

**ASSESSMENT OF ENVIRONMENTAL INTERVENTIONS BY LOCAL  
GOVERNMENT AUTHORITIES ON THE QUALITY OF ENVIRONMENT  
CONSERVATION IN THREE SELECTED COUNCILS OF DODOMA  
REGION, TANZANIA**

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**THESIS SUBMITTED IN FULLFILMENT OF THE REQUIREMENTS FOR  
THE DEGREE OF DOCTOR OF PHILOSOPHY (PhD) IN GEOGRAPHY  
(ENVIRONMENT) OF THE OPEN UNIVERSITY OF TANZANIA**

**2014**

**CERTIFICATION**

I, the undersigned, certify that, I have read and hereby recommend for acceptance by Senate of the Open University of Tanzania a thesis titled “*Assessment of Environmental Interventions’ by Local Government Authorities on Quality of Environment Conservation in Three Selected Council of Dodoma Region, Tanzania*” in fulfilment of the PhD in Geography (Environment).

.....

Professor Eleuther Mwageni

(Supervisor)

.....

Date

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.....

Gaspar Peter Mwanachipeta Mwembezi

Signature

.....

Date

**DEDICATION**

This work is dedicated to my Wife Amabile Leo Mbetti and my Children Stephan, Veronica, Godfrey, Victorius, Bernard and Angela.

## **ACKNOWLEDGEMENTS**

It would have been impossible to realise this work without the profound expertise of many who contributed by material and moral support. Special thanks are due to my supervisors Prof. Eleuther Mwageni of Ardhi University and Prof. Elisante Ole Gabriel, the Deputy Permanent Secretary of the Ministry of Information, Youth, Culture and Sports Development in Tanzania for accepting my idea and introducing me to this challenging area of research on this study. Their patience, technical counselling and encouragement were my best sources of support and progress. I thank them for reading my numerous revisions which led to quality product. They deserve more thanks for supporting me throughout my research in three selected councils of Dodoma region.

Special thanks go to Prof. Shaban Mbogo, The Director of Research, Publications and Postgraduate Studies, Prof. Hossea Rwegoshora the Associate Dean, Postgraduate Studies for his encouragement to ensure that, my study reached at its end. Similarly, I wish the Directors of the three selected Council in Dodoma, Chamwino and Kondoa for allowing and facilitating me to conduct this case in their areas of jurisdiction.

Moreover, my sincere gratitude are addressed to these three Councils Planning Officers and Manpower Management Officers of the Councils on their valuable inputs rendered, and introducing me to all levels covered by my study. These include; Dodoma Municipal Human Resource Officer; Kondoa District Human Resource Officer; and Chamwino District Human Resource Officer and their subordinates'. Similarly, many thanks go to the field researchers for helping in data

collection and gap filling while writing this thesis in Dar es Salaam. Their contribution and suggestion in fieldwork activities depict the local development realities that councils and other stakeholders may have to consider and make good judgment to improve environment quality in Tanzania. The researcher also extends special thanks to his research assistants drawn from University of Dodoma and the Institute of Rural Development Planning Dodoma for their tireless efforts that made this thesis possible.

Much need assistance and encouragement from members of the entire extended family. I am especially grateful to my beloved Mother Bibi Veronica Kalumbwe Mwezimpya who passed away on 14<sup>th</sup> January, 2001 and my late father, Mzee Petro Mwanachisi Mwembezi Wakutumwa who passed away on 11<sup>th</sup> August, 2013 amid of my academic struggles. It was a difficult time, but **‘God’** made it and let them rest in *eternal peace-Amen!*

Special thanks go to my kids, whose encouragement has been a tremendous source of support in my life. They have been missing me too much and always were asking their mother “where is our father”. I would like to thank them for being patient and living in hardship in the time when I was away. Indeed the period I spent for this higher degree course at the University, I came to realise that, the Open University of Tanzania is not only a place for academic excellence, but also a symbol of unity to live and a place to exchange ideas. The Open University of Tanzania is now my second home to make thanks to the wonderful friends I have encountered there. Unique vote of thanks above all, I thank the Almighty **‘God’** who provides me with the day-to-day strength needed to pursue this rigorous route of academics.

## ABSTRACT

More specifically, the focus of the study was an assessment of environmental interventions by local government authorities on the quality of environment conservation in three selected councils of Dodoma Region. The study highlights some of conservation challenges, quality strategies and interventions that could be enhanced for sustainable eco-development. The study area has one of the most degraded environments in Tanzania. The statement of the problem is that, while progress has been made to a certain level on environmental conservations programme, this change in terms of quality has not been investigated and assessed. A case study design was adopted in which a population of **629** respondents was involved. In this Study the population was used as sample hence Census technique, not sampling. Distribution of respondents for data collection was in four groups and divided into two categories which included intervention designers **215** and intervention implementers **414**. Data analysis by using SPSS and descriptive statistics were used to meet the case. Major findings include; poor use of natural resources, lack of adequate knowledge and knowledge dissemination, financial constraints and conflict of interest among stakeholders. Therefore, it is recommended that, ongoing interventions to environmental conservation should be refined and strengthened for quality and sustainable way.

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## **LIST OF ABBREVIATIONS**

CBM	Community Based Management
CDA	Capital Development Authority
CMT	Council Management Team
DEAP	Dodoma Environmental Action Plan
DOBEC	Dodoma Beekeepers Co-operative Society
DODEA	Dodoma Development Association
DoE	Department of Environment
DONET	Dodoma Network Environmental Trust
DOVEP	Dodoma Village Environmental Programme
EDI	Economic Development Institute
EGAJ	Earth Greenery Activity Japan
HADO	Hifadhi Ardhi Dodoma (Dodoma Land Conservation
MD	Municipal Director (Project)
HFHT	Habitat for Humanity of Tanzania
JFM	Joint Forest Management
JOVC	Japan Overseas Co-operation Volunteers
LDG	Local Government Development
LVIA	Lay Volunteers International Agency
MALD	Ministry of Agriculture and Livestock Development
M & E	Monitoring and Evaluation
MIGESADO	Miradi ya Gesi ya Samadi Dodoma (Dodoma Biogas Project)
MOW	Ministry of Works
MWTC	Mtumba Women Training Centre

MTNRE	Ministry of Tourism Natural Resources and Environment
NCSSD	National Conservation Strategy for Sustainable Development
NEMC	National Environment Management Council
NGO	Non Governmental Organisation
NPC	National Project Co-coordinator
PC	Planning Commission
PMO	Prime Minister's Office
SIDA	Swedish International Development Agency
SNV	Netherlands Development Organisation
TAS	Tanzanian Shilling
UNCED	United Nations Conference for Environment and Development
UNCOD	United Nations Conference on Desertification
UNCSD	United Nations Commission on Sustainable Development
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UN	:United Nations
USA	United States of America
URT	United Republic of Tanzania
USAID	United States Agency for International Development
VEO	Village Executive Officer
WCED	World Commission on Environmental Development
WEO	Ward Executive Officer

## **CHAPTER ONE**

### **1.0 INTRODUCTION**

This chapter presents the introductory part which highlights general background to the subject matter, Development and Environment in Tanzania, Local Government System in Tanzania, Profile of the Study Councils Statement of the research problem, Objective of the study, Research questions, significance of the study, Scope and limitations of the study, Conceptual framework and Organisation of the thesis.

#### **1.1 The Background Information**

Globally, environment sums up a total of all surroundings of a living organism, including natural forces and other living things, which provide conditions for development and growth as well as of danger and damage (URT, 2005). Therefore, the development on environment involves systematic use of scientific and technical knowledge to meet specific objectives and requirements which involves economic and social transformation that is based on complex cultural and environmental factors and their interactions and hence, eco-development (Lusambo, 2009). There are three types of environment which are Physical environment, Social or Cultural environment and biotic environment Jane, *at el*, (2006). The main focus of this study is on Physical environment.

Pezzy and Toman, (2002) argued that, the concepts of environment and development provide a nice summary of the economic literature on sustainable development. The difference revolves around the question of whether substitution between human made capital and natural resources are limited (if so, then the focus is on strong sustainability) or unlimited (the focus is weak sustainability). World Development

Report, (2011) sensed that, if you chop down the forest and sell the trees there is only a positive impact on Gross National Product. That is, you sell it today, you can't sell it tomorrow, so you take away tomorrow's GNP to increase today's. Plus may be you chop down the trees and the environment runs off, also losing future potential GNP.

## **1.2 Development and Environment**

In sub-Saharan Africa, the understanding of the complexity of environmental protection and poverty reduction can envisage that African peoples should not only be able to live in a thriving and unpolluted environment, but also, be able to access the resources provided by their environment which allow them to develop to their full potential. In essence, the human right to a general satisfactory environment under the law is a composite right, and thus, measures taken to protect the environment in terms of this right must also promote poverty reduction and socio-economic development (URT, 2008).

Growing environmental concern is a result of its degradation. Population growth, size, and spatial distribution have had an impact on the environment in multiple ways and environmental degradation has important implications for the well being of populations. As the world population grows fast, the pace of urbanisation accelerates unabated the resource depleting technologies, lifestyles that generate excessive wastes, and economic practices that are often at odds with environmental conservation and sustainable development are exerting adverse effects on the atmosphere, lands and forests, minerals and energy resources, oceans and quality of life (URT, 2004). Thus, the need to redress environmental development nexus is

imperative to ensure sustainable environment is achieved amid escalating demand for resource use mainly from the environment. One of the entry point to ensure successful environment – development nexus is through empowering the institutions that work so closely with the people, mostly the poor and which include the local governments.

### **1.3 Local Government System in Tanzania**

The Local Government system in Tanzania is based on political devolution and decentralization of functional responsibilities, powers and resources from central government to local governments and from higher levels of local governments to lower levels of local governments and overall empower the people to have ultimate control over their resource and welfare (URT, 2011). The founding provision of the Constitution of the United Republic of Tanzania recognize local governments as autonomous bodies with legal status (corporate bodies) creating with discretionary powers over local affairs within the unitary system of the Republic of Tanzania (URT, 2012).

In each Region, Districts, Urban areas and villages of United Republic there are established Local Government Authorities. Local governments Authorities have a responsibility for socio-economic development and public service provision within their areas of jurisdiction; facilitation of maintenance of law and order and promotion of local development through participatory process. The elected local councils are governments' organs which are at lower levels of one unitary Government of United Republic of Tanzania and thus required to operate within the national policy and legal framework while retaining their status as the highest

political authorities within their areas of jurisdiction. The most powerful tools of councils are their annual work plans, budgets and control of resources on socio-economic affairs exercised by the standing committees (URT, 2010).

Selection of Dodoma as study region was guided by Carissa *et al.*, (2005) who carried out a deskwork (based on an extensive literature review) to identify the regions within the country where critical ecosystem services for human well-being are stressed, signaling the need for immediate attention. Development in those selected councils involves environmental use which should not ignore the question of environmental conservation interventions. The main objective this study is to assess the environmental interventions by local government authorities on quality of environment conservation since 1980s to 2010.

It is a long line of thinking that, the study is seen as being of interest to be useful in generating some new information and knowledge in environmental conservation initiatives. However, Researches and scholars may use the findings of this study as a point of departure for further studies in the environmental conservation settings. The best practice revealed that, despite many efforts that have been made by local communities, central government, non-governmental organisations and other interested parties such as DONET, HADO, EGAJ, MIGESADO, CDA/JOVC, DOVEP, CSOs and other Development Partners (URT, 2008) still the quality is minimal.

Therefore, the integration of environmental considerations into economic development policies and programs at local level also resides the mandate of local

governments. This involves the integration of policies, plans and programs of sectors and interest groups to balance long-term and short-term environmental development goals. It calls for a coherent policy context where priorities can be defined and set for the promotion of long-term economic growth, creating incentives for sustainable utilisation of natural resources and effective management of the environment (URT, 2006).

#### **1.4 Profile of the Study Area**

Administratively, Dodoma region covers an area of 41,310 km<sup>2</sup> equivalent to 5% of the total area of Tanzania Mainland. It is located in the heartland of Tanzania and it is divided into seven districts as shown below.

**Table 1:1 Population Distribution by Sex in Dodoma Region**

DISTRICT	MALE	FEMALE	TOTAL
Kondoa	136,518	269,704	269,704
Mpwapwa	147,306	157,750	305,056
Kongwa	149,221	160,752	309,973
Chamwino	158,882	171,661	330,543
Dodoma, MC	199,487	211,469	410,956
Bahi	105,975	115,670	221,645
Chemba	117,585	118,126	235,711
Total	1,014,974	1,068,514	2,083,588

**Source:** NBS, (2012)

The region lies at 4° to 7° latitude South and 35° – 37° longitude East. The region is centrally positioned in Tanzania and is bordered by four regions namely: Manyara in the North, Morogoro in the East, Iringa in the South and Singida in the West. Much

of the region is a plateau rising gradually from some 830 metres in Bahi Swamps to 2000 metres above sea level in the highlands north of Kondoa (URT, 2002) as depicted in Figure 3:1. The annual rainfall ranges from 600 mm in lowlands to 1200 mm on the highland plateau. However, there are areas which experience exceptional droughts (with less than 600 mm of rainfall).

The mean annual temperatures vary with altitude from the valley bottom to the mountain top: between 18°C on the mountains to 30°C in river valleys and 25°C in most parts of the region. The economy of the region is dominated by agriculture though livestock keeping, fishing and mining are also common economic activities include; small scale farming; cattle production; traditional fishing and some mining activities (URT, 2012). Nonetheless, unpredictable weather conditions, natural disasters are serious factors to environmental destruction and extinction of flora and fauna.

The councils selected were Dodoma municipality, Chamwino and Kondoa district councils. These were the districts experiencing environmental problems such as environmental degradation including environment erosion, severe and chronic shortage of water for humans, livestock and agriculture, extensive deforestation and overgrazing, low level of alternative sources of domestic energy as substitutes for charcoal and fuel wood were blamed as drivers of environmental degradation. Other factors which also influenced the choice of these district councils were poor living standards, low level access of other social services; environmental pollution and loss of wildlife habitat and biodiversity (URT, 2010). These factors ought to complicate people's contribution to environmental conservation hence dwindling of ecosystems

goods and services. The study however, was not conducted in all councils because of logistical and financial constraints. Due to similarities in environmental attributes and economic profiles of Dodoma region, the researcher purposefully selected three councils for this study. The profile of each Council is presented below.

#### **1.4.1 Dodoma Municipal Council**

Dodoma Municipality is located at the south eastern end of the Tanzania Central Plateau, at an elevation of 1,200 metres above sea level. The town is located at the geographical centre of the country on the vital Central Railway line; and on major crossroad of the National East West trunk road and the famous north to south Cape to Cairo Great North Road, which passes in Tanzania through Mbeya, Iringa, Dodoma, Babati and Arusha. The town is 465 kilometres from Dar-es-Salaam, and 425 kilometres from Arusha situated at 6° south of the Equator. The total area earmarked for the Capital Development Area is 2729.1 km<sup>2</sup>, radiating 30-40 kilometres in each direction from the present centre of the town. The area involved includes the area earmarked for urbanization to a population of 1,000,000; future international Airport, underground water catchment area; agriculture and livestock grazing area, afforestation and conservation areas; and other necessary institutional and service facilities (URT, 2007).

Following the decision to move the Capital from Dar-es-Salaam to Dodoma, the founding President, Mwalimu Nyerere established a Ministerial portfolio and set up the Capital Development Authority as the Government Implementing agency for the task. Capital Development Authority is a corporate body established by a Government Order through Notice No.230 of 12 October 1973 by the President of

United Republic of Tanzania. This order has been amended subsequently to accommodate emerging needs. The Authority is modelled in line with urban development or new town development corporations of UK and has been vested with legal powers for urban development through powers delegated from the Minister for Lands, Housing and Human Settlements Development to the Minister Responsible for Capital Development. The Capital Development Authority is vested with master land title for the whole area earmarked for Capital Development and is given mandate to issue land titles to all developers within its area of jurisdiction (URT, 2008).

The National Capital Centre (NCC) is located in the south-east quadrant of the inner city within a ring-road that is the hub of the region's major roads. The NCC is designed to have Governmental offices (Ministries), Diplomatic offices, commercial buildings as well as residential uses. Other uses include Hotels and International conferences halls, shopping malls, medium and large institutional uses. The NCC also has land opportunities land for exhibition grounds. The city of Dodoma grows very rapidly in population and size. The city is also surrounded by a rich agricultural area and pleasant scenery. It is the centre of Tanzania's growing wine industry and the Tanganyika Vineyards Company is active in promoting its products (URT, 2009).

Livestock is the second contributor to the council's economy. The council has a total of 718,574 livestock composed of 418,874 cattle, 286,700 goats, 13,000 sheep, 2,000 pigs and 19,000 donkeys. The livestock density per area suitable for grazing is 22.4 LU per km<sup>2</sup>. Cattle keeping are still small scale with the majority of livestock being

owned by pastoralists in the municipal. Zero grazing especially for dairy cows and goats is developing in certain agro-ecological zone (URT, 2010).

#### **1.4.2 Chamwino District Council**

Geographically, Chamwino District Council is one of the six local government authorities of Dodoma region. It lies on the central plateau of Tanzania in the western bearing along Dar es Salaam road. The district has a total area of 8,056 km<sup>2</sup>. The District borders Dodoma Municipality in the western, Kondoa District in the North, Kongwa District and Kiteto Districts in the East and Mpwapwa District and Iringa rural on the southwest and Bahi District in south east URT, (2012). This Council is divided into 5 divisions, 32 wards, 77 villages and 687 hamlets. There are also two parliamentary electoral constituencies namely Chilonwa and Mtera. According to the 2012 National Population and housing Census, the population stands at 330,543 people, of which female are 136,869 and male 123,972 with a population density of 50 people per km<sup>2</sup> (URT, 2013). Apart from the hydro-electricity generated from Mtera “Dam, there is also energy from diesel, petrol and kerosene, which serve both small industries and domestic use.

This council has a total area of 8,056 square kilometres. The proportion of arable land crop and agricultural production is about 246,821 which are 70% of the total land. It has the potential and possibilities for agricultural expansion since the acreage utilized for crop production is around 44% of the total arable land. This implies that more land could still be brought under crop production (URT, 2012). Chamwino produces a substantial percentage of the total regional production of sorghum, maize and cassava. Other crops grown include grapes, sunflower, simsim, groundnuts,

bulrush miller and paddy. Livestock keeping is ranked second as a vital economic activity in the district, through its actual contribution to the district economy in terms of provisions of income, employment and contribution to GDP and Per Capita income is yet to be accurately assessed (URT, 2012).

Agriculture and Livestock sector constitutes the mainstay of the economy of Chamwino district and its population in providing income, employment and ensuring adequate food supplies. Only a small number of the population is engaged in commercial and industrial sectors. The latter sector is still limited to small scale enterprises which include maize mills, carpentry and tailoring mainly found at Chamwino and Mvumi Mission and trading centers of Haneti, Chalinze, Mpwayungu and Mlowa Barabarani (URT, 2009). In terms of livestock, data revealed that, by 2012 census report, the district had an estimate number of 284,749 livestock, whereas number of cattle was 185,659, goats 41,384 and sheep 9,007. Cattle population accounts for about 20% of the regional cattle herd and it ranks second to Kondoa district in terms of livestock numbers.

