities); those concerned with protection of the function of landscape(nature, heritage) and those concerned with integration of the two aspects(land conservation and landscape planning). Due to inconsistent goals of these formal institutions, the informal institutions like habits, traditional and cultural values, identity performs major influences on actors' behaviours leading to land use conflict. The demand for land driven by population growth and inherent desire for everyone to have access to a piece of land to build a home results in a situation with the land use being changed from typical agricultural practices into residential activities (Mahama & Dixon, 2006) in Lamptey (2009) thus resulting to land use conflict.

Wehrmann (2008) argues that conflicts over land uses are drove by poverty, institutional changes and change in society (e.g. demography and environment condition). These create strong psychological fears of insecurity, existence and desire to be recognised that led to extreme materials and emotional needs (shelter, productive base, seeking power and wealth).These needs shape people's interests which then results in change in attitudes and positions thus defining their behaviour on the reactions against the established institutions leading to conflict (Figure 2-1). As human population and needs increases concurrently land resource is dwindling hence conflict in land resource becomes unavoidable phenomenon.

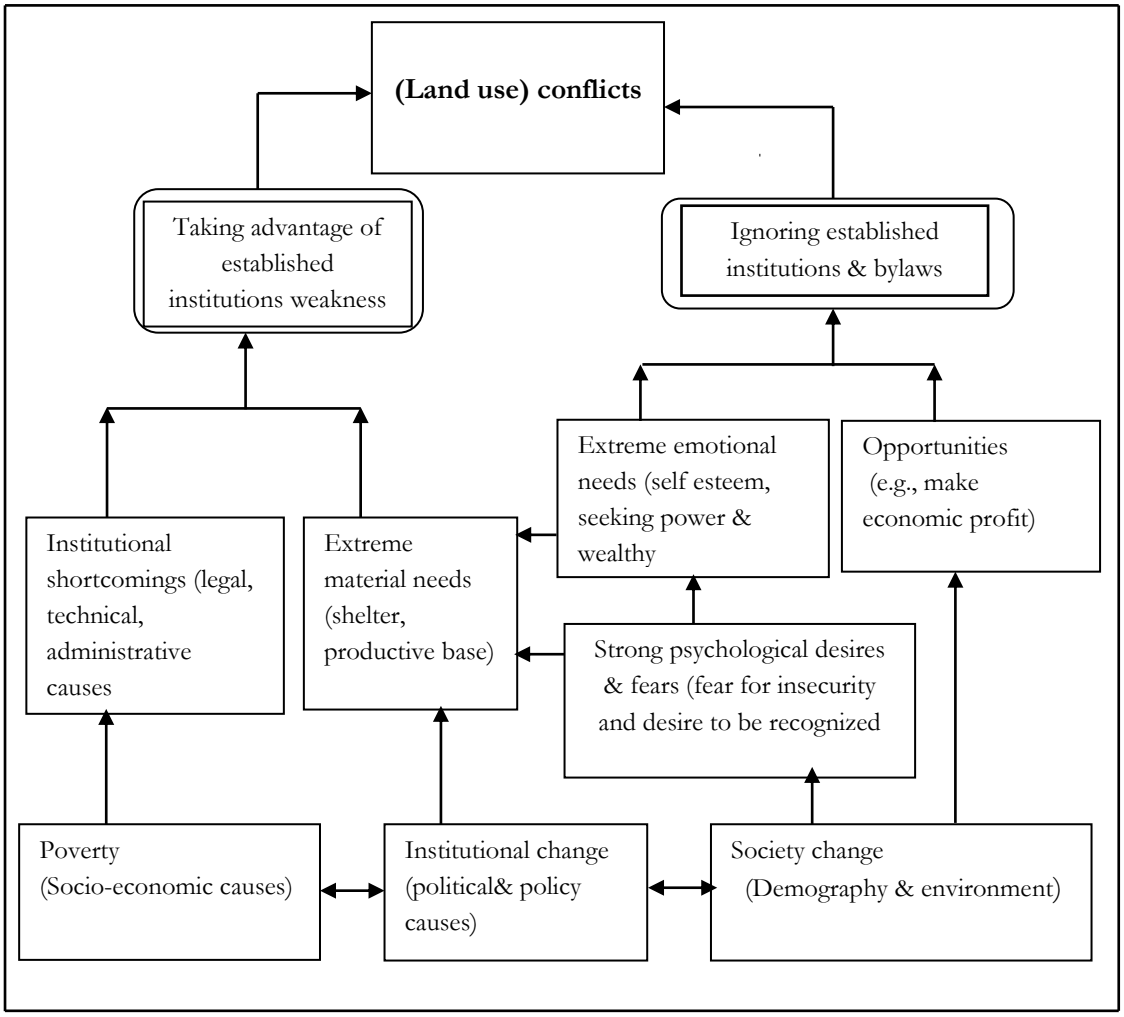

Figure 2-1: Interdependence of land conflict causes

Adapted from Wehrmann (2008)

According to Geist & Lambin (2002), conflict in land use is also influenced by both proximate causes and underlying drivers. The proximate causes (such as infrastructure extension, agriculture expansion, wood extraction in forest) are activities and actors that directly change land use while underlying drivers (such as demography, policy & institution economic, cultural, technology) are fundamental pressures that underpin the direct causes. The drivers' causes change in the state of land use thus leading to land use conflict. Specific example is the way demographic changes creates pressure of new housing leading to conversion of agricultural land mostly in peri-urban area. Conflict in land uses is also coupled with uncoordinated land use plans , rapid population growth, weak practical implementation of land tenure and security as well as lack of community participation (Guyer, et al., 2007; Myers, 2008; RGZ, 2004; Torhonen, 1998).

Rapid population growth combined with either limited opportunities for non-agricultural employment or in other areas increasing non-agricultural demand for land is a key factor that causes land value to appreciate resulting to high competition for limited or decreasing amount of land available thus leading to land use conflict (Deininger & Castagnini, 2004).

2.3. Participatory mapping (P-mapping)

Mapping is an exercise through which tacit knowledge embedded in people's spatial knowledge is converted into explicit and externally usable knowledge. It is a powerful tool to gather information on overlapping land claims where rights and responsibilities over land are unclear (Gessa, 2006). Participatory mapping can be defined broadly as any combination of participatory methods for eliciting and recording spatial data. The mapping skills range from hand-drawn sketches to technology-based visualization like 3-D modelling. According to McCall (2004) participatory mapping applications can be very productive in the early stage of conflicts with a spatial dimension. This is because the substance of the conflict is still limited to the issues that are distributed in space and can be mapped and analysed.

Participatory maps provide visual representation of what the community perceives as its place and significance features within it. These includes depiction of natural physical features such forest, land uses, water sources known by the community (Corbett, 2009). The process of participatory mapping differs from other map-making and traditional cartography through the process maps are created and the uses to which they are put. Participatory mapping focuses on providing the expertise and skills for community members to create maps themselves, and to represent spatial knowledge of community members. Corbett (2009) adds that the process can help stimulate community members to engage in land-related decision making, raise awareness about pressing land related issues, and address land-related conflict.

Gessa (2008) highlights the application of participatory mapping in various ways such; as a way to enhance community cohesion by sharing ideas and visions in the face of land related challenges, articulate and communicate spatial knowledge on land issues, as well as a tool for conflict identification and resolution in dispute related to land.

The choice to which tools to use is determined by the way in which the map is employed; the perceived impact the map will have on the target community and the availability of resources (McCall, 2004).

2.4. Participatory Geographical information (PGIS)

Participatory geographic information system (PGIS) is a computer based system that captures, mange, analyse, store and present geo-referenced spatial data (Corbett, 2009). It is also a tool that facilitates the representation of local people's spatial knowledge using two or three dimension maps (Rambaldi, et al., 2006). PGIS is practice in its own right; developing out of participatory approaches to planning and spatial information and communication management (Rambald & Weiner, 2004). The practice is more people centred than technological as it focuses on incorporating community views and understanding in GIS.

Jordan(1998) refers PGIS as the use of GIS in the participatory context. The PGIS has become synonymous with eliciting local spatial knowledge with participatory approaches including face-to-face (traditional meeting), distributed(on-line) and GIT (Jankowski, 2009).

Mohamed & Ventura (2000) see Participatory GIS as making GIT available to disadvantaged groups in society in order to enhance their capacity in generating, managing, analysing and communicating spatial information. According McCall (2004), PGIS are considered to have superior effects in terms of relevance, usefulness, sustainability, empowerment and meeting good governance due to ability to ensure participation and utilizing local knowledge.

PGIS have been much applied in land use planning, physical planning, and transport planning. It has been frequently applied in natural resource management, urban planning, and other fields that need geographical information for decision making such as in conflict resolution (Kyem, 2004), community forest management (Jordan, 1998), mapping customary land (Alcorn, 2000), and in land use/land cover (Mapedza, et al., 2003).

2.5. Benefits of participatory approaches

The demand for participation reflects broader social trends, particularly the quest for sustainable development, the support for partnership working and the challenge to traditional democracy, resulting in the desire for a greater civic voice. Involving people varies from informing them of a decision, through giving them the full control. According to Reed (2008) participatory approaches were developed as a response to the top down transfer of information and technology. By tapping into local knowledge, it was urged that more complete information could lead to more robust solution of the issues at hand.

In addressing the benefits of participatory approaches using PGIS and P-mapping various scholars in literatures have identified basic aspects such as planning process, decision making, ownership and control of information, influence of power relationship and institutional structure, on a particular project or research theme. Participatory approaches through participatory mapping can help with defining the problem and identifying the solution from a wide variety of viewpoints, increasing our understanding of the interlinked nature of problems facing the society (Lemma, et al., 2006).

It can ensure effective planning process of development-induced displacement & resettlement, environmental justice initiatives and resource conflict resolution projects which need effective stakeholder participation (Vajjhala, 2005) by adding comprehensive information input . It can empower community planning and decision making process (Alcorn, 2000) through mental maps.

The approach also help to increase public trust and sense of ownership as local people are the ones who provide inputs for information thus ensuring long term support and active implementations of decisions (Richard, et al., 2004). It is very useful in sustainable use of resources in areas targeted for biodiversity conservation by supporting increased recognition of indigenous people involvement in decision making (Nelson & Venant, 2008).

PGIS make explicit use of local people's knowledge of spatial boundary and resource condition.This knowledge can improves the way in which different actors understands the conflicts and take decision about its management. For example, Rambaldi et al.,(2002), describes the application of PGIS in management of boundaries, and resource use conflicts in Cordillera, Phillipines using bottom–up approach whereby the use of participatory 3-D model,integrated with GIS and GPS contributed to successful conflict resolution in the area.

Nabwire & Nyabenge (2006) noted that the inclusion of local people helps in the identificaton of conflicting areas in the use of natural resource ,setting community recommendations and priorities as well as obtaining baseline data on which future evaluation of impacts of interventios can be based. Kyem (2004), demonstrate that the use of PGIS enables to mediate conflicts between local groups competing for access to local forest resources. The spatial and non-spatial data obtained through participatory mapping and PGIS facilitates the identification of actual situation of the conflicting resources and its changes that involve different actors at local to district level (Mandara, 2007).

The growing acceptance and use by resource managers of participatory planning has highlighted the relevance of participation to the management of conflicts (Krishnarayan, 2005). The increasing complexity of the resource in management has also coincided with a growing emphasis on communicating with stakeholders and encouraging their participation in planning and management. The approach had a major impact on national policies, plans and processes.

2.6. Participatory approaches in this Study

In this study participatory mapping approach was used to identify and ground truth land use conflict areas. The mapping outputs integrated in ArcGIS and ERDAS software facilitated visualization of conflict and its spatial distribution in a study area. The participatory approaches context of this study is considered as empowering participants and community through knowledge sharing of the land use conflict during the mapping exercise (figure 2-2).The empowerment of communities' leads to identification of drivers for land use conflict, conflict identification, and interest and user rights of various stakeholders in the land resource.

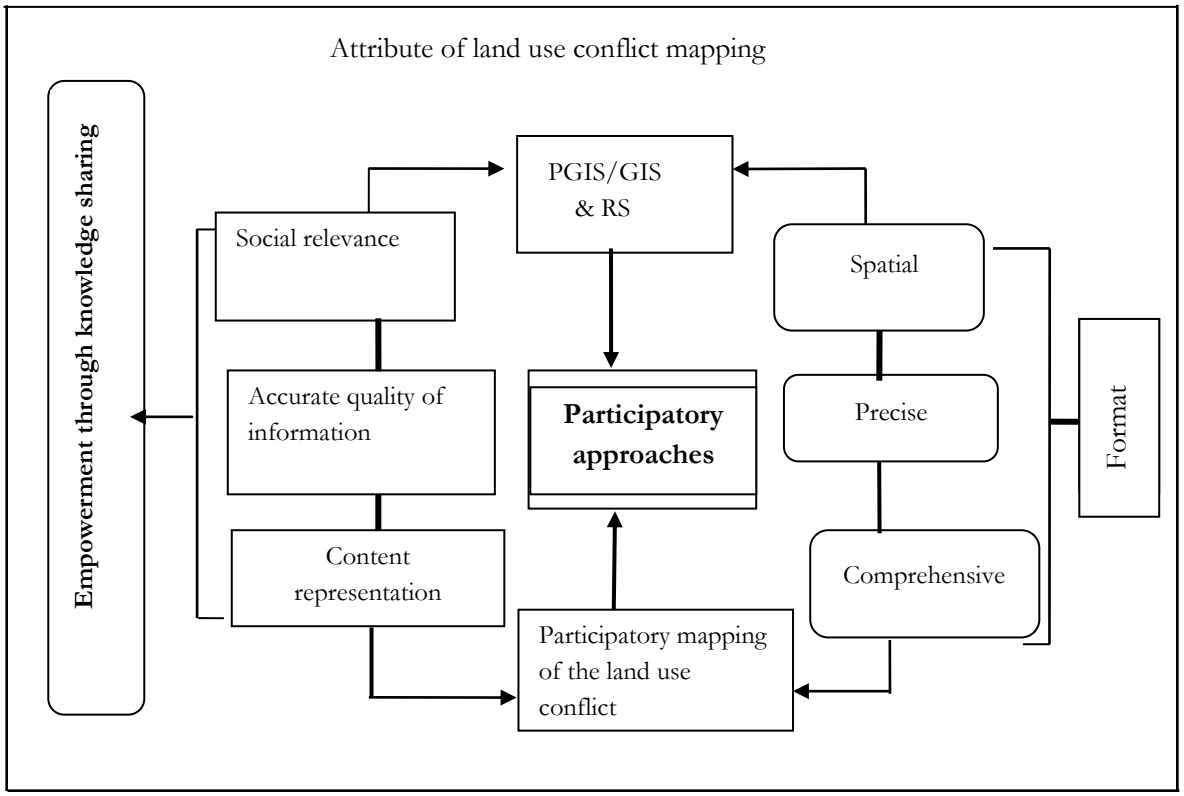

Figure 2-2: attributes for land conflict mapping shared by participatory approaches

Adapted from (Vajjhala, 2005)

The primary purpose of participatory approach in this study is to use participatory mapping so as to elicit local spatial knowledge on land use conflict and organise it spatially while GIS/RS does the reverse and arrange spatial information of land use conflict to shed more light on the local spatial knowledge. Accuracy and precision attributes are secondary to the need of participatory approach whereby correctness of information and description of the resolution of representation of map produced are examined so as to ensure the information are accurate, relevant and represent the contents of the study.

The use of participatory approach in this study focused on analysing the changes in land use and the drivers of land use conflict so as to enable the examinations of participation in identifying and analysing the land use conflict. This objective was intended to ensure that participatory approach meet its intended purposes as noted by McCall (2004) which are;

- Facilitation: local spatial knowledge through participatory map making and through use of handheld GPS

- Empowerment: referring to self-determination and local initiatives in all stages of p-mapping and PGIS so as to reinforce local decision making and empower local people.

- Collaboration: implies collaborative spatial land use analysis and joint identification of the conflict so as to establish the good link between decision makers and local people priorities for sustainable utilization of the land resource.

2.7. Limitation and constraints of the research

This study finding are fixed to a certain place and context (i.e. Masingini forest reserve and its surrounding communities in Zanzibar) and therefore can be only serve to highlight the potential challenges and opportunities for other land use conflict studies in Zanzibar and other countries with similar situation. Moreover because of time, resource and logistic constraints not everyone involved or associated in the management of Masingini catchment forest reserve could be interviewed, thus limiting this study's ability to produce more thorough representation or deeper analysis.

Secondly, beyond the normal time pressure and resource restrictions associated with the research, the practical consideration of qualitative field research also limited the number, and type of interview conducted. Because the case study was in peri-urban area gaining access to interview household took considerable time and the interview were only conducted after the approval of the local administrative officer (i.e. the Sheha) through the order of the District commissioner. Meanwhile because of political situation of Zanzibar and cultural importance of maintaining relationship, household interviews were only conducted after a repeated visit to Sheha's office.

Thirdly, consistent data on land use change in Zanzibar proved to be difficult to obtain. The main reason can be that, no single source possesses data on all land use categories. Different department have information of different land uses according to their goals. This makes an overview of land use change and its associate conflict over time difficult to obtain.

Lastly effective participatory approaches involves feedback sessions for data collected, challenges, lesson learnt so as the participants are able to make their own analysis and suggestion, but due to time constrains and the National election campaign during the field work period the researcher was not able to have a workshop with various stakeholders to give feedback on the findings .

3. UNDERSTANDING ZANZIBAR AND MASINGINI FOREST RESERVE

3.1. Introduction

Zanzibar, which is part of the United Republic of Tanzania, consists of two main islands of Unguja and Pemba and about 50 other small islets. The islands are located 40km off the Mainland coast of East Africa in the Indian Ocean. The two main islands are 50 km apart separated by the 700 metre deep Pemba channel. The total surface area of Zanzibar is 2,654 km². The name Zanzibar refers to three different issues: the semi-autonomous state of Zanzibar, the island of Zanzibar (in Swahili Unguja,) and finally the Town of Zanzibar.

This study uses the term Zanzibar referring to the island of Zanzibar (Unguja) and therefore the data collected and analysed is based on Unguja and does not cover the whole Zanzibar as a semi-autonomous - state.

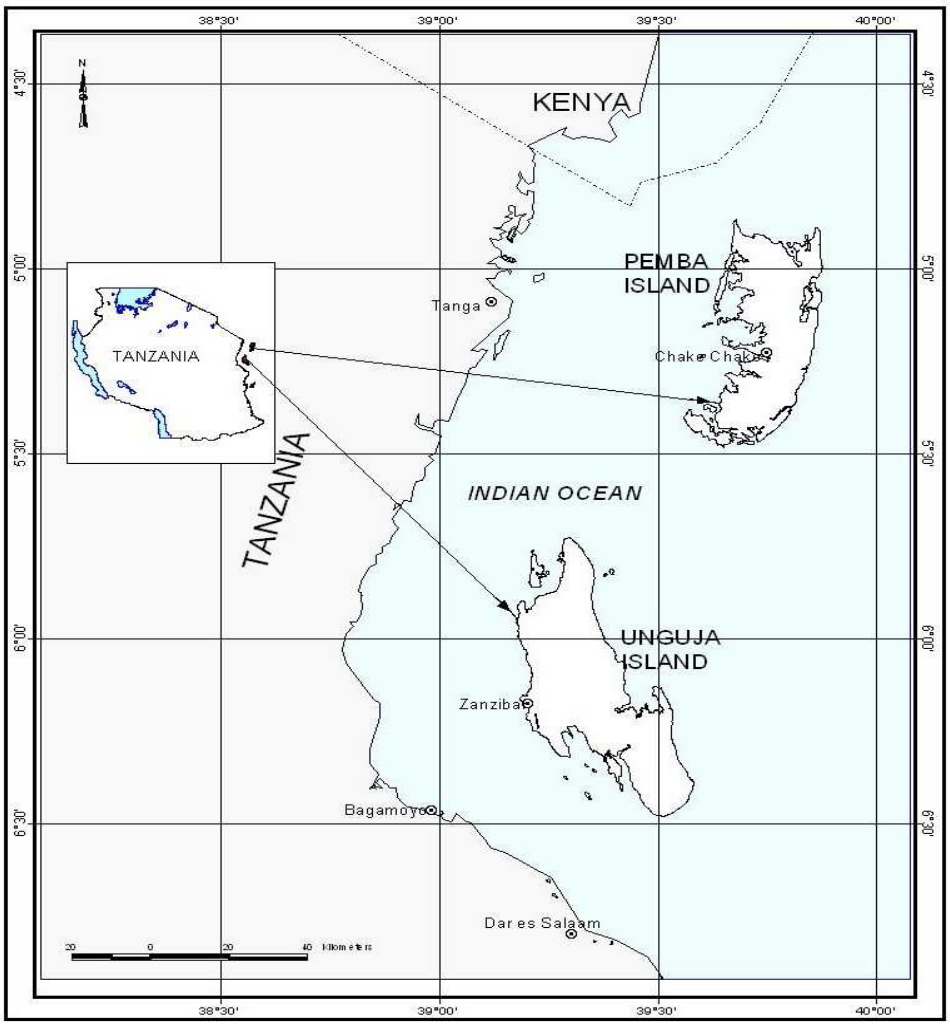

Figure 3-1: Location setting of Zanzibar

Source: Forest department, Zanzibar 2010

3.2. Topography

Zanzibar is characterized by wide valley corridors, fault structures and residual hills reaching a maximum of about 117 meters in the central part. It is divided into two main geographical parts along a north-south division line: a fertile western part called Shamba with rich agricultural land and some hilly areas and unfertile land called Wanda on the eastern part (Scholz, 2008). The western part of Zanzibar is also characterized by elevated, undulating terrain known as the Masingini Ridge (Kahyko, et al., 2008).

