DOCTOR OF PHILOSOPHY

Religious phenomenology, sociodemography and ecology in the rural Mt. Kilimanjaro, Tanzania

Manongi, Freddy

Award date:
2012

Awarding institution:
Bangor University

Religious Phenomenology, Socio-Demography and Ecology in the Rural Mt. Kilimanjaro, Tanzania

A Thesis Submitted in Total Fulfilment of the Requirements of the Degree of Doctor of Philosophy to the Bangor University

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21 September 2012

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Abstract

At the dawn of the twenty-first century, in what some have termed the 'postmodern age', and amidst scientific and technological advancements and interconnected globalized economies, religion appears to play an even more significant and public role in rural societies in Africa than in the past. Due to this, some interesting questions have risen, such as the following: To what extent do religious beliefs shape the economy and socio-demography of rural people and, conversely, to what extent do economic, socio-demographic interests influence the religious beliefs and practices? Do religions in rural Africa contribute to environmental conservation and, if so, how? What are the religious perceptions and beliefs of local people with respect to the natural environment? Consequently the purpose was to examine the association between core religiosity variables and perceptions about the natural environment and the use of natural resources in rural Kilimanjaro, with socio-demographic variables being controlled. There were 360 households who took part in the survey. It was hypothesized that a) there is a positive correlation between religious phenomenology and socio-demographic outcomes and b) there is positive association between religiosity and perceptions about nature and the use of natural resources.

Households were required to complete a standard questionnaire. Core variables for the analysis of religiosity and socio-demography, and religiosity and the natural environment, were selected through the use of factor analysis and nominal group techniques.

The majority of the respondents belonged to the Roman Catholic denomination (N=282; 78.33%). Therefore, the results and analysis of religion, socio-demography and the natural environment were based on households who reported that they adhered to the Roman Catholic faith.

The results show that, fundamentally, as far as households are concerned, the associations between religiosity (belief in God, reading religious texts and church attendance) and the natural environment phenomenology, controlling for socio-demographic factors, are generally weak and variable. It appears that the ordinary adherent to the Catholic faith in rural Kilimanjaro continues with his/her routine life, without serious environmental concerns, unless there is some good socio-economic reason for him/her to interact with the environment. Perhaps what relates to environmental concerns, or a lack thereof, of rural households is not religiosity as such but their intimacy with the natural environment in the pursuit of their daily livelihoods.

It seems also that most rural households, particularly women and primary school leavers, attend organized religious institution services weekly and read religious texts almost daily, making this setting in rural Kilimanjaro a prime and ideal venue for reaching and recruiting potential participants for socio-economic and environmental programmes.

Further research and the implications are discussed. Both theoretical and policy implications are also discussed.

Acknowledgements

I would like to thank the World Wildlife Fund, Inc. (WWFUS), who provided the majority of the funds through the Russell E. Train Education for Nature Program. I would also like to express my gratitude to the Frankfurt Zoological Society (FZS) and the College of African Wildlife Management, Mweka (CAWM) for providing support to bridge the funding gaps that existed during the PhD work. Specifically, I am grateful to Mr. Russell E. Train, Mr. Shaun Martin (WWFUS), Ms. Stephanie Einsenman (WWFUS), Dr. Judith Ballint (WWFUS), Dr. Markus Borner (FZS), Dr. Karen Laurenson (FZS), Ms. Chris Schelten (FZS), Mr. Gerald Bigurube (FZS), Mr. Emmanuel Severre (former rector of CAWM) and Mr. Deo-gratias Gamassa (former principal of CAWM), who, at different times, made sure that adequate resources were timely available for the study. I also thank Mr. Thadeus Mulengeki Binamungu, program officer of the African Wildlife Foundation (AWF) office in Arusha, and Dr. Steven Kiruswa (former director of AWF), who provided opportunities that ensured sustainable funding during the write-up phase of the research.

This dissertation would not have been completed if my supervisors had not provided the necessary strategic and conceptual guidance. The late Professor Gareth Edwards-Jones of the School of Natural Resources, Environment and Geography at Bangor University, and Dr. Shaun Russell, director of the Wales Environment Research Hub, provided supervision at the early stages of the write-up. Dr. Robert Brook of Bangor University provided the further guidance to ensure that the thesis met acceptable university and universal academic standards. Dr. Richard Cole and Dr. Paul Cross provided support with the research design and the selection of the statistical tests respectively.

I want to express my gratitude to Ms. Nancy Gelman of the Fish and Wildlife Service (FWSUS). She provided professional opportunities that helped to fund certain aspects of the study. I hope that the completion of my PhD will bring affluence, happiness and healthy lives to Nancy and her family.

Dr. Cindy Johnson of the Gustavus Adolphus College of Minnesota (USA) and Dr. Will Banham of PCI-Media Impact of the United States helped to review certain chapters of the dissertation. Professor Peter Ballint of the George Mason University, Washington (USA) reviewed my initial research ideas and the chapter on the methods. Mr. Ian Games, Geographical Information System (GIS) expert from Zimbabwe, and Ms. Rose Mayienda of AWF helped to draw the maps of the study area. Professor John Hall, former professor of the University of Bangor, made sure that I adhered to the time guidelines in completing the study. Dr. Heather Eves, professorial lecturer at the John Hopkins School of Advanced International Studies, donated key books, which helped to shape my concepts on religion and ecology. She also consistently reminded me of the role of spirituality in human sustainability.

Many and very special thanks go to my family, Mrs. Keolopile Manongi and Mr. Safieli Manongi, for allowing me to fully participate in the study, which took me away from them most of the time.

Data collection assistance was coordinated by Mr. Afred Gideon, tutorial assistant at CAWM, and supported by former CAWM students: Messrs Nordine Zacharia, Saanya Aenea, Emmanuel Munisi, Lupyana Mahenge, Elibariki Bajuta, Melejio Mollel and Miss Cocaya Shayo. I thank you all.

Thanks are due to Beverley James and Alison Evans, and other staff of the Bangor University, including Library and Information Technology (IT) staff, who were very kind and helpful.

Acknowledgements

Thanks are also due to Dr. David Manyanza, Dr. C. Mlingwa, Dr. S. Mduma, Dr. V. Runyoro, Dr. Daljit Virk, B. Kawasange, B. Andulege, P. Kisare, I. Dule, F. Mawi, D. Kweka, S. Lawrence, D. Ndesanjo, P. Kisare, S. Bundala and P. Mghwira. Other people who provided support in one way or another include P. Fariseli, J. Edward, R. Mwaya, J. Babili, J. Mushi, O. Nyakunga, F. Mvanda, E. Dembe, C. Chacha, A. Johnson, E. Ndesoma, A. Lobora, Father Kimario, J. Mshana, R. Kipenzi, B.Kisangija, Z. Mbano, Y. Kopwe, M. Njau, G. Kaguo, S. Machura, B. Jimmy and J. Zelothe. Support was also received from A. Msangi, O. Chambegga, B. Masuruli, A. Kaswamila, M. Yusuf, D. Peter, N. Materu, K. Melubo, R. Njau, H. Munisi, C. Nyakunga, L. Kahana, A. Kisingo, L. Mangewa, P. Ayo, E. Msyani, R. Njau, S. Kinabo, W. Ndesanjo and L. Gervas. The late Mr. Julian Machange provided spiritual guidance throughout the study. I thank you all.

Ms. Sue Reflex, Ms. Eleri Whyn Jones and Ms. Anne Gillian Thompson provided decent accommodation in Bangor (North Wales) and Caernarfon (North Wales). Messrs Stephen Mtera and Paschal Nyasa, college drivers, took me and my research assistants into the field whenever I requested assistance. I thank you all.

Last, but not least, thanks are due to Leah Leina, Rose Mosha, Eva Mnyenye, Parorick Longoi, Balatu Rashidi, Muki Msami, Emmanuel Munisi, Erick Mongi, John Kanyika, Kiondo Tunzo, Mustafa Boyogeri, Anderson Mathew, Lupyana Mahenge, Nordine Zacharia, Peter Mkilindi, Wilbard Mushi, Godfrey Nyangaresi, Ronald Lyimo, Butati Nyundo and Richard Nyandongo for effective participation in the nominal group technique exercise.

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Acronyms Used in the Thesis

AWF……	African Wildlife Foundation
CAWM……	College of African Wildlife Management, Tanzania
EKC……	Environmental Kuznets Curve
FA……..	Factor Analysis
FZS…….	Frankfurt Zoological Society
GDP……	Gross Domestic Product
GIS……..	Geographical Information System
HIV/AIDS……	Human Immuno-deficient Virus / Acquired Immuno-deficient Syndrome
KINAPA…….	Kilimanjaro National Park
MKUKUTA……..	The National Strategy for Growth and Poverty Reduction of Tanzania
NGT……	Nominal Group Technique
SPSS……	Statistical Package for Social Science
TANAPA…….	Tanzania National Parks
TDS…….	Total Dissolved Soluble
TDV……..	Tanzania Development Vision 2025
TPRI……..	Tanzania Pesticides Research Institute
TShs…….	Tanzanian Shillings
UNDP…….	United Nations Development Program
USA……	United States of America
VEO…….	Village Executive Officer
WEO …….	Ward Executive Officer
WMA…….	Wildlife Management Area
WWFUS……..	World Wildlife Fund (United States)

Chapter 1: Background on the Research

1.1 Problem contexts and research significance

1.1.1 Overall importance and resurfacing of religion in public life

Most people in the world follow some kind of spiritual or religious faith or beliefs. Spiritual knowledge, faith or beliefs are thought to relate to how people think, how they behave and what they practice by shaping their perceptions and attitudes. In Tanzania almost every person is believed to adhere to some kind of religious faith and spirituality. Religion, subsequently, may provide human societies with the shared spiritual beliefs and religious values that unite humans and provide them with the framework for their day-to-day lifestyles and operations.

Religions are also thought to bring social assets to the construction of strong rural societies. These social assets include, but are not limited to, the capacity to change the worldviews of rural people on various issues, moral authority, a large base of adherents and followers, and a significant amount of financial and material resources. These assets, if utilised successfully and resourcefully, could perhaps help to bring social change and human development in rural societies.

Many social scientists predicted that religion was going to disappear as a result of the development of more scientific and secular attitudes within society (Scupin, 2010). Scupin (2010) further writes that 'contrary to the expectations of the secularization theorists, the increasing technological and scientific revolutions that have dramatically transformed our world, religious experience appears to be more important than ever for constructing a meaningful world in the midst of these global processes'. Prothero (2010) also writes that 'until recently, most sociologists were sure that religion was fading away, that as counties industrialized and modernized, they would become more secular'. At the dawn of the 21stcentury, dizzying scientific and technological advancements, interconnected globalised economies, and even the so-called New Atheists have done nothing to change one thing: our world remains furiously religious (Prothero, 2010). As we begin the 21st century, in what some have termed the 'postmodern age', religion appears to play an even more significant and public role in societies than it has in the past (Scupin, 2010). Instead of becoming weak, and turning out to be insignificant in human society, religion seems to be resurfacing and becoming more vital. Roberts et al. (2009) also write that 'the last two decades have witnessed the 'return of religion' to public life in both developed and developing countries'. In his paper, Beek (2000) states that 'spirituality is central to many of the daily decisions people in the 'South' make about their own and their community's development, including that of whether or not to participate in risky but potentially beneficial social action'.

Consequently, there is a need to fully understand religious phenomenology amidst the growing interests and religious commitments amongst global citizenry.

1.1.2 Favourable worldviews about religion and religiosity

It is always considered in rural African contexts that all is good and all is positive in religion. Prothero (2010) elucidates that, for more than a generation, writers and researchers of religious matters have acted on the conviction that the way toward inter-religious understanding was to emphasise not only their similarities but also their essential goodness. It could be said that since the first petals of the counterculture boomed across Europe and the United States in the 1960s, it has been fashionable to affirm that all religions are beautiful and true (Prothero, 2010). Candland (2000) also writes that in much social science literature there is an aversion to treating religion as the basis for progressive social solidarity. Many of the available studies focus on the potentially positive role of religion with respect to morality, social harmony, sustainable development, social justice and achievement of certain development objectives (Roberts et al. 2009). Traditionally the role of religion in development has been viewed as both important and non-problematic (Mhina, 2007).

Worldviews are beginning to shift as a result of potential clashes between states and religions across the world. Uprisings fuelled by religious elements have also increased. Tensions have resurfaced between governments and religious groups in many regions of the world, religious leaders are engaged in open advocacy, on behalf of the disadvantaged, and in some cases agitate on behalf of their adherents (Mhina, 2007). This resurgence was dramatically highlighted by the terrorist attacks on the United States on September 11, 2001 (Roberts et al., 2009; Odumosu, 2009), but also has much a broader significance, especially in developing societies, in terms of the rise of religious nationalism, ethno-religious conflicts, poverty and religious movements against the post-colonial secular states. Local religious insurgents in Africa like Boko Haram in Nigeria, Al-Shabaab in Somalia and the recent political involvement of the “Jumuiya ya Uamsho na Mihadhara ya Kiislamu” (JUMIKI) in Zanzibar-Tanzania underline a clear need for an assessment of the relationship between religions and states and a need to examine government policies and development agendas amidst a renaissance of religious fundamentalism in Africa. Thus, the effort to understand and achieve inter-religious communication and more rounded global perspectives on world affairs is not just a luxury arising from a liberal arts education (Gambrill, 2011), but it is justified by the shifting relationships between religion, state and human development philosophies.

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After many political conflicts, which have been thought to be influenced by religions or religiosity, Prothero (2010) writes that 'we need to see the world's religions as they really are, in all their gore and glory'. It is also critically necessary to avoid conflicts, maintain world peace and ensure human survival in years to come (Gambrill, 2011). However, it is, unfortunately, the case that established religion is often burdened by doctrines and practices that militate against efforts to improve material conditions (Baha'i International Community, 2000).

Therefore, shifts in worldviews about the role of religion in state development need to be informed by accurate information about religion and religiosity.

1.1.3 Resurgence of beliefs in spiritual and faith healing

Use of ancestral spirits, spiritual powers, faith healing and herbs to find solutions to life's challenges occurred in Sub-Saharan Africa before the evolution of Islam and Christianity. The emergence of Islam and Christianity condemned these practices and few who believed in the indigenous African religions continued to practice the use of herbs and spiritual powers for the management of chronic diseases.

In the recent past, the governments of Sub-Saharan Africa have witnessed the renaissance of religious leaders who claim to treat chronic diseases by practising faith healing. Between June 2010 and May 2011, people from all walks of life who had chronic diseases like HIV/AIDS, high blood pressure, diabetes and cancer flocked to Samunge village in the Loliondo district of Tanzania to receive the therapy, which offers a combination of herbal (*Carissa spinarum*) and spiritual elements (special revelation from God) from the retired Pastor of the Evangelical Lutheran Church of Tanzania (ELCT), Mr Ambikile Mwasapila. Many other people in Tanzania also continue to claim to cure chronic diseases through a combination therapy of traditional herbs and spiritual powers. The assemblage of people at Samunge village and other places in Tanzania for this spiritual cure had affected the health policies, infrastructure, and the economic and environmental sectors of Tanzania in myriads of ways. This enlightened the government on the need to re-consider the spiritual dimensions of the human development process.

1.1.4 Religion, state and politics

In many countries the lines between religion and state are becoming considerably less distinct than they once were, and far more permeable (Orr, 2005a; Orr, 2005b). Dawkins (2006) argued that while Europe is becoming increasingly secularised, the rise of religious fundamentalism, whether in the Middle East or Middle America, is dramatically and dangerously dividing opinion around the world.

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During its first two decades of independence Tanzania enjoyed an apparently tolerant and cordial religious climate. But since the departure of the father of the nation, Julius Nyerere, from active politics in 1985 deepening religious tensions and strains began to emerge, not only between the state and major religions in the country but also as inter and intra-religious strife became common (Mesaki, 2011). The current tensions have mostly been fuelled by Islamic groups, which argue that Islamic principles should be part of the state and the constitution. In the recent past, efforts were also made to ensure that Zanzibar joined and became a member of the Islamic Organization Countries (IOC). Debates are also ongoing to establish Islamic courts known as 'Kadhi', which would run parallel to the existing non-religious state laws of Tanzania.

The interests of religious leaders in Tanzania to participate in the country's political reforms have gained impetus in the recent past. Religious institutions have also revealed an interest in using renowned politicians to raise funds to support different religion initiatives. Additionally, efforts by political leaders to use religious platforms to gain popular support have also intensified. This is an indication of the reduced distance between religion and political phenomena in Tanzania.

Perhaps there is a need to relate religions to the state and politics in order to avoid potential clashes between these elements and take advantage of the mutual relationships that exist between them. A clear understanding of the relationships between religion, the state and politics could perhaps help to reduce obstacles that slow or constrain the process of human development.

1.1.5 Religion and ecology

A growing body of literature suggests that conservation and development are often driven by ethical and moral values, which are frequently faith-based (Bhagwat et al., 2011). In his book *Ecological Imaginations in the World Religions, an Ethnographic Analysis*, Watling (2009) describes the current environmental crisis as 'biocide and genocide which comes not from failures of economic, physical environment and technological systems failure, but rather from the failure of moral and spiritual systems that form religions'. Dudley et al. (2006) also write that 'relearning to co-exist with nature presents people with huge challenges, requiring not only technical solutions but also, more importantly, a profound shift in our attitudes and philosophy'. A purely technical template approach to environmental challenges can overlook the values that underlie human behaviour, ultimately resulting in environmental degradation (Gambrill, 2011).

A growing body of literature also suggests a positive connection between religion and ecology (Cooper & Palmer, 1995; International Environmental Forum, 2002; Foltz et al., 2003; Harmon & Putney, 2003; Taylor, 2004; Tucker & Grim, 2004; International Group of Christians, 2005; John, 2005; Lorentzen & Leavitt-Alcantara, 2005; Stuart, 2005; Taylor & Kaplan, 2005; Xu et al., 2005; Dudley et al., 2006; Wilson, 2006; Taylor, 2007). Over four billions people in hotspot countries, nearly two-thirds of the world's population, are affiliated with mainstream faiths, demonstrating the potential for religion-based public support for biodiversity conservation and poverty alleviation (Bhagwat et al., 2011).

However, some scholars still view sustainable development and environmental sustainability as issues separate from religion. Because of this distinction, environmental sustainability and religious practitioners have previously worked with a dissimilar set of priorities. A number of scholars also view religion as having nothing to offer to environmental conservation, or that religious practice and behaviours have negative effects on natural environment systems (Bratton, 1992; Robolton & Hart, 1995; Shibley & Wiggins, 1997; Kollmus & Agyeman, 2002; Walsh, 2004). Bhagwat et al. (2011) also states that ‘critics might argue that religious beliefs promote conservation only arbitrarily and the extent of religious following is not a true reflection of public support’.

In Tanzania, no research on associations of religion and ecology has been conducted. Accentuation of the positive aspects of religious practices, and the increase of awareness and mitigation of the negative aspects of religion phenomena, can perhaps play an important role in improving environmental conservation and thus promote sustainable human development in Tanzania.

1.1.6 Religious-cultural dynamics and human development agenda

While pragmatic approaches to problem-solving obviously play a central role in development initiatives, tapping the spiritual roots of human motivation provides the essential impulse that ensures genuine social advancement (Baha’i International Community, 2000). Some anthropologists also hold views that traditions and early forms of religion evolved out of the need to solve various practical problems, such as producing more foods, fighting various diseases and managing the effects of environmental disasters, such as floods, earthquakes and so on (Scupin, 2010).

Existing development indices fall far short of bringing into relief the essential spiritual and social dimensions of life, which are so fundamental to human welfare (Baha’i International Community, 2000). The broad policy framework in Tanzania is narrated in the Tanzania Development Vision 2025 (TDV). Vision 2025 stipulates the vision, mission, goals and targets to be achieved with respect to economic growth and poverty eradication by the year 2025.

From TDV, the government developed policies, plans and strategies, including the National Strategy for Growth and Poverty Reduction, which in Kiswahili is called “Mpango Wa Kuondoa Umasikini na Kukuza Uchumi Tanzania” (MKUKUTA). MKUKUTA provides the basis for the Tanzanian development philosophy over a 10-year period from July 2005 to June 2015. None of the policy guidelines in Tanzania mentioned above considers the role of spirituality on human development. This could be partly due to inadequate knowledge of the inter-relationships between the socio-cultural variables of Tanzanian society and other human development variables.

The Millennium Development Goals (UNDP, 2000) formed a strong foundation of the TDV and MKUKUTA, but did not include religiosity indicators in its conceptual framework. However, MDG does briefly imply inclusion of a religion dimension in the human development dimension (Gambrill, 2011). Goal 7 requires it to “ensure environmental sustainability, creation care, and access to clean water”.

A policy review of three influential development organisations also demonstrated not only that none of them have a policy on how to treat the area of spirituality but that they consciously seek to avoid the topic in their programmes (Beek, 2000). Perhaps, as Scupin (2010) writes, ‘with greater understanding of the religious aspirations specific to different people, national governments and the international community will be better able to address their diverse development needs and interests’. Despite the evident centrality of spirituality to rural people, the subject is conspicuously under-represented in the development discourse (Beek, 2000). This failure to take religious phenomenology in the development agenda into account suggests perhaps that spirituality plays an insignificant role or perhaps that there is a lack of information on the role of religious phenomenology in sustainable human development.

There has also been a prevalent view that traditional cultural/religious beliefs have allowed African societies to live in “balance and harmony with nature”, thus supporting sustainable human development (Dudley et al., 2009). Is this really true, and how relevant are these beliefs and practices to human development in a modern contexts? There is a need to fill these gaps in knowledge with an up-to-date study of the role of religions on human development, and on how religion and culture are associated with the process of sustainable human development.

Religiosity, like many other social variables, changes as human communities evolve from traditional lifestyles through to modernity, influenced by various variables. However, despite these changes in life histories of rural people, the rural development agenda in Africa continues to be guided by a few material variables.

Perhaps, most importantly, the materialistic criteria now guiding development thinking must give way to a new conceptual framework that explicitly acknowledges the spiritual, cultural and social forces that define individual and community identity (Baha'i International Community, 2000). The Institute for Studies in Global Prosperity (2010) write that 'effectively addressing the problems now convulsing human affairs—such as crushing poverty amidst vast sections of the world's population, oppression and exploitation of women and minority groups, intractable conflicts among nations and peoples, disruption of global ecosystems, the breakdown of vital social bonds, and the erosion of standards of decency, among others—will require new models of social transformation that recognize the deep connection between the material, moral and transcendent dimensions of life'.

Thus, understanding the association between spirituality and other human development variables would perhaps help to add a religiosity dimension in the human development agenda.

1.1.7 Perceived insufficient data on religion in relation to rural human development

Despite the perceived importance of religion and religiosity, there have been few studies that have attempted to find a connection between religion or religiosity and outcomes in terms of individual attitudes and behaviour. In his paper, Beek (2000) states that, 'despite its importance, development literature and development practices have systematically avoided the topic of spirituality'. The Baha'i International Community (2000) also writes that 'throughout past decades, development thinkers have repeatedly encountered issues related to values and beliefs. Too often, however, they have backed away from a thorough examination of the subject'. This avoidance results in inferior research and less effective programmes, and ultimately fails to provide participants with opportunities to reflect on how their development and their spirituality will and should shape each other (Beek, 2000). Roberts et al. (2009) acknowledge that many studies on the role of religion in human development in rural Africa lack a strong empirical base. The reality is also that, until recently, Roberts et al. (2009) state that little academic effort has been channelled into systematically exploring the relationships between faith and development.

A content analysis of three leading development journals over the last 15 years found only scant reference to the topics of spirituality or religion (Beek, 2011). In fact, two of these journals contained not one article in which the relationship between development and religion or spirituality was the central theme during this period (Beek, 2011). The role of religion in social capital formation is also poorly understood and under-researched (Park & Smith, 2000; Verter, 2003). Research that has been done in this area is focused upon the US context, which suggests it to be a neglected area of study (Tomalin, 2011).

Thus, there is a need to study how religions influence human development in Africa through the use of scientific approaches and empirical data. Prothero (2010) writes that 'even if religion makes no sense to you, you need to make sense of religion to make sense of the world'.

In Tanzania, any efforts to research religion and religiosity are received very negatively by people, and often considered as insurgency against God. Thus, there is fear amongst the scientific community in Tanzania to dwell on this sensitive field. His Holiness the 14th Dalai Lama of Tibet once said that 'if science proves some belief in Buddhism wrong, the Buddhism will have to change' (Gyatso, 2005). Perhaps this could be one reason for the scientific community in Tanzania, which has a strong religious conviction, to avoid researching the associations between religious phenomenology and human development. Some scholars in Tanzania also share the view that religion or religiosity cannot be studied using scientific tools, i.e. religion cannot fit into science, which systematically builds and organises knowledge in the form of testable explanations and predictions about the universe. Perhaps these are myths, misguided by fear of the unknown. In Tanzania, therefore, religious surveys have been eliminated from the government's vital statistics since 1967. This might also discourage scientists in Tanzania from studying religious phenomena.

While pragmatic approaches to solving human development problems obviously play a central role in development initiatives, tapping the spiritual roots of human motivation provide the essential impulse that ensures genuine social-cultural advancements (Baha'i International Community, 2000). When spiritual principles and beliefs are fully integrated into community development initiatives, the ideas, values and practical measures that emerge are likely to promote sustainable development (Baha'i International Community, 2001). A worldview that simultaneously embraces secular science, institutional religion, traditional spirituality and magic can become the perfect mental platform for understanding and enabling the human development process in all its complexity and with all its contradictions (Jechoutek, 2004). Broadening the development process to take into account people's spiritual perceptions and aspirations represents an essential step toward creating the conditions that are necessary for stability, prosperity and sustainability in rural parts of Africa. Discouraging the investigation of spiritual reality and ignoring the deepest roots of human motivation is untenable (Baha'i International Community, 2000). Finally, the Baha'i International Community (2000) states that, 'indeed, if religion is to be the partner of science in the development arena, its specific contributions must be carefully scrutinized'.

1.2 Research questions on religion and rural development

Based on the background discussed above, many questions still exist concerning the challenges facing rural people, which are both increasing and taking new and complicated socio-cultural-economic-environmental dimensions. One set of religious-culture-socio-economic questions is:

- To what extent do religious beliefs shape the economic and socio-cultural behaviours of rural people, and conversely, to what extent do economic, socio-cultural interests influence the sorts of religious beliefs and affiliations people hold?
- Is there a mismatch between the need to develop rural areas and the demands of local traditions and institutional religions?
- Can helpful features of institutional religions and traditional African thoughts be harnessed to accelerate human development in Africa?
- What are the differences between secular science, institutional religions and traditional African views and what impacts do they have on the role of the individuals in rural Africa?
- To what extent are religious institutions involved in rural development processes?
- Are religious doctrines, beliefs and practices consistent with local traditions and the concepts and practices related to contemporary rural development?
- How do religions maintain, and sometimes change, the understanding of what different segments (sex, age, gender and ethnicity) of rural people in Africa should be and do?

Religions and religiosity are thought to play key roles in environmental conservation (e.g. White, 1967; Toynbee, 1972; Callicott, 1989; Boyer, 1994; Tucker &Grim, 1994; Burkett, 1996; Burhenn, 1997; Tucker & Berthong, 1998; Berkes, 1999; Chapple & Tucker, 2000; Chapple, 2002; Tirosh-Samuelson 2002; Belt et al., 2004; Bernard, 2004; Taylor, 2004; Tucker &Grim, 2004; Taylor &Kaplan, 2005; Xu et al., 2005; Wilson, 2006; Taylor, 2007). The other set of questions concerns specific roles that institutional religions and traditional beliefs and practices play in nature conservation in rural Mt. Kilimanjaro:

- What does “environment” mean from a rural perspective in Africa?
- What are the relationships between human beings, their diverse spiritualities, and the Earth’s diverse living systems?
- Do religions in rural Africa contribute to environmental conservation, and, if so, how?
- What are the religious perceptions and beliefs of local people toward natural environment systems, and towards individual organisms in particular?
- Are religions in rural settings being transformed in the face of growing environmental and socioeconomic concerns, and, if so, how?
- How could an understanding of contemporary environmental and sustainable development influence religions, religiosity and human behaviours, and practices and policy shifts in rural settings?

The answers to these questions are difficult and complex, and are intertwined with and complicated by a host of cultural, environmental and religious variables (Taylor & Kaplan, 2005; Taylor, 2008). If the development discourse is to address properly the issue of values, a rigorous dialogue will be required between the work of science and the insights of religion (Baha'i International Community, 2000). In this regard, any initiative examining the roles of religion and spirituality in advancing human wellbeing represent important contributions to the discourse on religion, science and human development (Baha'i International Community, 2000).

1.3 Broad aims and specific objectives of the research

This study is therefore aimed at contributing to the understanding of the relationships between socio-cultural, demographic and natural environment variables in selected villages of the rural Kilimanjaro and Arusha regions (rural Kilimanjaro) of Tanzania. The understanding of these relationships broadly aims to provide pointers for a modified paradigm of sustainable rural development that accounts for people's religious-cultural beliefs and practices. Consequently, the specific objectives of the study are:

- ☐ To understand rural Kilimanjaro's local contexts of religion, socio-demography and natural environment;
- ☐ To examine the correlation of the core dimensions of religious phenomenology and socio-demography of the people of rural Kilimanjaro; and
- ☐ To examine the associations between the religious-cultural tendencies of rural people and their perceptions of the natural environment and the association between religious-cultural practices and the use of the core natural environments of rural Kilimanjaro, controlling for socio-demographic variables.

The findings will help to provide recommendations for future study and policy direction on eco-religion in rural Kilimanjaro, and Tanzania as a whole. This might benefit programmatic and policy formulation regarding human development, and socio-demography and natural environment conservation in rural Tanzania where strong religious-cultural beliefs and practices exist.

1.4 Important definitions for research and research framework

Because of variations in usage and the understanding of common words, it is important to define key terms or words used frequently in this research. These include religion, religiosity, human demography and the natural environment.

1.4.1 Conceptual definitions and research framework

Conceptual or nominal definitions provide a working framework in research and describe major research variables in order to provide a common understanding of key terminologies and variables and to give a general understanding of the subject or key research areas. The conceptual definition of a variable is only the beginning, however, because the rules and procedures or operations that allow researchers to actually 'observe' a variable for individual cases are also needed (Argyrous, 2008).

1.4.1.1 Religion phenomenon

Because of the breadth of meanings for the word religion as well as confusion among users, it was important from the outset of this study to define religion and religiosity both conceptually and operationally. There have been many interpretations of what defines religion but few can be accurately utilised in most scholarly cases (Taylor, 2007). Because the terms religions and religiosity are core in this study, the two terminologies are discussed in detail and put in the research context under the literature appraisal chapter.

1.4.1.2 Human demography

The focus of much human demography research has covered the study of social-cultural, economic, health and ecological determinants and the consequences of changes in human population structure and dynamics (Vienna Institute of Demography, 2010). In recent years, there has also been an increasing awareness of the explanatory power of demographic variables in human development dynamics. Perhaps the most common conceptual demographic variables that influence human development in rural settings in Africa include but are not limited to gender, age, health and education.
Other demographic variables of research interests include ethical values, social relationships, access to shelter and energy, food and water availability, income and cultural elements and ethnicity. Marital status and elements of social inclusion and exclusion form important variables of research in rural development.

This study will utilise these common and conceptual elements of human demography, put them in the contexts of rural Kilimanjaro, and examine whether any associations exist between the core human demographic variables and religion phenomenon in the rural settings of Tanzania.

1.4.1.3 Ecology and the natural environment

The environment can be defined in many different ways. Environment can be defined as circumstances, influences, stresses, and competitive, cultural, demographic, economic, natural, political, regulatory and technological factors (which are called environmental factors) that affect the survival, operations and growth of an organisation (Adams & Lambert, 2006; Smith & Pun, 2006). The natural environment comprises all living and non-living organisms that occur naturally on Earth. In its purest sense, it is an environment that is not the result of human activity or intervention. The natural environment may be contrasted to be 'the built environment', which is an environment created by humans (Smith & Pun, 2006).

For some, there is difficulty with the term "natural environment", in that nearly all environments have been directly or indirectly influenced by humans (Smith & Pun, 2006). Because humans are a living species, some level of human influence is thus allowable without the status of any particular landscape ceasing to be 'natural' (Smith & Pun, 2006). The term's meaning, however, is usually dependent more on contexts than a rigid definition. Many natural environments are the product of the interaction between nature and humans, or between non-human factors and humans.

Adams and Lambert (2006) and Smith and Pun (2006) write that the concept of the natural environment can be distinguished by its components, namely:

- Complete ecological units that function as natural systems without massive human intervention, including all vegetation, animals, microorganisms, soil, rocks, atmosphere and natural phenomena that occur within their boundaries; and
- Universal natural resources and physical phenomena that lack clear-cut boundaries, such as air, water, and climate, as well as energy, radiation, electric charge and magnetism, not originating from human activity.

Subsequently, ecology is the study of the relationships between living organisms and their interactions with their natural or developed environment. It is also an interdisciplinary scientific study of the distributions, abundance and relations of organisms and their interactions with the environment (Allee et al., 1949; Omerod et al., 1999; Smith & Smith, 2000; Begon et al., 2006; Phillipson et al., 2009).

Because variation exists in the definition of the natural environment, in this study the natural environment shall be put into the contexts of the households of rural Kilimanjaro and then discussed in the contexts of the religion phenomenon and the socio-demography of rural Kilimanjaro.

1.4.2 Operational definitions

An operational definition recognises specific observable situations or events and suggests to the researcher how to measure specific conditions or events. Typically, there are several operational definition possibilities for variables and values. The operation chosen will often have an immediate impact on the course of the research, especially the findings. In this study, the operational definitions of demography, religiosity and natural environment shall be defined and put into local and rural contexts in the chapter on definitions, Chapter 5. In other words, these operational definitions will be put into the rural Kilimanjaro context and used to test the major research hypothesis.

1.5 Research hypothesis

Based on conceptual definitions and research frameworks, this research examines the hypothesis that there is a significant relationship between the level of key religiosity variables and key demographic characteristics amongst the households of rural Kilimanjaro. The assumptions are that cultural dynamics like religiosity are positively correlated to the core human demographic variables of rural Kilimanjaro.

Associations between religion phenomenon and natural conservation have also been reported. Some scholars have dismissed the idea that religion phenomena have any constructive ideas to offer about the relationship between humans and the earth. A number of obstacles to faith-based environmental engagement have also been highlighted in various studies. Some recent studies, however, suggest a more direct connection between religiosity and ecology, and identify the significant role played by religions in nature conservation in different parts of the world. The main hypothesis tested in this research is that religious-cultural tendencies (faith, behaviours, attitudes and practices) play significant roles in nature conservation in rural Kilimanjaro. Specifically the study examines whether core religiosity variables are significantly associated with the utilisation of core natural environments and the environmental perceptions of households in rural Kilimanjaro concerning the natural environment.

The results of examining the hypothesis on religiosity-demography connections will help us to understand the possible underlying specific socio-demographic variables behind the potential associations between religion phenomena and the natural environment in rural Kilimanjaro.

Specifically, results from this thesis are intended for scientists from the fields of eco-religion, human development and policy-making in the context of rural environment, and are not necessarily intended for the general public in rural Tanzania. There are potential dangers of misinterpretation if results from this thesis flow directly to the Tanzanian public.

1.6 Outline of the thesis

Chapter 1 describes the importance of research on religion phenomena, research problem contexts, research objectives and questions. It also outlines research core concepts, the hypothesis and the research conceptual model.

Chapter 2 appraises the relevant literature to identify research issues that are worthy of researching. It also discusses the literature on issues of theory and results by major research themes and core thesis chapters (operational definitions, religious-socio-demography and eco-religion).

Chapter 3 describes the study sites in order to enable the reader of the thesis to examine the results in the contexts of rural Kilimanjaro. The chapter also helped in the analysis of the results by putting the interpretation of the results into the contexts of the study areas.

Chapter 4 outlines the sampling techniques, research methods and equipment used to collect data, which was used to answer the core research hypothesis. Statistical methods used to process data are partly described in this chapter. Specific data analysis tests on a specific research hypothesis are described in detail in chapters 5, 6 and 7.

Chapter 5 defines core religion phenomena in the contexts of rural Kilimanjaro. Rural people also give emphasis to certain demographic characteristics and specific natural environment variables, which provide support to their livelihoods. These variables define socio-demography and the natural environment in the contexts of rural Kilimanjaro. The chapter thus defines demographic characteristics and the natural environment in the contexts of the study areas. Local definitions on religion phenomena, socio-demography and the natural environment were used to test the hypothesis of the study.

Chapter 6 gives the background of the Roman Catholic Church and faith development in rural Kilimanjaro. The chapter also discusses the association of religion phenomena and socio-demographic variables based on data of the households who are reported to adhere to the Roman Catholic faith.

Chapter 7 is the core research chapter and provides a description of the association of eco-religion connections, controlling for the socio-demographic dimension, based on data of the households who are reported to adhere to the Roman Catholic faith in rural Kilimanjaro.

Finally, Chapter 8 summarises the whole thesis by providing an overview of the links between chapters, conclusions of the research findings, and the contribution of this thesis to the body of knowledge in terms of theory and findings. This chapter also provides a discussion on the implications of this thesis on human development policies and religion phenomenon in rural Kilimanjaro.

On these foundations, the thesis proceeds with a detailed narrative of the research in the chapters that follow.

Chapter 2: Literature Appraisal

2.1 Background

This chapter discusses the literature on the issues of theory and the results of the relationship between environment (i.e. perceptions and practices) and religious contextual aspects (i.e. religion phenomena) while controlling for socio-demographic factors. A comprehensive review of literature on environment indicates varying hypotheses of relationships between environment and the religious contextual aspects. This chapter contributes to the existing literature in three ways. In each of the categories (i.e. religious, socio-demographic and environment) of the literature reviewed this chapter provides: first, a review of the theoretical foundations for the definition of religion phenomena; second, hypotheses relating religiosity and socio-demographic aspects; and third, a review of the eco-religion connections.

Many people in Tanzania, both men and women and from different educational and religious backgrounds, and from different experiences, see religion as supporting human development by providing social services such as education, health facilities and water infrastructure. This led to the Tanzanian government exempting all religious institutions from paying taxes. Despite the perceptions that religion phenomena are good for human development, a thorough search through various libraries and databases yielded unsatisfactory results as studies on religion and development in Tanzania are generally scarce. Relevant literature from outside Tanzania, which is significant to this study, will help to complete this chapter.

2.2 Definition and importance of religion phenomena

Because of global disparity in usage and understanding of common words, it is imperative to identify and define conceptually the religion phenomena used in the research hypotheses and put these terms in the right contexts.

The first chapter of this thesis introduced the conceptual or nominal definitions that help to describe major research variables and a common understanding of the research subjects. It also helped to develop a conceptual research framework. This chapter introduces specific operational definitions that shall be put in rural Kilimanjaro contexts in chapter 5 and used to test the relationships of religion phenomena and socio-demographic characteristics, and whether religion and religiosity play key roles in the conservation of the natural environment of rural Kilimanjaro.

Chapter 2: Literature Appraisal

A single, authoritative definition of religion or religiosity remains elusive, despite religion's status as one of the oldest human institutions (The Worldwatch Institute, 2003). However, several studies have explored the components of human religiosity (Cornwall et al., 1986; Hill & Hood, 1999). Most definitions include multiple dimensions. For instance, Cornwall et al. (1986) identify three dimensions of religiosity based on religious behaviour, namely knowing (cognition), feeling (affect), and doing (behaviour).

For the Romans, religion denoted ritual precision (Taylor, 2007). Taylor (2007) writes that being a religious Roman did not mean holding a particular set of beliefs, but instead meant performing acts such as sacrifice or visiting oracles at the right point in time and following the right rituals. The term religion might be traceable to the Latin root, *leig*, meaning to bind or tie fast, or to *religare*, which means to reconnect, supernatural constraint or sanction from the Latin *re* (again) and *ligare* (to connect, restrain or tie back)(Taylor, 2007).

Religiosity can be defined as beliefs, feelings and practices that are tied to religion (Ho, 2007). Merriam Webster's Dictionary (2010) defines 'religion' as a personal set or institutionalised system of religious attitudes, beliefs and practices. Buddhism has been central to the discussion of what religion is. The official Buddhist definition of religion is a specific fundamental set of beliefs and practices generally agreed upon by a number of persons or sects (Herbrechtsmeier, 1993). Religiosity can be defined as an organised system of beliefs, practices, rituals and symbols designed to facilitate closeness to the sacred or transcendent (Kilboume et al., 2009).

Some scholars make distinction between religion and spirituality. Taylor and Kaplan (2005) defined religion as a social and political organisation with structures, rules and officials, while spirituality refers to the sense of the transcendent, which organised religions may or may not foster. In other words, religions are characterised as narrow, organised and institutional, whilst spirituality is transcendent, more personal, empowering and subjective, and has to do with the deepest motivations in life.

Religiosity can be further divided into intrinsic and extrinsic religiosity. Intrinsic religious orientation is defined as the extent to which individuals actually play a part in religious activities (Swanson & Byrd, 1998) while extrinsic religious orientation is defined as an individual's inclination to play a part in religious activities as a way to obtain desired emotional or social outcomes (Swanson & Byrd, 1998). The intrinsically motivated individual lives his/her religion (self-transcendent) while the extrinsically motivated individual uses his/her religion (self-oriented) (Allport & Ross, 1967).

Chapter 2: Literature Appraisal

Some scholars see religion as a process with distinct with clear components. Glock and Stark (1968) defined religion to include all of the great monotheistic religions, Eastern religions, neo-pagan religions, a wide range of other faith groups, spiritual paths, ethical systems and beliefs about the existence of gods and goddesses. Five core dimensions of religion are listed by Glock and Stark (1968), namely:

- The belief consequence;
- The practice consequence - ritualised worship;
- The knowledge dimension - information and knowledge about beliefs;
- The consequence dimension - affecting behaviour; and
- The expectation experience - expectations regarding and experience or through prayer.

Looking at the analysis above, perhaps five distinct elements of religion and religiosity could be summarised as:

- Institution, organised group, or establishment dimension;
- Belief, opinion, faith or conviction dimension;
- Knowledge or information dimension;
- Action or practice, application and behaviour dimension; and
- Expectations, hopes or optimism dimension.

The definitions above also show that it is a multi-dimensional issue and that most dimensions of religiosity are somehow linked. For example, people who attend church services (practice dimension) are also likely to score highly on other dimensions, such as beliefs, spirituality, behaviour or optimism dimensions. Some of the religiosity dimensions may not be correlated at all, depending on the different social, economic, demographic or natural environment factors, or depending on other religiosity variables. This is why studying religiosity is complicated with few studies and literature on rural Africa.

Some scholars view religion as an important aspect of social life. Emmons (1999) writes ‘considered as an essential part of human culture, religion is seen as having the ability to shape an individual’s attitudes and beliefs’. Other scholars emphasise that religion supervises a specific, fundamental set of beliefs and practices generally agreed upon by a number of people or sects (Herbrechtsmeier, 1993; Taylor &Kaplan, 2005; Kilboume et al., 2009; Merriam Webster’s Dictionary, 2010). DeSpelder and Strickland (2005) outline three main functions of religion within societies. Firstly, religion unifies people by providing shared beliefs, values and norms.

Secondly, religion helps people to deal with issues of life and death by providing a framework as to what kind of life people are supposed to lead and also what happens to them after death. Thirdly, during times of crisis and upheaval, religion has been known to be a provider of emotional and psychological support. Religion is therefore seen as playing a role in human development. As such, this study will examine the role of religion in human development from the perspectives of rural Kilimanjaro.

In this research study, religiosity is conceptually defined to include the following five distinct dimensions, independently or in combination:

- ☐ Faith-based institutions;
- ☐ Faith-based knowledge and information;
- ☐ Spirituality and beliefs (spirituality dimension) that involves one's deepest moral values and most profound life experiences and a strong belief in a supernatural power or powers, spirits, or dramatic extraordinary forces that control human destiny and humanity;
- ☐ Faith-based actions, practices and behaviours; and
- ☐ Faith-based hopes, expectations and optimism.

This study will utilise these elements of religion and religiosity in the contexts of rural Kilimanjaro, as will be described in chapter five of the thesis.

2.3 Religion phenomena and socio-demographic characteristics

This section reviews literature that examines the relationship between religion phenomena and core socio-demographic variables. Perhaps socio-demographic characteristics of the rural people of Kilimanjaro affect eco-spiritual connections, which is a focus of this study. Therefore, in order to understand how religion phenomena are associated with environmentally ethical behaviours and attitudes, it is necessary to understand the association between religion phenomena and socio-demographic variables.

2.3.1 Religion phenomena and gender

The literature review on faith traditions and gender seeks to evaluate a wide range of existing research and materials that show whether differences exist in religious behaviour between genders. Several studies have shown that there are differences in religious commitments between genders in myriads of ways. Ruether (1999) suggests that religious issues can also be examined from the "lens of gender" perspective embraced by some in feminism and/or critical theory and its offshoots.

Chapter 2: Literature Appraisal

Some scholars have claimed in other parts of the world that gender seems to influence how men and women react to different socio-cultural aspects of life, including their responses to religious teaching and beliefs. Many studies highlight the potential role women might play in the regeneration of society, but also the constraints on this role imposed by the values and practices of the various religions, particularly Islam (Tomalin, 2008).

Available literature on differences in religious commitment between genders can be divided into three areas of research focus. The first examines the roles of genders in church establishments, the second looks at their dedications to a church's set of guidelines and the third literature looks at whether differences in spiritual commitment generate different behaviour and practices between genders. The latter includes whether spiritual healing produces different responses between genders. This research focuses on all aspects of religion and gender, and its implications to nature conservation in rural Kilimanjaro.

Perhaps the majority of studies, which have shown differences between genders, are those related to spiritual healing. More specifically, in long-term studies it is shown that religiosity is highly protective against depressive disorders in women (Miller et al., 1999; Mirola, 1999). Other scholars have also shown that women are both religious and affected by depressive disorders at rates significantly higher than men (Mirola, 1999). In Ghana and Kenya, Gyimah et al. (2010a & 2010b) linked religious involvement with HIV/AIDS protective behaviour. Given the patriarchal nature of African culture, they argued for the increased inclusion of men in HIV/AIDS programs, a critical group whose sexual behaviours have increasingly been linked to the spread and sustenance of the virus in the region. Drawing on different theoretical discourses, and using data from the 2003 Ghana Demographic and Health Survey, they examined how religious affiliation influences risky sexual behaviours amongst the adherents of Abrahamic faiths and traditional African religions. The results from the bivariate analysis suggested that Muslim and Traditionalist men were significantly less likely to engage in risky sexual behaviour compared with Christians. Nonetheless, Gyimah et al. (2010a & 2010b) write that 'those differences disappeared once socioeconomic variables were controlled, thereby rendering support for the selectivity thesis'. On spiritual healing, this study examines the differences between religion phenomena and disease incidences between genders in rural Kilimanjaro. Chapter 7 discusses eco-religion connections, controlling for socio-demographic variables including gender. The assumption behind this conceptual thinking is that perhaps gender focus in eco-religion could effectively and efficiently help achieve nature conservation outcomes in rural Kilimanjaro.

There are also a number of studies that address the question of gender, religion and depressive disorders. All these studies took place in the Western world without consideration of natural environment in the analysis of gender and religion. Maltby's "Church Attendance and Anxiety Change" (1998) suggests that church attendance lowers anxiety levels. Hummer, Rogers and Nam's "Religious Involvement and U.S. Adult Mortality" (1999) found that people who attend church weekly live longer than those who do not attend church at all. Miller, Warner and Wickramarante's "Religiosity as a Protective Factor in Depressive Disorder" (1999) noted that, in women, religiosity had a protective effect against depressive illness. Finally, Mirola's "A Refuge for Some: Gender Differences in the Relationship between Religious Involvement and Depression" suggested that 'religious involvement measures tend to have a negative impact on depression for women' (p.419). Church attendance and involvement is vital to all of these studies of religious benefit and Kelly and De Graff's (1997) article lead us to make church attendance and involvement as our indicators of religiosity. The study in rural Kilimanjaro examines whether environmental ethical behaviours are affected by the spiritual feminism elements.

Another group of studies on religion and gender examines the roles of genders in religious institutions. Islam is very clear about the status of women as economically independent human beings, such that there is hardly any dispute about the economic rights of women among Islamic scholars and jurists (Roberts et al., 2009). For example, women's access to productive resources is closely related to Islamic views on marriage. Marital practices, like provision of maintenance and seclusion (or purdah), are perceived and analysed as part of the contractual nature of marriages in Northern Nigeria. As part of the marriage contract, a man is obliged to provide things like food, clothes, shelter and medicine, while a woman is expected to be obedient and faithful (Roberts et al., 2009). Data from Area Courts in Sokoto, a city in Nigeria, from 1988 to 1998 show that out of divorce and non-divorce reasons why women go to court, 53 percent were maintenance-related based on Islamic doctrine (Adamu, 2002). This division of responsibility preached by Islam makes women socially accept seeking divorce on the grounds of non-support by their husbands. The study in rural Kilimanjaro examines whether association between religious phenomena and gender exist. It further examines whether religious phenomena and perception about natural environment exist, controlling for gender.