Currently, livestock are concentrated in Makang'wa, Chilonwa, Itiso and Mpwayungu divisions (URT, 2012). Natural resources in this council are comprised of four sub sectors which include:- Forestry, Wildlife, Bee-keeping and Fisheries. It has six forest reserves which cover an area of 107,720 ha equivalent to 1077.2 km<sup>2</sup> the east and west Chenene 29,839 ha, Chinyami 43,330 ha, Goima 6,959 ha, Sasajila 1.145 ha and Chamhene 3,785 ha. The District has no game reserve and controlled areas, but wild animals like elephants, great kudu, grants and gazelle, buffalos,

warthog, zebra, lion, hyena, leopard and different type of birds are not uncommon. Estimated area occupied by the wildlife is about 710 km<sup>2</sup> including the forest reserves. Fishing is among the important activities in the district. Fisheries activity employ more than 22,000 peoples in the field of fishing which include; fish mongering, fish trading, fish processing, fishing nestles craftsmen and fishing gears suppliers (URT, 2004). The district is also endowed with mineral resources including limestone deposits which are exploited at Mvumi Iringa, Mvumi and Mlowa Bwawani. Other minerals deposits are gemstone such as crystallites and green tamale which are found at Haneti area (URT, 2004).

#### **1.4.3 Kondoa District Council**

The District is located in the north of Dodoma region about 160 km from the capital centre. It lies between 35 °E and 36 °E and 4 °S and 5 °S. Annual average rainfall ranges between 400mm-800mm. altitude ranges between 1056 -1300m above sea level with temperature between 20C<sup>o</sup> -25C<sup>o</sup>, average 22 C<sup>o</sup> and humidity of annual average of 67%. Wind blows south- east to north-west at an annual average velocity of 130km per hour. The District has an area of 13,210 km<sup>2</sup> (URT, 2012). The District is dominated by bush land with isolated bushed grasslands. The total area of the forest in the District is 257,379 hectares. Central government has an area of 27,379 hectares, while the District council forest has an area of 4,249 hectares. Natural forest has an area of 2,200 hectares other institutions have 494 hectares, and HADO (forest conservation Program in Dodoma) has forest area of 125,600 hectares. The District has a total of 1.9 million hectares while the total arable land is 924,630 hectares, and land under cultivation is 222,184 hectares (URT, 2012).

The district is almost entirely depending on agriculture and animal husbandry. About 91% of the District population depends on agriculture. About 70% of the total area of the District is potential for agriculture while those entirely depend on livestock is only 1.6%. Average acreage per household is between 3 to 10 acres. The main crop grown are; Bulrush millet, which is the staple food. Other crops are maize, sorghum, pigeon, peas, simsim, ground nuts, cassava, sweet potatoes, beans, cowpeas, bambaranuts and sunflower (URT, 2012). Livestock is the second contributor to the district economy. The district has a total number of 718,574 livestock composed of 418,874 cattle, 286,700 goats, 13,000 sheep, 2,000 pigs and 19,000 donkeys. The livestock density per area suitable for grazing is 22.4 per km<sup>2</sup> cattle keeping is still small scale with the majority of livestock being owned by pastoralists in the District.

### **1.5 Statement of the Problem**

The background information indicates that the environmental conservation efforts in Tanzania and particularly in Dodoma Region are inadequate despite many efforts and interventions that have been made by local communities, central Government, non-governmental organisations and other interested parties since 1980s (URT, 2012). The main causes of the environmental degradation and ways of protection are known. While progress has been made in empowering stakeholders on environmental conservation schemes but, challenges are still several exists. Likewise, while some programmes and policies to enhance community participation, empowerment and poverty reduction have been put in place, the full quality outcome of interventions has not been realised. Therefore, this study attempted to assess the interventions by local government authorities on quality of environment

conservation through the ongoing and planned interventions in Tanzania by using a case study of Dodoma Municipality, Chamwino and Kondoa District Councils.

### **1.6 Objectives of the Study**

The main objective of the study is to assess the impact of interventions on quality of environment conservation in Dodoma Region. From this overall objective the following four specific objectives of the Study were develop:-

- i. To identify the Leading Challenges on the quality of Environment Conservation in Dodoma Region
- ii. To find out the important interventions in predicting the quality of environment conservation
- iii. To compare the assessment of quality of environment conservation by designers of intervention and the implementers of interventions
- iv. To identify the leading strategies on improving the quality of environment conservation

### **1.7 Research Questions**

In relation to selected study area, the study attempted to seek answers to the following questions which were developed from the specific objectives.

- i. What are the leading challenges affecting the environment conservation in Dodoma Region Councils?
- ii. What are the important environmental interventions on predicting the quality of Environment conservations?
- iii. Is the assessment of environment conservation quality by intervention designers different from that of implementers?

- iv. What are the leading strategies to improve the environment conservation quality in Dodoma region Councils?

### **1.8 Significance of the Study**

This study was conducted in Dodoma region which is a leading on environmental damage compared with other regions in Tanzania. In particular the region has been, for a long time experiencing the problems of environmental depletion and general environmental depletion (URT, 2006). Therefore, this study would contribute to enhance control measures which would be taken from time to time including forced reduction of livestock numbers, ridge cultivation, contour bunds and terraces with an adequate drainage system, rotational grazing as well as depopulation leading to quality eco-development.

There has been also a significant increase in the number of livestock in those councils, partly due to immigration of nomadic pastoralists with their livestock into the area. The forest and wood land areas in the district have been greatly dilapidated due to deforestation as a result of shifting cultivation, uncontrolled bush fires, overgrazing and the catering for energy use (URT, 2004). However, more than 95% of the population depends on firewood and charcoal as sources of energy. Excessive use of charcoal and firewood leads to the destruction of eco-system, forest depletion and serious environmental degradation (URT, 2010). The study findings will add to the stock of literature on the management of the environment in Tanzania and provides up-to-date information on environmental conservation practices in those selected councils and the rest countrywide.

The study knowledge is timely to contribute to the realisation of not only the Tanzania Development Vision, 2025 but also of the Millennium Development Goals 1990-2015 which among things seek to eradicate poverty by half this period. It also strived to provide fresh issues in understanding environment conservation interventions quality which are direct linked with Rural-Urban communities. This study would also be of benefit and catalyst to everyone involved in environmental conservation initiatives and would serve to attract planners, policy makers and other various interested parties to take deliberate initiatives and appropriate measures in addressing environmental conservation issues leading to eco-development. This study would also contribute to respective councils nationally, in Africa and the World wide data base which is adequate to satisfy the requirement for socio-economic planning, implementation and evaluations.

Livestock also contributes significantly to the council's economy. According to the 1984 census, there were 150,140 livestock units in Dodoma Municipality URT, (2005). It is estimated that this number has since increased significantly as evidenced by the 2012 National Sample Census of agriculture in the region. Sources of energy for both industrial and domestic use are hydro-electricity from Mtera dam, diesel, kerosene, charcoal and fuel wood. The use of charcoal and fuel wood by a large part of the population in the study councils means that, the ecosystem is destroyed, existing forests are depleted and the environment is seriously degraded. Recently, due to concerted efforts made by NGOs biogas plants have been installed in a few villages surrounding the Dodoma Municipality. The climate is normally dry, windy, hot sunny with low humidity leading to permanent problem of water

availability (URT, 2007);

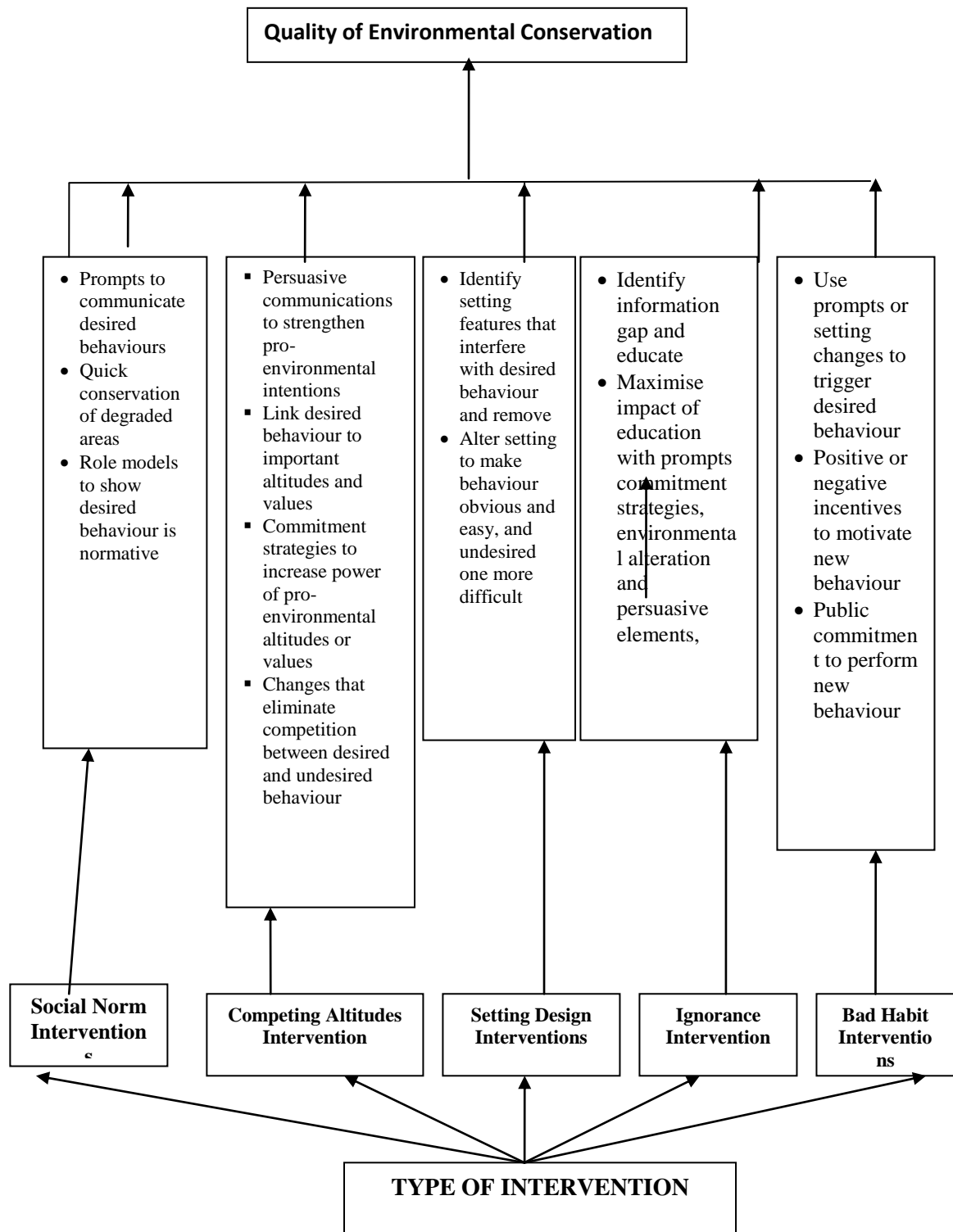
Due to this situation, a number of stakeholders have embarked on sustainable environment conservation in those councils in order to contribute and enhance checks and balance on resource exploitations. It was further envisaged that, the findings of the study would inform and guide the selection of potential areas where a more detailed local-scale integrated assessment of the links between ecosystem services and human well-being can be carried out. However, the study established that, Dodoma is a priority region for ecosystems-related researches, because it is stressed in all the four ecosystem services. It also has serious data gaps in all the above-mentioned ecosystem services.

### **1.9 Scope and Limitations of the study**

The Region has seven (7) Councils but these three were carefully selected for this study. The study concentrated only on interventions made in three selected councils of Dodoma region namely the Dodoma Municipality, Chamwino and Kondoa District Council.

### **1.10 A Conceptual Framework of the Study**

Environmental degradation worldwide is caused by many stakeholders who are involved in infrastructure extension, agricultural expansion, industrial development, livestock keeping, wood extraction and other factors. Thus, the address of environmental problems require an engagement of various stakeholders and in Tanzania may include Ministries, Institutions and Agencies, LGAs, CBOs, NGOs, FBOs and local Communities.



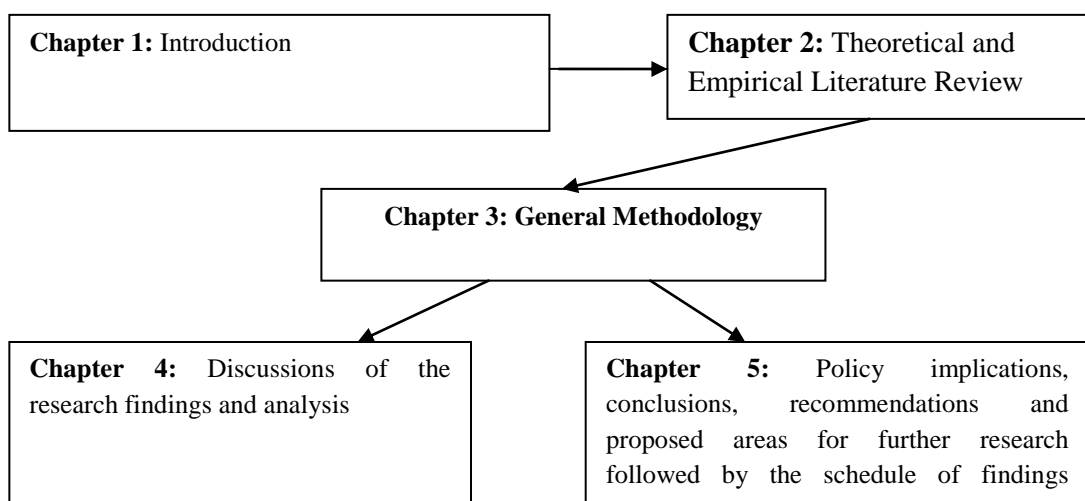
**Figure 1.1: A Framework for Understanding Environmental Conservations**

**Source:** Researcher, 2014 modified from Burn, and Winter, (2007)

This conceptual framework was used to reflect the study variables in the study area. This conceptual framework acts as a basis for discussing key issues related to environmental interventions, conservation and exploitation.

### 1.11 Organisation of Thesis

This thesis is in five chapters (Figure 1.2). Chapter one deals with introduction of the research background. Chapter two covers the theoretical and empirical literature review pertinent to the present study. Chapter three is concerned with the overall methodology used in pursuit of the present study. Chapter four presents characteristics of the respondents and general discussion of the study findings and analyses whereby Chapter five deals with Policy implications, conclusions, recommendation, areas for further research, and schedule of dissemination of findings. This part is also highlights major contributions of the study and the areas which need further research.



**Figure 1.2: Thesis structure**

**Source:** Developed by the Researcher, 2014

## **CHAPTER TWO**

### **2.0 THEORETICAL AND EMPIRICAL LITERATURE REVIEW**

#### **2.1 Overview**

This chapter reviews the general literature on interventions pertinent to the present study. It concisely gives an overview of the environmental conservation situation in both Tanzanian and global contexts. It also highlights various factors affecting environmental choice and consumption intensities. The relevant theoretical perspectives have been reviewed rather extensively. Forces playing against interventions on environmental conservation efforts have also been reviewed. The economic values of ecosystem and valuation techniques have been highlighted. The chapter also provides a synopsis concerning the relevance of both energy services and forests to the attainment of the Millennium Development Goals. Empirical literature review is also presented in this chapter.

#### **2.2 Definition of Terms**

##### **2.2.1 Agroforestry**

Refers to “Land use system in which trees or shrubs are grown together with crops and/or livestock on the same piece of land” (Assmo and Ericksson 1994:45 quoted by Marandu V. C. (1999:9).

##### **2.2.2 Biotic Environment**

It is also known as biological environment and organic environment. The opposite side of the physical environment, the biotic or biological environment is responsible for the living beings. So, the biological environment is the environment which involves the living part of the earth.

### **2.2.3 Capacity Building**

This is the process of promoting human resources development in terms of knowledge and skills.

### **2.2.4 Community Development**

This is a strategic policy process addressing people who feel excluded from society. It consists of a set of methods which can broaden vision and capacity for social change, including consultation, advocacy and relationships with local groups. It is a way of working informed by certain principles which seek to encourage people who live in the same areas, or who have something in common, to tackle the problems they face. Community Development empowers them to change things by developing their own skill knowledge and experience and also by working in partnership with other groups and with statutory agencies (Mdendemi, 1994:10).

### **2.2.5 Consumption Overpopulation**

This exists when a small number of people use resources at such a higher rate that significant pollution, environmental degradation and resource depletion occur.

### **2.2.6 Development**

The systematic use of scientific and technical knowledge to meet specific objectives or requirements which involves economic and social transformation that is based on complex cultural and environmental factors and their interactions.

### **2.2.7 Environment**

The sum total of all surroundings of a living organism, including natural forces and other living things, which provide conditions for development and growth

as well as of danger and damage.

### **2.2.8 Environmental Conservation**

The process by which a potentially renewable resource is used at a rate exceeding the natural replacement rate and thus making its available supply to shrink, e.g.

- i. Cultivating land without proper soil management so that crop growth is reduced by soil erosion and depletion of plant nutrients.
- ii. Deforestation
- iii. Overgrazing
- iv. Desertification (Blaikie, 1987:296)

### **2.2.9 Environmental Pollution**

Any undesirable change in the characteristics of air, water, soil or food that can adversely affect the health, survival or activities of humans or other living organism (Brown, 1989:53).

### **2.2.10 Environment Resistance**

This consists of all the limiting factors jointly acting to limit the growth of a population. For example: Water, reproductive rate, space, nutrients, food and so on. They determine the carrying capacity (the number of individuals of a given species that can be sustained indefinitely in a given area). (Booth, 1993:71).

### **2.2.11 Environmental Resilience**

Organism, population, communities and ecosystems have some ability to withstand or recover from externally imposed changes or stresses – provided those stresses are

not too severe. (Ibid.).

#### **2.2.12 Metapopulation**

population in which individuals are spatially distributed in a habitat in two or more subpopulations. Populations of butterflies and coral-reef fishes are good examples of metapopulation. Human activities and natural disasters are the main causes of metapopulation and increase the population that occurs as metapopulations. Such factors cause the fragmentation of a large habitat into patches. This may be an important reason whereby models of metapopulation dynamics become important methods/tools in the field of conservation biology.

#### **2.2.13 Free-range**

Livestock that is kept or produced in natural conditions in which it can move around freely without being affected by harmful or something undesirable.

#### **2.2.14 Participation**

The consciousness of the public/community about their right to decide on matters affecting their destiny that force the decision makers to give in the demands for popular participation.

#### **2.2.15 People Overpopulation**

People overpopulation exist when there are more people than the available supplies of socio-economic goods and services and other important resources which can support at a given minimum level.

### **2.2.16 Peri-Urban**

This can be defined as those villages which have almost the same characteristics that can be found in urban areas.

### **2.2.17 Physical environment**

It is also known as a-biotic environment and natural environment. This is a non living like land water air conditions atmosphere which constitutes of soil. So, physical or a-biotic environment is the environments which include non living or physical things which are constitute of soil and affect the living things. It also includes the climatic factors such as sunbeams, rainwater, precipitation, moisture, pressure and wind speed.