3.3. Climate

The climate of Zanzibar is characterized by four distinct seasons. The hot season (Kaskazi) is between December and February with little or no rains. Masika is the long rainy season from March - May. The relatively cool dry season (Kipupwe) occurs between June and September, when light showers (Mchoo) may occur. Vuli is the short rainy season from October – November. The average rainfall amount in Zanzibar varies from 1000-2500mm/yr., while temperature ranges between 17º C and 40ºC.

3.4. Population

According to the population census of 2002, Zanzibar had a population of 984,531 people at a growth rate of 3.1% (Revolutionary Government of Zanzibar, 2007)). Currently the population is estimated to be 1.193 million at population density of 400 people per square kilometre (NBS, 2009) which indicate Zanzibar is one among the highly populated island in the world. This has also a direct implication on resource demand for agriculture, forest products, tourism industry, as well as for settlement development.

3.5. Economic development

The economy of Zanzibar made significant development in 2002 by recording a GDP growth rate of 5.6 percent, nether less the economy is still highly depending on agriculture and tourism sector. Over 80% of population depends on agriculture, mainly production of and exports of cloves. Agriculture accounts for more than one third of the GDP, however it has been steadily declining from 41% in 1995 to 34% in 2002. Tourism sector has shown prominence in the economy of Zanzibar accounting the over all growth rate greater than agricultural sector. The GDP per capita has been increasing from 261,000Tshillings in 2002 to 518,000Tshillings in 2007 (OCGS, 2008).

3.6. Urban development

Urban areas in developing countries face highest population growth and due to the lack of sufficient infrastructure and urban development control suffer most from the population growth (UNCHS, 1996). The urban development of Zanzibar today happens mainly in the area of Ng'ambo (i.e. the other part of Zanzibar city apart from historical stone town) as the Stone Town is completely built up. The development takes place largely outside public control, directed by an ever-expanding informal and housing market. The result has been the spontaneous incremental expansion of scattered new settlements along the city outskirts. Uncontrolled settlement development is causing physical disorder, uneconomical land utilizations, excessive intrusion of settlement into agricultural and forest land, environmental degradation and pollution risks.

3.7. Land use and land tenure

The pattern of land uses in Zanzibar generally follows the distribution of different soil classes, the permanent, settled agricultural activities being carried in the so called deep soil areas(western part of Zanzibar) while other activities such as tree felling, shifting cultivation and grazing are largely conducted in the coral-rag and mangrove areas (FAO, 1995). Over time the landscape of Zanzibar has modified into a predominantly agricultural landscape. Today cropland covers over 50000 hectares or about a third of the

area of Zanzibar (Klein, 2008). Land tenure system of Zanzibar is a complex combination of traditions and government legislation. Since the 1964 Revolution, all the land technically has been owned and controlled by the state. Although a number of Acts and piece of legislation provide the officially recognised legal basis of the tenure system, traditions and community rules still play an important role.

3.8. Forest resources development

Forestry is one of the four principal natural resources of Zanzibar; the others are agricultural land, fisheries and beaches (COLE, 1995). It has been estimated that 90% of the total population of Zanzibar is dependent on firewood and charcoal as the main sources of energy (Kombo 2010). Forestry alone contributes about 1% of GDP when using conventional national income accounting procedures. However, if the value of wood fuel and other unrecorded wood products, the contribution to GDP may reach more than 10% (FAO, 1995). The tangible contribution of forestry to the national economy includes timber for building and carpentry, wood fuel, fruits crops and other non-wood forest products such as medicinal plants, materials for handcrafts, honey and employment. The conservation of mangrove forest has important implications for fisheries production for both market and subsistence sector while forest reserves increases revenues from ecotourism. Although forest benefits accrue to all members of the society, those most dependent on such benefits and most threatened by their destruction are the poor.

3.8.1. National forest policy of Zanzibar

The national forest policy of Zanzibar put more emphasis on forest resources and biodiversity conservation, environmental protection and community participation in planning and management of the forest resource. The policy has set three major goals to be achieved:

- **Environmental goals**: Protect and conserve forest resources including wildlife and flora and enhance the role of forest in maintaining soil and water conservation and other environmental benefits.
- **Social goals:** Strengthen the role of forestry in alleviating poverty and increasing equity in resource management and utilization.
- **Economic goals:** Strengthen the role of forest resources in promoting economic development, in meeting demand for forest products and in creating income and increasing national revenue and efficiency (DCCFF, 2009).

3.8.2. Forest Protection

Zanzibar has different five types of forests namely; mangrove forests, natural forests, plantation forests, coral rag forests and urban forest. However the main one is forest reserves and plantation forest (figure 3-2). Due to rapidly decreasing of forest stock since the colonial period, various measure have been undertaken to protect the forest resource. In 1946 Jozani-Chwaka Bay forest reserve was declared closed for cutting followed by Ngezi forest and "Msitu Mkuu" in 1947. In 1950 the Forest Reserve Decree was adopted and over the next 15 years, important forests such as Jozani, Ngezi and Masingini were gazetted (FAO, 1995). The forest department established after the revolution of 1964 is responsible for all matters related to forest and their management. As in most parts of the world, the department had been focusing primarily on policing and protecting the forest from local people rather than seeking their active collaboration in the management. This led to a feeling of mutual antagonism between the department and the local communities. However, in recent years, the approach of the department has swung dramatically in the direction of increases involvement of local communities. More participatory extension approaches is being promoted and public awareness is being built by contacting farmers and other actors using radios, newspaper, magazines and other media.

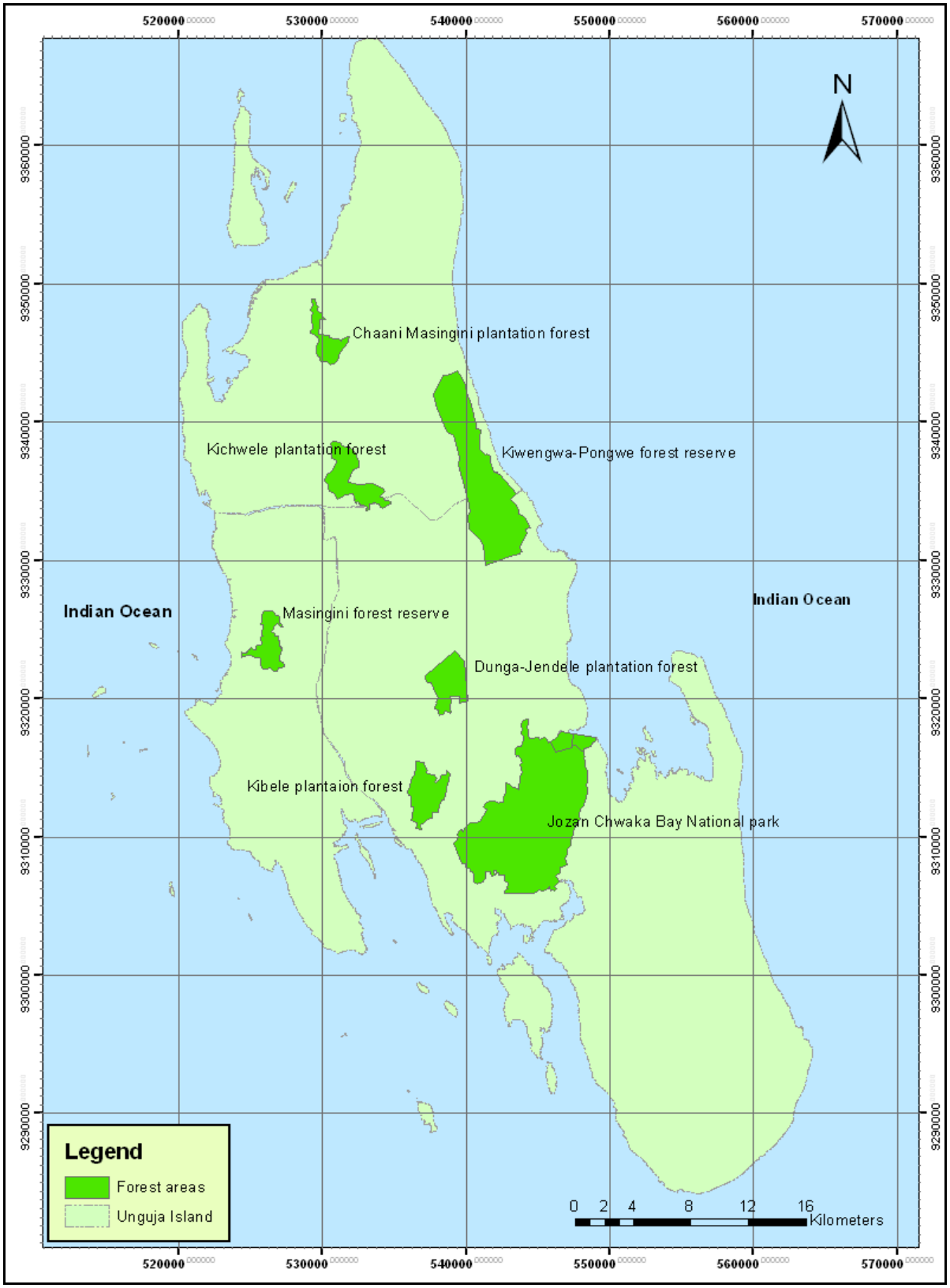

Figure 3-2: Forest reserves and plantations, Zanzibar

3.9. Masingini Forest reserve

This case study area is located on north-western part of Zanzibar town about 10 kilometres in one of the highest place of the Island around 120m above the sea level. It can be reached by the main road heading north from Zanzibar town (figure 3-3). Masingini forest reserve is only urban forest reserves established in 1950 and situated in the West District but partly located within the town boundary of Zanzibar municipality. The forest reserve is currently under great pressure for forest products, agricultural land, settlement and tourism development. Encroachment in the forest reserve for agricultural use and residential activities as well as encroachment in water sources for residential development is a growing problem that has created a conflict between the management authority and the local people. These factors make Masingini forest reserve an interesting case study for analysing land use conflicts in Zanzibar.

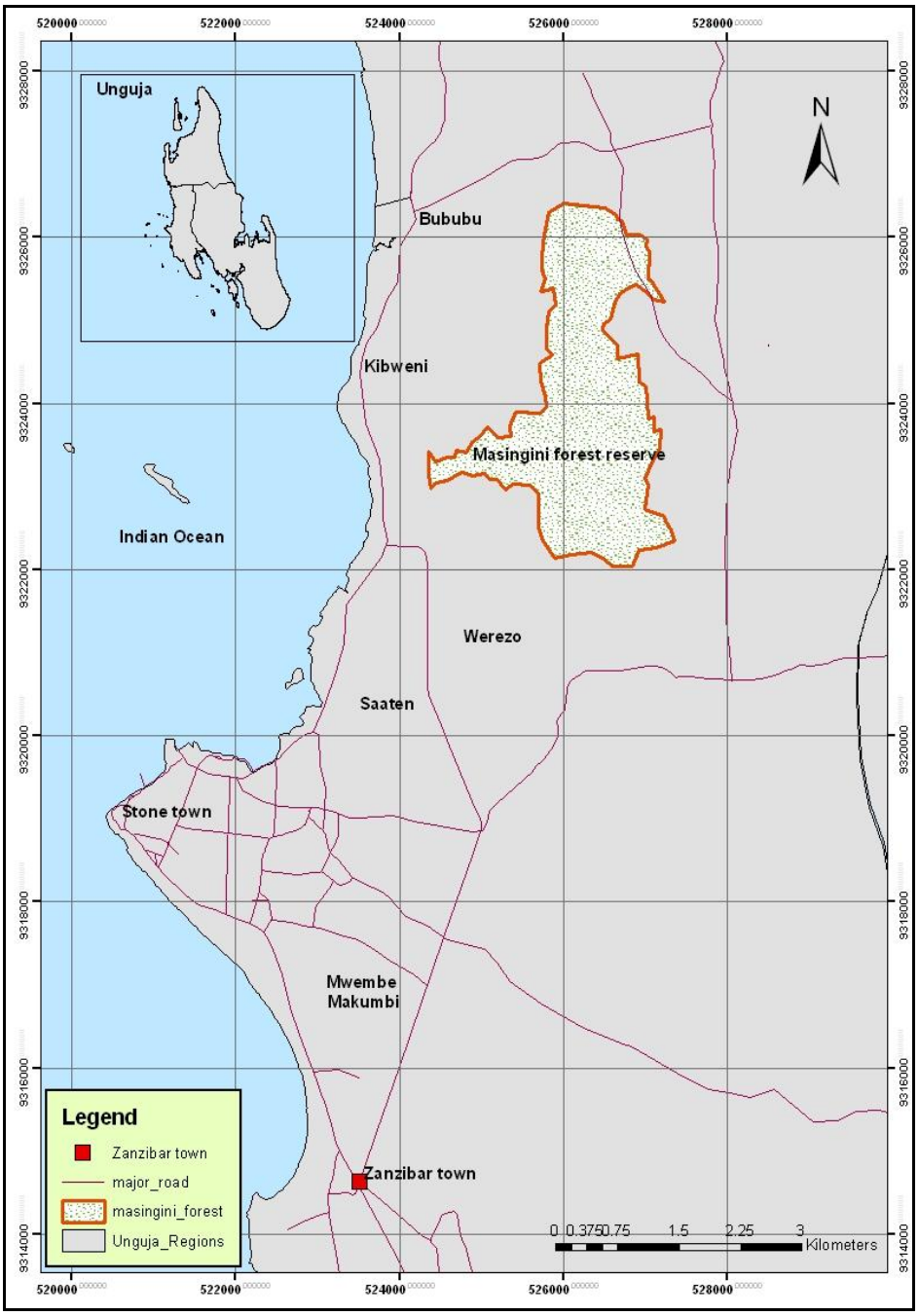

Figure 3-3: Location of Masingini forest reserve

3.9.1. Forest land

The Masingini forest reserve consists of both natural (291ha) and plantations (275ha) forest amounting to total area of 566ha. The major tree species grown in plantations forest are Caribbean pine and eucalyptus trees. The plantations forests are used for production of timber and fuel wood while the natural forests are preserved for soil erosion control and conservation of ground water. Masingini forest reserve plays an important role as catchment for water sources in Bububu spring and Mtoni spring which are official water sources used for water supply in Zanzibar town.

3.9.2. Land tenure and forest ownership

The issue of land tenure on Zanzibar is complex. Though the land was nationalised soon after the Zanzibar revolution in 1964, several tenure systems exist within the islands. With nationalisation of land people had the right to own and sell only crops and structures located on a piece of land but could not sell land because it belongs to the State. In villages people still own land under customary law. There is also land "wakf" which is dedicated specifically for religious use and no one including the Government could use it for a different purpose.

Before 1980s, all lands surrounding Masingini forest reserve were known as Communal Land. Community members surrounding the reserve were cultivating subsistence and cash crops with the consent of the local leaders. Local individuals could only own properties like trees and building over the land and bare land has no value. When tourism activities started in mid 1980s, land became valuable and land use rights changed from communal to individual rights.

According to the Land Tenure Act of 1992 S.3 (1) all natural land within the island of Zanzibar is public land. It is vested in the President, to be held by him, for the use and common benefit, direct or indirect, of the people of Zanzibar. This has created many land problems and conflicts especially around the reserve where people have no land titles. The interpretation of land laws and other has jeopardizes the local community rights. Local people still traditionally considers that villagers own the land around and within the reserve. The present situation of encroachment obviously is due to the fact that local people did not accept the gazzetment and in the absence of law enforcement they continue living and utilizing the forest resource in the gazetted area.

3.9.3. Settlement development around the reserve

The growth and development of urban settlement around the Masingini forest reserve is very poor. Urban expansion has occurred almost exclusively outside formal state control and urban planning systems (Myers, 2008). After failing to obtain planned and serviced land, individuals opt buying piece of urban fringe crop land around Masingini catchment forest reserve and develop those causing negative impacts on other land uses nearby. Due to lack of development control human settlement communities around the forest reserve are becoming squatter areas. The forest reserve is surrounded by ten communities, some of them are located further from the forest but still depend on it for fuel wood, building poles, medicines and other forest products (figure 3-4). According to the 2002 population and housing census, the population size of the communities the surrounding the reserve was 61 552 people having 30425 males and 31127 females ((URT, 2002), this implies that due to the rapid population growth in Zanzibar, the size of the current population surround the forest reserve may exceed the one identified in 2002.

Figure 3-4: Settlement development around Masingini forest

3.9.4. Potentials of Masingini forest reserves

For the people of Zanzibar, Masingini forest reserve provides numerous essential benefits, many of which are vital to the fundamental well-being of the nation. The reserve provides protection against soil erosion and provides many of the nutrients inputs needed in agriculture. A supply of good quality of water in Zanzibar town is also depending on this forest through its water shed coverage. The forest produces 13-15 million litres of water per day.

Zanzibar is famous for her carpentry and boat building due high quality of wood collected from Masingini forest and other natural forest. However, much of the population of Zanzibar particularly rural people depends on the forest for firewood and charcoal as the main source of energy. Collection and trade of firewood and charcoal is one of the major economic activities in the Island.

Masingini forest is a home of most endangered endemic species such as Red colobus monkeys which are becoming major tourist attractions. The monkeys were translocated to Masingini forest reserve from Jozani forest in 1976/1977 in order to help save this rare species. The thick forest in the reserve is the habitat of Blue monkey (Cercopithecus mitis albogularis). Many species of birds also fill the forest with singing. Red bush squirrels are abundant and can be seen climbing up and down the trees. Mini-antelopes, sunis and blue duiker hide on the forest floor.

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4. METHODOLOGY

4.1. Research design

A research design is a procedural plan that is adopted by the researcher to answer questions validly, objectively, accurately and economically (Kumar, 2005). Given the nature of the problem operating under GIS and the conceptual framework, this study uses both qualitative and quantitative data employing Participatory GIS methodology using multiple methods. The PGIS methodology is implemented to help understand the community member's perceptions and opinions on land use conflicts and the drivers behind it.

4.1.1. Selection of research strategy

To investigate the drivers of land conflict in the study area, a methodology which facilitates the analysis of the behaviour, perceptions, causes, interrelations and interactions among the actors was needed. Hence my methodological approach in analyse land use conflict is case study approach which bases on the fundamental context and practice over time. The case study approach provides a sound way of understanding the land use conflict as the conflicts involves different actors embedded in a social process. It is therefore as a researcher to integrate social interpretation of the conflict into inquiry process.
The theoretical framework used is based on progressive triangle according to Walker & Daniels (1997) that depicts a land use conflict as a triangle of three interrelated dimensions of substance(what is the conflict all about?) procedural(how is the conflict manifested?) and relations(what is relationship between conflicting parties?).

4.1.2. Rationale for the selected research strategy

According to Yin (1994) the choice between different research strategies should be based on the type of research questions asked. Case study strategy is favoured when a research focuses on "how" or "why" questions in situations related to contemporary events which are outside the researcher's control (Yin, 1994). The main emphasis of this study is on how and to what extent the drivers of land use conflict in the Masingini forest reserve have led to existing land use conflict to the surrounding local communities. The descriptive and exploratory nature of the research clearly favours the use of case study strategy which deals with variety of events such as interviews, observations, documentations, mapping, focus group discussions etc (Yin, 2003).