Flere (2005) studied gender differences among university students in Catholic, Christian Orthodox and Muslim environments of Central Europe and in an American, predominantly Protestant, environment. Religiosity was evaluated by differentiating between intrinsic religiosity (internal beliefs, moods and motivations, etc.) and extrinsic religiosity (rituals, prayers, hymns, and other external practices). Psychological explanations, which include anxiety, authoritarianism and femininity, revealed differences in religiosity between the genders.

Chapter 2: Literature Appraisal

The study in rural Kilimanjaro examines whether association between religious phenomena and environmental ethical behaviours exist, controlling for the effects of gender and religiosity connections.

Rich literature examines whether differences in spiritual commitment generate different behaviours and practices between genders. Perhaps one of the best overviews of the work done pertaining to sex and religion is Walter and Davie's (1998) sociological literature review, "The religiosity of women in the modern West", which was published in The British Journal of Sociology. Walter and Davie trace the studies of religiosity and gender and put forward the premise that 'whether or not religion is or has been a response to socially-induced vulnerability, it is and always has been a response to the physical vulnerability of the body that is the human condition'. They extend the argument to say that, because women's bodies are more vulnerable, women should be more religious. Sadly, they also note the dearth of research in the area. Gazzaniga (1998) note religion's connection to human anxiety, but fail to question whether different sexes might experience religion differently because of it. Bowker's (1995) "Is God a Virus?" is especially helpful because he addresses issues of the co-evolution of nature and culture and specifically women's relationship with religion. Taken together, these sources and their references are the foundation of literature on connections of religion phenomena and gender.

There has been little attempt in other academic, activist or policy literature to consider the ways in which gendered natural resource use and management is cross-cut by issues of religious attachment (Tomalin, 2008). There are also a couple of literature sources on eco-feminism. Some of these literatures attempt to disentangle religion phenomena from connections between gender and nature. With regard to European cultures, considerable archaeological evidence indicates that both the earth and the female were held in high regard in the Neolithic settlements prior to the Bronze Age (Spretnak, 1994). Cultural responses to the physical connections between nature and the female range from respect and honour to fear and resentment (Tucker & Grim, 1997; Momen, 1999). A number of scholars have suggested that the Bible is also a source for developing an eco-feminist response to environmental devastation (Ruether, 1992; Adams, 1993; Keller, 1996; Ruether, 1999; Habel, 2000). McCartney and Hetrick (2002) also write that 'the questions concerning gender and religiosity are particularly important because of the patriarchal nature of so many religions'. As a society, we should try to find ways to fulfil women's unique psychological and spiritual needs in a society that values women (McCartney & Hetrick, 2002). The majority of chapter 7 examines eco-religion connections in rural Kilimanjaro, controlling for socio-demographic characteristics including gender dimensions.

Taking all of the studies into consideration, this study examines the correlation of religiosity and gender in order to scrutinise the associations of religion phenomena and environmental ethics behaviours and the attitudes of rural people in Kilimanjaro, which are controlling for the gender variable.

2.3.2 Religion phenomena and ageing

Another demographic characteristic that seems to affect human development is age. This study focuses on participants who are in adulthood. In Tanzania, adulthood is defined as ranging from 18 years old upwards. Adulthood can be further broken down into many different categories. This study assumes that religiosity levels would not differ between young adults and older adults. What, precisely, are the spiritual needs of older individuals and how do they differ from the spiritual needs of other age groups? To what extent does religion assist individuals in coping with the challenges of advanced age? What difference does it make how religious individuals are in old age? It further assumes that eco-religion connections would not differ with the age of households in rural Kilimanjaro. In other words, association of religion phenomena and ecology was studied, which are controlled for the age variable.

Few studies of religion-age-ecology connections have been conducted, thus limited literature exists. The majority of literature on this area focuses on connections of religiosity-age, without consideration of influences of this connection on environmental ethical behaviours and perceptions. Chapter 5 of the thesis outlines connections of religiosity and age, and chapter 7 considers eco-religion connections, controlling for ageing. This section answers the question of whether connections of age and religiosity exist first, before examining eco-religion-age connections in subsequent sections.

Few results have generally found consistent results regarding age and religiosity. The Employer Forum on Belief (2012) discovered that that younger people are more likely than older people not to belong to any religion, reflecting the trend towards secularisation. The survey commissioned by the Bible Society of New Zealand (2008) asked the question, “Would you describe yourself as a Christian?” Results indicated that those respondents of the questionnaire were prepared to affiliate more with the Christian religion as they grew older. These studies were conducted in the western world, and did not show the connections between religiosity and ageing and how it affects environmental perceptions and behaviours.

Many other literatures have demonstrated a link between ageing, spiritual wellbeing and better psychological health in developed nations (Masters & Knestel, 2011; Mirsaleh et al., 2011; Village, 2011).

Other literatures have also shown that older people tend to adhere strongly to religious phenomena compared to young people (Malinowski, 1965; Richardson et al., 1997; Gallup Organisation, 2006; Imamura, 2009).The Gallup Organisation (2006) further suggests that 'Americans' likelihood to adopt religious attitudes and behaviours does increase dramatically with age'. Reasons given by scientists concerning the relationship of religiosity and ageing are related to greater chronic health issues, depressive symptoms, health satisfaction, social support and healthy behaviour displayed by people as they grow older. Most of them argue that religion acts as a comforter to individuals who are going through tough times. Yet again these studies were conducted in the western world, and did not show connections between religiosity and ageing and how it affects environmental perceptions and behaviours.

Perhaps the most important sources of texts on religion and ageing are found in the abstracts of the Journal of Religious Gerontology, the American Society on Ageing and the Forum on Religion, Spirituality and Ageing. Nonetheless, no single study seemed to suggest connections of eco-religion, controlling for a gerontocracy.

Clear gaps seem to exist between the connections of eco-religion and ageing in rural Kilimanjaro. Taking these few studies into consideration, the following objectives were proffered. The study examines the correlation of religiosity and age in order to scrutinise the association of religiosity and environmental behaviours and perceptions and the use of natural environment resources, which are controlling for ageing.

2.3.3 Religion phenomena and level of education

Educational attainment is yet another demographic phenomenon that seems to affect human perceptions and behaviours. This study assumes a connection of religion phenomena and education attainment, which, in turn, affect environmental ethical behaviours and perceptions.

There are many different literatures with mixed research outcomes on the relationship between religiosity and level of education or education achievement. In the United States and Australia, educational attainments have been compared with religious behaviour in urban areas (Kaldor, 1987; Australian Social Trends, 2004; Gallup Organisation, 2006, 2009; Barro & Hwang, 2007). Other studies have shown a strong positive correlation between the level of education and atheism/agnosticism, while there is a strong negative correlation between the level of education and belief in and practice of religion phenomena (Finnerty, 2007; Bagnall, 2010). In the United States, religious attendance declines sharply with education across denominations (Sacerdote & Glaeser, 2001).

In Spain, the level of education was found to be negatively correlated with religiosity (Branas-Garza & Neuman, 2004; Branas-Garza et al., 2008). The negative effect of education on religious belief causes more educated individuals to sort into less fervent religions, which explains the negative relationship between education and religion across denominations (Kaldor, 1987). These studies were conducted in the western world, and did not show the connections between religiosity and education achievement and how these affect environmental perceptions and behaviours.

Positive correlations of religion phenomena and religion, nonetheless, have been revealed. Studies of Mormons in the United States show that those with higher education attend church more regularly than uneducated Mormons (Kaldor, 1978). In the United States, data from the PEW survey indicates that educational attainment, how much schooling an individual has completed, is the single best predictor of religious knowledge (The PEW Forum, 2008).

This study examines the correlation of religiosity and levels of education in order to scrutinise the association of religiosity and environmental perceptions and the use of natural environment resources, which are controlling for education attainment.

2.3.4 Religiosity and health conditions

Health condition is hitherto another demographic characteristic that seems to impinge on human perceptions and behaviours. This study assumes a connection of religion phenomena and health conditions, which, in turn, affect environmental ethical behaviours and perceptions.

Correlations of religiosity and health conditions, particularly depression and mental disorders, have been found in many parts of the world. The beneficial impacts of religiosity and religion on mental health have been reported in many different studies (Thoits, 1987; Shafranske, 1996; Science Daily, 2007; Bishop, 2008; Murphy, 2008; Pfaff et al., 2008; Assimakopoulos et al., 2009; Cohen et al., 2009; Koenig, 2009; Steffen, 2009; Wittink et al., 2009). A causal model developed by Koenig (2000) suggests that higher levels of spirituality and religiosity affect intermediary variables and eventually result in better mental health, which then positively affects physical function. Religions and religiosity tend to enhance the spirits of sick people and lengthen the lives of those who require comfort in the form of support. African-Americans who incorporate prayers, religion and God into their lives had lower blood pressure than that found in less religious African-Americans (Steffen, 2009). In Germany, the prevalence of religious delusions in schizophrenia is, above all, associated mostly with cultural factors (Pfaff et al., 2008). Schizophrenia is a severe psychiatric disorder with symptoms of emotional instability, detachment from reality and withdrawal into the self.

Bishop (2008) writes that greater friendship closeness in combination with greater secure attachment to God was also shown to reduce the risk for depressive symptoms in the United States. Does improvement of mental health state and depressive symptoms affect environmental ethical perception and behaviours? Are there any connections between health state and eco-religion? The study in rural Kilimanjaro examines relationships of health conditions and religious phenomenology and whether the connections have anything to do with the perceptions of the rural people about their immediate natural environments, or use of water and energy.

Yeung and Chan (2007) write that 'inpatients with HIV, an expanded version of Koenig's model found that increased spirituality/religiosity is positively associated with self-reported outcomes'. Many other scholars have suggested a positive correlation of religiosity and better HIV/AIDS management outcomes (Guillory et al., 1997; Morse et al., 2000; Muturi, 2005; Milam, 2006; Paruk et al., 2006; Yi et al., 2006; Gilbert, 2008) and religiosity as an HIV/AIDS coping strategy. None of these studies showed how religion and health connections affect environmental perceptions and behaviours.

Taking all of these studies into consideration, the following objectives are proffered. This study tests the hypothesis that there is a significant relationship between level of religiosity and an indicator of health (in this case, the incidence of malaria, as this was the most commonly reported ailment) amongst households who are affiliated with the Roman Catholic Church in rural Kilimanjaro. It was assumed that, perhaps, the connections of level of religiosity and health conditions had an effect on environmental perceptions and behaviours. Malaria prevalence in rural Kilimanjaro could be attributed to natural environment factors and other factors ranging from religious-cultural to socio-economic. Is there any correlation of natural environment and religion phenomena controlling for incidences of malaria? This thesis attempts to establish this connection.

2.3.5 Religion and wealth conditions

This review examines the concept of religion and wealth in order to understand the correlation of religiosity and wealth. The review of the literature on connections of religiosity and wealth will help to examine the role of religiosity in nature conservation, which are controlling for wealth variables.

Overall, there are two levels of literature on religion and wealth. One level examines state level indicators of wealth and religiosity, and the other addresses religion and wealth indicators at an individual level. In some cases, however, the state level indicators are summarised from individual level indicators.

The available literature also outlines six different ways that describe relationships of religion and economy at state or individual level. Firstly, organised religions are sometimes employers of labour, providers of services, especially in health and education, investors in real estate and managers of properties. Secondly religious doctrines instill in its adherents a sense of genuineness and in return they can become fair players in their business endeavours. Thirdly, religious doctrines affect, in a positive manner, the economic attitudes, perceptions and behaviours of its adherents. Fourth, religions can stimulate consumption, which in turn affect the spending of its adherents and affect either positively or negatively the incomes of the people. Fifth, religion may affect economic development by endorsing certain economic actions. Sixth is whether religion governance supports the economy of religion phenomena. The study in rural Kilimanjaro addresses most of these elements, and attempts to examine whether environmental ethical attitudes and practices are informed by the association of wealth and economy of the households of rural Kilimanjaro.

Perhaps a paper by Adogame (1999) provides a comprehensive summary, compared to other literatures, that relates to conditions of the study area of rural Kilimanjaro and covers most of the aspects that describe the relationship of religion and wealth both at state and individual levels. His/her paper revealed a manifold and complex interplay between religion and state economy and wealth. The author provides examples of economic roles that organised religions play in Nigeria, such as an employer of labour, provider of services, especially in health and education, an investor in real estate and a manager of properties. He/she then identifies ways in which, to varying degrees of intensity and significance, religion can affect economic attitudes and behaviours. Adogame (1999) also examines some issues related to the impact of religion on wellbeing. He/she notes that organised religions have striven to alleviate some of Nigeria's socio-economic problems – though this is not their primary responsibility. He suggests that personal and business virtues such as honesty, fair play and honouring ones' commitments are essential in economic life, to the extent that religion is successful in inculcating such virtues in adherents, and this has an impact on individual economies. Moreover, religion also, on occasion, stimulates consumption and therefore economic growth. Finally, religion may influence economic development by explicitly endorsing certain economic or business activities. For example, various religious bodies have either supported or rejected certain economic strands of the government. Adogame did not extend his/her analysis of connections of wealth and religion to address its implications on environmental ethical behaviours of the people of Nigeria. The study in rural Kilimanjaro examines eco-religions connections, controlling for wealth variables.

Barro and Mitchell (2005) recognised two kinds of individual-level dimensions with respect to religiosity. One is participation in formal religion (e.g. attendance at formal religious services and/or personal prayer) and the other is religious belief.

Barro and Mitchell (2005) further reiterate that religion might influence economic outcomes, especially if one considers traits like work ethic, honesty and other characteristics. Barro and Mitchell (2005) undertook a World Value Survey that covered 50 countries and surveyed between 1,000 and 2,000 individuals in each country in order to understand their values. They used data on attendance at formal religious services in addition to a number of specific religious beliefs. As such, they were able to identify some correlations between certain religiosity variables and certain economic outcomes. Barro and Mitchell did not examine the effects of religion and wealth on environmental ethical attitudes and behaviours.

This study in rural Kilimanjaro focuses on individual level dimensions of wealth in rural settings and from three main indicators: monthly incomes, land and properties owned by households in rural Kilimanjaro. Land is the main asset of production in rural Kilimanjaro and is intimately connected to the livelihoods of these people. Land use activities are the basis for the monthly income and estimated property values of the people of rural Kilimanjaro. Thus the study assumes that wealth (income, land and other properties) of households is associated with religious phenomena. In other words, perhaps religion phenomena in terms of religious doctrines affect economic perceptions and attitudes, economic practices and behaviour, which in turn affect ownership of land and other properties and monthly incomes of households of rural people. The study further assumes that eco-religion connections in rural Kilimanjaro are affected in some ways by wealth of the people of these areas.

Other studies in West Africa examined connections of wealth and religiosity focusing on the responses of religion phenomena to capitalism. In his study on “Christian appraisal of economic stewardship in capitalist society”, Anyanwu (1996) synthesises different interpretations of how Christians should live their economic lives in a capitalist society, spelling out exactly what is expected of them according to Christian teaching. The study is part of an appraisal of economic stewardship. Other efforts have recently been directed at understanding the construction of the ‘religious economy’ in West Africa. Based on specific cases, two of the studies, for instance, identify and evaluate various forms of religious economy (tithes, offerings etc.), the governance superstructure within which this economy operates and the consequences for church and society (Azubuike, 2005; Roberts et al., 2009). This study in rural Kilimanjaro did not go into religion governance (transparency, rule of law and accountability) and economy of the religion and its adherents. The study also did not evaluate principles of religions in rural Kilimanjaro, whether or not they uphold capitalist tendencies and whether they support rural people to survive in a capitalist society.

Oguntoyinbo-Atere (2005) examines the relationship of religion phenomena and poverty. He articulates the interest in the material needs of the poor that are found in St. Luke's Gospel as a basis for critically evaluating the programmes designed by the Redeemed Christian Church of God (RCCG) to help those living in poverty. Notwithstanding the shortcomings identified, the study identifies a need for the churches to complement government efforts by initiating programmes for the development of human capital, giving priority to the provision of sound education, healthcare delivery, good water supplies and rural and urban development. According to Roberts et al. (2009), recognition of these needs has led to the rampant solicitation of 'giving' in many churches in Nigeria today. On the issue, Solaru (2000) argues that the recent growth of Pentecostal churches, with their tithe doctrines, is responsible for the apparent poverty among many adherents of Pentecostalism. He is of the view that, historically, the churches did not apply the tithe doctrine but achieved much by sacrificing their time, energy and members' lives to educate or proselytise. Instead of following a path similar to the colonial and early post-colonial orthodox churches (Catholic, Anglican, Methodist and Baptist), the new churches, he suggests, have become 'adulterous' in their search for money and wealth. However, rather than raising funds for the benefits of the poor and wider society, he alleges that the funds benefit newly emergent religious elites. Solaru advances a methodically argued case based on textual analysis of the scriptures, especially the Mosaic laws and the New Testament equivalent and the doctrine of grace, rather than on empirical evidence, providing a possible hypothesis that can be tested rather than findings. It would appear that not much attention has been given to what Michael Taylor terms 'the theology of suffering' (Taylor, 2000) and its impacts on Christian approaches to economy. This study examined the association of wealth, or lack thereof, and religion phenomena. The study further relates wealth/poverty – religion connections and how it affects the natural environment, and environmental ethical attitudes.

In the literature on religion/religiosity and socio-economy, Barro and Mitchell (2005) provide perhaps the best conceptual model on the relationships between religion and wealth. They recognised that there are two causal directions regarding the conceptual or theoretical approaches to the connection between religiosity and political/socio-economy. First, an important line of research posits that religiosity is dependent upon developments in the economic and political aspects of contemporary life. It suggests that events in the economy and the standard of living or governmental market interference influence dimensions of religiosity and issues such as church attendance, prayers or religious beliefs. The second theoretical approach considers religion as an independent variable. In other words, religion influences economic, political and social outcomes. Weber (1930) supports this view that religiosity influences economic performance, and perhaps political institutions. The study examines the association of religion phenomena and wealth, in the contexts of rural Kilimanjaro. Results from rural Kilimanjaro could confirm the conceptual model on religion and wealth proposed by Barro and Mitchell (2005) and links the model to eco-religion connections.

Barro and McCleary's findings (2003) on the 'religion and economic growth' debate commented on Stark and Bainbridge's (1987) paper "A Theory of Religion" and described two important sociological theories on religion and social and economic development. One approach is called the "Secularization Hypothesis" (SH). It is a part of what is often called "Modernization Theory" (MT), which looks at the economies of developing countries and develops institutional capabilities to alleviate poverty and rationalise markets. The MT posits that, as an economy develops and gets richer, certain societal institutions and features change in predictable ways. The secularisation hypothesis applies this theory to religiosity. As economies develop, people supposedly become less religious. The study examines the association of religion phenomena and wealth at an individual level, and not at state level, and in the contexts of rural Kilimanjaro. Results from rural Kilimanjaro could confirm MT, if change brought by wealth of households is associated with religion phenomena. MT, if confirmed, could also be linked to the model of eco-religion connections. Max Weber's work of 1906, "The Protestant Ethic and the Spirit of Capitalism", was an important part of the empirical work in this field. This theory posits that religion affects the economy by influencing certain individual traits. These traits, in turn, may make people more or less economically productive. Weber particularly stressed the Protestant work ethic in Germany. Weber argued that if religiosity influences the willingness to work and to be productive, then the economy would be impacted. Yet the association of eco-religion-economy, which is the focus of this PhD study, has not been tested through the MT.

The second important approach in the sociology of religious literature is often called the "Religion Market Model" (RMM). The RMM addresses the way that governments interact with religion and influences participation in religion, or even the extent of religious beliefs. Thus, a government may regulate the market, and thereby possibly promote a specific religion or make it difficult for other religions to flourish, because of regulations or social policies. Under this theory, the government might make it difficult for people to practise their religion or it might subsidise religious activity. In one way or another, the government influences the amount of formal religious activity. One example of this influence is the establishment of an official religion in a country. The study in rural Kilimanjaro examines the individual level of association between religion and wealth, and does not attempt to confirm RMM in the contexts of rural Kilimanjaro.

In Taiwan, Chang (2006) used the data from the Taiwan Social Change Survey to examine the determinants of religious giving for an Eastern-culture country, with people mostly adhering to folk beliefs, Buddhism and Taoism. After estimating a Tobit model with simultaneous equations of religious giving and attendance, the results indicated that there is a positive relationship between giving and church attendance. Chang (2006) reiterated that the price elasticity of religious giving is statistically significant for Eastern religions, but not for individuals affiliated with Christianity.

However, unlike the findings from previous studies, one's income level appeared to have only a slight influence on religious giving or church attendance for individuals adhering to Eastern religions or Christianity in Taiwan. This study supports the economic argument for increasing people's religiosity through tax deductions for religious giving. This study also seems to partly support both RMM and TM. This PhD study examines the connection of wealth and religion phenomena at the level of an individual, and in the contexts of rural settings. Elements of religious giving shall also be tested against wealth. The connections of religious giving and eco-religiosity shall also be examined in the context of rural Kilimanjaro.

The PEW Forum (2008) showed correlations of religiosity and Per Capita GDP for different countries. It was clear that, as religiosity increased, wealth decreased and vice versa (Figure 1).

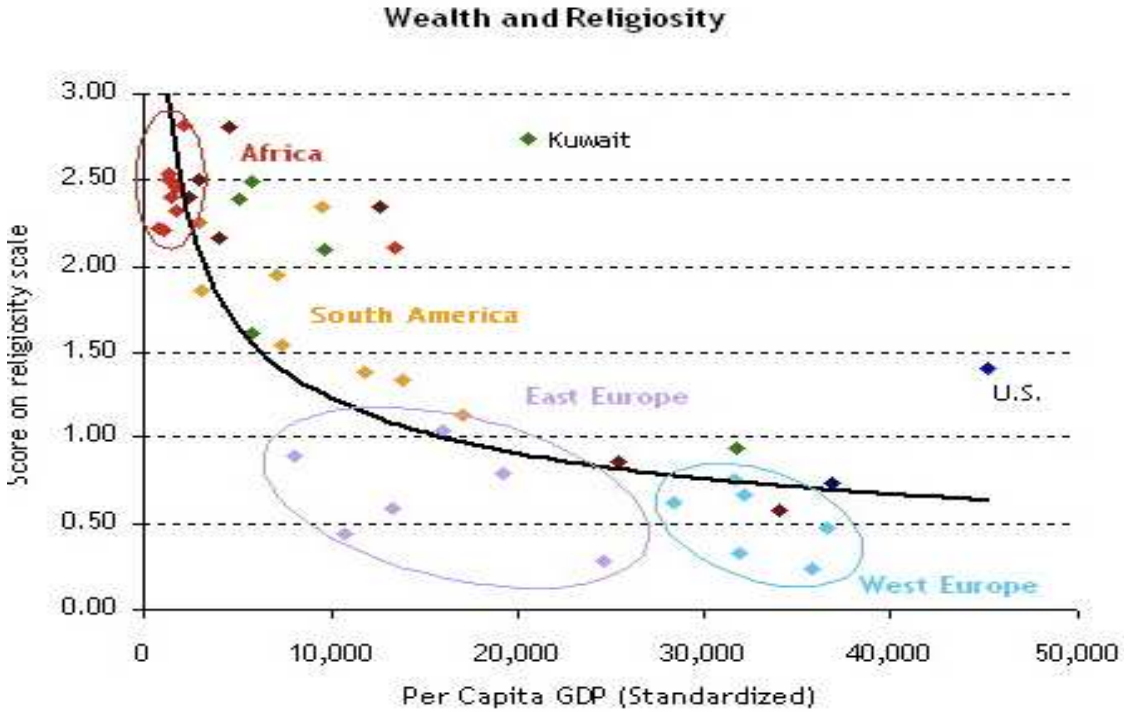

Figure 1: Correlation of Wealth and Religiosity – The PEW Forum (2008)

These results raise a number of questions of research interests. Does belief in God cause a society to be dysfunctional or are less successful countries more likely to encourage religiosity? Or is there no obvious cause and effect behind this correlation? Why does the United States and Kuwait seem like an outlier compared to other states, and what is religion in the context of the United States and Kuwait?

Chapter 2: Literature Appraisal

This study examines the definition of religion phenomena in the context of rural Kilimanjaro. Perhaps the definition of religion phenomena in rural Kilimanjaro differs from the definition used by the PEW Forum (2008). Results in rural Kilimanjaro, based on local contexts of religion phenomena, might perhaps yield different results on connections of religion and wealth. However, the study in rural Kilimanjaro also focuses on individual level wealth and religiosity, and does not use national or state indicators like Per Capita Gross Domestic Product.

Reflecting on this background, the study examined the correlation of wealth and the religiosity of households in rural Kilimanjaro. The correlation, or lack thereof, would help to examine the association of religiosity and the perceptions of the natural environment of the rural people and correlation of the use of natural resources and religiosity, which are controlled for wealth.

2.4 Religion and environment phenomena

Debates have erupted and intensified about the relationships between religions, cultures and the earth's living systems (Hamed, 1993). Some scholars have argued that ritual and religion can play a salutary role in helping humans to regulate natural systems in ecologically sustainable ways. Others have blamed one or more religions or religion in general, for promoting worldviews and cultures that precipitate environmental damage. Religious publications in recent years suggest not only that many religions are becoming more environmentally friendly but also that a kind of civic planetary earth religion may be evolving. Examples of such novel, nature-related religious evolution allows us to ponder whether, and if so, and in what ways, the future of religion may be green. For instance, the role of different religions and religiosity in nature and environmental management and conservation is richly documented (Puri, 1975; Oyadomari, 1989; Hamed, 1993; Sharma et al., 1999; Sagoff, 2007; Dudley et al., 2008; Bhagwat and Palmer, 2009). Many other scholars have studied how religiosity, cultural values and rituals help to protect habitats or wildlife or specific religious practices that support the protection of specific wildlife species or habitats.

The major objective of this study is to examine the inter-relationship between religions and the environment in rural Kilimanjaro. Specifically, the study elucidates how the religions in rural Kilimanjaro negotiate between their main faith and practices with respect to the recognition of nature and its implications for the wellbeing of their members. The study explores the beliefs and perceptions, practices and attitudes of the adherents of major religious groups towards the natural environment.

Chapter 2: Literature Appraisal

The literature review attempts to uncover existing concepts on religion and ecology and responds to the following key questions:

- ☐ How can religions contribute to environmental management, thus supporting sustainable human development efforts?
- ☐ What are the perceptions and beliefs of the local people's religions and their adherents toward the natural environment systems?
- ☐ Are religion phenomena associated with environmental ethical behaviours and practices?
- ☐ Are religions being transformed in the face of growing environmental concerns, and if so, how?

Most of the literature on ecology and religion examines how both traditional and modern religions support efforts to protect the natural environment. There is a wealth of literature that establishes the relationships between religions and the establishment of conservation areas. Many scholars have shown how religious scriptures and doctrines support conservation of environment and natural resources.

The consideration of environment by religions was proposed in 1967 by White, who wrote an article entitled, "The Historical Roots of Our Ecological Crisis". In this article, White indicated that the Western world's attitudes towards nature were shaped by the Judeo-Christian approach. According to White (1967), this tradition involved the concept of a world created solely for the benefit of humans, i.e. God planned all (of creation) explicitly for man's benefit and rule. No item in the physical creation had any purpose save to serve humans' purposes. Along with this, Western Christianity separated humans from nature. In older religious traditions, humans were seen as part of nature, rather than its ruler (White, 1967). And, in animistic religions, there were beliefs that a spirit exist in every tree, mountain or spring, and all had to be respected. In contrast with paganism and Eastern religions, Christianity not only established a dualism of man and nature but also insisted that it is God's will that man exploit nature for his proper ends. White further noted that Christianity was a complex faith, and that different branches of it differ in outlook. But, in general, White proposed that Christianity, and Western civilisation as a whole, held a view of nature that separated humans from the rest of the natural world and encouraged exploitation of it for our own ends. Concepts by White (1967) were the basis for this research on eco-religion. The study examines whether eco-religion connections are positive in rural Kilimanjaro. It examines whether perceptions of the local natural environment are distinct from religion phenomena in rural Kilimanjaro, and whether religious faiths, attitudes and practices encourage the exploitation of natural resources, specifically water, and forest products and energy.

Boyle (1997) wrote about archaeological evidence, which seems to symbolise the relationships of ancient people and the ethno-culture with the natural environment. In the prehistoric world, and well into historic times, 'religion was life, and life was religion'. Evidence exists on the ethno-cultural values of wildlife and environmental resources simultaneously in many parts of the world. In rural Kilimanjaro Islam and Christianity replaced traditional or indigenous religions in the 1550's and 1980's, respectively. It was hypothesised that contemporary religion phenomena would continue to promote nature conservation behaviours and practices as traditional religions did in the past. Traditional religions evolved from interactions between humans and their immediate environments, which supported their livelihoods. Thus, traditional religions supported nature conservation for livelihoods.

Most of the studies published from the early 1980s to the mid-1990s illustrate that some aspects of religiosity were correlated with environmental attitudes and perceptions. Greeley (1993) attempted to expand a study reported in 1989 and 1996 by Eckberg and Blocker of the relationship between religion and concern about the environment in Tulsa, Oklahoma in the United States. Greeley used only one variable: willingness to spend money on the environment. Results showed that a low level of environmental concerns correlates with biblical literalism. They also correlate being Christian with confidence in the existence of God. On the other hand, support for environment correlates positively with a gracious image of God, and being Catholic. This study also looks at religion phenomena and whether they correlate to environmental variables, in the contexts of the rural people, i.e. is there any relationship between religiosity and environmental perception in rural Kilimanjaro? Environmental indicators used in the USA, such as willingness to spend money on the environment, may not be useful in rural Kilimanjaro. Instead, environmental attitudes and perceptions are perhaps more useful indicators and they are, perhaps, associate with religion phenomena in rural Kilimanjaro.

The World Wildlife Fund and Alliance of Religion and Conservation (2005) studied how religious faith has influenced the establishment and management of protected areas in different parts of the world. The protected areas, which were established on the basis of religious faith, are listed in their "Beyond Beliefs" book. A gap exists in these studies on whether any protected areas have been de-gazetted on the basis of religion phenomena, or which protected areas have been adversely affected by religious tendencies. This study, among other elements, examines whether environmental attitudes and perceptions of households towards the Kilimanjaro National Park are associated with any degree of spiritual commitment or religious faith. It also examines whether the park had any spiritual value to the rural people, who helped to establish the park in 1973.

Chapter 2: Literature Appraisal

Perhaps Gottlieb's (2006) book, The Oxford Handbook of Religion and Ecology, is the single most important book that has shown how major faith groups support conservation of the environment. The book reveals how complex and multifaceted religious beliefs, moral teaching, practices and behaviours called religions have taught humans how to think about and relate everything we do to a supernatural being in the form of God. Gottlieb talks about a changed environment and a changed faith, objection to ecological religions, spiritual challenges and spiritual opportunities, and what religion can do to promote environmental sustainability. He also provided a summary on how traditional religions viewed nature and how these views may be reinterpreted or altered in light of the environmental crisis. The book examines major faith groups and their broad philosophies on ecology and environmental conservation including Judaism, Catholicism, Orthodox Christianity, Protestantism, Jainism, Hinduism, Buddhism, Islamism, Daoism, Confucianism, African Culture, and indigenous traditions. Most of the literature contained in Gottlieb's book comes from eco-theologians and environmentalists with religious inclinations. Their inclination and ethnocentrism perhaps make them fail to recognise religious-cultural constraints to sustainability. Little is also mentioned of the eco-religion connections in rural East Africa in Gottlieb's book. This study will not examine the philosophies of the major religious faiths found in rural Kilimanjaro but shall instead examine the outcomes of religious philosophies and their connections to environmental sustainability, or lack thereof.

Two volumes of the Encyclopaedia of Religion and Nature (Volume I: A-J and Volume II: K-Z) edited by Bron Taylor (2008) contain perhaps the richest literature on religion and nature of recent times. The two volumes attempt to answer the broad question of what the relationships between human beings, their diverse religions and the Earth's living system are. Specifically, the volumes attempt to respond to the following questions:

- What are the perceptions and beliefs of the world's religions towards the Earth's living systems?
- Are religions being transformed in the face of growing environmental concerns, and in what ways?
- Are religion's resources or barriers able to help fight growing environmental catastrophes?
- Do religions complement one another in the management of environmental challenges?
- To what extent are contemporary environmental movements considered religious?
- What are the reciprocal influences between nature and religion in inter-human conflicts and violence?
- What are the relationships among religious ideas, population growth and decline?
- What is the relationship between science and religion?
- What is nature religion? How can it be used to support nature conservation? and
- What is the relationship between global economy and religions/religiosity?

Chapter 2: Literature Appraisal

Information on religion and ecology from different socio-cultural and geographical set-ups could help respond to some of these key questions on the role of religion in environmental sustainability. The study in the rural area of Mt. Kilimanjaro attempts to answer some of these questions primarily based on views of households who adhere to the Abrahamic faiths and in the contexts of rural environments. Specifically, the study attempts to answer the following questions outlined in the two volumes of Encyclopaedia of Religion and Nature (Volume I: A-J and Volume II: K-Z) (2008):

- What are the perceptions and beliefs of religions in rural Kilimanjaro towards the Earth's living systems?
- Are religions in rural Kilimanjaro being transformed in the face of growing environmental concerns, and in what ways?
- Do religions complement one another in the management of environmental challenges?
- What is the relationship between religion and ecology in rural Kilimanjaro, controlling for socio-demographic variables?

The International Society for the Study of Religion, Nature and Culture (ISSRNC) publishes a biannual journal called the Journal for the Study of Religion, Nature and Culture. Most of the literature published in the Journal revolves around nature and cultures and how they broadly relate to the natural environment. Literature on environmental ethics and the responsibilities of religions in relation to the protection of nature are common topics of the Journal. Overall, the Journal attempts to examine the relationships among human beings, their diverse religions and the Earth's living systems. The majority of the literatures published in this Journal have their origin from eco-theologians from sources other than Sub-Saharan rural Africa. Conclusions of religious-environment connections are based on studies conducted away from Sub-Saharan Africa. This study defines and correlates eco-religion variables in the context of rural Kilimanjaro. Perhaps the study would reveal different results with different perspectives from the studies published by the ISSRNC.

Taking an opposite view from most of the recent literature, Nash (2009) challenges the view of many eco-theologians and environmental Christians that the Bible, religions and religiosity makes a clear and compelling case for ecological responsibility. Nash states that Christians have shown impressive capacities to make biblical texts say or mean what fits their personal values or political perspectives. He feels that this is partly caused by the broad and vague statements contained in the Bible. Nash also observed that the pursuit of biblical warrants has contributed to Christian moral distortion and confusion on a host of issues, from racial and gender equity, to war and the death penalty, from homosexuality to sexuality per se, and from environmental policies to ecclesiastical politics.

Failure to interpret the Bible and religious doctrines contained in it may hinder the development of Christian socioeconomic and ecological commitments (Nash, 2009). There is a wealth of literature available on the religious values of animals, plants and physical natural resources (Nash, 2009). These values have either helped to protect or to destroy natural resources. Natural resources and environmental management regimes have been hugely influenced by the outstanding cultural and religious values of these resources. The study in rural Kilimanjaro will not examine the religious texts used in rural Kilimanjaro in detail. It presupposes that religious texts of the Abrahamic faiths studied by Nash (2009) are similar to those used in rural Kilimanjaro. The study thus examines the frequency of reading religious texts and perceptions of rural Kilimanjaro on the natural environment, controlling for socio-demographic variables. It assumes that perhaps environmental ethical perceptions and behaviours, or the lack thereof, are associated with religious texts.

Despite the fact that wildlife in certain parts of Africa are killed on a severe scale, some species are protected against harassment and killing by taboos or religious doctrines. Alves et al. (2009) studied the use of reptiles for medicinal and magic religious purposes in Brazil. Forty two species are used for medicinal purposes, thirteen for magical purposes and one for religious purposes. The largest numbers of species used were snakes (15 species), turtles and tortoises (14), lizards (10) and crocodilians (5). Therapeutic products from 42 reptile species are used to treat 100 different illnesses and at least 13 reptile species were recorded as having magical religious values. They are commonly sold in Brazilian cities in outdoor markets and stores that sell religious articles. Of the reptiles recorded, 52.3% were endangered species. This demonstrates the importance of understanding such uses in the context of reptile conservation as well as the importance of understanding the cultural, social and traditional role of these reptiles in order to establish management plans for their sustainable use. Baker et al. (2009) did something similar, as did Alves et al. (2009). Baker et al. (2009) investigated reports of sacred monkeys, Sclater's guenon (*Cercopithecus sclateri*), in the Igbo-speaking region of Nigeria. They confirmed nine new sites where primates are protected as sacred: four with Tantalus monkeys (*Chlorocebus tantalus*) and five with Mona monkeys (*Cercopithecus mona*). Between 2004 and 2006, they visited two communities (Akpugoeze and Lagwa) previously known to harbour sacred populations of Mona monkeys to estimate population abundance and trends. They estimated a total population of 124 Sclater's monkeys in 15 groups in Lagwa and 193 monkeys in 20 groups in Akpugoeze. The Akpugoeze population was relatively stable over two decades, although the proportion of infants declined, and the number of groups increased. As Sclater's monkeys do not live in any official protected areas, sacred populations are important to the species' long-term conservation. Despite the monkeys' destruction of human crops, most local people still adhere to the custom of not killing monkeys. These sites represent ideal locations in which religious practices lead to species conservation.

Though the study in rural Kilimanjaro does not copy these studies in West Africa, it nonetheless assesses whether religious myths on wildlife are associated with environmental actions to protect or to destroy certain wildlife species.

Another similar study was conducted in Nigeria. Adeola (1992) studied the purposes for wildlife utilisation from the perspectives of the people of Nigeria. Utilisation of animal wildlife and their by-products by farmers was mainly used for cultural and religious ceremonies and traditional medicine. Consumption of wild animals also depended on what species were available in different ecological zones. From a religious perspective, Muslims were very selective. This selection helped to protect certain species of wildlife in the study areas. Wildlife utilisation was also largely carried out by tribal and ethnic groups for the installation of traditional rulers and in performing traditional rites. This restriction also helped to secure certain wildlife species. Adeola did not examine the negative impacts of traditions and culture, including religions, on wildlife species conservation. This study in rural Kilimanjaro examines whether there are any religious values and ceremonies that help to protect the environment, including wildlife species in these areas. The study also examines whether there are any religious values and ceremonies that help to destroy the environment, including wildlife species in these areas.

Colonial and post-colonial conservation policies ignored the potential role of traditional African cultural practices in contributing to conservation goals. Using examples and data drawn from different parts of Tanzania, Kideghesho (2009) reviewed the ecological impacts of two major conservation problems facing Tanzania – species overexploitation and habitat loss, and the possible advantages of traditional cultural practices (compared to conventional conservation strategies). The traditional practices were more cost-effective, more socially acceptable and had a minimal risk of failure. Reviving these practices coincides with the philosophy of co-management approaches, which advocate the sharing of power, rights and responsibilities between the state and local resource users. His paper specifically focused on four elements: traditional institutions, taboos, sacred sites and totemic species. Byers et al. (2001) also did something similar to Kideghesho in Zimbabwe. He examined the role of traditional religious beliefs and traditional leaders in conserving remnant patches of dry forest in the Zambezi Valley of northern Zimbabwe. He examined aerial photographs spanning more than three decades, and interviewed and surveyed local residents to learn about the environmental history of the forests and the factors that have affected land use in the area. Forest loss was dramatically less in forests that are considered sacred or which were in the past connected to sacred forests. This supports the hypothesis that traditional spiritual values influenced human behaviour affecting the forests, and played a role in their protection. He also found that rates of forest loss were much higher in an area where traditional leaders are relatively disempowered within the post-independence political system, compared to an area where traditional leaders have more power.

These findings lead to the conclusion that a strategy that links the conservation of culture and nature is likely to be more effective in conserving forests than a strategy that ignores traditional beliefs, values and institutions. However, Kideghesho did not examine the role of religion/religiosity in natural resources management amidst the emergence of western Christianity from the 1880s through to recent times. This study complements Kideghesho's work by attempting to examine whether existing religion phenomena in rural Kilimanjaro, which has replaced most traditional cultural values and practices, are associated with environmental ethical behaviours and perceptions. Byers et al. (2001) also did not examine the role of contemporary religious beliefs, values and institutions in forests and in relation to environmental conservation.

Dudley et al. (2009) noted that most people followed and were influenced by some kind of spiritual faith and examined two ways in which religious faiths influence biodiversity conservation in protected areas. Dudley et al. (2009) noted that, first, biodiversity conservation was influenced through the direct protection afforded to wild species in sacred natural sites and in semi-natural habitats around religious buildings. Sacred natural sites are almost certainly the world's oldest form of habitat protection. Although some sacred natural sites exist inside official protected areas, many thousands more form a largely unrecognised 'shadow' conservation network in many countries throughout the world, which can be more stringently protected than state-run reserves. Second, faiths had a profound impact on attitudes toward protection of the natural world through their philosophy, teachings, investment choices, approaches to land they control and religious-based management systems. Dudley et al. (2009) considered the interactions between faiths and protected areas with respect to 11 mainstream faiths and to a number of local belief systems. The close association between faiths and the natural environment offer major conservation prospects, but also cause challenges. Bringing a sacred natural site into a nationally protected area system can increase the protection of natural resources for a nation. More information about the conservation value of sacred lands is needed, as is more informed experience in integrating these into wider conservation strategies (Dudley et al., 2009). This study examines whether Kilimanjaro National Park has any religious values and whether its establishment had anything to do with religious values. It also examines whether religious values have any negative effects on the conservation of Kilimanjaro National Park.

Many international reports claim that poverty is a major cause of the degradation of the natural environment, including the World Commission on Environment and Development's Report and UNEP's Geo 2000. Movic et al. (2003) analysed some of the problems of degradation persisting in the dryland regions with particular reference to Sub-Saharan Africa. The theory relating to environmental degradation and level of per capita income of a country is known as Environmental Kuznets Curve (EKC). This theory is based upon an environmental demand that would increase social control and government regulations as a society gets richer.

Barros et al. (2005) investigated whether Brazilian poverty affects the EKC and found a correlation between poverty and environmental degradation. In other words, environmental degradation increased as poverty increased. Conservation organisations often fail to understand and address the role of the environment in the lives of the rural poor, as well as the central role the rural poor must play in conserving the ecosystem (World Wildlife Fund, 2005). There is still very little scientific evidence that poverty actually causes environmental degradation in rural parts of Africa, and whether religiosity is correlated to poverty. This study broadly examines environmental degradation (water quality and quantity and soil quality), and whether any religious practices have had any influence on state of change of these two environmental variables, controlling for poverty in terms of land ownership and estimated monthly incomes. The study does not attempt to confirm EKC in the contexts of rural Kilimanjaro.

Reflecting on this background literature review, the study hypothesises that religiosity is associated with the perceptions and attitudes to the natural environment held by the people of rural Kilimanjaro. It also assumes that the use of core natural resources by the people of rural Kilimanjaro is associated with the religiosity of these people, controlling for socio-demographic variables. The study examines whether religious values and myths have any effects on the conservation of rural Kilimanjaro environments.

Chapter 3: Description of the Study Area

3.1 Background of Kilimanjaro and Arusha regions

This study took place in the rural parts of the Kilimanjaro and Arusha regions of Tanzania (Figure2). The study area is referred to as rural Kilimanjaro or rural Mt. Kilimanjaro throughout this research because all the villages which were surveyed borders the Kilimanjaro National Park and situated along the slopes of the Mt. Kilimanjaro.

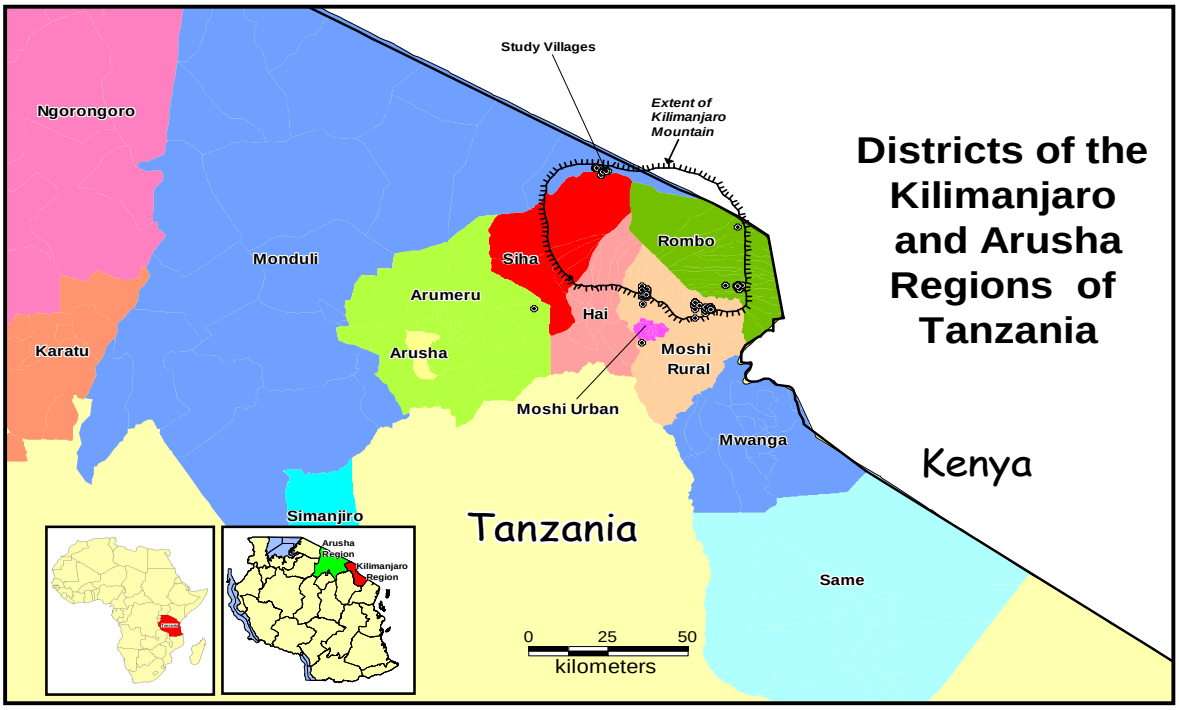

Figure 2: Districts of the study areas

The Kilimanjaro and Arusha are two of the 30 administrative regions of mainland Tanzania. Tanzania evolved out of the union between Tanganyika and Zanzibar on 26th April 1964, after independence of Tanganyika and Zanzibar on 9th December 1961 and 12th January 1963 respectively. Tanzania became a multiparty democracy in 1992.

3.1.1 Tanzania statistics on economy and religions

Gross Domestic Product (GDP) - real growth rate for Tanzania was 7.1% in 2008. In 2007 and 2006 GDP – real growth rate was 7.1% and 6.7% respectively. GDP - per capita Purchasing Power Parity (PPP) was $1,300 in 2008, and $1,300 and $1,200 in 2007 and 2006 respectively (CIA World Fact Book, 2009).

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Tanzania is in the bottom ten percent of the world's economies in terms of per capita income. The economy depends heavily on agriculture, which accounts for more than 40% of GDP, provides 85% of exports, and employs 80% of the work force. Topography and climatic conditions, however, limit cultivated crops to only 4% of the land area. Industry traditionally featured the processing of agricultural products and light consumer goods. The World Bank, the International Monetary Fund, and bilateral donors have provided funds to rehabilitate Tanzania's out-of-date economic infrastructure and to alleviate poverty. Long-term growth through 2005 featured a pickup in industrial production and a substantial increase in output of minerals led by gold. Recent banking reforms have helped increase private-sector growth and investment and have improved the tourism industry. Continued donor assistance and solid macroeconomic policies supported real GDP growth of 7.1% in 2008 (CIA World Fact Book, 2009).

Current and accurate statistics on religion in Tanzania are unavailable because religious surveys were eliminated from government census reports after 1967. The decision to remove religions on census reports aimed at bridging the gaps between Christians and Muslims, which seemed to be increasing after independence in 1961. Religious leaders and sociologists estimate that the Christian and Muslim communities are approximately equal in size, each accounting for 30 to 40 percent of the population, with the remainder consisting of practitioners of other faiths, indigenous religions, and atheists (Father Kimario, 2012: personal communication).

3.1.2 Administration of study area villages

The Kilimanjaro region has seven districts namely: Moshi Rural, Moshi Urban, Rombo, Siha, Hai, Mwanga and Same. Arusha region has six districts namely: Arusha, Arumeru, Monduli, Longido, Karatu and Ngorongoro. Six villages from three administrative districts of Moshi Rural (Mweka, Sungu, Arisi, and Ruwa), Rombo (Shimbi Masho), and Longido (Lerang'wa) were selected for the study based on accessibility and proximity to the Kilimanjaro National Park (KINAPA) (Figure3).