### **2.2.18 Poverty**

It is usually defined as not being able to meet one's basic economic needs.

### **2.2.19 Poverty trap**

Four elements of poverty trap

- i. Lack of access to enough land and income to meet basic needs.
- ii. Physical weakness and poor health caused by not having enough land to grow food or enough income to buy enough food for good health. This decreases the ability of the poor to work and plunges them into poverty.
- iii. Powerlessness that can subject the poor to being trickled into signing away the little land or on loans such that they lose their land and livestock, and having to pay bribes to get work.
- iv. Rapid population growth, which produces more workers than can be,

employed wages down as the poor compete with each other for scarce work. (Chambers, 1983).

#### **2.2.20 Social or cultural environment**

This involves the culture and life style of the human beings. It means the environment which is created by the man through his different social and cultural activities and thinking. Therefore, the historical, cultural, political, moral, economic aspects of human life constitute to the social or cultural environment.

#### **2.2.21 Sustainable Development**

The use and exploitation of today's resources in such a manner that these resources will be available for use by future generations. In other words, consumption today with tomorrow in mind. That suggests putting environmental conservation and management issues at the forefront of development process. (UNEP, 1997:5).

#### **2.2.22 Sustainable Development Planning**

Entails planning process which takes into account environmental considerations and involves all stakeholder groups, so that decisions and agreed plans are binding.

#### **2.2.23 Urbanisation**

Urban growth in which the rate of growth of urban population, growing in two ways, either by natural increase (more births than deaths) or by immigration (mostly from rural to urban areas).

#### **2.2.24 Zero Grazing**

Modern ways of animal husbandry. Instead of practising free range grazing in the communal land people limit them in a specified area.

### **2.3 Theoretical Literature Review**

The world is beset by various environmental problems Glantz, (1999) such as global warming, stratospheric ozone depletion, desertification, acid rain, water and air pollution, biodiversity loss and tropical deforestation. Darkoh, (2009) has reported that environmental problems in the Southern African Region are global warming and climate variability, loss of biodiversity, deforestation, desertification and environmental depletion, waste and littering, pollution, population growth, urbanisation, poverty and health hazards. Seymour, (2008) has argued that the main drivers in changes of biodiversity and ecosystems are habitat change, climate change, invasive species, over-exploitation and pollution.

According to Byron (1999), studies on deforestation mechanisms can generally be grouped into four general categories: Neo-Malthusian, government-failure, microeconomic and macroeconomic approaches. The Neo-Malthusian approach sees population pressure as the underlying cause of tropical deforestation. The government-failure approach looks at misdirected policies that result in unintended deforestation and government's inability to preclude preventable deforestation. The microeconomic approach examines how, under various forms of market failure, an agent's economic behaviors can lead to deforestation. The macroeconomic approach explores the possible links between debt and deforestation

According to Walker, (2009), climate variability has an impact on the renewable natural resources. Sanga et al., (2005) assert that, population pressure; deforestation and environmental depletion are major concerns in developing countries. Asner et al., (1997) attribute the emission to fossil fuel combustion, deforestation and cement production. Greenhouse gas emission remains a serious problem since many countries have little incentive to reduce greenhouse gas emissions (Weber and Zygarlickle, 2001).

According to the United Nations, (2002) attempts to promote human development and reverse environmental degradation have not, in general, been effective over the last decade. Tanzania is facing serious environmental problems such as deforestation, pollution, land and forest degradation, erratic rainfall, declining hydrological balance, loss of biodiversity and destruction of aquatic systems (Monela and Abdallah, 2007).

## **2.4 Environmental Conservation Interventions**

‘Conservation intervention’ in conventional terminology is taken to mean the wise recovery action use of resources. In the context of landscape, it implies notions of purposeful action rather than a policy of laissez faire, the positive use of resources rather than their preservation in a museum-like way, the environment of value by creative action and renewal, living on interest rather than capital and the maintenance of ‘sustainable yield’. Conservation demands long term rather than short term decision and it is concerned with the inter-relationship between different rural resources on the supposition that the value to society of the whole fabric of the countryside may be greater than the sum of its parts Ozer, (2004).

Price, (2003) argued that, the concepts of environment interventions and development provide a nice summary of the economic literature on sustainable development. The difference revolves around the question of whether substitution between human made capital and natural resources are limited or unlimited. Environmental conservation has a long history. It is difficult to say exactly when and where conservation started. According to the literature, environmental conservation can be traced back to the 1930's when early views were expressed by George Catlin, (2002) an artist and naturalist in America. About the future of the buffalo and the plain Indians that depended on them.

Catlin proposed the initiation of a vast national park in which Indians and wildlife would be left alone. Further concern was shown by Henry David Thoreau in the 1950's. The focus was for the future of all wild nature with the wilderness providing the hope for the preservation of the World. As part of his action to the problem, Thoreau advocated the 'more sacred law' of nature, when these came into conflict with the regulation of human society. Despite the views of both Catlin and Thoreau, very little attention was paid by other ecologists and people in general to this issue Thomas, (2005). Nevertheless the concrete idea of environmental conservation was expressed by George Parkin in the 1960's that provided the first text book on conservation.

According to Jacobson, (2005) et al pleaded for the protection of nature and was successful in the establishment of the Yosemite National Park. In 1872 the United States Congress created the first official national park at Yellowstone. However, it

was not until 1908 that Theodore Roosevelt (President of USA) introduced the term ‘conservation’ to describe all these activities. Environmental conservation started as a popular movement in the 1960s sparked off by student revolts and on increasing awareness of the dangers involved in pollution, population growth and destruction of nature Iraossi, (2006).

Frye, (2005) has attributed the hitherto prevailing environmental interventions problems to several root causes. Religious root cause of some scholars think that early Christian teaching shaped many people’s attitudes towards nature, which in turn fostered the creation of exploitive systems of science and technology that are largely responsible for the destruction of environment. Cultural root cause of other scholars believe that the spread of democracy, which put land ownership and wealth in the hands of many, and the industrial revolution, which made mass production of goods possible and spread wealth throughout society, are roots of the environmental crisis. Biological and evolutionary root causes of human populations, like those of other organisms, expand if there are adequate supplies of resources and no other controls. For humans, technology has greatly facilitated population growth and greatly increased our environmental impact.

Psychological and economic root causes of human attitudes and beliefs are also responsible for many unsustainable practices. According to UN, (2007), Major direct causes of forest clearance and degradation include expansion of agricultural land, overharvesting of industrial wood, firewood and other forest products, and overgrazing. Underlying drivers include poverty, population growth, markets and

trade in forest products, as well as macroeconomic policies. Hermosilla, (2000) argue that, economic growth and affluence which led to excessive consumption, are important underlying causes of environmental destruction in general and deforestation in particular. Forests are also damaged by natural factors such as insect pests, diseases, fire and extreme climatic events. Global biodiversity is being lost at a rate many times higher than that of natural extinction due to land conversion, climate change, pollution, unsustainable harvesting of natural resources and the introduction of exotic species.

According to Edwards, (2006) the proximate causes of biodiversity loss are habitat loss and alteration, overharvesting, and pollution and climate change; while the underlying root causes on environmental conservation interventions are: demographic change, poverty and inequality, public policies, markets, politics, microeconomic policies and structures; and social change and development. Human beings and other creatures depend on the earth's environment and its limited natural resources. The interactions of man with the environment are enormously complex and yet it is human activities that continue to undermine to reduce the support capacity of the latter. Human activities have been noted to be the leading factor in influencing environmental changes.

Gerasimov, (1974) argues about interventions on environment that, mankind has encountered the direct threat of the total exhaustion of natural resources in different parts of the world. The environment is deteriorating due to the emission of substances dangerous to human life. Man is an important factor in the environment. He both modifies it through his actions and has his actions modified by the

environment. In many cases of environmental change it is not possible to state, without risk of contradiction, that it is man rather than other species and nature which are responsible.

Felleg, (1986) emphasises that, human activities take place in conjunction with, not in isolation from, the many processes in nature. People are only one agent of change in a continually evolving environmental system. Given the scale of many of the transformations initiated by human activity and the rapidity with which they take place, they tend to produce significant and highly visible impact on the environment. Therefore, the interaction of man and the environment becomes crucial when dealing with environmental degradation and conservation.

Kaoneka, (2000) explained the relationship between man and environment as an interaction between a 'human-use system' and a 'Natural-events system.' Examination of impact of human society on the environment shows that this relationship is increasingly one of mutual dependence. Thus, in order to preserve nature and the environment the general 'human-use system' of the environment should be understood and monitored Silverton, (2000). Environmental economists argue that, the causes of many environmental interventions lie in the functioning, or rather malfunctioning of the economic system at local, national and international levels. FAO, (2001) contends more that, "we depend on the resources of the environment, for our continued well-being, and therefore, have a vested interest in preserving clean air, lean and abundant water, and health ecological system by ensuring that our activities do not impose undue pressure on these elements".

Gasparotos *et al*, (2008) argue further that, while people are less likely to die from natural hazards, such as infectious diseases and earthquakes; they are more likely to suffer consequences of stress, desertification, air pollution, water pollution and others which all are human induced threats. Population growth is often cited as the main threat to the environment. Apparently human beings have developed the capacity of subjugating all other biological species to their own ends.

Gibson, (2004) notes that, “Many contemporary attitudes and practices were developed when societies were dependent upon the local environment but had small impact upon it. The biblical injunction to be ‘be fruitful and multiply’ and later economic systems which rewarded the exploitation and domination of nature dependent on the assumption that exploitation would not destroy the environments people dependent upon. Rising population, more powerful technology and better scientific understanding have combined to show that the assumption cannot hold”.

Olander, (2008), on analysing the impacts of human beings, particularly the increase in population in relation to the earth and its resources observed that; “.....human population has grown from one million some 2000 years ago to about five billion. Environmental conservation awareness and intervention evolved over time. According to Ozer, (2004) the growth of the movement can be summarised as follows: “The first conservation movement happened between 1890 and 1915. This is the period when environmental resources were allocated by the market system with little regulation by government. Extreme exploitation occurred especially in forest logging areas and at the same time huge fortunes had been amassed from

exploiting resources such as coal and oil. Control of some natural resources was concentrated in the hands of a few rich and powerful capitalists’.

The second conservation movement happened between 1930 and 1950. This period was characterised by the great depression of the 1930s and was due to the failure of market forces in allocating resources among various uses. It was perceived that the combination of economic, social and environmental problems were responsible for the second conservation movement. Massive government intervention in the management of the economy and of environment resources was designed to create better social and economic conditions particularly in the United States of America. Conservation intervention was broadly explained in terms of use and development instead of exclusively preservation.

Activities such as tree planting, terracing of eroded land and construction of dams were widespread. Government intervention also was apparent in agriculture and integration of economic and environment conservation policies. Concern about environmental depletion was widespread in this period. Many countries passed legislation for public funding for environment conservation in the 1930s and 1940s. Notable examples included Sri Lanka (1938), New Zealand (1941), Mexico, (1942) and Kenya, (1942) (Parreth, 2003).

The third conservation intervention happened in the 1960s and 1970s and was characterised by rapid population growth, the dread of likely shortage of basic resource products and the satisfaction of urban – industrial lifestyles. Renewed government intervention in environmental resource issues coupled with enactment of

new legislation and mushrooming of new government agencies in the USA and other countries marked this phase. This period was also marked by the emergence of new environmental interest groups. For example, Lowe and Goyder, (2006) have shown that the number of such groups was more than twice that of any decade between 1966 and 1976.

Lastly, the conservation intervention movement in 1980s was marked by growth in membership and expanding environmental conservation budgets in many countries Pearce, (2005). The focus of the movement included resources management for utilitarian ends and more eco-centric issues. In principle, the movement was seen as a concern for people in developed economics. This view has now changed and according to Perrera, (2000), it is now possible to talk of a global environment movement. This view finds credence in initiatives by organisations such as Tepliz, (2006).

## **2.5 Sustainable Environmental Conservation Interventions**

Sustainability is a critical concept to this debate. The main argument is that present and past rural urban conservation programmes are not sustainable. These programmes have reduced desertification in the area and dependence on external assistance. It is asserted that, such dependence has increased because of the magnitude of the aid, which is channelled through the programme. In that sense, one may question the need for creating environmental conservation development programmes which are sustainable. Hence the need to relate sustainability to donors support in environment programmes.

A large and diverse literature concerned with the notion of sustainable development has emerged in recent years. Many definitions have been suggested and debated, thereby exposing the range of approaches linked to different world views Pearce and Jersuit, (2006). The most publicised definition of sustainable development is that of the World Commission on Environment and Development (WCED) known also as the Brundtland Commission. The Commission defines sustainable development as ‘development that meets the need of the present without compromising the ability of the future generations to meet their own needs’ Kaale, (2011).

The Food and Agriculture Organisation (FAO) defines sustainable development as the management and conservation of the natural resources base, and the orientation of technological and institutional change in such a manner as to ensure the attainment and continued satisfaction of human needs for present and future generations. Such sustainable development conserves land, water, plant and animal genetic resources, is environmentally non-degrading, technically appropriate, economically viable and socially acceptable” Kennet, (2006).

However, it is acknowledged that the operational meaning of sustainability depends on the viewpoint of the observer and in particular on disciplinary and other backgrounds. With the coupling of the environment and development the concept of sustainability has also been tied to development strategies of individual countries. In the “memorandum of understanding on development co-operation between Tanzania and Norway” for example it is stated that, “The major objective of the development

co-operation between Norway and Tanzania was agreed to be the promotion of a sustainable economy that is not dependent on development assistance” URT, (2011).

Various actors could therefore, define sustainable environmental conservation at all levels. This continuity ensures the level of achievement towards environmental conservation in any country. However what creates this ability depends on a variety of factors. It could be argued that in-built capacity within the programme action plans is essential. Consequently the capacity could be included during its course of implementation” Dale, (2010). The pathways to sustainable environmental conservation start from many points of the compass, often unconnected and mutually related. However, to be clear, it is essential to understand the processes and different levels of institutional machinery on which progress depends. The intention is to identify some criterion for a system approach to sustainability.

In this respect De Groot, (2008) cautioned that, there was misconception at policy making level that environmental conservation in the context of local farming systems requires capital intensive measures based on machinery earlier introduced by the colonial administration. Such perception about environmental conservation exists in Tanzania even today. Most prominent environment conservation programmes like HADO and HASHI are capital based, donor financed programmes, aimed at rehabilitating the environment in their specific areas. Environmental conservation has also to be integrated in the farming systems. Thus, the approach to environment conservation at farm level is now changing towards the concept of land husbandry whereby, according to Desvaux, (2008) good farming is seen as good conservation.

Earlier thinking that conservation must from the base for production is being turned around to say that well managed production forms the basis for conservation.

Environmental conservation intervention should not be seen as a separate from the daily farming practices. But rather, farmers have to “improve agricultural production on a sustainable basis through incorporating conservation intervention as an integral part of normal farming practices”. Dietz, (2002) emphasised more that, agriculture, livestock and forestry are three activities which are likely to dominate one’s focus when talking about community participation for sustainable environment conservation in Tanzania. The major reason is that, the majority of Tanzanians (about 87% of the population) are living in rural areas where their basic livelihood depends on those activities. In that regard, Dubey, (2007) insist that, extension and training on conservation intervention should be integrated to include agriculture, livestock and forestry since most farming systems in Tanzania are diversified.

Literature indicates that two systems of livestock husbandry must be considered in environment conservation. System one is zero-grazing where, under zero grazing animal keeping system, grass and other fodder crops are developed and harvested on sustainable basis by cutting and carrying. If animals are allowed to feed directly on the grass plots they will destroy the fodder crops by reducing their ability to regenerate. Zero grazing is however, laborious and is only suitable for few animals. The second system is free range grazing which requires a good land use planning in terms of well developed paddocks demarcated by live fencing to reduce costs. In this regard, they caution on the need “to control the number of animals according to the carrying capacity of the land”.

The second system is difficult to operationalize in Tanzania and especially in the pastoral setting because, as pointed out by them: “the land is most often communally owned without any restriction on the number of livestock occupying the area”. This is exactly the case in connection with accessibility to grazing land in the study area. Another way of undertaking environmental conservation activities as part of daily farm practices is through agroforestry. Agroforestry plays double role in environmental conservation. First, according to them it “offers solution for rural people to meet most of their daily needs in terms of fuel wood, poles, shade, fodder, food and timber”. Once these needs are guaranteed then the possibility of people getting into the natural forests for illegal tree cutting or other needs will be very low.

According to Duclos, (2006) argue also that, “agroforestry also contributes to environment conservation, reduces environment loss and improves environment fertility”. When trees are planted along contours, the roots help to hold the environment together and thus reducing the erosive of falling rain drops. Trees also protect the environment from wind erosion by acting as wind break. In this citation, community participation in generating ideas, planning, and implementation of environmental conservation programmes is encouraged as a cornerstone for socio-economic development of peoples.

According to Nyanda, (1989) community participation in environmental conservation is therefore that it is the way through which sustainable changes can be attained. Technicians, environmental practitioners and extension workers must be read to learn from the beneficiaries as a better way of understanding the local environmental problems. It is also argued that, there must be correct perception at

all levels on what environmental conservation means. According to Nyerere, (1979) emphasised more that, People cannot be developed, they can only develop themselves.

It is possible for an outsider to build a man's house; an outsider cannot give the man pride and self confidence in him as a human being. Those things have a man to create himself by his own actions. He develops himself by making his own decisions, by increasing understanding of what he are doing and why by increasing his knowledge and ability and by his own full participation as an equal in the life of the community he lives in..." Quoted by Kallabaka, (1989).

## **2.6 nvironmental Conservation Interventions by Local Government Authorities**

According to Dunn, (2004) the basis for the theory and philosophy of peoples participation lies in the fact that it is human nature that man can best take pride and value in those things he can himself help to create. In the process of involving himself, he takes account of his own problems, needs, aspirations/ideas and interests and incorporates them in the Programmes, projects and activities that are implemented. Because his ideas have been incorporated, he feels that they are his and is obliged to guarantee their success and continued effective operation. Various versions and perceptions on what participation means have been developed out of this foundation.

Writers on participation often quote the United Nations Economic and Social Council resolution 2004 (LVII) on participation theory. According to Egmond, (2007) the resolution states that, participation requires voluntary and democratic

involvement of people in contributing to development effort; sharing equitably in the benefits developed there from and decision making with respect to setting goals, formulating policies and planning and implementing economic and social development programmes.

The idea that is emphasized in the participation theory is that, the needs and development priorities of stakeholders constitute the core of a participatory programme. In such programmes the stakeholders are not only the means, but they are also the ends beneficiaries. Community participation is defined by Elhag and Walker, (2009) as an active process by which beneficiary or client groups influence the direction and execution of development project with a view to enhancing their well being in terms of income, personal growth, self reliance, or other values they cherish. It is a fact that stakeholders in a certain local environment are better informed about the type and magnitude of their problems than outsiders. Hence, if one is to have a correct perception of the local problems, he/she should work in collaboration with the Local Government Authorities, as pointed out by Ellis et al, (2003) participatory approach encourages discussions. In so doing, innovators and target groups exchange information, innovators get chance to know their clients, respect their views and learn from them, share their problems and fears and then bridge the existing gaps.