4.1.3. Sampling

Sampling consist of selecting some part of population to observe so that one can estimate something or population parameter and draw inference about the whole population. The population and sample frame used to determine sample for this study were all households. Because more than 64% of all households are immigrants; even few indigenous are troubled by the land use conflict in their respective communities; therefore the population is homogenous.

4.1.4. Sample size

Sampling differ from one research to another determined by what the researcher wants to do with the finding, what type of relationships has to be established (Kumar, 2005) and variability of sample to studied. According to Bernad (1995) a sample size in the range of 30 to 50 is sufficient for exploratory and in-depth work if the population is homogeneous. For this study the final sample size was 89 households living around the Masingini forest reserve and 8 experts adding up to 97 sample sizes. The household sample size was done at village level in areas where community members directly benefit and affects the

reserve and excludes villages which are far from the reserves. The sample size from households and experts interviews representing key stakeholders in forest management assisted in generalizing the results for the final output.

4.1.5. Sampling design

A sample design refers to the technique or the procedure the researcher would adopt in selecting items for the sample (Kothari, 2004). The study used both probability and non-probability sampling technique in selecting sampling units. The purposive sampling was used for intensive studying of shehia's of interest and excludes those which do not suit the purpose of the study but also in selecting information rich cases for in depth analysis related to land use conflicts around the Masingini forest reserve, however systematic random sampling was used for household interview within the selected shehia's due to unavailability of household lists.

4.2. Data collection

Methods of data collection used were both primary and secondary sources. The primary sources methods were selected based on its suitability, applicability and socio-economic demographic characteristic of the study population (Kumar, 2005). For this study socio-economic and demographic features such as occupation, household size, originality of the households (indigenous/immigrant) were taken into account. Secondary sources were gathered from literature study to get government publications, shehia's statistics and records as well as reports and useful documents related to the subject matter. Therefore several methods/tools were used sequentially or jointly based on situation on the ground and how best could the method/tool facilitate to answer research questions and achieve the research objectives. The methods and tools included literature review, participatory mapping (sketch mapping, geo-coded transect walk), focus group discussion, interviews and field observation.

4.2.1. Interviews

To capture people's perceptions and values related to their environment, one needs methods which allow individual knowledge to become accessible. The number of interviews has been less in open-ended interviews than in the structured interviews as the open-ended methods requires longer time frame for each interview. Both expert and individual interviews were conducted and both genders participated in the interview as gender affects clearly one's insights and experiences. The household interviews were conducted after getting the permission from local administrator (Sheha) of the respective shehia's. Semi-structured interviews were conducted with 89 respondents chosen randomly in each of the 3 villages and 8 respondents from 5 stakeholder group representing their organisations as indicated in appendix 4. The number of respondents in each village included women, youth and elders both immigrants and indigenous to the area. All household interviews were carried in Swahili while expert interviews were carried in English.

4.2.2. Focus group discussion

This group interview targeted key informants within the respective shehia's to identify land use changes, land use conflicts, spatial pattern of the conflict and drivers for land use conflict. The interview was organized in close contact with the local administration leader (Sheha), who either chose the possible informants according to criteria defined in the research. The Sheha in collaboration with the researcher gave the objective of the research to the informants and what is expected from them. Most of the informants were chosen on the bases of their occupation and gender and interviewed in the village of the respective shehia's. All the discussions were carried out in Swahili. Vertical aerial photographs from 1952, 1977, and 2004 were used to initiate focus group discussion among the key informants who were asked to interpret different aerial photographs, demarcate changes and discuss the useful of aerial photography in participation. Furthermore participants were asked to identify the drivers of land use change that has led

to the existing land conflict due to illegal grabbing of forest and agricultural land. The informants were given a small monetary fee as a compensation of the lost working hours.

4.2.3. Participatory sketch mapping

Participatory sketch mapping is an exercise through which tacit knowledge, as embedded in people's spatial memory, is converted into explicit and externally-usable knowledge. It is a map-making process that attempts to make visible the association between land and the local communities using the commonly understood and recognised language of cartography (Corbett, 2009).

Participatory sketch map was undertaken by the participants with the support of the researcher as a facilitator and it was carried in two communities of Mtoni Kidatu and Kianga communities. Prior to the mapping process, the researcher introduced himself to the participants (figure 4-1) and briefs the participants on the research objectives and what is expected from them. Furthermore, the researcher provided the community with sufficient information about the participatory mapping (e.g. why mapping, what maps are, and how they are made and used), the range of tools available from sketch maps to computer based mapping system.

Figure 4-1: Participants awareness creation of the research

Left: Researcher briefing participants on the research objectives and what expected from them
Right: Participants identifying features of their community boundary on aerial photograph and topographic sheet.

Different land uses have changed in these communities. As a researcher I wanted to know the participants perceptions of the past, present and future of the local environmental and surrounding area, specifically on information related to land uses and land use change. Oral narration of the history of different land uses were done by a key informant then sketch mapping for depicting detailed information of the community layout and infrastructures and plotting the information on the occurrences, distribution, access and use of land uses within the economic and cultural domain of a specific community followed. It involved drawing directly on large sheets of paper (flip chart) different land uses using different colour marker pens, as shown in figure 4-2 by both gender separately. During the sketch mapping of the different land uses in both the communities men were able to sketch their community land uses without depending on the topographic maps (appendix 5) but women were not able to sketch the map directly, so they depended on the topographic map to identify the main road and the main existing land uses as well as facilitation from the researcher.

Figure 4-2: Participatory sketch mapping exercises

The map needs to accurately represent the views and knowledge of community members (section 2.6). . Therefore it was important to allow the participants to evaluate the contents and usefulness of the sketch maps produced. The output of the participatory sketch mapping exercises (appendix 3) of both genders was displayed to all the participants and was done in each community separately to see and scrutinize. It involved correcting the mapping outputs produced by either of the gender to fit the reality on the ground. Several questions were asked to the participants during the evaluation process; such as; is the information displayed in the map accurate and represents the content of the community? What are the most important parts represented on both maps and what are the main differences represented on both maps? The evaluation process reveals that Masingini forest reserve is a very important part in either of the two communities (i.e. Kianga and Mtoni Kidatu). It also reveal that men are more knowledgeable on different land uses that has been happening in their communities, however both maps lack legends as the participants failed to agree to which legend to use in representing different land uses instead name writing was used.

The participants were given also the two aerial photograph of Dole Masingini: one from 1952 and the other from 1977 to observe the differences in tones. The pointed out that they saw lighter tones in the 1952 vertical aerial photograph whereas they could see darker tones in the 1977 aerial photograph. However there were two kinds of interpretation: one interpretation was that dark tones showed increased vegetation cover in 1977 and the second interpretation that light tones in 1952 showed increased vegetation due to low population density around the reserve which reduced human activities from degrading the forest. However participants agreed that the dark tones represented increased vegetation in 1977 compared to 1952 and that the increased vegetation is the result of vegetation regeneration in the

forest reserve after development of deep gullies locally known as Masingi and soil erosion in the reserve. However, the participants were also given the vertical aerial photograph of Masingini area of 2004 (appendix 4), and observance the participants agreed that there were trees in 2004 compared to 1977 and that settlement development have expanded to a large extent to the communities surrounding the reserve, thus posing a threat to the sustainable management of the Masingini forest.

4.2.4. Transect walk/GPS coding

This is a spatial cross-section of the community depicting geographic features (e.g., roads, water resources) as well as land use types and vegetation (forest) observed along an imaginary line. The process help to analyse linkages, pattern and interrelationships of land uses along the transect. This geo-coded transect walk tool was used to gain information on different zones and forms of land use of communities surrounding the Masingini forest reserve. The transect walk was done with the help of handheld GPS to capture exact location and identify the water sources and the settlements developed near the Masingini forest reserve due to different interests and perceptions on the use and benefits of the forest. Transect walks were carried out with key informants representing the two communities and representative from the forest department throughout the Masingini forest reserve, observing, asking, listening, looking and identifying conflicting areas. Through the transect walk, spatial data such as land use pattern, spatial pattern of conflict, extent of settlement development and perception on drivers for land use change were investigated and discussed in detail.

4.3. Stakeholder analysis

Stakeholder includes all actors or groups who affect, and/or are affected by the policies, decisions, and actions of the project or proposed interventions. Stakeholders represent systems with their objectives, resources and sensitivities. According to McCall (2004) stakeholders can be described in various ways in resource management, but the common are;

(i) Direct users and in direct users

(ii) Active stakeholders(those who affect) and passive stakeholders(those who are affected by)

(iii) Scaled along micro to macro continuum of stakeholders

(iv) Legitimate interests vs non-legitimate interest

(v) Beneficiaries' vs non-beneficiaries

A stakeholder analysis was carried out to identify the actors involved in the use and management of forest resources within the Masingini catchment forest reserve, their interests, stake in solving the problem (influence) and their perception of land use conflict. This type of analysis is justified when one of the actors is in the position of weakening the decision makers or managers of the land and forest resources. This stakeholder analysis takes into account most of organizations, agencies and firms that exist in Zanzibar and which are directly or indirectly involved in the utilization and management of Masingini forest reserve. For this study stakeholders for mapping the land use conflict were among the interviewees identified based on their interactions with the Masingini forest reserve in line with the data required to achieve the objectives of this research. However not all of them were interviewed but some of stakeholder's interests were identified through secondary data. These include international organisations and other civil society existing in Zanzibar.

4.3.1. Identification of stakeholders

The identification of the stakeholders (appendix 8) involved in the use and management of forest and water resources within Zanzibar was carried out in two phases, first a preliminary list of them was constructed in the pre-fieldwork period and later this list was further developed during the fieldwork. The

key stakeholders were distinct at two levels. The first differentiation is between primary and secondary stakeholders. Primary stakeholders are those who directly affected by the conflict within Masingini forest reserve, while secondary stakeholders are those ones who are somehow directly or indirectly related to the protection of Masingini forest reserve but are not so directly affected by the prevailing land use conflict. The second differentiation is on the type of stakeholders either active or passive. It is understood that active stakeholders are those who affect or determine the decision or action in relation with reference taken while passive stakeholders are those affected by the decision or action in a positive or negative way in the forest and water source management plan within Masingini forest reserve.

4.4. Data processing and analysis

The common data sets processed for land use change were remote sensed imagery (aerial photographs and satellite imagery) and various types of topographic maps. The actual change detection were carried out in Geographical Information Systems (GIS), Erdas software and Statistical software(SPSS &Ms Excel) which provide useful tools for analysing change trajectories and dynamics of land uses over different time periods. The data process involved use of spatial and non-spatial data sets. Spatial data sets were processed into UTM 37 S map coordinate system with Arc 1960 datum and Clarke 1880 ellipsoid.

4.4.1. Image classification of aerial photo, 1952 1977, &land sat TM 2009

The black and white aerial photograph of 1952 and 1977 with a spatial resolution of 1m was resampled to spatial resolution of 30m to fit with the land sat TM 2009 which had 30m resolution and then image classification was carried. Principle component analysis was applied to enable spectral reflectance and easily distinguish the land use classes of the study area. The image classification was done using pixel-based approach in which supervised classification method was used. In order to detect land use/land cover changes and quantify the changes effectively, land cover map of the case study area was derived and then simplified in various classes to examine the spatial extent of the changes. For this study, three main classes were of interest, namely built-up area (roads and buildings), agricultural area (crop land, pastures, plantation trees) and the forest area (mixed forest, and ever green forest). The area of land use change for land use classes was calculated through the number of pixel in the attribute table and then converted to hectares.

4.4.2. Accuracy assessment

Accuracy assessment is considered as an important step in evaluation of different image processing routines in image classification. The most common approach to assess accuracy of remote sensed data uses an error matrix and is referred to as confusion matrix being recommended and adopted as the standard reporting conventional (Canters, 1997). The approach compares the classification results with ground truth information. In this study the accuracy assessment was carried for the land cover map obtained from 1952, 1977 and 2009. The accuracy of the image classification and its land cover classes for 1977 aerial photograph was done using derived coordinate points from the topographic map of 1977 and the true colour aerial rectified photograph of 2004 -2005 with 1m spatial resolution. For 2009 land sat imagery, accuracy assessment was done using the collected fieldwork GPS points. The overall classification accuracy was 73.47% for 1977 and 73.33% for 2009 (appendix 7).

4.4.3. Limitation of image classification and accuracy assessment

According to Foody (2002) accuracy or degree of correctness of map classification is considered unbiased if it gives accurate representation of the land cover indicating the degree to which the derived image classification agrees with the reality. Due to complexity of urban land scope and limitations of the used image and image resolutions and the methodology of using pixel based classification, combinations of brightness and textures created confusions among land use cover classes. This led to low overall classification for 1977 and 2009 as shown in section 4.4.2. This is also supported by Anderson and Cobb

(2004) who identified that panchromatic aerial photograph shows greater variations in local brightness values even for patches of the same vegetation. Some building also have the same reflectance as the bare land and also agricultural fields reflected plantation forest hence allocated the same pixel number due to brightness and tones, however the process improved the image classification to a certain degree.

4.5. Research approach

To explore and analyse the land use conflict and drivers of land use conflict through conflict mapping and identification in the study area, the overall research activities were divided into three phases, namely pre-field, field work and post field as shown in figure 4-3 below.

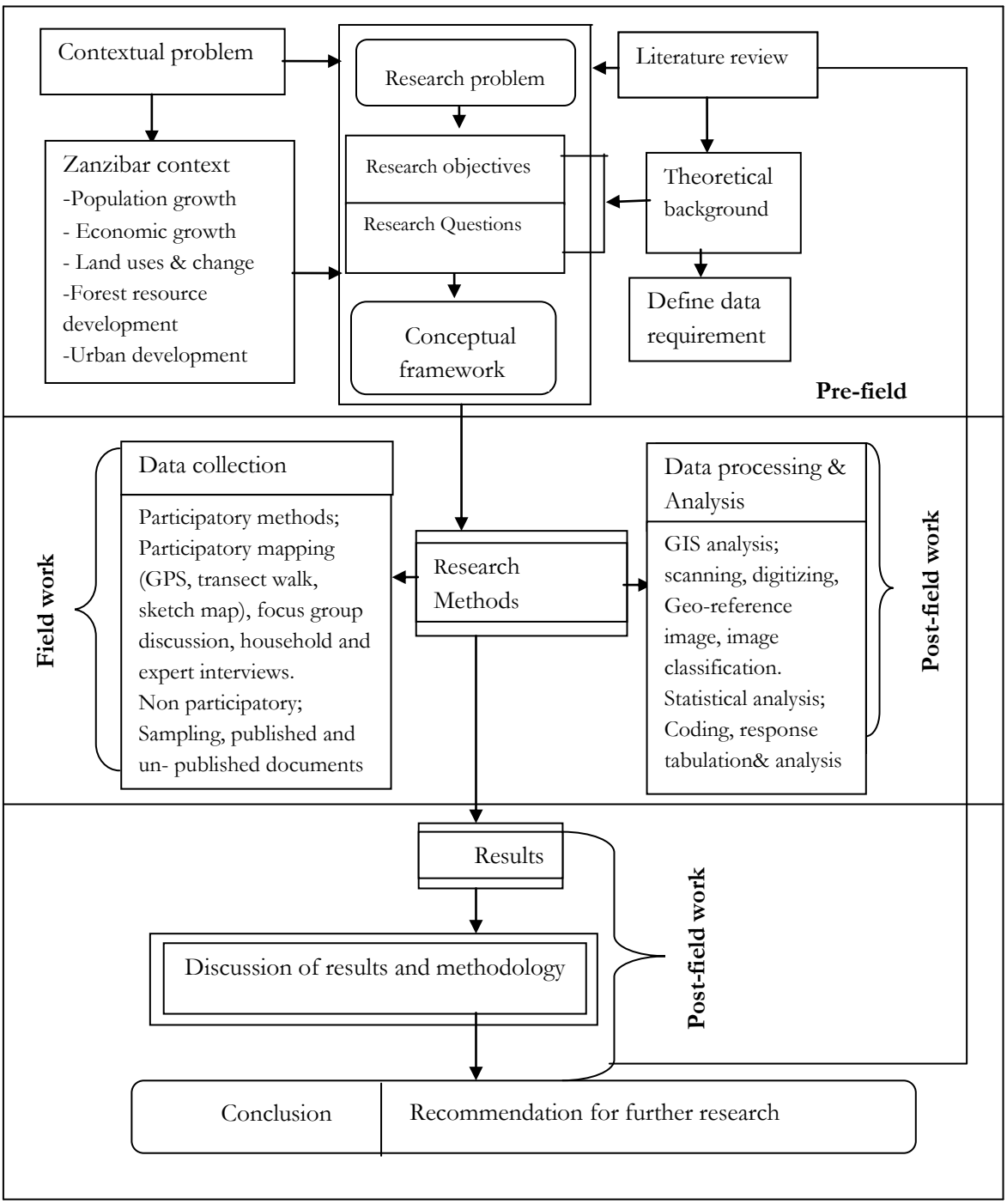


Figure 4-3: Research process: Steps and methods

5. PARTICIPATORY APPROACHES FOR IDENTIFYING LAND USE CONFLICTS

This chapter covers the results of participatory approach used for identifying and analysing the land use conflict in a study area as described in chapter 4. It includes the spatial knowledge that local people have on the source and cause of the land use conflict, actors involved, effects of the conflict on the people's lives, spatial pattern of the conflict as well as analysis of land use changes in the conflicting area. Participatory approach using p-mapping and PGIS in combination with household& expert interviews, geo-coded transect walk, FDG and field observation have been used to achieve the research objective in this area.

5.1. Local spatial knowledge on land use conflict

As used in this study local spatial knowledge (LSK) denotes a type of knowledge that has evolved within the community and has been passed from one generation to another (Tripathi & Bhattarya, 2004). It is a specific and on-going knowledge about the land and land resources, land conflicts and the local people's management of the resources (McCall & Minang, 2005). In this study land use conflicts has been defined as incompatible interest, goals and disagreement about the course of action taken that interferes access, uses and control of Masingini forest and its catchment zones by various actors who are directly or indirectly benefiting from the land resource. During the household interview, focus group discussion, and participatory mapping local people share different perception of the on-going land use conflicts between local people and the management authority of the Masingini forest reserve.

5.1.1. Existence of land use conflicts

The increase of population, changing in policies and market development has created mounting competition of land resources in the study area. As a result of these pressure and social economic changes the forest land around Masingini area has been encroached for settlement expansion and agricultural farms leading to land conflicts between the forest management authority and the local people. The existence of conflicts pertaining to land use is shown by the respondents interviewed during the household survey. It was revealed that 69.7% of the respondents identified the presence of land use conflict in Masingini as associated with encroachment of the forest land. Another 24.7% of respondents indicated that there were no land use conflict and 5.6% did not know if there were conflicts associated with Masingini forest reserve encroachment.

The table 5-1 below shows the summary of household responses that indicate there are land use conflicts in a study area.

Table 5-1: Household responses on existence of land use conflict

Existence of land use conflict in a study area		
		Percent
Valid	YES	69.7
	NO	24.7
	Don't know	5.6
	Total	100.0

Source: this research 2010, Zanzibar

5.1.2. Conflict interpretation and perceptions

Conflict transforms over time and may leads to positive as well as negative outcomes with short term or long term effects. The way communities and local people interprets the existing land use conflict varies from one respondent to another, reflecting how directly or indirectly they are affected by the conflict. The household survey conducted in three communities of Kianga, Mtoni Kidatu and Mwanyanya, revealed different perception of the existing land use conflict around Masingini forest reserve. The interpretation range from high meaning the conflict is highly expressed to dormant conflict in situation where the conflict is not clearly expressed or no action are taken against those who disobey the conservation and preservation rules existing on the management of the forest and water sources. The results of the household survey show that among the respondents who reported the existence of land use conflict; 55% of them identified it as dormant. Another 29% mentioned it as low and 16% indicate that the conflict is active and high. Those who expressed as high and active were those who in one way or another faced legal action for illegal land grabbing in the special forest area and water sources. The perception and interpretation of the land use conflict is based on the subjectivity and objectivity of the individuals and not the researcher.

5.2. Conflict identification

Prior to fieldwork the researcher looked at the study area and identified that the study area have been spotted by different researchers as experiencing land degradation, pollution of water sources and depletion of forest resources due to illegal grabbing of forest land for agriculture, infrastructure and settlement development (COLE, 1995; Kombo 2010; Myers, 2005). During the field work through various participatory methods such household and expert interviews, community sketch mapping, geo-coded transect walk, focus group discussion and field observations, three main land use conflicts were identified; conflict over water source encroachment; conflict over forest reserve encroachment and conflict over agricultural land conversion to other uses. The conflict are identified in different forms, sources scale and type (Boix Fayos, 2002; Mandara, 2007). The conflicts identified are both inactive and active as some respondents mentioned that they are dormant.