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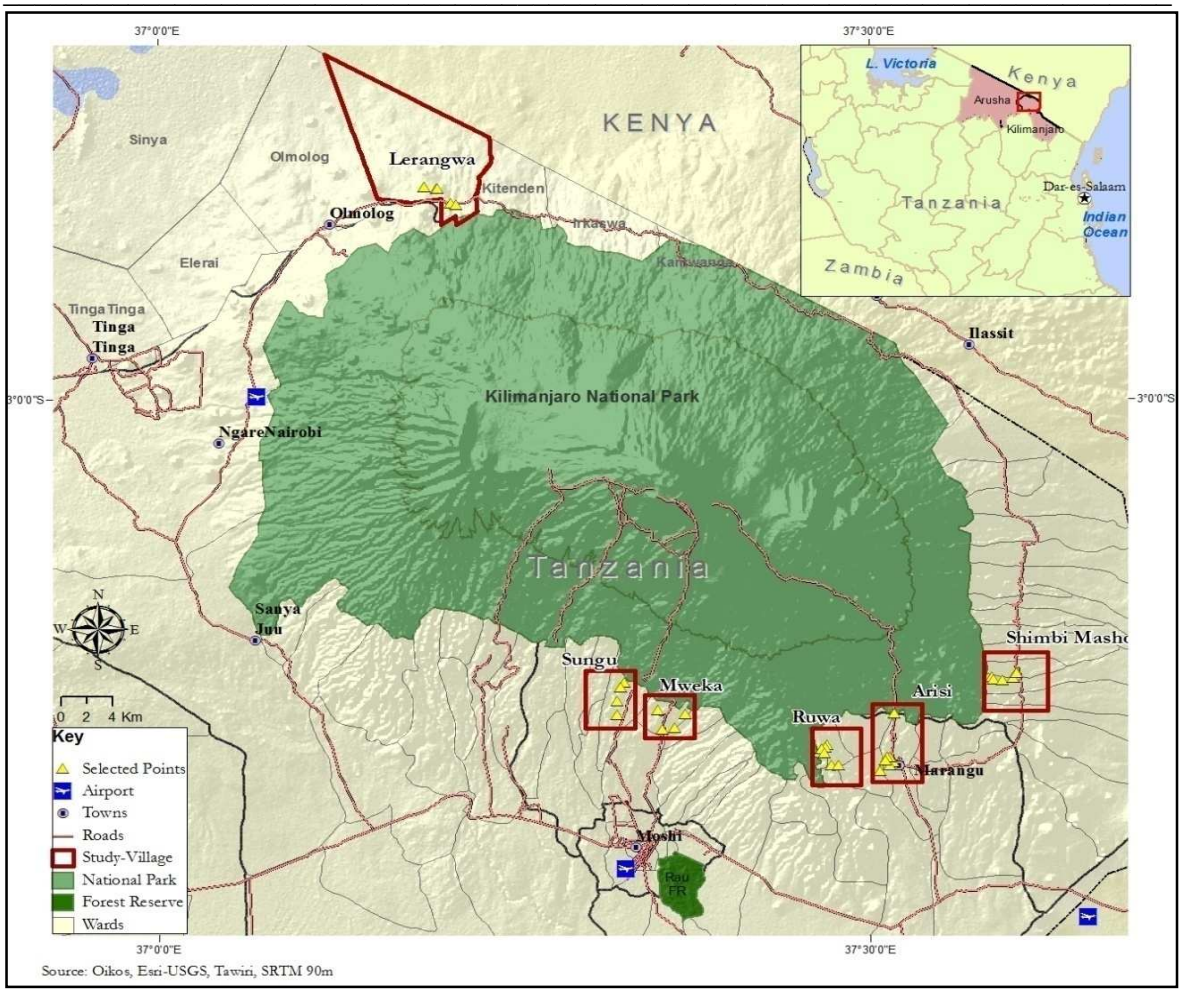

Figure 3: Access and facilities of the study areas

Because KINAPA is fully protected from human uses, except non-consumptive tourism, its environments were considered free from human influence, including influence of religions and religiosity. Human practices, including faith-based practices, are prohibited within the boundaries of KINAPA.

3.1.3 Population of Kilimanjaro region

The Kilimanjaro region is located in the north-eastern part of mainland Tanzania just north of the equator, and has a total surface area of 13,209 km^2. It comprises 1.4% of the entire Tanzania Mainland (Roll, et al., 2006). It is the smallest region in the mainland, but at the same time the third most densely populated region, with a density of 158.8 people per km^2 (Gamassa, 1991). This is due to the high agriculture fertility of the land, which also leads to a high scarcity of available land in the area (Misana, 1991; O'kting'ati & Kessy, 1991).

Total population of the Kilimanjaro region is 2,097,166 (Government of Tanzania, 2002), which is 4.9% of the total Tanzania mainland population (Misana, 1991). Annual average growth of the population of Kilimanjaro region is 1.6% (Gamassa, 1991). Moshi Rural District has 192,998 men, 209,433 women, 402,431 total people, and 84,862 households, and average of 4.7 per household (Government of Tanzania, 2002).

3.1.4 Population of Arusha region

The Arusha region is also located in the north-east part of mainland Tanzania. Arusha region has a population of 1,288,088 (Government of Tanzania, 2002), about 2.8% of the population of Tanzania. Like most regions on Tanzania Mainland, the population of Arusha region has experienced significant growth over the recent decade. The region had 1,288,088 people in 2002 compared to 744,497 inhabitants in the 1988 resulting in a significant increase of 543,591 people (73 percent) during the inter-census period. In 2002, the region had 3.8% of the total population of Tanzania Mainland which was 33,461,849. However, the projections for 2007 put the regional population at 1,522,974 out of which 50.6% are females. Arusha region occupies an area of 34,526 km^2. Figure 4 shows population densities in study areas.

Chapter 3: Description of the Study Area

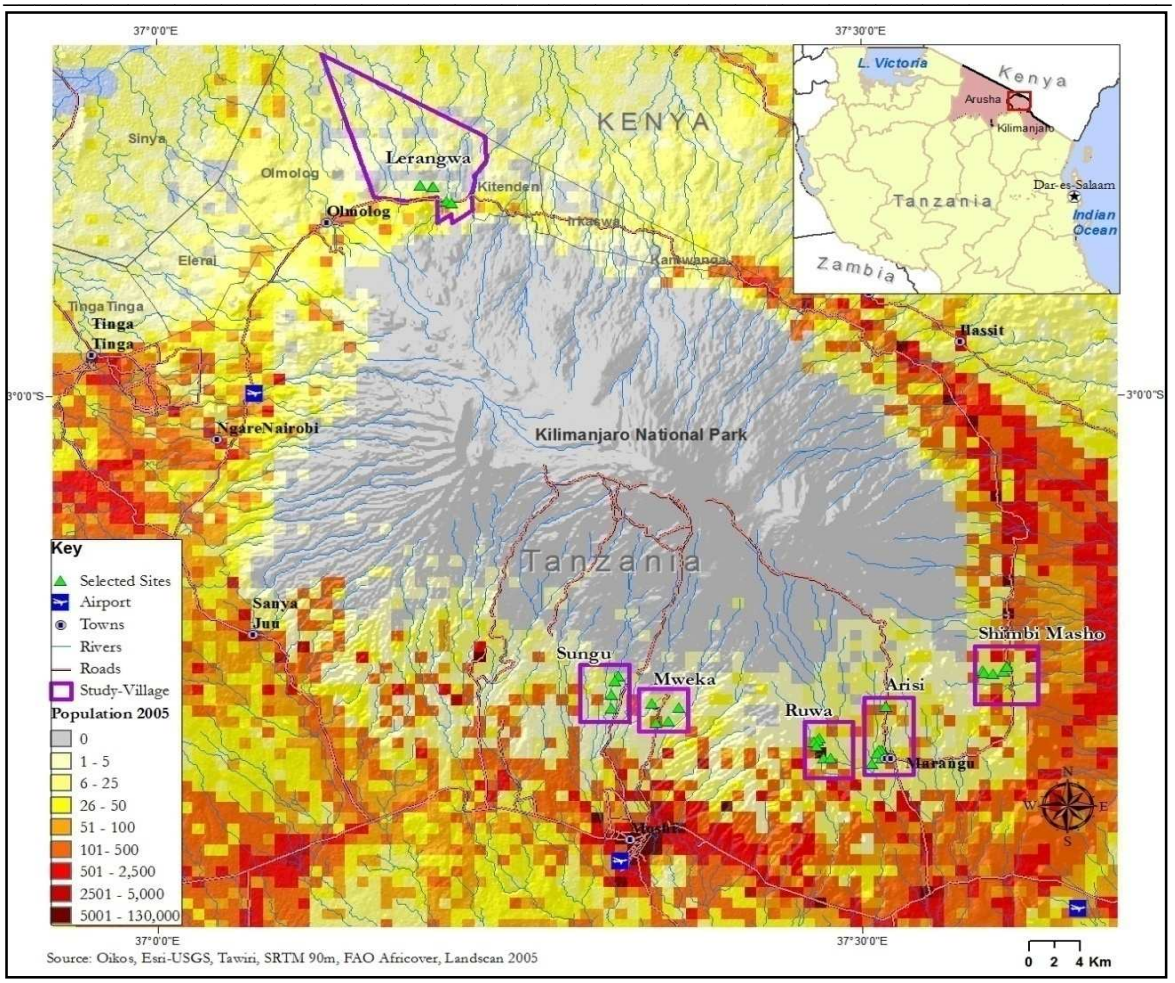

Figure 4: Human population

3.1.5 Ecological zones and farming

The Kilimanjaro and Arusha regions comprise four ecological zones based on altitude, soils and climate. These zones are the Peaks of Kilimanjaro and Meru Mountains, the Highlands, the Intermediate zone and the Lowland Plains zone. The Highland zone lies between 1100 and 1800 meters above the sea level. This zone has very fertile soils derived from volcanic rocks rich in Magnesium and Calcium and is suitable for agricultural activities. The Intermediate zone lies between 900 and 1100 meters above the sea level, and has moderate soil fertility. The Lowland Plains zone lies below 900 meters with an average annual rainfall between 100 and 900 mm, and temperatures above 30℃. The rate of cultivation is low in the l owland plains accounting for only 10% of total activity (Government of Tanzania, 2005).

Seventy five percent of the region's population lives in rural areas. Farming, mostly subsistence, is ranked as the dominant economic activity in the region (Government of Tanzania, 2000). Of the total population of the Kilimanjaro region 45% practice agriculture activity as a source of livelihood and about 60% of the population of the Arusha region practice livestock keeping (Government of Tanzania, 2005).

Food imbalances and poor nutrition are big problems in the area, and more than 25% of the population of Kilimanjaro region suffers from protein malnutrition, 32% from nutritional anaemia, 6.1% from vitamin A deficiency, and 25% from iodine deficiency (Government of Tanzania, 2005). Data were not available for Arusha region at the time of research. Nonetheless the village that was studied from Arusha region borders Rombo and Siha districts of Kilimanjaro region and it is likely that food imbalances are not very different.

3.1.6 Economy of the ethnic groups of the study area

Although both regions border the mineral rich district of Simanjiro of the Manyara region, where Tanzanite is plentiful, the two regions have no known commercially viable deposits of minerals. They lack mineral reserves as well as important lakes and rivers. However the two regions have more than 20 medium and small rivers, lakes and dams and are relatively rich in tropical forests managed by national and district authorities.

The ethnic groups of the high middle elevations are Chagga, Meru, Pare, Mbulu and Iraqw while low elevations have mixed population comprised of Chagga, Pare, Kahe, Arusha, Rwa, Temi, Mbugwe and Maasai. Maasai, pastoralists, tend to be concentrated on the lower elevations of both Kilimanjaro and Arusha regions. These lower belts are also used for farming by mixed tribes who come from the other belts and other regions of Tanzania. Some consider that the survival of wildlife in lower Kilimanjaro and Arusha regions was largely dependent of cultures of the dominant Maasai tribe.

3.1.7 Access and infrastructure

The Kilimanjaro and Arusha regions have relatively good road infrastructure compared to other regions of Tanzania. About 32% of all the roads in Kilimanjaro and Arusha region are tarmac or gravel. The relatively good infrastructure has promoted business between the villages and the urban areas. The Kilimanjaro International Airport (KIA) is also found between Kilimanjaro and Arusha regions. Good roads and KIA connect Kilimanjaro and Arusha region to major cities of East Africa, namely Dar Es Salaam, Nairobi (Kenya) and Kampala (Uganda). Good transportation infrastructure and basic infrastructure have huge significance both in terms of socio-economy, religiosity and environments of the regions (Figure5).

Chapter 3: Description of the Study Area

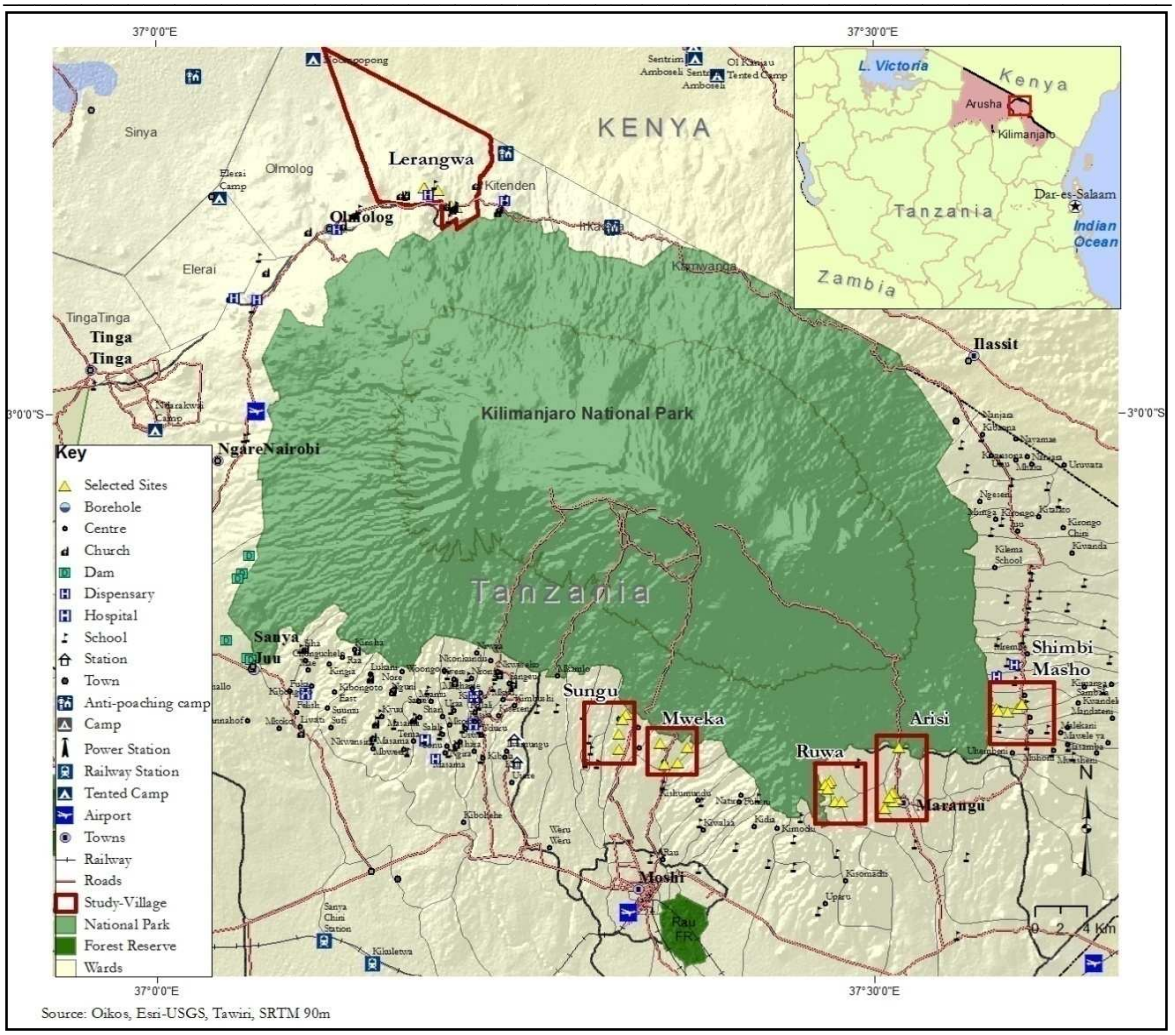

Figure 5: Infrastructure

3.1.8 Climate

The area has a mild climate. The area receives long ("Masika") and short rains ("Vuli") in March to May and October to December respectively (Buckle, 1996). Ground water levels in the study areas are at their highest between March and May. The local weather conditions in villages that were studied are influenced by the Mt. Kilimanjaro weather dynamics which is somewhat unpredictable. Precipitation varies from 2000mm per year in the rainforest belt (and in most of the villages studied) to less than100mm per year in the summit zone to less than 500mm in the lower villages of the study areas (i.e. the Lerang'wa village of Longido district). Likewise, daily and annual temperature fluxes in villages that were surveyed are atypical when compared to normal weather cycles in the rest of lowland and costal Tanzania and are largely dependent on altitude and mountain induced weather.

In Mweka, Sungu, Arisi, Shimbi Masho and Ruwa Villages, weather conditions tend to be tropical to semi-temperate and are relatively stable year round. Lerang'wa village is hot and dry with average temperatures of around 29.44 ^{0}C, during the dry season (October – February) and 20 ^{0}C during the coolest season (June and August) of the year. Because the climates in these regions, particularly in the highlands are relatively cooler European missionaries were more likely to settle in these areas. The dominance of Christianity in the highlands of Kilimanjaro, Mbulu, Pare and Meru was influenced by the climatic conditions of pre-colonial and colonial Europeans. The mountainous and cool climates discouraged Arabs and Islam from dominating many parts of Kilimanjaro and Arusha regions. However, recently lower parts of Kilimanjaro and Arusha have experienced an emergence of Islam.

The Rift Valley cuts through the middle of the Arusha region, in a north-to-south fashion. *Oldonyo Lengai* (Mountain of God in Maasai language) is an active volcano to the north of Ngorongoro in the Arusha region. Altitudes throughout the regions vary widely, but ranges from 500 meters to 5,895 meters.

3.1.9 Tourism and ecotourism in the regions

The regions studied are popular tourist destinations and are the centers of the Northern Tanzania Safari Circuit. One of the major African ungulate ecosystems is found in northern Tanzania in the Mara-Serengeti-Ngorongoro-Manyara-Tarangire-Simanjiro-Kilimanjaro-Amboseli areas. Half of this ecosystem is within the Kilimanjaro and Arusha region. Ngorongoro Crater in Ngorongoro Conservation Area, Serengeti National Park, Lake Manyara National Park, and Tarangire National Park are all within 400 km kilometers from Arusha and Kilimanjaro regions. Mt. Kilimanjaro (in Kilimanjaro Region) is 70 kilometers east of Mt. Meru (in Arusha region) and attracts many tourists annually. Tourism which is mainly wildlife-based tourism perhaps influences socio-economy, behaviors, attitudes and religions of peoples of the study areas.

3.1.10 The Mt. Kilimanjaro

Because six of the villages that were studied border the Kilimanjaro National Park, and are influenced by the ecological dynamics of the mountain, emphasis will focus on the Kilimanjaro National Park.

Mt. Kilimanjaro, the highest mountain in Africa and one of the world's largest free standing mountains, is located 330 kilometres south of the equator. It is composed of one extinct volcano, Shira (3,962 metres above sea level (m.a.s.l)) and two dormant volcanoes, Mawenzi (5,149 m.a.s.l) and Kibo (5,895 m.a.s.l) (TANAPA, 2006). Kilimanjaro was established as a Game Reserve in the early 1900s and as a forest reserve in 1921.

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Kilimanjaro National Park (KINAPA) was established in 1973 (Government Notice No. 50 of March 16, 1973) in accordance with the National Parks Ordinance (Cap 412) of 1959 (Government of Tanganyika, 1959). The boundaries of the park were established by the Presidential Proclamation of March 8, 1973. The park was officially opened for visitation in 1977. In 1987, the World Heritage Convention declared KINAPA a World Heritage Site. In September 2005, the park boundaries were enlarged to include the Kilimanjaro Forest Reserve (TANAPA, 2006).

3.1.11 Ecological zones and socio-economy

There are three zones on Kilimanjaro relevant to the socio-economy and ecology of the people in the study areas. The lower belt, with low rainfall (700mm per year), is suitable for maize, rice, millet, beans, cotton, sunflower, groundnuts, vegetables, sugar cane, fruits and raising beef cattle. The middle belt (750-800 mm of rain per year) is suitable for coffee, bananas, maize, beans, vegetables and fruits and dairy cattle. The higher belt (1000 – 1750mm of rainfall per year) is suitable for coffee, bananas, vegetables and dairy cattle. There are irrigation canals in the middle and higher zones. The map (Figure 6) provides overview of main ecological zones, land use and different habitats of the study site.

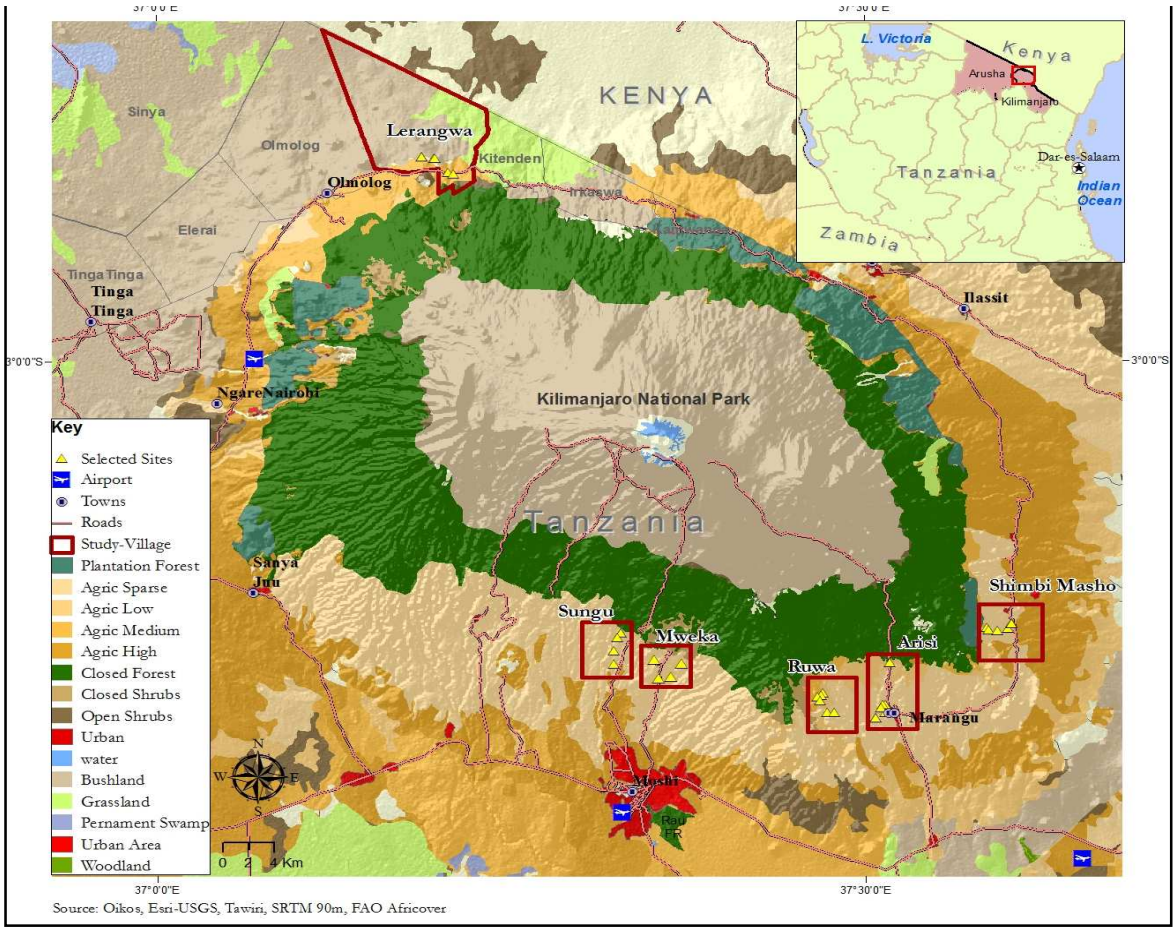

Figure 6: Land use

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The study sites have enormous environmental problems. Increasing populations of people along the savanna bush land zone (700-1000 m) and in the sub-montane agro-forest (1100m and 1600m) have changed the social ecology of these areas. Clearance of vegetation for livestock and agriculture has left the majority of the soils in the area bare and the rivers are prone to increased evaporation and persistent drought. In the past twenty years, what were once permanent rivers are now seasonal, only flowing during heavy ("Masika") rains of March-May.

Another significant change is the range expansion of mosquitoes, which were absent in the sub-montane agro-forest (1100m and 1600m) and beyond. Mosquitoes are now very common in these areas along with mosquito transmitted diseases such as malaria. Increased mosquitoes at higher elevations are an indicator of increased annual average temperatures along the slopes of Mt. Kilimanjaro. Malaria prevalence in Tanzania has said to decline by half over the past decade (Lema, 2012: personal communication). During the same period, malaria in the sub-montane agro-forest zone on slopes of Mt. Kilimanjaro has doubled due to increased temperatures and increased number of mosquitoes carrying malaria parasites in this zonedue to warming effects and immigration (Lema, 2012: personal communication).

Deforestation affects the climate and water regimes in the region. Water is an essential component of the fragile Mt. Kilimanjaro ecosystem and one of its most important natural resources. The area's hydrological processes are critical to the existence of the Mt. Kilimanjaro resources and natural processes. All of north central and northeastern Tanzanian and the neighbouring Kenya populations depend on water from Mt. Kilimanjaro. On the lower slopes of Mt. Kilimanjaro, livestock grazing, cultivation, logging of indigenous trees, man-made fires, charcoal production, forest villages (squatters) and landslides have completely altered the natural vegetation patterns. A belt of cultivated forage and cropland has replaced virtually the entire lower part of the montane forest belt. The magnitude of forest destruction through illegal timber harvesting is high (TANAPA, 2006).

Other environmental problems that are evident in the study areas include but are not limited to:

- ☐ Wildlife migratory routes between Mt. Kilimanjaro and lower land wildlife areas like Enduimet Wildlife Management Area and the Amboseli National Park, Kenya are no longer intact and prevent migration;
- ☐ Wildlife-human negative interactions;
- ☐ Drying of rivers and springs;
- ☐ Effects of climate change;
- ☐ Poaching of wildlife for bushmeat;
- ☐ Wildfires on the Mt. Kilimanjaro; and
- ☐ Excessive fuel wood harvests.

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3.2 Mweka village

Mweka village is more developed compared to the rest five villages which constitute the study area. Mweka and Arisi are the only villages which can be accessed through a tarmac road. Mweka village however has more institutions and biggest commercial farms compared to other villages. The village borders Kilimanjaro National Park (KINAPA) in the western section. It is in the Moshi Rural district (Kilimanjaro region). Mweka village covers an area of 1034.38 hectares and contains six sub-villages. The population is 3186 people according to national population census of 2002 (URT, 2002), including 1656 women and 1530 men. The total number of households in the area is 814. Sixty households (7.37%) from Mweka village were interviewed during the research survey.

Two major rivers flow throughout the village throughout the year (Mweka VEO, 2009: personal communication) and these rivers support livelihoods of people in the village.

According to the Village Chairman (2011), the village had 710 big sized livestock (290 cattle, 380 goats and 40 sheep).

The vegetation of the area is dominated by exotic plants including banana plants *(Musa spp*), which forms the staple food of the people of the area. Dominant tree species include *Albizia schimperiana, Cordia africana, Ficus cycomorus, Ficus thoningii, Prunus persica, Newtonia buchananii, Erythrina abbyssinica, Spathodea campanulata, Makhamea lutea, Grevilea robusta Persia americana, and Eucalyptus* spp*.* Banana, coffee and maize are the dominant crops followed by beans. Mixed types of agricultural, intercropping and agro-forestry are practiced in the area.

Diverse ecological zones along the slopes of Mt. Kilimanjaro support a diversity of wildlife species, including an astonishing diversity of indigenous birdlife. A visible canopy dweller bird species that cannot be missed anywhere in Mweka village is the Silvery-Cheeked and Trumpeter Hornbills. Other common birds include Turaco (Louries), Sunbirds, Black Backed Barbet, and Cinnamon-Chested Bee-Eater. Fine-Banded Woodpeckers occupy the forest fringes and sunlit glades. Due to clearance of the forests in village lands for human settlements and agriculture, most of the forest birdlife is more difficult to see in Mweka village. Common species in the village include Green Pigeons, Emerald Cuckoo, Klaas's Cuckoo, White Brown Coucal, Hartlaub's Turaco, Cardinal Woodpecker and varieties of Chat, Flycatcher, Apalis, Shrikes, and Starling.

The montane forest is one of the most important zones on Mt. Kilimanjaro. Approximately 69% of the Mt. Kilimanjaro's flowering plants species, 78% of the bird species and 80% of the larger mammal species are contained in the montane forest (TANAPA, 2006).

The montane forest may also contain the largest known populations of abbot's duiker in Tanzania (TANAPA, 2006). Human settlements and farms in the sub-montane agro-forest areas of the village (between 1100m and 1600m) have pushed smaller-sized and middle-sized ungulates into the montane forests inside the Kilimanjaro National Park. Ungulate species which lived at the edge of the forests in the village have since been moved to lower parts into the savannah woodland. Blue Monkeys and Colobus Monkeys can still be found in Mweka. Likewise*, a* smaller, nocturnal family of primates known as Lesser Bush Babies and Greater Bush Babies or Galagos is also fairly common in the village. Other primates include Vervet Monkey, Blue Monkey, Olive Baboon, and Patas Monkey. Sightings and signs of Leopards*, C*ivets*,* Genet*,* and *S*ervals are evident in the village though increasingly rare. *S*mall rodent species such as the Four Stripped Grass Mouse*,* Mole Rat and squirrels are very common in the village. Smaller antelope such as Klipspringer and Duiker are periodically seen in a recently established commercial coffee farms, possibly due to the clearance of native vegetation.

The majority of snake species have survived human settlements and agriculture despite the visceral reaction of villagers to snakes, which are usually killed immediately. This attitude towards snakes was likely enhanced by the emergence of Christianity in the village. Snakes were compared to Satan and it was believed that snakes were used by Eve to seduce Adam to eat the holy fruits in the Eden Garden. Most snakes have responded to increasing human populations by moving deeper into forest fringes along the rivers and into the Kilimanjaro National Park (snakes are highly sensitive to movements in their vicinity, and will usually move away before humans arrive). Common snakes in the village in the edges of forests are Green Mamba and Boomslang*,* both of which are arboreal and poisonous. Vine (Twig) Snakes are also common in the Mweka village.

Mweka village is accessible throughout the year. Basic amenities like shops, churches, schools and hotels are available in the Village. The College of African Wildlife Management (CAWM), established in 1963, is situated in Mweka Village. Prior to this, St. Margaret Nursing College, owned by the Roman Catholic Church occupied the space where CAWM is now situated since 1952. The Nursing School replaced Mweka Kindergarten School which was established in 1903 by German colonial government and taken by British colonial government in 1918. For the past 108 years, Mweka village civilization, culture, socio-economy and religiosity were perhaps shaped by these institutions. This includes several Roman Catholic institutions (Kibosho Hospital, Kibosho Seminary, Uru Seminary and Kibosho Church) situated in the nearby villages of Sungu and Uru. Apart from one Roman Catholic Church in the village, there is a Lutheran Church, two Assemblies of God Churches, and one Ephata adherent church in Mweka village.

Recently, the establishment of a commercial coffee farm, Kilimanjaro Plantation Limited, in the village has employed many people. The farm employs about 1000 casual labourers each day during the coffee harvest season (Figure7), and the total certified size of the farm is 643 Hectare (Kilimanjaro Plantation Limited, 2011).

Figure 7: Coffee plantations and workers in Mweka village

Other institutions include Urusula nursery school (Roman Catholic), Mweka Nursery School (Government), Omi and Mweka Primary Schools (both under Government), Cyril Chami Secondary (Government), Nsoo Secondary (Roman Catholic), Omi Dispensary (Government), and Kibo Poultry Limited (privately owned).

Almost half (47%, 7000 tourists) of the tourists descending from Mt. Kilimanjaro come through the Mweka village route (TANAPA, 2006). Commercial farming, tourism and government institutions in Mweka village have changed the infrastructure of the area and the socio-economic dynamics of the peoples of the village through new economic investments and new cultures of the people associated with the infrastructure.

3.3 Sungu village

Sungu village is adjacent to Mweka village, situated in the Moshi rural district (Kilimanjaro region). Like Mweka village, Sungu is located along the sub-montane agro-forest between 1100m and 1600m. It has five sub-villages. The population of Sungu is 3612 people according to the National population census of 2002 (Government of Tanzania, 2002). Sungu has approximately 596 households.

Sungu is not as accessible as Mweka village. There road that links Sungu to Moshi town is gravel and it is not easily passable throughout the year. Mweka and Sungu villages are separated by Kichau river, which makes it difficult to access Sungu through Mweka from Moshi. The types of agriculture, cultures of people, climate and ecological communities are similar to that described for Mweka Village above. Sungu is also situated in the sub-montane agro-forest between 1100m and 1600m and harbours similar animals and plants.

Main economic activities of the people of Sungu include peasantry (banana, coffee, maize), livestock keeping, retail shops, formal employment in schools and health centers i.e. Kibosho Hospital (Roman Catholic Church, Sungu and Mboreni primary schools (both under Government) and Sungu Secondary School (Government). According to village records (2010), the village has 430 livestock (280 cattle and 100 goats, and 50 sheep).

Sungu has two major Roman Catholic Church institutions, Kibosho Hospital and the oldest Roman Catholic Church in the area built in 1900. Due to the presence of these two key Roman Catholic institutions in Sungu village and nearby Mweka village, 99.9% of those who were randomly picked for the surveys were Catholic.

3.4 Arisi village

This village is situated in Marangu Ward in Moshi Rural district (Kilimanjaro District). Arisi village also borders Kilimanjaro National Park and the route which goes to the main gate of the park pass through the village. The population of Arisi, according to the national population census of 2002, is 3617 people (Government of Tanzania, 2002). The number of the household in Arisi village is 614.

Village data (2011) showed that there was a total of 1887 big-sized livestock (1202 cattle, 600 goats, and 85 sheep).

Arisi is also situated in the sub-montane agro-forest between 1100m and 1600m and topography, climate, vegetation and crops are all similar to Mweka and Sungu. The dominant tree species include: *Albizia Schimperiana, Cordia Africana, Ficus cycomorus, Ficus thoningii , Prunus persica, Newtonia buchananii, Erythrina abbyssinica, Spathodea campanulata, Makhamea lutea Gravilea robusta,* and *Cypruce* spp. Bush babies, Blue monkeys, Mole rats, Butterflies, and Hedgehogs are some of the wildlife which can be cited in the village more often.

The economy of Arisi village is strongly influenced by tourism. This is a major entry and exit point to the mountain receiving 31% of the tourists entering the park and 53% existing (TANAPA, 2006). More than 9,000 tourists use this route each year. Tourism in Arisi village has changed the socio-economic dynamics of the people with six tourism investments (hotels, lodges and camps) inside Arisi village. The majority of the people of Arisi village are employed as porters and guides.

There are other exceptional resource attractions in the village. The Amini's Waterfalls, Kuvilie Caves, and many minor waterfalls provide outstanding scenic views which attract foreign tourists. Two rivers (Una Himo and Morijori) are sources of permanent water for the village.

The village is accessible through the main tarmac road linking Marangu Gate at KINAPA and Moshi, and Marangu Gate through Himo to Dar Es Salaam. There are several Lutheran and Roman Catholic Church investments in the village or nearby. Lutheran Ashira Secondary School, Roman Catholic Marangu Secondary School, Lutheran Marangu Hospital, Lutheran Vunjo Secondary School, Lutheran Agape Secondary School, Marangu Teachers Training College (Ex-Lutheran), Young Men Christian Association (YMCA) Agriculture Institute (Lutheran), St. Margaret Secondary School (Roman), Mamba-Mwika Lutheran Bible School, Mandaka Teachers College (Lutheran), Anuwarita Secondary School (Roman Catholic), etc. Other education, health and religious centers in the village include Ngaruma Lutheran Parish Nursery School, Komkyamise Lutheran Parish Nursery School, Marangu "Mazoezi" Nursery School, Marangu Primary school (Government), Darajani Secondary School (Government), Marangu Teaching College (Lutheran Church ELCT), and four Lutheran churches. There were no churches for Roman Catholic, and Pentecostal church and no Islam institutions in the village. There is also Marangu Hospital (Lutheran Church) and Ndesaura Lyimo Dispensary managed privately.

Arisi village represents an important interface on the south eastern part of Mt. Kilimanjaro where Lutheranism and Catholicism outreach collided.

3.5 Ruwa village

Ruwa village is situated in Kilema Ward, Moshi rural district of the Kilimanjaro region. The village is south western of Kilimanjaro National Park. The Ruwa Forest lies between Ruwa Village and Kilimanjaro National Park. The population of this village ranges from 12,000 to 14,000 with a total of 1050 households (Government of Tanzania, 2002).

According to Ruwa village statistics of 2010, there were 2030 big-sized livestock (1130 cattle, 600 goats, and 300 sheep).

Muwe, Wona, Mshiri, and Maye rivers which flow from Mt. Kilimanjaro to join the Pangani River Basin provide water for the village. Ruwa is in the sub-montane agro-forest between 1100m and 1600m and topography, climate, vegetation and crops are all similar to that described for Mweka.

Common tree species include: *Albizia schimperiana, Cordia africana, Ficus cycomorus, Ficus thoningii, Prunus persica, Newtonia buchananii, Erythrina abbyssinica, Croton macrostachyus, Croton melocarpus, Makhamea lutea, Grevilea robusta, and Eucalyptus* species. Bush babies, Blue monkeys, Mole rats, Butterflies, and Duikers are some of the dominant wildlife species found in the village.

Roman Catholic Church adherents are dominant in this village due to the presence of Maua Seminary, Brothers School, and Kilema Hospital. Compared to Mweka and Arisi villages, tourism is not a big business in Ruwa. The routes to Kilimanjaro are not well developed and few tourists used these Ruwa routes. Agriculture supports the majority of the people of Ruwa village. Access to the village is not as easy and the roads in these areas are maintained by Roman Catholic investments, mostly the Kilema Hospital. Other institutions in the village are Ruwa Nursery School (Government), Ruwa Primary School and Kitai Primary School (both under Government), one Roman Catholic Church, and one Assemblies of God Church.

3.6 Shimbi Masho village

This village is situated in Rombo District eastern part of the Kilimanjaro National Park (Kilimanjaro Region). The population is 2,229, including 613 households (Government of Tanzania, 2002). According to 2002 National population and housing census, 80% of the residents of Shimbi Village are actively involved in agricultural activities. Peasantry (banana, coffee, and maize), livestock keeping, small retail shops, and formal employment are the main economic activities. According to the village government records (2011), the village had 2307 big-sized livestock (551 cattle, 1632 goats, and 104 sheep).

Two rivers, Kinanuka and Karari, are permanent and support the village. On the northeast, the village is facing the Amboseli National Park of Kenya. The village is situated along the elephant corridor which moves between the Kilimanjaro National Park and the Amboseli National Park. Because the majority of the people living in this village depend on agriculture for their livelihoods, Shimbi is an epicenter of conflicts between humans and wildlife. Other economic activities (livestock and small business) account for a smaller proportion of livelihoods. The major crops are similar to other villages but also include bananas grown for commercial purposes.

Common tree species include: *Albizia schimperiana, Cordia africana, Ficus cycomorus, Ficus thoningii, Prunus persica, Newtonia buchananii, Erythrina abbyssinica, Croton macrostachyus, Croton melocarpus, Makhamea lutea Grevilea robusta, and Eucalyptus* species.

Apart from Elephants, Bushbabies, Blue monkeys, Mole rats, and Butterflies of different species are common wildlife in the village.

The village has a couple of education and religious institutions. These institutions are Kwasondo Nursery School (Government), Shimbi Masho Nursery School (Government), Masho Primary School (Government), and Kwasondo Primary School (Government). Most believers are from Roman Catholic Church and they share the church building located in the nearby village.

The village is accessible through seasonal roads that are only passable during the dry season. Accessibility is difficult during the rainy season.

3.7 Lerang'wa village

Lerang'wa village is located on the north-western slopes of the Mt. Kilimanjaro. It is the only village that borders the Kilimanjaro National Park outside the Kilimanjaro region. The village belongs to Olmolog Ward of the Longido district of the Arusha administrative region. The area is mostly inhabited by pastoral people due to good range resources for livestock. The population is 6,779 (Government of Tanzania, 2002) including 656 households, with an average of 10 people per house (Lerang'wa VEO, 2009; personal communication). During the survey, 9.12% of the households (60 people) were interviewed.

Lerang'wa Village Statistics (2011) indicated that the village had 6628 livestock (1293 cattle, 1598 goats, 3137 sheep, and 600 donkeys). Data clearly indicate that the village households are predominantly pastoralists.

Lerang'wa has diverse physical features such as mountains, plains, rivers and small hills. It is located in the savanna bush land zone (1000 -1700 masl), unlike the other villages which were found above 1400 meters above sea level. The main vegetation of Lerang'wa is Acacia woodland, bushland and shrubs. *Grevelia* spp and *Eucalyptus* sppare non-native dominant tree species in the area. Other common plant species include *Acacia senegal, Acacia mellifera, Balanite aegyptiaca, Leonotis nepetifolia, Acacia tortilis, Acacia drepanolobium, Euphobia tirucalii,*and *Cordia ovalis.* There are six small mountains in this village including: Nonionik, Lengagwa, Nongi, Konyi, Nengireri, Lekishooku and Lekimishera. There are three seasonal rivers, which flow during the wet season. The Lerang'wa River is the only river that passes through the village and flows year round.

The area receives less than 1000 mm of rains yearly and drought is fairly common. Due to these droughts mass deaths of livestock occur in the village during prolonged dry seasons.

Chapter 3: Description of the Study Area

Lerang'wa village area is a wildlife migration corridor between Kilimanjaro and Amboseli National Parks in Tanzania and Kenya respectively. Mass deaths of wildlife have occurred recently due to extremely drought conditions.

Elephants, Buffaloes, Elands, Lions, Giraffes, Wildebeest, Zebra, Squirrels, Warthog, Olive baboons, Vervet Monkeys, Leopard, Hyena, Jackals and Gazelles of different types are common on the village lands. Over 250 species of birds have been recorded within the Lerang'wa–Kitendeni wildlife corridor (Mkonyi, 2007). The ability of the Lerang'wa village, and villages surrounding it including the Kitendeni village, to act as a wildlife corridor has been severely reduced over the past few years due to habitat loss. The drivers of these changes include demographic factors, government policies, economic factors, and changes in natural resources responsibilities, traditions and attitudes of people towards the corridor (Noe, 2003). Immigration of people from other villages, who were attracted by good livestock pasture, has increased numbers of people in Lerang'wa and Kitendeni village.

Lerang'wa is the most cosmopolitan village compared to the other 5 villages in the study area. Main faiths groups in Lerang'wa village include: Roman Catholic Church, Lutheran Church and Anglican Church adherents.

Education and religious institutions in the village include: Lerang`wa Nursery School (Government / Roman Catholic Church), Matasia Nursery School (Government), Mkao and Lerang`wa Primary Schools (Government), Lerang'wa Secondary School (Government), Enduimet Secondary School (Government), two Roman Catholic Churches, two Lutheran Churches, three Pentecostal Churches, and one Seventh Day Adventist Church.

Pastoralism and agriculture are the dominant land uses in the area, and the majority of the population practices both agriculture and livestock. The main crops that are grown include Maize, Wheat, Beans, Sunflower, and Round Potatoes. Agriculture activities are primarily restricted to the rainy season.

The village, in collaboration with eight other villages, established the Enduimet Wildlife Management Area (WMA) in 2005. The WMA helps village governments protect the wildlife of the area and accrue benefits originating from consumptive and non consumptive tourism in the WMA.

Chapter 4: Data Sampling and Research Methods

Current statistics on religion in Tanzania are unavailable because religious surveys have been eliminated from the government census since 1967 (International Religious Freedom Report, 2007). The government of Tanzania does not designate religiosity on any records of vital statistics, like economic surveys, environmental surveys, health surveys and medical forms, election documents and on passports. The research that has been done in the fields of religion and sustainable development remains focused on the urban developed states context, which suggests a neglected area of study in developing nations (Tomalin, 2011). Roberts et al. (2009) also acknowledge that many studies on the role of religion in human development in Africa lack a strong empirical basis. These facts have influenced the sampling and the methods used for this research.

The main tool used to collect data was a standard questionnaire (Annex 1). The standard questionnaire was developed through information from Yeung and Chan's (2007) indicators, Hill and Hood's (1999) measures of spirituality and the Gallup Spiritual Commitment Indicators (Gallup Organization, 1992), Nominal Group Technique (NGT) and a pre-test exercise. The seven dimensions of religious involvement summarised by Hill and Hood (1999), Yeung and Chan (2007) and Gallup Organization (1992) are public religious participation (e.g. church attendance), religious affiliation (e.g. involvement in a religious organisation / denomination), private religious practices (e.g. prayer and reading religious materials), religious coping (turning to one's religion/belief system for assistance), daily religion-related spiritual experiences (e.g. one's subjective perception of the transcendent in daily life), religious commitment (times and resources involved in religious activities and beliefs), and self-rated overall salience of religion (importance of religion in one's life).

Figure 8: Administration of a standard questionnaire and participants in the NGT

Typically, NGT has four main stages, namely the silent generation of ideas, round robin recording of ideas, discussions and clarification, and finally ranking of scores through voting (Dunham, 2006; Sample, 2006). However, preparation of a venue and facilities for NGT and the selection of group leaders and recorders precede the four key NGT steps. NGT provides a solution to unfair consensus and time problems. It is a participatory and collaborative process which allows people with different backgrounds and experiences to reach consensus on contentious issues quickly and succinctly (Dunham, 2006; Sample, 2006; Silicon, 2006). It is also a learning and study process whereby a facilitator develops and poses a question, give participants a few minutes to think about a response, and then asks participants to share their ideas and reach a consensus (Dunham, 2006; Sample, 2006). NGT was used to help a group of twenty multi-faith rural households with differing opinions and backgrounds, over a limited period of time, to come to a consensus on the core religiosity, socio-demographic and natural environmental variables considered important to their livelihoods. Experience with group dynamics has shown that, without a given process, a group of rural households would spend the majority of their time trying to decide how to accomplish the assigned task and not have enough time to concentrate on the substance of their assignment.

The design of the questionnaire and subsequent collection of the information on perceptions of households of environmental elements and use of core environmental resources (water and energy) was informed by pre-testing the initial questionnaire. The standard questionnaire was also reviewed to reflect 6 major environmental problems facing Tanzania, which require urgent attention by all stakeholders in Tanzania (Government of Tanzania, 1997). These problems, which are outlined in the National Environmental Policy of 1997(Government of Tanzania, 1997), are loss of wildlife habitats and biodiversity, deforestation, land degradation, deterioration of aquatic systems, lack of accessible, good quality water and environmental pollution. The specific data on the natural environment which was collected covered water, soils, forests (including trees and fodder) and climatic conditions.

Data on beliefs and practice systems, and the abundance and distribution of religions were collected from church printed records, and through personal interviews. Information on the history of religions was extracted from books, the internet and other printed materials. Wide ranging data on the demography of the peoples of rural Kilimanjaro and information on the environment were also collected using the standard questionnaires, personal interviews and printed materials.

The smallest unit of local administration in Tanzania is a ten cell, which consists of ten family units or ten households. Between 600 and 1000 households, make up a village in Tanzania. The village is the lowest level in the decentralised local government system of Tanzania.

Legal and political authority from the central government has been transferred to the lowest possible administrative unit, which is a village. The village level is where the local authority begins to plan, make decisions and manage public affairs by agencies other than the central government. The Regional Administration Act (Government of Tanzania, 1997) of Tanzania, give villages the mandate to own lands and make decisions on the type of use and levels of use and physical development in their villages. Land use planning in Tanzania takes place at the village level in rural areas. In areas such as towns, municipalities and cities, urban authorities have responsibility. Several villages form Wards, which form districts. Regions are formed by between 4 and 7 districts. In all cases, the number of people is the basis for the formation of a village, ward, district or region in Tanzania.

Because villages are the key units of decision making, households in villages were selected as the lowest units for the study. Due to time and monetary constraints, it was not possible to survey and investigate the entire population of religious people in all the villages around the Mount Kilimanjaro. There was a need to select sample villages and determine the number of households in villages to be interviewed. Always economy and reliability are competing ends, because to reduce error in research often requires an increased expenditure of resources (Argyrous, 2008; Acton & Miller, 2009). Despite the fact that resources were limited, efforts were made to ensure that the sampling intensity was more than 10% (+-2.7%) in order to increase the validity and credibility of the results. Funds and time were available to interview 60 households in 6 villages, i.e. 360 households. Based on these constraints, six villages were selected based on their access from the research base, the College of African Wildlife Management– Mweka - and proximity to the Kilimanjaro National Park (KINAPA). The villages were Mweka, Sungu, Ruwa, Arisi, Shimbi Masho and Lerang'wa. No consumptive human use is permitted within KINAPA, thus KINAPA formed a good basis as a control on environmental aspects. There are also no villages or consumptive human uses allowed inside KINAPA (TANAPA, 2006).

Scientifically credible surveying techniques require a sufficient intensity of sampling to capture the majority of variation in a parameter (Kumar, 2005). If one applies unbiased sampling and estimation techniques, but fails to adequately sample the population of interest, there is a risk of basing conclusions on accurate but imprecise data (Argyrous, 2008; Acton & Miller, 2009). Efforts to secure more funding to increase sampling intensities to a minimum of 10% for each village, in order to avoid likely sampling error and coming to the wrong conclusions, proved futile. However, a small sample, properly managed and carefully analysed, is always better than a poorly supervised, large sample which is never fully analysed for lack of resources (Nichols, 2006).