Encouraging participation of Local Government Authorities in environmental conservation programmes makes them feel that the programme is theirs and it is geared towards improving their lives. It follows logically that, if certain environment conservation programme originating from outside does not exist and

operate according to people's expectations, and then it may be rejected by the same people by not taking part in it. Mkwizu, (1990) argues that: "... no matter how good a plan is, if the people for who it is made do not feel it belongs to them, it will not work successfully"..

Hence, if Local Government Authorities are participating willingly in environmental conservation programme, it means they like it because it addresses their problems. That is, they are aware of the extent to which their needs are taken care of by the programme. At this juncture it is important to realize that environmental conservation programme can also be implemented by hired labour as long as the resources are available. But Fadhila, (2007) insists that: "... Continuity can be guaranteed if local people that is, the implementers are involved and have continued interest in what is being planned".

There is, therefore, nothing that can substitute the role of the Local Government Authorities in community based programmes if the changes or benefits are to be sustained. While emphasizing on stakeholders participation for sustainable environmental conservation, Farkler et al, (2007) pointed out that, it has been suggested that local knowledge of the farming community must be utilized in environment management and this must be the way forward for environment conservation planning in developing countries. If this approach is taken, the main criteria for the introduction of environment conservation planning must be the perception of the environment exploitation problems by farming communities and individual farmers, rather than by expert.

All these projects have adopted community participation strategy in order to ensure their sustainability. Initially, HADO was very much centralized in its approach, but it later came to be realized that without community participation, no true environmental conservation could be sustained. The implementation strategy of the programme had to be changed, to make it more participatory. It is the Local Government Authorities that make these projects continue operating and produce the desired benefits to the community after donors have withdrawn.

## **2.7 Empirical Literature Review**

Environment in the World, Sub-Saharan Africa (SSA) and other tropical areas provide many products and other services of direct benefit to mankind Grimm, (2008); FAO, (2007). The products include; fuelwood, charcoal, round wood, sawn wood, wood based panels and paper while the NWFP consist of game meat, medicinal plants, fodder, latex, beverages, dyes, fibres, gums, resins, oils, beeswax and honey, tannins and toxins. Other benefits which accrue from the environment include: watershed functions, maintenance of environment fertility, conservation of biodiversity, sustaining cultural values, climatic amelioration and eco-tourism Geist, (2001).

Despite all the invaluable goods and services provided by environment however, their destruction is still going on, which contribute significantly to the current environmental or environmental depletion. Environmental depletion, being an insidious process characterized by decreased land productivity and loss of biodiversity threatens the livelihoods and environments of many of the world's poorest people Lundgren and Taylor, (1993); quoted by Gravetter et al, (2004). The

reason for such interest include disappearance of natural cover, environmental problems, scarcity of natural products, large areas of potentially productive lands decreased in a highly degraded state, decreased infiltration and water retention capacity, increased runoff and disrupted hydrological cycles, increased sediment transport and water pollution, siltation of dams and destruction of coastal and marine environments, increased inequality of access to resources, poverty, hunger, social unrest and famine Barraclough and Ghimire, (1996); Ayoub, (1998); quoted by Montagnini, (2000).

Despite all these efforts which attempts to rehabilitate degraded lands and ensure sustainable exploitation and management of the existing natural resources, however, evidence exist shows that a number of local governments and international bodies of the projects have failed to meet their planned objectives mainly because they addressed symptoms rather than causes or used unfavourable approaches to the targeted local communities who are end-users of forest products. Also most of the existing land conservation efforts of the schemes tend to focus on biological aspects and pay inadequate attention to the socio-economic viability of the system. The major direct causes of uncontrolled deforestation and environment degradation in the sub-humid lands are settlement and agricultural expansion, overgrazing, fuelwood and charcoal production, uncontrolled fires, commercial logging, development of infrastructure/industry and refugees Mualuko, et al (2007).

## **2.8 Environmental Conditions in Tanzania**

Tanzania covers an area of 945,000 sq km<sup>2</sup> and is one of the Africa's most ecologically rich countries. The diverse climatic and physical conditions range from

arid, semi-arid, and mountainous areas of afro-alpine vegetation, woodland and dry land savannah. About 40% of Tanzania is covered by forests and woodlands, which host various types of ecosystems. Tanzania's eastern coastline extends about 240km north to south along the Indian Ocean. This is a very important part of the resource heritage of Tanzania. These forests are almost entirely on upland high rainfall areas. They are important for biodiversity, for catchment and hill slope and for protection and carbon retention. Additionally, there are several lakes, rivers and swamps, which contain diverse types of aquatic life Munishi, and Mbilinyi, (2009).

Degraded lands severely impacted by intensive and/or repeated disturbance may still provide a wide range of products (i.e. fuelwood, poles, and cattle grazing) and services of value to local community for subsistence and cash income. Caution, therefore, needs to be exercised in the identification of degraded land, its importance to local communities and the need for and methods of conservation and management. Conservation, if required should also seek to identify and enhance the ecological and socio-economic value of such lands to local communities and not deprive them of existing benefits.

It is increasingly recognized that, the traditional conservation method (i.e. monoculture plantations of exotic species) may not be appropriate in all instances or for all purposes Mugasha, (2004), though silvicultural techniques are better-established and short-term productivity and economic benefits may be high. The transformation of degraded sub-humid lands into rehabilitated natural woodlands rather than into monoculture plantations of exotics is more suitable in the following cases: to meet the diverse product (e.g. fuelwood and fodder) needs of the local

people, to supply valuable indigenous forest species as supplies decline with the depletion of primary woodlands, to restore ecological values including biodiversity, watershed functions and environment stabilization, the facilitation of natural succession processes can be a relatively cheap method of reforestation and may therefore be particularly suitable for establishment by local resource-poor people.

These driving forces along with increasing local government empowerment enhance the interest in and scope for rehabilitating some sub-humid degraded lands to natural woodlands or forests that may be better suited to serving local community and environmental needs, as compared to monoculture plantations of exotics. However, such needs are more often met by establishing plantations of mixed species (both native and exotic as desired), though silvicultural knowledge on mixed species is still limited Chokkalingam et al., (2001).

Proper management practices, plantations on degraded lands facilitate natural succession processes and increase biodiversity. Usually, species-rich understories of native trees develop inside plantations, which can be manipulated along with the plantation tree species to develop into a new and diverse forest Yirdaw, (2002). Tree species, which are more effective for erosion control ought to be included in forest plantations and especially in plantations established on steep terrain.

The report by Parotta, (2002) indicates that, in the case of plantations established primarily for conservation of severely degraded sites, watershed stabilization, and/or native forest restoration, additional knowledge of how planted trees can facilitate, or inhibit, natural succession processes that lead to the development of structurally

diverse and functionally stable forest ecosystem is also needed. Enrichment planting may also help trees to occupy the site more quickly but the growth of these trees is slow relative to the growth rates of the weed species.

Intervention by enrichment planting has the following advantages Malimbwi, (2003) and Murdyarso et al, (2006): partial preservation of internal microclimate and environment protection by the initial growing stock, shade demanding species can be regenerated, a natural all-aged secondary stand rich in species can be preserved under the upper story formed by the valuable tree species when this or these grow older, due to small quantity of plants required, the material and field planting costs are low. Enrichment planting, however, may not be a feasible technique because there are considerable expenditures due to the indispensable intensive tending of young stands and protection from fire. Restoration by native forest regeneration is cost-effectively be achieved through abandonment of degraded land and subsequent natural forest succession. In recent years, there has been consideration of management options to accelerate recovery and restore productivity, biodiversity and other values. There is strong evidence that plantations can facilitate forest succession in their understories through modification of both physical and biological site conditions Mvungi, (2007).

Changes in light, temperature and moisture at the environment surface enable germination and growth of seeds transported to the site by wildlife and other vectors from adjacent forest remnants Mwambapa et al., (2007). Although seed dispersal by animals is the predominant form of dissemination of proper seeds in many tropical regions has the potential to facilitate native vegetation degraded sites, the presence in

a given site of relevant traits for attracting seed dispersers e.g. the availability of perches, structural complexity of the vegetation and the presence of food resources, especially fruit, as an attractant is very crucial Mwanri, (2007). Tree plantations with these traits will be particularly attractive to animal seed dispersers and, therefore, will have higher rates of seed rain than plantations lacking these traits.

The efficiency of animal seed dispersal to restoration sites can, however, be limited by the degree of isolation from a seed source, animal seed dispersers in the region and by large seed size Mwero, (2002). In highly degraded regions where seed sources may be isolated and animal dispersers rare, restoration will require direct sowing or planting. However, even under the best of conditions with a full complement of animal seed dispersers and nearby seed source, large seeded species, because of their immobility, should be planted if a full return to primary forest is desired Musvoto, (2008).

Forest conservation on degraded lands can, however, be greatly accelerated if fires are efficiently controlled. Presently, the best agricultural lands in the country are densely populated which in turn results into its degradation, making the environment unfit for cultivation. Deforestation, which is taking place at an alarming rate, has augmented the magnitude of desertification and adversely affected environment fertility, water catchment areas and water flow. Discharge of untreated effluent continues to pollute the ocean, lakes and rivers, thus making water unfit for human consumption and destroying the aquatic habitats Nduwamungu, (2001).

The sustainable supply of fuel wood is estimated at 19 million cubic meters per year while consumption is estimated at 43 million cubic meters. Some example of very feasible and quantifiable loss of woodland occur-around Dar es Salaam, where wood and charcoal is now often brought from over 150 km. In other areas, woodland is being converted to agriculture or grazing and the trees burned off as part of the clearing process NEMC, (2005). The border regions of Kigoma and Kagera have been severely affected by large concentrations of refugees from Rwanda, Burundi and the democratic republic of Congo (former Zaire). Refugees related environmental problems have had a negative impact on the quality of life of refugees and the host population. The problems include uncontrolled tree felling for firewood, construction encroachment on arable agricultural land, pollution and over use of water supplies and poaching Njuki, (2001).

An effective environmental conservation and management of Tanzania's natural resources is crucial for sustainable development and livelihoods of the people. In this regard, adequate and appropriate attention to environmental issues is paramount. This is because environmental problems and resource use conflicts are on the increase and are adversely affecting the socio-economic well-being of the Tanzanians. According to NEMC, (2006) conference on implications of climate change in Tanzania noted that, the country had started experiencing severe impacts of climate change with drought and imminent threat of famine in many areas, unprecedented long dry spells that resulted into the drying up of often-reliable water flows in the Pangani and Great Ruaha Basins both for hydroelectric power generation and fishing. Environmental sustainability is increasingly being linked to

the fight against poverty in the country. The poor are most vulnerable to the negative impacts of environmental challenges such as climate change. In many instances, the poor depend highly or wholly on natural resources, and unsustainable utilization of resources such as environment, water and forests, have resulted in environment erosion, deforestation and reduced water retention in the environments OECD, (2005).

Sustainable development, therefore, requires a strategic approach that ensures that all stakeholders undertake a combination of mutually reinforcing priority actions on all the main fronts toward common environmental objectives. Achievement of desired objectives must draw on the analysis of the interactions among sectors and interest groups of the integration of environmental, economic, and social perspectives Mwanri, (2007).

According to Kulindwa et al., (2000) pointed out that, for Tanzania, the major factor preventing the rational use of natural resources has been lack of integration of environmental concerns into economic policies, and argued that there is a serious and immediate need for awareness building for politicians and government leaders in Tanzania to protect the environment and biodiversity. The environmental problems should be tackled at local, regional and global scales Romer, (2006).

The global challenge is how to reduce humans' conspicuous and unsustainable consumption of planetary resources with the view of alleviating its consequent impacts on the environment. Despite the fact that it is one of the main factors influencing humans' impact on the environment, the population increase problem

has rarely been addressed. The response to the problem is at variance between developed and developing countries and this can be explained by the economic theory of reproduction which is based on the economic way of looking at behaviour.

According to Tepliz-sembitzky, (2006) asserts that reliance on traditional fire wood is not only the result of poverty, but it may act as a barrier to poverty alleviation or may even be a factor contributing to adverse living conditions. Poor households in Tanzania spend between 28-34 % of their income for cooking and lighting energy USAID, (2008). Miombo woodlands which constitute 90% of all forested land in Tanzania are the main source of fire wood Kilahama, (2005) and constitutes 70% of total urban wood fuel and energy requirements and consumption with consequent adverse to environmental impact.

According to Zahabu et al., (2007) stressed that, Tanzania is facing serious environmental problems due to high levels of deforestation, pollution, land and forest degradation, erratic rainfall, declining hydrological balance, loss of biodiversity and destruction of aquatic systems. Luoga et al., (2000) asserted that, before independence in 1961, the forest cover was 50% of total land area in the country. In the late 1970s, it decreased to 45%; in mid-1990s it further decreased to 41% and in late 1990s it was just 36% of total land area. Charcoal consumption is a real threat to the long-term persistence of forests in Tanzania Lusambo, (2002). According to Malimbwi et al., (2001), wood fuel consumption is the main cause of deforestation in Tanzania: is responsible for degradation of 25% of closed woodlands and deforestation of 20% and 51% of closed and open woodlands respectively, findings which are, however, at variance with other studies conducted

in Tanzania Misana, (2003) which found that agriculture is the dominant factor in miombo woodland change.

According to Monela and Abdalla (2007) conservative estimates indicate that, Tanzania has forests and woodlands occupying a total of 33.5 million hectares of the land area, they comprise of high closed forests, closed and open Miombo woodlands, and coastal mangroves. Out of 33.5 million ha, 12.5 million ha are set aside and gazette as production and protection forests and woodlands reserves, of which, 11.9 million ha are under the central government's Forestry and Beekeeping Division and 0.6 million ha are under village council (local governments). This implies that, about 21 million ha of forests and woodlands are unreserved forest lands under private management by farmers, which have become to be known as forests on general land. As for the aspect of forest resources management, Saucer and Abdalla, (2007) reported that, Miombo woodlands in Tanzania are managed as general land forests, family forests, forest reserve under government management, and local authority reserves which are under local district authority. Zahabu et al., (2007) further explained that, 47% of Tanzanian forests are under reserve forests, 6% are in National parks and 47% are unprotected forests in general land.

In Tanzania, the lives of Citizens are intimately linked with the natural environment and harmony is required in this linkage. There is therefore a need to strive to manage the environment and its natural resources in ways that enhance the potential for growth and opportunity for present and future generations. A healthy economy and a healthy environment go hand in hand, and both are needed for our survival and

prosperity Mariki, S. et al (2003). In the mainland Tanzania, about 50% of the total land area is forest and woodland, 40% is grassland and scrub and 6 to 8% is cultivated. The following table demonstrates the patterns of land use in Tanzania URT, (2007).

**Table 2.1: Tanzania Land use Pattern in terms of Hectors and Percentage**

Land Use	Ha (Million)	Percentage
Small holder cultivation	4.1	5
Large scale agriculture	1.1	1
Grazing land	35.0	39
Wood land and Forest	44.0	50
Other land use	4.0	5
Total	88.2	100

**Source:** NEAP, (2009).

A large proportion of western and central woodland is the tsetse fly infested. Forests are also important resources, which are environmentally significant. Grassland and scrub includes most of the range land area of the country and supports a total of about 15 million cattle and 12 million sheep and goats. However, almost 60% of this livestock holding is concentrated on 10% of the land in the north and central parts of the country URT, (2003). Biodiversity is one of the country's greatest assets. Tanzania is among the five most diverse countries in Africa in terms of mammals, birds, and Swallow tail butterflies. For plants it is the second in Africa. But the country is also important for endemic species that is species that are found nowhere else.

Important sites for endemic species include the Great Lakes for fish and the “Eastern Arc” mountains, where one quarter of the surveyed flora is endemic Wardle et al, (2005). The major energy resources are woodfuel, hydropower and coal. Petroleum imports supplement these national resources. The country depends heavily on woodfuel for primary energy use. Coal reserves are estimated at 2,200 million tons but little exploitation has yet taken place Nkwilima, (2000).

**Table 2.2: Exhibits the Major Sources and Percentage Use of Energy in Tanzania**

Energy Source	Percentage of Use
Woodfuel and Charcoal	90
Oil fuel	8
Electricity	1.6
Coal and others	0.4
Total	100.0

**Source:** Nkwilima, (2000)

Although minerals account for only a small part of GDP, they however, have important impact on the local environment. But energy source review made in 2012 revealed that, electricity account 94%, minerals 6.0%, and oil fuel account 6.8% of GDP URT, (2012). The government has identified six major categories of environmental problems in the country. These problems include; environmental depletion; lack of accessible to quality water; air pollution; loss of wildlife habitats and biodiversity; deterioration of aquatic systems; and deforestation.

## **2.9 National, Sectoral Policy and Laws Response**

The national policy on human population adopted in 1993 does recognise the close link between the demographic characteristics, the quality of the environment and the availability of social services. The 1985 national policy on science and technology was revised in 1993. It recognises essential links between sustainable development and sound environmental management. It therefore, stresses the protection of the environment and national utilisation of natural resources through a set of objectives. The policy also, stresses the need to promote new and emerging technologies with the view of acquiring capability and capacity to embark on technologies that will accelerate the national economy.

The National Environmental Policy (1997), The Agricultural policy of 1983, A revised Mineral Policy Document (1993) and A revised Forest Policy (1993) are also designed to support sustainable natural resources management. A number of sectoral policy initiatives are also underway, particularly in agriculture. put forward objectives related to environmental conservation. Policies on livestock management and destocking were based on restoring degraded range land. The Ministry of Agriculture has developed a draft National Environment and Water Conservation Program (NSWCP) which sets out policies and strategies for dealing with environmental depletion and better agricultural water use. The Ministry of Water and that of Energy and Minerals have policies for energy conservation including efficient use of charcoal as well as for water provision URT, (2009).

In recognition of the above, this policy has identified five priorities including the need for further reservation of forest and proper management of natural forests,

involvement of other institutions besides the government in tree planting, promotion of research and education URT, (2010). The Government of Tanzania (GOT) also admits, in this policy, that the country needs to adopt environmentally sustainable natural resource management practices in order to ensure that, long term sustainable economic growth is achieved World Resource Institute, (2005). It can therefore, be concluded that, the country's long-term economic growth is dependent among other factors, upon its coherent natural resource management World Bank, (2002).

## **2.10 Environmental Conservation Using Agro Forestry**

Reclamation agro forestry involves planting trees on degraded forest land with the objective of checking further erosion and restoring environment organic matter and fertility status which is selectively removed and agricultural production introduced Wood, (2000). However, time is needed to build-up the enlarged plant-litter-environment nutrient cycle Kessler and Wilson, (2007), a period during which exploitation of the vegetation should be very low with necessary protection from grazing. The initial tree removal can be along contour aligned strips, with belts of trees remaining in between, leading by stages towards hedgerow intercropping Wilson, (2002). Other options include fodder incorporation along strips or multi-storey systems Young et al, (2003).

Studies in Tanzania by Baranyi, (2001) demonstrate that the Sambaa people use their traditional agroforestry and intercropping systems to improve environment productivity and crops yields. This traditional agroforestry system consists of the multi-storey tree garden, which involves the mixing of trees and farm crops in a spatial arrangement. The system includes a spatial mixture of an under-storey of

coffee, food crops such as maize/beans and a variety of pulses, a middle storey of *Grevillea robusta*, a multipurpose species commonly used for timber, fuelwood and building poles production. Ongoing practices in Dodoma and community-based management are among the successful land conservation. Deforestation and desertification in Kondoa, however, is a well-known example of failure by the Tanzanian government, colonial rulers and HADO Project.