The table 5-2 is arranged to show parties involved in the conflict according to the interviews, focus group discussion and stakeholders perceptions. The source, scale and type have been also identified. The concept is coming from conflict related studies by (Mandara, 2007; McCall, 2004; Mostert, 1998) and this research field data.

Table 5-2: Conflicting parties from findings and literatures

Conflict party	Source	Scale	Type and relationship
Settlement developers vs Water authority	Interest disagreement factual disagreement	Intra-community local (micro-micro)	Boundaries(water catchment land related)
Settlement developers vs Forest reserve authority	Factual disagreement Relational aspects(distrust)	Intra-community local (micro-micro)	Resource use, land use, boundaries(Forest related)
Farmers vs Government	Factual disagreement Conflicting goals	Intra-community local (micro-micro)	Resource use, land use (land related
Farmers vs Forest reserve authority	Interest disagreement, factual disagreement	Intra-community (micro-micro)	Land use (land related)

The above identified conflicting parties or actors and the source, scale and type of land use they disagree are described as follows:-

5.2.1. Conflicts between settlement developers and water authority

This conflict is concerning encroachment of water sources around the Masingini forest reserve by settlement developers. The expansion of settlements by settlement invaders as named by the water authority have led to degradation and pollution of water sources leading to frequent outbreak of waterborne diseases like cholera and dysentery particularly during the rainy season due to contamination of drinking water as most of residents rely on boreholes and wells for water. Furthermore loss of vegetation around water sources reduces water flow causing decline on water volume at the water reservoir in Saaten. This leads to shortage of water in Zanzibar town. Apart from that other sources are drying out causing people particularly women to waste time and energy looking for other sources to fetch water for daily consumptions. The major water sources which are under pressure are Mtopepo and Mwanyanya water springs. One respondent was not happy by the way the water authority name them as invaders and he insisted the blame should be put to the Sheha as he said:-

"The water and forest authority says we invaded this land, they call us invaders and they are going to demolish all the houses (marked and written "Maji- water) that we have already built and invested. This is not true. I bought this land. Where did we get the right to build it if it wasn't from the Sheha? We poor people are always victims in own land."

The above quotation entails that conflict over the water source encroachment is because of interest and fact disagreement as reported by (Mostert, 1998). Local people claim to have right to the use of land because they bought legally however development interferes with other land uses such as water source conservations/protection.

5.2.2. Conflict between settlement developers and forest reserve authority

This conflict is over the forest reserve encroachment leading to its destruction (figure5-1) and forest reserve expansion. The local people complained that the forest reserve is taking their land through expansion of the forest reserve and its catchment. On the other hand the forest reserve is complaining against the local people who sell their land to settlement developers who cut the trees for timber and poles and also clear the forest land for residential activities leading to decrease of forest land and disturbance of the ecosystems. It was found also that due to the increased demand for building lots, an informal land market around the Masingini forest reserve is in force, giving rise to the spontaneous development and undesirable intrusion by urban related uses onto the best forest land. The department of forest with the responsibility of protecting the reserve evicts the invaders by force leading to conflicts between these actors due to the conflicting of interests. One developer revealed that forest land encroachment is caused by the lack of access to planned and surveyed plots due bureaucracy in land allocation process as he said

"It is not better to develop in forest land but where can we get planned and surveyed plots? When they announce that they are distributing plots for instance in Tunguu. Who gets those plots? The government officials" People like me even the Sheha don't stand a chance so most of us squat in areas around the forest reserve where it easy to get land without any complications.

However from the focus group discussion it was also point out that the government policies in prohibiting low income earners to access the surveyed plots due to high charging price have led poor people to find alternative of livelihood in the special forest areas. Furthermore they added that, the way the policies are enforced leads to forest land use change and encroachment as they said forest land is still seen as the only nationally owned asset irrespective of the efforts the surrounding communities have exercised in protecting for many years through their traditional and informal rules.

Figure 5-1: Building construction into forest land (Masingini village)

5.2.3. Conflict between farmers and the government

This is a conflict over the change of agricultural land to urban land uses (figure 5-2). As part of major land reform, the government distributed the Three acre plots (TAP) commonly known as "eka" to landless families immediately after the revolution of 1964. Since the plots were to be used entirely for agricultural purposes it was and still is illegal to sell or convert them into human settlements. As the urban population grew, the demand for residential plots increases forcing the "eka" owners to sell and subdivide their land which is eventually converted to human settlement by home developers against the right of use given before. This created and still is continuing creating the conflicts between the government and the TAP owners. To confirm that the conflict over agricultural land use change is also the main problem between the government and local people, one key informant at Mtoni Kidatu during the focus group discussion expressed his anger against the government decision to stop them from converting the plots into settlements as he said:-

"Mzee Karume (Zanzibar Revolution government first president) gave us three acre plots in 1966 and said it is ours to use for farming and other economic activities. I have a big farm land with little family why am I not allowed to convert it to settlements while the land value is high for me to get benefits? Is it fair that we should not build houses on the Masingini ridge?"

Figure 5-2: Agricultural land turned into settlement (Kianga)

Box 1: Response to decline of agricultural land

Small farmers in Masingini ridge had been involved in clove, coconut production. Indeed it was a large cash earner. In few years when the low prices and credit problems seems long term, farmers sought alternatives. Initially they trimmed their bushes to grow food crops such as cassava, banana but also sell their plots for residential activities leading decline of agricultural land. (Key informant interview

5.2.4. Conflict between farmers and forest reserve authority

This is also conflict over forest reserve encroachment by farmers through farm expansion. Encroachment into the forest reserve for agricultural use is a growing problem as observed during the field work. Small scale forest clearing mostly around forest edges is often done in Masingini forest. The deforestation or degradation which is taking place is depriving wildlife (described in section 3.9.2) of important shelter, making them more vulnerable to hunting activities. Uncontrolled harvesting and over–exploitation for firewood by farmers have also affected the quality of the Masingini natural forest outside the protected area. Countermeasures against crop destructions pose another conflict with agriculture as the use of pesticides sometimes carry effects on the environment. From the focus group discussion in Kianga area where most of the participants are farmers, it was found that, this type of conflict is often due to unclear boundary of the forest reserve in which farmers do claim that the forest reserve is taking their land while the forest reserve management authority claim that farmers are slowly encroaching buffer zones of the forest created by the presence of firebreak.

Generally the analysis of the respondents' from the household interviews show that conflict over water source encroachment by settlement development is the main type of land use conflicts followed by land use conflict over forest land encroachment. Land use conflicts over agricultural land was found as not a biggest issue by the local people in the study area as it was pointed out by few respondents as shown in table 5-3. The conflict over water source encroachment were rated as the main (62.9%) by respondents as most of their houses have been marked "X" written Maji (water) meaning that they have legal notes to vacate from the water catchments area and look for somewhere else to develop, followed by conflict over forest encroachment (31.5%) and conflict over agricultural land took the least (5.6%).

Table 5-3: Household response on main types of land use conflicts

Type of land use conflict		
		Percent
Valid	conflict over forest encroachment	31.5
	conflict over water source encroachment	62.9
	conflict over agricultural land use	5.6
	Total	100.0

Source: this research 2010, Zanzibar

5.2.5. Stakeholders perceptions on drivers of land use conflict

The conflict around Masingini forest reserve is characterized by various drivers or forces from internal and external sources leading to land use change and thus creating land use conflict between different stakeholders within Zanzibar and Masingini area in particular. In identifying the causes of land use change and the perceptions on the drivers of land use conflicts, several actors (both internal and external) as identified in section 4.3.1 were involved. From stakeholder analysis, among the actors, some were conservation-preservation interest (government institutions- mainly department of forest, water, and environment and national, NGO's such as SONARECOD, and project program such as SMOLE, some were forest and water dependant people (local people, private tourism company). Some were development oriented (immigrant farmers and settlement invaders) and some were profit oriented (individuals and private business on wood and timber) as shown in the table 5-4 below.

Table 5-4: Stakeholders perceptions of drivers of land use conflict

S/n	Main actor	Perception of the drivers for land use conflict
1	Local community (Shehia council, village council)	Population pressure, government policy, climate change, and personal long term motivations has caused farmers and local people to change their TAP plots and encroach forest and water source land leading to destruction.
2	Immigrant farmers and settlement developers	Crop yields due to fertile soil, presence of infrastructure, and availability of cheap land in the area (economic factor) creates an opportunity to encroach forest, agricultural and water source for development and production.
3	Department of environment (in MALE)	Population pressure and the need to exploit forest and water resources have led to pollution of water sources, soil erosion and destruction of the environmental sensitive areas like Masingini forest and its water catchments.
4	Department of forest (in MALE))	Poor land allocation, overlapping of government policy on natural resource conservations and lack of coordination among the government institutions have led to encroachment of forest land leading to conflict.
5	Zanzibar water authority	Weakness in enforcement of laws, missing coordination link with DCCFF, and scarcity of land has led to the change of water source land in the catchment to residential activities.
6	Local authority (ZMC, and WDC)	-The forest land is being changed to other uses by local people as result of unclear urban management machinery, and poor resource base. -Also due to lack of coordination between government agencies in land allocation and inadequate development control - Overlapping of development control responsibility between the WDC and ZMC in which part of the Masingini forest reserve is within the ZMC boundary according to 1982 Master plan.
7	Department of survey and urban planning (in MLWCE)	-The forest land is being changed due to lack of planned and surveyed plots in the Island and absence of clear boundary of the forest but also water sources are encroached due to absence of fences and clear boundary as buffer zones. -Lack of general physical land use plan for development forcing most of poor people to develop haphazardly.
8	SMOLE	-The forest and agricultural land are changed to other uses because of the prevailing land market in which land value is very in Zanzibar thus forcing people to change their land to other uses and also some try to expand their farms to forest areas so as to have more plots for subdivision. -Land tenure change as most of the TAP has lost their tenure status and thus converted to other uses.
9	Local NGO's(SONARECOD)	Population pressure and weakness of responsible institutions in enforcing bylaws has led to local people to change their private land as well as government land to other uses leading to land use conflict in the area.

5.3. Land use changes around Masingini forest reserve

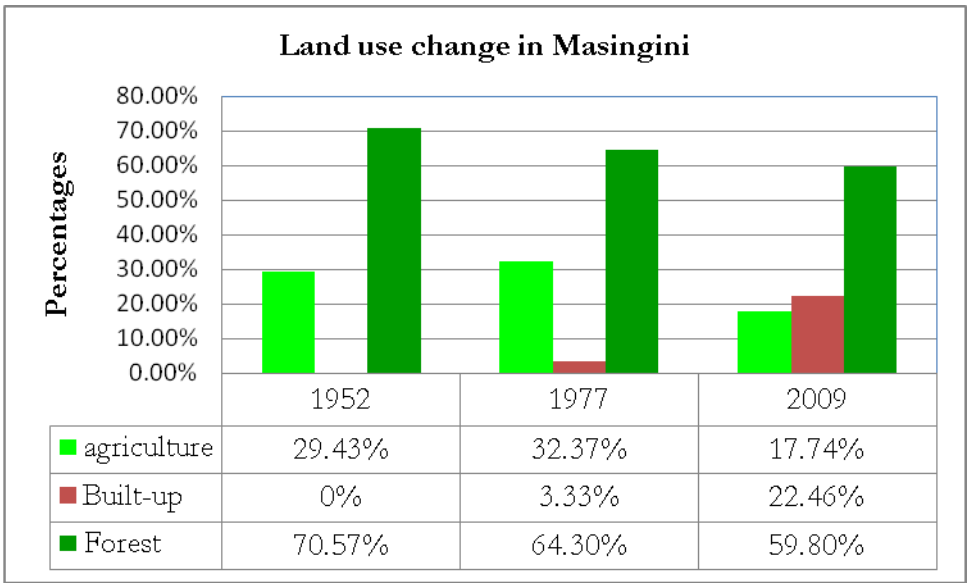
Changes in land use are the direct and indirect consequences of human actions to secure essential resources and reflect how and to what extent human responds to meet changing needs or adapt to the changing environment. Land use changes and the consequent changes in land cover characteristics are readily observable in Masingini forest landscape. The area is facing a growing problem of urban sprawl, loss of vegetation (forest), open space and general decline of wildlife habitats. The public identifies these problems when they see residential activities, infrastructure and commercial development replacing land around them. The geographical understanding of land use changes in Masingini area is a key aspect in conflict identification. By analysing a temporal spatial pattern, rates of change and trends can provide insights into how Masingini forest reserve and its surrounding settlements have developed under varying social, economic and environmental conditions.

5.3.1. Spatial pattern of land use change

Spatial pattern of land use change have occurred across all the sites visited during fieldwork in Masingini area over the past 50 years characterised by increasing encroachment of the forest area and management of water sources. The pattern has occurred at a very uneven pace across the area depending on historical condition and varying driving forces. The participatory mapping approach described in chapter 4-section 4.2.4 revealed important land use changes conversion that can be summarised as follows;

- An expansion of agricultural land into forest land
- An expansion of settlement into forest area and its water catchment zone
- Maintenance of natural vegetation in Masingini forest land
- An expansion of settlement into agricultural land

The analysis of land use change were based on the interpretation of the land cover and land use pattern from the vertical aerial photographs of 1952, and 1977 as well as the Land sat imagery of 2009 described in chapter 4 . The main land use changes and the extent of changes are shown in figure 5-3 below and are mostly based on forest and agricultural land.



	1952	1977	2009
agriculture	29.43%	32.37%	17.74%
Built-up	0%	3.33%	22.46%
Forest	70.57%	64.30%	59.80%

Figure 5-3: Land use changes in a study area

From the figure above, most of the forest and agricultural land had been slightly declined during the course of decades. In 1977 the proportion of forest land was 64.30%and by 2009 was 59.80%. Similarly the proportional of built up has increased from 3.33% in 1977 to 22.46% in 2009. Furthermore agricultural land has decreased from 32.37% in 1977 to 17.74% in 2009. However the analysis also shows that the reserve was mainly used for agriculture and forest activities in 1952 with little or no permanent buildings thus regarded as negligible even if they were there. This conforms with the knowledge of local people during the participatory transect walk and focus group discussion whereby participants pointed out that during the colonial period the Masingini forest reserve was only used for agricultural purposes where crops such as cassava, bananas and cloves were grown and no permanent buildings existed.

The increase of built-up area in the forest reserve is because of the conversion of agriculture and forest land as well as the encroachment of the water source preservation area such as Bububu and Mtoni springs. The unplanned expansion of settlements with consequent use of pit latrines is seriously threatening the quality and quantity of water produced. The use of pit latrines in these areas is already causing water pollution and threatening the suitability of water for domestic uses. This was observed during the ground truth exercises. Although some agricultural activities and take place within the surrounding communities they take place on lands already earmarked conservations areas. A typical remarks was given by the farmer at Kianga Shehia who said"

"*When I first settled here thirty (30) years from Pemba Island, all the places were forest and farm lands but has been converted to residential land with building sprinkling all within a short time. People move from all over the Island to build in this area making land very expensive and more difficulty to get a place to farming".*

The remark above from the farmer implies that land use changes in the area are influenced by population growth through in-migration. The household interviews in table 5-5 revealed that 64% of the people living in the communities surrounding the Masingini forest reserve are immigrant from different parts of Zanzibar and the Tanzania mainland, whereas 36% are indigenous residence born and raised in the area.

Table5-5: Originality of residence in Masingini area

Originality of residence in Masingini area		
		Percent
Valid	Indigenous	36.0
	Immigrant	64.0
	Total	100.0

Source: this research 2010, Zanzibar

The spatial distribution of land uses changes shown in figure 5-4, shows that rapid land uses changes is in the Western side of the study area where settlement development is increasing during the course of decades threatening the sustainability of forest and water resources in the area. This is because the western side is close to the Indian Ocean and the Zanzibar city (only 10km) where urban activities are carried. The eastern side of the area is occupied by farms and agro-forestry.

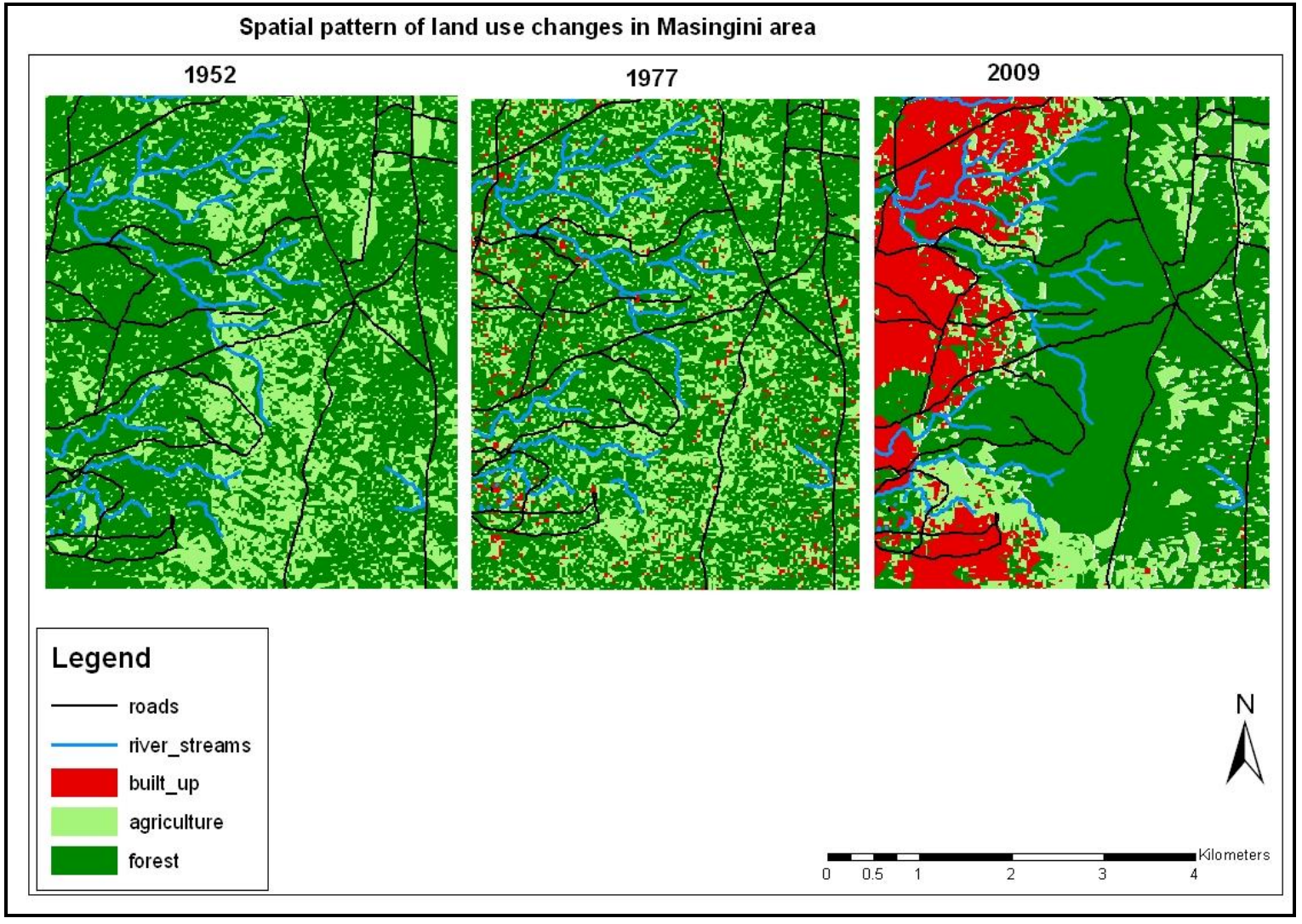


Figure 5-4: Spatial distribution of land use changes in Masingini forest area

5.3.2. Factors for land use change

Population growth and market development in all the communities surrounding the reserve have created mounting competitions of land resource. According to populations census the growth rate of 9.3 in the West District has added pressure on land and the forest resource. Local people during the household survey also reveals the same that population growth has led to various changes in Masingini forest, however they added other factors for changes in Masingini forest reserve such as introduction of conservations by laws and policies for forest and water sources as shown in the figure 5-5 below. The household interview depicts population growth as the main factor for land use change followed by conservation policies in water sources and forest resource.