Therefore the number of 60 households per village was determined based on the budget, and based on an estimated sampling intensity of 10%. Table 1 provides a summary of the number of households and sampling intensities based on a choice of 60 households per village.

Table 1: Sampling intensities

Village Name	Households 2002 Census (URT, 2002)	Sampling Intensities (%)
Sungu	596	10.07
Shimbi	613	9.79
Arisi	614	9.77
Lerang'wa	656	9.15
Mweka	814	7.37
Ruwa	1050	5.71

The villages of Mweka and Ruwa had slightly smaller sampling intensities compared to Lerang'wa, Shimbi, Arisi and Sungu villages. This will be pointed out during the discussion of the results in cases where serious discrepancies in the results between the two villages and other four villages exist. The precision of estimates could be improved through stratification on the basis of certain variables of interest. Nonetheless, religiosity, socioeconomic and ecological stratification were not possible because the information on these variables had not been collected by any government agency or independent researcher before this study.

Four transects, 100 meters apart, were established in each village and maintained during the interviews through the use of a Global Positioning System (GPS) and a navigational device, a compass. Each house along transects was picked and the available household was interviewed. Interviews took place between 0900 hrs and 1600 hrs throughout the week, including Saturdays and Sundays. GPS were recorded for many purposes, but specifically to allow cross-checking of responses when and where the need arose, especially for open-ended questions on the standard questionnaires. Transects were also maintained as the basis for eco-religion longitudinal study, if the opportunity arose.

A form of systematic random sampling was deployed to pick houses and households to be interviewed in each village. For each house picked, the head of the house was interviewed. In rural Kilimanjaro, the head of a family is, in almost all cases, a man (husband). If a man is absent an elder woman (wife) or old son/daughter was interviewed, in that order of priority. In houses without men, women were interviewed or any person who was the oldest in the house. In homes where both male and female households were present couples were allowed to decide who should be interviewed. In cases where no one was present in a house along the pre-determined transects, the next houses were picked for research.

Because completion of the standard questionnaires consumed the time of households, each household who accepted to be questioned was rewarded TShs. 2,000 (1 GBP = TShs 2,500:23rd June 2012). TShs 2,000 could buy 0.8 kg of imported rice in the rural areas of Mount Kilimanjaro (23rd June 2012). The financial incentive was mentioned before the questionnaires but only given at the end of the questions.

The types of questions were designed carefully and interviewers were trained in order to minimise the influence of financial incentive on responses. Two-day training on questionnaires and data collection was undertaken for carefully selected Interviewers. The training mainly covered aspects related to how to administer sensitive questionnaires, research diplomacy, effective verbal and non verbal communication, listening skills, and respect for people's cultures and values. Interviewers were undertaking their second year Advance Diploma in Wildlife Management at the College of African Management in Mweka, Kilimanjaro. Students with the highest Grade Point Aggregates (GPA) who were fluent in spoken, listening and written Swahili, Chagga, English and Maasai (in this order) were selected to form a 4-people Interviewer Team.

To go through the villages in Tanzania, village governments must be informed. Letters were written to village Chairpersons to inform village leaderships about the objectives of the research before the interviewers went to meet the households.

Before engaging in the data collection, research clearance was acquired from the College of African Wildlife Management and relevant government authorities, including village governments where research was to be conducted. Religious leaders at the village and diocese levels were also consulted to avoid misunderstandings amongst the local people and their religious leaders and in order to raise awareness on the purpose and the need for the research.

Before the data collection, 50 structured questions were tested by trained Interviewers at the research sites. During the pre-test, 200 questionnaires were completed. The pre-test provided an opportunity to detect sensitive questions as well as to weed out questions that did not make sense to respondents, or they were not clear. In addition, face-to-face interviews based on the questionnaires were pre-tested to allow researchers to obtain detailed feedback from the pre-test respondents and seek clarifications where necessary. During the pre-test, it was also possible to seek suggestions for improvements. Back-translation and pre-testing are critical in cross-cultural and cross-religion research (Acton & Miller, 2009). The questionnaires were reviewed after the pre-test. Care was also taken to make sure that information generated from the questionnaires (with clear categories and score levels) could be analysed statistically through the use of the Statistical Package for Social Studies (SPSS). Questionnaire format took cognizance of how data are entered and edited using SPSS, defining variable names, setting data types and defining variable and value labels using SPSS.

For example, using the standard questionnaire (Appendix 1), households were requested to indicate how frequently they prayed (never; once a year; monthly; weekly; once daily and more than once a day), how frequently they attended religious services (never; once a year; monthly; weekly; once daily and more than once a day), how frequently they read religious texts (never; once a year; monthly; weekly; once daily and more than once a day), and how much money they spent to support other people on religion grounds per annum (nothing; under TShs. 30,000; TShs 30,000-60,000; TShs 60,000-120,000; TShs 120,000-240,000; TShs 240,000-480,000; more than TShs 480,000).

The data on demographics and the environment also followed similar patterns. The households were requested to indicate their age and the highest level of education attained. The genders of respondents were also recorded at the time of interview. In order to understand their health, households affiliated to the Roman Catholic Church were asked to estimate the number of times they had contracted malaria over the past three years (no contact, less than 1, between 2-3, between 4-5, and more than 6 times).

Data on wealth in rural Africa is hard to estimate (Ferguson et al., 2003). The riches of rural people in rural Kilimanjaro are neither easily revealed nor recorded. The rural people of Kilimanjaro rarely keep their monetary incomes in banks and their daily incomes are not recorded. This posed a huge challenge in estimating the wealth of households in these areas. Wealth estimation elsewhere showed substantial measurement errors and was subject to systematic reporting biases (Ferguson et al., 2003). The indicator-based indices proposed by several analysts show much promise in circumventing these difficulties but nonetheless exhibit certain limitations (Ferguson et al*.,* 2003).

Taking into cognizance the difficulties in estimating wealth in developing countries, the enumerators in rural Kilimanjaro collected data on proxy wealth indicators (estimated monthly incomes and estimated size of land owned of households). Ordinal data on estimated monthly incomes and the estimated size of land owned by households were collected by enumerators after a pre-test and repeated estimation exercises which were conducted before the actual data collection. During the data collection exercises, recorded data on estimated property values was an average of the estimations from the four enumerators. This perhaps reduced the amount of error in estimating the wealth of individuals in rural Kilimanjaro.

Combinations of categorical (nominal and ordinal) data, which were collected during the study, explain different aspects of the main faith groups of the rural Kilimanjaro. Generally, the statistical method used to analyse categorical data is frequency (Giuliano & Polanowicz, 2008). Subsequently, frequency tables and graphs (descriptive statistics) were used to represent an overview of the faith groups and the key aspects which distinguish them.

Definition of religiosity and demography used locally, and key aspects and key phenomena are those factors underlie and explain the variation and the correlations between spiritual commitments and demographic variables studied. Subsequently, a combination of Factor Analysis techniques and the NGT results helped to extract important variables for discussion on differences, or lack thereof, between key faith groups in rural Kilimanjaro. These exploratory tests were used to reduce and select core variables for analysis. The two techniques are explained in detail in Chapter 5.

Water and soil surveys are an important tool as ecological indicators of change in tropical ecosystems, assessment of the sustainable use of biodiversity resources, and the monitoring of the environmental impact of various human activities. Water and soil survey data was required to indicate the state of environment of the study villages. Points for data collection were selected randomly in research sites. Each village sampled borders the Kilimanjaro National Park. Human activities are prohibited inside the park, therefore control data was collected 200 m inside the park, away from the boundaries of each village.

One transect was established across each village. Technicians from the Tanzania Tropical Research Institute (TPRI) went through the pre-determined transects and collected water and soil samples. Transects were maintained through the use of the Global Positioning System (GPS). GPS readings and altitudes were recorded at each point where soil and water samples were collected. Due to high sample analysis costs, 4 water and 4 soils samples were collected in each village along the established transects. 1 water sample and 1 soil sample were collected inside KINAPA near each village site.

Brand new plastic (Nalgene) bottles were sterilised and used to keep water samples which were collected along the established transect. Surgical gloves were worn throughout the exercise to control contaminations. Bottles were labelled accordingly, and transported to the TPRI laboratory. Water analysis was also carried out to determine pH, water hardness and electro-conductivity. The composition of Nitrates, Sodium (Na), Fluoride (F), Calcium (Ca), Magnesium (Mg), Zinc (Zn) and Copper (Cu) was also tested in the water samples.

Water samples were tested through the use of Methods for Soil Analysis and Water (1989) adapted from the Royal Tropical Institute KIT (1989) in the Netherlands. Water pH was measured through the use of a pH meter. The chemicals and reagents involved in measuring the water pH in the TPRI laboratory were buffer solutions of pH 4, 7 and 9 for pH meter calibration, and distilled water. A conductivity meter was used to measure the water's electrical conductivity. Only distilled water was used to test the water's electrical conductivity.

The Total Dissolved Solids (TDS) was measured through a TDS meter, and distilled water was involved as the only reagent. On the other hand, water hardness was tested using the same combined meter and through the use of distilled water. A fluorimeter was used to measure the levels of Fluorine in the water samples. The chemicals and reagents used include Ammonium Fluoride for preparing standards to calibrate the meter. Metals and hard metals were tested through the use of a Flame Photometer and Atomic Absorption. Hydrochloric and Nitric acids were used to dissolve various metals and metallic compounds to make standards.

Soil samples were tested through the use of both the Methods for Soil Analysis and Water adapted from the Royal Tropical Institute KIT (1989) in the Netherlands and the National Soil Services Laboratory Procedures for Routine Soil Analysis (Government of Tanzania, 1990) developed by the Ministry of Agriculture and Livestock Development of Tanzania. The soil sampling was conducted through the use of Auger and Shovel for soil digging (top soil profile 0-20 cm deep was involved in soil sample collection). The sampling units at each depth were then thoroughly mixed to form a composite sample. Black and sterile polythene bags were used to keep 1 kg soil sample. Labels were attached on both sides of the bags, i.e. inside and outside, before tying-up the bags on both sides ready for transport to the TPRI laboratory. Soil analysis was tested in the laboratory of the Tanzania Pesticides Research Institute (TPRI) to determine % sand, silt, clay and Nitrogen. Soils were also analysed to determine available Potassium (K), Sodium (Na), Calcium (Ca), Magnesium (Mg), Iron (Fe), Zinc (Zn) and Carbon (C). Carbon Capacity Exchange and pH were analysed as well. At the TPRI, the soils were air-dried and ground to pass through a 2 mm sieve for routine soil analysis.

Soil pH was tested through the use of pH meter, shaker, polythene bottles and balance. Buffer solutions of pH 4, 7 and 9 were used for pH meter calibration, and distilled water was also used to complete the soil pH test.

Soil Texture/Particle Size was measured through the Hydrometer method and the use of Hydrometer (Bouyoucos Hydrometer), sedimentation cylinder (1000 ml size), shaker, thermometer, stop watch, polythene bottles (250ml size) and plunger. A dispersing agent called Sodium Hexametaphosphate, Sodium Carbonates and distilled water were the only reagents used to complete the test.

The total Nitrogen from the soil samples was tested through the use of the Semi Micro-Kjeldahl Method. This method included a Kjeldahl digestion block, efficient fume chamber, digestion tubes, distillation unit, pestle and mortar, 0.5 mm sieve, analytical balance, and burette and conical flask or beakers. Concentrated Sulphuric Acid, Selenium powder, Copper Sulphate, Potassium Sulphate/Sodium Sulphate, Sodium Hydroxide, Bromocresol Green, Methyl Red, Ethanol Boric Acid and dilute Sulphuric Hydrochloric Acid were used as reagents to test the total Nitrogen levels in the soil samples.

The available phosphorus in the soils was measured through the use of the Bray and Kurtz II Method. Spectrophotometer, balance magnetic stirrer, shaker funnels and filter papers. Ammonium molybdate, hydrochloric acid, Ammonium fluoride Sulphuric acid, ascorbic acid, potassium antimony tartarate, potassium dihydrogen phosphate (for making standard K solutions).

The Cation Exchange Capacity (CEC) was tested according to Neutral Ammonium Acetate Solution, the Filtration method. Funnels, filter paper, volumetric flask, polythene bottles, measuring cylinder, distillation unit, beakers, burette, magnetic stirrer, balance and pH meter were used in the measurement of CEC. Ammonium Acetate (neutral solution, pH 7), Hydrochloric Acid, Ammonium Hydroxide, Ethanol, Potassium Chloride, Boric Acid and Sulphuric Acid were used as reagents.

Exchangeable bases, i.e. Sodium, Potassium, Calcium and Magnesium as well as trace/micro nutrients such as Zinc, Iron, Manganese and Copper, were measured through the use of a Flame Photometer and Atomic Absorption Spectrophotometer (AAS). Calcium Chloride, Diethylene Triamine Penta Acetic Acid (DTPA), Triethanolamine, a standard solution of pure metals and metallic compound solutions, nitric acid hydrochloric acid and distilled water were used as reagents to test for exchangeable bases.

Specific data analysis tests on a specific research hypothesis are described in detail in each specific chapter.

5.1 Background

A total of 360 households were interviewed in the six study villages of the Kilimanjaro and Arusha regions (rural Kilimanjaro) on religiosity, socioeconomic and environmental conservation issues. The majority of the respondents belonged to the Roman Catholic Church (78.33%) denomination. Other respondents belonged to the Lutheran Church (13.61%), the Pentecostal Church (Assemblies of God, 2.50%; Ephata, 0.28%), Seventh Day Adventist (1.94%), Indigenous Religion (0.83%), Shiite Islam (0.83%), Sunni Islam (0.56%)) and the Anglican Church (0.56%). A few respondents (0.56%) did not reveal their religious affiliation.

Nearly all respondents (99.9%) in four villages (Mweka, Sungu, Ruwa and Shimbi) belonged to the Roman Catholic Church. Roman Catholic adherents were dominant in all the villages surveyed except in Arisi village. Half of the respondents (50%) in Lerang'wa village and about one third (33.33%) of respondents in Arisi village belonged to the Roman Catholic Church. The adherents of the Lutheran Church who responded to the questionnaires during the research, were dominant (N = 37; 61.66%) in Arisi village (Figure 9).

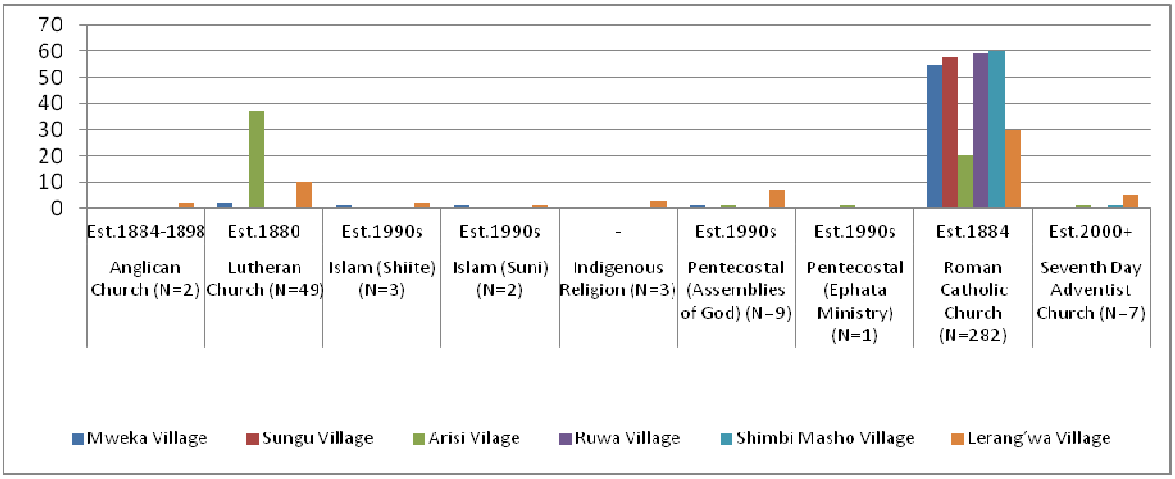

Figure 9: Respondents by religions and villages

Respondents from all religions (except the indigenous religion) found in the Mount Kilimanjaro areas could be grouped into two major faiths of Christianity (Seventh Day Adventist, Roman Catholic and Protestants namely Lutheran, Anglican, and Pentecostal) and Islam (Shiite and Sunni).

The two faiths of Christianity (including Judaism) and Islam are linked by common sources, concepts and traditions (Cooper & Palmer, 1998). They use the Old Testament of the Bible, the New Testament of the Bible and the Koran respectively. All major religions found in the study area use "Abrahamic" faith concepts of creation and Abrahamic religious traditions. In the field of comparative religion, the main world religions are generally classified as Abrahamic, Indian or Taoic. Central to Abrahamic faith is the belief in one God (monotheistic God), creator and sustainer of all that has been, is and will be (Cooper & Palmer, 1998; Gane & Dolson, 1993). Another significant principle of Abrahamic faith is belief in life after death, where and when God will make decisions on the fates of peoples of the world (Cooper & Palmer, 1998). Data from the study confirmed that 99.8% of those who responded to the questionnaire believed in the existence of one God, and 84.2% believed in life after death. A few Abrahamic faith adherents who responded to the questionnaire (0.83%; N = 360), and all of those who practiced the indigenous religion, believed in the existence of more than one God. A significant minority of followers of the Abrahamic tradition, and those who adhered to the indigenous faith (17.8%), did not believe in an afterlife.

5.2 Religiosity, Human Socio-Demography and Natural Environment: Rural Kilimanjaro Contexts

Because of global variation in usage and understanding of common words, it is imperative to identify and define the key variables used in the research hypotheses and put these terms in the contexts of rural Kilimanjaro. The key terms are religion/religiosity, human socio-demography and natural environment.

The first chapter of this thesis introduced the conceptual or nominal definitions which provided a working framework in the research and described major research variables in order to achieve a common understanding of key terminologies and variables and a general understanding of the subject or key research areas. This chapter introduces specific operational definitions that shall be used to test the relationships of religiosity and human socio-demography, and whether religion and religiosity play key roles in the conservation of the natural environment of rural Kilimanjaro. Specifically, the chapter explores interdependencies between the numerous qualitative and quantitative variables in data collected from rural Kilimanjaro and reduces the complex interrelationships to a few pseudo-variables relevant to the hypotheses of the research.

5.2.1 Techniques Used to Identify and Select Core Variables for Analysis

The general approach used was multivariate analysis. Specifically, factor analysis (FA) and nominal group techniques (NGT) were used to identify, define and select core research variables of religiosity, human demography and natural environment for the analysis of the data on religion and rural development from rural Kilimanjaro.

The factor analysis helps to discover simple patterns in the pattern of relationships among the huge set of ordinal and continuous variables (Acton & Miller, 2009). In particular, factor analysis seeks to discover if the observed variables which can be explained largely or entirely in terms of a much smaller number of variables called factors (Field, 2000) or pseudo-covariates because they are not real covariates, but groupings of covariates in such a way that they help understand complex data (Costello & Osborne, 2005).Factor analysis takes thousands, and potentially millions, of measurements and qualitative observations and resolves them into distinct patterns of occurrence for analysis. The aim is to reveal any latent variables that cause the manifest variables to co-vary (Arrindell & van der Ende, 1985; Guadagnoli & Velicer, 1988; Steiger, 1990; Velicer & Jackson, 1990).

Specifically the factor analysis helped to do a number of things for the research dataset from rural Kilimanjaro. The main applications of factor analytical techniques are to reduce the number of variables and detect structure in the relationships between variables that is to classify and group continuous variables. It is therefore a data reduction and structure detection method, which selected the following core religiosity components from the ordinal and continuous dataset from rural Kilimanjaro. It uncovered interdependency and pattern delineation between large quantities of religio-socio-demography data. Initially the study assumed that the dataset on religiosity and socio-demographic factors are interrelated in a complex fashion, and factor analysis may be used to untangle the linear relationships into their separate patterns. Each pattern appears as a factor delineating a distinct cluster of interrelated datasets for analysis of religion-demography connections in rural Kilimanjaro. In cases where the clustering seemed logically unclear, a confirmatory test, the Spearman Correlation Coefficient (Rho), was used to ascertain associations between clusters of ordinal religiosity and socio-demographic variables resulting from the factor analysis through the use of Statistical Package for Social Science (SPSS) version 18.Only two natural environment variables, rate of use of water and fuel wood a day, conformed to the criteria of ordinal-scaled data. Subsequently, the data detection and reduction exercise through the use of factor analysis did not consider the natural environment dataset.

The NGT is a participatory research technique. Typically the NGT has four main stages, namely silent generation of ideas, round robin recording of ideas, discussions and clarification and finally ranking of scores through voting (Dunham, 2006; Sample, 2006; Silicon, 2006). NGT deals with both continuous and categorical data. Preparation of a venue and facilities for NGT, selection of group leaders and recorders precede four key NGT steps (College of African Wildlife Management, 1994). NGT helped a group of twenty households that reported adherence to the Roman Catholic Church faith, selected from research villages, with differing opinions, backgrounds and experiences, to come to a consensus on what defines, and constitutes, core religiosity/demographic/natural environment variables in rural Kilimanjaro, i.e. respondents were asked to identify and rank (in terms of importance) four variables that describe religiosity, human demography and natural environment in the local context. Appendices on NGT results describe fully the NGT used to reach consensus on the core variables defining religiosity, demography and natural environment in rural Kilimanjaro contexts.

Therefore, core religiosity and human demographic factors, which explained the majority of the observed variations and which appear under many principal factors, were selected and used (combined with NGT results) to test whether there are significant relationships between levels of religiosity and key demographic characteristics amongst the people of rural Kilimanjaro. In other words, factor analysis helped to reveal core types of socio-demographic features and religiosity variables as explained by the households of rural Kilimanjaro.

5.2.2 Results and Discussions: Core Religiosity Variables

5.2.2.1 Factor Analysis: Results and Analysis

A combination of factor analysis criteria (Kaiser Criterion and Scree Test) was used to identify the principal components which account for much of the variability in the religiosity continuous data set collected in rural Kilimanjaro. Data from the component, structure and pattern matrices (Appendix 2) were used to summarise the important religiosity variables described in this chapter.

Factor analysis results of the ordinal religiosity commitment variables from the study show the Kaiser-Meyer-Olkin (KMO) and Bartlett's Test value of 0.668 ($N=360$; $X^2=196.443$; $DF=21$; $p<0.01$). KMO and Bartlett's value tests the null hypothesis that the variables in a population correlation matrix are uncorrelated (Evolumedia, 2011). Thus the continuous data collected from rural Kilimanjaro confirmed that variation between religiosity factors in rural Kilimanjaro existed, and KMO and Bartlett's value above 0.5 was big enough to continue with the factor analysis to detect patterns of the ordinal and continuous religiosity data. The observed significance level ($p<0.01$) concludes also that the strength of the relationships among the ordinal religiosity variables of rural Kilimanjaro were strong enough to perform and continue with the factor analysis.

The initial factor analysis process extracted three (3) out of seven (7) religiosity components (Annex 2), and each of the religiosity components selected had an Eigen value of more than one (Annex 2.1).

In order to provide an idea of how the religiosity factors which were initially extracted differ from each other, and to produce a clearer picture of which religiosity items are associated with each factor, axis rotation was performed. Results indicate that only three religiosity components, out of seven variables, accounted for 58.7% of the variance of the relationships between the ordinal data of the spiritual commitment indicators in rural Kilimanjaro (Annex 2). The correlation procedure also confirmed that the three religiosity pseudo-variables showed stronger association with other continuous spiritual commitment variables than the other remaining seven spiritual commitment indicators.

Factor 1: Private and public religious observance and involvement

Beliefs about God's influence in everyday life across all levels of rural society were evident when factor analysis was performed on the dataset collected from rural Kilimanjaro. The first principal component accounts for 27.9% of the variability in the dataset. Variables included in the first factor were frequency of reading religious books, frequency of attending church services and frequency of meeting religious leaders. Households were asked to indicate how frequently they attended church services (never, once a year, once a month, weekly, daily), read religious books (never; once a year, once a month, weekly, daily) and met religious leaders (never, once a year, once a month, weekly, daily). Attending church services, reading religious books and meeting religious leaders are considered right ways to worship God in rural Kilimanjaro (Kimario, 2012: personal communication). It thus seems likely that church attendance, meetings with religious leaders and giving offerings on Sundays are linked and acceptable ways of observing the love of God for humanity in rural Kilimanjaro. Individuals' subjective identification as “religious” and the frequency that they engage in religious activities represent core elements of participation in, and commitment to, the religious role. Taken together, these are typically referred to as religious involvement (Froese & Bader, 2007). Frequency of attending church services and frequency of meeting religious leaders are generally known to be public religious involvement whilst reading religious books is a more private practice (George et a*l.,* 2002; Mueller et al., 2001).It seems that the majority (64.58%) of the households who adhere to the Abrahamic faith meet church leaders and read religious texts on Sundays when attending church services (Figure10). This is the main connection between these three core religious activities.

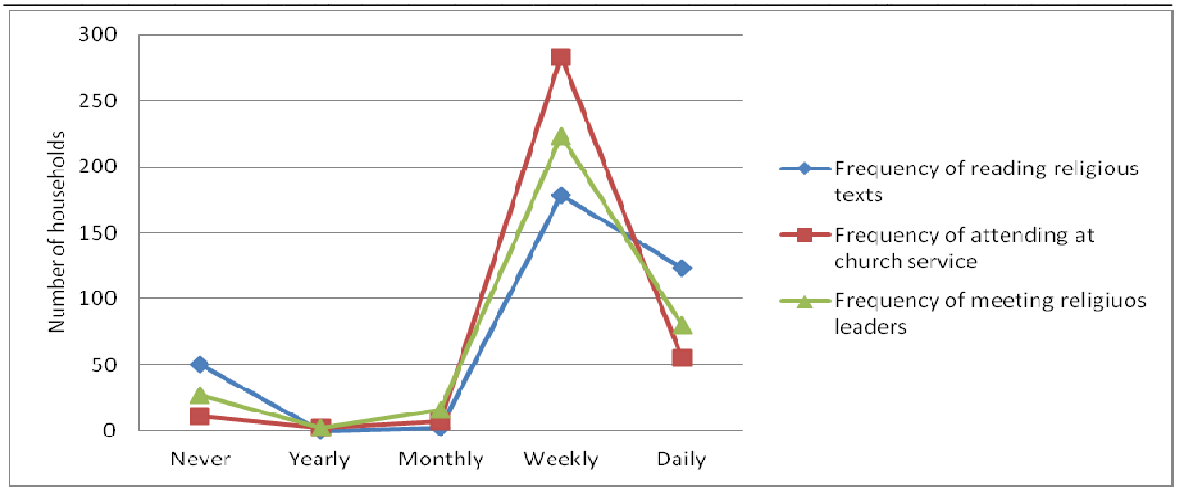

Figure 10: Frequency of reading religious texts, attending church and meeting leaders

There is a sizeable minority of households (24.4%) who are committed to their faith and attend church services daily, and each day they visit a worship place they meet religious leaders and read religious texts. Daily church services are common in adherents of Abrahamic faiths. Yearly church commitments, on the other hand, usually coincide with annual events like Christmas, New Year and Easter festive seasons, whilst monthly religious commitments in rural Kilimanjaro may be associated with religious weddings or funeral services, in case they occur on a monthly basis. There is a small minority of households (8.3%) in rural Kilimanjaro who are never committed to any religious faith; they never attend church services or read religious texts or meet religious leaders. This could possibly be a group of those households that belong to indigenous religions or belong to organised religious groups but are still in the transition periods of their faiths.

The results of the NGT (Table 2) also supported the factor analysis results by identifying related activities like frequency of prayers, frequency of reading religious books and church attendance to be the most important features of religiosity in rural Kilimanjaro. Spearman's Correlation Coefficient (Rho) tests also confirmed that strong and positive correlations between these variables exist and are significant at the 0.01 level (2-tailed) (Table 2).

Table 2: Results (r values) of attending church, reading texts and meeting leaders

Correlation coefficient (r)	Frequency of reading religious texts	Frequency of attending church services	Frequency of meeting religious leaders
Frequency of reading religious texts	1.000	0.413	0.369
Frequency of attending church services		1.000	0.486
Frequency of meeting religious leaders			1.000

These three variables shall be considered for the analysis of religion and demography and the role of religion in nature conservation in rural Kilimanjaro, if they pattern strongly with demographic and nature conservation variables in the combined factor analysis.

Factor 2: Religiosity and social conflict

Another principal component which accounts for much (16.3%) of the variability in the data isthe amount of money contributed to religious institutions by the households and social conflict in terms of the number of conflicts found in religious beliefs. The households in rural Kilimanjaro were requested to indicate approximately the amount of money they contribute towards a place of worship or to support religious activities per annum and how many times they had conflicts with families or other people that were based on religious principles.

Social conflict is an important aspect of social power (Giddens et al., 2009). It refers to various types of negative social interactions that may occur within a social relationship, for example, arguments, criticism, hostility, and unwanted demands including physical confrontation. Religions can help instil moral values that minimise social conflict and promote peaceful environments for sustainable human development. It can also destroy peace if it is used in such a manner that it causes or fuels social conflicts of its adherents.

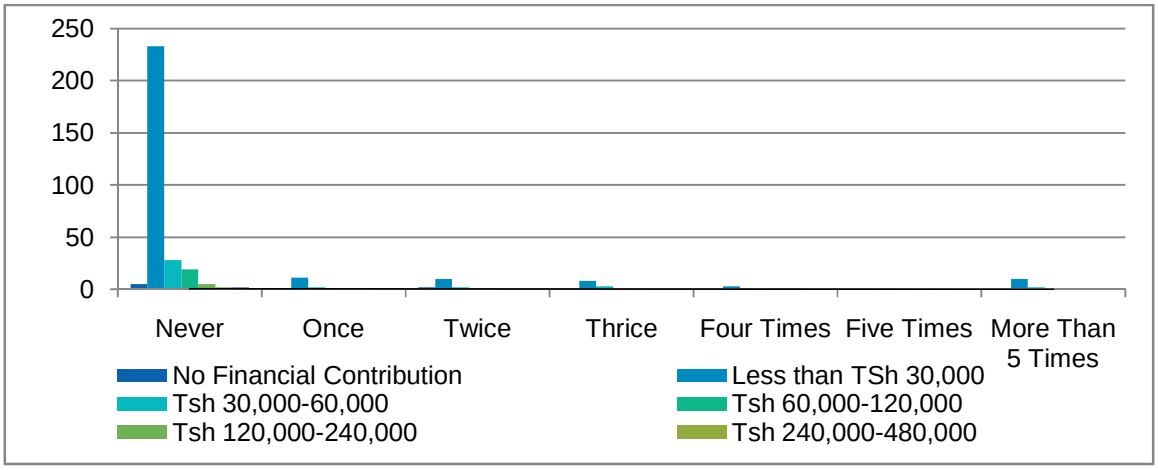

Figure 11: Money spent on charity

The graph (Figure 11) shows that the majority of households in rural Kilimanjaro contribute between TShs. 1.00 to 300,000.00 each month to support development of religious institutions and activities in their areas.

It also seems that the majority of the households had no social conflicts which are founded on their religious faiths that they could remember. However, a few (11.9%) from the group of households that contributed between TShs. 1.00 and TShs. 30,000.00 had encountered some form of social conflict. In other words, people who provide less to support religiosity seemed to get involved in certain social conflict situations. Therefore, if the amount of financial contribution to the church is a measure of degree of religiosity, then religiosity in rural Kilimanjaro helped the households avoid conflict situations.

However, an exception is evident in the group of those households who encountered conflict more than five times, where one household (out of four) had many conflicts despite the fact that he/she had given more than TShs. 480,000 to the church.

The relationship between religiosity and conflict is a complex one. Religiously-motivated peace builders have played important roles in addressing many conflicts around the world. It seems likely in this case that minimum conflict found in religiosity in the past three years was somewhat motivated by belief in the power of God and a need to financially support religious institutions. Several questions however remain unanswered. Is religion really the cause or does it prevent social conflict? How do other socio-demographic factors like age, sex, education, religious denomination or wealth influence religiosity and social conflict in rural Africa? This should be the direction of research in rural areas in the future. One or all of the two variables shall be considered for the analysis of religion and demography, and the role of religion in nature conservation, if they pattern strongly with demographic and nature conservation variables in the combined factor analysis.

Factor 3: Private religious commitments

Degree of belief in God and frequency of prayer also explained some (14.5%) of the variation of ordinal spiritual commitment variables studied. According to Abrahamic faith believers, God sent two other messages to certain prophets over the course of human history (Dodds, 2009), which are the nature and qualities of the one God, the purpose and nature of the universe created by God. These are the core foundations of the Abrahamic faiths and largely explain the variation of spiritual commitment ordinal variables in rural Kilimanjaro. Thus, frequency of prayer of households who were interviewed in rural Kilimanjaro and degree of belief in the existence of almighty God also accounted for much of the variability in the data set. The households were asked to indicate their frequency of prayer (never, once a year, monthly, weekly, daily, many times a day) and to what extent they believed that God exists (I don't believe, I believe with doubt, I sometimes believe, I strongly believe). The factor analysis results seem to suggest that respondents prayed frequently to uphold one core principle of the Abrahamic faith, which is to recognise the existence of God. The belief in God is pervasive and influential in contemporary rural African societies. However, little is reported about the content of those beliefs and the ways those beliefs are connected with specific spiritual commitment indicators.

Abrahamic faith adherents believe that praying is talking to God directly. They believe that if you want to spiritually re-connect to God, prayer is the easiest way in which to do it. Mark 11:24 in the Bible states that "therefore I tell you, whatever you ask for in prayer, believe that you have received it, and it will be yours". Therefore, connections between degrees of belief in God and frequency of prayer in rural Kilimanjaro did not come as a surprise. It is well established that belief in God is pervasive and influential in contemporary human societies (Schieman, 2010). The concept of a personal relationship with God identifies the ways that many people maintain a bond with the divine that parallels social relations with other people (Glock & Stark, 1965; Pollner, 1989). These beliefs often include the conviction that God is a conscious, omnipotent being who has explicit expectations and desires for each human being (Black, 1999; Stark & Finke, 2000).

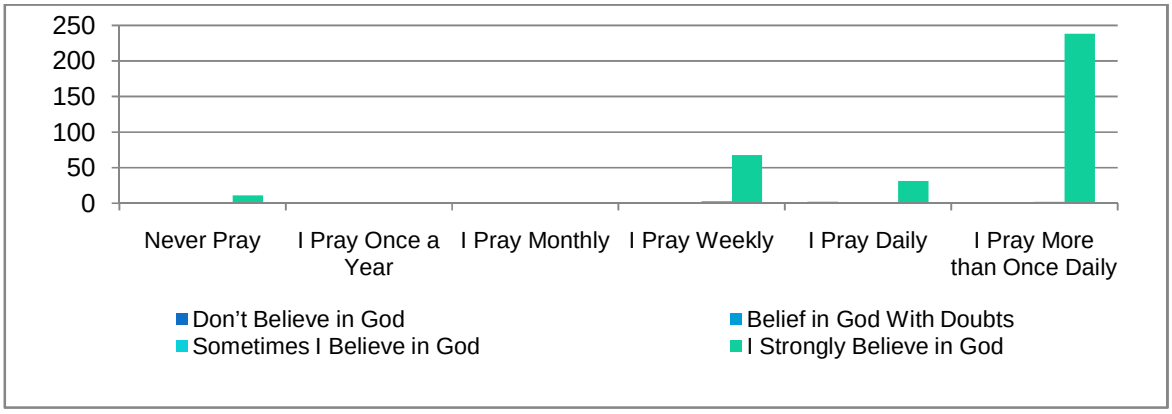

Figure 12: Relationship of frequency of prayer and degrees of belief in God in rural Kilimanjaro

The majority (67.2%) of households who were interviewed prayed more than once daily and strongly believed that it was the only way to communicate with God who they strongly believed existed (Figure 12). The Spearman Correlation Coefficient (Rho) test also confirmed weak but positive correlation of frequency of prayers and degree of belief in the existence of God ($N=360$; $r=0.107$; $p<0.01$) amongst the households of rural Kilimanjaro.

Unlike other religious commitment indicators, which are grouped together under factor number one, prayers have to be committed many times daily and more privately compared with attendance at church services, meeting religious leaders and reading religious texts which are more public events compared with prayer. These two variables shall be considered for analysis in the next chapters, if they pattern strongly with demographic and nature conservation variables in the combined factor analysis.

5.2.2.2 Nominal Group Technique: Results and Analysis

The nominal group technique (NGT) was used to identify key spiritual commitment variables from both ordinal and nominal scale variables (Annex 3). The NGT was also used verify results of the factor analysis on what constitute core religiosity indicators as perceived by representative households from Roman Catholic Church adherents in rural Kilimanjaro (Table 3).

Table 3: Results of NGT on religious indicators

Religious indices	Scores (rank)	Frequency	Standard Deviation
Private religious practice (frequency of prayer)	40	11	1.61
Public religious participation (frequency of attendance at worship places)	33	13	1.13
Daily or weekly religious experiences (Bible reading frequency)	24	9	1.57
Religious commitment (charity/supporting others on religious grounds)	19	7	1.56
Belief system (degree of belief in God and life after death)	14	7	1.19
Religious commitment (dressing code)	10	5	1.09
Ownership of religious symbols and books	10	6	1.01
Religious commitment (adherence to religious commandments, pillars/rituals)	9	4	1.18
Adherence to restricted feeding and drinking behaviour	8	3	1.33
Attendance at religious ceremonies and rituals	7	2	1.33
Born again attitudes and self-expression	6	2	1.2
Good religious practices	5	4	0.65
Use of language to affirm God's existence and power	3	1	0.83
Religious affiliation (involvement in a church organisation/denomination)	1	1	0.28
Adherence to religious values of parents	1	1	0.28
Continued talking and discussions about positive religious issues	0	0	0
Frequency of singing religious songs	0	0	0

Frequency of prayers, frequency of attendance at worship places and frequency of reading religious texts, particularly the Bible, were considered to be the three most important measures of spiritual commitment in rural Kilimanjaro.

The NGT helped to uncover some core public religious indicators which are not regarded as important elements of religiosity in the Western world and are rarely considered for research on religion. Frequent use of language to affirm God's existence and power, dressing code, eating and drinking behaviour, ownership of religious symbols and participation in religious groups like church choirs came out strongly as very important religiosity indicators in rural Kilimanjaro. These were also identified during the participatory workshop process of the selected households from rural Kilimanjaro.

5.2.3 Results and Discussions: Core Socio-Demographic Variables

5.2.3.1 Factor Analysis: Results and Analysis

Data on socio-demographic variables was collected through the use of a standard questionnaire described in the data sampling and methodology section of this thesis. The households were asked to indicate estimated values of land, and property in general, which were directly under their ownership. The households were also asked to estimate the number of times they had contracted certain diseases (malaria, typhoid, dysentery and flu) over the past three years. Other questions included indicating the number of verbal or physical assaults encountered over a period of three years and how they feel about certain ethical and moral issues like extramarital affairs, divorce, atheism and arranged marriage.

A combination of factor analysis criteria (Kaiser Criterion and Scree Test) were used to identify the principal components which account for much of the variability in the data set collected in rural Kilimanjaro. Data from the component matrix (Annex 4) were used to summarise the important socio-demographic variables described in this chapter. Factor analysis results of the ordinal demographic variables from the study show a KMO and Bartlett's Test value of 0.646 (N=360; X^2=2757.213; DF=435; $p<0.01$). Based on the data, factor analysis results show sixteen main types of socio-demographic features that largely explain the core socio-demographic phenomena which account for much of the variability in the data collected in rural Kilimanjaro.

In order to provide an idea on how the socio-demographic variables which were initially extracted differ from each other and to provide a clearer picture of which socio-demographic items are associated with each factor, rotation was performed. Results indicate that only ten socio-demographic components, out of thirty components, accounted for 62.37% of the variance of the relationships between the data of the socio-demographic indicators in rural Kilimanjaro (Annex). In cases where more than four major factors were grouped together, those with least influence were removed and the factor analysis was re-run. After re-running of the factor analysis, the least important variables or redundancies were then rejected.

The correlation procedure also confirmed that the ten socio-demographic pseudo-covariates showed a stronger association with other socio-demographic variables than the other remaining twenty socio-demographic indicators from the rural Kilimanjaro dataset (Annex 4).

In summary, wealth, health, level of education and age seemed to "hang" or pattern together when the socio-demographic ordinal scale dataset from rural Kilimanjaro was processed using the factor analysis. Thus the contribution of level of education and age of households in wealth making and maintenance of health cannot be under estimated in the analysis of the relationship between religiosity and socio-demography in rural Kilimanjaro. The ten socio-demographic components which account for as much of the variability (62.37%) in the dataset as possible are:

- Health, wealth, morality and social conflicts;
- Wealth, type of occupation and morality;
- Education and perception about atheism;
- Ageing and wealth;
- Ageing, wealth, language proficiency and perception about abortion;
- Education, wealth and language proficiency;
- Ageing, wealth and health;
- Wealth and health;
- Wealth and morality; and
- Health indicators.

Factor 1: Wealth, human health and morality

The first principal component combines a number of pseudo-variables on health, wealth and moral issues. The component accounts for as much (10.9%) of the variability in the data as possible were the estimated values of land, estimated values of all properties owned by households, human diseases, feelings of the households in rural Kilimanjaro about certain moral issues and number of physical or verbal assaults over a period of three years.

Land issues also feature prominently in other principal components and seem to relate to many other socio-demographic variables in rural Kilimanjaro. This is because land in rural Kilimanjaro is a major source of production and regarded as a major source of wealth by the local people. In rural Kilimanjaro, the most important single demographic indicator is control of land, followed by other productive resources, capital equipment (tractors, ploughs), consumer durables, income (farm and non-farm) and livestock (Castro et al. 2009).Land is a pivotal asset in many African societies and the Chagga are no exception (Carr, 2004). The land has provided for the livelihood and trading income for generations and it is the hope of each of the Chagga that it will continue to care for their families in such a way. The land has been passed down through families for generations, making Chagga familial connection to the land strong (Carr, 2004).

Profound attachment to the homeland appears to be a worldwide phenomenon. It is not limited to any particular culture and economy, the land is viewed as mother, and it nourishes, place is an archive of fond memories and splendid achievements that inspire the present, place is permanent and hence reassuring to man, who sees frailty in himself and chance and flux everywhere (Tuan, 1977). Land ownership is also an indicator of social status and is an important determinant of attachment to the community (e.g. Sell & Dejong, 1978; Fernández & Dillman, 1979; Stinner et al. 1990). Among the Chagga and other lineage-based societies, possession of land is personal and statutory. The Chagga may work elsewhere, but still have a strong attachment to their home lands (Knutsen, 1999). Many of the migrants remain emotionally attached to the home area and want to help improve conditions there. Creighton and Omari (1995) mentioned that seventy-seven per cent of those surveyed from the Arusha and Kilimanjaro regions planned to return to their villages to retire due to land ownership and home associations.

Therefore association of estimated value of land and estimated values of all properties of household ($r=468$; $p<0.01$), land being one of the major properties, could be explained by the values of land attached to the people of rural Kilimanjaro. The estimated financial values of all the properties by and large are a function of land as a rural people come from local agricultural products. The trading which takes place in rural Kilimanjaro is found of produce which come from land. The rich volcanic soils and complex irrigation systems built by early Chagga residents for use during the dry seasons provide a choice environment in which to raise both subsistence and cash crops such as bananas, beans, cabbage, onions and avocados, as well as coffee and maize that were brought by Swahili traders (Carr, 2004). Subsequently the size of land, which is a reflection of its estimated values, effective and efficient uses of that land would, by and large, reflect the estimated financial values of all the properties of households of the rural people of Kilimanjaro. Thus it is understandable how these two components hung together when the factor analysis was performed. Land and other wealth indicators also patterned together on other components below.

The estimated values of land and values of all properties owned by households in rural Kilimanjaro as proxy indicators of wealth could explain their health conditions. Occurrences and incidences of certain diseases have been associated with wealth on a number of occasions. For instance, malaria and typhoid are intimately connected with poverty. Poor economies of individuals in malaria endemic areas would make them vulnerable to *Plasmodium* spp. through mosquito bites because these individuals would not afford gears to protect themselves against mosquito infection and subsequent malaria infection. Dysentery conditions could be prevented by the use of treated water. People in rural areas with poor economies cannot afford water treatment procedures to avoid typhoid and dysentery. Wealth in rural areas is also a proxy indicator of awareness and understanding of the ecology of diseases.

This understanding and awareness might have helped the households who are wealthy to avoid circumstances which lead to disease infection. On the contrary, poor households seemed to succumb easily to malaria and typhoid. Results however indicate a slight positive association between wealth (values of properties) and health conditions (malaria, dysentery and flu incidences). This could possibly be a result of accurate estimation of disease incidences by wealthier households than poor record keeping of less wealthy households. Further research on this area might uncover the actual wealth-health connections in rural Kilimanjaro.

The factor analysis results also show connections of wealth, health conditions and ability to accept or reject certain moral values like alcohol drinking. The contextual influences of income inequality on alcohol use and frequency of drunkenness, which in turn affect health conditions, have been shown in some countries (Elder et al. 2005). Table below provides a summary of results from Spearman's Correlation Coefficient (Rho) test which indicates negative associations between estimated wealth/disease incidences of households and feelings about alcohol drinking behaviour. It is likely that experiences in drinking resulting from wealth had negative influences on health of households who succumbed to flu and dysentery.

Table 4: Results (Rho) of how households feel about neighbour drinking alcohol and socio-demography

Estimated financial values of all household's properties	Value of land owned by household	Dysentery incidences in household over a three-year period	Flu incidences in household in a three-year period
(r=-0.255; p<0.01)	(r=-0.194; p<0.01)	(r=-0.206; p<0.01)	(r=-0.256; p<0.01)

The results from Spearman's Correlation Coefficients (p<0.01) show that the number of physical or verbal assaults befell households in rural Kilimanjaro over the past three years was also linked positively to wealth (value of land owned) and health (malaria, typhoid and flu) conditions and negatively correlated to households' perceptions about neighbours drinking alcohol (Table 5).

Table 5: Correlation of physical assaults, wealth and health

Value of land owned	Malaria prevalence/incidences in people	Typhoid prevalence/incidences in people	Dysentery incidences	Flu incidences	Perceptions about neighbour drinking alcohol
r=0.202	r=0.146	r=0.113	r=0.321	r=0.241	r=-0.126

Abuse or assault at family and village levels often follow other forms of more subtle and long-term violence like verbal, emotional, psychological, financial etc. They are closely correlated with alcoholism, drug consumption, intimate-partner homicide, teen pregnancy, reckless behaviour and the onset of mental health disorders (Vaknin, 1996).

Perhaps persistent poor health conditions of the households resulting from alcohol drinking has caused tension in families and created conflict situations in rural Kilimanjaro. Further studies are required to uncover these associations in rural Kilimanjaro. The focus of this study is to identify core socio-demographic variables which hugely account for variability in the dataset for the analysis of the relationship of religio-demography in the next chapter.

Factor 2: Wealth and moral issues

The second important principal component which accounts for much (9.74%) of the variability in the ordinal socio-demographic dataset from rural Kilimanjaro are elements related to wealth (size of land of households and households who ranked farming and formal employment as the most important source of their livelihoods) and moral issues such as the household's perceptions and views about extramarital affairs, divorces, atheism and arranged marriage. Land, which seemed to be an important socio-economic variable in rural Kilimanjaro, this time in terms of its size, seems to be linked to the contribution of farming and formal employment to the economies of households of rural Kilimanjaro. Linkage between size of land and farming contribution of households was expected because the rich volcanic soils, complex irrigation and amount of rainfall in these areas support both subsistence and cash crops such as bananas, beans, cabbage, onions, and avocados as well as coffee and maize. As the size of land owned by households in rural Kilimanjaro increased, the tendency to depend on land for farming for livelihoods increased as well. On the other hand, higher engagement in land husbandry or farming makes the households less dependent on other sources of income such as that gained via formal employment. This was confirmed when the Spearman's Correlation Coefficient (Rho) test was performed. The importance attached to formal employment by the households was negatively correlated to the importance attached to farming by the households (r-0.522; $p<0.01$).

Despite the fact that the factor analysis grouped wealth indicators together with moral issues, the confirmatory test, the Spearman's Correlation Coefficient (Rho), showed that the two broad sets of variables were not correlated. The three wealth indicators patterned together and the four moral indicators were also patterned different from wealth indicators but showed strong positive correlations between them (Figure 13).