In the past, Dodoma region, Tanzania had been extensively forested with woodland and bush land species such as *Acacia*, *Brachystegia*, *Albizia*, *Commiphora* and *Dalbergia* species. However, massive deforestation through shifting cultivation, tsetse flies control campaign in early 1920's and most recently extensive grazing led to environment fertility decline and degradation and the subsequent low crop yields, shortage of dry season fodder, scarcity of fuelwood and construction poles and severe wind and environment erosion MNTE, (1995). The report by Kamwenda (2000) indicates that between 20 - 30% of the livestock in Tanzania are found in Dodoma where 18% of the land is utilized for livestock keeping.

According to projections by Kaale, (2005), Chamwino district in Dodoma region has the highest number of livestock totalling to 2,404,627. The pressure on grazing land in Dodoma is quite intense and will continue to become worse due to the high annual growth rates of livestock of 3-5%, short duration of grasses and lack of multiple land use planning MNTE, (1995). The magnitude of environmental degradation and its subsequent effects due to overgrazing and haphazard exploitation of rangelands forestry resources seem to have overwhelmed the indigenous people who previously used to live harmoniously with these vital environmental resources (Khan, 2005).

Results in those Study Selected Councils attempted to alleviate the dry season fodder supply shortages, conserve and protect environments and reclaim degraded land Kilahama, (1994) the Wagogo agro pastoral community use their indigenous silvopasture technology. Studies by Lenzen, (2006) indicate that, the Dodoma Municipality, Chamwino and Kondoa District Councils has the potential of improving the ecology of the site where trees enrich the environment surface through decomposition and mineralization of their litters. The extensive ground cover of shrubs, grasses, herbs and forbs also help prevent environment degradation and facilitate water infiltration and percolation by reducing surface runoff and increasing environment water storage.

There is increasing evidence that Dodoma Municipality, Chamwino and Kondoa District Councils are a widespread and very popular system among the Wagogo of Dodoma region since 1920's. Dodoma Municipality, Chamwino and Kondoa District Councils regarded, as traditional dry season fodder reserves Otsyina and Asenga, (1994) are farmer led initiatives that evolved out of the traditional strategies in grazing. It encompasses retaining of an area of standing hay until the rain season ends; the area remains closed to livestock at the onset of rain season and opened up at the peak of the dry season to allow the livestock get dry season fodder Ongunbameru et al., (2003). Grazing under Dodoma Municipality, Chamwino and Kondoa District Councils normally starts from July and August of the year after crop residues and forage in fallow areas have been depleted; and animals are removed from those study councils after all the fodder is exhausted or when fodder becomes available URT, (1994).

Dodoma Municipality, Chamwino and Kondoa District Councils vary from 0.2 to 20 ha with an average of 20 ha. Communal land on the other hand, in those study areas is established with mutual consent of village members and, they consist of large areas of 10 to 20 ha with an average of 50 ha. The communal land in those areas established during Ujamaa villages Odada, (2009). Individual or private land in those areas is located around homestead along lowland river ways and on-farm lands away from homestead. Homestead locations are more preferred for calves, oxen and lactating cows grazing during the wet season Brandstrom, (1999).

Dodoma Municipality, Chamwino and Kondoa District Councils on farmland serve several purposes including the provision of fodder during the dry season, environment restoration through fallowing and nutrient cycling and protection of land ownership rights. Individual ownership pattern of Dodoma Municipality, Chamwino and Kondoa District Councils proved to have very positive implications in management, improvement and development, as farmers had been more willing to undertake development work on their own land Bowling, (2005).

To ensure prolonged availability of fodder in those Councils during dry season and minimize environmental depletion, the Wagogo also developed various rotational grazing management strategies Malcom, (1953). The most common system presently used can be described as progressive deferred grazing which involves demarcation of paddock for specific periods. Upon completion of fodder on particular paddock, animals are moved to a fresh paddock. Duration of grazing on a paddock depends on its size, availability of fodder and the number of animals Buttler, (2006).

In communal paddocks and movements of animals between paddocks is controlled by well informed and experienced elders, who apparently make management decisions on specific indicators such as level of utilization and availability of fodder. The virtue of their composition mainly trees, shrubs, grasses and their interaction with livestock constitute an ideal agroforestry system capable of eliminating most of the fodder shortage, fuelwood and pole scarcity and environment degradation constraints Buxton, (2007).

The traditional system together with the underlying ecological and management concepts, therefore, provide a valuable opportunity and a basis development of sustainable silvo-pastoral agroforestry systems in Wagogo-land Carter et al., (2000). The extensive farmers and animal keepers' indigenous knowledge about the values of trees and grasses, ecological bases of those Councils location and management and general acceptance of the system provided potential tools for developing parallel agroforestry technologies such as fodder banks and improved fallow systems Convery, (2007).

In addition to the development of sustainable silvopasture systems, it is also possible that, the study Councils system analogy could be valuable for developing other agroforestry technologies on croplands, which could combine fodder production as well as environment fertility restoration in space and time Cogoy, (1999). Despite the great role played by those Councils in reclaiming degraded lands this system is presently confronting problems of land scarcity, invaders, encroachment, land insecurity, fire hazards, conflicts, overgrazing, and low quality of fodder during the

dry season attributable to low availability of quality fodder species and the land restrictions by Government laws Chamshama, (2002).

## **2.11 Environmental Conservation Challenges**

The government has identified six major categories of environmental problems in the country. These problems include; environmental depletion; lack of accessible to quality water; air pollution; loss of wildlife habitats and biodiversity; deterioration of aquatic systems; and deforestation. The problems below impact negatively on the economy and well being of the people of Tanzania Musvoto, (2008).

### **2.11.1 Environmental depletion**

Human impacts on deforestation, environment erosion, overgrazing, and degradation of water resources and loss of biodiversity have all resulted into environmental depletion. Poor agricultural practices such as shifting cultivation, lack of crop rotation practices, lack of agricultural technology and land husbandry techniques exacerbate the problem Nkonoki, (1983). Liviga, (1999), contends that the effects of overstocking, which are localized, give rise to serious degradation in places such as Shinyanga and Mbulu where livestock units have exceeded the carrying capacity. This situation is seen as a good indicator of each of capacity for the decentralized institutions at the local level to enforce laws and instruments which are meant to ensure sound environmental management.

The productivity of environments has been considerably reduced in many parts of Tanzania. Agriculture and rangeland resources are the backbone of the Tanzania's economy. It is estimated that, about 55% of the land could be used for agriculture

and over 51% for pastoral lands. However, only about 6% of the agricultural land is a cultivated with the practice of shifting cultivation which causes deforestation and environmental depletion on the pastoral land. Lake Manyara basin, Geita Gold Mines, Usangu Wetlands and Ngorongoro Conservation areas have been affected the most by inadequate control and land management O'brien, (2000). The main cause for these problems is due to inadequate implementation of proper instruments of enforcement of the existing legislation, policy and by-laws by local authorities. Again where the mandates of central and local institutions on environmental management are weak, conflicting and confusing; enforcement of laws and implementation plans becomes difficult if not impossible (URT, 2011).

With respect to mineral resources, a Joint Appraisal Mission Report (1999) noted conflicting authorities on matters regarding mineral prospecting and mining. Additionally, local authorities have a minimal role in the mineral resource management process, despite the fact that mineral depletion is occurring in the local communities' area. Any attempts made by local authorities to make by-laws imposing mineral levy such kind of by-laws have been met with an "outcry of double taxation" by mineral concessionaires against both the central government and the local authorities (URT, 2005). The Tanzanian economy depends upon mineral resources for a major source of its revenues. However, mineral exploitation is often done without regard to environmental and social impacts. Thus the Mining Act of 1998 addressed this problem and required mining companies to conduct environmental impact assessments. Mining activities are the major cause of environmental degradation by deforestation, destruction of habitat, loss of

biodiversity and general damage to the land URT, (2012).

Environmental depletion also results from the removal of wood, vegetation especially when the rate of removal is higher than the rate of regeneration. Only 3.2% of Tanzania is covered by closed sense forests. The remained forests comprise mainly of Miombo woodlands and large areas of thorn-bush. The need for more land for agriculture, increasing demand for fuelwood, charcoal, tea-drying, tobacco curing and wood for rural and urban industries, have created an unsustainable environmental situation (Edward, 2003).

#### **2.11.2 Lack of Accessible, Good Quality Water**

The issue of water shortage is one of environmental health and the ability of people to work productively. Water shortage for families is directly linked to water quality example, the more remote from a safe water source that a family lives, the more likely that water consumed was polluted. In rural areas, water quality is compromised by too many people using untreated and often unprotected sources of water and in urban areas these problems are compounded by the presence of untreated or poorly treated industrial waste discharge and Sewage. Cholera, typhoid, and dysentery are the result of this situation and a major cause of illness and mortality. All this is an effect of poor environmental conservation as population grows Dunn, (2004).

Consumptive water use in Tanzania can be classified into irrigation use of 89%, rural and urban domestic use of 9%, and industrial use of 2%. The poor especially those who live in rural areas have limited access to clean water for domestic use, crop

production and adequate sanitation. Only 54% of the population has access to improved water supplies and 24% have access to adequate sanitation. Ground water is often contaminated by leaking toxic drainage systems and surface water contains harmful bacteria and often human waste, and people have no choice other than utilize this unsafe water leading to high prevalence of water borne diseases. Such diseases account for over half of diseases affecting all population, and 80% of diseases affecting rural population. As a result, 20,000 children die before the age of five each year due to water borne diseases. About 92% of the urban population lives in the poverty stricken slums. The urban population is fast growing and has overburdened the water services; in consequence “only about 70% have access to reliable water supply”. The situation worsens when there are diseases like AIDS pandemic and cholera, which require extra quantities of water (Drigo, 2006).

### **2.11.3 Environmental Pollution**

Pollution is a major problem in urban areas of Tanzania. Improper treatment and disposal of solid and liquid wastes are the major contributors to urban area pollution. The combined results of these problems are that both air and water have been contaminated with pollutants, which are detrimental to human health. In Dar es Salaam, for example, less than 5% of the population is connected to a sewage system. Where a sewage system exists, raw sewage is discharged directly into the Indian Ocean without prior treatment. Thus a workable water supply and sewage treatment is needed for the urban areas (Dolfma, 2002).

Pollution problems in the country include urban pollution, industrial pollution, rural pollution arising from agriculture, mining pollution and coastal pollution. Poor

sanitation, inadequate solid waste disposal, poor domestic and industrial effluent discharge and treatment, poor disposal and lack of treatment of industrial wastes, and emissions cause urban pollution from industries (Abrahamse, 2007). Environment pollution from agriculture is mainly due to the use of agrochemicals, livestock, and drugs. Major environmental problems related to mining include local deforestation and environment erosion, air and water pollution, and disturbance of vegetation and wildlife. Coastal pollution arises from oil spillage and sewage. Waste disposal is a serious problem in both ocean and lake shores (Arnold, 2001).

#### **2.11.4 Loss of Wildlife Habitats and Biodiversity**

Tanzania is one of the world's great reservoirs of wildlife and biodiversity. The extensive national parks housing savannah and grassland fauna and flora are well known. It is also, one of the few countries with vast number of wildlife resources. For example, Tanzania's "protected areas" cover about 25% of the total land. The protected land is comprised of national parks, game reserves, game controlled areas and the Ngorongoro Conservation Area Nations, (1988)

The "Eastern Arc" mountains, wetlands, the coastal forests, marine and fresh water, ecosystems, are also habitats with outstanding reservoirs of plant and animal species. A full biodiversity profile of the country has not been worked out yet, but available statistics indicate that of the 10,000 plant species so far recorded, over a quarter are endemic. The forests of Tanzania also harbour 32 endemic amphibians, 18 endemic species of lizard, a species of snakes and birds. There are a number of wild varieties of several cultivated crops including coffee, rice and millet. Tanzania has 40% of the world's wild coffee varieties and about 80% of the famous African violet flower

plant species. The oceans, rivers and lakes contain many species of fish, including about 600 fish species in the coastal waters and 700 species of fish in the rivers and lakes (Azar, 2003).

Tanzania is also famous in terms of games. The selous game reserve has the largest concentration of Elephants in East Africa. The tree-climbing lions of Manyara national Park are unique throughout the world. While the nation has been a leader in the designation of protected areas, Tanzania Wildlife resources and habitats are under threat. In some areas the threat is due to fragmentation and loss of critical ecosystem linkages, in some cases species are being over exploited. But, in many areas, the problem has age-long conflict between the Wild and stakeholders (OECD, 2005).

In the Eastern Arc Mountains there is a considerable local pressure to extend agriculture at the expense of forest, often for very short-term gain. Poaching is also a concern. A major problem is that while at the national level reserves are created and legislation passed, the concerns of local people often do not appear to be addressed. Although Tanzania has committed about 25% of her land area to protected area network, many times these protected areas have been created without consideration of the demand of the surrounding communities (grazing area, fuel wood, water etc). Neither is the surrounding communities benefiting from the proceeds accruing from the protected areas. As a result, local people have no incentives to respect protected area boundaries, and frequently disturb habitat through land clearance and natural resources extraction, and take wildlife for their own-uses, such as food, skins, and to sell for profit (Palo, 1995).

Unfortunately, communities living around these protected areas do not benefit from the wildlife industry. They live in uncertain conditions visited by persistent attacks by the wild animals and destruction of their crops. This has resulted in an antagonistic relationship between the wildlife authorities and the local populace. Local communities resort to activities like poaching to gain access to and benefits from the wildlife and other natural resources. This is a direct result of the central government excluding local communities from wildlife management (Olander, et al 2008).

#### **2.11.5 Deterioration of Aquatic System**

Aquatic resource of Tanzania includes marine and fresh water ecosystems, mangrove forests, coral reefs, grasses, wetlands, lakes and rivers. These resources provide the livelihood of a significant part of the population; they are also an important food source; and they also contribute to the tourist industry (O'brien, 2000). Concerns over aquatic resources in Tanzania arise because of such practices as environmentally destructive fishing using dynamite, excessive trawling, chemical poisoning and use of small mesh size nets. The destruction of coral reefs, which are critical habitats of marine organisms, is a cause of great concern. Beach erosion, coastal pollution from environment spillage and sewage, and uncontrolled felling of mangroves are also major environmental concerns (Odada, 2009).

Climate change threatens the productivity and sustainability of river and lake basins' resources and socio-economic activities, thus affecting water supply for power generation, irrigation, domestic and industrial use. Many lake basins, which form important components of the ecosystems, have also been affected by the adverse

impacts of climate change. Water levels of lakes like Victoria, Tanganyika, Rukwa, Manyara and Jipe have been reported to drop significantly. For example, like Rukwa has receded by about 7 kilometres for the past 50 years (Price, 2004).

#### **2.11.6 Deforestation**

According to Price, (2006) conservation estimates indicate that, Tanzania has forests and woodlands occupying a total of 33.5 million hectares of the land area. Out of 33.5 million ha, 12.5 million ha are set aside and gazette as production and protection forests and woodlands reserves, of which, 11.9 million ha are under the *central government's* Forestry and Beekeeping Division and 0.6 million ha are under village council (*local governments*). This implies that about 21 million ha of forests and woodlands are unreserved forest lands under private management by farmers, which have become to be known as forests on general land. Extensive miombo woodlands are unique forest ecosystem are available in this huge forest resource endowment, and are potentially a very useful frontier for economic development.

The Tanzanian government has three main challenges, which require concerted and unprecedented efforts to accomplish; Realisation of its development vision 2025 which strives to see to it that by the end of 2025 Tanzanian society will be free from poverty and will have graduated from a group of least developed countries to that of middle-income countries, with high level of human development; Achieving 8 MDGs at latest by 2015: eradication of extreme poverty and hunger, achieving universal primary education, promoting gender equality and empowering women, reduction of child mortality, improving maternal health; combating HIV/AIDS, malaria and other diseases; ensuring environmental sustainability and developing

global partnership for development and; Fulfilling the international commitments which Tanzania has acceded to sign and ratify such as; atmosphere-related conventions – Vienna convention for protection of ozone layer, Montreal protocol for eliminating ozone-damaging substances and United Nations Convention on Climate Change (UNFCCC) ; biodiversity conventions – Convention on biological diversity, Convention on international trade of endangered flora and fauna species (CITES), International plant protection convention & Lusaka agreement on cooperative enforcement against illegal trade of wild flora and fauna; desertification convention – International convention to combat desertification; and hazardous wastes convention, Basel convention on the control of trans-frontier movement of hazardous wastes and their disposal, and Bamako convention on the ban to import into Africa and control of trans-boundary movement and management of hazardous wastes within Africa Price, (2010).

## **2.12 The Role of Environment in Millennium Development Goals**

The role of forest ecosystems in supporting human-well being and poverty reduction notwithstanding, the value of forests as means of addressing the MDGs is often underestimated Barrow et al., (1999). Lovett, (2007) underlines that, forest resources evidently contribute to poverty mitigation – saving as subsistence ‘safety nets’ or low income ‘gap-fillers’, and poverty reduction – helping to lift households out of poverty by increasing assets, services, civil and political rights, voices and rules of law – such contribution calls for greater recognition of the value of sustainably managed forest in the national statistics and accounting, and investment and decision making Barrow et al., (2007); Meyers, (2007). Meyers reckons that, among MDGs

available, the MDG7 should actually be understood as a foundation for all other MDGs.

### **2.13 Summary of the Theoretical and Empirical Literature Review**

Consequential information pertinent to environmental consumption in the World, Africa, Sub-Saharan Africa, Tanzania and Dodoma region has been illuminated in the above literature review. It has been unequivocally shown that managerial performance of local government authority in the country is, as it is for other developing countries, enormously dependent on environment as the main and sometimes the only source of social and economic dependence. The overarching endeavor of the present study is to contribute to reversing the unsustainable environmental consumption in the country. The importance of understanding the mechanisms and factors underlying people's consumption decisions and behaviour in order to pragmatically address the community environmental consumption challenges in the study area is next to none.

It is for this reason that issues pertaining to determinants of people's environment consumption and conservation theories and consumer preferences have been extensively reviewed. Economic values of ecosystems as well as their management challenges have also been explicitly presented. Overall, relevance of information provided in this review to the community natural resource consumption in the study area cannot be over-emphasized. Conclusively, the literature survey has realised that environmental degradation is a problem in many parts of the World. But the developing countries are yet to build enough capacity to handle this problem.

The empirical literature survey has also realised that, the needs and development priorities of stakeholders constitute the core of a participatory programme. In such programmes the stakeholders are not only the means, but they are also the ends (beneficiaries). This paradigm pressed more emphases that, stakeholders in any local environment are better informed about the type and magnitude of their problems than outsiders. Participatory approach encourages discussion. In so doing, innovators and target groups exchange information, innovators get chance to know their clients, respect their views and learn from them, share their problem and fears and then bridge the gaps.

The literature survey asserts that environmental exploitation is a problem which need quality interventions in many parts of the World. But the Developing Countries are yet to build enough capacity to handle this problem. Environmental conservation intervention programmes, in particular, are planned and implemented without adequate participation of stakeholders. The case reveals that, councils in the country are, as it is for other developing countries, enormously dependent on environment as the main and sometimes the only source of survival on earth.