Farm expansion for was another factor for land use change. Respondents on farm expansion reveal that existing of borrowed land as tenure encourages them to expand their farms so as to have more plots for subdivision and thus maximize profit through borrowed land. On conservation policies it was added that historically the Masingini forest was mainly used for agriculture and forest and that people had access to tree cutting for fuel wood, timber, and easy extract medicinal plants, introduction of policies have led to change of land use as access is restricted to some extent. The change in the management of the forest and its catchments have created conflicts between local people and the forest management authority as well as the water authority as explained in section 5.2.4.

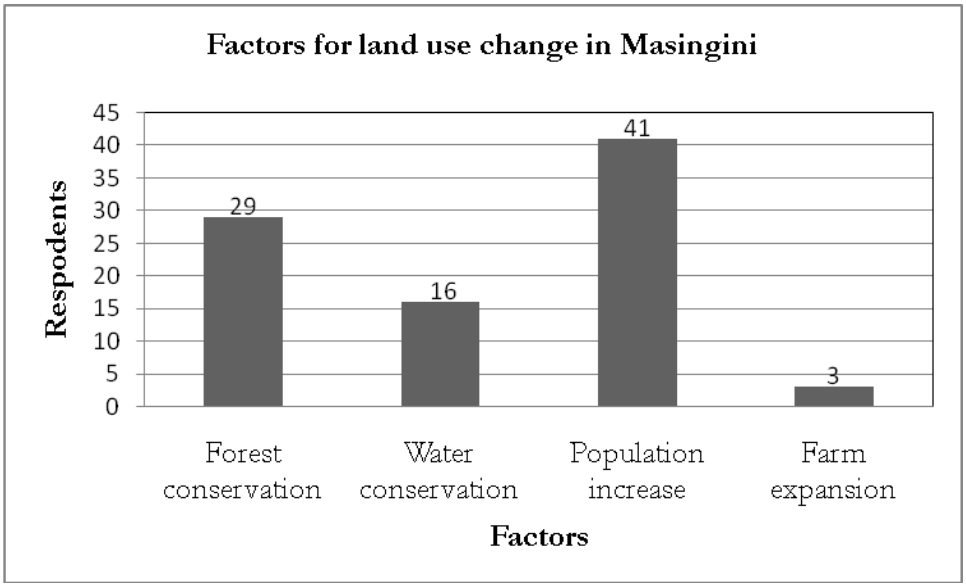


Figure 5-5: Households response on factors for land use change in Masingini forest

5.3.3. Decision on land use changes

Changes in land use should be identified and analysed and disseminated for proper land use planning and sustainable natural resources management with participatory approaches. Local people are in position to know more on changes in land use than experts who in most cases are outsiders. In Masingini forest area, centralised knowledge, urban influences and values have predominated over the years and often failing to recognise the knowledge which local people possess. According to respondents of household interview shown in figure 5-6 below, changes in land use has been done to a great extent with little or no participation.

The analysis shows that participation has been little exercised in forest resources than in water source preservation. From the interviews and focus group discussion it was also found that the little participation is because of afforestation and tree planting campaign in the forest reserve where by local people in collaboration with the government plant trees. In water resource preservation, community

involvement in conservation is not yet practised as the responsible authority (i.e. ZAWA) have employed guards to protect water sources and thus neglecting the capability of local people.

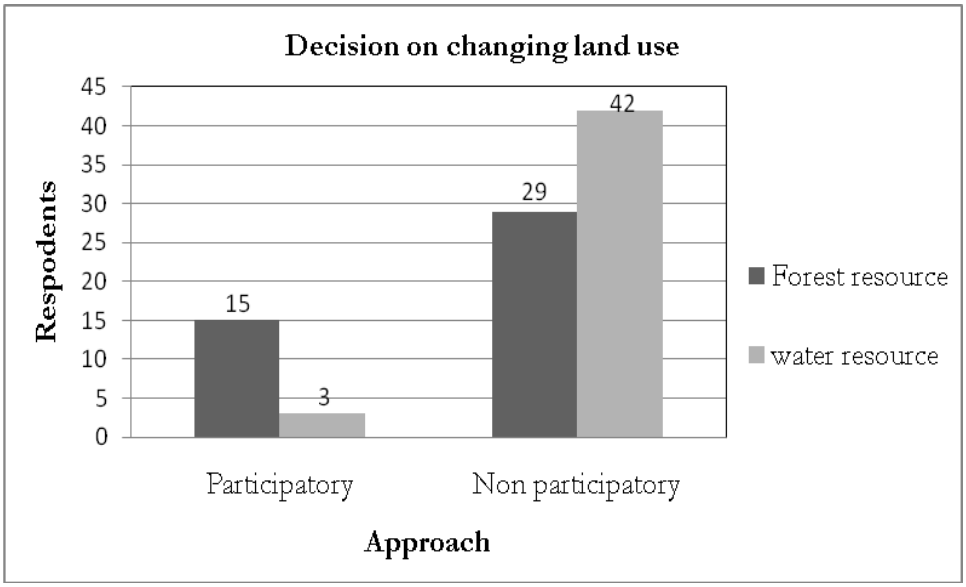


Figure 5-6: Community involvement in decision making for conservation

5.3.4. Conflicting areas at Masingini forest reserve

Through community mapping, geo-coded transect walk, field observation and interviews as explained in chapter 4, conflicting areas and their causes were identified. Limited access to forest resource due to government orders on conservations, conflicting land uses such as forest reserve conservations, water source conservations, settlement development and farm expansion towards the forest reserve are the major conflicting issues. The visualization of conflicting areas presented in figure 5-7 gives only some idea of the potential maps to be. The emphasis is put on trying to find spatial indicators with known physical dimension (points, lines or areas) which could represent some aspects of the identified conflicts.

To approach the exercise so as to identify spatial indicator of the conflicts and its source, the information analysed in section 5.2 (conflict identification) was recovered. The conflicts were decomposed into components that were revealed through focus group discussions and during the interviews with different expertise representing various stakeholder groups (Table 5-6).In this way it is possible to visualize the conflict areas or areas experiencing land use conflict.

Table 5-6: Decomposition of conflicts into components and indicators

Conflict number	Conflict parties	Component of the conflicts according to interview	Spatial indicator of the component
1	settlement developer vs. Zanzibar water authority	water springs and water source encroachment	Water source dried and disappeared and polluted
2	Small farmers vs. Forest department	Destruction of forest edges	Forest disappeared
3	Small farmers vs. Government	Land utilization(change of agricultural land into residential activities)	Agricultural land decreases, water source pollution
4	Settlement developers vs Forest department	Land utilization, and destruction of forest land	Forest disappeared

From figure 5-7 below it can be seen that some of the areas experiences all the conflicts which are; conflict over water source encroachment by settlement; conflict over forest reserve encroachment by farmers and settlement developers as well conflict on change of agricultural land to other urban uses shown in the table 5-6 as conflict number 1, 2, 3 and 4. The interviews and focus group discussion conducted reveal that Mwanyanya, Mtoni Kidatu and Kianga communities experiences the mentioned land use conflicts.

Illegal settlement development to water source and forest land, illegal faming to forest land and change of agricultural land into other urban uses is much practised in Mtoni Kidatu, Mwanyanya and Kianga leading to all the conflict numbers shown by conflict 1, 2, 3, and 4. This forces government authorities such as Zanzibar Municipal Council(ZMC), West District Council(WDC), Department of Cash crops, Fruits and Forest(DCCFF) through the forest department as well as Zanzibar Water Authority(ZAWA) to frequent release legal notes of evicting these encroachers who claimed to have right of possessing the land.

Ndunduke area experiences only a water source related conflict whereby existing natural springs are dried up because of encroachment caused by residential activities (conflict number 1). Another area that experiences frequent conflict is Dole-Masingini; the farmers are in conflict with the forest authority because of forest edge clearance in order to create space for agricultural land but also in demand for firewood (conflict number 2). Most of water source related conflicts are more experienced in Mwanyanya and Mtoni Kidatu communities whereby river stream of Bububu and Mtopepo passes by.

The land use conflict is also in areas where agricultural farms are converted into residential areas. The increased demand for building lots and informal land market has given rise to spontaneous development and undesirable intrusion by urban related uses onto the agricultural and forest land. Mtoni and Mtoni Kidatu communities are good example whereby conversion of agricultural land into residential activities as well as clearing of forest edges is done by local people. This has resulted to the conflict between settlement developer and the local government but also with the forest management authority (Conflict number 3, 4).

It can then be deduced that most of the conflicts occurring in areas shown in figure 5-7 are because of conflicting goals and interest disagreement. Most of respondents during interviews and focus group discussions admit that Masingini forest reserve and its catchment areas have been announced as one of the protected area since the colonial period and that agricultural and settlement development near the forest reserve or forest edges were prohibited but due to changes in population, land market, economic factors, government policy and environmental conditions such as climate change, local people are finding different alternatives to ensure their livelihood while the government through the management authorities is trying to protect and conserve the resources for sustainable development in accordance to national and international laws, policies and regulations.

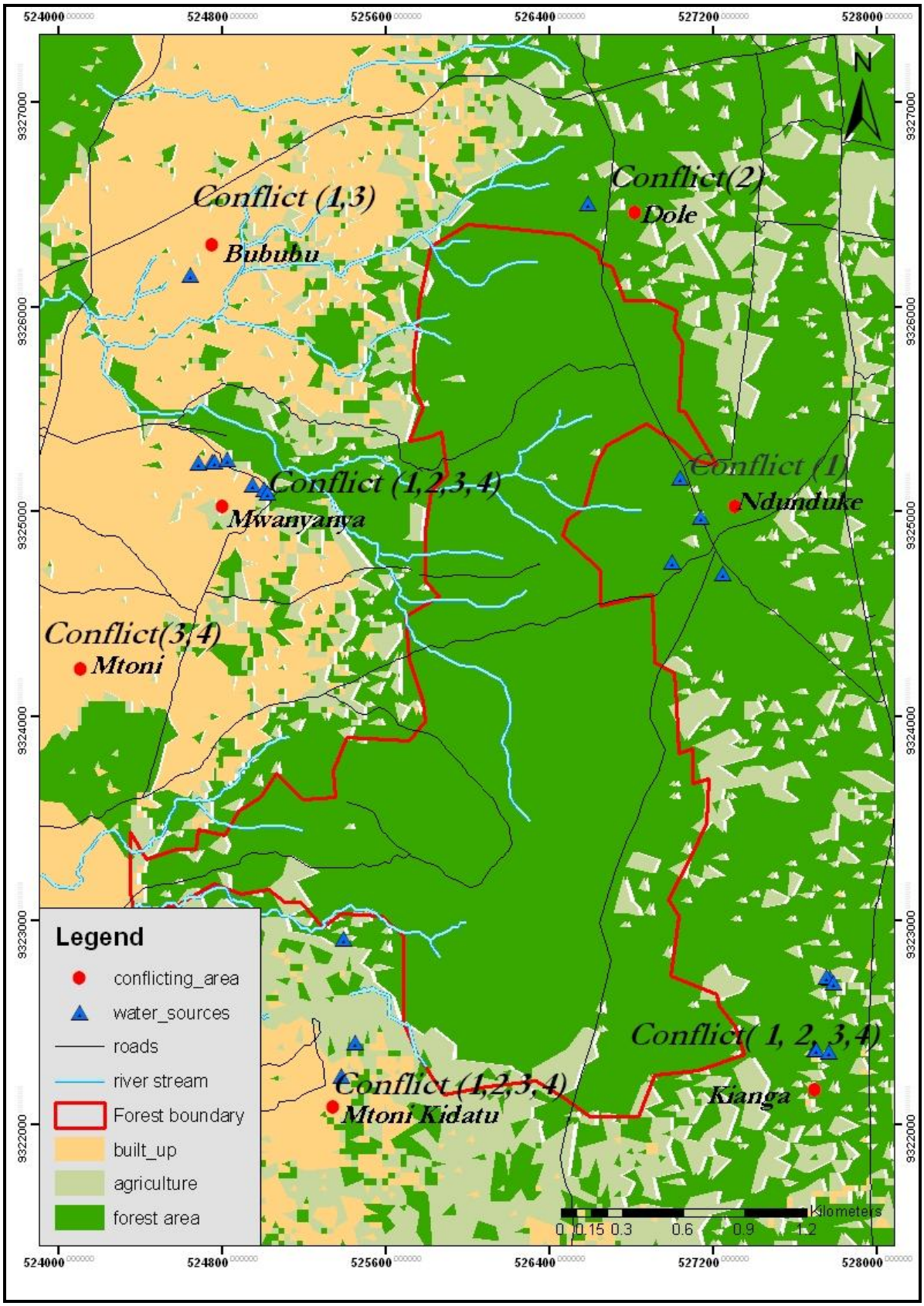


Figure 5-7: Conflicting areas in Masingini forest

5.3.5. Causes and effects of encroachment the forest reserves

The main provider of plots and services in the urban development area in Zanzibar is the central government however funds, man power and equipment for urban development are not sufficient. As a result the government has low capacity to acquire land and service it and allocate for urban developments. According to household interview, 56.2% of the respondents identified the shortage of surveyed plots as the main cause of encroachment, 28.1% pointed out as due to weakness of the responsible authorities in enforcing the existing bylaws. 12.4% said because people want easy access to water source and 3.3% due to lack of education (figure 5-8).

Destruction of the forest through illegal development had been creating a numerous of problem to the society including water shortage, fuel wood shortage, environmental degradation and loss of biodiversity. From the focus group discussion participants pointed out, water shortage as the main effect of Masingini forest encroachment followed by shortage of fuel wood as most of the inhabitants depend on it as a source of energy for daily human consumptions. This implies that since the encroachment of the forest reserve by settlement expansion is creating numerous effects to people's lives, protecting the forest from these alternatives land use claims are important and inevitable task.

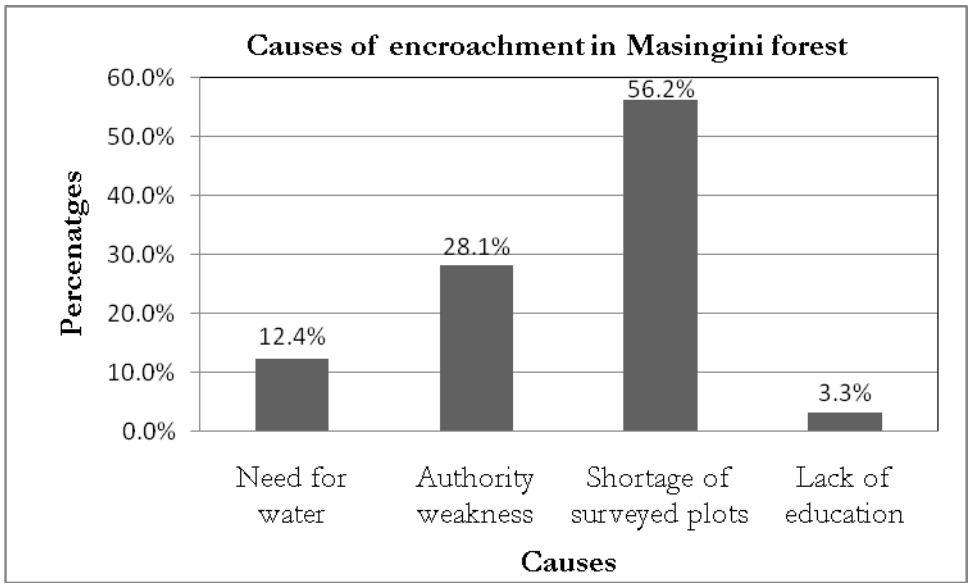


Figure 5-8: Household response on causes of encroachment in Masingini forest

5.4. Spatial pattern of conflict

Visualization of spatial pattern conflict can be used to further understand the conflict and the clear idea of spatial dimensions. A conflict map help to understand complexity of reality by decomposing some aspects of that reality in spatial reference (Boix Fayos, 2002). Simple visualization of satellite imagery, high resolution aerial photograph and the local spatial knowledge derived through interviews, participatory mapping and focus group discussions shows the most obvious causes of spatial pattern of conflict in a study area. The spatial patterns of the conflict that are visible are strongly influenced by infrastructure and climatic conditions and are occurring towards the areas where multiple competitions of land resource exists such as agricultural, forest, and water sources.

i) Towards the water sources

The conflict occurs in urbanised areas where human activities are concentrated towards the attracting water sources such as natural springs and constructed wells. In a study area both natural springs and constructed wells are used as sources of water for human consumptions. The pattern of conflicts spatially follows the water resource whereby settlement expansion degrades water sources. Loss of vegetation around water sources reduces water flow while poor disposal of liquid and solid wastes causes water pollution. It was found that water related conflict is largely occurring in the government gazetted water springs of Bububu and Mtoni (Box 2). In these springs the encroachment by settlement development is occurring within 200m against the water regulation Act 2007 that prohibits such extent.

ii) Within acre plots (TAP)

Competition between the farmers, buyers and the government has led to exerting of the conflicts around the agricultural fields as the TAP commonly known by local people as "eka" designed purposely for agricultural activities are turned into residential activities.

The conflict is spatially distributed in all areas designated as TAP across all the communities surrounding the Masingini forest reserve. The change of agricultural land to other urban uses has and is creating frequent conflict within these areas from the government as the decrease in agricultural land has in turn result in shortage of food though no exactly records was obtained concerning the production of agricultural products around Masingini area.

iii) Around forest edges

The conflicts in Masingini area is also flowing towards the forest edges in which illegal land grabbers clears the forest land to create space for farm expansion and for residential activities. The spatial pattern can be observed in all forest edges. Furthermore, the forces are more from urban area towards the forest edges, whereby areas such as Mtoni Kidatu, Kianga, Mwanyanya, and Bububu which are close to town shows high pattern of conflict through encroachment. From the focus group discussions and interviews it was observed that the exactly forest boundaries are not known by local people let alone accepted by them.

To approach the problem of visualization of the spatial pattern of conflicts in a study area, it was important to determine what we want to show and how. The study aimed to answer two questions in this area; first questions were, are the conflict flowing in the same direction between two areas or are they within the same area? The second question was, how much are these conflicts affecting the living of people's lives? To represent the pattern of the conflict spatially, the researcher only extracts two spatial dimensions namely the direction dimensions; which tries to answer the questions that the conflicts is happening in the same direction following the competing resources or and the intensity dimensions; shown by the thickness of the arrow representing how strong the conflict is and affects people's lives in the area (Figure 5-9).