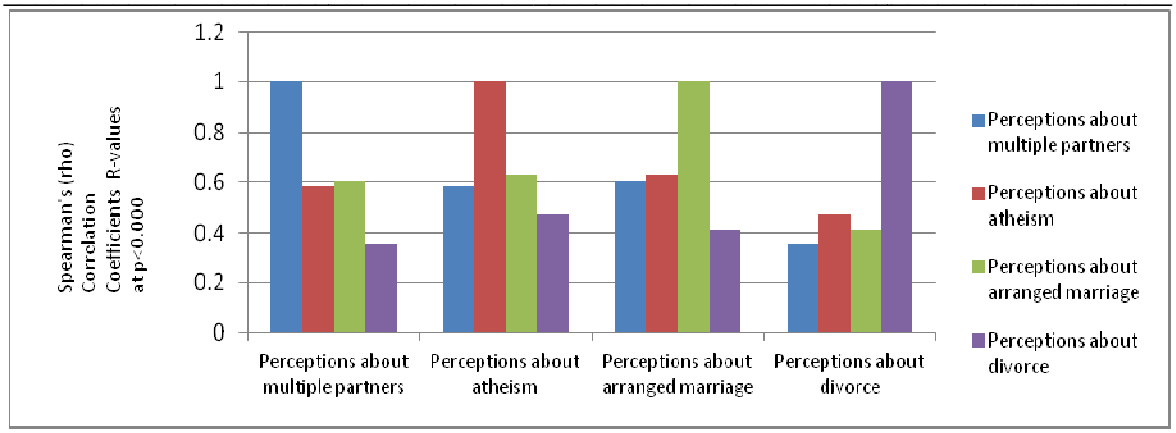

Figure 13: Correlation of wealth and morality

Overall, the households of rural Kilimanjaro perceived atheism, arranged marriage, multiple partnerships and divorce to be bad or very bad behaviours (Figure 14). All these four moral issues are legal in Tanzania. Overwhelm rejection of these issues by the households who were interviewed may be influenced mainly by religion or local tradition or both. Negative attitudes towards atheism are jointly influenced by the dominance of the Abrahamic faith institutions and indigenous religions, because both faiths ascribe to some form of theism. Divorce, which was strongly rejected by the households, is discouraged by both Abrahamic faiths and local culture and traditions.

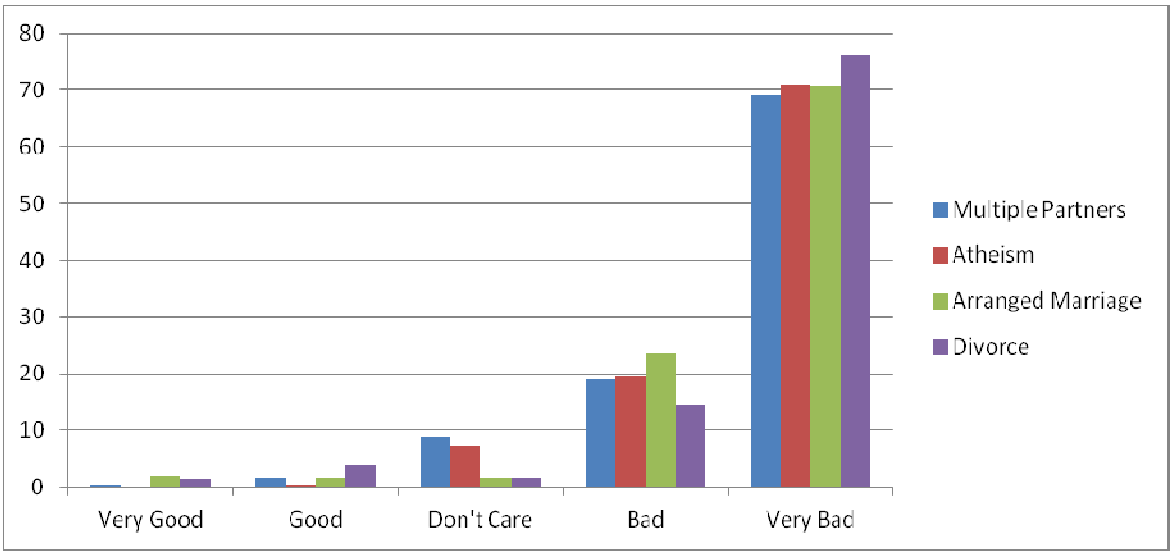

Figure 14: Perceptions of moral issues by households

Although households strongly rejected atheism and multiple partnerships, a few individuals did not care about the two ethical values. The concept of multiple female partners exercised by men before Christianity (1890) in rural areas was common and considered an indicator of strength in terms of masculinity and wealth (Hunter, 2005). Christianity, colonialism, the HIV/AIDS pandemic and gender equity movements have shifted the multiple partner paradigms from extreme left to extreme right over the past one hundred and fifty years and that is why a few elements still feel that extramarital affairs could be acceptable. Atheism too receives strong opposition from religions, including traditional religions, and local cultures.

On the other hand, arranged marriages have been part and parcel of local traditions and the dominant Abrahamic faith institutions have not interfered much with the practice. Arranged marriages are marriages which are negotiated primarily by the parents of the couple, rather than the couple themselves. Nonetheless, many of the Abrahamic faith sects don't allow forced marriages. Perhaps the forces against this practice (arranged marriages) come from specific type conventional education taught in school, and emerging views of the young people for pro and personal choices when it comes to family related matters, including the choice of partner. Nonetheless, the existing dataset on age and level of education showed no correlation with perceptions relating to arranged marriages when Spearman's Correlation Coefficient (Rho) test was performed.

Therefore these variables "hanged" or patterned together when the factor analysis was performed due to the strength of opposition against them which exists in rural Kilimanjaro. There is also continued debate on these issues because arranged marriages, multiple partnerships, divorce and atheism are said to persist in rural Kilimanjaro despite the fact that it is not easy to obtain actual data on them.

Factor 3: Level of education, employment and atheism

Level of education and perception about atheism also accounted for 8.50% of the variability in the data which was collected in rural Kilimanjaro.

In order to understand the influence of education in rural Kilimanjaro, the households were asked to indicate the highest levels of education achieved. In Tanzania, the levels of education could be classified, from lowest to highest, as follows: primary school (seven years of schooling); Ordinary Level Secondary School Certificate ("O" level) (four years of schooling); Advanced Level Secondary School Certificate ("A" level) (two years of schooling), tertiary levels (Colleges-Technician Certificate

and Ordinary Diplomas) and the university level of education. “O” and “A” level graduates could join tertiary education or colleges for the Technician Certificate or Ordinary Diploma training programmes. Vocational training is designed for provision of livelihood skills for those who have completed primary school or secondary school education.

The households were also asked to indicate levels of the contribution of formal employment to their livelihoods (first most important, second most important, third most important, or not important to their livelihoods). The assumption made is that higher education would enable households in rural Kilimanjaro to get employment from the private or public sector and earn their livelihood from formal employment.

Concerning atheism, the households were asked to indicate how they perceived atheism in their areas (very good, good, don’t care, bad or very). It was assumed that educated households would not care about atheism and, perhaps as education levels increased, the households would tend towards self-sufficiency and atheism.

The Spearman's Correlation Coefficient (Rho) test confirmed a negative correlation of level of education and importance attached to formal employment by households of rural Kilimanjaro ($r=-0.249$; $p<0.000$). In other words, as households achieved higher levels of education above the primary school level, they tended to move away from formal employment and rely on non-formal employment as their main sources of income. The formal sector in Tanzania involves firms and institutions which are subjected to annual accounts, taxes, labour laws, etc. The formal sector scheme in Tanzania covers about 691,404 people, which is only 2% of the entire population and 3.9% of the total labour force of Tanzania (Government of Tanzania, 2011). Out of 359 households who responded to this question, 80.5% said formal employment made no contribution to their livelihood at all and only 12.5% mentioned that formal employment was the first most important source of their income. Theoretical models show a positive relationship between education and formal employment exists (Trevithick, 2000).The negative correlation of level of education and formal employment in rural Kilimanjaro requires further studies.

No significant correlation of atheism and level of education or of atheism and formal employment was ascertained when the Spearman's Correlation Coefficient (Rho) test was performed.

Overall, regardless of their levels of education, households who were interviewed in rural Kilimanjaro perceived atheism to be a very bad thing and they would not wish to be associated with it (Figure 15). However a few households did not care about atheism, again regardless of their levels of education. Atheism also seemed to pattern distinctly with other moral issues under factor three of the factor analysis.

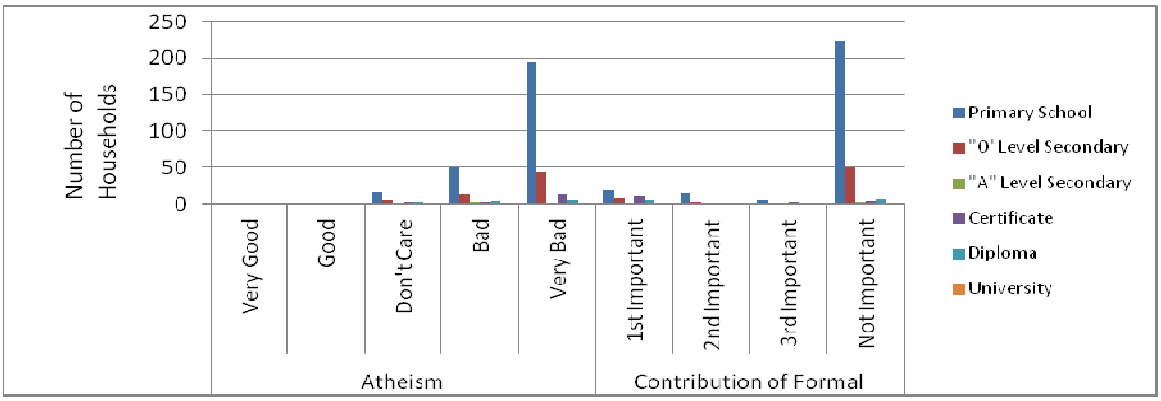

Figure 15: Contribution of formal employment, education and perception about atheism

Empirical work exists on religiosity of the general population, correlating findings on religiosity with other social indicators, usually stressing the seemingly rapid secularisation and the spread of atheism as a result of increased education (Flere, 1994). Atheism seems to underlie certain hidden associations with socio-demographic variables of rural Kilimanjaro which require further investigation.

Factor 4: Ageing and wealth

The age of respondents and wealth retained 6.43% amount of variance when the factor analysis was performed. Age or stage of an individual in the life cycle is an important determinant of social-economic position occupied by individuals of rural Kilimanjaro. The dataset associates age of the households who were interviewed and perceptions of the households about the contribution of small scale business to their overall livelihoods, estimated financial values of all properties, support given to other either on religious or non-religious reasons, values of land, size of land, Chagga and Kiswahili proficiency.

When Spearman's Correlation Coefficient (Rho) test was conducted, age and size of land of land owned by the households of rural Kilimanjaro were shown to correlate to the majority of other variables.

The importance of land in rural Kilimanjaro has been detailed under Factor Two above. A strong showing under this factor is yet further proof that land seems to dictate the livelihoods of the peoples of rural Kilimanjaro.

The size of land owned by households positively correlated with age ($r=-0.119$; $p<0.01$) and Kiswahili proficiency (-0.115) and positively correlated to estimated values of land owned by households ($r=0.492$; $p<0.01$), estimated property values ($r=0.104$; $p<0.01$) and amount of money spent by households to support other people ($r=0.114$; $p<0.01$). It is possible that old households give land as inheritance to their children and remain landless because old people in rural Kilimanjaro remain under the custodianship of their children when they grow old and are unable to support themselves. It thus appears that landholding concentration within the older age groups decreases slightly as the parents pass over land to their children in form of inheritances or they sell. The relationship between land ownership and Kiswahili proficiency is not very clear. Perhaps language proficiency is a proxy indicator of other wider socio-cultural and economic variables in rural Kilimanjaro. Value of land, estimated property values and amount of money spent to give support to other people are all indicators of worth in rural Kilimanjaro, and they positively correlate to the size of land owned by respondent households. There is a strong relationship between access to land and household income in rural Africa (Jayne et al., 2003).

On the other hand age also seems to be an important factor in the life of the peoples of rural Kilimanjaro in this group of socio-demographic variables. In order to understand the influence of age in human development in rural Kilimanjaro, households were asked to indicate their age in a six defined age groups (18-25 years; 26-35 years; 36-45 years; 46-55 years; 56-65 years; 66 years and above). Smaller age groups were used in order to adapt the dataset to other broader age categories, depending on type of analysis to be performed. Age of the households correlated positively with contribution of small business in households' economies ($r=0.155$; $p<0.01$) and estimated property values ($r=0.229$; $p<0.01$) and correlated negatively with size of land ($r=-0.119$; $p<0.01$), Kiswahili ($r=-0.160$; $p<0.01$) and English ($r=-0.116$; $p<0.01$) proficiencies. It appears that older households had more properties and collective values of their properties were more than younger households in rural Kilimanjaro. This was expected because as households in rural Kilimanjaro live longer they tend to accumulate worth and acquire more land through purchases, inheritance or lending. This however tend to change as households above 65 years begin to lose land as they pass it over to middle age households through inheritance.

It is evident from the graph (Figure 16) and the confirmatory statistical test that the households who were interviewed in rural Kilimanjaro tend to disengage from small scale businesses as they grow old.

Small scale business in rural Kilimanjaro is characterised by travelling long distances and spending many hours daily to make follow up of would be buyers and goods to sell. Ability to travel away from home and staying at business centres for many hours a day diminishes with age. The correlation of age and disengagement of rural people from small scale business is therefore evident. Age has always been an important factor in achieving socio-economic outcomes in rural parts of Africa.

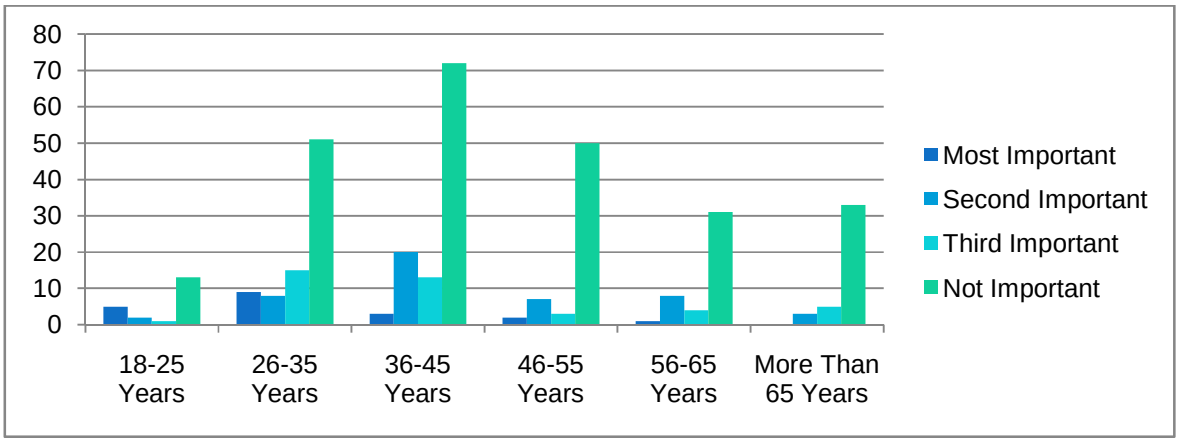

Figure 16: Small business engagement and ageing

Kiswahili and English are second and third languages for households above sixty-five years in age in rural Kilimanjaro respectively. Chagga is the first language for this age group. Perhaps the relationship of age and Kiswahili and English language proficiencies is a reflection of this fact. Increasingly however Chagga is losing ground to Kiswahili in rural Kilimanjaro mainly due to immigration, education, inter-tribal marriages and the Tanzanian government policy on increasing the use of Kiswahili to reduce negative tribal influences on local politics and rural development. English, on the other hand, becomes a symbol of level of education and the wealth elite tend to be associated with English proficiency.

Factor 5: Ageing, wealth, language proficiency and perception of abortion

Another principal component, which accounts for 5.87% of the variability in the data set, was age yet again, Chagga and Kiswahili proficiencies, wealth in terms of property values of households, and perceptions about abortion. Age, language proficiencies and wealth in terms of estimated property values of properties patterned together and accounts for much of the variability in the data as described in the previous factor. An additional variable, the perception of households about abortion, seems to associate with age, language proficiency and wealth. In order to examine this association households were asked to indicate how they perceived abortion in their areas (very good, good, don't care, bad or very).

Overall the households who were interviewed in rural Kilimanjaro strongly rejected abortion as a bad or very bad thing (Figure 17).

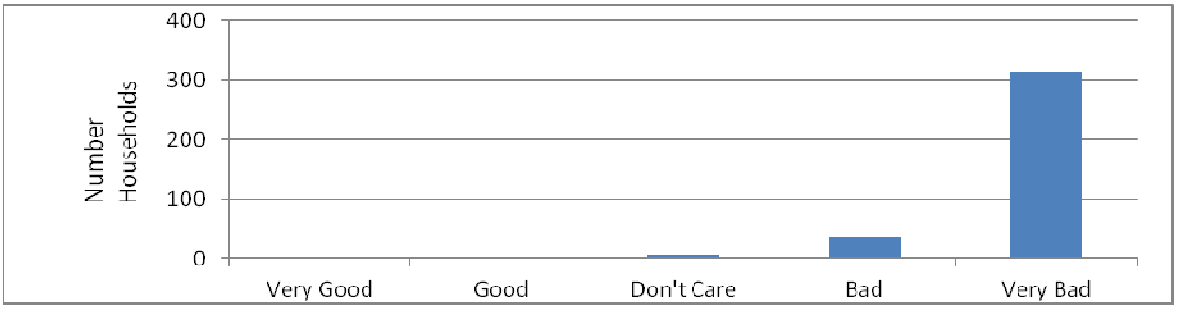

Figure 17: Perceptions of households about abortion

Abortion is illegal in Tanzania. Abortion legislation in the United Republic of Tanzania is based on the English Offences against the Person Act of 1861 and the Infant Life (Preservation) Act of 1929. Under the Revised Penal Code of Tanzania (Chapter 16, Sections 150-152) the performance of abortion is generally prohibited. Nonetheless, an abortion may be performed to save the life of a pregnant woman (Section 230 of the Revised Penal Code). Both religions (Abrahamic Faith) and local traditions (Chagga and Maasai) are against abortion on any grounds. The Bible sheds some light on the question of abortion (Genesis 5:3-4, 28-32; Genesis 25:21-26; Job 3:11; Jeremiah 1:5; Amos 1:13; Matthew 1:18-25; Luke 1:41, 44). Strong rejection on abortion is therefore a function of the interventions of the local traditions, colonialism, conventional religions and the Tanzanian government.

Despite this rejection, induced abortion is perceived to have increased in rural Kilimanjaro. The annual number of induced abortions in Africa rose between 1995 and 2003, from 5.0 million to 5.6 million (Singh et al., 2009). In 2003, most of the abortions occurred in Eastern Africa (2.3 million), Western Africa (1.5 million) and Northern Africa (1.0 million) (Singh et al., 2009).

When Spearman's Correlation Coefficient (Rho) test was conducted, perception about abortion did not correlate to age, language proficiencies or wealth (Table 6).

Table 6: Results of Spearman's (rho) Correlation Coefficient test

	Age of respondents' households	Kiswahili proficiency	English proficiency	Perception about abortion	Estimate financial values of properties
Perception about abortion	r=-0.008	r=0.006	r=0.085	r=1.000	r=-0.001
	p<0.875	p<0.912	p<0.106	p<0.01	p<0.981

Perhaps the relationship between perceptions about abortion and age is the fact that abortion befell women of childbearing age, who are less than 45 years old. The estimated abortion rate in 2003 was 39 per 1,000 women aged 15-44 in Eastern Africa (Singh et al., 2009). The connection between wealth and perceptions about abortion is unclear in rural Kilimanjaro. Researchers in India found that women from higher-income, better-educated families were far more likely than poorer women to abort a girl, especially during a second pregnancy if the firstborn was a girl (Yardley, 2011). Cultural and wealth reasons for abortion need to be investigated further in rural Kilimanjaro before reaching any strong conclusions about wealth-abortion connections. Kiswahili and English proficiencies seem to be proxy indicators of wealth and age in rural Kilimanjaro. Therefore, connections between language proficiencies and perceptions about abortion could be explained better by examining connections of perception about abortion, wealth and age in rural Kilimanjaro.

Factor 6: Level of education, wealth and English proficiency

Another principal component which accounts for 5.77% of the variability in the data set was the level of education, money spent to support others on any grounds, contribution of small scale business to the livelihoods of the people of rural Kilimanjaro and English proficiency. Yet again the level of education of households in rural Kilimanjaro seems to hang together with other socio-demographic variables, this time with wealth indicators and English proficiency.

When Spearman's Correlation Coefficient (Rho) test was conducted, the level of education of households positively and very strongly correlated to English proficiency ($r=0.715$; $p<0.01$) and the amount of money spent to support other people ($r=0.183$; $p<0.01$). This relationship between education/English language was expected in Tanzania. To a great extent, the Tanzanian government has been controlling language use through the educational system by passing edicts (Neke, 2003). One such edict is prescribing the medium of instruction to be used at each level of education. Kiswahili is assigned for primary and adult education while English is assigned for secondary and tertiary education. Therefore the higher the level of education attained in Tanzania the better the English proficiency because English is taught at higher educational levels. On the other hand, the amount of money spent by households is possibly a key indicator of the income wealth of the people of the research areas. Factor three clearly indicates some connections between wealth and level of education in rural Kilimanjaro. It shows that higher education perhaps enabled households in rural Kilimanjaro to gain employment from the private or public sector and earn the majority and a high amount of their livelihood from formal employment.

A confirmatory statistical test also showed a weak but positive correlation between amount of money spent by households to support others in rural Kilimanjaro and English proficiency ($r=0.107$; $p<0.043$) and the contribution of small-scale businesses to the livelihoods of the households ($r=0.180$; $p<0.01$). Yet again, the positive relationships of money spent to support others, contribution of small-scale businesses, the livelihoods of the households and their English proficiency seem to confirm the education-wealth connections in rural Kilimanjaro.

Factor 7: Ageing, wealth and health

The number of children, age, health (stomach ulcers) and wealth in terms of the ability of households to support other people accounted for 4.11% of the variability in the data set. Yet again, age, wealth and health indicators in rural Kilimanjaro are patterned together under this component. The element of number of children per households appears under core socio-demographic variables for the first time. The households were also asked to indicate the number of children they had (None, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 and more than 10).

Despite the fact that age data was patterned together with the amount of money spent to support others and health in terms of stomach ulcers, the Spearman's Correlation Coefficient (Rho) test confirmed a positive relationship between age of households number of children ($r=0.300$; $p<0.01$). The mean number of children in rural Kilimanjaro seems to increase with increased age of the households (Figure 18).

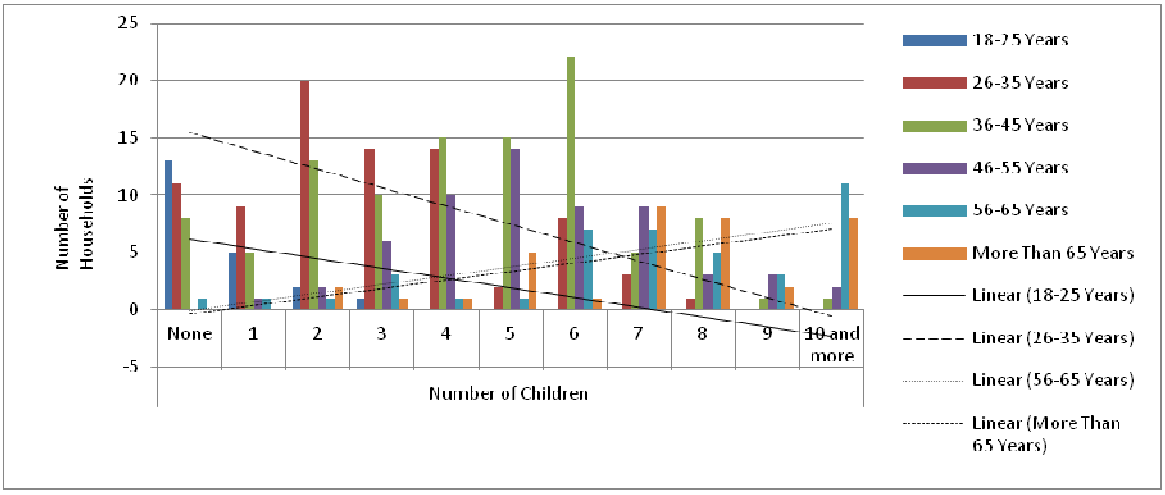

Figure 18: Relationship of age and number of children in rural Kilimanjaro

The current data does not provide a long time series of household data, thus it is difficult to assess the trends of the average children per household in rural Kilimanjaro. What the factor analysis results show is a relationship between age and number of children. The Spearman's Correlation Coefficient (Rho) test confirmed this association. The relationship between age and disease is logical because the human body succumbs easily to disease as humans grow old. It is highly likely therefore that older households succumbed to diseases more than younger households. The relationship of income to health and how it varies according to age has been proved in developed nations (Der et al., 1999). This is perhaps the reason why age, health indicators and wealth variables were grouped together in the dataset from rural Kilimanjaro when the factor analysis was performed.

Factor 8: Wealth and health indicators

Another principal component which accounts for 3.94% of the variability in the data, was Kiswahili proficiency, estimated monthly income, income trends for the past ten years and health indicators in terms of stomach ulcers. In order to assess the wealth status of households in rural Kilimanjaro, the households were also asked to indicate their estimated monthly income and perceived income trends for the past ten years (increasing, stable or decreasing).

When Spearman's Correlation Coefficient (Rho) test was performed, no significant ($p<0.01$) correlation between these variables was confirmed. The correlation was insignificant partly because this factor only accounts for 3.949% of the variability in the socio-demographic dataset from rural Kilimanjaro. However factors have shown conceptual associations between language proficiency, wealth and health indicators.

Factors 9: Wealth indicators and morality

Another principal component which accounts for 3.70% of the variability in the dataset is contribution of formal employment and small-scale businesses to the livelihoods of the households of rural Kilimanjaro and perceptions about homosexuality. The households were asked to indicate how important formal employment and small-scale businesses are to their livelihoods and their perceptions about homosexuality (very good, good, don't care, bad and very bad). The Spearman's Correlation Coefficient (Rho) test did not uncover any significant association between these variable at the significant 0.01 level.

Factor 10: Health indicators

Another principal component, which accounts for 3.38% of the variability in the dataset from rural Kilimanjaro, is incidences of heartburn and malaria. The households were asked to indicate how many times they contracted heartburn and malaria over a period of three years.

The Spearman's Correlation Coefficient (Rho) test also confirmed the weak but positive association (r=0.190; 0.01) between the two health conditions.

Heartburn isn't a disease per se. It's a symptom where stomach acid moves up into the oesophagus and leaves a sour taste in the mouth. Normally, digestive acid in the stomach is kept away from moving up into the oesophagus by the lower oesophageal sphincter, i.e. the valve relaxes or weakens, allowing stomach acid to flow up (reflux) into the oesophagus. On the other hand, malaria has many different symptoms. Households in rural Kilimanjaro could be confusing some malaria symptoms with many other conditions, including heartburn. This is one possible explanation of the connections between malaria and heartburn suggested by the patterns revealed by the factor analysis results.

5.2.3.2 Nominal Group Techniques: Results and Analysis

Because nominal data on spiritual commitment could not be processed using the factor analysis, the nominal group technique (NGT) was used to identify key demographic variables from a nominal scale from a pool of twelve variables (Table 7).

Table 7: Results of NGT on socio-demographic variables

Core demographic variables in order of importance	Scores	Number of people voting	Standard deviation
Age	25	11	0.9
Level of education	22	11	0.77
Level of income	19	8	1.19
Gender	12	5	1.3
Religious affiliation	9	4	1.25
Occupation	7	4	0.82
Leadership	6	4	0.82
Influential people	5	3	0.93
Marital status	3	2	0.65
Organisation structure	1	1	0.3
Ethnicity	0	0	0
Health condition	0	0	0

Results from the NGT indicate that marital status, gender of respondents, type and nature of housing occupied by respondents, major economic involvement or occupation and common diseases affecting the rural population were viewed the most important categorical variables in explaining the demography of rural Kilimanjaro.

Age has always been an important factor in rural African societies. Decision making, ownership of property and leadership aspects in rural African societies are very much dependent on the age of individuals according to the households who participated in the workshop. Demographic segmentation variables which are commonly used to divide a population into smaller segments in social studies are age, gender, family size, wealth, occupation, education, ethnicity and health. Variables that are frequently linked to religiosity in rural Africa are gender, age and education (Alolo Al-hassan, 2006a). Though both women and men, young and old, educated and uneducated generally participate in religious activities and make contributions to the spiritual welfare of their lives, families and societies, these religious roles and degree of religiosity are often distinct, operating on different planes (Alolo Al-hassan, 2006b). Data on the age of the households exists in the dataset from rural Kilimanjaro and the following sub chapters examine whether a significant correlation exists between age and core religiosity variables.

Also in many African rural societies, dignity is defined in terms of both material wealth and a healthy life. It is judged by the absence of want, in that a person is dignified if they are healthy and have an abundance of wealth in the form of crops, animals and children. In the African context, therefore, there is nothing wrong with displaying one's material possessions or physical and mental prowess within acceptable limits and within the context of an individual's status at the moment. Rural Kilimanjaro was no exception to this rule. Wealth and health conditions hugely explained the variation of the demographic phenomena of rural Kilimanjaro and were ranked very highly amongst the selected households from rural Kilimanjaro. Ordinal data on wealth and health incidences of the households exist in the dataset from rural Kilimanjaro and the following sub chapters examine whether a significant correlation exists between wealth and health and core religiosity variables.

The households revealed in the participatory workshop that a higher level of education helps them to secure reliable engagement with the government or reputable private firms that pay good salaries to support their livelihood. They also associate education with understanding basic life principles which helps them to manage their livelihood more effectively and efficiently. They associated wealth and health conditions in their village with levels of education. Data on education attained by the households exists in the dataset from rural Kilimanjaro and the following sub chapters examine whether any significant correlation exists between the levels of education attained and core religiosity variables.

On gender, the households explained how different roles to pursue livelihoods in rural areas of Kilimanjaro are divided along gender lines. Taking care of children, collection of fodder for livestock, collection of fuel wood and water fetching, cooking and cleaning homes and farming were reserved mainly for women in rural Kilimanjaro. Security at home and small-scale businesses were duties reserved mainly for men in these villages. The households proclaimed that allocation of these duties were based on "who does what best" and some referred to religious texts which gave mandates for men and women to engage in particular kinds of duties. Data on gender of the households exists in the dataset from rural Kilimanjaro and the following sub chapters examine whether significant correlation exists between gender and core religiosity variables.

Differences in occupation or career were considered by households to distinguish incomes of people in rural Kilimanjaro. They strongly reiterated that households who were engaged in big businesses, employed by local or central governments were better than those engaged in small-scale farming in their villages. Subsequently the levels of livelihood amongst the households in rural Kilimanjaro, according to the participants in the workshop, are divided along the main occupation lines. Data on perception about which occupation provides for the livelihoods of rural people exist in the dataset from rural Kilimanjaro and the following sub chapters examine whether significant correlation exists between occupation and religiosity variables.

On marital status, there were perceptions that women who were under some kind of marriage arrangement were more secure in terms of livelihood than women who were single. These views were held by those who mentioned marital status as one core variable in supporting livelihoods of the people of rural Kilimanjaro. Data on marital status exists in the dataset from rural Kilimanjaro and the following sub chapters shall examine whether significant correlation exist between marital status and religiosity variables.

Leadership and influential people in the villages were stated by the some few participants in the workshop to influence development, or lack thereof, in rural Kilimanjaro. Issues of good governance like transparency, accountability and rule of law were pointed out to support people in villages and promote sustainable livelihoods of the peoples of rural Kilimanjaro. They stated that corruptive tendencies and bad governance, which were a result of poor leadership, were responsible for poor economy and rampant poverty in their villages. They also linked having influential people coming from their villages and development projects. They mentioned that villages which had very rich people or people high up in the government helped to bring development projects to their villages. Data on leadership and good governance is not part of the dataset from rural Kilimanjaro.

5.2.4 Results and Discussions: Core Natural Environment Variables

Factor analysis deals with continuous variables. There were only two natural environment variables conform to this criteria, estimated amount of water and fuel wood used per day by households. The two indicators shall be used in the chapter on religion and ecology to examine the correlation of religiosity and natural resource use. Other environmental variables were of a categorical nature and all will be examined in the chapter of religion and ecology. Therefore, NGT were used to give an overview of core natural environment variables in the contexts of rural Kilimanjaro.

Twenty representatives of households of mixed religious faiths from the six study villages were asked to respond to this question: "What are the four most important environmental variables which influence people's livelihoods in rural Kilimanjaro, which can be accessed and objectively verified?" Silently and independently, each participant listed in a notebook four core environmental factors he/she thought to influence livelihoods in rural Kilimanjaro (Annex 5).

After silent generation of ideas, the households went through the process of round robin recording of ideas, discussed and clarified issues which were generated (silently and independently) and finally ranked the scores from issues generated through voting (Table 8).

Table 8: Summary of NGT on core environmental variables, in order of importance

Core environmental variables in order of importance	Scores	Number of people voting	Standard deviation
1. Water	21	12	0.8
2. Soil (and land)	19	15	0.5
3. Mount Kilimanjaro and its influences	5	3	0.7
4. Natural catastrophe	2	1	0.5
5. Forests and its products	2	1	0.5
6. Health centres	1	1	0.3
7. Wildlife resources	1	1	0.3
8. Temperatures	0	0	0
9. Diseases	0	0	0
10. Plants	0	0	0

Water and soil and land in general were considered by the representative from rural Kilimanjaro to constitute core environmental variables. They felt strongly that their livelihoods are hugely influenced by the quality of land and availability of water. Land quality and access to water also determines the price of land in their villages. The land issues also feature prominently in other principal components, one under the socio-demographic variables, and seemed to relate to many other socio-demographic variables in rural Kilimanjaro. Both water and soil were voted for by twelve and fifteen households respectively.

Other environmental variables which seemed to influence livelihoods of rural Kilimanjaro include the influences of Mount Kilimanjaro as the major regulator of weather in rural Kilimanjaro. During the discussion, three households who voted for this variable mentioned that cool and calm weather are due to the influence of high altitudes on the slopes of Mount Kilimanjaro. They also reiterated that, apart from rainfall, the main sources of reliable water are rivers flowing from Mount Kilimanjaro and springs originating from the mountain. The selected households were aware that the fertile volcanic soil, which is the main source of their agricultural products, resulted many years ago, during the formation of Mount Kilimanjaro. Subsequently Mount Kilimanjaro and its influences were considered thirdly very important because it influenced weather, including temperature, water and soil regimes.

Natural catastrophes like floods, forests and its products (plants) along with health centres were also considered by a household each to be important environmental variables which influenced their livelihoods. Floods do occur in periods of excessive rainfall and they cause serious damage to crops and other human property. Forest products are sources of building materials and fodder support livestock zero grazing which is a dominant form of livestock production system in the villages which were studied. Environmental diseases like malaria, typhoid and dysentery are endemic in rural Kilimanjaro and diseases were identified during the silent generation of ideas stage of NGT. Perhaps identification of health centres as a core environment which influenced livelihood is recognition of the role health centres play in treatment of sick people of the area.

Discussion on recognition of wildlife as an important natural environment was explained in two different ways. Firstly, the six villages border the Kilimanjaro National Park (KINAPA. Essential KINAPA is a park for would be bird watchers and mountain climbers. Therefore wildlife tourism is one of the major sources of income for people living in these villages. Paradoxically, wildlife moves freely between KINAPA and Amboseli National Park (Kenya), between KINAPA and Tsavo National Park (Kenya) and between KINAPA and Enduimet Wildlife Management Area. In their movements, particularly elephants, wildlife cause significant amount of damage to people's properties and livelihoods. Subsequently wildlife can influence the livelihoods of the people of these areas and can either be a source of both profit and loss.

5.2.5 Results and Discussions: Combined Religio-Socio-Demography Variables

5.2.5.1 Factor Analysis: Results and Analysis

A combination of factor analysis criteria (Kaiser Criterion and Scree Test) was used to identify the principal components that account for much of the variability in the religion-socio-demography ordinal dataset collected in rural Kilimanjaro. Data from the component matrix (Appendix 7) were used to summarise the important natural environment variables described in this chapter.

Factor analysis results of the ordinal religion-socio-demography natural environment variables from the study show a KMO and Bartlett's Test value of 0.656 (N=360; X^2=3656.105; DF=702; p<0.01). Based on the data, factor analysis results show 18main types of religion-socio-demography and natural environment features that hugely explain religion-socio-demography and natural environment phenomena which account for 59.01% of variability in the data collected from rural Kilimanjaro.

In order to provide an idea of how the religion-socio-demography and natural environment variables which were initially extracted differ from each other, and to provide a clearer picture of which religio-socio-demography and natural environment items are associated with each factor, rotation was performed. Results indicate that only 11 components, out of 39 components, accounted for 59.01% of the variance of the relationships between the data of the religion-socio-demography and natural environment indicators in rural Kilimanjaro (Annex 6). The correlation procedure also confirmed that the 11 religion-socio-demography pseudo-covariates showed stronger association with other religion-socio-demography factors than the other remaining 28 religion-socio-demography indicators from the rural Kilimanjaro dataset (Appendix 6).

Eleven variables which were grouped together by the factor analysis were:

- ☐ Wealth and health conditions;
- ☐ Education, English proficiency, morals and conflicts situations;
- ☐ Religiosity, contribution to church and Kiswahili proficiency;
- ☐ Chagga proficiency, attending church service and atheism;
- ☐ Wealth, contributing at church services and prayers;
- ☐ Education, small-scale business and prayers;
- ☐ Attending church and meeting religious leaders;
- ☐ Ageing, belief in God and monthly income;
- ☐ Belief in God and prayers;
- ☐ Formal employment and monthly incomes; and
- ☐ Disease incidences (heartburn) and belief in God.

Below is a summary of the results of the factor analysis. These factors have been discussed in detail above.

Factor 1: Wealth and health conditions

The first important principal component which accounts for 9.2% of the variability in the data set is value and size of land owned by the households in rural Kilimanjaro, estimated financial value of all their property and their health conditions (incidences of malaria, dysentery, typhoid, hepatitis, and flu over a period of three years). The associations of wealth and health conditions are discussed in detail under socio-demographic variables above. Religiosity variables were not grouped under this core variable. Perhaps this is an initial indication of minimum correlation and association of religiosity and socio-economic variables. Nevertheless strong contribution of wealth and health indicators in the variability in the data set is a suggestion that these social variables drive the livelihoods of the people of rural Kilimanjaro. Consequently, in analysing association of religious phenomenology and ecology in rural Kilimanjaro, wealth and health indicators should perhaps be considered as socio-demographic control variables.

Factor 2: Farming and formal employment, education, English proficiency, morality and conflicts situations

The second important principal component which accounts for 8.2% of the variability in the data set is the perception of the households of rural Kilimanjaro on certain moral issues (homosexuality, arranged marriage, extra marital affairs, atheism, abortion and alcohol drinking) and how they ranked the contribution of farming and formal employment to their livelihoods, English proficiency and level of education and amount of conflicts found on religion. The ordinal religiosity variables are not associated with variables under this component. The association of wealth, English proficiency and education was covered under socio-demographic components above. Level of education seemed to influence proficiency in both written and spoken English. In rural Kilimanjaro, regardless of level of education and type of economic engagement, people are in opposition to homosexuality, arranged marriage, extra marital affairs, atheism, abortion and alcoholism. Perhaps this is the best explanation of association of morality, type of engagement and level of education revealed by the factor analysis results.

Wealth indicators were also grouped with health variables under factor 1. This factor introduces moral issues and level of education dimension as important socio-demographic variables in rural Kilimanjaro. This factor also grouped conflicts found on religion with education, morality and type of socio-economic engagement. Perhaps strong opposition to moral issues in rural Kilimanjaro cause conflicts amongst the rural households. Pearson correlation coefficient test results show positive and weak but significant correlation of level of education and number of conflicts found on religiosity (Table 9).

Table 9: Results (r values) of conflicts found in religiosity, morality and level of education ($p<0.01$)

Level of education	r=0.199
Feelings about homosexuality	r=0.151
Feelings about neighbour drinking alcohol	r=0.149
Feelings about abortion	r=0.125
Feelings about atheist neighbour	r=0.168
Feelings about parents choosing partner for marriage	r=0.146
Feelings about divorce	r=0.126

Because many unrelated variables were grouped together, the factor analysis was repeated to reveal underlying, perhaps hidden, associations of these factors (Table).Results show KMO and Bartlett's Test value of 0.694 (N=360; X^2=920.17; DF=66; $p<0.01$). The factor analysis separated these variables and grouped morality issues together as factor 1, accounts for 23.9% of the variability in the dataset (Table 10).

Table 10: Factor analysis results on selected socio-demographic variables: component matrix

	Component			
	1	2	3	4
English proficiency	0.035	0.856	0.128	-0.080
Level of education	-0.142	0.825	0.019	-0.228
Feeling about homosexuality	-0.032	0.039	-0.815	0.019
Feeling about your neighbour drinking alcohol	0.669	0.108	0.188	0.071
Feelings about having extra marital affairs	0.741	-0.009	-0.089	-0.072
Feelings about abortion	0.076	-0.022	-0.753	-0.111
Feelings about atheist neighbour	0.761	-0.152	-0.063	-0.019
Feelings about parents choosing partner for marriage	0.746	0.040	0.025	-0.081
Feelings about divorce	0.520	-0.023	-0.172	0.037
Number of conflicts found in religiosity	0.100	0.495	-0.247	0.166
Rank farming in terms of contribution to your overall livelihoods	0.091	0.073	-0.050	-0.785
Rank formal employment in terms of contribution to your overall livelihoods	0.030	-0.018	0.024	0.868

The level of education of households, English proficiency and number of conflicts found in religion were grouped as factor 2, accounts for 17.72% of the variability in the dataset. Abortion and homosexuality were grouped as factor 3, accounts for 9.4% of the variability in the dataset. Perhaps these were two most important moral issues ostracised most by the households of rural Kilimanjaro. Types of important economic engagement for the livelihoods of rural Kilimanjaro were grouped as factor 4, accounts for 8.5% of the variability in the dataset.

It seems that that homosexuality and abortion are strongly opposed by households in rural Kilimanjaro and this might be causes of some form of conflicts found on religiosity. Perhaps, when analyzing association of religiosity and perceptions of households towards environment, level of education and morality should be considered as variables which could influence households' perceptions about the natural environment. Perhaps the element of conflicts could be considered when analysing religiosity and socio-demographic variables.

Factor 3: Religiosity, contribution to church and Kiswahili proficiency

The level of education attained by the households, degree of religiosity (frequency of reading religious text, money spent to support other people on religious grounds, frequency of meeting religious) and their Kiswahili proficiencies accounted for 7.1% of the variability in the dataset collected from rural Kilimanjaro.

When confirmatory tests, the Spearman Correlation Coefficient (Rho), were used to ascertain associations of religiosity and Kiswahili language proficiency, it was clear that Kiswahili proficiency was positively correlated to the frequency of reading religious books ($r=0.264$; $p<0.01$) and frequency of meeting religious leaders ($r=0.230$; $p<0.01$).Kiswahili is the main language of instruction at church services. Religion institutions in rural Kilimanjaro have also translated the majority of their texts into the Kiswahili language in order to capture a bigger share of followers in these areas. Positive correlation of religiosity and proficiency in Kiswahili was therefore expected.

The Spearman Correlation Coefficient (Rho) test confirmed a positive correlation between level of education attained by households of rural Kilimanjaro and frequency of reading religious texts ($r=0.221$; $p<0.01$) and Kiswahili proficiency ($r=0.124$; $p<0.01$). Perhaps education fosters the reading culture, and Kiswahili which is taught at a basic educational level helps the households to read religious texts which are always in the Kiswahili language.

The chapter 6 shall examine further the relationships of religiosity and socio-demography variables which account for significant variability in the dataset under the majority of the principal components. Because

Factor 4: Chagga proficiency, attending church service and atheism

The fourth important principal component which accounts for 6.70% of the variability in the data set is Chagga proficiency, attending church service and perceptions about atheism.

Spearman Correlation Coefficient results show a negative and weak but significant correlation of perception about atheism and frequency of church attendance (N=360; r=0-186; p<0.01). Atheism is found on the notion that God does not exist. To the contrary, attendance at church services is found on the pretext that God exist. The negative association of attending at church services and perceptions held by the rural people about atheism could be real.

Spearman Correlation Coefficient results neither reveal significant correlation of Chagga language proficiency and attendance at church services nor could not show significant association of Chagga language proficiency with atheism. Nonetheless, the Roman Catholic Church in rural Kilimanjaro has translated several religious texts in Chagga language and administers Sunday sessions in Chagga in areas where Kiswahili is barely spoken. Perhaps this could suggest association of Chagga language and church attendance. Discussions under factors on socio-demography showed that languages in rural Kilimanjaro are a proxy of level of education. Perhaps level of education is the best control variable when analysing association of religion and natural environment.

Factor 5: Wealth, contributing at church services and prayers

Perception of the households about unselective tree cutting, setting a wildfire, their degrees of religiosity in terms of frequency of prayer, money spent on religions and financial values properties of households accounted for 5.4% of the variability in the dataset collected from rural Kilimanjaro.A summary of the Spearman Correlation Coefficient (Rho) test shows a positive correlation of frequency of prayer, wealth and charitable giving (Table 11).

Table 11:Results (r values) of correlation of estimated wealth (properties), prayers and charitable giving (p<0.01).

Frequency of prayers	r=0.119
Money spent to support others on religious grounds	r=0.314

Many questions arise out of this association. Do religious people, as indicated by the amount of prayers, are more likely to give than non-religious people? Is charitable giving related to wealth as indicated by financial values of properties of households? Chapter 5 shall examine this kind of association in much detail. Nonetheless, wealth seems to an important variable in rural Kilimanjaro, and perhaps, and important control factor when the role of religion in natural conservation is examined in chapter 7.

Factor 6: Education, small-scale business and prayers

The level of education attained, intensities of prayers and small-scale business accounted for 5.00% of the variability in the dataset collected from rural Kilimanjaro. Successful business might be enhanced by knowledge, attitudes and skills attained through attending formal schooling. This is likely connection between education and contributions of small-scale business in livelihood of the people in rural Kilimanjaro. Because education seems to be an important socio-demographic variable, from the previous section, association of payers and level of education attained shall be considered in chapter 6. The important of prayers as intrinsic religiosity variable was also discussed in previous sub section.

Factor 7: Meeting religious leaders and attending at church services

Frequency of meetings religious leaders and attending at church services accounted for 4.1% of the variability in the dataset from rural Kilimanjaro. This element was discussed in the sub section on religious indicators in the rural Kilimanjaro contexts. It is almost inevitable that rapport between households and religious leaders is mostly established when adherents of a particular faith trait attend worship places. This rapport can extend to meetings outside worship places. Attending church services therefore could be a perfect venue to establish contacts and share views amongst the adherents of specific religious faith. Political leaders and government officials in rural Kilimanjaro use these platforms to meet their constituents, share development and political agenda, and establish affinity with their people.

Factor 8: Ageing, wealth and belief in God

Age of households, estimated monthly incomes and belief in God accounted for 3.5% of the variability in the dataset. The Spearman Correlation Coefficient (Rho) test results show non-significant ($p<0.05$) correlation between these factors. In rural Kilimanjaro, nonetheless, ageing is a reflection of wealth resulting from accumulation of wealth. Old age households also tend to be more religious resulting from death anxiety, as they get closer to biblical estimated dying age of 70 years. Psalm 90:10 says, “The days of our years are threescore years and ten (70 years); and if by reason of strength they be fourscore years (80 years), yet is their strength labour and sorrow; for it is soon cut off, and we fly away.”It is therefore expected that when households get near this age, or above, death anxiety begins to unfold.

Factor 9: Belief in God and frequency of prayers

Belief in God and frequency of prayers accounted for 3.16% of the variability in the dataset from rural Kilimanjaro. Association of belief in God and intensities of prayers has been discussed when indicators of religiosity were described.

Factor 10: Monthly income and formal economic engagement

Monthly income and importance attached to formal employment in rural Kilimanjaro accounted for 3.11% of the variability in the dataset from the rural Kilimanjaro. The ordinal religiosity variables are not associated with variables under this component. Connection of monthly incomes and importance attached to formal employment has been discussed above. Those who are employed in the public or private sector in rural Kilimanjaro receive salaries at the end each month. Perhaps this is the association between monthly incomes of the households and importance attached to formal employment.

Factor 11: Belief in God and health conditions

Belief in God seems to be a very powerful intrinsic religiosity commitment indicator because it "hanged" together with various religiosity and socio-demographic variables. Belief in God and health condition (incidences of heartburn) accounted for 2.80% of the variability in the dataset from rural Kilimanjaro. It is not uncommon for people who are unwell in rural Kilimanjaro to keep mentioning the name of God as a coping strategy or a means to comfort sick people.

5.2.5.2 Consideration of nominal / categorical dataset for analysis

The NGT process helped to identify and show the importance of the core nominal/categorical religiosity, socio-demographic and natural environment variables for analysis of religio-socio-demographic relationships and the role of religion in environmental conservation.

Under socio-demographic variables, gender, occupation, marital status, leadership and influential people were identified and discussed during the NGT process. Data on influential people did not exist in the dataset from Kilimanjaro region. The data on occupation was treated under the results of factor analysis of socio-demographic variables as ordinal data. Other socio-demographic categorical data which is available as part of the dataset from the questionnaire administered in the rural Kilimanjaro, which did not feature during the NGT process, includes ownership of certain properties, decision making in homes of the households and types of houses owned by households in rural Kilimanjaro. Ownership of property and types of house owned by households in rural Kilimanjaro are reflected in and represented by other ordinal wealth data such as estimated values of all property of the households and they will be discussed together during the analysis. Decision making in homes is related to gender and will be discussed together with gender in the chapter on the relationship of religiosity and socio-demography.