It is for this reason that, issues pertaining to determinants of councils natural resource consumption, conservation intervention and environmental concerns, consumption theories, and consumer preferences have been extensively reviewed. Economic values of ecosystems as well as their management challenges have also been explicitly presented. The success of the traditional fodder reserves in Dodoma region can be attributed to the fact that, this system is established traditionally and

managed by farmers themselves implying that any land conservation project based on this valuable indigenous knowledge is also likely to succeed.

Generally, although the selected Councils attained the planned objective using their own efforts, it can be noted that, to efficiently conserve environment in the study areas and increase the availability of high quality dry season fodder and wood based products, those Councils need to be improved and enhanced through regular capacity building at all levels. Studies by Kamwenda (1999) showed a number of technical issues for Councils management and improvement including: lack of knowledge by farmers about, planting and management of trees, absence of tree seedlings, lack of proper treatment or care at early stages of tree establishment, inadequate knowledge of the site requirements of the tree species, and conflicting primary objectives of land management.

Farmers need to be assisted in some of these aspects in order to improve the Councils system. The empirical evidence has revealed that, sustainable environmental conservation programmes can be made more effective and result oriented if environmental conservation activities are integrated and implemented as daily and routine farm activities. Such conservation activities can be done through land husbandry, livestock husbandry and agro forestry.

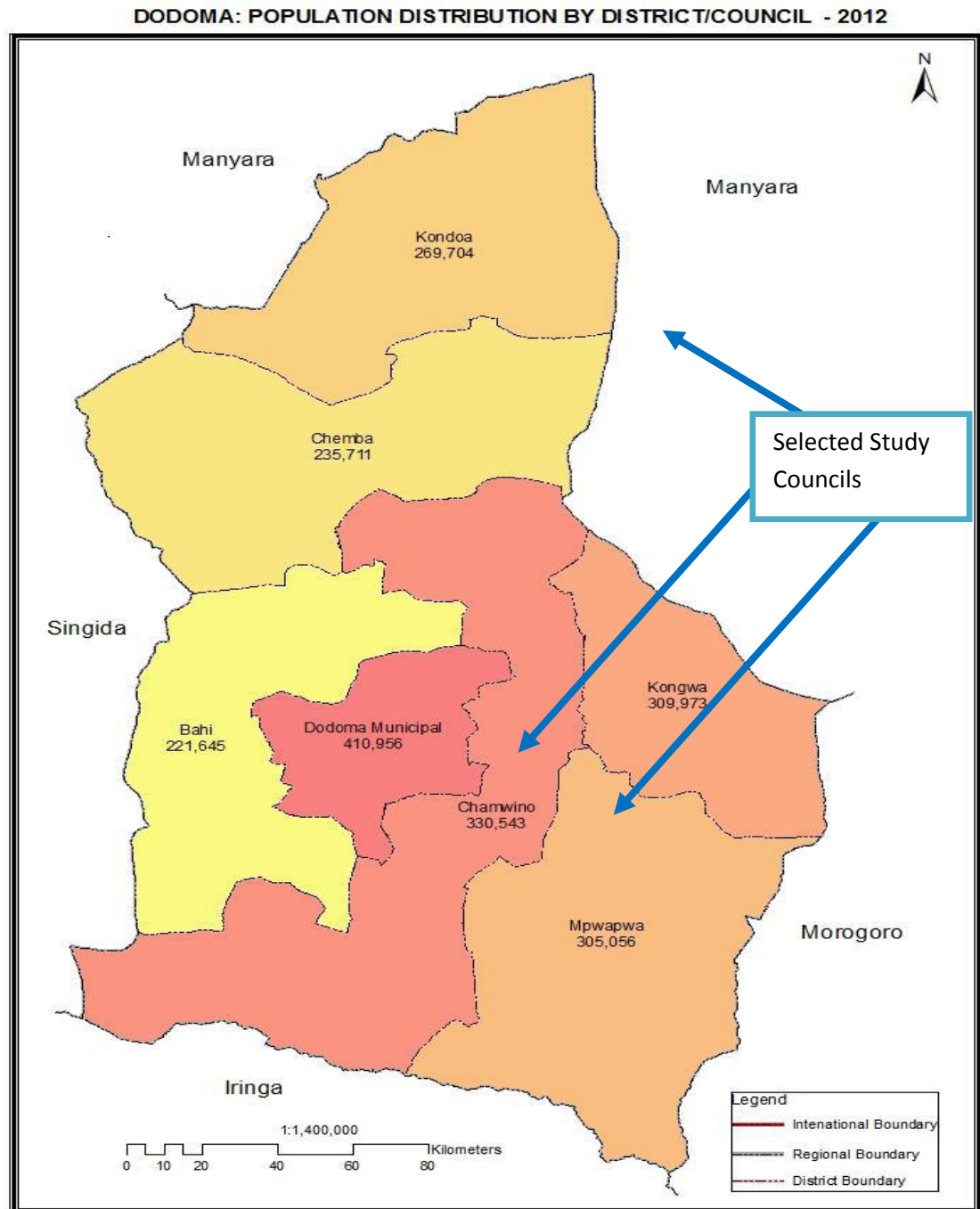
## **CHAPTER THREE**

### **3.0 RESEARCH METHODOLOGY**

#### **3.1 Introduction**

This chapter presents study area profile, discusses the research methods and procedures used in undertaking this study. It explains the pretesting exercise followed by research design which was used by the study, justification of the selected research site, the category of population consulted and how the selection of the respondents was done. The chapter further highlights on the methods used in data collection and data analysis. Last but not least the chapter provides the limitation of the study. It is also briefly, highlights instruments translation, pre-testing and pilot-testing phase, research design, sampling procedures, determination of sample size, representativeness of the study sample, justification of sample size, rural area sample selection, urban area sample selection, peri-urban area sample selection, sampling methods, data collection procedures and sources of data required, validity and reliability of questionnaire, ethical considerations, legal permits, data collections method, types of data collected, key informants for interview, data editing, coding and entry; data analysis, processing and presentation.

The methodological aspects presented in this chapter are explicit and well founded. It is reasonably evident that in light of the methodology provided: the research was conducted objectively; the psychometric properties (validity and reliability) of the research instruments were fairly improved; sample used was sufficient and representative of the target population and both scientific and ethical standards were prudently observed.



**Figure 3.1: Administrative and Population Distribution Map of Dodoma Region Showing District Boundaries**

**Source:** National Bureau of Statistics, (2012)

### **3.2 Research Design**

The study used cross-sectional in the sense that, data on different groups of respondents was collected at one specified period of time. The design has a greater degree of accuracy and precision in social sciences than other designs (Casley and kumar 1988). This type of design, either the entire population or a subset thereof is selected from the sample population; data is collected to help to answer research questions of interest. The cross sectional survey was preferred in this study because of its flexibility and its simplicity in collecting many types of information related to the use of various data collection methods. The design was also economical in terms of costs and time due to its ability to draw generalisation about large population on the basis of representative sample. Despite making a survey at different points, the study was descriptive (qualitative) in capturing the feeling of different respondents in as far as exploring the challenges affecting the environmental conservations and strategies to improve the situation.

The main thrust of the study was aimed at identifying managerial performance and challenges within the local councils affecting the environmental conservation, with a view of seeking strategies for improvement of environmental conservational programs. Because of that, the design of this study was largely influenced by the nature of data required and the target population as indicate in category 'A' and 'B'. This powerful research design allowed the researcher to have high confidence in the results. Further, the study also adopted quantitative approach by using frequencies and statistical tests. Last but not least, the study used a comparative approach to compare the performances in different councils. This enabled to establish the good

practices which could be adopted in other areas. Based on the four research questions of this study, a research relation is given as well as corresponding analysis technique and decision making rule.

The research relations indicate what exactly is expected to be studies based on the respective research question. In this study, three research relations which include Ranking, Forecasting and Comparison were used. Ranking used in the relation whereby, the responses are ranked on a descending order in order to have a positioning of the collected responses by the respondents. This helps the decision makers on the application of the results hence to focus on some areas of concentration more specifically. This relation is applied to rank the challenges facing environment conservation as well as the suggested strategies to improve the conservation.

Forecasting used in the relation whereby the independent variables are analysed to find out if there are important ones in predicting the dependent variable. Sometimes, based on the data collected from the respondents it can be found that only a few variables are important or no any variable which is statistically significant in predicting the dependent variable. In this study the independent variables are the interventions while the independent variable is the environment conservation, and comparison used in the relation enables the researcher to know the comparison of two distinct groups about a specific variable. The variable could be the dependent or independent or any other variable provided that one variable is compared by two groups or categories at a time. In this study the variable under the study from which this relation will be applicable is the dependent variable (environment conservation).

It is imperative to note that, one research relation can be applicable in more than one research question provided that the variable(s) is different. Details of the analysis mapping for this study are given on Table 3.3.

**Table 3.1 Analysis Mapping for each Research Questions**

Research Question	Research Relation	Research Techniques	Decision Making Rule
<i>Research Question 1.</i>  What are the leading challenges affecting the environment conservation in Dodoma Region Councils?	Ranking	Frequencies and Percentages	The higher the frequency the higher the positioning
<i>Research Question 2.</i>  What are the important environmental interventions on predicting the quality of Environment conservations?	Forecasting	Multiple Regression Analysis	If p-value for the regression coefficient ( $\beta$ ) is less than 0.05, then the intervention is important for prediction (i.e. $p < 0.05$ )
<i>Research Question 3.</i>  Is the assessment of environment conservation quality by intervention designers different from that of implementers?	Comparison	t - Test	If p-value for the 't' value is less than 0.05, the difference is said to be statistically significant (i.e. $p < 0.05$ )
<i>Research Question 4.</i>  What are the leading strategies to improve the environment conservation quality in Dodoma region Councils?	Ranking	Frequencies and Percentages	The higher the frequency the stronger the strategy

### 3.3 Sample Size

A sample size is a sub set of the population that is selected for a study (Burns and Groove 2001). It is therefore, entails selecting respondents from a group of population that is convenient for data collection. In order to obtain an appropriate sample size and get a better statistical inference. Having the target population of 629, the researcher opted to use Census approach whereby sample size is the same as the target population. The distribution of the population for respondents for “t” is given on Table 3.1.

**Table 3.2: Distributions of the Research Population**

S/N	COUNCIL	CMT	COUNCILLORS	WEOs	VEOs	TOTAL
1	Dodoma M/Council	19	52	37	142	250
2	Kondoa DC	19	63	42	84	208
3	Chamwino DC	19	43	32	77	171
	<b>TOTAL</b>	<b>57</b>	<b>158</b>	<b>111</b>	<b>303</b>	<b>629</b>

**Source:** Developed by the Researcher

### 3.4 Response Rate on Data Collection

Generally there was a good response from the respondents with a few exceptions. From the Number of questionnaires distributed ( $N_d = 629$ ), the number of questionnaires collected ( $N_c$ ) is 520. Therefore the overall response rate ( $R_r$ ) is given as;

$$R_r = N_c / N_d = 520/629 \times 100\% = 82.7\%$$

Details of responses for each Council and group is given on Table 3.3

**Table 3.3 Responses from each Council**

	Intervention Designers						Intervention Implementers								
Council	Cmt			Councillors			Weos			Veos			Total		
	<i>Nd</i>	<i>Nc</i>	<i>Rr</i> %	<i>Nd</i>	<i>Nc</i>	<i>Rr</i> %	<i>Nd</i>	<i>Nc</i>	<i>Rr</i> %	<i>Nd</i>	<i>Nc</i>	<i>Rr</i> %	<i>Nd</i>	<i>Nc</i>	<i>Rr</i> %
<b>DOD OMA</b>	19	15	80	52	41	78.8	37	30	81	142	124	87.3	250	210	84
<b>KON DOA</b>	19	16	84.2	63	55	87.3	42	36	85.7	84	67	79.8	208	174	83.6
<b>CH' WIN O</b>	19	14	73.7	43	37	86	32	25	78.1	77	60	78	171	136	79.5
<b>TOT AL</b>	57	45	79	158	133	84.2	111	91	82	303	251	82.8	629	520	82.7

### 3.5 Target Population

Population refers to those elements from which information will be collected (Kothari, 1993; Tromp and Kombo, 2006). In conducting this study four groups of population were involved. These included Councils Management Teams (CMT), Councillors, Ward Executive Officers (WEOs), and Village Executive Officers (VEOs). These groups categorised into two categories; Intervention Designers (ID) and Intervention Implementers (II). According to the Regional Strategic Plan of Dodoma, (2012). This population is 629 for the three selected Councils.

### 3.6 Determination of the Sample Size

According to Kothari, (2006), sampling is defined as the selection of some parts of aggregate of the totality based on which a judgment or inference about the aggregate or totality is made. It is a process of selecting a group of people, events, behaviour,

or other elements with which to conduct a study. An important issue influencing the choice of a sampling technique was whether a sampling frame is available, that is, a list of units comprising the study population. In this study, having a population of 629 a Census technique was used. This implies that, the population (N) is given to sample (n).

### **3.7 Representativeness of the Study Sample**

The sampling frame that was developed for getting the sample adhered to the statistical specifications for accuracy and representativeness Vaughn and Buss, (1988). In councils setting, interviews were conducted during official hours and sometimes in the evening maximising the number of participants at home. If no eligible persons were at office of work the next official was visited. Follow-ups visits to officials who were not around during the previous visits were revisited and interviewed in each council.

### **3.8 Sampling Methods**

In order to capture required information, stratifications of respondents were necessary, because different categories of respondents had different viewpoints. The target population of the present study was the Council Management Teams, Councillors, Ward Executive Officers and Village Executive Officers in those three selected councils.

### **3.9 Methods of Data Collection**

Data were collected using basic research instrument namely questionnaire. The questionnaire catered for both categories. Data was classified, disaggregated,

summarised and then subjected to analytical procedures. Data carried structured questions as follows;

- i. Sought to know respondents and his/her council of work
- ii. Sought to know the group he/she belongs as shown in category 'A' and 'B'
- iii. Attempted to know major challenges which affecting the environment conservation in the council
- iv. Sought his/her assessment opinion on the following environmental interventions in the council. Particularly on social norms, competing altitudes, setting design, ignorance and bad habit.
- v. Sought to know the way respondents can rate the overall quality on environmental intervention conservations in his/her council.
- vi. Sought to know key major suggestions to improve the quality of environment conservation in his/her council

There was a good response rate on from the respondents with a few and exceptional cases as indicated in Table 3.1. Data were collected using three basic instruments namely; interviews and questionnaire. A combination of methods was used to collect both quantitative and qualitative data whereby, the primary and secondary data collection methods applied accordingly.

### **3.9.1 Interview**

According to Kothari, (2006), an interview is a set of questions administered through oral or verbal communication or is a face to face discussion between the researcher and the interviewee respondent. Interviews were guided by open and closed-ended questions covered in a pre-determined sequence. Data on how all levels have been

encouraging compliance to environmental conservation intervention in their areas also obtained through structured and unstructured interviews. Specifically, the interviews aimed to elucidate: the availability of natural resources, sources of environment challenges in the area, by-laws set to address the forest destruction problem, the problems the designers and implementers encounter in discharging their duties, and the strategic focus to manage natural resources in their areas. The respondents of both categories asked to suggest the strategies which could be used to better and quality environmental conservation interventions.

### **3.9.2 Key informants for interview and Units of Analysis**

This is the major entity that is being analyzed in the study, it is what or whom that is being studied in social science research, typically unit of analysis includes: individual, groups, social organizations and social art craft e.g. geographical units Kothari, (2006). The key informants in the present study were: Councils Management Teams, Councilors, Ward Executive Officers and Village Executive Officers. The key informants provided the information on the existing natural resources in their districts upon which the researcher based his sampling to be studied.

Also provided general information on the management aspects of the environments, main threats to the existing situation and steps they take to address the management problems of the natural environment. They further provided the information on the bottlenecks to the successful discharge of their responsibilities, the changes of natural resources over time and reasons behind these changes and what should be done to address environmental problems in general and registered

their opinions on how to better improve natural resources management in their respective districts.

### **3.10 Researcher's Direct Observation**

According to Kothari, (2006) observation is the method where the information is sought by the way of own direct observation and environment scanning without involving respondents. Each selected environmental conservation project visited and direct observation of different actions being done by different actors towards the conservation of environment was made. This approach enabled the researcher to discuss, and the actors to explain the salient features of the interventions. For the whole period of fieldwork, my fieldwork assistants were keenly observing various aspects related to environment use and conservations. We focused our observations on the following areas: general attitudes of the target population towards our study, availability of forests and other systems on environment as social and economic focus. Each fieldwork team member was supposed to permanently have a special notebook in which he could record any information pertinent to environmental consumption. Every evening (irrespective of whether we had conducted a survey in that particular day or not) we had to convene and deliberate on any direct observation of interest to the study.

### **3.11 Focus Group Discussion in the Study Wards**

During questionnaire pilot testing in the present study, a focus group discussion (FGD) approach was used to elicit contextual information on various natural resources consumption related issues and to establish criteria to be used for

respondent' stratification. This was carried out at all levels (the council, ward and Village). The focus group at each level comprised of 6 (six) members: the Ward Executive Officer (WEO), two members from the Ward Environmental Management Committee, two primary school teachers who have stayed in the area for the longest period and a famous person. The checklist for the FGD comprised five questions and the process was estimated to last for not more than one hour.

### **3.12 Validity and Reliability**

Reliability had been defined by Fisher et al as the consistency, stability or dependability of the data (Fischer, et al 1992). In order to ensure quality, reliability and validity of the data collected during the research, the renaissance and pilot study was conducted in advance. This activity enabled the researcher to be familiar with the targeted area which now made easier for data collection. It also helped the researcher during his supervision works to ensure quality and productive advice on the progress of the study. In order to ensure validity, the questionnaires were pretested before use in the field. Research assistants were instructed to ask questions in the same way as they appeared in the questionnaire. A competent co-field supervisor was recruited to help researcher assistants in difficult situation and monitor their work and an attempt was made to compare collected data for this study with those from similar studies conducted elsewhere.

Schwab (1998) and Barribeau et al., (2005) posit that, no matter how much care is used, questionnaire construction remains an imprecise research procedure, thus necessitating pilot testing of the questionnaire. The authors acknowledge two common types of pre-testing which include; participating pre-test, which dictates

that a researcher should inform the respondents that, he/she is carrying out the pre-test and ask them to react on the question forms, wording and order. This kind of pre-test helps determine whether questionnaire is understandable; and pre-testing, which was adopted by the present study, is undeclared pre-testing which demands that the researcher/interviewer does not tell the respondent that it is pre-testing. In this particular case, the survey is given just as the researcher intends to ultimately conduct it. This kind of pre-test, according to the authors, allows checking for choice of analysis and standardization of the survey.

In validity, the present study, questionnaire testing was carried out for a number of reasons; to gauge whether questions, as set in the questionnaire, are understood by the respondents; to check whether the questions will elicit the intended information; to find out the sensitive questions contained in the questionnaire; to determine the respondents' interest, attention and cooperation towards the survey; to test the competency of assistant data collectors; to estimate the time it takes to complete one questionnaire, and; to establish an appropriate time to start direct measurements of fuel. Both pre-testing and field testing were carried out to improve both face validity and content validity of the questionnaire.