Box 2: Bububu spring

The spring is situated 3km east of Bububu town centre which is in western sea shore. The yield varies with rainy season, the average being about 2300$m^{3/day}$ supplied through the gravity main and 1440$m^{3/day}$ from secondary booster pipelines. The encroachment towards the spring is currently within 200m on the southern part of the valley. In 2007, ZAWA tried to enforce the protection of the conservation area and a number of houses were demolished however in a mean time the same houses already been rebuilt. Therefore serious efforts need to be made to protect this very important spring as the amount of water produced is sufficient to meet the demand of 40,000 people. Source(ZAWA, 2008)

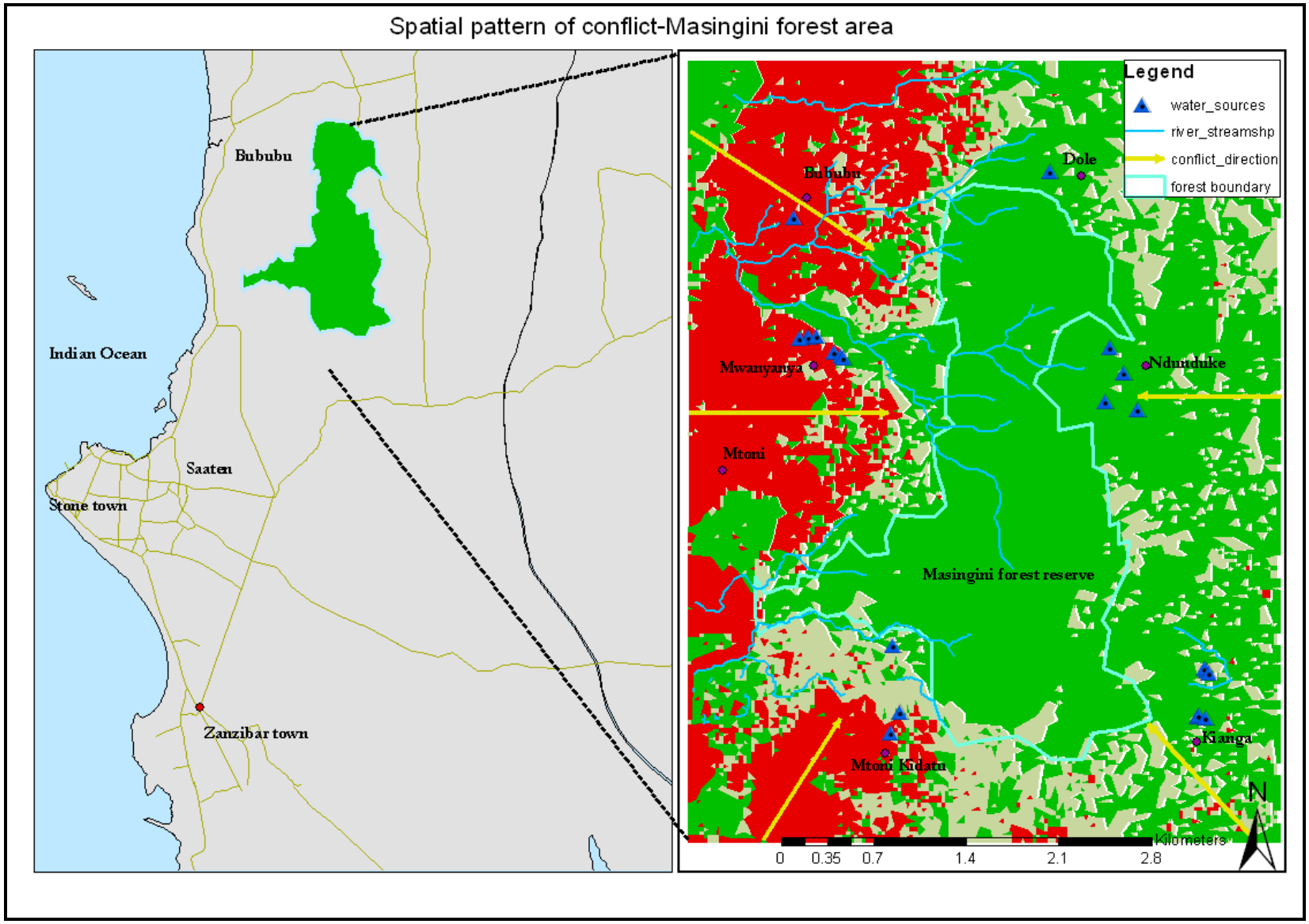


Figure5-9: Spatial pattern of conflict in Masingini forest reserve

From figure 5-9 the direction of arrows originates from urbanised area (i.e. areas close to towns or residential communities such as Stone town, Bububu, Mwanyanya, Mtoni Kidatu, Kianga, Mtoni, Ndunduke and Dole as described in section 5.3.4 as well from infrastructure pattern such as roads and other water utilities. The spatial pattern of the conflict is towards water and forest resources however some of the conflict are happening within agricultural land and thus are not shown spatially as the researcher did not get exactly original of such occurrences.

It can be seen that the conflicts are spatially distributed mostly in the western side of the study area which is close Zanzibar town (about 10 km). Proximity to Zanzibar town influences both rural and urban people to find alternative to land uses that will attract the opportunities available and meet their long term goals-make profit through sell of plots for residential development and rent of farm land for cultivation because of existence of borrowed land as tenure borrowed land tenure.

Through the focus group discussion and information derived from expert interview, it was found that, the land use conflicts in a study are happening in the same direction among the communities surrounding the forest reserve, and that competition for land is the main source of such pattern however it was also identified that location of conflicts are far from where other stakeholders reside. The household survey show that 43.8% of respondents live more than 1km from Masingini conflicting area however they are involved directly to the conflict as some of them have buildings and farms in the area.

The thickness of the arrows shown in figure 5-9 above reveal that the conflicts which are spatially distributed towards the water sources are regarded by local people as intense exerting more effects to their daily lives. As identified through the field observation, most of the houses constructed 200m of the water sources have been marked "X" meaning that demolition is to follow. This means the developers can not continue with other development activities until the problem of eviction is resolved.

It was also identified that conflict around forest edges affects local people especially the farmers and settlement developers. However, conflict over agricultural land conversion to other land uses was identified as exerting little effects to local people compared to the former. The reason given was that probability to be punished by the government is minimal as most of the TAP- government allocated farm lands have lost their tenure and becomes urban land.

6. ANALYSING THE DRIVERS OF LAND USE CONFLICT

This chapter discusses the drivers that influences land use conflict and their potential impacts in land use changes as explained in the previous chapter. The framework for assessing these drivers is introduced in chapter 2, 4, 5 and reflected in this chapter. It also discusses the challenges of participatory approach in understanding and analysing land use conflict. The participatory approach exercised in chapter five (5) to elicit local spatial knowledge on land use conflict identified three main types of conflict existing in the study area; conflict over water source encroachment; conflict over forest reserve encroachment and conflict over agricultural land conversion. These conflicts are results of changes in land use which have been driven by adverse framework of political, socio-economic, institutions, demography, environmental and psychological drivers which operate at local, regional and national levels as identified by Wehrmann (2008). Based on literature information, and result of the analysis of the field work, the direct causes and underlying drivers of land use conflict are presented.

6.1. Underlying drivers of land use conflicts

The unsustainable land use change are mostly driven by both internal and external effects and these give incentives to violate regulations and cause pressure on land use to act in a way that is not optimizing the well-being of the society (Loehr, 2010) thus leading to land use conflict .The changes are also promoted by a closely connected groups of powerful interests. The conversion of land uses described in section 5.3.1 has been influenced with various driving forces prevailing in at Masingini forest reserve and Zanzibar as a whole. The land use change reflects an evolution of the Zanzibar national economic as farm crops, water needs, forest products, income opportunities and risks have evolved and households level of resources such as land and labour availability have changed.

Decisions for land use change are generally taken when an opportunity is seen that is likely to satisfy long term motivations. These motivations are influenced by psychological personal drivers such as values, behaviour, interest and circumstances which are then directly or indirectly influenced by a range of external drivers. These drivers are outside the control of land owners.

In order to get a better understanding of the factors that influence land use conflict, in Zanzibar the schematic model showing the preliminary causes and the underlying drivers is adopted from Geist & Lambin,(2002) as shown in figure 6-1 to suit the discussions of results of this study. The preliminary causes of land use conflicts are activities and actors that directly change the land use such as infrastructure extension, agriculture expansion, fuel and pole wood extraction from the forest, and settlement development through residential expansion while the underlying drivers such as demography, socio-economic, policy & institutions, socio-cultural and environmental are fundamental pressure that underpin the preliminary causes (Geist & Lambin, 2002).

For the case of Zanzibar and particularly Masingini forest reserve and its surrounding communities five main drivers identified from the focus group discussion and interviews explain the source of land use conflict in a study area. These are demography, economic, policy & institutions, environmental and psychological factors. These factors interact with each other, with complementary and tensions to create the evolving of new system in Zanzibar. They are influenced and shaped by both national and international economic and political context operating at local, regional and national level.

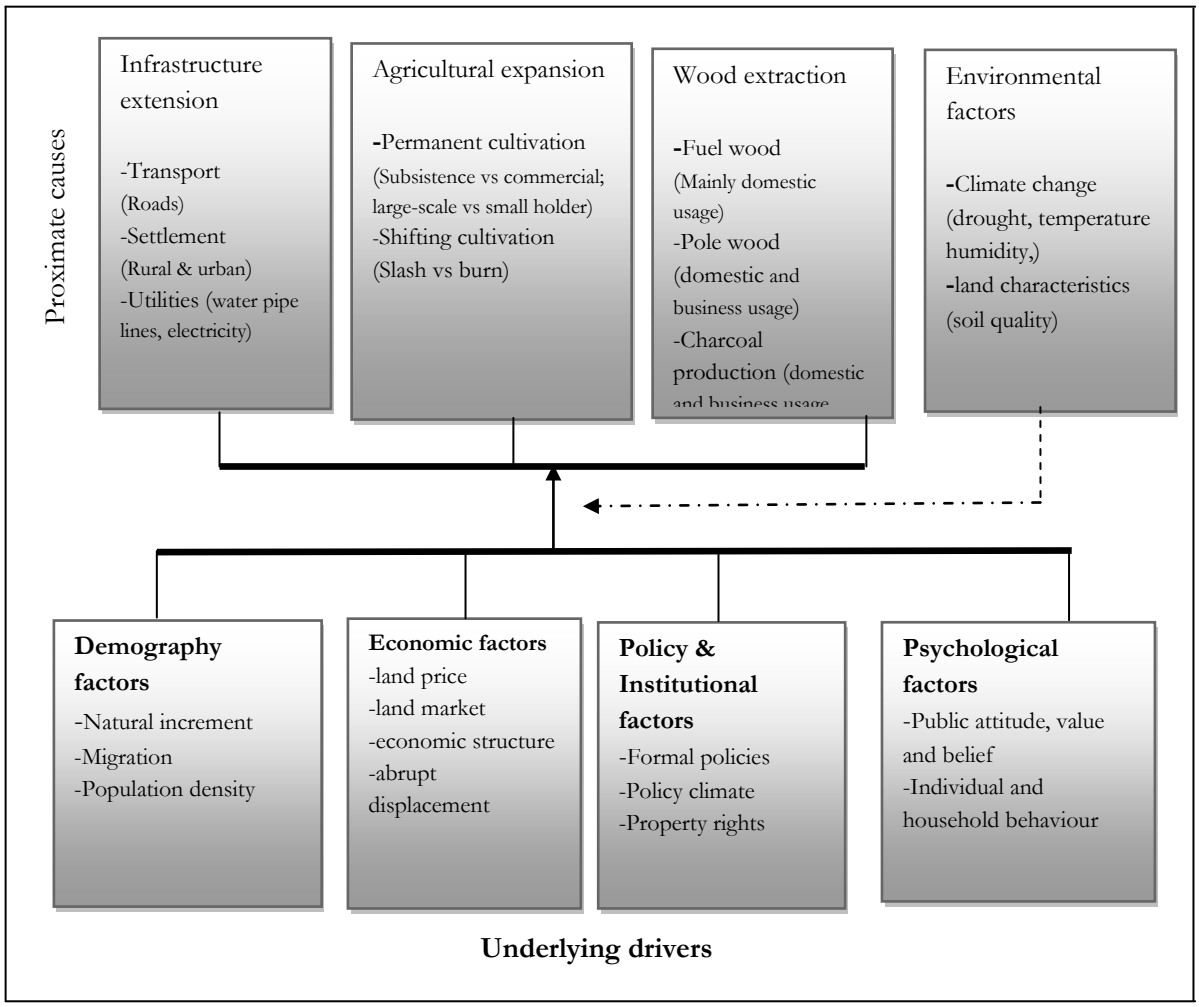


Figure 6-1: Underlying driving forces for land use conflict in Zanzibar

6.1.1. Demography drivers

As an underlying driver of land use conflict demography can best described with population growth and population density. The population pressure may have two main sources; natural growth and migration. Zanzibar population has grown from 476111 people in 1978 to over 1.193 million in 2009 which presents a growth rate of 3.1% per year. The rapid rate of population growth has reduced land availability per capita and increased population pressure and this has led to land use intensification and to out migration. First, short distance out migration from the communities surrounding the forest reserve, moving near the forest reserve then, longer distance out migration of people outside the West District and moving towards it to search for land in remote areas or urban fringe as shown by the results.

The demographic change creates pressure of new housing in peri –urban and rural areas thus increasing competitions for land leading to the transfer of land out of agriculture, water source conservation and forest respectively. This has seen bringing economic benefits to the seller, but creating land use conflict between land owner, developers and the institutions responsible for the protection of the forest and water sources (i.e. ZAWA, and DCCFF). The same was identified by Zondag & Borsboom (2009), that demographic changes results in need for more urban land which is won through conversion of land uses such as agricultural land, forest land and other land uses mainly affecting crop farming and forest resources.

Population growth is linked to land use conflict by the additional land that is required for living, food production and resource extraction (proximate causes of land use change). The migration of people affects

forest land directly (by removing forest cover from establishment) and indirectly (by converting forest and agricultural land), because may be the owned land produces insufficient income for attaining high standard of living.

6.1.2. Economic drivers

The GDP per capita as one of the indicators of economic growth for Zanzibar has been increasing slightly over the past five years (section 3.4). This economic growth is associated with increased demand for goods which in turn spurs the demand for natural resources in particular timber and fuel woods. The change of economic system in Zanzibar in 1984 through the introduction of free market economy lead more people to move to Zanzibar town. Migration into Zanzibar town with limited capacity of the government to provide building plots caused a demand for plots which could not be met forcing people to find alternatives like encroaching in water and forest resources thus leading to the land use conflict. On agriculture land, the price, marketability of clove commodity, unavailability of agricultural inputs such as insecticides and technologies has led to general pattern of land use change in Masingini. The impacts of these had led to low production of clove crop forcing the peasant farmers to diversify their livelihood by engaging in eka plot subdivision and land rent to settlement developers as a way of increasing income. The same situation was identified by Scholz (2008) who find that the price of land in Zanzibar are the highest due to informality of the land market prices which are not transparent.

The cost of land is the fundamental driver for any land use change in Zanzibar. It is strongly linked to productivity (residential need) and to the willingness of communities to forego productivity (protection need). The growing and attractive markets that have been established for forest plantation grown timber have also attracted farmers due to the increase in land prices for areas with soil, rainfall and altitude suitable for plantation forest development. As a result the natural forest land is cleared to create space for farming and forest plantation. According to Kombo (2010), approximately 1000ha of forest land are cleared annually in Zanzibar.

6.1.3. Policy and Institutions drivers

Local and national policies influence the incentives to develop land as the value of agricultural or forest land in undeveloped uses depends on the price of farm and forest products respectively. If farm or forest resource products falls due to changes in the management programs, the land owners may be inclined to convent their land to other uses which may be incompatible with other interests. According to Zondag & Borsboom (2009) policies can effect land use directly (e.g. spatial policies) or via driving forces (subsidies on new technologies).

Policy on agriculture in Zanzibar encouraged the introductions of cash crops such as cloves and coconut for export market. This led to clearance of large area of Masingini forest area and spread of agriculture in 1977. The results from the image classification of land use changes show that agriculture development increased from 29.43% in 1952 to 32.37% in 1977. However the slightly decrease is seen in 2009 where only agricultural land occupied 59.8% in Masingini area. This may be caused by low crop prices and inadequate access for farm inputs such as insecticides forcing the small holder farmers to diversify from agricultural production.

The rather unrealistic planning standards and building codes also led to changes in land use as they created problem of their own. Ali & Sulaiman (2006) note that in the late 1970's and early 1980's , one of the condition for building a house in a planned area was that, the developers must have T-shillings 500,000(approximately 300 USD) to access the surveyed plot and by that time it was impossible for poor people to afford. This condition put many people off from attempting to build houses in planned areas as they could not afford it. The only option was to invade the urban fringe and change their eka plots to other urban uses thus creating conflict with existing land uses.

The extension of infrastructure which requires the clearing of land and through which deeper access into forest is given shows another proximate direct cause of land use change. The easy access through roads and utilities such as waterlines results in movement of timber logging and agricultural activities into the forest land without suffering from more difficulties and expensive transportation of timber and agricultural goods to the market in Zanzibar town. Likewise the local people have easier access to previously remote areas on which they can develop residential activities as in case of Masingini forest reserve area.

According to the 1982 Master plan, there are communities and natural resources which are within the planning area of ZMC but within the boundary of WDC. The Masingini forest reserve is a good example. This particular situation has created difficulties in establishing and enforcing sound development control.. Contradictions occur as to which authority should provide permits or control development. To the large extent the atmosphere of confusions have been resulting to the change of land use in the forest land while every institution waited for another to control or stop the on-going illegal development and clearing of forest land until it become rather too late to act as shown by the existing situation.

Like any other countries in Africa, Zanzibar has for a long time employed highly centralised management strategy that has generally conferred control over land and other natural resources to government departments. Land, forest and water resources in Zanzibar are controlled and administered by separate government agencies at different levels who formulate their own control measure and development plans based on their own control mechanism however existing of poor coordination and integrated development plans has led to change of land uses leading to land use conflict. This was also identified by COLE (1995) noting that the planning and management of urban development in Zanzibar as a whole is split under different badly coordinated departments. In the study area the development control is split among, ZMC, WDC, DCCFF and ZAWA which lack communication, coordination and cooperation in enforcement of development control and protection of the resources.

The results of the analysis show that, authority weakness in enforcing the laws in forest as causes of forest destruction through change of its use. This show that local people are aware of existing laws however there is no enforcement of laws on conservation and protection areas. The United Nations (1992) statement on environment declares that appropriate measure should be taken by governments to protect forest resources and forest land against harmful pollution, encroachment, fires in order to maintain their multiple values. This is not the case of Masingini forest reserve still people are able to access it freely and clear land. The Water Regulation Act 2007 section(6) states that no human settlement shall be located within 500m upstream of the water sources and the Act continue on section 86 that any settlement developer within 200m from the source is guilty of offence and is liable to fine equivalent to not less than 50 US Dollar. However this law is not known by local people as the enforcement of law is weak and non - existence to those who illegally changes the land use by developing within the water catchment areas thus causing the land use conflict.

6.1.4. Psychological drivers

Any land use change that led to land use conflict is primarily result of a business decision by the land owner for agricultural or housing business. Decision to change is generally taken when opportunity is seen that is likely to satisfy or dissatisfy long term motivations (Figure 6-2). These motivations can be influenced by personal drivers such as circumstances (emotional needs& materials needs), behaviours and values (attitude and interest) as described by Wehrmann (2008) in section 2.2 . The opportunities can be those supplied by an individual's (skills, resource ownership and confidence), and external drivers (supplied by government, business, NGO's, and wider environment (including nature, population growth, socio-economic trend & community expectations).

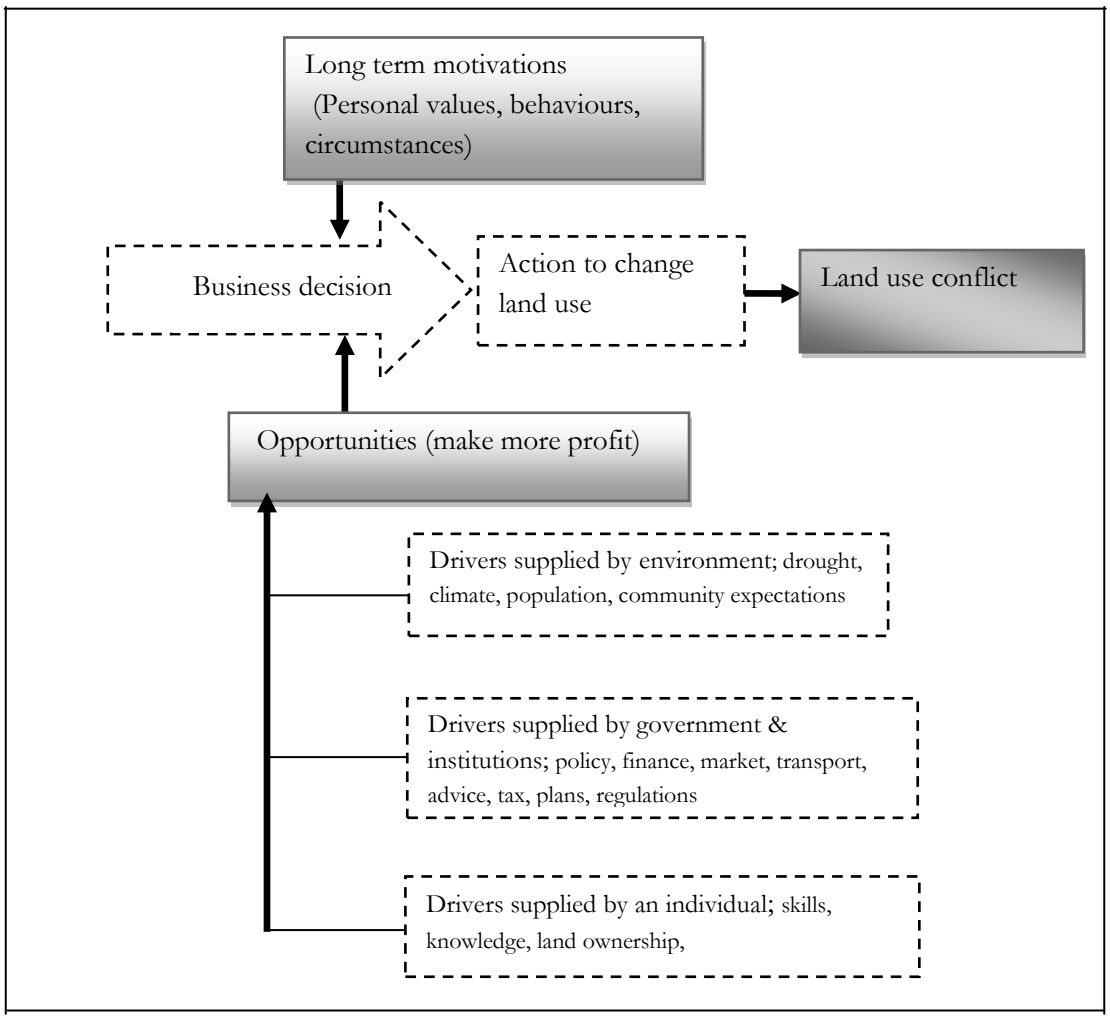


Figure 6-2: Influence of psychological drivers on land use conflict

In Zanzibar, and particularly Masingini area , land use conflict is a political issues as those who illegally grab the by changing its designed use are politically connected and yet both the grabbers and those losing land have similar political inclination (Kamata, et al., 2009).The increase of investments especially tourism in coastal areas has resulted in increasing land pressure due to demand for hotel and residential development. This has led to individual people to use this opportunity to change their TAP plots to residential activities. Furthermore, inadequate conservation practices for surface water runoff, inadequate community sensitization about water sources protection, inadequate enforcement of law to protect water sources, lack of title deeds for the gazetted catchments of Bububu and Mtoni as well as inadequate demarcations and fencing of the legally announced water conservation sources as stipulated in the laws by ZAWA has created an opportunity for both land owners and land seekers to encroach the resource by changing the land uses that results into land use conflict.