Under religiosity variables, the NGT process did not uncover categorical data which was different to the available categorical data in the dataset obtained from the administration of the standard questionnaire. Categorical religiosity data which was collected from the study area includes religious denomination, source of religious identity, types of religious symbols owned by households, description of God, purpose of prayer and power of God to influence global change. Relationship of these categorical religiosity data with socio-demography and natural environment shall be discussed in the following chapters.

There was no categorical data on the natural environment. Questions on listing different species of wildlife (birds, mammals, reptiles and amphibians) and their occurrences in villages, and societal response environmental indicators (environmental policies, bye laws, institutions and projects) did not receive responses mainly due to issues relating to the design and administration of the questionnaires. This aspect shall be covered under the shortcomings of the research at the very end of the document.

5.2.5.3 Criteria for selection of variables for testing research hypothesis

Both the factor analysis and NGT are exploratory procedures (there are no inferential statistics) designed, and are still most appropriate for use in exploring a data set. The question remains: what are the specific variables to use to test the hypotheses based on the initial groupings, in a numerical sense, from the factor analysis? Primary consideration shall be given to the following criteria:

- ☐ Variables which depicted much variability in the dataset under different factors;
- ☐ Specific variables which appeared under many different factors resulting from the factor analysis;
- ☐ Variables commonly and widely used for research on religion, socio-demography and natural environment;
- ☐ Variables which make both conceptual and statistical sense;
- ☐ Natural environment variables which are confirmed to correlate to certain religiosity variables;
- ☐ Socio-demographic variables which are confirmed to correlate to certain religiosity variables; and
- ☐ Nominal/categorical variables which scored the highest during the NGT process.

5.2.5.4 Core religiosity variables for testing research hypotheses

Apparently, related research has rudimentarily focused on the seven dimensions of religious involvement (Yeung & Chan, 2007). They are public religious participation (e.g. church attendance), religious affiliation (e.g. involvement in a religious organisation/denomination), private religious

practices (e.g. prayer and reading religious materials) and religious coping (turning to his/her religion/belief system for assistance), daily religion-related spiritual experiences (e.g. one's subjective perception of the transcendent in daily life), religious commitment (times and resources involved in religious activities and beliefs) and self-rated overall salience of religion (importance of religion in one's life)(Mueller et al., 2001; George et al., 2002). Key religiosity variables found in rural Kilimanjaro did not differ from spiritual commitment indicators used elsewhere.

In summary, and based on factor analysis and NGT results, and found in the seven dimensions of religious involvement used on a global scale, the following five groupings and specific religiosity indicators shall be used to test the relationship of religiosity, human demography and natural environment of the rural Kilimanjaro:

- ☐ Public religious participation (church attendance);
- ☐ Religious affiliation (involvement in a church organisation/denomination);
- ☐ Private religious practices (frequency of prayer and degree of belief in God);
- ☐ Daily religion-related spiritual experiences (frequency of reading religious books); and
- ☐ Religious commitment (money spent to support others on religious grounds per year as a broader proxy indicator for money spent to support church development and activities).

These religiosity indicators accounts for much of the variability in the religiosity dataset from rural Kilimanjaro. They were confirmed by the NGT analysis and widely used globally in research on religiosity and development. These variables also meet several selection criteria outlined above.

Degree of belief in God was patterned with the factor analysis with a number of natural environment variables when the factor analysis was performed. However, Rho test confirmed that correlation with natural environment variables was insignificant at the 0.01 level. This variable also was not shown to be associated with socio-demographic variables, despite the fact that it is a core element of the Abrahamic faith and monotheism.

The amount of money spent by households to support religious institutions and activities and the number of conflicts which were found relating to religious faith showed a huge amount of variability in the religiosity dataset from rural Kilimanjaro. Nonetheless, the two variables showed minimum association with socio-demographic and natural environment indicators. They are also seemed to be proxy and outcome indicators of wealth and degree of belief in God respectively. These two variables should be a focus of future studies on religion and development in rural Kilimanjaro.

5.2.5.5 Core socio-demographic variable for testing research hypothesis

In summary, based on factor analysis and NGT results, the following specific demographic variables will be used to describe religious denomination found in rural Kilimanjaro and test the hypothesis of religion and socio-demography in rural Kilimanjaro in the subsequent chapters:

- ☐ Level of education;
- ☐ Age of household;
- ☐ Gender of household;
- ☐ Wealth in terms of size of land owned by household; and
- ☐ Health conditions in terms of malaria incidences amongst the households.

Age, level of education and wealth in terms of land owned by the households in rural Kilimanjaro and health conditions appeared to pattern with several ordinal variables when the factor analysis was performed. The confirmatory statistical test, Spearman (rho) Correlation Coefficient, also showed correlation of age, education, health and wealth with each other and many other ordinal and continuous variables of the households of rural Kilimanjaro. The NGT process also confirmed that the selected households from rural Kilimanjaro mentioned that gender, education, health, wealth and age provided a significant influence on the livelihood of the people in their areas. Several studies seem to associate wealth, health, age, gender and education with changes in development outcomes in rural areas of Africa. These variables also meet several selection criteria outlined above.

Moral issues such as the household's perceptions and views about homosexuality, extramarital affairs and multiple partnership, divorce, alcohol drinking, atheism and arranged marriage featured prominently under socio-demographic variables but they patterned less with religiosity variables which is a focus of the research. This could possibly be a direction of future studies in rural development.

English, Kiswahili and Chagga language proficiencies patterned with a number of religiosity indicators. Nonetheless, these indicators correlated strongly with level of education, age of households and wealth variables. It seems that languages are proxy and outcome indicators for mainly education, modernity and wealth in rural Kilimanjaro. Kiswahili is also widely used by religions at worship places and all religious texts used in rural Kilimanjaro are in Kiswahili. Subsequently, language proficiency indicators shall be represented by education, age and wealth indicators for analysis in this research.

5.2.5.6 Core natural environment variables for testing research hypothesis

In summary, based on factor analysis and NGT results, the following specific variables will guide discussion on the role of religion in conservation and management of natural environment in rural Kilimanjaro:

- ☐ Water conservation (practices, perception of conditions and the role of religion);
- ☐ Soil and land conservation (practices, perceptions of conditions and the role of religion);
- ☐ Forests (and its products) conservation (practices, perceptions and the role of religion); and
- ☐ Climate (perceptions and the role of religion).

In order to test the hypothesis of relationship of religiosity and environment, the following specific natural environment variables which are shown to pattern and group with religiosity indicators are used:

- ☐ Estimated amount of water used by households a day;
- ☐ Estimated amount of fuel wood used by households a day;
- ☐ Perceptions of households about starting a wildfire;
- ☐ Perceptions of households about water misuse; and
- ☐ Perceptions of households about unselective cutting of forests.

These indicators shall be examined based on core religiosity indicators outlined above, controlling for core socio-demography indicators. Additional religiosity indicators on the frequency of meeting religious leaders of the households in rural Kilimanjaro will be tested against the core environmental variables because it patterned with a number of them resulting from the factor analysis.

Chapter 6: Religious Phenomenology and Human Socio-Demography

6.1 Background

Religion is thought of as having three main functions within rural or countryside societies in Africa. Firstly, religion unifies people by providing shared beliefs, values and norms (DeSpelder & Strickland, 2005). Secondly, religion helps people to deal with issues of life and death by providing a framework as to what kind of life people are supposed to lead and also what happens to them after death (DeSpelder & Strickland, 2005). Thirdly, during times of crisis (e.g. poor health, poor economy) and upheaval, religion has been known to be a provider of emotional and psychological support to people (DeSpelder & Strickland, 2005). Considered as an essential part of human culture, religion is also seen as having the ability to shape an individual's attitudes and beliefs (Emmons, 1999). Religion is therefore seen as playing a significant role in human development.

Religion is broadly defined as a system of faith and worship which consists of a collection of beliefs, practices and values which are based on the teachings of a spiritual leader (The American Heritage Dictionary of the English Language, 2000).The core beliefs, values and practices which strongly define religion in rural Kilimanjaro are public religious participation (attendance at church services), religious affiliation (involvement in a church organisation/denomination), private religious practices (frequency of prayer), daily religion-related spiritual experiences (frequency of reading religious books) and religious commitment (money spent to support others on religious grounds per year).

Chapter Five showed that the Roman Catholic adherents account for the majority (78.3%; N = 360) of the respondents. Due to statistically insignificant numbers of respondents from other religious denominations, data from Roman Catholic respondents is used to test the hypothesis of the relationship of religion phenomena and demographic variables. Therefore out of 360 participants in the study, only data from the Roman Catholic respondents (N = 282) is used, as the remaining participants were affiliated with mixed religions, each with statistically very small numbers of participants. Therefore, before examining relationship of religiosity and socio-demography in subsequent sections, and religiosity and ecology in the subsequent chapter, the Roman Catholic Church in Kilimanjaro is described below in terms of factors influencing spatial growth, distribution, functions and abundance of its adherents. Policy implications regarding the state regulation of religion, religious liberty and church-state relationships are also described. The background will help put into context the analysis of the relationships of the Roman Catholic Church and socio-demography and the Roman Catholic Church and the natural environment.

6.1.1 State policy and legal frameworks guiding the Church

Before examining the Roman Catholic Church in rural Kilimanjaro, it is important to broadly discuss the legal and policy framework guiding religions in Tanzania.

The Constitution of the United Republic of Tanzania (Government of Tanzania, 1977) provides for freedom of religion in Tanzania. The aim of the constitution in the context of religion is to address macro-religion issues of a society as a whole, with the focus on institutional processes and changes such as changes to religious involvement in government and participation in the development of the country.

The constitution respects the rights of Tanzanians to practice religions, within the constraints of the law of the United Republic of Tanzania. It further reiterates that the government does not penalise or discriminate against any individual on the basis of religious belief or practice and it does not designate religion on any records of vital statistics such as the national census and on passports (International Religious Freedom Report, 2007).

Customary or statutory law in both civil and criminal matters governs religions in Tanzania. The law prohibits religious preaching if it incites persons against other religions.

The Government of Tanzania requires that religious organisations register with the Registrar of Societies at the Ministry of Home Affairs, Public Security and Safety. In order to register, religious organisations must have at least ten followers and must provide a constitution, the resumes of their leaders and a letter of recommendation from their district commissioners.

Religious groups are exempt from paying taxes because they are assumed to be non-profit organisations. However, these groups can only order goods internationally without paying duty provided they receive an exemption certificate from the Tanzania Revenue Authority (TRA).

The constitution prohibits preaching or distribution of materials that are considered inflammatory and represent a threat to public order. The government has banned religious organisations from involvement in politics, and politicians are banned from using language intended to incite one religious group against another or to encourage religious groups to vote for certain political parties. The law imposes fines and jail time on political parties that campaign in houses of worship or educational facilities. Increasingly, religious leaders have commented on issues relating to governments such as grand corruption and mismanagement of the country's economy. Momen

(1999) suggests that when religious groups become increasingly concerned with the things of this world rather than the spiritual world, it is an indicator of secularisation in a country. If unchecked, these comments can potentially cause conflict between the state and religions and between citizens who adhere to different faith groups. In other words, conceptually though not constitutionally, the gap between religion and state is narrowing as a result of perceived mismanagement of the country's economy. Islam has always been part of the state in Zanzibar and there has always been debate in the mainland regarding a review of the constitution to make Islam part of the state. The National Muslim Council of Tanzania ceased being an official part of the Government of the United Republic of Tanzania in 1994. This move upholds the constitution which clearly states that it does not support any official state religion.

Although perceived religious favouritism is not an issue in Tanzania, there are increasing public discussions on balancing government benefits among the country's religious communities. There is no evidence for the Tanzanian government to use the constitution or law to implement secularisation theory or a religion market model to regulate and influence activities of religions or religiosity in the country. Efforts by the government to equalise or to ensure equity of religions or religiosity in Tanzania are not based on the constitution or existing laws.

Religions and religiosity may be taught in public schools in the form of a class on religion, but they are not part of the Tanzania national curriculum. Such classes are generally taught on an ad hoc basis by parents or other volunteers, but must be approved by the schools administration and/or parent-teacher associations. Therefore, neither the constitution nor the laws prohibit teaching of religious lessons in school. Many private schools and universities are associated with Christian church groups. The National Muslim Council of Tanzania maintains an Islamic university in Morogoro and numerous Islamic schools in Zanzibar. Private religious schools usually make religious classes compulsory for all their students (International Religious Freedom Report, 2007).

The Government officially recognises eight days for religious holidays, equally divided between Christian and Muslim celebrations. Two days for Christmas, two days for Easter, two days for the Muslim holiday of Eid-el-Fitr, one day for the Muslim holiday of Eid-el-Haj and one day for the Muslim holiday of Maulid). Holidays for other religions are not officially recognised.

There is a non-governmental interdenominational religious council that meets periodically to discuss issues of mutual interest amongst the major faith groups of Tanzania. The constitution does not prohibit such initiatives in Tanzania. The Roman Catholic Church operates within these policies and legal constraints in Tanzania.

6.1.2 History of the Church in Rural Kilimanjaro

Roman Catholic Church adherents formed the dominant faith group in the study areas. The Roman Catholic Church is possibly one of the oldest institutions in the world. It can trace its history back almost two thousand years. Christianity and Catholicism were separated first by the Orthodox Church in the eleventh century and later by Protestant churches in the sixteenth century. Today there are almost two billion Catholics across the world (Catholic Education Resource Center, 2011). This section describes the Church's history at the meso-organisational (middle) level that focuses on changes in Church organisations and practices in rural Kilimanjaro over the years.

The history of the Roman Catholic Church in Kilimanjaro (and Tanganyika, then Tanzania after 26 April 1964) dates back to the fourteenth century. Catholicism was introduced by Portuguese Augustinian missionaries who arrived with Vasco Da Gama along the coast of East Africa at Zanzibar in 1499 (Kilaini, 1995). The Roman Catholic presence did not last long due to the huge Arab Moslem trade and commercial influences and opposition by Islam on the Tanzanian coastal mainland (Tanganyika), particularly in Zanzibar (Kilaini, 1995). Therefore, the Portuguese mission was short-lived and ended when the Arabs from Oman conquered Zanzibar in 1698 (Kilaini, 1995).

The second, and successful, Roman Catholic evangelisation was in the nineteenth century. This second conquest was pioneered by three religious congregations, the Holy Ghost Fathers, the White Fathers and the Benedictine monks, who arrived in Zanzibar in 1863 (Kilaini, 1995). The missionaries had joined forces with the European powers to fight the slave trade that was carried out by Arabs, and this eased the introduction of Catholicism. In 1868 they crossed to Tanganyika from Zanzibar and opened villages in Bagamoyo to keep slaves who were freed from Arab slave camps by British marines (Kilaini, 1995). In 1878, with the help of catechists trained in so called "slave" villages, two groups of missionaries moved to Western Tanganyika along the shores of Lake Tanganyika and another group moved to around Lake Victoria. The two evangelised all the western parts of Tanganyika and the neighbouring countries of Rwanda, Burundi, Uganda and the Eastern Democratic Republic of Congo.

In 1887, the Benedictine Missionary Monks of St. Ottilien landed in Dar es Salaam. From Dar es Salaam, Benedictine Missionary Monks of St. Ottilien evangelised southward to Ruvuma River on the border with Mozambique (Kilaini, 1995). Their two ministries of Ndanda and Peramiho became centres of the Catholic Church development in the southern parts of Tanganyika (Kilaini, 1995).

In Kilimanjaro, the Roman Catholic Church started in 1890, when the French missionaries of the Holy Ghost Congregation arrived at Kilema (Catholic Church of Moshi, 1990). From Kilema, they set up two central stations, one at Kibosho in 1893 and the other at Mkuu-Rombo in 1989 (Catholic Church of Moshi, 1990). The three stations were built as centres for evangelising the three natural regions of Rombo, Vunjo and Hai, which further grew to the Catholic diocese of Moshi. Before the arrival of the Roman Catholic missionaries in rural Kilimanjaro, in 1885, the Church Mission Society (CMS) of the German Lutheran Church, the main Protestant group, headed by the German explorer Johann Rebman and Ludwig Krapt, had already established Lutheran churches in these areas. By 1892, the CMS handed over their Lutheran work to the Leipzig Society. In order to avoid inter-faith conflicts, the German colonial government set boundaries to separate Catholicism and Lutheranism in rural Kilimanjaro (Father Kimario, 2012; personal communication). The Sanya Juu-Machame, Old Moshi, and Mwika-Marangu areas were allocated to the Lutheran Church whilst Uru-Mweka-Sungu, Kirua-Kilema and Rombo were set aside for the Roman Catholic Church. The Roman Catholic Church also avoided areas where the Lutheran Church had already settled (Catholic Church of Moshi, 1990).

Another obstacle that slowed the establishment of the Roman Catholic Church in rural Kilimanjaro was the strong traditional leaderships composed of chiefs (Catholic Church of Moshi, 1990). The Roman Catholic Church had to go through the German administration as well in order to reach the local leadership and finally the local people. Through inculcating traditional values into the Catholic system, working with powerful chiefs such as Sina of Kibosho, Horombo of Keni (Rombo), Rindi of Moshi (alias Mandara) and Marealle I of Marangu, the Roman Catholic Church finally and slowly managed to enter into the deep parts of Kilimanjaro (Catholic Church of Moshi, 1990). The wars between the chiefdoms partly slowed the infiltration of the Roman Catholic Church into rural Kilimanjaro. Infiltration was finally assisted by the end of the German administration in around 1919 and the arrival of the English speaking Holy Ghost Fathers in 1922. The German administration lasted between 1884 (after the Berlin Conference) and 1919. Under the League of Nations, Tanganyika was declared a British colony until independence in 1961.

6.1.3 Relationship of the Church with the State

The Roman Catholic Church has always enjoyed a relationship with German and British colonial states during colonialism as well as with independent Tanganyika and later Tanzania. However, the growth of the Roman Catholic Church was adversely affected by the Arusha declaration, an African socialism policy called “ujamaa”, in 1967. From the start of evangelisation, the missionaries insisted on both educational and health programs.

In 1968, when the Church was celebrating its first centenary of evangelisation to Tanzania, it was running 1,378 primary schools, 44 secondary schools, eight teacher training colleges, 15 trade schools and 48 home craft centres country-wide. The Church then had 25 hospitals, 75 dispensaries, 74 maternity clinics and 11 medical training schools. After the Arusha declaration in 1967, all Roman Catholic owned hospitals and schools were confiscated by the state and they became state properties in 1970. The "ujamaa" policy did not change the functions and the roles of those institutions. However, the health and educational institutions were no longer used as means by which to convert people to Catholicism, but played a key role of supporting the government in its efforts to enhance unity amongst Tanzanians and socio-economic development. From the perspective of the Church, evangelisation was the primary goal, and the number of converts baptised was the measure and objectively verifiable indicator of its success. Socio-economic support was the secondary purpose of the Church that helped to increase the number of people converted to Catholicism making the Roman Catholic the most successful religion, in terms of numbers, in the rural Mount Kilimanjaro areas.

After 1992, after the Zanzibar declaration where socialism was partly abandoned by the ruling "Chama Cha Mapinduzi" (CCM) party, the government returned some of the schools and hospitals to the Roman Catholic Church and the Church continued to build more schools and hospitals. By the year 1993, the Church had 413 kindergartens, 82 secondary schools (including 23 junior seminaries), 73 technical and vocational schools, 48 home craft centres for girls, two teacher training Colleges and six schools for the handicapped. In the medical sector the Church runs 36 hospitals, including a 850-bed consultant hospital in Bugando in Mwanza and 223 heath centres and dispensaries. Today the Catholic diocese of Moshi owns more than 300 colleges and more than 250 secondary schools (Father Kimario 2012: personal communication).

6.1.4 Organisation and administration of the Church

The Roman Catholic Church in Tanzania is part of the worldwide Roman Catholic Church, under the spiritual leadership of the Pope and curia in Rome. There is a hierarchical structure of clergy (bishops, archbishops and cardinals) that leads in a pyramid to the Pope at the top. There is an estimated nine million followers of the Roman Catholic Church in the country, about a quarter of the total population of Tanzania. There are thirty-one dioceses, including five archdioceses. The archdioceses include the Ecclesiastical Province of Arusha, the Ecclesiastical Province of Dar Es Salaam, the Ecclesiastical Province of Mwanza, the Ecclesiastical Province Songea and the Ecclesiastical Province Tabora.

Chapter 6: Religious Phenomenology and Human Socio-Demography

The Ecclesiastical Province of Arusha is responsible for the spread of evangelism in the study areas through Catholic Diocese of Moshi. Moshi diocese is situated at the foot of Mount Kilimanjaro. The Catholic diocese of Moshi has a population of 1,334,177: 704,910 are Catholic, 305,803 Lutheran, 5,352 Anglican, 7,682 Pentecostal, 72,055 Muslim and 10,433 belong to indigenous religions (Catholic Church of Moshi, 1990). Atheists and new emerging faith groups exist in minimal numbers.

By October 2009, the diocese had forty-nine parishes, and twenty-five substations (Diocese of Moshi Strategic Plan, 2011). It also had two catechetical training centres, twenty religious formation houses, one major seminary and three minor seminaries. In addition, there was a variety of pastoral programs being implemented (Diocese of Moshi Strategic Plan, 2011). Evangelisation needs human resources. By October 2009, the diocese had 168 priests, 62 men religious and 680 women religious, and 246 Catechists (Diocese of Moshi Strategic Plan, 2011).

The table 12 provides a summary of health, education and environmental facilities reported to be owned by the Roman Catholic Church in the research sites.

Table 12: Catholic Church Investments in the study area

	Colleges and Universities	Secondary Schools	Number of churches	Health centres	Primary schools	Other
Mweka	0	1	1	0	0	1 nursery school
Sungu	1 vocational training	1	1	1 hospital	0	0
Ruwa	0	0	1	0	0	0
Lerang'wa	0	0	2	1 hospital	0	1 nursery school, 1 tree planting project
Shimbi	0	0	1	0	0	Tree planting under Father Ladislaus
Arisi	0	0	0	0	0	0

The research also examined the organisation and impact of almost 121 years of existence in rural Kilimanjaro. This raised two core research questions:

- Whether existing eco-religio and socio-demographic tendencies and worldviews (perceptions, attitudes, beliefs) of the households reported to adhere to the Roman Catholic Church are a reflection of the impact of the Church; and
- Whether existing eco-religio and socio-demographic tendencies (behaviour and practices) are a reflection of the impact of the Church.

Chapter 6: Religious Phenomenology and Human Socio-Demography

Based on factor analysis and NGT results in the previous chapter, and found on the seven dimensions of religious involvement used on a global scale, the following five groupings and specific religiosity indicators will be used to test the relationship of religiosity, human demography and the natural environment of the rural Kilimanjaro:

- ☐ Church attendance;
- ☐ Religious affiliation;
- ☐ Frequency of prayer and degree of belief in God;
- ☐ Frequency of reading religious books; and
- ☐ Religious commitment (for example, money spent to support others on religious grounds).

Initial results show that a majority (98.2%) of households (N=282) who reported adherence to Roman Catholic dogma believed that one God exists. Typically this is the view of the followers of Abrahamic faiths who believe in monotheism which also conforms to one key Catholicism doctrine of a triune God, consisting of God the Father, Jesus the Son, and the Holy Ghost. Subsequently, the majority (98.2%) strongly believed that one God exists, 0.8% reported to believe in God some of the time when they face life challenges and 0.7% reported that they did not believe in existence of God. A majority (54.3%) believed that God is non-physical like wind and could not easily be described using human examples. Some of them (37.9%) believed that God is physical and human-like. Very few (7.1%) did not want to respond to this perceived sensitive question and only 0.4% described God as black in colour. Apart from believing in God, which is a principal of Abrahamic faiths, the households who reported to adherence to Roman Catholic doctrine also believed in the existence of ghosts (55.7%), hell (70.2%) and Satan (83.7%).

When asked about prayer, church attendance and reading religious texts, the majority (63.8%) reported they prayed many times daily while 11.0% prayed once each day before sleeping, 22.3% reported praying once each week and 2.8% reported not being involved in prayer at all. Between 79.1%-82% of households reported that they attended weekly church services, where they also met religions leaders. The majority (81.9%) reported that they read a Bible or other religious text either daily or once a week. The majority (81.9%) owned a Bible and less than 5% owned books other than a Bible.

A majority (81.6%) of the households reported that they inherited the Roman Catholic denomination from their parents, spouses (0.7%), religious leaders (1.4%) and from other sources (16.0%). The Roman Catholic Church adherents interviewed also had their spouses (94.0%), best friends (91.8%) and persons they disliked most (94%) belonging to Catholicism.

When asked about the estimated amount of money spent to support other people on religious grounds, the majority (56.7%) reported spending between TShs 0.1 and 30,000 each year. Some households (23.05%) that reported adherence to Roman Catholicism spent nothing in one year, whilst 12.7% reported spending between TShs 30,000 and 7.4% spent more than TShs 60,000 to support other people, not on humanitarian but on religious grounds.

The next section and subsequent chapter will examine the relationships of religiosity resulting from investments of time, human and capital resources of the Church in these areas, worldviews on various issues held by households, and religious and other tendencies of the households who reported to adhere to the Roman Catholic Church doctrine. The impacts, and association, of religious faith, beliefs, and practices on human development and natural environment shall also be examined. Core human demographic phenomena which are considered to be the most important for development in rural Kilimanjaro are level of education, wealth, health, age, and gender. These variables are thought to significantly influence human development in the majority of rural parts of sub-Saharan Africa.

A thorough search through various libraries and databases yielded unsatisfactory results, as studies comparing degree of religiosity phenomenology and human demographic variables in rural Africa are scarce. Thus it appears that whether the degree of religiosity differs with core human demographic variables of level of education, age, gender, wealth, and health is worth exploring further. Therefore this section tests the hypothesis that there are significant relationships between demographic variables (gender, age, education and wealth) and church commitment amongst the people of rural Kilimanjaro. Specific hypotheses are presented at each sub chapter describing the demographic variables of rural Kilimanjaro.

6.2 Data Analysis Techniques

Both nominal (categorical labels) and ordinal (which enable ranking) data on spiritual commitment and demography was collected and stored through the use of SPSS Version 18. The combinations of categorical data, nominal and ordinal, were used to explain different aspects of the main faith groups in rural Kilimanjaro. Generally, the statistical methods used to analyse categorical data are frequencies (Giuliano & Polanowicz, 2008). Subsequently the frequency tables and graphs (descriptive statistics) were used to represent an overview of the number of adherents of the main faith groups, and the key aspects which distinguish them. On an ordinal scale, a central tendency of a group can be described by a mode (i.e. the most common item) or median (the middle-ranked item). Given a set of categories of, say, religion and its adherents, sets of the most common religions and religiosity variables were summarised and outlined using descriptive statistics.

Chapter 6: Religious Phenomenology and Human Socio-Demography

In Chapter Five, factor analysis and NGT were used to select religiosity and demographic data which showed the strongest variability amongst the data collected during the study. The beliefs, values and practices which strongly defined religiosity in rural Kilimanjaro are church attendance, religious denomination, frequency of prayer, frequency of reading religious books and money spent to support others on religious grounds per annum. Because of the choice of one denomination, namely those who were affiliated to the Roman Catholic Church, the remaining four variables (church attendance, reading religious texts, prayers, and support on religious groups) were used to test the hypothesis that there is a significant relationship between the level of religiosity and key demographic characteristics amongst the people of rural Kilimanjaro. Factor analysis and NGT identified levels of education, age, gender, estimated wealth and disease prevalence as core phenomena which described human demography in rural Kilimanjaro.

All the remaining four religiosity variables used for analysis were on ordinal scales. The human demographic variables were of mixed nature. The gender of respondents was a nominal scale whilst age and wealth were interval scaled data. The level of education and health variables were on ordinal scales. The nature and types of data determined the choice of statistics used to analyse the relationships of religiosity phenomenology and human demographic variables.

Spearman's Rank-Difference Correlation Coefficient was used to ascertain relationships between ordinal (dependent variables) and ordinal (independent variables) data i.e. religiosity (church service attendance, number of prayers, religious book reading and money spent to support others) and level of education, wealth and health of individuals in rural Kilimanjaro. Spearman's Rank-Difference Coefficient of Correlation is a nonparametric test for determining if there is an association between phenomena (Acton & Miller, 2009). The negative (- or decrease) and positive (+ or increase) signs in correlation were used to suggest direction and strength, but not cause-effect relationships.

Pearson's Product Moment Correlation Coefficient was used to test relationships between ordinal (dependent variables) and interval (independent variable) scales, i.e. frequency of prayers and age of respondents. It is the most widely-used type of correlation coefficient (Pearson, 1896) and is also called *Pearson's r*, *linear* or *product-moment* correlation.

A multivariate Pearson Chi-Square test of Independence was deployed to uncover associations of specific socio-demographic variables and religiosity, controlling for other specific socio-economic variables.

Interpretation of strengths and direction of correlation coefficients (r values) was according to Cohen (1988) (Table 13).

Table 13: Interpretation of r values based on Cohen (1988)

Correlation (r values)	Negative	Positive
None (very weak)	−0.09 to 0.0	0.0 to 0.09
Small (weak)	−0.3 to −0.1	0.1 to 0.3
Medium (strong)	−0.5 to −0.3	0.3 to 0.5
Large (very strong)	−1.0 to −0.5	0.5 to 1.0

Since the correlation coefficient reduces all the information contained in the scatter plot into a single number, it is a very efficient and powerful statistic for describing the relationships, although not enough to describe cause-effect relationships between religiosity and human demography. In other words, both correlation coefficients did not show whether religions or religiosity caused demographic changes and vice versa. They show whether a relationship exists and, if so, whether it is a positive or a negative relationship and whether it is a strong or a weak relationship.

The degree of freedom tables were also used to ascertain the correlation of religio-socio-demography connections. When the correlation coefficient is equal to or larger than the critical value from degree of freedom table, it was then confirmed “statistically significant”.

An independent sample t-test was conducted to ascertain the differences between categorical data on ordinal (dependent variables) and nominal (independent variables) scales, i.e. religiosity and the gender of respondents belonging to the Roman Catholic Church.

6.3 Results and Discussion: Religiosity and Human Demographics

This chapter responds to the hypothesis that there is a significant relationship between the level of key spiritual commitment and key demographic characteristics amongst the people of rural Kilimanjaro. The study may have policy implications when it comes to questions like whether the government should exempt religious groups from equality legislation or go as far as contracting public services to religious organisations. These are all current issues and examples of the privileging of religions in Tanzania which need to be re-examined. Questions on whether or not the Tanzanian government should include religiosity data on vital human development surveys and statistics are yet to be answered, because the relationship of religiosity and human development is unknown in rural Tanzania.

The study focuses at the micro-religiosity level, the level where the focus is on individual religious belief, practices and behaviour to draws wider conclusions on religiosity and socio-demography in rural Kilimanjaro. .

6.3.1 Religious phenomenology and education attainment

There are many different views on the relationship between religiosity and level of education. Education equals time and capital (takes money to educate). Religion can also be inversely proportional to time and capital.

Conventional theories on why religion varies from place to place claim either that modernisation leads to loss of faith or states that interfere with religion actually make people disenchanted with it or adhere to it. Is this true in the context of rural Tanzania? Does awareness through an increased level of education lead to loss of religiosity and vice versa? This section examines whether the level of education correlates to the degree of spiritual commitment of the peoples of rural Kilimanjaro. Subsequent chapter, chapter 7, examines eco-religion connections, controlling for the level of education of the households of the rural people. Understanding of correlation of religion phenomena and education attainment might perhaps help promote environmental ethical behaviours and perceptions in rural Kilimanjaro.

The government of Tanzania puts education central to its development philosophy and key to attaining the Millennium Development Goals (MDGs). It also promotes education at all levels as one of the most powerful instruments for reducing poverty and inequality and promotes equity and sustainable human development. Education is at the centre of the National Strategy for Growth and Reduction of Poverty of Tanzania with the aim of ensuring equitable access to quality primary and secondary education for boys and girls, universal literacy among women and men and the expansion of higher, technical and vocation education. Due to these efforts, the net enrolment rate (NER) in primary schools in Tanzania has improved considerably over the few years, going from 58.6% in 2000 to 96.1% in 2006 (Government of Tanzania, 2000).

While 96% of Tanzanians enrol in primary schools, only 4% of Tanzanians are enrolled in secondary schools or go beyond secondary school education (Government of Tanzania, 2000). In Tanzania, primary school education has been compulsory since independence in 1961. Therefore all Roman Catholics respondents had completed basic education, primary school education, and figures are higher compared to the national average (Figure 19).

Other levels of education, from lowest to highest, that were found in the study areas include Ordinary Level Secondary School Certificate ("O" level), Advanced Level Secondary School Certificate ("A" level), tertiary level (Colleges-Technician Certificate/Diplomas) and the university level of education. "O" and "A" levels graduates could join tertiary education or colleges for the Technician Certificate or Ordinary Diploma training programs. Vocational training is designed for the provision of livelihood skills for those who have completed primary school or secondary school education level.

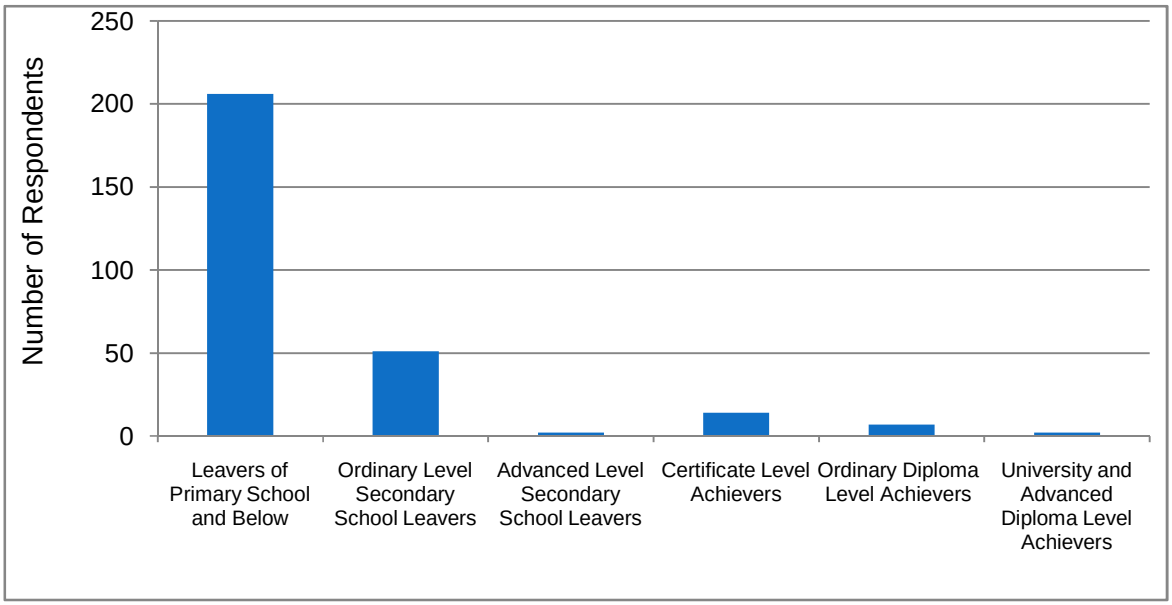

Figure 19: Education attainment of Roman Catholic Church adherents in Rural Kilimanjaro

A number of studies have been undertaken to examine the relationships of education attainment and religiosity, and some studies have explored the relationship of religiosity to issues such as intelligence, age, gender, health and wealth. In the United States and Australia, education attainment has been compared with religious behaviour in urban areas (Kaldor, 1987; Australian Social Trends, 2004; Gallup Organization, 2006; Barro & Hwang, 2007). During the literature search, no study was found to correlate religiosity and education attainment in rural Africa. Therefore this study tests the hypothesis that there is a significant relationship between the degree of religiosity and education attainment amongst the people of rural Kilimanjaro.

Results from the Spearman's Rank Correlation Coefficient test showed no significant correlation between reading religious books, prayer and money spent to support on religious grounds and educational attainment of Roman Catholic adherents in rural Kilimanjaro. Results, nonetheless, show that church attendance was negatively, and very weakly but nevertheless significantly, correlated to educational achievement ($N = 282$; $r=-0.130$; $p<0.05$) of adherents of the Roman Catholic Church in rural Kilimanjaro i.e. there is a weak negative correlation between the level of education and attendance of religious services by the Roman Catholic Church adherents of rural Kilimanjaro.

The study also postulated that there could be differences in the degree of religiosity between the villages which could also be manifested in spatial education patterns of the Roman Catholic adherents of the rural Kilimanjaro. Subsequently when village specific data were examined, the Spearman's Rank Correlation Coefficient test results show no correlation between the frequency of prayers and education attainment of Roman Catholic adherents of the rural Kilimanjaro.

Negative correlations between church attendance and level of education were found for the Roman Catholics of Sungu village ($N = 58$; $r = -0.310$; $p<0.05$) and the Roman Catholics of Mweka village ($N = 55$; $r = -0.275$; $p<0.05$). It was also found that the more often people attend church, the less likely they are to believe in the concept of evolution in the United States (Gallup Organization, 2009)(Table 14). Evolutionary concepts defy the core belief of the Abrahamic faith adherents of creation and the existence of a supernatural being.

Table 14: Frequency of church attendance compared to belief in evolution (Gallup Organization, 2009)

	Believe	No belief	No opinion
Weekly	24	41	35
Near weekly/monthly	30	26	44
Seldom/never	55	11	34

Mweka and Sungu are the only villages which were studied and are contiguous. It was therefore expected to find that respondents share a majority of religious and demographic ideals and values. Almost one third of the residents of Mweka and Sungu villages had formal employment with the government, church or private institutions. These residents are employees of Kibosho Hospital, the College of African Wildlife Management, Stephano Moshi Memorial University College, the Kilimanjaro Plantation Limited and the ten secondary schools in these two villages. Access to these two villages from urban Moshi is easy and distance is shorter (8 km) compared to the remaining four villages. The major ascent routes of tourists from the Kilimanjaro National Park pass through the Mweka village (TANAPA, 2006). Tourists, tour guides and porters spend a few hours in the village before they move to Moshi town. The majority of youths (attained secondary schools and colleges) in these villages are connected to the tourism business, which keeps them busy throughout the week, including Sundays.

Sungu had the minimum proportion of primary school leavers (55.2%) compared to the average (73.0%), and Ruwa (71.2%), Arisi (75.0%), Shimbi (76.0%), Mweka (78.2%) and Lerang'wa (93.3%). This might have made the differences of behaviour of educated people more noticeable in Sungu. The influence of educational attainment of the people of Sungu village might have spread to the neighbouring Mweka village, thus we see similar religiosity-education connections.

The differences between villages in the impact of education on religious belief can explain the large cross-village variation in education-religion connections. These cross-village differences in the education-belief relationship could possibly be explained by local socio-economic and geo-political factors. Mweka and Sungu villages had more primary and secondary schools and colleges compared with the other four villages studied (see table 15).

There is a strong relationship between education level and belief in evolution, as an indicator of religiosity elsewhere.

Table 15: Educational level compared to belief in evolution (Gallup Organization, 2009)

	Believe	No belief	No opinion
High school or Less	21	27	52
Some college	41	29	30
College graduate	53	22	26
Postgraduate	74	11	16

Just about all the studies that could be found regarding this subject show that there is a strong positive correlation between the level of education and atheism/agnosticism, while there is a strong negative correlation between the level of education and belief in a religion (Finnerty, 2007). Many studies on the subject of level of education versus belief in religion have occurred and the results consistently show that as educational levels decrease, so unquestioned belief in religion increases (Bagnall, 2010). In the United States, religious attendance declines sharply with education across denominations (Sacerdote & Glaeser, 2001). The negative effect of education on religious belief causes more educated individuals to sort into less fervent religions, which explains the negative relationship between education and religion across denominations (Kaldor, 1987).

The 1998 wave of the International Social Survey Program dataset were used in Spain. Through PCA, two indexes (practice and religious beliefs) were used as dependent variables in several estimations with demographics as exogenous determinants. Education was found to be negatively correlated with religiosity (Branas-Garza & Neuman, 2004).

Nonetheless positive correlations have also been revealed. Studies of Mormons in the United States show that those with higher education attend church more regularly than uneducated Mormons. Survey research indicated that 41% of Mormons with only elementary school education attend church regularly. By contrast, 76% of Mormon college graduates attend church regularly and 78% of Mormons who went beyond their college degrees to do graduate study attend church regularly (Kaldor, 1987).

In Australia, 23% of Christian church attendees have earned a university or postgraduate degree, whereas the figure for the general population is 13%. Christianity is the predominant religion in Australia, although adherence is falling (Australian Social Trends, 2004; Kaldor, 1987). Commentators on the survey attribute the educational levels to sociological factors, such as age, class and income, making no claims about intelligence (Kaldor, 1987).

Positive relationships exist between the amount of money spent by Roman Catholics of Sungu village to support others on a religious basis and level of education ($N = 58$; $r=0.306$; $p<0.05$) and the positive relationship between amount of money spent by Roman Catholics of Mweka village to support others on the basis of religion and education attainment ($N = 55$; $r = 0.386$; $p<0.05$). In other words, more educated people (which in turn probably relates to better paid jobs) gave more financial support to other people on the basis of religion compared with less educated adherents of the Roman Catholic in these villages. It is obvious that what limits church contribution is amount of financial possessions. Church adherents with more resources will definitely give more support to others, driven by religious faith philosophies and commitments. In this study also, a correlation between wealth and level of education was revealed amongst adherents of the Roman Catholic Church. Results also revealed a weak correlation between education and wealth, i.e. the level of education of Catholics weakly but positively correlated to levels of monthly incomes ($N = 282$; $r = 0.267$; $p<0.001$) of the Roman Catholics of rural Kilimanjaro. Perhaps this suggests that supporting other people is a function of education and wealth than religiosity.

The village specific results also indicate a weak positive correlation of frequency of reading religious books and level of education attained by Roman Catholic adherents of Lerang'wa village ($N = 30$; $r = 0.278$; $p<0.05$). In the United States, data from the PEW survey indicates that educational attainment, how much schooling an individual has completed, is the single best predictor of religious knowledge (The PEW Forum, 2008).

However, a larger sample size helps to reduce the chance of a coincidental correlation. There is therefore a need to re-test these correlations of level of education and supporting people on religious basis and correlation of level of education and frequency of reading religions books, and level of education and attitudes to give support on religious grounds by increasing sample sizes within villages.

The negative correlation of education and religiosity could mean that religiosity in rural Kilimanjaro might influence more educated individuals to become less enthusiastic about their religions. The positive correlation of level of education explains the positive education-religion connection, where religiosity increases with increased levels of education in rural Kilimanjaro. The minor cross-village differences in the education-religiosity relationship revealed in the rural Kilimanjaro study could be explained by variables such as socio-economic, physical characteristics and geo-political factors which interplay to discredit or support religion in various ways.

6.3.2 Religious phenomenology and ageing

This sub chapter examines whether religiosity of the people of rural Kilimanjaro changes with the changing social, psychological and biological aspects of aging. In other words, the study investigates the effects of an ageing population on the religiosity of the people of the study area. Does religiosity increase with age and proximity to death? What, precisely, are the spiritual needs of older individuals and how do they differ from the spiritual needs of other age groups? To what extent does religion assist individuals in coping with the challenges of advanced age? What difference does it make how religious individuals are in old age? Such questions have preoccupied gerontologists since the founding of their discipline and continue to trouble researchers in religiosity and human demography. The study examines correlation of religiosity and age in order to scrutinize the association of religiosity and environmental behaviours and perceptions and the use of natural environment resources in chapter 7, which are controlling for ageing.

Answers to these questions, information and knowledge from this study, could be applied to human development policies and programmes, including the macroscopic (for example government rural planning) and microscopic (for example building nursing homes, review school and church curricula etc) perspectives. Demographic data of this kind can also contribute greatly to an understanding of the current religious picture of rural Kilimanjaro and address deeper questions of why a certain age groups are more or less attracted to religion. This will help answer key questions like what, precisely, are the spiritual needs of older individuals and how do they differ from the spiritual needs of other age groups, and to what extent does religion assist individuals in coping with the challenges of advanced age. Questions like is there any relationship between religiousness and gerontocracy could also be revealed by studies on relationship of religious phenomenology and age.

The study tests the hypothesis that there is significant correlation between the level of religiosity and age of the people of rural Kilimanjaro.

The Pearson's Product Moment Correlation Coefficient was used to test relationships between ordinal (dependent variables) and ratio (independent variable) data e.g. frequency of prayers and age of respondents. The trendline equation coefficients were used to confirm the correlation of religiosity and age or lack thereof.

Results from the Pearson Correlation Coefficient test show no correlation between religiosity variables (church attendance, frequency of reading bible and support on a religious basis) and ages of respondents. Nonetheless, results show that frequency of prayer positively but weakly correlated to age of respondents from the Roman Catholic community in rural Kilimanjaro ($N = 282$; $r=0.147$, $p<0.014$).

Typically, using trendline equation coefficients results indicate that Roman Catholic respondents tend to reduce the amount of weekly prayers ($y = -3.8514x + 32.98$; $R^2 = 0.5623$) and increase the amount of prayers daily as they grow old ($y = 3.9x + 53.067$; $R^2 = 0.489$) (Figure20).

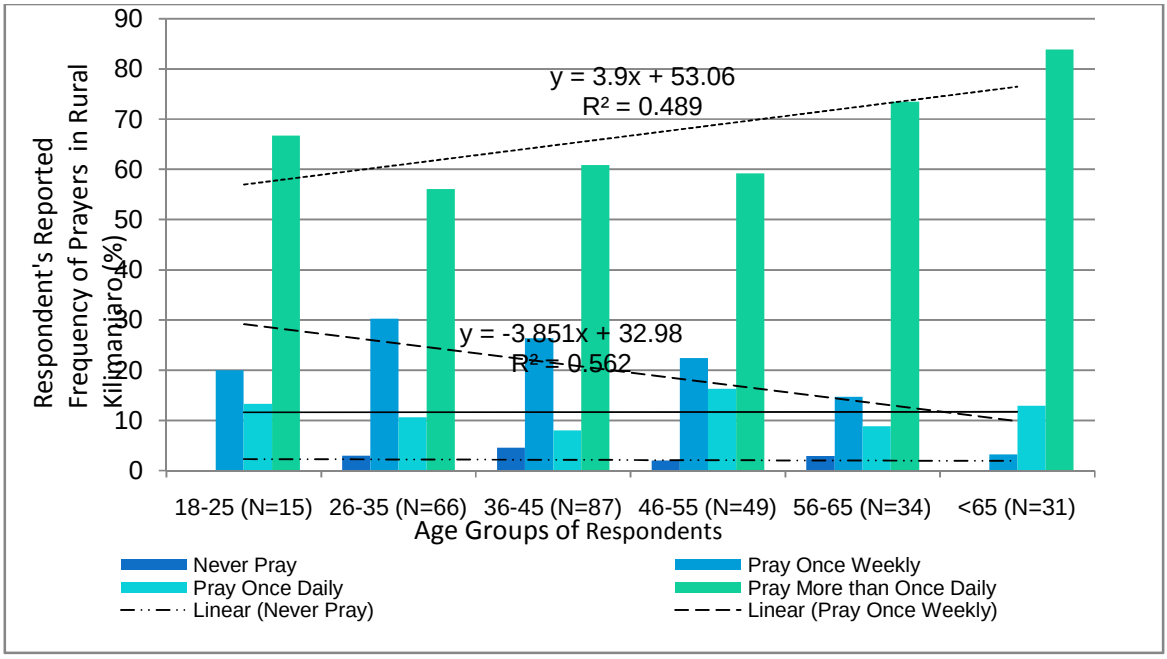

Figure 20: Ageing and prayers

Results also show that all young (<25 years) and all old (>65 years) households affiliated to the Roman Catholic Church in the rural Kilimanjaro pray at least once each day and a good proportion of them (75.3%) pray many times each day compared to middle aged groups (26-65 years) where some of them pray a few days each week and the proportion of those praying more than once daily is lower (62.4%) compared to the proportion of very young and very old.

The study also postulated that there are could be differences in degrees of religiosity between the villages which are also manifested in spatial aging patterns of the respondents. Subsequently, when village specific data was examined, the Pearson Correlation Coefficient test results showed correlations of all religiosity variables and age of respondents are insignificant at 0.05, except for the Mweka village data. Results from Mweka village indicate that correlation of frequency of prayers was significant but positively and weakly correlated to elderliness ($N = 55$; $r = 0.287$; $p<0.033$) (Table 16).

Table 16: Results (r values) for Mweka village data (N=55; p<0.05)

	Frequency of reading religious texts	Frequency of attending religious services	Frequency of prayers	Money spent to support others on religious grounds	Belief in God
r values	-0.120	0.010	0.287	0.253	0.231
P values	0.384	0.945	0.033	0.062	0.071

Similar studies show that the likelihood of retaining religious attitudes and behaviour does increase dramatically with age. Recent polls conducted by the Gallup Organization (2006) as well as the Pew Forum on Religion & Public Life "U.S. Religious Landscape Survey" (2008; hereafter "Pew Survey") have shown that older Americans are more likely to self-identify with, and belong to, an organised religious tradition. It is also true that older Americans are much more likely than younger Americans to say that religion is very important in their lives (Gallup Organization, 2006).