In terms of reliability, efforts were made to improve the reliability of responses obtained in the present study. Questions (in the questionnaire) were made as simple and objective as possible so as to increase reliability (Dunn et al., 2004). Training of the fieldwork assistants was carried out to ensure that they were conversant with the study objectives and that they were confident that they would be able to use the

research instruments accurately and in the same way. The gist here was to attain standardization of data collection.

Kennet et al., (2006) argue that, for data to be accurate, there must be high reliability and that responses must reflect the objectively true state of affairs. Training of fieldwork (data collector) assistants was therefore aimed at reducing their role restricted effects on responses and enhancing data quality. Two questionnaire domains were however; tested just to have a rough idea whether the items measuring the domains are internally consistent.

### **3.13 Ethical Consideration**

The pertinent ethical considerations were as much as possible observed throughout the research activities: data collection, data analysis and report writing as argued by various authors such as Roser, (2008).

### **3.14 Legal Permits in the Study Area**

Ethical permission for the study was obtained from the Directorate of Research, Publications, Postgraduate Studies and Consultancy at the Open University of Tanzania. It was conducted following an approval from my Employer, Dodoma regional Secretariat and both two selected councils authority. The administrative procedure demanded that, the researcher should obtain the necessary official authorisation to carry out research in the earmarked study councils. The Open University of Tanzania followed by my employer's no objection issued three letters to both selected councils requesting permission to undertake the study in their areas.

The pertinent ethical considerations were as much as possible observed throughout the research activities: data collection, data analysis and report writing as argued by various authors such as Schenk and Williamson, (2005); Rosenthal, (1994). The letters explicitly stipulated the objectives of the study and how useful the study findings would be. Each Director at Council level in turn provided the researcher with the authorisation letter, with the copy of the same given to every Ward Executive Officer (WEO) in the respective districts. The authorisation letter from the council authority asked the WEOs to take note of my presence in their area and that they should render any assistance which the researcher may require.

### **3.15 Data Management Procedure**

Prior to detailed analysis, data were arranged in such a way as to facilitate analyses. Data organisation, editing and entry into the computer conducted in the field. At the end of each data collection day, the researcher convened a meeting for the research team to thoroughly review all the completed data collection instruments for necessary editing, checking for the missing information, and possible outliers. Thereafter, he personally entered all data into the SPSS computer programme.

Information for all the research instruments for a particular study site were entered into the computer before moving to another site so that in the event of missing information and/or an ambiguous data, clarification would be made with the concerned respondents. Review meetings served also as useful platforms to discuss the difficulties encountered in the field and chart out the way forward before embarking on subsequent data collection the following day. Each data collection

team member was supposed to briefly explain what problems were encountered and how he addressed them.

### **3.16 Data Processing and Analysis Mapping**

Processing activity carried out using SPSS and Excel statistical computer programmes. Prior to detailed analysis, data were arranged in such a way as to facilitate appropriate analyses. Manipulations of data into suitable forms for analysis were carried out primarily by Excel Computer Programme. Care was as much as possible taken to ensure that statistically appropriate techniques were used to carry out data analysis. The quantitative data from survey used statistical techniques to generate descriptive statistics.

### **3.17 Study limitations**

The scope of the study is delimited to only three Councils of Dodoma Municipality, Chamwino and Kondoa District Councils due to time limitation and other official obligations; it was not possible to study the entire Seven (7) Districts. Secondly, transport was a problem which encountered during the actual process of data collection in the villages. In an attempt to mitigate this limitation, data collection was arranged to coincide with the then, on-going Councils meetings. During this time, Dodoma region like most other parts of Tanzania, was suffering from severe drought. In an attempt to mitigate this problem, data collection was done when the respondents were attending a training programme conducted by the councils. The researcher faced budgetary constraints but this was taken care from other financial sources.

## **CHAPTER FOUR**

### **4.0 FINDINGS AND ANALYSIS**

#### **4.1 Overview**

The study was conducted with the aim of assessing how environmental management interventions affect the overall quality of environmental conservation. The assessment of intervention designers is compared to that of intervention implementers in order to establish the assessment gaps if any. Qualitative and quantitative data were collected in this study. For the first and fourth research question, frequencies analysis technique is used. As for the second research question, a linear regression analysis is used while for the third research question a t –Test analysis was applied.

The results are based on the analysis of three Councils of Dodoma region. Actual data collected (see table 3.2) from the four groups of respondents used include; Council Management Team (CMT = 45), Councilors (133), Ward Executive Officers (WEOs = 91), Village Executive Officers (VEOs = 251). These four groups were finally categorized to two categories. The first category included CMTs and Councilors and this category is known as ‘Intervention Designers (ID)’. The second category included WEOs and VEOs and this category is known as ‘Intervention Implementers (II)’. The total number of respondents who responded is 520 out of 629. A questionnaire (Appendix A) was used to collect information from the respondents. There were both closed ended and open ended question. The information was collected carefully to ensure that the analysis for the four research questions of the study will be a possibility. The information collected includes;

- i. Identification of major Challenges facing the environment conservation
- ii. Identification of the important interventions in predicting the quality of environmental conservation
- iii. Assessment of quality interventions of environment conservation
- iv. Identification of the strategies to improve environmental conservation

The analysis done in two dimensions. Dimension one is using responses from all councils (520 responses) and the second dimension is analysis based on the Councils. The second dimension will enable the specific Council to use the finding of this study to make improvements on specific variables related to the said Council. The third dimension will enable us to make a comparison of the success achieved in interventions. It will also allows the researcher to identify most appropriate ways of implementing interventions and strategies.

#### **4.2 Major Challenges Affecting the Environment Conservation**

The responses are analysed in two dimensions. The first dimension comprise of the responses in major challenges affecting the environment conservation from all 520 respondents in general. Specifically, the analysis is also done based on the specific three councils. An open ended question was given to all respondents to identify one major challenge affecting the environment conservation. Four major challenges were identified while the other other ones were given a label of others. The value-coding of the said major challenges identified by the respondents was as follows;

1 = Financial Constraints

2 = Conflict of Interest among Stakeholders

3 = Poor use of Natural Resources

4 = Lack of Adequate Knowledge

5 = Others

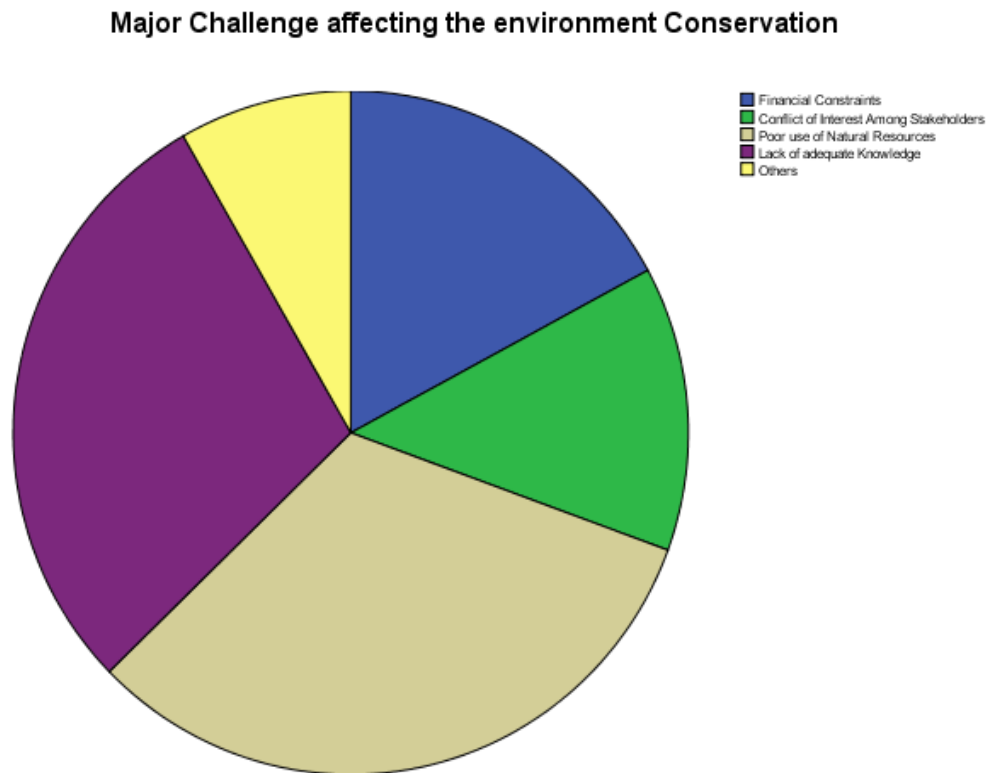
### 4.3 Responses on Challenges Affecting Conservation from all Three Councils

From the respondents of the three Councils in Dodoma Region the summary of overall responses is shown in Table 4.1

**Table 4.1 Major Challenges Affecting Environmental Conservations**

	Major Challenge	Frequency	Percent (%)
1	Financial Constraints	89	17.1
2	Conflict of Interest Among Stakeholders	70	13.5
3	Poor use of Natural Resources	167	32.1
4	Lack of adequate Knowledge	151	29.0
5	Others	43	8.3
	<b>Total</b>	<b>520</b>	<b>100.0</b>

Results from Table 4.1 show that in terms of ranking the major challenge affecting the environmental conservation the leading challenge is ‘Poor use of natural resources’ (32%), followed by ‘Lack of adequate knowledge’ (29.1%), followed by Financial constraints (17.1%) and Conflict of interest among stakeholders (13.5%). This implies that generally in Dodoma Region, special attention should be given to the use of natural resources and dissemination of knowledge about environment management. The pictorial form of the above analysis can also be shown through a Pie Chart (figure 4.1).



**Figure 4.1 Challenges Affecting Environment Conservation in Dodoma Region**

**Source:** Current Survey, 2014

#### **4.4 Responses on Challenges Affecting Conservation from Specific Councils**

The same responses are analysed based on each Council so as to have the assessment of each challenge from the specific Council out of the said three Councils. The results of the analysis for each council are given in Table 4.2. Results from Table 4.2 show that, for Dodoma Municipality the leading major challenge is ‘lack of adequate knowledge’ (36.7%), followed by Poor use of Natural resources (36.4%). For Kondoa District Council, the leading challenge is ‘Poor use of Natural resources’ (34.5%) followed by ‘lack of adequate knowledge’ (22.4%) while for Chamwino District Council, the leading challenge is ‘Poor use of Natural Resources’ (25.7%) and lack of adequate knowledge (25.7%). For Kondoa District Council, more efforts

should be directed towards rationalisation of natural resource followed by increased sensitisation of communities on environmental conservations. Therefore, from two Councils (Kondoa and Chamwino), the leading challenge is Poor use of Natural resources. This is because it has the highest percentage compared to other major challenges identifies by the respondents in this two Councils whereby, for Dodoma Municipality is lack of knowledge.

**Table 4.2: Major Challenges Affecting Environmental Conservation from each Council**

	Major Challenge	Dodoma M’Council		Kondoa D’Concil		Chamwino D’Concil	
		Frequency	%	Frequency	%	Frequency	%
1	Financial Constraints	31	14.8	31	17.8	27	19.9
2	Conflict of Interest Among Stakeholders	12	5.7	33	19.0	25	18.4
3	Poor use of Natural Resources	72	34.3	60	34.5	35	25.7
4	Lack of adequate Knowledge	77	36.7	39	22.4	35	25.7
5	Others	18	8.6	11	6.3	14	10.3
	<b>Total</b>	<b>210</b>	<b>100.0</b>	<b>174</b>	<b>100.0</b>	<b>136</b>	<b>100.0</b>

**Source:** Developed by the Researcher, 2014

This implies that, interventions should focus more on the optimal use of natural resources and knowledge dissemination. It is also evident that from all the three Councils, the next major challenge is lack of adequate knowledge about the environment conservation. For Dodoma Municipal Council and CHAMWINO District Council poor use of natural resources and lack of adequate knowledge are leading challenges equally. But in Dodoma Municipal Council, they are ranked

higher than in Chamwino District Council. This means that, for Chamwino District Council and Dodoma Municipal Council equal attention should be given to both of them. This means that the environmentalists working in Dodoma Region need to address these two challenges more aggressively in order to sustain environmental conservation in the Region. Moreover, conflict of interest is among politicians and councils whereby each tends to drive scarce resources available to his/her area without technical backup.

#### **4.5 Identification of Important Key Interventions for Predicting the Quality of Environment Conservation**

There are five environmental interventions studied on how they affect the prediction of the quality of conservation. The set of interventions are Social Norms Interventions, Competing Attitudes Interventions, Setting Design Interventions, Ignorance Interventions, Bad Habit Interventions. The quality of these sets of interventions was assessed by assigning the following codes for the respondents to respond;

- 1- Very Poor
- 2 - Poor
- 3 - Moderate
- 4 - Good
- 5 - Very Good

The above sets of intervention independent variable form the component of independent variable ( $X_i$ ) of this study. The dependent variable ( $X$ ) is the overall quality.

#### 4.6 Significance of the Interventions on Conservation in General

The dependent variable is “overall quality of environmental conservation” to be regressed against types of independent intervention variables ( $X_i$ ). A regression model was used to find out the interventions which are statistically significant in predicting the overall quality of conservation in general as well as for the specific Councils. The multiple regression equation is given as;

$$Y = a + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + e$$

Where;

Y – overall quality of environment conservation

a - constant

$X_1$  - Social Norms Interventions,  $X_2$  - Competing Attitudes Interventions

$X_3$  - Setting Design Interventions,  $X_4$  - Ignorance Interventions,  $X_5$  - Bad Habit Interventions.  $\beta_1$  to  $\beta_5$  - Regression coefficients, e - standard error of the estimate.

The results for the regression analysis for the responses in general are given in Table 4.3.

**Table 4.3 Regression Results for Responses in General**

<b>Predictor</b> (Type of Intervention)	<b><math>\beta</math></b>	<b>t</b>	<b>p-value</b>
Constant	2.0	9.12	0.000
Social Norms ( $X_1$ )	0.22	5.61**	0.000
Competing Attitudes ( $X_2$ )	0.12	3.04**	0.002
Setting design ( $X_3$ )	0.17	4.31**	0.000
Ignorance ( $X_4$ )	0.16	4.12**	0.000
Bad habit ( $X_5$ )	-0.37	-9.33**	0.000

\*\* Significant at 1%, ns = not significant

From the results, the regression equation for the overall quality of conservation (Y) in general was obtained as:

$$Y = 2.0 + 0.22X_1 + 0.12 X_2 + 0.17 X_3 + 0.16 X_4 - 0.37 X_5.$$

The coefficient is said to be statistically significant if its P-value is less than 0.05. From the results on Table 4.3, p-value for all coefficients of regression are less than 0.05. This implies that in answering the second research question all five mentions interventions are important in predicting the quality of environment conservation in Dodoma Region.

#### **4.7 Assessment of Environment Conservation by Intervention Designers and Implementers**

A comparison was carried out if these two categories of parameters are statistically significantly different. The assessment values given to the respondents to assess the quality of environment conservation were as follow:

1 - Very Poor, 2 - Poor, 3 - Moderate, 4 - Good, 5 - Very Good.

##### **4.7.1 Comparison of Conservation in General**

The analysis techniques used was t – test. The decision rule for this is that, the assessment will be considered to be statistically significantly different if the p-value is less than 0.05 for the t-value. Results for analysis of t-Test are given on Table 4.4.

**Table 4.4: t-Test Results on Assessment of Conservation**

<b>Respondents</b>	<b>Mean</b>
Intervention Designers	2.96
Intervention Implementers	2.99
t-value	-0.42
P - Value	0.676

**Source:** Determined by the Researcher, 2014

With the t – value of -0.42 at p-value of 0.676 it implies that the means of the two samples are not statistically significantly different. This implies that the assessment of the quality of conservation by Intervention Designers is not statistically significantly different from the assessment of Intervention Implementers. The mean gap score for designers is 2.96 (59.2%) while for the Implementers is 2.99 (59.8%). Therefore, in addressing the third research question, the assessment of the conservation quality by designers and implementers of interventions is not statistically significantly different.

#### **4.8 The Leading Strategy on Improving the Environment Conservation**

Respondents were given an open ended question to mention a major strategy which they think suffices to improve the conservation. Several responses were given by all respondents; These responses were grouped to four major responses and the few which could not fall on the four were considered as others. The responses were coded for analysis as follow;

1- Enhance Community Awareness

- 2 - Improve Law enforcement
- 3 - Training of Intervention Stakeholders
- 4 - Improve Monitoring & Evaluation Systems
- 5 - Others

The analysis techniques used in this case is Frequencies and Percentages. Results of the responses on the major strategy to improve the quality of conservation are given on Table 4.5.

**Table 4.5 Major Strategy to Improve Environment Conservation**

<b>S/N</b>	<b>Strategy</b>	<b>Frequency</b>	<b>Percent %</b>
1	Enhance Community Awareness	275	52.9
2	Law Enforcement	50	9.6
3	Training to intervention Stakeholders	129	24.8
4	Improve Monitoring & Evaluation Systems	45	8.7
5	Others	21	4.0
	<b>Total</b>	<b>520</b>	<b>100.0</b>

From the results on Table 4.5, the leading major strategy is 'Enhance Community Awareness (52.9%)'. This implies that the management of the councils ought to consider proper campaigns to create awareness to their respective communities. This is followed by the need for training the intervention stakeholders (24.8%). For individual Councils, the results are given on Table 4.5.

#### 4.8.1 The Leading Strategies by Specific Council

**Table 4.6: Major Strategy to Improve Conservation from each Council.**

	Major Strategy	Dodoma M’Council		Kondoa D’Concil		Chamwino D’Concil	
		Frequency	%	Frequency	%	Frequency	%
1	Enhance Community Awareness	115	54.8	85	48.9	75	55.1
2	Law Enforcement	22	10.5	16	9.2	12	8.8
3	Training to intervention Stakeholders	52	24.8	46	26.4	31	22.8
4	Improve M& E Systems	14	6.7	17	9.8	14	10.3
5	Others	7	3.3	10	5.7	4	2.9
	<b>Total</b>	210	100.0	174	100.0	136	100.0

Results from Table 4.6 show that the leading strategy in all the three councils is ‘Enhance Community Awareness’. This is because for Dodoma Municipal it is at 54.8%, Kondoa District Council (48.9%) and Chamwino District Council (55.1%). The ranking from each Council happen to be consistent with the overall ranking as given on Table 4.5. Therefore, in addressing the fourth research question, the leading major strategy to improve environmental conservation based on each council is to enhance the awareness of the community.

#### 4.9 Summary

The findings revealed further, a statistically significant difference among councils in the exploitation of natural resources. This suggests that it is more plausible to address natural resource exploitation issues separately: a one-size-fits-all approach in

addressing natural resource related problems is likely to be futile. Council's specific strategies should be devised to address the current natural resource exploitation problems. As depicted by the present study, those councils in the study area are economically and forests poor. This suggests that, any strategy aimed at providing alternative sources of reducing the wood fuel consumption should be affordable to all members of the community; and should be buttressed by poverty reduction activities.