The RGZ (2004) reveal that recently large hotel complex and their construction has introduced growing need for building poles and for some people this has meant improved opportunities for employment pushing them to relocate in land towards more abundant forests and thus encroaching the forest for residential and forest resource extraction. The results of the survey also show that destruction of Masingini forest lands and its catchment is caused by lack of surveyed plots whereby people could not afford plots closer to town and plots in the outskirts of town like Masingini area is cheaper. Furthermore plots were easier to hold off because there were no available spaces for new plots closer to Zanzibar town.

The department of survey and urban planning receives 1500-2000 applications per year for residential surveyed plots but the government is only able to survey and register 400-500 plots per year (urban planner September 2010) personal interview during field work. This shows that the demand for building lots is higher than the supply and hence gives rise to spontaneous development and undesirable intrusion to forest and agricultural land.

As shown by the result of the survey, the land use conflict is following the infrastructure development such as roads, and utilities and thus local people use these infrastructure developments as opportunity for changing land uses. The expansion of very small hand cultivated farms, some in river beds/water sources and forest land reflects the people's ability to claim land under familiar tenure regime and gain entry into agricultural on their own account to profit from improved reliability of the transport for highly perishable products to urban market in Zanzibar town.

6.1.5. Environmental drivers

Climatic change influences land use change in the form of periodic drought, changing temperature and humidity that affects agricultural production. The average amount of rainfall in Zanzibar varies from 1000-2500mm/year while the temperature ranges between 17^0C and 40^0C. However in recent years it has experienced fluctuation of rainfall, particularly drought. The declining precipitation has resulted in the reduced rice production in the river valleys and other low areas as water availability is decreased. Also other conditions such crop diseases in clove and decline in soil fertility has caused farmers around Masingini area to change their cash crop agricultural plots to residential activities. This was observed during the focus group discussions at Kianga and Mtoni Kidatu whereby participants identified that decline of soil fertility in their area as among the major cause of changing agricultural land to other urban uses use leading to land use conflict. However the impacts of climate change on agriculture can be less if production is allowed to move in response to changing climate as some land that are not currently suitable for agriculture because of climate may become suitable in the future.

6.2. Relationship of the drivers on land use conflict

Most of the drivers described above interact with each other. Some interactions can be anticipated (e.g. agricultural expansion causing tension with environmental landscape and protection of the forest). For instance an environmental driver such as climate change may interact across all or some drivers including economic factors (limited capital market), policy and institutional framework (targets, regulations,) and psychological factors (individual and public attitudes and values). Apart from that one drivers may have an impacts to more than two direct causes of the land use change that leads to land use conflict. Agricultural expansion can be influenced not only by economic factors but also by personal psychological drivers such as the need to make more profit. The deforestation of the forest through fuel wood and timber extraction can also be influenced by more than one factors such as demography (need for constructing home), policy & institutions factors (weakness in regulation, tenure, policies of access)as well; as economic factors(profit through selling of pole or timber due to tourism development).

Settlement expansion in water sources and forest area may also be influenced by all drivers (demography, economic, policy, psychological and environment factors) as shown in figure 6-5. For example, the market economy of land as it is in Zanzibar have led to difficulty in requiring land legally in planned area while inadequate surveyed plots (institutional weaknesses) have caused the encroachment of water sources which is then also influenced by psychological desires to be recognised. In migration and natural population growth drives the expansion of residential activities to cater for the demand of the family.

Therefore the change of land uses leading to land use conflict cut across the drivers and that not only a single driver can be the source of land use conflict in a study area.

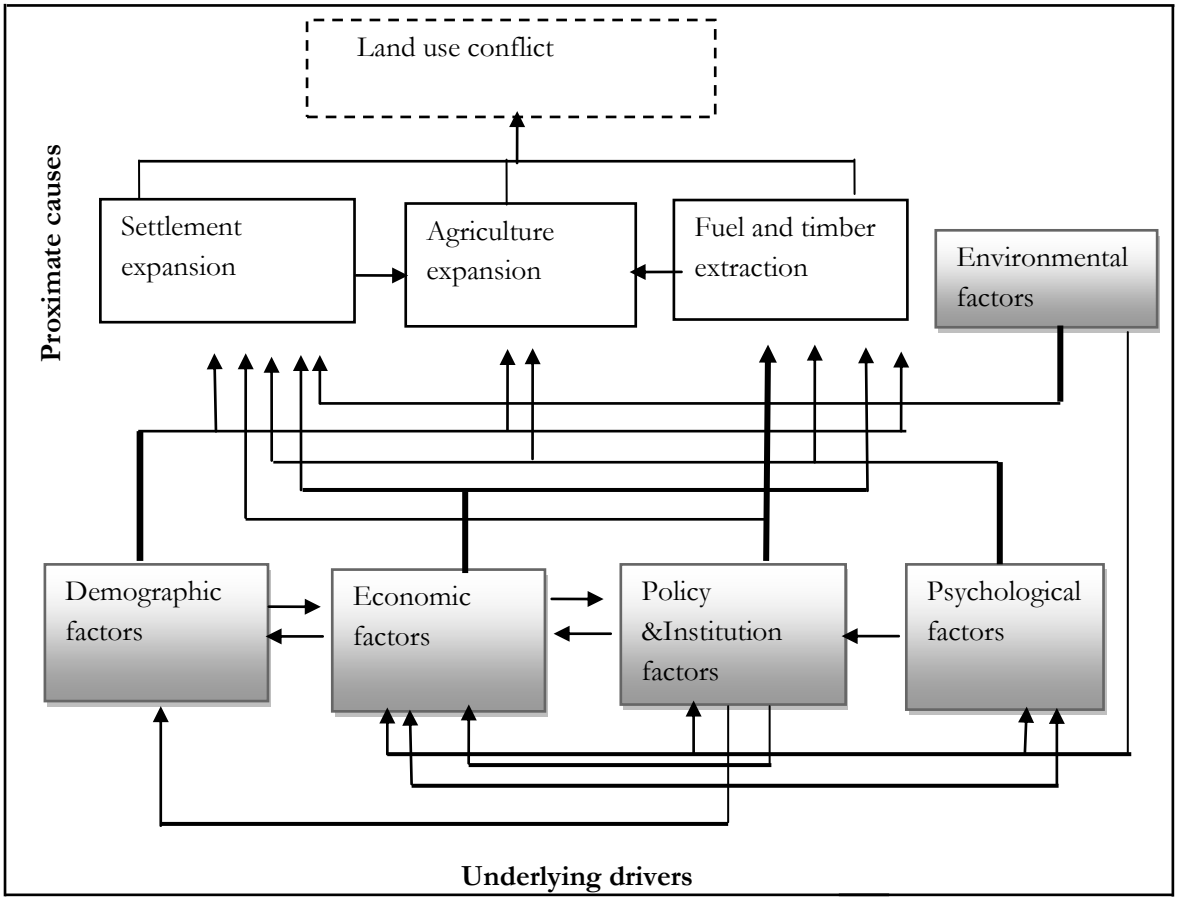


Figure 6-3: Causative pattern of drivers of land use conflict
Adapted from Geist & Lambin,(2002)

The above relationship of the drivers of land use conflict show that the drivers cut across all land uses in Masingini area in a positive or negative way and that cannot easily isolated. However the results of household survey and the focus group discussion show that policy & institutional drivers as well as demography driver are the main fundamental drivers of land use conflict in Masingini area. These drivers were noted as the main factors for land use changes (described in section 5.3. 2) in the study area and thus causing the ongoing land use conflict in Masingini area.

It can also be deduced that any of the drivers on its own or in combinations with other drivers can trigger land use conflicts if other circumstances are also favourable. The findings also show that the drivers can be controlled if the organisations that deal with land allocations, agricultural supply and forest products can create opportunities that satisfy long term motivations of local people. This is because most of the land use conflict in a study area is caused by lack of surveyed plots for residential development, fuel wood as energy source as well as income generation through production of quantity and quality crop products.

6.3. Challenges of participatory approaches in land use conflict

Although the potential benefits of participatory approaches in conflict identification are widely accepted (section 2.6), promoters of participatory action still face world of choices; which is the desired level of public and stakeholder involvement? Who participates? When should interest parties participate? How? What will be achieved through participation? To what extent participation influences the final decision (Videira, et al., 2006). Each of these participatory design elements contributes to the success of the process and needs to be sustained by an adequate interpretation of the local realities (e.g. the institutional and political context, the pre-existing relationships between actors and the culture of national/local

stakeholder involvement. However apart from the choices, some of the challenges of participatory process in land use conflict are due to the participatory methods and the process itself.

i) Managing expectations

There is a common criticism that creating an open and flexible discussion leads to raised expectations and wish-listings by participants, putting instigators in a difficulty positions. This was shown during the focus group discussion and participatory mapping whereby participants wanted to know if the process will solve the addressed land use conflict and concrete changes could follow after the researcher and other government official visit. However this unrealistic expectation can be avoided by setting clear objectives of the process (as described in section 4.2.3) in a participatory manner in order to help the participants in the conflicting process to understand the boundary of the particular process. This is important in order to get people's willingness to participate as the inclusion of their local knowledge can provide an overview of the land use conflict, allowing the people to highlight how the particular issue in questions fits within wider expressed needs.

ii) Identifying non-negotiable positions

Land use policy makers have statutory and ethics to protect the land and other resources which may conflict with the priorities of the stakeholders. These top-down legislation policies are non–negotiable as they are part and parcel of nationally or internationally agreed principles. This means participatory process cannot be fully empowering as agencies retain the right to oppose outcomes that conflicts with their statutory duties. However there may be room for bottom-up process to seek collectively developed approaches when addressing land use conflict that interferes with policies. A very carefully planning, determination on the part of stakeholders, and highly skilled facilitator is needed so as to ensure the process achieves its goal.

iii) Adequate resources

Inclusions of all the stakeholders involved in a conflict can be a time and a resource hungry. The iterative and potentially open-ended nature of the participatory process requires efficient time and support until a natural end point is reached. The time required to make a decision may not match up with time required to run a participatory process. The danger is that the process may fall short of expectation given the available resources. This research had a limited time and resources and that not all stakeholders participated through focus group discussion in analysing the land use conflict in a study area, however the process leads to identification of important information that could not be achieved through literatures only. Therefore the cost of running an adequately resourced participatory process should be weighed against the likely cost of resistance to decision taken and enforced without engaging stakeholders. This will assist in understanding the value of participatory approach.

iv) Individual barriers

This refers to personal behaviours, attitudes and personal (communication) skills, since it is assumed that only non-authoritarian, none dominating and social skill behaviour encourages participation, mutual learning and empowerment. According to Chambers (1995) the greater danger with participation is that words will be used without the reality of changed behaviour, approaches and methods. Typical examples are; not wanting to listen, being right, competing, and trading blames, practising authoritative leadership and decision making. The existence of court cases among the stakeholders as shown by the results of this survey implies that people and management authority are reluctant to change their behaviour and that they only practise authoritative decision. Participation in understanding the exactly source of land use conflict will not produce positive outcomes unless the behaviour of people and decision maker changes.

Therefore, it would be a mistake to see participatory approaches through participation as a magic cure for land use conflicts. However, Participatory approaches are still valid as they can help point out where land use conflicts are likely to occur and provide a way forward in addressing the conflicts.

7. CONCLUSION AND RECOMMENDATION

This chapter covers conclusions of the study in line with the research objectives. The conclusions focus on four areas mainly the local spatial knowledge (LSK) on land use conflict, spatial pattern of land use change, and the drivers of land use conflict as well as challenges of participatory approaches in land use conflict. It is based on the main objective which was to explore and analyse the drivers of land use conflicts using participatory approach. Through the results and analysis done in this study, we have answered all the research questions which imply the research objectives have been achieved as follows:

Local spatial knowledge of land use conflicts.
The interviews, oral narration and focus group discussion showed that local people are the experts of their own environment as they are very much aware of the changes that have occurred in land use, land ownership and use rights as well as in land use conflicts in their communities. They were able to identify the causes, actors involved, the intensity, and effects of the existing land use conflicts. Furthermore, they identified that the conflict which is more intense at the present moment and which raise a degree of concern from the whole society and the government is that related to encroachment of water sources for residential activities and this is caused by lack of surveyed plots and authorities' weakness in enforcing laws and regulations. Although the study revealed that local people have knowledge about the changes that have occurred in their land from 1952 to 2009, their knowledge may depreciate with time as identified during the participatory mapping activities. There is a need to empower local people through the use of PGIS to record the changes that occurred in Masingini area.

Spatial changes of land use in the conflicting area
Land ownership, use rights and land use have changed both in size and in shapes. A greater proportional of agricultural land that used to be under government ownership (i.e. the TAP plots) in 1952 have lost their tenure status and been converted to individual ownership illegally in 2009. Likewise all land that was used for agriculture in 1952 has given a way to residential development. The forest land also has been converted to farm and other residential activities. Furthermore water sources have been encroached by high density settlement development leading to alteration of hydrological cycle at the catchment level thus affecting the quantity and quality of water in the catchments. The visualization of the spatial aspects of the land use changes and the conflicting area developed can be an interesting tool to be used by decision makers to facilitate the discussion among various stakeholders.

Drivers of land use conflict
Land use conflict is primarily result of land use change. Decision to change the use is generally taken when opportunity is seen that is likely to satisfy long term motivations. The study reveal that these motivations are influenced by five main drivers namely the demographic factors, economic factors, policy and institutions factors, psychological factors and environmental factors. These influences the availability and suitability of opportunities that land owners and land seekers might take up. The driver cause changes in the state of land use thus leading to land use conflict. Specific example of the nature and extent of changes has been presented in this study such as demographic change creating pressure of new housing in peri-urban area or changes in climate (environmental driver) and their impacts on agricultural land. In general these drivers are complex mix and cannot easily isolate from each other as most of them interact with each other. There is a need to influence all sectors involved in land allocations, agricultural supply, forest resource and water resources to change the drive they control in order to create opportunities for people to satisfy their long term motivations in a sustainable way.

Challenges of participatory approaches in land use conflict

The participatory approaches in this study involve the use of p-mapping and PGIS practices. The study reveals that the participatory mapping and PGIS is useful in eliciting local knowledge for capturing spatial dynamics of land uses as well as building local capacities through exchange and sharing spatial information which can be used as benchmark for addressing the land use conflict. However the decision on; which is the desired level of public and stakeholder involvement? Who participates? When should interest parties participate? How? What will be achieved through participation? To what extent participation influences the final decision as well as the need for adequate resources, presence of individual barriers and achieving expectations of all stakeholders provides a formidable challenges and reveal that participatory approaches is not completely flawless as it faces challenges. It requires very carefully planning, determination on the part of all stakeholders as well as high skilled facilitator.

Overall conclusions

This study confirm that demography, economic, policy & institutional, psychological and environmental factors are the main drivers of land use conflict in Zanzibar and particularly Masingini catchment forest reserve and its surrounding communities and that they create the biggest challenge for the responsible authorities and the government in management and protection of Masingini forest reserve. To be able to identify and manage the changes and the associated conflict, it requires the inclusion of LSK of local people. Community involvement through FGD, interview, participatory mapping proved to be useful for examining and identifying the drivers of land use conflict and the conflict spatial temporal distribution. Through visualization of the conflict, participatory approach using PGIS and p-mapping and other tools may contribute to the identification of the conflict by placing the parties in conflict in relation to the problem and in relation to each other. Furthermore the sequence of method used can probably be applicable to other areas especially when looking to a wide variety of stakeholders in conflict because it gives an understanding of the existing situation. However the study recognises that participatory approaches using p-mapping and PGIS practices and other tools in analysing land use conflict is a challenging approach that can not be completely flawless. It requires a very carefully planning, determination on the part of stakeholders as well as highly skilled facilitator.

Recommendations

Many aspects of land use in Zanzibar and particularly in Masingini forest reserve and its surrounding communities are changing leading to land use conflict because of the growing demand for land. Due to limited time frame of this research, the spatial pattern of land use changes and the drivers of land use conflicts were considered. However, there are other important aspects such as;

- What drivers aspects to change so as to create opportunities for local people to access and satisfy their long term motivations thus avoid land use conflict
- To what extent changes in land ownership creates land use conflicts

It is recommended to explore the use of participatory methods (i.e. PGIS tools) in these aspects.

Participatory approach using participatory mapping and PGIS can be useful in capturing spatial changes in land uses. Since this study considers only the general land use changes around Masingini forest area, it is recommended that, land use changes in each of the communities surrounding the reserve be investigated using the participatory approach in order to draw the general conclusion on the spatial dynamics of land uses in a study area. Again the study was limited to identify the spatial dynamics of land use by using vertical aerial photograph and low resolution land sat imagery. It therefore recommended that high resolution satellite image be used for mapping exercise and spatial analysis so as to accurately represent the changes of land use for better decision making.

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APPENDIX

Appendix 1: Checklist and Questionnaires

Household questionnaire

You are kindly requested to help complete a survey on land use conflict. This survey is intended to be used for analysing land use conflict using participatory approach. I'm interviewing a sample of households and yours is included, so please your input is considered very valuable to this survey.

Note: All answer will be treated with confidentially.

Village/hamlet	
Plot/House number	
Interview number	
Date of interview	

A. General household characteristics and occupation

1. Type of household	Male headed……. Female headed……. Child headed…….
2. People living in your household in numbers	……..
3. Occupation	Farming…… Livestock keeping…… Others (please mention)…….
4. Level of education	…….
5. How big is your farm	(Mention specific size)
6. Ownership of land	Family owned…… Individual…… Government……
7. How long have you been here?	……..
8. Are you an indigenous or immigrant?	…….
9. If you are immigrant, where are you from?	……

B: Land issues and parties involved

10.Have there been land use changes	Yes……. No……..
If Yes Where (b) why	Give reason and indicate during mapping
11. How is it done?	Participatory…….. Non participatory…….
12. How the land use change is affects your livelihood?	……
13. Do you record the knowledge on spatial trends of your land?	Yes…….. No……..

	Don't know…….
If yes, how? If No, why?	…… ……
15. Are there any conflicts?	Yes…… No…….
16. What are conflicts about?	Yes……. No…….. Don't know……
17. Who are involved?	Mentioned involved parties and be specific……..
18. What are the causes of land use conflict?	Please mention and specify
19. What are the drivers behind the cause of land use conflict?	Brief explain
20. Where are the conflicting areas and reason to why there?	Mention and indicate during mapping
21. How do you address these conflicts?	Brief explain
22. How are they controlled or managed?	Brief explain

C. Masingini forest reserve and its catchments

23. How far are you from Masingini forest reserve?

(a)100-500m, (b) 501m-1000m, (c) more than 1km

24. Are there any restrictions in accessing the forest reserve? Brief explain

.....

……

25. Why do people develop in the forest reserve area? Brief explain

……

……

26 What are effects of developing residential activities in water sources and forest area?

……

27. Are you involved in the protection and management of the forest? If yes how?

……

General checklist for officials on land issues

1. Who owns land in this community?

……

2. What are the existing land uses in this area/community?

……

3. What is the total size of land under forest management and other land uses especially residential, and infrastructures?