The 1973-98 General Social Surveys conducted by the National Opinion Research Center indicates a consistent increase in the percentage of Americans reporting to be "very religious" by age (Figure 21).

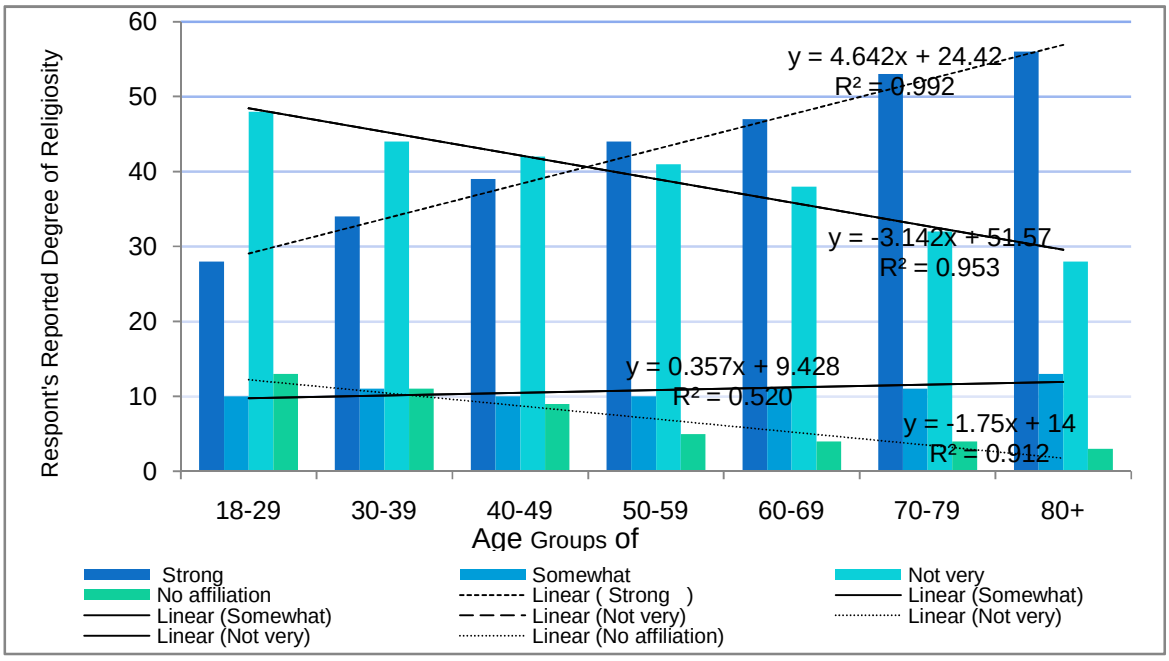

Figure 21: Religiosity and ageing

Literature review section of the thesis shows that the survey commissioned by the Bible Society (Bible Engagement) of New Zealand asked the question, would you describe yourself as a Christian? Results indicated that those respondents of the questionnaire were prepared to affiliate more with Christian religion as they grew older (Bible Society of New Zealand, 2008).

There are multiple ways to interpret these results. The significantly higher importance placed on religiosity through number of prayers by older respondents may be due to increased need for consolation and comfort brought on by life's difficulties and the reality of death (for themselves and loved ones) (Gallup Organization, 2006). Imamura (2009) found that Japanese elders' religiosity related to greater chronic health issues, depressive symptoms, health satisfaction, social support and healthy behaviour. Other researchers argue that religion acts as a comforter to individuals who are going through tough times (Malinowski, 1965) and they also declare that religion is particularly useful when it comes to offering consolation and support to individuals who are dying or individuals who fear death (Richardson et al., 1997). Typically in rural Kilimanjaro, the majority of old people suffers from chronic diseases and is almost inevitably disengaged by society from socio-economic and political opportunities. Furthermore, the traditional forms of care available to older generations until recently are under threat (Kalache, 1991). This creates loneliness, depressive symptoms and a need for spiritual support and healing.

Because the incidence of chronic illness and disability increases with age, the longer one lives, the more likely one is to experience illness and disability. Chronic illness and disability, in turn, increase the likelihood that many very old people will no longer be able to live independently, but will require care. Consequently, crises such as the need to change living arrangements, financial problems and the inability to perform self-care activities are ubiquitous events among the very old.

One of the major problems confronting planners and policy makers is the absence of systematic reliable data on the needs of older Africans. Some data exists for relatively few countries, but the current lack of reliable national-level data about older populations presents a major limitation to understanding problems and formulating interventions specifically for older people.

Parents and youths in rural Kilimanjaro have formed secure relationships in the Chagga tradition dominated community. This is the strongest type of attachment. Young individuals feel they can depend on their parents or providers, they know that their parents will be there when they need help. Thus young Roman Catholic adherents were expected to follow and adhere to the instructions of elders and parents, hence all of them did not violate rules of prayer.

Results from Mweka village, which indicate that correlation of frequency of prayers was significant but positively and weakly correlated to elderliness ($N = 55$; $r = 0.287$; $p<0.033$), need to be examined further.

Policy considerations should take into account a broad-based approach that distinguishes between the well and active elderly, the disabled elderly and the frail elderly. Intervention options should consider inter-sectoral structures and multidisciplinary strategies to ensure that older people are well physically and psychologically and for as long as possible. This means the families and local communities could be empowered with resources and technical assistance to care for older persons in local communities, and this in turn means access to amenities ranging from water, sanitation, transport, housing and access to health promotion, disease and disability prevention strategies.

6.3.3 Religious phenomenology and gender

In this study gender is assumed to differ with degree of religiosity and the results respond to the hypothesis that there is significant difference between levels of religiosity related to gender as a factor amongst the people of rural Kilimanjaro. Gender differences in religiosity are well reported. Past studies have consistently shown that females tend to be more religious than males (Miller &Hoffman, 1995). They are more likely to express a greater interest in religion (e.g. Lenski, 1953; Yinger, 1970; Sasaki, 1979; Miller &Hoffman, 1995), have a stronger personal religious commitment (e.g. Bect-Hallahmi & Argyle, 1975; Benson et al. 1989) and attend church more frequently (e.g. Moberg, 1962; Cornwall, 1989; Batson et al. 1993). Therefore, the study tests the relationship of gender and key religiosity variables (namely church attendance), private religious practices (frequency of prayer), daily religion-related spiritual experiences (frequency of reading religious books) and religious commitment (money spent on supporting others on religious grounds per year) in rural Kilimanjaro.

Demographic data of this kind can contribute greatly towards an understanding of the current religious picture of rural Kilimanjaro and address the deeper questions of why a particular gender is more attracted to religion, and whether that kind of attraction has something to do with supporting or deterring human development in rural Kilimanjaro.

The results indicate that more men (55.7%) than women (44.3%) answered the standard questionnaires administered in rural Kilimanjaro. All women interviewed were found in homes along the established transects where men were absent during the time of interviews. In other words, men are regarded as heads of households in rural Kilimanjaro. In many rural areas, socio-cultural perceptions contribute towards the low figures of female households (Tempelman & Keita, 2005). But also beliefs of the Abrahamic faith adherents as prescribed in the Bible preach and recognise men to be heads of households (Colossians 3:21, Proverbs 31:12, 1 Peter 3:7, Ephesians 5:25, 1 Timothy 5:8, Genesis 3:16,). Corinthians 1 11:3 clearly states: “but I want you to understand that the head of every man is Christ, the head of a wife is her husband, and the head of Christ is God.”

Typically, in Chagga tradition, men are the heads of the households, in the sense that they lead, although women may provide most of the domestic services. During the surveys in rural Kilimanjaro, enumerators interviewed the head of the household, man or woman, whoever was present at that time. It seemed obvious that, in cases where both man and woman were present, men always came forward for interviews based on both Roman Catholic Church values and Chagga tradition and perhaps influenced by the monetary incentives given to interviewees.

In order to test the hypothesis of relationship of religiosity and gender, an independent sample t-test was conducted. The results showed that there were non-significant gender differences in church attendance (t (279) = 0.601; $p<0.05$). The results also showed no significant gender difference in frequency of prayer (t (279) = 0.007; $p<0.05$) and amount of money spent by both men and women in supporting other people on religious grounds ((t (279) = 0.337; $p<0.0.05$). However the results showed significant gender differences in frequency of reading religious books (t (279) = 2.284; $p<0.01$). The mean frequency of reading religious books was higher amongst males (M = 4.15; SD = 1.073) as compared to their counterparts, females (M = 3.77; SD = 1.342).

The study also assumed that current differences in degree of religiosity between the villages are manifested in spatial gender patterns. Subsequently when village specific data was examined, the independent sample t-test showed no significant gender difference in church attendance, prayer and amount of money spent by Roman Catholic adherents of the rural Kilimanjaro. The results also show no significant gender differences in frequency of reading religious books in five villages, except for Lerang'wa village which displayed significant gender differences (t (28)= 3.245; $p<0.05$). The mean frequency of reading religious books was also higher amongst males (M = 4.19; SD = 1.047) as compared to their counterparts (M = 2.57; SD = 1.651) in Lerang'wa village.

Though statistically the differences were not significant, except in the frequency of reading religious texts, the Figure 22) and frequency distribution data indicate that in general terms females showed more spiritual commitment than men in church attendance.

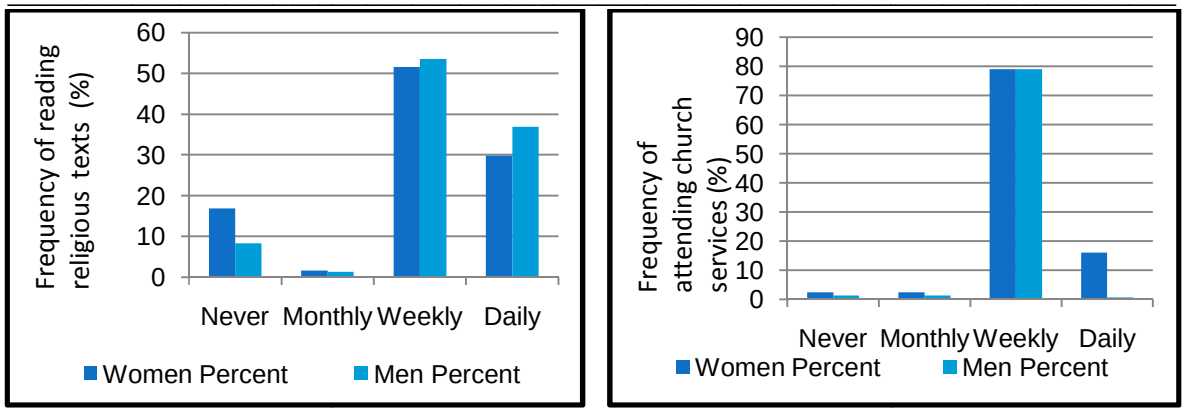

Figure 22: Variation between genders in reading religious texts and church attendance

The frequency distribution data also shows that women households who reported to adhere to the Roman Catholic Church prayed more often a day than men and did give monetary support to other people on a religious basis more than men especially those who gave less than TShs 30,000 per annum (Figure 24).

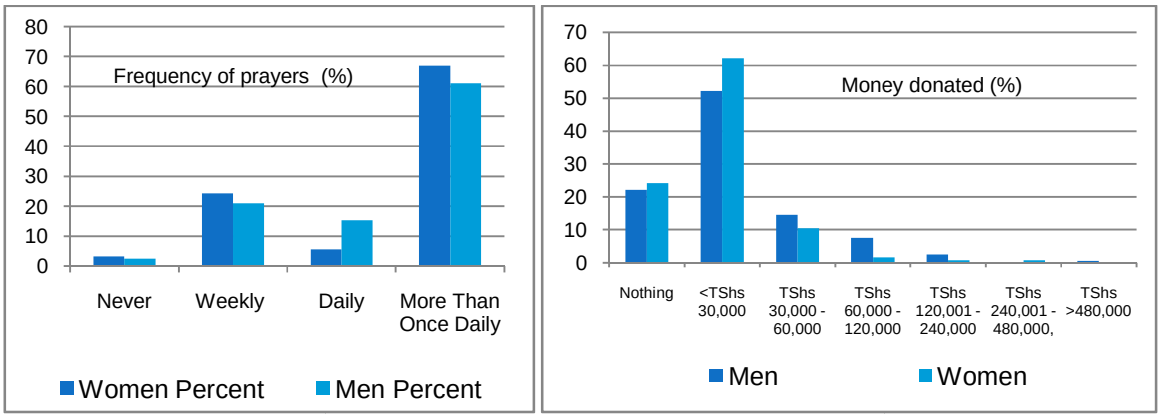

Figure 23: Gender differences in prayers and giving charity

Available literature on differences in religiosity between genders are summarised under literature appraisal chapter, and can be divided into four. The first looks at the roles of genders in church institutions, the second looks at their commitments to church doctrines, the third literature examines whether differences in church commitment produce different behaviour and practices between genders and the fourth looks at the responses of different genders to different economic, health or environmental conditions.

Global-scale results of similar nature tend to suggest that women are more religious in all aspects than men, which is contrary to the results obtained in rural Kilimanjaro. The Gallup Organization (2006) has shown that women and older Americans are more likely to self-identify with, and belong to, an organised religious tradition. According to the Pew Survey, all Christian traditions have a higher percentage of female membership and all other traditions have a higher percentage of male members than the national survey total. A majority of Americans self-report as belonging to a Christian tradition.

Furthermore, the stereotype of the female gender seems to also be confirmed, albeit to a reduced extent, 69% of women, compared to 57% of men, find religion important in their lives (World Economic Forum, 2002). Women are also more committed to going to church regularly, 35% to 28% for men (World Economic Forum, 2002).

Data and trends elsewhere also indicate that women are more religious than men in all religious traits. Religious groups with female membership out numbering male membership include: evangelical churches (53%), mainline churches (54%), historical black churches (60%), Catholics (54%), Mormons (56%), Orthodox (54%), Jehovah's Witnesses (60%) and other Christians (54%). Groups with male membership out numbering female membership include: Jews (52%), Muslims (54%), Buddhists (53%), Hindus (61%), other faiths (54%) and "unaffiliated" (59%) (Gallup Organization, 2008; Pew Survey, 2008). These trends are occasionally reversed for more specific strands of a given religion, but for the overall percentages within these larger religious traditions the pattern remains strong in favor of women (Gallup Organization, 2008; PEW Forum, 2008). For example, while overall Judaism in America is more male than female, conservative Jews are more likely to be female than male, 55% and 45% respectively. It should also be noted that while the overall Pew Survey sample size is large, the sample for some individual traditions is not. For example, the data on Judaism is based on only 682 observations. While the tradition specific samples do accurately reflect the relative make-up of the US population as a whole they may not be very reliable for the demographic breakdown within the various traditions because of their small sample size. Perhaps if the sample size for data collected from rural Kilimanjaro could be increased, the results would have suggested different patterns.

Overall, women reported belonging to religious communities much more often than men (PEW Forum, 2008). For example, women are significantly less likely to report being religiously "unaffiliated" than are men. In particular, women represent a sizable minority percentage of agnostics (36%) and atheists (30%). Thus, women tend to identify with a specific religious tradition more often than men. It is impossible to offer a reason for this discrepancy on the basis of the Pew survey data but this trend clearly warrants more detailed investigation.

There are many arguments as to why religiosity is higher in women (Chuin, 2010). New analysis of survey data finds women pray more often than men, are more likely to believe in God, and are more religious than men in a variety of other ways (PEW Forum, 2007). The reasons, analysts say, could range from traditional and mothering duties to the tendency of men to take risks, in this case the chance they might not go to heaven. A reason why this is so has also been proposed by Schumaker et al., (1988) who said that in most societies men are encouraged to pursue success and attain accomplishments which would cultivate the illusion of immortality while women are not. Other researchers declared that because women more readily admit troubling feelings as compared to men, their death anxiety scores are higher. Still others claim that death might have different connotations and implications for men and women and thus may be construed differently (Schumaker et al. 1988). This would affect their levels of death anxiety as they might fear different dimensions of death.

In the Tanzanian context, women are perceived to be more religious than men because of aggravation befalling women resulting from different kinds of men-women partnerships (Binamungu, 2012: personal communication). Church authorities in study areas did not have, or could not reveal, statistics on church attendance, which could confirm the data on frequency of church attendance of women and reasons for attending church services so often.

Overall, women are more religious than men on the more personal dimensions but not on the more public or cultural measures (religious practices and fundamentalism) (Nelsen & Potvin, 1981). Milot & Ludden (2009) studied the effects of religion and gender on well-being, substance use, and academic engagement among rural adolescents. Among other findings, the results indicated that females viewed religion as more important than males, although the frequency of religious attendance did not differ for males and females.

In the Religious Landscape Survey in the United States, The Pew Forum on Religion and Public Life (PEW Forum, 2008) found that a variety of religious traits, including frequency of reading religious materials, help to explain differences in religious knowledge between ages, races and gender. The Forum also noted that among demographic groups, men had better knowledge of religious matters and worldviews than women, due to, among other things, frequency of scripture reading. In Tanzania women read books more frequently than do men (Binamungu, 2012: personal communication) because apart from the fact that women are preoccupied with many domestic issues, they see religious texts as sources of comfort and happiness after daily hard work and sour partner relations.

The Strategic Plan (2010/2014) of the Catholic Diocese of Moshi seems to recognise the existence of spiritual feminism issues. One goal of the plan is stated as “improved gender equality in the diocese by empowering the families”.

In its situation analysis section, the plan indicates that the inhabitants of the diocese of Moshi have their customs and traditions. Some of these are good as they promote good societal values, respect of people, environment and enhancement of peace within the community (The Roman Catholic Strategic Plan, 2010). However, there are some unfavourable customs and traditions, for example, the discrimination against women in decision making processes even in matters that are of their concern (The Roman Catholic Strategic Plan, 2010). Women are even sometimes beaten up by their husbands and are not allowed to inherit family property, and indeed, gender inequality and violation of human rights is noticed in the diocese (The Roman Catholic Strategic Plan, 2010). One of the challenges explained in the plan is gender inequality in the diocese. A boy child is highly valued and respected and the majority of women in the diocese are not involved in decision making. It states that "most of the decisions are made by men though women will be involved in implementing them, and in the church, women are in a forefront but few of them are not in the leadership positions (The Roman Catholic Strategic Plan, 2010). This is an indication that the Church in rural Kilimanjaro is well aware of spiritual feminism and gender inequity challenges and the ways in which these issues are relevant to development policy and practice and development of the church in these areas.

Additional research and an increased sample size are necessary to address more fundamental issues of spiritual feminism and gender inequity in rural Kilimanjaro.

6.3.4 Religious phenomenology and household wealth

Religion is a factor that hasn't received a lot of attention but it could be an important socio-economic variable (Keister, 2003). Religious teachings of different faiths may influence spending and saving strategies in a variety of ways (Keister, 2003). They can help people draw on the tools they learn from religion to develop strategies for saving, investing and spending, and those tools may be different in various faiths and different geographical locations. Therefore, this section tests the hypothesis that there is significant correlation between level of religiosity and wealth amongst the people of rural Kilimanjaro.

Religiosity was measured using five variables which were identified through factor analysis, Spearman (rho) Correlation Coefficients, and information from the Nominal Group Technique. The variables which were identified are attendance at church services, prayer, reading religious texts, belief in God and estimated amount of money spent by Roman Catholic adherents to support other people on a religious basis. Wealth, on the other hand, was measured using two indicators - namely estimated monthly incomes and estimated size of land owned by Roman Catholic Church adherents in rural Kilimanjaro. The two wealth variables were identified through the factor and nominal group analyses in chapter five.

Spearman's Rank Correlation Coefficient was used to ascertain relationships between ordinal (dependent variables) and ordinal (independent variables) data i.e. religiosity (church service attendance, belief in God, number of prayers, frequency of reading religious text, money spent to support others) and estimated wealth of households in rural Kilimanjaro. The results show non-significant correlation between religiosity variables and estimated households monthly incomes non-significant correlation of religiosity and sizes of land owned by households who reported to adhere to the Roman Catholic doctrine in rural Kilimanjaro (Table 17).

Table 17: Results (r values) on relationship of religiosity and wealth

		Belief in God	Reading religious texts	Attending religious services	Frequency of prayer	Money spent to support others on religious grounds
Estimated monthly income (N = 282)	Correlation Coefficient	0.969	0.075	0.004	-0.071	0.069
	Sig.(2-tail)	0.002	0.208	0.946	0.232	0.251
Size of land owned (N = 279)	Correlation Coefficient	0.020	0.003	0.059	-0.044	0.048
	Sig.(2-tail)	0.684	0.962	0.325	0.468	0.422

Results elsewhere suggest connections, either positive or negative, between religiosity and wealth when data from different countries were compared. In the PEW survey across nations, survey respondents were measured using three religiosity indicators namely: faith in God is necessary for morality, religion is very important in their lives and if they pray at least once a day. The results indicate that in poorer nations, religion remains central to the lives of individuals, while secular perspectives are more common in richer nations. The Gallup Organization (2006) also conducted a similar study in more than one hundred countries. The results show that the more poverty a nation has, the higher the "religiosity" in that nation. Macro-economic and macro-religiosity level indicators used by the Gallup Organization were derived from micro-economic and micro-religiosity level indicators. Except for the United States of America and Kuwait, in general, richer countries were less religious than poorer ones (Gallup Organization,2006). Many other studies have suggested a negative correlation of religiosity and wealth, both at state and individual levels.

Positive correlations of religiosity and wealth are also evident in the Western world. Analysing the data of the 1972-2006 within country cumulative General Social Survey in the United States shows that net of all other factors low income white Catholics attend church less often than other white Catholics, although social integration mechanisms significantly moderate the effects of income (General Social Survey, 2008). Additional analyses of the same data also suggest that the effects of income on church attendance are greatest for the younger white Catholic cohort (General Social Survey, 2008). In both cases, the first thing to remember about this is the fact that the data describes correlation, not causation. The studies did not conclude that if more wealth leads to less religion, less religion leads to more wealth, if it is some combination of the two, or if instead both more wealth and less religion are caused by entirely separate social forces.

Correlations of religiosity and wealth within specific global sites have also been shown by different studies (e.g. Lehrer, 2004; Parboteeah et al., 2008; Ariyabuddhiphongs & Jaiwong, 2010; Sullivan, 2010). Religiosity, another dimension of religion, also affects economic and demographic outcomes, partly because it accentuates differences by religious affiliation, partly because religious involvement has generally beneficial effects on health and well-being (Lehrer, 2004). All of these studies took place in industrialised nations and not in the countryside as was the case in rural Kilimanjaro.

The study also postulated that there could be differences in degree of religiosity between the villages which could have manifested in spatial wealth patterns of Roman Catholic Church adherents. Subsequently, when village specific data was examined, Spearman's Rank Correlation Coefficient test results showed significant correlation of certain religiosity variables and certain wealth indicators at 0.05 (2-tail).

Religiosity (money spent by Roman Catholic Church adherents to support others) and their estimated wealth show significant and positive correlation from data collected from Mweka, Sungu and Arisi villages. Money spent on supporting other people on religious grounds positively correlated with estimated monthly incomes of the people of Mweka ($N = 55$; $r = 0.266$; $p<0.049$) and Sungu ($N = 58$; $r = 0.417$; $p<0.001$) villages. The correlation between money spent to support other people on religious grounds and size of land owned by Roman Catholic adherent households was strongly positive and significant from data collected from Sungu ($N = 58$; $r = 0.442$; $p<0.001$). In other words, results indicate that wealthier Roman Catholic Church adherents in those villages supported other people on religious grounds more than poor ones. A large number of studies have found a positive correlation between individual income and his or her subjective well-being (e.g. Easterlin, 1974; Diener, 1984; Diener et al.,1985), including the relationship of wealth and comfort from religiosity. It was found in the United States that making donations or setting-up philanthropic foundations is still an elite phenomenon (Adolf, 2009). The estimated monthly incomes positively correlated to the level of education and size of land owned by Roman Catholic Church adherents in the rural Kilimanjaro. Roman Catholic doctrine also requires its adherents to give in order to receive blessings from God. In the New Testament of the Bible, 1 Corinthians 9 shows Paul concluding his appeal by pointing to the benefits the Corinthians will reap as a result of generous giving. He said, "Whoever sows sparingly will also reap sparingly, and whoever sows generously will also reap generously". A similar thought is found in a number of Old Testament texts (Job 4:8; Proverb 11:24-26; 22:8-9; Josiah 10:12-13; Luke 6:38) of the Bible. Therefore wealth, level of education and their inclination to Roman Catholic core values could have perhaps influenced wealthy households in Mweka and Sungu villages to spend money to support other individuals on religious grounds. Educational level, ill-health, social capital and religiosity all positively reinforce the inclination of people to transfer resources to charities (, 2009).

Frequency of attendance at religious services on Sundays also showed a significant correlation with wealth of the Sungu and Ruwa villages households who adhered to Roman Catholic Church doctrine. The correlations of church service attendance and estimated monthly incomes of the Roman Catholic adherents of Sungu ($N = 58$; $r = 272$; $p<0.039$) and Ruwa villages ($N = 59$; $r = 0.258$; $p<0.049$) were significantly positive but weak. Religious service attendance and size of land owned by the households that adhere to Roman Catholic Church doctrine in Ruwa village was also significant and strongly positive ($N = 59$; $r = 0.492$; $p<0.000$). In Shimbi Masho village, the frequency of reading religious texts amongst the respondents and their estimated monthly incomes were significant but weakly correlated ($N = 60$; $r = 0.259$; $p<0.045$) and frequency of reading religious texts and size of land owned by the households who adhere to Roman Catholic Church doctrine was also strongly and positively correlated ($N = 60$; $r = 0.470$; $p<0.000$). Results also indicate that the levels of estimated monthly income of the households of Shimbi Masho increased with increase in frequency of prayer ($N = 60$; $r = 0.341$; $p<0.008$) whilst the frequency of prayer and land owned of the people of the Ruwa village was also positively correlated ($N = 59$; $r = 0.365$; $p<0.006$).

This engagement among wealthier people in prayer, reading religious texts and attending church services needs further analysis, because religious institutions typically provide their members with benefits such as improved physical and psychological health, social networks, and civic skills that may be less important for wealthier people. Wealthier households can often access social networks and civic skills elsewhere, outside church or the religion sphere of influences. Trends elsewhere also indicate a negative correlation between religiosity and wealth. Poor people would wish to associate closely with the church because religious congregations may be one of the few institutional sectors these people can turn to for social, economic and emotional support in the face of tough times.

Wealthy people in rural Kilimanjaro go to church regularly to reveal their affluence through the amount of church offerings or displaying possessions such as clothing and cars (Mwaya, 2012: personal communication). Mghwira (personal communication, 2012) also commented on wealth-religiosity connections in rural Tanzania. He said that in the rural district of Singida Tanzania, the only opportunity for wealthy people to show off their riches is in church congregations. This is the place where new clothes and cars are displayed to the public. He added that church sites are also places to socialise and where rich people will be introduced with their families for their contribution to church services and that they will be given opportunities to speak in public to church followers. He also mentioned that, after church services people get another opportunity, outside the church premises, to explain weekly successes, for example, to explain whereabouts of family and children especially if the family has achieved significant success and mostly if they live outside the country. Mghwira further explained that Sundays are when wealthy people wish to be seen by being introduced in front of other adherents and recognised by church leaders for their contribution so that they get blessings to sustain their riches and protect it against evils such as enemies and thieves.

Mushi (personal communication, 2012) commented that rich people believe that their wealth was given by God, and they must worship God to maintain their financial capital. When households who adhere to the Roman Catholic faith were asked how much God provided towards their livelihoods, the majority (86.5%) perceived God to provide 100% of their livelihood requirements (Figure 24).

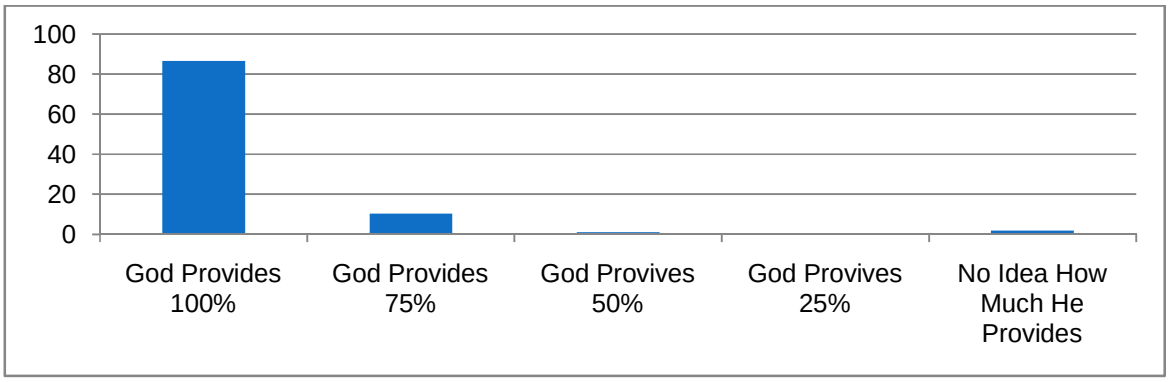

Figure 24: God powers in providing for livelihoods in rural Kilimanjaro

Regardless of wealth or poverty levels, people in rural Kilimanjaro tend to associate material possessions or their successful pursuit of their livelihood with God despite the fact that the results of the correlation of wealth and religiosity proved contrary to these perceptions.

Manyanza (personal communication, 2012) gave a long narration of the perceived correlation of religiosity and wealth in Tanzania. He said, “I think psychological health is important. This is the reason why there is a connection of religiosity and wealth. In Tanzania, and perhaps in the whole of Africa, most people traditionally fear death so much. This is exemplified by the extent they cry during funerals. Now two things come into play here. Most rich people in Sungu would be old people who have reason to seek psychological health as their probability of dying gets fairly high. It is associated with repentance. In case the wealth was acquired through illegal means such embezzling public funds or stealing it comforts them not only to going to church but also giving more offerings (zaka in Kiswahili) to God for forgiveness. Remember Mr. Julius Nyerere (the first President of the independent Tanganyika, which became Tanzania after the union with Zanzibar on 26th April 1964) once said that there were people who attempted to "bribe" God by giving more on Sundays after they had stolen! They are seeking forgiveness from God for all they stole. Another reason is social control. As one becomes rich he gains a lot of recognition in society and brings him closer to religious leaders too. People expect him to join them lest he is seen as someone very unusual. He is obligated. He does it not for himself but for the sake of the society. By the way this happens a lot with politicians! Seeking for recognition and acceptance is a known deficient motivator. People will seek to fulfil this deficiency in them. So predictably these people are acting according to Abraham Maslow's hierarchy of needs! The same reason of ’bribing’ God would account for the rich young people for the same reason that they have also stolen. However, among young people thinking about death is remote.

They do not spend their time imagining accidents happening as this would be the most likely cause of death at their age".

Kahana (personal communication, 2012) summed it up that, "We see certain things for those rich people who frequently attend at the Roman Catholic Church services at the Mweka village. Of late there have been huge campaigns led by the Roman Catholic Church leaders to involve church adherents who are rich so that they support church developments, especially construction projects. The rich people in the village, like the late Mr Masika, were instrumental in the construction of the house which now keeps Roman Catholic fathers in the village. It is also true that rich people and politicians attend at church services frequently in order to come close to church adherents and win their hearts and souls in order to succeed in their business endeavours. Lastly wealth people in Mweka village wish to be seen at church services frequently in order to clean up their wrong deeds to God (or as a form of repentance) and show church adherents that their riches were obtained legally, and not through illegal means".

The effects of small samples size (N = 55-60) and the influence of geographical variation needs to be examined because correlations of wealth and religiosity were not significant when the sample size was increased to 279 and 282 households.

It seems also that wealth (estimated monthly income and sizes of land owned) could be the strongest predictor of a number of other demographic behaviours and core religiosity variables in rural Kilimanjaro. Estimated monthly income shows significant but weak positive correlation with the areas of land owned by individuals who are Roman Catholic adherents in rural Kilimanjaro ($N = 282$; $r=0.173$; $p<0.004$). The levels of education and wealth (estimated monthly income) also show significant and positive correlation. The positive correlation of estimated monthly income and size of land owned by the households affiliated to the Roman Catholic Church did not come as a surprise because, as indicated in the previous chapters, land is a pivotal asset in many African societies and the Chagga are no exception (Carr, 2004). It provides for the livelihood and trading income of the people of rural Kilimanjaro (Carr, 2004). Therefore the positive correlations between estimated monthly income and land ownership confirmed the positive role that land (and subsequent wealth) plays to enhance the livelihoods of the people of rural Kilimanjaro. Wealth seems to also play a key role in religiosity of the peoples of the rural Kilimanjaro, as suggested by the village specific data.

The studies did not conclude that more wealth leads to less religion and vice versa; religiosity and wealth may be caused by entirely separate social forces. The study, therefore, could neither confirm nor dismiss an important sociological theory, the Secularisation Hypothesis.

At policy level, and if the theory is confirmed in rural Kilimanjaro, local and central government might interact with religion and influence participation in religion, or even the extent of religious beliefs, if they support government policies or deter human development. Thus, a government may regulate the market, and thereby possibly promote a specific religion or make it difficult for other religions to flourish because of regulations or social policies. This introduces us to another important sociological theory namely the Religion Market Model (Weber, 1930). Under this theory, the government might make it difficult for people to practice their religion or it might subsidise religious activity in order to support human development. Far more detailed survey instruments are required to determine the cause of the increased wealth as religiosity increases. In other words, additional and expanded (to include more data, more villages and more religious denominations) research to confirm these patterns and longitudinal research to determine trends are necessary to determine what, if any, connections exist between core religiosity variables and core household wealth indicators in rural Kilimanjaro. Inclusion of religiosity data in different planning surveys and vital statistics in the country such as the census and health and education programmes would help to build a religiosity database for future studies.

Because also this covariation (wealth and religiosity) has been replicable, the cause of this relationship has become the focus of research on the wealth-religion connection (Diener et al,. 1992). Does income relate to subjective well-being because it aids individuals in meeting universal human needs such as good health, nutrition, and comfortable housing? Causality of the wealth-religiosity connection in rural Kilimanjaro needs also to be a focus of surveys and studies on connections of religion-wealth in rural Africa.

When further tests were conducted, controlling for other socio-demographic variables, an association between wealth and religiosity begun to emerge. Results from a multivariate Pearson Chi-Squire test of Independence show a positive association of wealth and religiosity (reading texts, belief in God, prayer and church attendance) variables of women households who reported to adhere to the Roman Catholic faith ($N=140$; $r\varphi>3.500$; $X^2>35.000$; $p<0.01$). Results also show a positive association of the size of farms owned and frequency of reading religious texts in households that have achieved primary school education alone ($N=206$; $r\varphi=0.350$; $X^2=56.941$; $p<0.01$). Perhaps further study which compares the nature and determinants of religious beliefs about the causes of both wealth and poverty, with a special focus on gender and level of education is warranted. Indeed such a study might benefit the Church in helping it to promote income generating projects focusing on women and primary school graduates.

The Catholic diocese of Moshi, outlined through its strategic plan (2010-2014), among other things, challenges faced by the diocese in performing its roles. It states that "although the diocese has managed putting in place structures and human resources for proclaiming the word of God, the faith is not well lived by the many Christians. Some of them live a double life – they follow Christianity and at the same time practice paganism. People, too, have become materialistic. They want to appropriate wealth at the expense of others. They are ready to steal, cheat or use all sort of corrupt means in order to become rich". Perhaps this is an opportunity for the Catholic Church, with the majority of followers in the study site, to work with development experts to clearly understand the causation of wealth and religiosity.

The plan also tends to recognise gender issues in the Catholic diocese of Moshi. One of the goals of the plan is to improve gender equality in the diocese by empowering the families. Perhaps some of the gender inequalities are founded on religiosity. Further studies on wealth-religiosity focusing on women might help the Church address fundamental and core gender issues in the diocese.

6.3.5 Religious phenomenology and household health

Studies on the link between a person's religiosity or spirituality and their health are on the increase. The increase on number of studies examining the correlation of a number of demographic, clinical, spiritual/religious and psychosocial characteristics is partly due to a potential link between religion and development and the debate about the role of religion in public life in the last decade against the backdrop of ascendant religiosity that has challenged secularisation and modernisation theses. Studies addressing the relationship between religiousness and mental health in physically vulnerable populations, such as the aged, ill and disabled, claim that they have been insufficient (Yeung & Chan, 2007). Relationships between religiousness and improved health of terminally-ill patients and people with chronic diseases have been confirmed mostly in studies in industrialised nations (e.g. Sangwon & Gisselle, 2011). In rural Africa studies correlating religiosity and health are rare. The focus has been on examination of experiences of religious participation amongst HIV-positive individuals (e.g. Root, 2009). Studies about the use of illicit drugs and religiosity have also been conducted in South Africa (Peltzer et al., 2002).

This study tests the hypothesis that there is a significant relationship between level of religiosity and an indicator of health (in this case, the incidence of malaria, as this was the most commonly reported ailment) amongst households who are affiliated with the Roman Catholic Church in rural Kilimanjaro.

Health status is defined as incidences of malaria in the households that adhere to the Roman Catholic faith who were interviewed during the study. The incidences of diseases were measured by the estimated number of malaria attacks during the past three years. Malaria is the commonest and most serious disease in rural parts of Tanzania. This commonality influenced the choice of this disease for the examination of correlation of religiosity and health conditions of households which adhere to the Roman Catholic faith in rural Kilimanjaro. Flu, which showed the highest incidences in the rural Kilimanjaro of those interviewed (Figure), is not considered as a serious communicable disease, and is normally not treated when it infects the dwellers of rural Kilimanjaro (Mushi, 2012: personal communication).

The figure 25also illustrates disease incidences in the households that adhere to the Roman Catholics faith who were interviewed (N = 282) during the survey. The majority of the Roman Catholics (89.4%) contacted flu once or more than once over a period of three years. Almost half of them (51.6%) also contacted malaria over a period of three years. The incidences of typhoid, dysentery, hepatitis and stomach ulcers were very uncommon amongst households that adhere to the Roman Catholic faith.

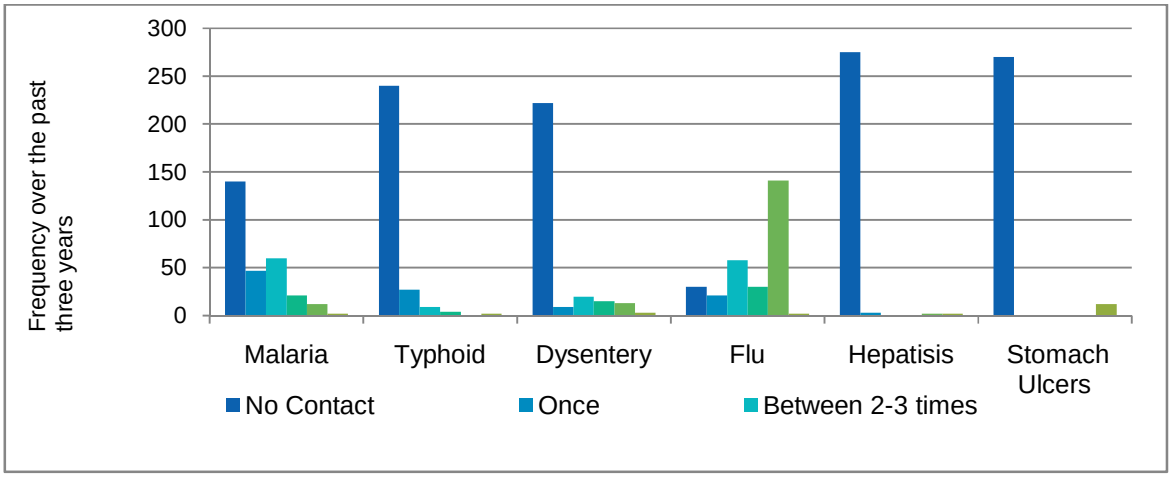

Figure 25: Disease incidences

Malaria is caused by a parasite called *Plasmodium*, which is transmitted via the bites of infected mosquitoes (Florens et al. 2002). In the human body, the parasites multiply in the liver, and then infect red blood cells (Florens et al. 2002). This section describes incidences of malaria in the households affiliated to the Roman Catholic Church in rural Mt. Kilimanjaro over a period of three years. Malaria was considered a more important health condition and showed more variability in the dataset when factor and nominal group analyses were performed in the previous chapter.

In order to understand incidences of malaria incidences in these areas, households were asked to estimate the number of times they had contracted malaria over the past three years: no contact, less than 1, between 2-3, between 4-5 and more than 6 times.

Malaria prevalence in these areas could be attributed to many factors. In general terms, malaria is prevalent in these villages because of the significant amounts of rainfall and consistently high temperatures and high humidity, along with stagnant waters in which their larvae mature which typically provide mosquitoes with the environment needed for continuous breeding. The spread of malaria in these localities is assisted by myriads of factors ranging from religio-cultural to socio-economic. Is there any correlation of malaria incidences and religiosity in rural Kilimanjaro?

Spearman's Rank Correlation Coefficient was used to ascertain relationships between ordinal (dependent variables) and ordinal (independent variables) data i.e. religiosity (church service attendance, number of prayers, frequency of reading religious texts, money spent to support others) and health (incidence of malaria) of households who adhere to the Roman Catholic Church doctrine in the rural Kilimanjaro.

Results show non-significant correlation of the frequency of attending at church service, frequency of reading religious texts, money spent by the households affiliated to the Roman Catholic faith to support others and malaria incidences for the past three-year period when the data from all the six villages were combined. Nonetheless, significant but weak positive correlation of frequency of prayer and malaria incidences of the households who belonged to the Roman Catholic Church in rural Kilimanjaro was confirmed ($N = 282$; $r = 0.230$; $p<0.000$). This means that those who prayed often had succumbed to malaria more often than those who never prayed or prayed once weekly. What does this really mean in practical terms? Where are the possible malaria-prayer connections?

In the same survey, households that adhere to Roman Catholic Church doctrine in rural Kilimanjaro were asked, when they pray, what do they mainly wish to receive from God? The majority of the respondents wanted children (31.6%), but mostly the households who responded to this question wished for protection against diseases and good health (25.5%) or a good life (25.2%) which is closely associated with freedom from disease in rural Kilimanjaro (Figure 26).

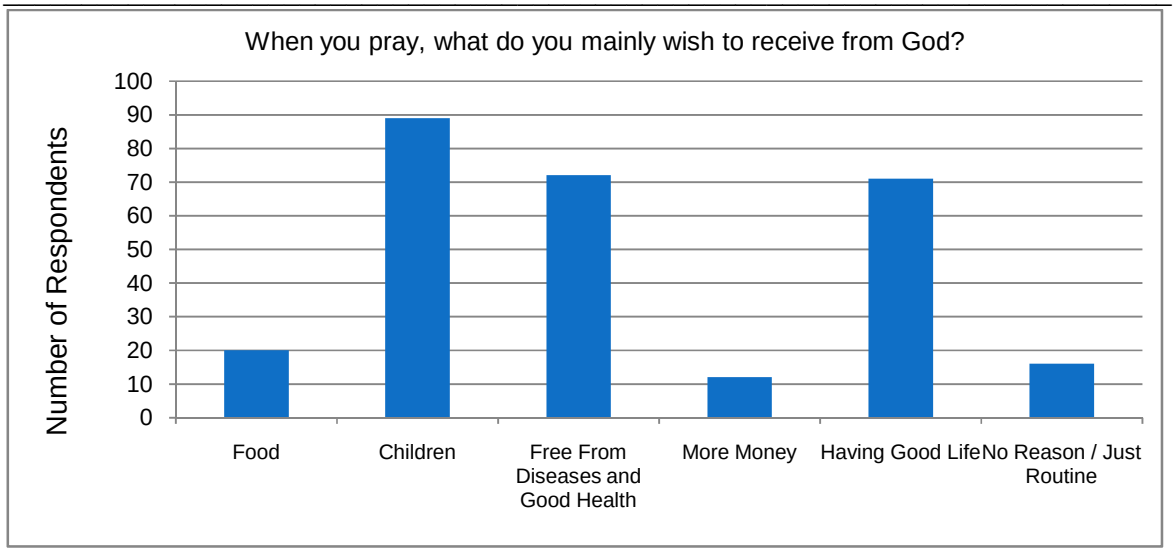

Figure 26: Purposes of prayers

In other words, it seems that the main reason for payer in rural Kilimanjaro amongst the household that adhere to Roman Catholic Church dogma is to gain a better life through the process of physical and spiritual healing.

In medicine, the role of prayer has been suggested to control depression and diseases associated with depression. Spirituality and religion are often central issues for patients dealing with chronic illness (Yi et al. 2006). People who had a decline in health as well as those with improved health reported more prayer, suggesting that individuals who experience a progressive disease or an acute health change are more likely to use prayer to cope with changing circumstances (Paloma, 1993). While prayer about health issues increased across all groups in their study, from 43% in 2002 to 49% in 2007, the data indicated that people with the highest incomes were 15% less likely to pray than those with the lowest incomes, and people who exercised regularly were 25% less likely to pray those who didn't exercise. Women, African-Americans and the well-educated were most likely to pray about their health (Paloma, 1993). Many other scholars have shown the importance of different dimensions of prayer in clinical practice (e.g. Byrd, 1988; Foster, 1992; Paloma, 1993;1997; O'Laoire, 1997; Larimore, 2001; Leibovici, 2001;Hojjati et al., 2011; Yeung & Chan, 2007).

With a growing emphasis on holistic health care, serving the whole person rather than the diseased entity alone, spirituality is re-emerging as a relevant factor in serving the sick and disabled (Graber & Johnson, 2001).

In Iran, frequency of prayer had no effect on the spiritual health of haemodialytic patients. According to the dominancy of religious culture and beliefs of Iranian people, it is expected that health care staff pay more attention to religious and spiritual dimensions in patient care (Hojjati et al., 2011). The beneficial impacts of religiosity and religion on mental health are evident in a number of studies (e.g. Shafranske, 1996; Assimakopoulos et al. 2009; Bishop, 2008; Cohen et al., 2009; Koenig, 2009; Murphy, 2008; Pfaff et al., 2008; Science Daily, 2007; Steffen, 2009; Thoits, 1987; Wittink et al., 2009). Religions and religiosity tends to boost morale of sick people and prolong the lives of those who require consolation or comfort in form of encouragement. It seems therefore that those households, who succumbed to malaria more often over the three-year period, responded in many different ways, including spiritually by increasing the numbers of prayers. Yeung & Chan (2007) suggests that higher levels of spirituality and religiosity affect intermediary variables and eventually result in better mental health which then positively affects physical function.

Similar trends were also observed when the correlation of prayer and other common diseases in rural Kilimanjaro were tested. The frequency of prayers is also significant, but positively and very weakly correlated to incidences of dysentery (N = 282; r=0.151; p<0.011) and flu (N = 282; r=0.199; p<0.001) (Table 18).

Table 18: Correlation of prayers and disease incidences

		Typhoid prevalence/ incidences	Dysentery prevalence/ incidences	Flu prevalence/ incidences	Hepatitis prevalence/ incidences	Stomach ulcers prevalence/ incidences in people	Heartburn prevalence/ incidences in people
Frequency of prayer (N = 282)	Correlation coefficient	0.027	0.151	0.199	0.066	0.116	0.044
	Sig. (2-tailed)	0.657	0.011	0.001	0.268	0.051	0.464

It seems evident therefore that one of the major coping strategies for the adherents of the Roman Catholic faith in rural Kilimanjaro who frequently succumb to diseases is to increase the amount of prayer. Manyanza (personal communication, 2001) mentioned to me that, “unlike for the rich people who go to church either for repentance or as a result of social control, poor people pray for a different reason. Prayers and looking for God consoles and comforts them from the misery of poverty. Now, it is not the prayer that causes or induces or cures malaria but their ignorance, body weaknesses and poor malaria protective infrastructure are due to poverty that make them succumb to malaria. Globally religiosity tends to be positively correlated with poverty! Religiosity seems to be a function of ignorance, it bridges ignorance gap”.

Based on the above argument, further tests were conducted to ascertain the relationships of malaria incidences of the households who ascribed to the Roman Catholic faith and other core demographic variables. There was no significant correlation between age, wealth, gender, the level of education and the incidences of malaria (Table 19).

Table 19: Correlation of malaria, prayer, ageing, gender and wealth

		Gender	Age	Level of education	Estimated monthly income	Frequency of prayer	Size of land owned
Malaria prevalence/incidences (N = 282)	Correlation coefficient	0.087	-.0008	-0.105	-0.028	0.230	0.012
	Sig. (2-tailed)	0.146	0.892	0.080	0.634	0.000	0.837

Results show that after controlling for core demographic and other core religiosity factors, frequency of prayer is a significant factor predicting the significance and incidences of malaria in rural Kilimanjaro. This suggests that religiosity (frequency of prayer) is an important variable in coping with health conditions of the households that belong to the Roman Catholic faith in rural Kilimanjaro.