In short, Dodoma region particularly those selected councils has the following environmental problems; Severe and chronic shortage of water for human, livestock and irrigation for agricultural development; Environmental degradation and environment erosion as a result of deforestation and overgrazing; Lack and low level of alternative sources of domestic energy as substitutes for charcoal and fuel wood; Inadequate capacity of councils institutions including those selected councils authority to effectively manage economic development; Poor living standards, poor housing and other social services; Unemployment and low levels of income in the study areas as well as Environmental pollution and loss of wildlife habitat and biodiversity.

## **CHAPTER FIVE**

### **5.0 CONCLUSIONS, POLICY IMPLICATIONS AND RECOMMENDATIONS**

#### **5.1 Overview**

This chapter highlights the results (findings) of the present study as the contribution to the body of existing knowledge. It also outlines Policy Implications, Recommendations and the areas that need further studies. The strategies that will be used to widely disseminate the findings of the present study have also been outlined accordingly.

#### **5.2 Conclusions**

The assessment of quality gaps made by Intervention designers and Implementers is revealed to be statistically significantly different. In this regard all groups need to be focused to the assessment of the quality of environment conservation and also interact with other stakeholders to understand why the gaps exist and how this gap can jointly be managed. The existence of gaps can affect quality environmental conservation interventions (Varey, 2002). To reclaim natural environment through increased sustainable poverty reduction it is suggested that, national and global societies invest in actions that increase the natural nutrient capital in the long-term and not short term only.

The study has made a number of key contributions. It is the first study, to the best of my knowledge, which has painted a detailed and explicit picture of environment conservation interventions in Dodoma Region. It has generated information that can be used as baseline data by later studies. The predictive model used is undoubtedly a

tool for natural resource management in general and sustainable environment management in particular. The descriptive modelling conducted in this study has highlighted socio-economic and demographic variables which when manipulated can influence changes in environmental exploitation.

This study has, in detail, analysed the environmental costs which the policy makers will find particularly useful. It has been argued that, much of the essential work on climate change and ecology in Africa was done by academics and organisations in other parts of the world, and that there have been now increasing move to strengthen the continent's own professional capacity Lovett et al., (2005). The present study therefore, has contributes towards that end by analysing in detail deforestation issues.

The study has assessed the situation and effects of environmental degradation in those Councils. It examined also the ways in which people use the environment and cope with interventions. The general findings of the study revealed that, drought conditions like other parts of Dodoma region, is also prone to interventions conditions. This has implications for the survival of trees planted yearly, particularly during the dry season which is fairly long. In terms of farming systems practised in the study councils, there is still a reasonable number of residents in the peri-urban area who use shifting cultivation. This means many trees are cut and burned in order to prepare new farms for cultivation. It was also found that many households use charcoal and fuel wood as their energy source. This has the effect of depleting existing forest cover, which is not very extensive in the study councils and the rest in Tanzania.

A number of factors found as a most part of the major environmental problem in those councils. According to the environmental Profile of Dodoma Region, so far 385.5 hectares have been eroded and it is estimated that every year up to 10 mm of environment is exploited URT, (2011). This has implications for the peasants using this land for agricultural activities. Productivity is reduced leading to regular food shortages in the area. This is a good indication as many agents are participating effectively in planting trees although the trend and efforts are decreasing from day to day.

Overstocking was also found that despite the efforts of HADO, MIGESADO, the Councils, CDA and others, overstocking is still a problem in the study areas. Very few people are using modern ways of animal husbandry such as zero grazing. Many people own large number of cattle and practice free range grazing on communal land. This practice causes environment erosion and environmental depletion at large. In terms of plans and coordination of environmental conservation programme. It was found that there is a strategic intervention for environmental conservation in those selected study Councils. But co-ordination of environmental activities including planning and implementation is inadequate. This can be evidenced from environmental conservation agents as each agent uses its own approach.

The study now has revealed that, those Councils are still facing many environmental problems. There are positive actions that have been taken in addressing these problems through the participation of many agents in those areas. For example, trees have been planted, destocking efforts have been made, by-laws have been enacted,

and environment education has been given to communities and many others. Despite these efforts, still Dodoma Municipality, Chamwino and Kondoa District Councils have a long way to go to ensure that sustainable environmental conservation is achieved. Sustainable development, therefore, requires a strategic approach that ensures that all stakeholders undertake a combination of mutually reinforcing priority actions on all the main fronts toward common environmental objectives. Achievement of desired objectives must draw on the analysis of the interactions among sectors and interest groups of the integration of environmental, economic, and social perspectives (NEMC, 2005).

### **5.3 Policy Implication**

In many parts of the world, land-use choices are often driven by government (domestic and/or foreign) incentives or subsidies that can favor unsustainable agricultural practices over more ecologically sound natural resource management schemes. Normally, livestock will remain critically important both culturally and economically in much of the region. But provided with a better understanding of disease epidemiology and grasslands ecology, land-use planners can begin to take the true costs associated with both disease control schemes and environmental degradation related to livestock management practices not well-suited to a particular ecosystem into account, and therefore more often favor a return to natural production systems. For example, in semi-arid parts of southern Africa, foot and mouth disease control programs, implemented to support beef production for an export market, may not be as profitable or as environmentally sustainable as a return to multi-use natural systems.

The findings also noted that, steps have to be taken to improve the situation. In this section, some options which have also been suggested in other studies (Bilia, 1997) are emphasised as important in promoting sustainable environmental conservation in those Councils which include; Environmental education to be targeted to the entire community including schools at the primary and secondary level; Deliberate efforts have to be taken by concerned governments, CBOs, NGOs, and Development Partners to introduce and use alternative sources of energy such as biogas, electricity and kerosene. This is possible if these sources can be made cheap through subsidization; Promotion of other income generating activities for people who depend on the selling of charcoal and Fuel wood and; the need to revise Regulations and Laws relating to environmental conservation so as to make them more tight and severe. These should include laws on deforestation, afforestation, destocking and farming systems which have negative effects in the environment.

Those selected Councils and the rest in Tanzania needs to establish a coordinating mechanism for making regular follow-ups in the planning and implementation of environment conservation schemes. To discourage the current situation in which each environment conservation agency operates on its own needs. This would allow a pro-active approach in dealing with environmental depletion and other environmental problems in the study areas more effectively. The general policy implication is that, intervention designers and implementers should enhance their capacity in terms of knowledge and skills as not only a survival strategy but for positive impacts on the environment hence, sustainable intervention and eco-development.

#### **5.4 Recommendations**

Policies are needed which enable those councils to adopt and protect themselves in a rapidly changing and usually hostile socio-economic environment. Addressing environmental problems should not be regarded as the responsibility of the government alone but the responsibility of the community, government, and other stakeholders. In light of the above, the researcher made recommendations at four different levels as follows;

The study has evidently shown that there is a statistically significant preference of the stakeholders/households for natural resources as one part of wood fuel sources. It is unlikely therefore that, afforestation programmes in the study area will have a significant impact on reducing pressure on natural resources. Consequently, more concerted efforts should be directed towards improving the sustainable management of the natural resources, but this doesn't imply whatsoever that tree planting activities should be ignored. Ecologically speaking, the loss of natural resources cannot be compensated by plantation forests because they have different values in terms of biodiversity and ecosystem functions. In conclusion, empirical evidence suggests that improving natural resources services is a cardinal for sustainable environment management in those selected councils in the Region and the rest of Councils in Tanzania.

At Central Government, field experience and empirical evidence from the present study suggest that poverty is part of the main concern in Dodoma region and Tanzania at large. Any environment conservation strategy that fails to explicitly paint a picture of how it will assist in reducing poverty is likely to be futile.

Environmental problem concerns are “not in the back yard” of the most stakeholders. Therefore, to address unsustainable environment exploitation, the researcher, recommends that, the government should; promote, disseminate and scale-up the uptake of improved firewood and charcoal stoves. The stoves should be affordable, durable and consider the socio-cultural aspects of the end-users. The overarching message to end-users should stress saving fuel expenditure and improving health of the users.

It would be prudent for the government to institute a body responsible for quality control of the improved stoves; strive to increase peoples accessibility to electricity by electrifying the rural areas and reducing (subsidising) the connection costs. Empirical evidence has indicated that accessibility to electricity reduces the share of wood fuel in the total community energy. Access to electricity will also promote income-generating activities and prolong the productive hours and; regularly and consistently provide adequate and well targeted extension education services to the community so as to change their habits, way of thinking and attitudes towards environmental management issues.

Governments must have conservation policies and be committed to their implementation, Forestry and other natural resources policies should be reviewed to enable involvement of communities and other stakeholders in management and utilisation of general natural resources reserves, There is a need for natural resource policy reviews so that non gazette forests are not treated as “open access” resources, Land policies should be reviewed so as to enable communities and villagers to have secure and clear tenure rights. Protection and conservation of plants especially

species highly endangered is of prime importance. Botanical Gardens known as plant banks are the only safe places for the existence of global fauna and therefore a primary necessity for the perpetuation of plant species.

Environments have to be managed in terms of socio-economic, ecological and cultural sustainability or, in other words, in accordance with principles of multi-functionality and equitable benefits. Communities should be involved in joint forest management (JFM) of adjacent forest reserves or in community based management (CBM) of unreserved forests bordering villages, continued agricultural intensification is essential to achieve the triple goal of; assuring production of sufficient food for future generations at reasonable prices; protecting natural resources from exploitation and; alleviating poverty, hunger, food insecurity and malnutrition, Adoption of agroforestry, a sustainable production system affordable by peasants and farmers so as to ensure food security and wood availability and thus reduce pressure on forest resources. Establishment of woodlots should also be encouraged.

#### **5.4.1 Natural Resource Management for Conservation**

At Regional and Local Government Authority, stakeholders show a strong preference for natural forests in comparison to plantation forests as a source of wood fuel. It is recommended that, tree planting (particularly for fuel purposes) should be carried out in conjunction with education and advice on suitability of reforestations for eco-development. Tree species to be planted should be carefully selected to ensure that their energy output is comparable to the preferred natural forest species.

It is further recommended that, the regional and district forest officials should make available improved charcoal production technologies to all charcoal makers in their respective areas, and put in place by-laws requiring all charcoal to be produced using improved technologies. The existing forest management laws and by-laws should be strictly enforced. Environmental management committees from local communities surrounding the forest resources should be involved in all steps of sustainable environment management planning undertaken at regional/district level. This is consistent with the argument made by Arnold et al (2009): “it has now been accepted that participatory forestry or some aspects of participatory forestry, should be a component of forestry policy and strategies throughout most of developing world and the aid community”.

Adhikari and Lovett (2006) also argued that, the local communities have an in-built capacity to control harvesting as well as effectively monitor illegal felling through local arrangements adding that the overall transaction cost, at the same level of control as that which could be rendered by the government, is lower. At Village Governments level, the local communities under their village leaders are the immediate managers of the natural resources. They should have both sense of ownership of natural resources and responsibility for its management. If the local community is not dedicated towards management of their surrounding natural resources, no amount of efforts from higher levels will bring about a sizeable change towards a desired outcome.

It is with this understanding that, the following recommendation is tasked to both councils up to the village-level leaders; a by-law at village level should be made to

ensure that all wood fuel- using households use improved stoves; charcoal makers should be monitored by the village leaders and/or environmental management committees to ensure that all (charcoal makers) should be required to use improved charcoal production technology and; village leaders should devise a mechanism which will ensure that households have individual wood lots for fuel purposes.

For other stakeholders, pertinent stakeholders have equally important roles to play in improving environment services where; the researchers should assist in improving the improved stoves' efficiency and enabling stoves to conform to various social and cultural preferences; the mass media are critical in awareness creation. They should publicise the existing community alternative energy sources to reduce over exploitation on environment and; the environment conservationists should assist in raising awareness among the community on the environmental and health costs for sustainable eco-developments.

### **5.5 Dissemination of the Research Findings**

It is a paramount responsibility of a researcher to disseminate his research findings as widely as possible. The success in unequivocally disseminating the information hinges partly on the type of media used. Daft and Lengel, (1986) developed a media richness hierarchy, in which richness refers to a medium's capacity to change understanding. In this hierarchy, face-to-face interaction is the richest medium followed by video phone and video conferencing, telephone, electronic mail, personally addressed documents such as letters, and formal impersonal documents such as written reports. According to the authors, the richness of these media is a

function of four features: the opportunity for timely feedback; the ability to convey multiple cues; the tailoring of messages to personal circumstances; language variety.

Face-to-face interaction is the richest medium because it allows immediate feedback regarding interpretations and meaning. It also allows multiple cues such as body language, blush, and tone of voice, in addition to the spoken message. This enhances the potential for a clear understanding of the message. Written communication is at the lowest end of the richness continuum due to its slower feedback in comparison with face-to-face interaction and the fact that visual cues may be limited to pictures and diagrams or completely absent.

According to Gray et al. (2005), written communication modes are not effective ways of communicating complex information such as academic research results. In rural areas in particular, written communication could be less effective due to a low literacy rate. The findings of this research will be disseminated to both an internal audience people who will immediately make use of the information such as policy makers, community in the study area and external audience as well as the people who may be interested to know about and possibly make use of the findings such as other researchers, Tanzania development partners.

Internally, the findings of this research will be disseminated to the pertinent policy makers via policy briefs, the community in the study area; district forest officials in the study area, journalists and general public, environmental conservation advocacy groups and other local researchers. Externally, the study findings will be disseminated through media, symposiums, conferences and workshops. At least four

manuscripts are expected to be published in international peer-reviewed journals.

The findings dissemination plan is summarised and presented in Table 5.1.

**Table 5.1: Depicts the Overall Dissemination Plan**

List of Stakeholders	Research executive summary	Press release	Fliers and posters	Seminar to those Groups	Policy briefs	Workshop	Manuscript/Journal articles
Intervention Designers							
Intervention Implementers							
Journalists and General Public							
Environmental Conservation Advocacy group							
Other Researchers							
External Audiences							

**Source:** Researcher's Plan

The overall objective of the present study findings dissemination is to encourage the adoption environmentally friendly behaviour amongst the public, Tanzanians in particular. This calls for proper information dissemination since accepting and adopting new behaviour is an intricate process as highlighted by UNCEF (2005): "... as a rule, we do not suddenly begin to do something we have never done before: we learn and weigh the benefits of doing it or not doing it; we look around to see if anyone else is doing it and if our friends and community accept the new behaviour.

If it seems socially acceptable, valuable and practical, we learn the skills to undertake the new behaviour and we may apply it to our own lives. We then evaluate whether it is worthwhile to continue. From our experience we may reject the new behaviour, or we may encourage others to follow our example.”

### **5.6 Areas for Further Study**

On the bases of the findings of this study and in conjunction with the literature reviewed on the subject matter there are research gaps. There are still other areas pertinent to this study which need to be further investigated in future so as to provide more insight into environment conservation issues, and consequently into how to judiciously abate its undesirable impacts from the preceding causal factors and consequences of environmental depletion, conservation efforts and constraints to successful land conservation process. The findings of such an investigation could be an important ingredient in further improvements of natural resources. Therefore, research is suggested to be undertaken in the following areas:

- 1 To determine and scale-up the adoption of sustainable eco-development to rigorously investigate factors hampering the wider-scale adoption of ongoing environmental conservations initiatives.
- 2 To determine and establish the efficiency of the earth-mound charcoal production kilns could be cost-effectively improved; and how best to motivate the charcoal makers to adopt more efficient charcoal production technology.
- 3 The impacts of natural resource policies/legislation, sectoral policies, and macroeconomic policies on sub – humid forests management and utilisation.
- 4 Silvicultural management of mixed species stands and species-site matching,

nursery studies on methods to raise indigenous trees, specially natural species need high priority if the indigenous tree species are to be successfully used in conservation.

- 5 Finding alternative and more sustainable methods of food production, Studies are needed on the valuation of forest resources to estimate the total economic value so as to reflect the value of the forest as a physical asset and indicates the rationale for investing in forests.

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## APPENDICES

### Appendix “A”: Respondents Questionnaire

Dear Respondent, my name is **Gasper Peter Mwembezi**. I am doing an academic study on the relationship of Environmental Interventions and Environment Conservation in the Councils of Dodoma region. The information you will provide will be used only for academic purpose.

1. Tick your Council Name: (a) Dodoma Municipal [ ☐ ], (b) Kondoa [ ☐ ], (c) Chamwino [ ☐ ].
2. Please Tick your group; (a) CMT [ ☐ ], (b) Councillor [ ☐ ], (c) WEO [ ☐ ], (d) VEO [ ☐ ]
3. Mention one major challenge which is affecting the environment conservation in your Council? .....
4. In your opinion, how do you assess the following environmental intervention in your Council?; (**Tick** one answer for every Intervention given depending on your opinion).

<i><b>Intervention</b></i>	<b>Very Poor</b>	<b>Poor</b>	<b>Moderate</b>	<b>Good</b>	<b>Very Good</b>
<i>Social Norm Interventions</i>					
<i>Competing Attitudes Intervention</i>					
<i>Setting Design Interventions</i>					
<i>Ignorance Interventions</i>					
<i>Bad habit Interventions</i>					

5. How do you rate the overall quality of environmental conservation in your Council?  
Very poor [ ☐ ], Poor [ ☐ ], Moderate [ ☐ ], Good [ ☐ ], Very Good [ ☐ ]
6. Suggest one major strategy to improve the quality of environment conservation in your Council:

## Appendix B: Dodoso La Mhojiwa

Ndugu Mhojiwa, jina langu naitwa **Gasper Peter Mwembezi**. Nafanya utafiti wa kitaaluma kuhusu mahusiano ya Afua za Mazingira na Hifadhi ya Mazingira katika Halmashauri za Wilaya Mkoani Dodoma. Taarifa utakazotoa ni kwa ajili ya mahitajio ya kitaaluma tu.

1. Weka alama ya vema kuonyesha Halmashauri uliomo: (a) Dodoma Manispaa [ ], (b) Kondoa [ ], (c) Chamwino [ ].
2. Tafadhali weka alama ya vema kundi ulimo; (a) CMT [ ], (b) Diwani [ ], (c) Afisa Mtendaji wa Kata [ ], (d) Afisa Mtendaji wa Kijiji [ ]

Taja changamoto kuu ambayo inaathiri hifadhi ya mazingira katika Halmashauri yako? .....

3. Kwa maoni yako, unathamini vipi hatua za afua zinazotumika kuhifadhi mazingira katika Halmashauri yako; (Weka alama ya vema kuonyesha hatua ya afua iliyofikiwa kulingana na maoni yako).

<i>Afua</i>	<b>Dhaifu Sana</b>	<b>Dhaifu</b>	<b>Wastani</b>	<b>Nzuri</b>	<b>Nzuri Sana</b>
<i>Afua za Kijamii</i>					
<i>Afua za Mitizamo Shindani</i>					
<i>Afua za Kuandaa Mfumo</i>					
<i>Afua za Ujinga</i>					
<i>Afua za Tabia Mbaya</i>					

4. Unatathimini vipi ubora wa jumla wa uhifadhi wa mazingira katika Halmashauri yako?

Dhaifu Sana [ ], Dhaifu [ ], Wastani [ ], Nzuri [ ], Nzuri Sana [ ]

5. Pendekeza mkakati mmoja mkuu wa kuboresha kiwango cha uhifadhi wa mazingira katika Halmashauri ulipo: .....