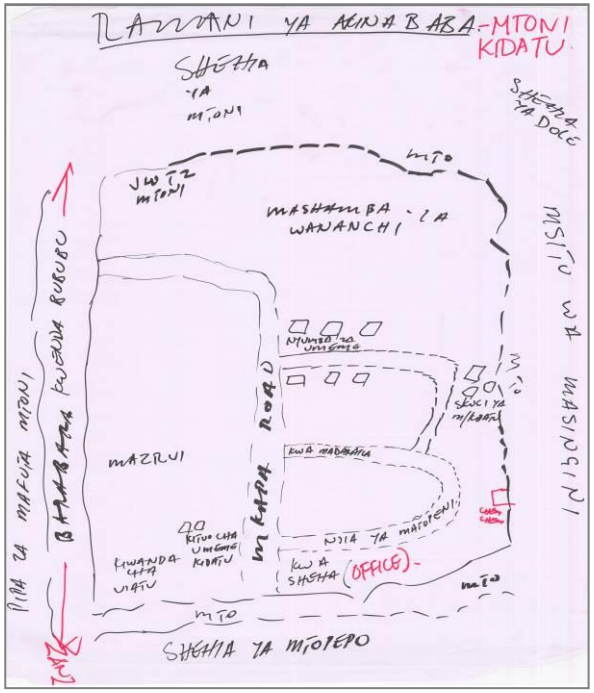
……

4. What spatial pattern of land use change can be observed over time in forest reserve?
……
5. How do local people from different village access and use the forest land?
……..
6. Which areas of forest reserve are more invaded by local people?
……
7. What are the impacts of encroachments activities on the forest reserve and the water sources?
…….
8. What are the issues /causes of the land conflict (specifically forest land?)
…….
9. What are the implications of the conflict to natural resources and society as whole?
……
10. What strategies or approaches do you use to manage the conflict?
…….....
11. Are these management practices effective? If not why?
……..
12. What policy do you have regarding land use and forest conservation?
……..
13. Do you involve local people in the management of forest reserve? Yes/No. If Yes how?
……

Appendix 2: Observation ground control point

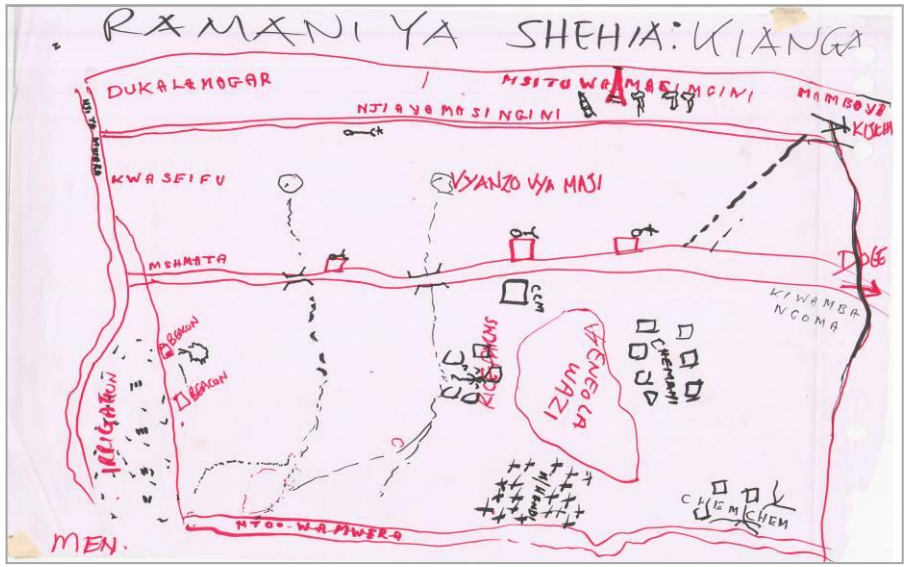
Type	Ident_	Description	Latitude	Longitude
WAYPOINT	046	Beacon_Masingini forest	-6.09362785	39.24142423
WAYPOINT	047	Beacon_Masingini forest	-6.09363967	39.24080456
WAYPOINT	048	local pool(dam)	-6.09358108	39.24031531
WAYPOINT	049	Beacon_Masingini forest	-6.09360547	39.24011867
WAYPOINT	050	Beacon_Masingini forest	-6.09368660	39.23939874
WAYPOINT	051	dried_ watersource	-6.09395583	39.23802973
WAYPOINT	052	water_source with ferns	-6.09376875	39.23805093
WAYPOINT	053	Mwanyanya water source	-6.10502883	39.22368913
WAYPOINT	054	Mwanyanya water source	-6.10501592	39.22380664
WAYPOINT	055	Mwanyanya water source	-6.10489279	39.22434728
WAYPOINT	056	Mwanyanya water source	-6.10508172	39.22310516
WAYPOINT	057	Houses marked X	-6.13223364	39.22941037
WAYPOINT	058	Houses marked X	-6.13076353	39.23001202
WAYPOINT	059	Houses marked X	-6.13176475	39.22766106
WAYPOINT	060	under_constructed_road_Kianga	-6.22242000	39.31788000
WAYPOINT	062	under_constructed_building	-6.17330000	39.35768000
WAYPOINT	063	Road_junction Zanzibar TV tower	-6.52014000	39.30642000
WAYPOINT	064	plantation_forest	-6.13228100	39.24331300
WAYPOINT	065	Natural_forest	-6.13237890	39.23872020

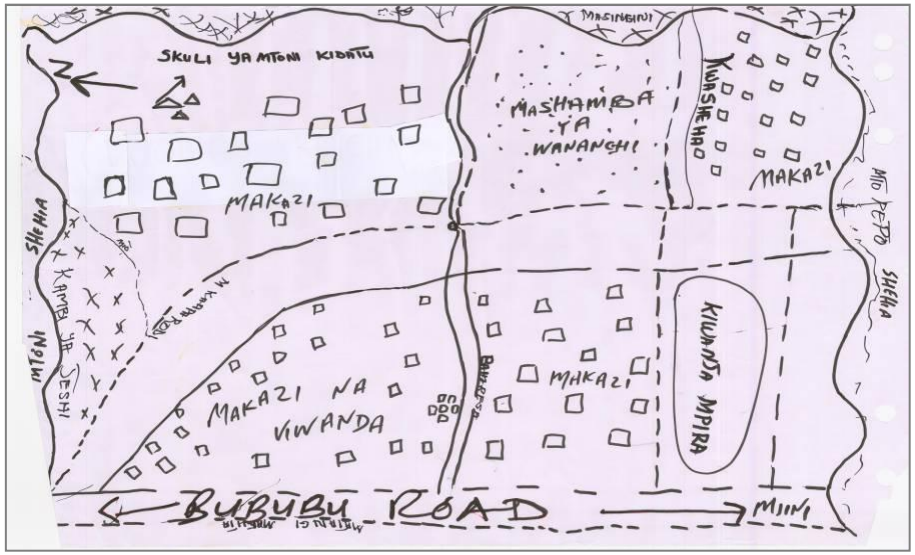
WAYPOINT	066	agriculture_field_Mtoni	-6.12625300	39.22752100
WAYPOINT	067	agriculture_field_Mtoni Kidatu	-6.13448800	39.23470100
WAYPOINT	068	agriculture_field_Bububu	-6.09837700	39.23277200
WAYPOINT	076	agriculture_field_Kianga	-6.13486200	39.24587240
WAYPOINT	077	Water_source ndunduke	-6.10573039	39.24439369
WAYPOINT	078	Water_source ndunduke	-6.10744231	39.24532165
WAYPOINT	079	Water source_ndunduke	-6.10998035	39.24627978
WAYPOINT	080	Ndunduke spring	-6.10944031	39.24406872
WAYPOINT	081	agriculture_field	-6.10964013	39.24533900
WAYPOINT	082	plantation_forest	-6.10661760	39.22655600
WAYPOINT	083	Water_source _Kianga	-6.12789500	39.25105168
WAYPOINT	084	stream (another source)_Kianga	-6.12780246	39.25089276
WAYPOINT	085	Water_source_ Kianga	-6.12808652	39.25120507
WAYPOINT	086	Natural_forest	-6.12615740	39.22953130
WAYPOINT	087	with ferns (watersource)	-6.13105061	39.25038985
WAYPOINT	088	with ferns (water source)_Kianga	-6.13102572	39.25045598
WAYPOINT	089	local_pool_Kianga	-6.13112438	39.25097893
WAYPOINT	092	Mtoni Kidatu	-6.14231681	39.23384347
WAYPOINT	093	water source_mtoni kidatu	-6.14229812	39.23410054
WAYPOINT	094	water source_mtoni kidatu	-6.14226988	39.23410038
WAYPOINT	095	water_source_Mtoni lidatu	-6.14240164	39.23397825
WAYPOINT	096	Mwanyanya water source	-6.10604119	39.22548529
WAYPOINT	097	Mwanyanya water source	-6.10622887	39.22597295
WAYPOINT	098	Bububu or Mwanyanya	-6.10639080	39.22616607
WAYPOINT	100	Mto pepo / Mtoni spring	-6.13980685	39.21813989
WAYPOINT	101	Mto pepo / Mtoni spring	-6.14044103	39.21702761
WAYPOINT	102	Kianga_settlements	-6.12686796	39.25325629
WAYPOINT	103	houses near water sour _ Bububu	-6.09675300	39.22272400
WAYPOINT	104	agriculture_field	-6.11635550	39.24482440
WAYPOINT	105	agriculture_field	-6.10178400	39.24537570
WAYPOINT	131	agri_culture_fields_Mwanyanya	-6.11379900	39.23124800
WAYPOINT	133	houses at water source_Mtoni	-6.00038714	39.23868100
WAYPOINT	134	agri_culture_fields_Dole	-6.09634000	39.24802100
WAYPOINT	135	agri_culture_experiment_Dole	-6.09293100	39.22773000
WAYPOINT	136	building near forest _Kianga	-6.04986000	39.35768000
WAYPOINT	137	agri_culture_fields_Dole	-6.09846500	39.24913400
WAYPOINT	138	Natural_forest	-6.12405165	39.22627760
WAYPOINT	150	Natural_forest	-6.09588467	39.23870312
WAYPOINT	153	plantation_forest	-6.10833253	39.24799058
WAYPOINT	154	Army camp_forest_Mtoni	-6.11983959	39.21967214
WAYPOINT	155	houses at water source_Mtoni	-6.11807860	39.24581500
WAYPOINT	156	houses at water source_Mtoni	-6.11501430	39.25362510



Appendix 3: **Participatory sketch mapping outputs**

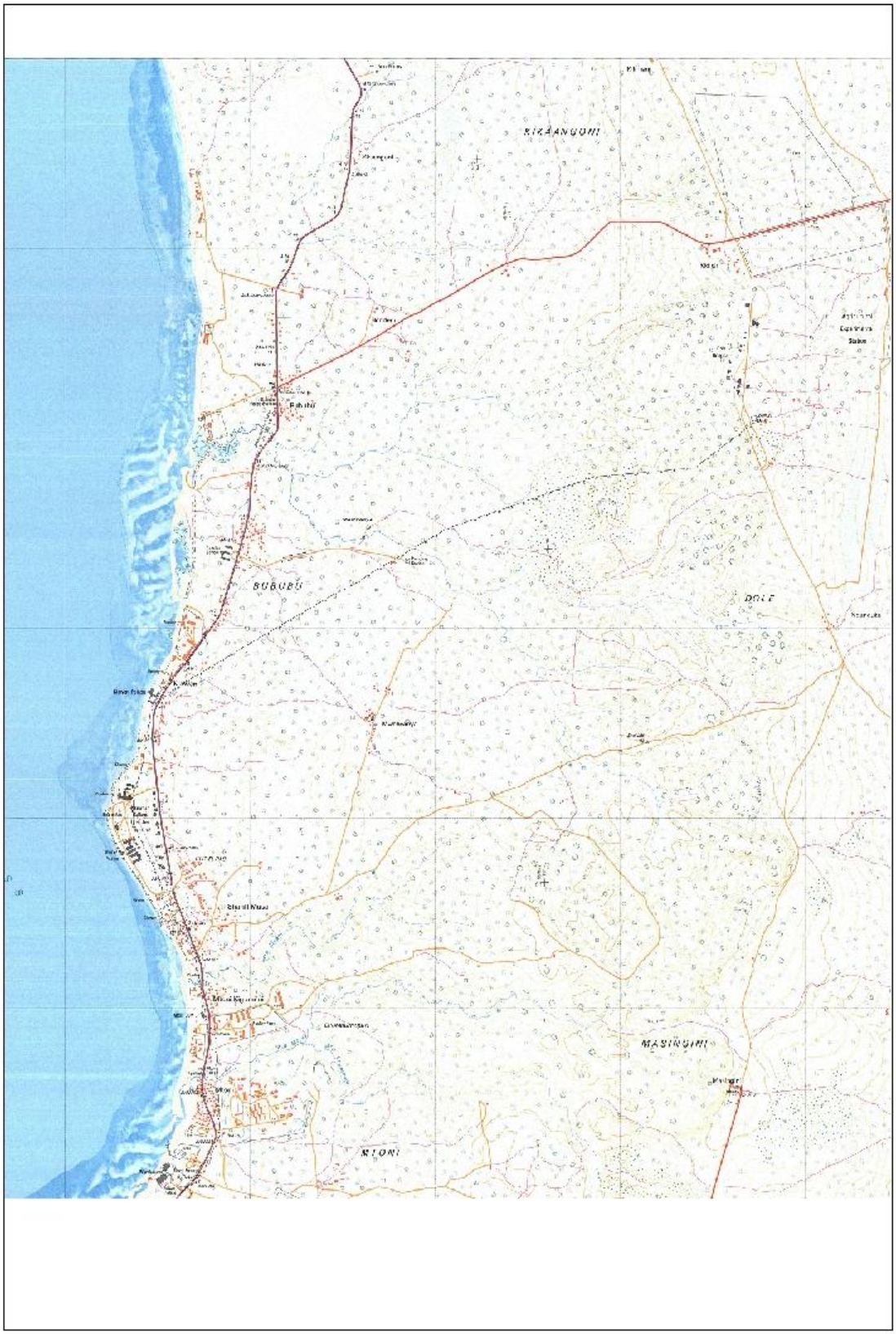
Left: men out put at Mtoni Kidatu
Right: Men out put at Kianga
Bottom left: assessing the sketch Maps-Kianga
Bottom right: Women sketch Map at Mtoni Kidatu



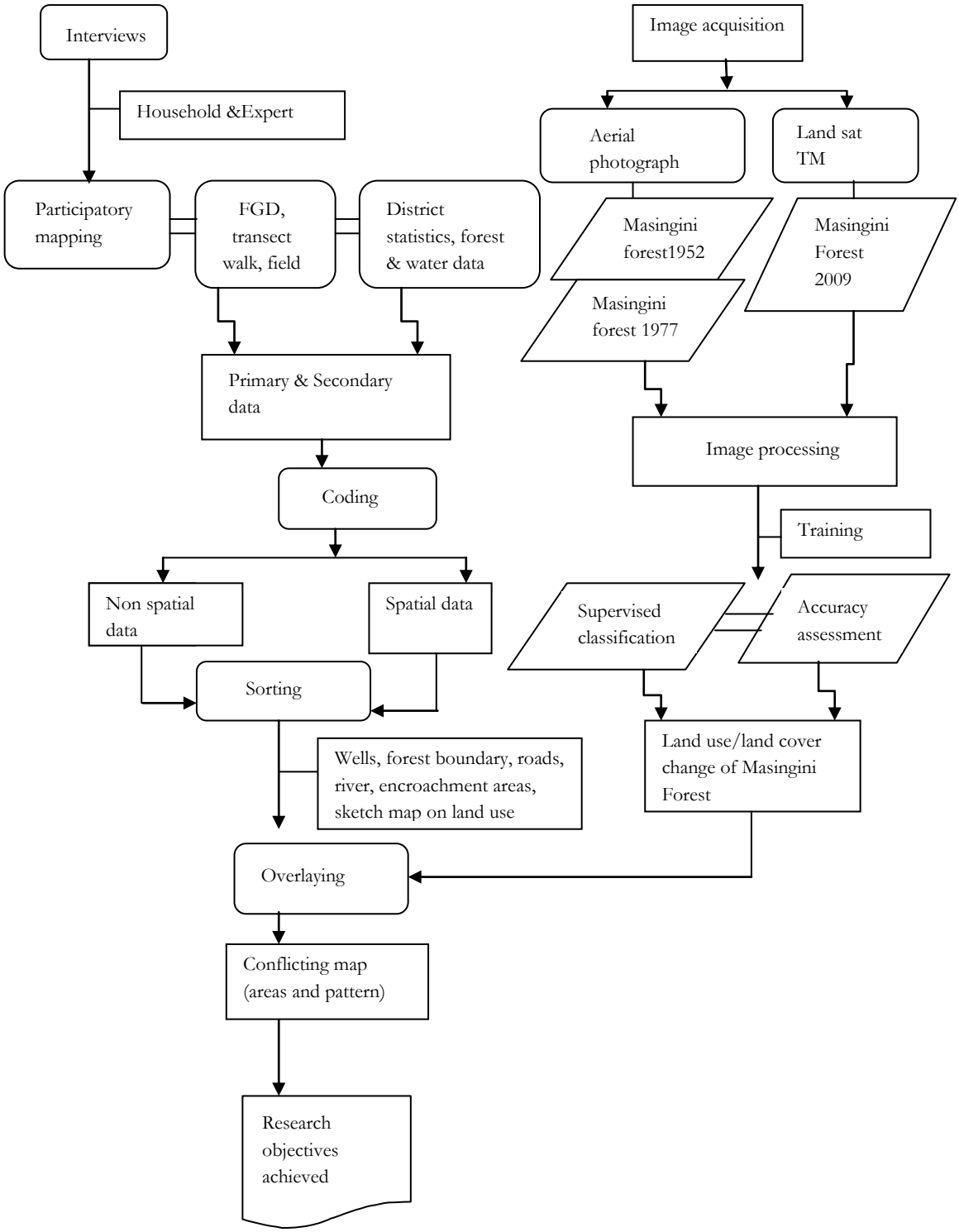


Appendix 4: Vertical aerial photography; Masingini forest reserve, 2004

Appendix 5: Topographic map of Masingini forest reserve, 1977



Appendix 6: Processes and output flow



Appendix 7: Accuracy assessment of land use classes

Class name	Image classification 1952		Image classification 1977		Image classification 2009	
	Producer accuracy	User accuracy	Producer accuracy	User accuracy	Producer accuracy	User accuracy
Agriculture	86.67%	92.86%	50%	100%	53.33%	53.33%
Built-up	-	-	75%	75%	68.42%	92.86%
Forest	93.33%	93.33%	86.96%	71.43%	88.46%	74.19%
Over all classification = 90%			73..47%		73.33%	
Overall kappa statistics = 0.8065			0.5795		0.5832	

Appendix 8: List of stakeholders in Masingini forest management

Level	Stakeholder group	Type	Nature of interest	Influence of the Group
Primary	Department of forestry	Active	Protect, conserve and develop forest reserve	High
	Zanzibar water authority	Active	Protection of water sources and catchment zones	High
	Department of environment	Active	-Proper environmental management -Protection and conservation of ecosystem	High
	Zanzibar Municipal council	Active	-collect forest revenue from forest products -management for conservation and biodiversity value	High
	Sustainable management of land and environment project	Passive	-Sustainable use of forest land -Environmental management	Medium
	Migrant farmers &settlement invaders	Active	Access to land for development	High
	Indigenous people	Passive	Harvesting and utilization of forest products	Medium
	SONARECOD (Society for Conservation of Natural Resources	Passive	-Environmental conservation and sustainable development -community forestry governance	Medium
	Ministry of land water, energy and construction 1; Department of survey and urban planning	Passive	-Protection of environment sensitive areas -demarcation of forest and water sources	High

	2. Department of lands and registration 3. Department of land tribunal		-Property right and jurisdiction - Law enforcement in conflict	
Secondary	Shehia councils	Active	-Control forest and water sources use by immigrants -Protect environment sensitive area	High
	Pastoralists	Active	Access to free grazing	Medium
	FAO	Passive	Assist with inventories &research, training and monitoring of forest reserve	Low
	WWF	Passive	-Support the conservation of forest and ecosystems -Awareness creation on dangers of destroying the forest	Low
	CARE-Tanzania	Passive	forest conservation and development	Low