Analysis of Variance (ANOVA) tests (F-test) suggests non-significant differences between the average values of groups making up the frequency of prayer and the categories of malaria incidences in the households who adhered to the Catholic faith in rural Kilimanjaro. The F-tests also point to non-significant differences between the average values of frequency of prayers and the categories of core demographic variables of the households that are affiliated with the Roman Catholic Church. This further suggests that religiosity (frequency of prayer) is an important variable in coping with health condition challenges of the households that belong to Roman Catholic faith in rural Kilimanjaro, regardless of gender, wealth, age and levels of education.

Prayer is a pillar of Roman Catholic Church doctrine and is considered to be the best of all acts of worship and one who offers prayer loves God very much and in prayer adherents of the Roman Catholic Church talk to God. Roman Catholic Church adherents believe that God is listening (Psalm 66:19) and they believe that He understands them (Heb. 2:11-14, 4:15 &16) through prayer. Prayers are signs of humility and of respect towards the supernatural authority, the Almighty God. Therefore, a person who prays must pray humbly before such an Almighty Creator (Rev. 4:11, 5:12), always recognising who he is and who God is. In this way his/her prayers are answered in a positive way.

In rural Kilimanjaro, recurrences of malaria, dysentery, flu and typhoid could also be associated with other chronic diseases like HIV/AIDS. It is not uncommon therefore for people in rural parts of Tanzania, who succumb to chronic diseases like HIV/AIDS, diabetes, cancer and high blood pressure to seek spiritual solutions as one important coping strategy for their appalling health conditions. This was evidenced recently in Tanzanian when millions of people from all walks of life flocked to the tiny village of Samunge in northern Tanzania to receive cures for chronic diseases from the former pastor of the Lutheran Church, Mr Ambikile Mwasapile. Mr Mwasapile has, for the past several months, been serving his herbal concoction to multitudes of people, estimated at over 10,000 every day, in the village of Samunge (The Daily Nation, 2011). Mr Mwasapile claimed to have found a cure for chronic diseases after having been guided by God through a dream to use the herb (*Carissa species*) to cure an array of chronic diseases, including HIV/AIDS and cancer.

The correlation of HIV/AIDS and religiosity has been widely studied in Africa and the United States. Most patients with HIV/AIDS belonged to an organised religion and used their religion to cope with their illness (Yi et al. 2006). The increased spirituality/religiosity was found to predict increased religious coping, which influenced social support in HIV/AIDS patients in South Africa. Social support, in turn, positively influenced depressed moods (as a measure of mental health), depressed moods affected fatigue and both variables predicted self-reported physical function (Yeung & Chain, 2007). In Swaziland, religiosity supports antiretroviral treatment and community home-based care programmes. Religiosity facilitated vital decisions around HIV testing, HIV disclosure, treatment uptake/adherence as well as reduced HIV stigma in Swaziland (Root & Wyngaard, 2011). Within African-American communities, those with high religiosity displayed significantly higher stigma, associating HIV/AIDS with a curse or punishment from God (Muturi & Soontae, 2010). In Swaziland, analysis showed that HIV disclosure in church settings is a highly reflexive process, mediated by subjective religiosity, the social dynamics of church networks and broader structural vulnerabilities (Root, 2009). A study in Senegal showed how Islam influences AIDS prevention. Participants with higher religiosity scores were more likely to abstain from sex, however, participants high in religiosity were not more likely to report that they did not use condoms when sexually active (Gilbert, 2008). A study explored the manner in which a South African informal community coped with living with HIV/AIDS by relying on existing assets and local resources. The study found that community members coped with HIV/AIDS by relying on culture and family, faith in God, religiosity and prayer (Paruk et al. 2006). In South Africa, poorer health status and perceptions, less social support and lower spiritual well-being were related to significant depressive symptoms, while personal religiosity and having a religious affiliation was not associated when controlling for other factors (Paruk et al., 2006).

Correlates of health-related quality of life such as spirituality/religiosity and depressive symptoms could be fruitful potential targets for interventions to improve health-related quality of life in patients with HIV/AIDS (Mrus, et al., 2005). In South Africa, higher religiosity was significantly correlated with a more positive attitude for people with HIV (Paruk et al., 2006). According to Prado et al., (2004), interventions to attenuate psychological distress in HIV-seropositive African American mothers might focus on increasing social support, promoting active coping and decreasing avoidant coping. The findings suggest that this may be accomplished, in part, by promoting involvement in religious institutions and practices. In the United States, religiosity was found to be a strong predictor of women's involvement in HIV-related risky behaviours, with the greatest risk reported by women who were the least religious (Elifson et al., 2003). The practice of public religiosity was found to be inversely associated with engagement in high-risk health behaviour among HIV-infected and healthy women but not among the chronically ill. Although private religiosity was unrelated to African American women participants' perceptions of physical health, public religiosity was positively associated with physical health among HIV-infected women and inversely associated with their CD4 count (Morse et al., 2000).

In the current study, village specific data also shows significant correlation of certain religiosity indicators and malaria incidences. Despite the fact that the sample sizes are reduced when village specific data are analysed, significant and strong positive correlations were confirmed between malaria incidences and frequency of reading religious texts ($N = 58$; $r = 0.380$; $p<0.003$) of the households of the Sungu village and frequency of prayer significantly and (very strongly) correlated with malaria incidences of the households of Lerang'wa village who shared the Roman Catholic faith ($N = 30$; $r = 0.548$; $p<0.002$). This correlation could be explained by some of the factors described above.

Negative correlations were also observed on data from specific villages of rural Kilimanjaro. The amount of money spent to support other people on religious grounds shows significant and negative correlation with malaria incidences of the households that adhere to Roman Catholic doctrine in Ruwa village ($N = 59$; $r = -0.279$; $p<0.033$). This implies that support to other people was reduced as the households succumbed to malaria. A possible explanation for this correlation is that households were unable to provide financial support for the reasons that money was used for treatment and there was not enough money to support others. Results also show significant and negative correlations between malaria incidences and frequency of attending religious services of the households of Mweka village who subscribed to the Roman Catholic faith ($N=55$; $r=-0.273$; $p<0.044$). In other words, households reduced the amount of times they attended church services as they continued to succumb to malaria pandemics.

As clinical practices seek to enhance the quality of care given to patients, attention should be paid to understanding how prayer could be used to mitigate the effects of frequent ailments in rural Tanzania. In some countries, family physicians have begun dialogue about how to take a spiritual history of their patients in order to assist in recovery and prevention of illness and disease (Kutz, 2004). Future applied research examining how "church" may be a vital public health setting outside, but integral to, formal health services and programmes is warranted. The acceptance of spirituality as a component of health and quality of life requires a shift in perspective that may allow for the development of new treatment and care strategies that are meaningful to those whose conditions are presently incurable (Guillory et al.1997).

Although the underlying cause-effect relationship between frequency of prayer and malaria remains unclear, these results suggest that it is worthy of intervention and research focus in rural parts of Africa. Given that religion may have both positive and negative consequences, further research is needed to determine the extent to which promoting religiosity may increase or alleviate distress.

The Catholic diocese of Moshi seems to understand the role of religions in the health of its people. The diocese could not survive with its adherent population being sick. Recognising this facts, the diocese, where Roman Catholic churches in all the study villages fall, developed the its strategic plan in 2010, "The Five Years' Strategic Plan of the Catholic Diocese of Moshi, January 2010 – February 2014. As a result of the Strategic Plan, the Diocese developed Health Strategic Plan (2010-2014)". The plan aimed at guiding the operations in the health sector for the next five years, has accorded the diocese of Moshi and other stakeholders to rethink approaches to better health in its catchment areas and assess prevailing strengths, weaknesses, opportunities and threats to success. The situation analysis did not examine relationships of religiosity (prayers, reading religious texts, attendance at church services) and health management. The analysis could have helped the diocese to incorporate its practical health strategies into mainstream religious practices like church lessons, prayer and weekly church services on Sundays.

6.3.6 Summary of Results and Discussions: Religious phenomenology and socio-demography

Non-significant correlation was showed by the results between reading religious books, frequency of prayer, belief in God and money spent to give support on religious grounds and education attainment of the households who reported to adhere to the Roman Catholic faith in rural Kilimanjaro.

Results, nonetheless, show that attendance at church services of the households who reported to adhere to the Roman Catholic faith was negatively and very weakly but significantly correlated to education achievement (N=282; r=-0.130; p<0.05). Results from elsewhere exemplify negative correlation of religiosity and education attainment. Perhaps higher levels of education allow people to seek for spiritual answers and comfort from other sources than religion.

The results from the Pearson Correlation Coefficient test show non-significant correlation between religiosity variables (church attendance, frequency of reading bible, belief in God, and support given on religious basis) and age of respondents. Nonetheless, results show that frequency of prayers positively but weakly correlated to age of respondents from the Roman Catholic community in rural Kilimanjaro (N=282; r=0.147, p<0.05).Results from elsewhere illustrate that prayers help the old and sick to cope with depressive conditions.

In order to test the hypothesis of the relationship of religiosity and gender, an independent sample t-test was conducted. The results showed that there were non-significant gender differences in church attendance (t (279) = 0.601; p<0.05). The results also showed no significant gender difference in frequency of prayer (t (279) = 0.007; p<0.05) and amount of money spent by both men and women in supporting other people on religious grounds ((t (279) = 0.337; p<0.0.05). However the results showed significant gender differences in the frequency of reading religious books (t (279) = 2.284; p<0.01). The mean frequency of reading religious books was higher amongst males) (M = 4.15; SD = 1.073) as compared to their counterparts, females (M = 3.77; SD = 1.342). Nonetheless, frequency distribution data shows that women are more religious than men in three core religiosity traits, namely church attendance, frequency of prayer and money spent on supporting other people on religious grounds. Data from elsewhere and perceptions of local people in Tanzania tend to support this view, suggesting that a combination of death anxiety, refusal to take risks, traditional and biological mothering roles and sour men-women partnerships make women more religious than men.

Spearman's Rank Correlation Coefficient test results show a non-significant correlation of core religiosity and core wealth variables (N = 279-282). When village specific data was considered and sample sizes minimised (N = 55-60), the results showed a positive correlation of wealth (monthly income and size of land owned) and religiosity (supporting others, frequency of reading religious texts, frequency of prayer, frequency of attending church services) in certain villages. Controlling for other socio-demographic variable, the results from a multivariate Pearson Chi-Square Test of Independence show a positive association of wealth and religiosity (reading texts, belief in God, prayer and church attendance) variables of women households who reported to adhere to the Roman Catholic faith (N=140; rφ >3.500; X2>35.000; p<0.01).

Results also show a positive association between the size of farms owned and frequency of reading religious texts in households that have achieved primary school education only (N=206; rφ=0.350; X2=56.941; p<0.01). Perhaps further study which compares the nature and determinants of religious beliefs about the causes of both wealth and poverty, with special focus on gender and level of education is warranted. Indeed, such a study might benefit the Church enabling it to promote income generating projects focusing on women and primary school graduates.

Spearman's Rank Correlation Coefficient demonstrates a non-significant correlation of the frequency of attending church services, rate of reading religious texts, malaria incidences for the past three years and money spent by households affiliated to the Roman Catholic faith to support others on religious grounds when the data from all the six villages was combined. Significant but weak positive correlation of frequency of prayer and malaria incidences of the households who belonged to the Catholic faith in rural Kilimanjaro was confirmed (N = 282; r = 0.230; p<0.05). Despite the fact that the sample sizes are reduced when you analyse village specific data, significant and strong positive correlation was confirmed between malaria incidences and frequency of reading religious texts (N = 58; r = 0.380; p<0.003) of the households of the Sungu village and frequency of prayer significantly and (very strongly) correlated with malaria incidences of the households of Lerang'wa village who shared the Roman Catholic faith (N = 30; r = 0.548; p<0.002). ANOVA tests (F-test) suggest non-significant differences between the average values of groups making up the frequency of prayer and the categories of malaria incidences and between malaria and other core demographic variables. This further suggests that frequency of prayer is an important element in coping with health challenges, regardless of gender, wealth, age and level of education in households affiliated to the Catholic faith in rural Kilimanjaro.

The study proposes expanded research and longitudinal studies to establish cause-effects relationships between religiosity and socio-demographic trends in rural Kilimanjaro. Planning and socio-economic surveys and vital statistics in the country should be considered, including data on religious phenomenology, in order to support these studies.

The core research chapter, Chapter 7, examines the association of religion and natural environment. This chapter has explored the relationships between religious observance and socio-demographic factors. This understanding is necessary so that these effects can be taken into account as part of the main discussion about the relationship between religion and ecology in the in the subsequent main study chapter.

Chapter 7: Religious Phenomenology and Ecology

7.1 Background

Some scholars have dismissed the idea that religion has any constructive ideas to offer about the relationship between humans and the earth (e.g. Naess, 1989). A number of obstacles to faith-based environmental engagement have also been highlighted in various studies (e.g. Berry, 1981; Bratton 1992; Altfield, 1993; Kearns, 1995; Robolton & Hart, 1995; Shibley & Wiggins, 1997; Redekop, 2000; Kollmus & Agyeman, 2002; Walsh, 2004). However, some recent studies suggest a more direct connection between religiosity and ecology and identify the significant role played by religions in nature conservation in different parts of the world (e.g. Messer & Lambek, 2001; Cooper & Palmer,1995; Hessel & Ruether, 2000; International Environmental Forum, 2002; Tirosh-Samuelson 2002; Foltz et al. 2003; Gardner, 2003; Harmon & Putney, 2003; Taylor, 2004; Tucker & Grim, 2004; Henderson, 2005; International Group of Christians, 2005; Jacobs, 2006; Johns, 2005; Lorentzen & Leavitt-Alcantara, 2005; Stuart, 2005; Taylor & Kaplan, 2005; Xu et al. 2005;Dudley et al. 2006; Hart, 2006; Wilson, 2006; Pokomy, 2007; Taylor, 2007).

A number of important questions thus need to be posed in order to come to an understanding of how religion may play a useful part in nature conservation and human development across the world:

- What does the term 'natural environment' refer to with reference to rural perspectives?
- What is the nature of the relationship between human beings, their various forms of spirituality, and the Earth's diverse living systems?
- Are religions and religiosity contributing to environmental conservation, and how?
- What are the religious perceptions and beliefs of different faith groups towards natural environment systems?
- Are religions in rural settings being transformed in the face of growing environmental and socioeconomic concerns, and if so, how?, and
- How can our contemporary understanding of environmental and sustainable development influence religions and settings for religiosity, and encourage policy shifts towards more human development in rural settings?

Some scholars have made a note that the answers to these questions are difficult and complex, and are intertwined with, and complicated by, a host of cultural, environmental, socio-economic and religious variables (e.g. Taylor, 2008; Taylor & Kaplan, 2005). This study cannot answer all these questions. Nonetheless, any initiative to examine the roles of religion and spirituality in advancing human well-being can represent significant contributions to the dialogue on eco-religion connections.

Chapter 7: Religious Phenomenology and Ecology

The previous chapter explored the relationship of religiosity / religions to the socio-demography of households in rural Kilimanjaro. It also examined the general conflicts and synergies between socio-demography and religiosity in the study area. This chapter examines the relationships between religiosity and environment variables, including controls for socio-demographic variables. The specific objectives of the chapter are to:

- Describe the natural environment in the contexts of the people of rural Kilimanjaro;
- Examine the current state of core natural environment variables of water and soils, and analyse spatial differences;
- Examine the association of environmental perceptions and the degree of religiosity of those households in rural Kilimanjaro who reportedly adhere to the Roman Catholic Church;
- Examine the relationship between religiosity and the consumption of the core environmental resources of water and energy (fuel wood) among those households in rural Kilimanjaro who adhere to the doctrines of the Roman Catholic Church; and
- Examine the role of the Roman Catholic Church, in terms of local environmental interventions (environmental, policies, plans or projects), and to analyse eco-religious-myths and sacred sites in rural Kilimanjaro

The following hypotheses will also be examined:

- That there is a positive association between environmental perceptions and the degree of religiosity in those households in rural Kilimanjaro who adhere to the Roman Catholic Church; and
- That there is a relationship between religiosity and the consumption of the core environmental resources of water and energy (fuel wood) among the households in rural Kilimanjaro who adhere to the Roman Catholic Church.

7.2 Results and Discussions: Core Environmental Variables in the Contexts of the People of Rural Kilimanjaro

This section draws together some of the key issues surrounding the concept of environment in the context of rural Kilimanjaro, and explores some of the central conceptual issues involved in the investigation of the connection between religion and environmental perceptions. This is an expansion on the results in Chapter 5 of this thesis, and gives meaning to the environmental (practice and perceptions) indicators which were considered important by the households and people of the rural Kilimanjaro, when the exploratory analysis of Nominal Group Technique (NGT) was performed. The section also draws relevant information from a standard questionnaire which helps clarify environmental variables identified through NGT.

Chapter 7: Religious Phenomenology and Ecology

The objective of carrying out an environmental variables analysis is to provide a picture of the local environment from the point of view of the rural people of Kilimanjaro. This will ensure that the subsequent analysis of eco-religio variables remains focused on the influences they have on rural people's livelihoods and cannot not diverted towards looking at global environmental issues.

The figure 27 provides a summary of environmental variables in order of importance.

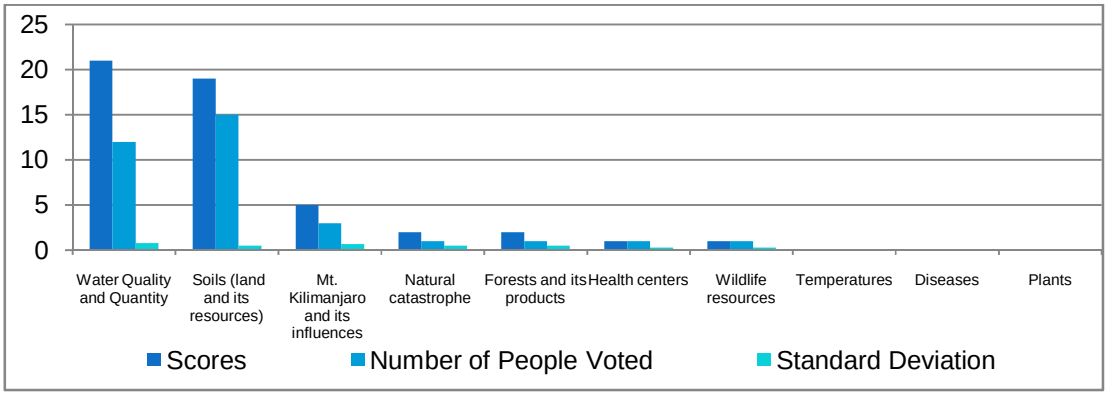

Figure 27: Results of the NGT on core environmental variables

Almost unanimously, the rural people of the Kilimanjaro region regard water and soil (and land and its resources) as core variables which represent key indicators of change in the state of the local natural environment. Water and soil resources have always been critical to the survival of human societies in rural Kilimanjaro in terms of sustaining livelihoods.

Members of the Catholic households felt strongly that their livelihoods were hugely influenced by the quality of land and availability of water. Land quality and access to water also determines the price of land in their villages. The land issues also featured prominently in other human development outcomes in terms of socio-demographic variables and issues of the availability soil and water seem to relate to many other socio-demographic outcomes in rural Kilimanjaro.

With regard to the issues of soil and water, the members of the households reiterated that the main problem facing farmers, particularly in the maize-beans zone, is soil erosion. The results of the survey show that households generally own between 0.5 and 2.5 acres (0.2–1 ha) of land. After harvesting their maize and beans, they remove all of the crop residues to feed to their animals. That leaves the soil bare, and gullies form easily when it rains heavily. The water does not seep into the soil, so there is not enough moisture in the soil to support a crop through a dry spell. The water runs off instead, carrying valuable topsoil with it. Households cannot afford to apply expensive fertilizer to maintain their crop production. The result is declining yields in these areas, leaving households with less food and less money. Both water and soil were voted by 12 and 15 households respectively as being key factors.

Other environmental variables which were identified by the local people as affecting their livelihoods included the influences of Mt. Kilimanjaro as the major regulator of weather in the area. During the discussion, members of three households who voted for this variable mentioned that cool and calm weather occurs frequently at high attitudes on the slopes of Mt. Kilimanjaro. They also reiterated that, apart from rainfall, the main sources of reliable water are the rivers flowing from Mt. Kilimanjaro and the springs that originate from the mountain. The selected households were aware that the fertile volcanic soil, which is the main source of their agricultural products, has existed for many years, since the formation of Mt. Kilimanjaro. The Mt. Kilimanjaro forest has a very high catchment value. Water from the reserve supplies traditional supplies irrigation systems for coffee and banana plantations on the southern and eastern slopes. The reserve also supplies the sugarcane plantations of Arusha Chini and the large scale rice project south-east of Moshi (in the Rau Forest). Kilimanjaro is the main contributor to the Pangani river system, which flows to the Indian Ocean, waters several agricultural projects along the way and feeds two major hydroelectric plants.

The influence of Mt. Kilimanjaro includes belts of forests around the mountain. Forest products are sources of building materials and fodder for support livestock which are kept under zero grazing conditions. This is the dominant form of livestock production system in the villages which were studied. The area is dominated by *Ficus sycomorus, Milicia excelsa* and *Newtoniabuchananii.* Other significant trees include *Bequaertiodendron natalense, Tabernaemontana ventricosa, Trichilia emetica* and *Uapaca* sp. A tall, straight boled *Acacia* sp. also appears here. Understorey trees include *Cordia sinensis, Ficus exasperata, Garcinia* sp. and *Markhamia zanzibarica*. The people recognized the influences of the forests on their livelihoods as well as the extent of their impacts on these forests. Much of the reserve is in good condition. However, near the border of the forest reserve, now part of the Kilimanjaro National Park, open deciduous forest is being degraded by overgrazing, logging and burning. Near the villages at either end of the forest, firewood is collected, and the south western edge is grazed and sometimes damaged by bushfires. At the south eastern end of the forest, *Warburgia salutaris* bark is collected for sale in the market, where it fetches at high prices. In consequence many trees are debarked.

Kilimanjaro National Park was considered to be the third most important type of natural environment because it was considered by the majority (65.4%) of the members of Catholic households to be the most important source of good weather, rainfall and water (Figure). The majority (78%) of the respondents to the religio-ecology survey were Catholics, thus making their perceptions statistically significant for the analysis of the connections between religion and ecology in rural Kilimanjaro. Apart from the ecological values of the Kilimanjaro National Park, members of the Catholic households generally had the opinion that KINAPA provided some support for foreign tourism and the local economy (Figure 28).

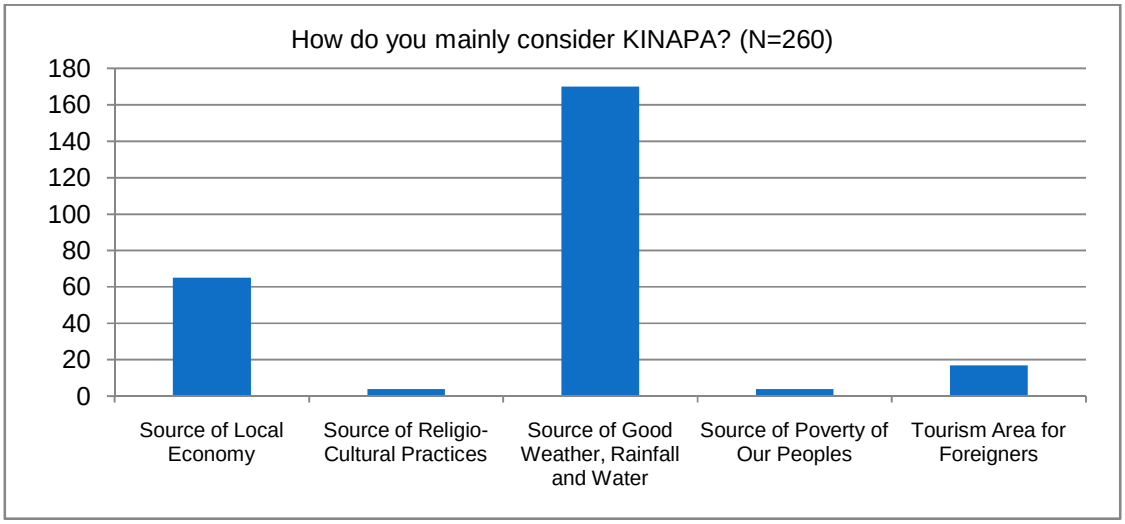

Figure 28: Importance of KINAPA to the households in rural Kilimanjaro

Despite the fact that 25% of the respondents (recognized the economic value of KINAPA, the majority (83%) of members of the Catholic households categorically declared that they received nothing from the ecotourism initiatives related to the tourism activities of the national park (Figure29). Very few respondents (1.5%) perceived KINAPA to be a source of religio-cultural practices. No evidence was found during the study that KINAPA was used by the local people for religio-cultural or ritual practices.

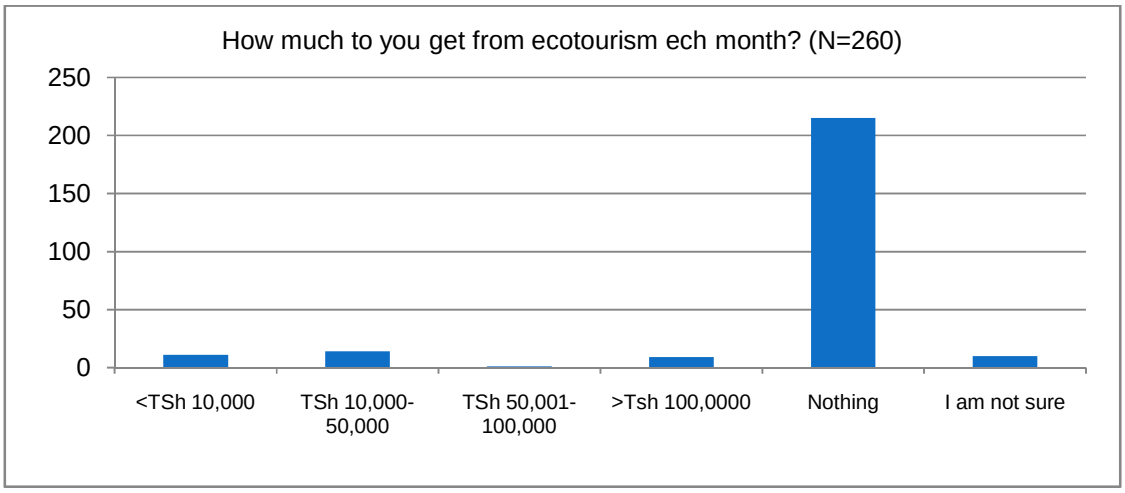

Figure 29: Monthly contribution of ecotourism to households in rural Kilimanjaro

Natural catastrophes like extreme weather were also considered by households to be important environmental variables which could influence their livelihoods. Extreme weather in rural areas can lead to drought, wildfires and hunger in rural Kilimanjaro. It can cause excessive rainfall and subsequent floods, which can result in serious damage to crops and human life and property on the lower slopes of Mt. Kilimanjaro.

Environmental diseases like malaria, typhoid and dysentery are endemic in rural Kilimanjaro. Thus, common types of diseases and the locations of health centres were identified during the process of generating ideas for NGT. The identification of health centres as core environmental facilities is recognition of the role they play in treatment of sick people in the area and of their influence on local people's livelihoods. Responding to health related environmental problems, the Catholic Diocese of Moshi has developed a Strategic Health Plan (2010/2014) in order to enhance health care, promote public health and to protect against and prevent environmental diseases. Specifically, the Church intends to increase health care service availability and accessibility, improve health care quality, safety, and provide better value for money. It will recruit, develop and retain a competent health care workforce in its hospitals and health centres. The Church also intends to prevent the spread of infectious diseases and to promote and encourage preventive health care.

It was also recognized that wildlife is an important element in the natural environment. Therefore, the area, including the six villages bordering the Kilimanjaro National Park (KINAPA), has been established as a park for bird watchers and mountain climbers. Therefore wildlife tourism has become one of the major sources of income for people living in these villages. However, wildlife moves freely between KINAPA and the Amboseli National Park (Kenya); between KINAPA and Tsavo National Park (Kenya) and between KINAPA and the Enduimet Wildlife Management Area. Such movements, particularly those of elephants, can cause significant amounts of damage to people's properties and livelihoods. Thus, the presence of wildlife can be a source of either both profit and loss for local people.

Rural people in Kilimanjaro also listed the following aspects of the environment in order of priority: natural catastrophes, forests and their products, the health infrastructure, wildlife resources, temperatures and human and plant diseases (Figure 27). The presence of the list of environmental features like forests and their products, wildlife resources, temperatures and plants in general did not come as a surprise because these natural environments are related to both the KINAPA environment and the tropical forest belt which touches all the six villages in the study, and which surrounds KINAPA. Catastrophic variables which can adversely affect the livelihoods of the peoples of rural Kilimanjaro, like floods and drought were also considered as being natural by the Catholic households.

Apart from HIV/AIDS pandemic, other human and plant diseases were also connected to the weather of the highlands in the tropical regions. However, such a strong recognition of the health infrastructure as a core natural environment phenomenon was not expected. Due to the prevalence of tropical diseases like malaria, typhoid, and dysentery in these areas, adherents of the Roman Catholic faith observed that they badly needed an effective health infrastructure. This requirement clearly influenced their responses to questions about what they considered to be the most important core natural environmental facilities for the area.

Members of the Catholic households did not mention the environmental sustainability indicators of the MDG related to the quality of their settlements, improved sanitation in villages, and carbon emissions and ozone layer depletion. This was presumably because these outcomes seemed distantly related to their immediate livelihood options.

Attitudes and perceptions of rural people about the natural environment did not feature in the analysis of natural environment by the rural people of Kilimanjaro. Nonetheless attitudes and perceptions of the rural people on land, soils, water, forests and management aspects of the rural natural environment represent core research variables. People's decisions and actions concerning their environment are based not only on objective but also on subjective non-physical factors. Perceptions and attitudes are important issues in people's livelihoodsfor the reason that they are able to change their values and thoughts, develop knowledge, improve overall welfare, and change their logic of realism.

Subsequent sections will consider the natural environment in the contexts of the people of rural Kilimanjaro. Succeeding sections will also consider non-physical elements of the environment like perceptions and attitudes of rural people towards the environment in the analysis of eco-religion.

7.3 State of soil and water characteristics in rural Kilimanjaro

Due to the fact that water and soil were considered core environmental variables which support livelihoods of the people of rural Kilimanjaro, carrying out an examination of the current state of attributes of these two parameters was therefore considered particularly important. An understanding of the state of water and soil characteristics help to build a database for longitudinal religio-ecological studies in these areas, in order to promote a better understanding of the help that longitudinal religio-ecology data could provide for human development in rural Kilimanjaro. Basic and accurate data on the water and soil characteristics of the research sites was not immediately available.

An analysis of soil and water in rural Kilimanjaro could be carried out to give a broad indication of the quality of these two important environmental resources. This could provide some perspective on the examination of eco-religious associations in subsequent sections.

Specific differences between the water and soil characteristics of the research sites were examined. An examination of variations in the soil and water characteristics of the samples collected from the research sites could shade some light on possible influence of different types and levels of human activity. Spatial variations in water and soil characteristics could also be used for discussion in subsequent sections, particularly if inter-village variations in environmental perception and religious faith and attitudes of the Catholic households were taken carefully into consideration.

7.3.1 State of water in rural Kilimanjaro

Water possesses several unique physical, biological and chemical properties that are directly responsible for the evolution of our environment and the life that functions within it. The low-cost supply of large quantities and quality of water for various human uses is one of the foundations of traditional and modern human societies. The demand for water is increasing around the world but supplies are shrinking because of population growth, new demands and decreasing water quality and quantity (Mutikanga et al., 2009). Concerns about the long-term effects of water use, the and the decline in quality and quantity of water needed for human purposes have brought the need to properly manage water resources to prominence(e.g. Malley et al. 2008; Palela, 2004). For these and many other reasons, the rural people of Kilimanjaro saw water as the most important element of the local environment. This section describes the state of water conditions of the study area. The Electrical Conductivity (Ms/cm) in milligrams per litre (mg/l) of traces of Fluoride (F), Sodium (Na), Calcium (Ca), Iron (Fe), Zinc (Zn) and Copper (Cu) were analyzed from the samples collected. It was assumed that significant differences in the water bio-chemistry of the six villages would be identified.

Appendix 8 provides a summary of results of the analysis of bio-chemistry of water samples collected from the research sites. The differences between the water elements in the seven sites (six villages and KINAPA) were examined using Kruskal Wallis test, a non-parametric test equivalent to the one-way ANOVA, to compare three or more sets of scores from different groups.

Significant ($p<0.01$) differences were discovered in the water samples from all the sites in terms of water pH, Electrical Conductivity, water hardness, Fluoride (F^-), Magnesium (Mg) and Calcium (Ca) chemical elements (Table 20).

Table 20: Differences in water chemistry between six villages of the rural and KINAPA at $p<0.01$

	Water pH	Electrical Conductivity (mS/Cm)	Water Hardness (CaCo3 mg/lt)	Nitrates (mg/lt)	Fluoride (mg/lt)	Sodium (mg/lt)	Calcium (mg/lt)	Magnesium (mg/lt)	Iron (mg/lt)	Zinc (mg/lt)	Copper (mg/lt)
Chi-Square	20.647	19.754	18.189	9.789	18.454	6.858	18.711	15.110	10.031	2.940	6.370
Df	6	6	6	6	6	6	6	6	6	6	6
Asymp. Sig.	0.002	0.003	0.006	0.134	0.005	0.334	0.005	0.019	0.123	0.816	0.383

Non-significant differences were discovered in the amounts of the substances, namely Nitrates (NO_3), Sodium (Na), Iron (Fe), Zinc (Zn) and Copper (Cu) in water samples collected from the study areas and KINAPA.

Almost half of the world's population relies on non-networked water supply services, in which contamination by *Escherichia coli* (*E.coli*) and faecal streptococci, is highly likely (Pickering et. al., 2010). In the villages in rural Kilimanjaro which were surveyed, 85% of the residents relied on a non-networked water supply service. When the biological parameters of the water samples from the study sites were examined, *E.coli* was absent in all the samples, including control samples collected inside the Kilimanjaro National Park. Levels of *E.coli* bacteria in water samples were quantified by using the most probable number (MPN) method, a test which assumes that cultivatable bacteria meet certain growth and biochemical criteria. Preliminary tests suggested that *E.coli* was not present at in excessive amounts and that therefore there was no need for further tests.

The differences in the water chemistry which were revealed by the results of water analysis may have been caused by the existence of different types and levels of human uses and different types and levels of physical development in the area. Soil types, altitude and weather may have also influenced the differences in water chemistry. There was no immediate indication that use of water for religious purposes had an influence on the state of water in the area.

7.3.2 State of soil in rural Kilimanjaro

Soil was identified by a selected group of rural people as the second most important natural environment variable in rural Kilimanjaro. Soil is closely connected to the culture and civilization of an ethnic group living in a given place, including their religion, thoughts, livelihood and health (e.g. Leke at. al. 1993; Enyong et. al., 1999; Gray & Morant, 2003). It is important for people to protect their soil, agriculture and the environment because the collapse of soil leads to the collapse of human culture, civilization, livelihood and health (Leke et. al. 1993; Diamond, 2005). These links between the soil and culture, civilization, livelihood, religion and health may result from the ethical attitudes people have about the soil which they demonstrate through their interactions with it. However, soil resources have been overexploited by modern society and are currently on the verge of collapsing (Minami, 2009). Soil is a heavily used environmental resource on which the rural people in Third World countries are hugely dependent. In Tanzania, the Kilimanjaro in particular, rural people are strongly connected to the soil and are heavily dependent on it for their short-term and long-term plans. The majority of conflicts in rural Kilimanjaro are connected to land use or ownership or both. Land is almost everything for the peoples of the area. Soil and land are connected because soil quality is defined as the fitness of soil for a specific form of land use.

The types of soil in these villages include alluvial loam fluvisols, gleysols, in depressions, vertisols and alkaline soils (Lovett & Pocs, 1993)(Figure30). Due to the dry climate, alkaline salts are often deposited near the surface. The depressions are seasonally inundated.

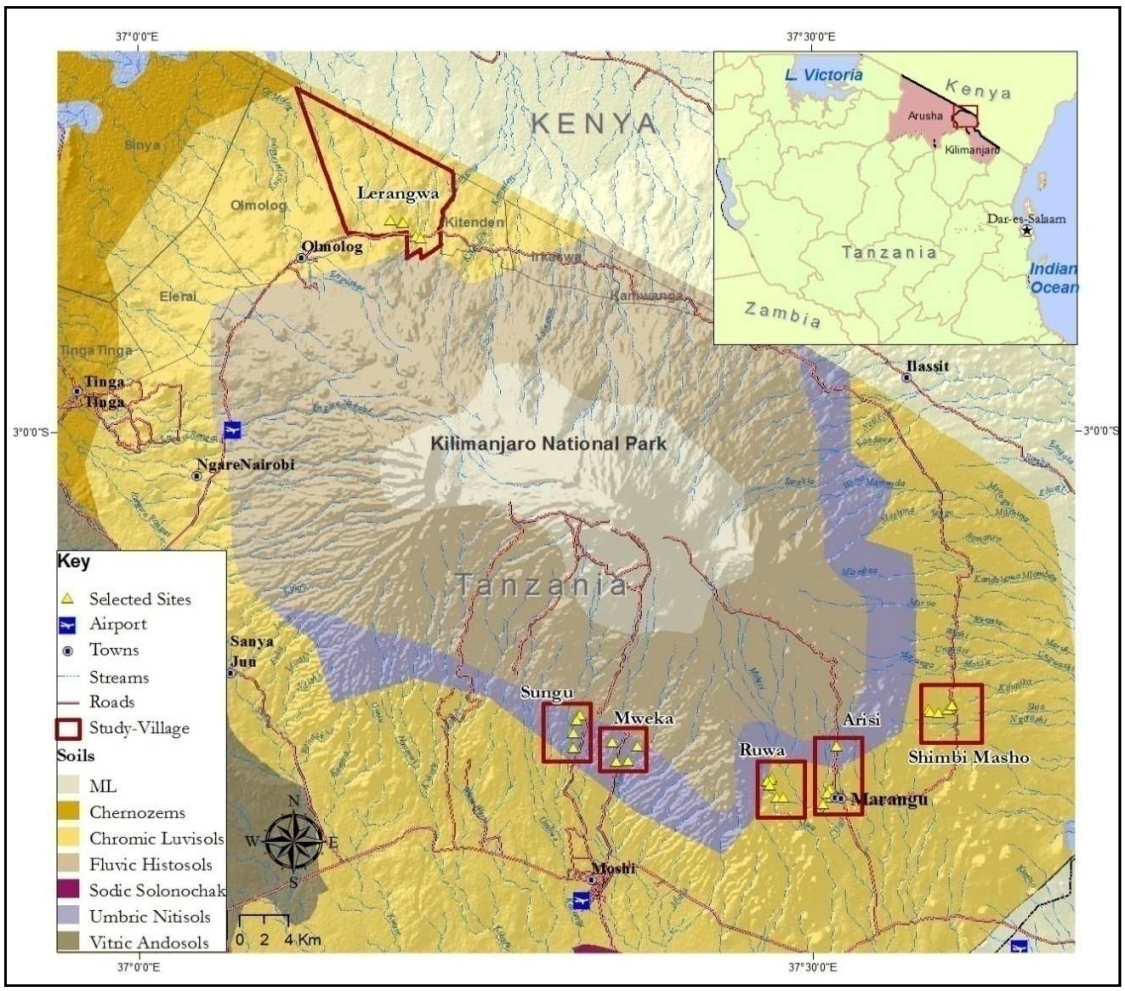

Figure 30: Soil types in rural Kilimanjaro

The soil in the research sites is generally fertile, and the rainfall is relatively good, around 1800 mm a year in the predominantly coffee-growing area (all villages, excluding Lerang'wa village), and about 800 mm in the maize/beans area (Lerang'wa village). The research sites have some of the highest population densities in Tanzania (650 people/km^2) in the coffee-growing area and 350 people/km^2 in the predominantly maize/beans growing zone (Lerang'wa village). Some scholars have recently perceived declining soil fertility in these areas and a decrease in the quality and quantity of water, due to erratic rainfall and decreased amounts of spring and surface water (Majule, 2003).

Soil texture (composition of sand, clay and silt), soil pH, soil exchange capacity and the availability of P-mg/kg were also analysed (Appendix 9).

Other soil aspects which were analysed included Iron (Fe), Zinc (Zn) and Copper (Cu). Nitrogen (N), Potassium (K), Sodium (Na), Calcium (Ca), and Magnesium (Mg) were also analysed from the soils samples collected from the six villages around Mt. Kilimanjaro and control samples were collected inside the Kilimanjaro National Park.

In order to assess the state of the soil in rural Kilimanjaro, variations in soil properties from the seven sites (six villages and KINAPA) were analysed using a non-parametric Kruskal Wallis test (Table 21). Significant ($p<0.01$) variations were discovered in the percentages of Copper (Cu), Fluoride (F) and Nitrogen (N) in soil samples of different sites.

Table 21: Differences between soil elements in seven sites in rural Kilimanjaro ($p<0.01$; df=6; N=32)

	% Sand	% Silt	% Clay	Soil pH	P (mg/kg)	% N	K (mg/100g)	Na (mg/100g)	Ca (mg/100g)	Mg (mg/100g)	CEC	F (mg/kg)	Zn (mg/kg)	Cu (mg/kg)
Chi-Square	5.67	11.31	6.46	11.25	11.14	19.52	13.51	6.57	9.70	6.56	15.17	20.82	14.83	19.81
P values	0.460	0.079	0.373	0.081	0.084	0.003	0.036	0.362	0.138	0.363	0.019	0.002	0.022	0.003

Chemical properties generally varied more than physical properties in terms of the analysis of the soil samples collected from the study areas. Non-significant differences were observed between sand (%), silt (%), and clay (%) in the soil samples collected in the research sites. Other soils' chemical properties, such as Phosphorous, Calcium and Magnesium also showed non-significant variations in the samples collected from the seven research sites (Table 21).

It may be that the variations, or the lack thereof, in the soil in various study area sites were mostly a reflection of differences in levels and types of land use. This may be reflected in differences in types of soil management e.g. additions of fertilizer and litter management, rather than the influence of religions. However, additional research is needed to assess the importance of the management on soil properties and whether religious attitudes or perceptions can have an influence on such variations. Social-economic factors can certainly strongly influence soil conditions (Boardman et al. 2003).

There was no indication, therefore, that religious practices or perceptions had an effect on the state of soil in rural Kilimanjaro. There was also no evidence that religious institutions had played any part in initiating technologies aimed at reducing soil erosion, conserving and improving the soil fertility, and keeping water in the soil in order to retain the right conditions for crop production.

Outside the study villages, the Catholic Diocese of Moshi owns three main land projects: the stone quarry, the Uri Coffee farm and the Kilacha farm, but these were established for income generation rather than to help achieve environmental outcomes. There is also a mention in the Strategic Plan for the Diocese Catholic of Moshi that the Church shall engage in soil and water conservation projects during the 2010-2014 period of plan implementation. Subsequent sub chapters will examine the association of religious beliefs and the perceptions of the Catholic households with regard to the different types of local environment, with particular reference to the issue of soil conservation.

7.4 Perceptions of natural environment and religiosity

7.4.1 Introduction and data analysis

This section consists of a response to the assumption that there are positive relationships between both intrinsic and extrinsic religious orientations and the environmental practices, perceptions and attitudes of the households in the rural Kilimanjaro. Reference will be made to a field study in which the questionnaires were presented to, and interviews were carried out with, the Catholic households in the region.

This section draws on a select number of quantitative public perception surveys to draw some broad conclusions about the perspectives on the natural environment among the Catholic households.

How does a human, as an individual or as part of a particular cultural group, perceive the natural environment? This is a fundamental question to ask when trying to understand the complex interrelationships between people and the biosphere (Whyte, 1977). People's decisions and actions concerning their environment are based not only on objective but also on subjective factors. This is the underlying principle of research into environmental perception.

Perceptions and attitudes are influential issues in people's lives because they are able to change their values and thoughts, develop knowledge, improve overall welfare, and change their sense of reality (Del Rio &Oliveira, 1996). Perceptions shape the interpretation of information when it enters a social system from an ecosystem, and perceptions shape the decision-making process that leads to actions affecting the ecosystem (Marten, 2001). Perceptions arise from different sources. Life and socio-cultural experiences, education backgrounds, images, stories, religious education are some of the major aspects which help form people's worldview, their perception of themselves and the world around them. Therefore the section examines whether the perceptions of the households towards of natural environment stem from religious beliefs and practices.

Chapter 7: Religious Phenomenology and Ecology

Religion is a way in which societies use generations of accumulated wisdom to organize their values, perceptions and behaviour (Marten, 2001). It can have a major role in a society's perception of the relationship that its people have with one another and with nature (Biel & Nilsson, 2005). Religions offer moral codes, guidelines about right and wrong and rules of behaviour that are particularly effective because they are reinforced by emotionally compelling beliefs, symbols and rituals. Religion is a powerful way in which societies organize their worldviews and shape human behaviour. The importance of such moral codes for human-environment interactions is the balance they promote, not only between the desires of each individual and the needs of others, but also between short-term desires and longer-term considerations, such as the concern for future generations (Marten, 2001).

Different religions can have significantly different perceptions about the relationship of humans to nature and significantly different moral codes to guide human interaction within the environment. While every form of perception has some basis in reality, some perceptions of nature are more useful because they embrace reality more completely or accurately. Therefore this section explores the perceptions of the Catholic households in this area towards the natural environment around them.

A number of specific environmental indicators were used to examine specific religio-environment connections in rural Kilimanjaro, including controlling for the core socio-demographic variables described in Chapter 6. The connections between religiosity and the environment were analyzed through an examination of the correlation of core environmental variables and the core religiosity variables. Religiosity can be defined as beliefs, feelings, and practices that are tied to religion (Ho, 2007). For example, going to church or temple on a regular basis is a form of religiosity. Religiosity can be further divided into intrinsic and extrinsic religiosity (Allport & Ross, 1967). Intrinsic religious orientation is defined as the extent to which individuals actually partake in religious activities (Swanson & Byrd, 1998) while extrinsic religious orientation is defined as an individual's inclination to partake in religious activities as a way to obtain desired emotional or social outcomes (Swanson and Byrd, 1998). In other words, the intrinsically motivated individual lives his/her religion (self-transcendent) while the extrinsically motivated individual uses his/her religion (self-oriented) (Allport & Ross, 1967). The following three extrinsic and intrinsic religiosity variables account for the majority of variations in the dataset and are used to analyse religio-environment connections:

- Church attendance;
- Degree of belief in God; and
- Frequency of reading religious books.

Frequency of prayers, which was used in Chapter 5 as one core indicator of religiosity, was not considered in the analysis of religio-environment connections because it was considered an outcome of those core religiosity indicators outlined above and it is more intrinsic indicators compared to other religiosity indicators. Apart from weak correlation with age, prayers were distantly related to other socio-demographic variables in Chapter 6. Chapters 5 and 6 also revealed that money spent to give support on religious grounds was closely linked to other wealth indicators than religiosity. This variable was also not considered for religio-environment analysis.

Chapter 5 also showed that the Roman Catholic adherents accounted for the majority (78.3%; N = 360) of the respondents. Due to the statistically insignificant numbers of respondents from other religious denomination, data from Roman Catholic respondents are used to test hypothesis of relationship of religiosity and environmental variables. Therefore, out of 360 participants in the study, only data from the Roman Catholic respondents (N = 282) are used as the remaining participants were affiliated with various religions, each with statistically very small numbers of participants (N>100).

The environmental perceptions and practices of specific households may also be associated with non-religious indicators like socio-economic phenomena. For example, level of education is an independent variable because it is associated with another variable of water and energy consumption. Therefore, perceptions of the connection between the natural environment and religion will be examined, while socio-demographic variables are kept constant. The socio-demographic variables which are used as controlled variables are:

- Level of education;
- Age of households;
- Gender of households;
- Wealth in terms of size of land owned by households; and
- Health conditions in terms of incidence of malaria amongst the households.

Factor analysis was used to explain the relationships between religiosity and socio-demographic variables at an ordinal level. Factor analysis helps to discover simple patterns in patterns of relationships among a large set of ordinal and continuous variables (Acton & Miller, 2009). Each pattern appears as a factor delineating a distinct cluster of interrelated datasets. The distinct clusters of interrelated datasets which account for the majority of variability in the data set define the core variables for the research.

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Environmental dataset available for religio-environment analysis are of a categorical nature, apart from information on estimated water and energy use per day reported by the Catholic households. Because the available dataset is categorical, and the amount of ordinal variables data was not extensive, the factor analysis technique was not used to detect patterns and identify distinct clusters of interrelated datasets or components. All the available environmental data which were collected from the rural Kilimanjaro through a standard questionnaire are analysed in this Chapter.

The members of the Catholic households felt strongly that their livelihoods were hugely influenced by the quality and availability of water. In rural Kilimanjaro, all the households relied on wood for fuel at any one time during the day. Water, land and forest products were singled out as being the most important resources in the livelihoods of rural people in the Kilimanjaro and Arusha regions. Developing an understanding of the religio-variables which influence consumption of these increasingly scarce resources was one of the key objectives of the study. Subsequently the environmental variables of ordinal nature, which shall be tested in this Chapter, are:

- ☐ The estimated amount of water used by households per day; and
- ☐ The estimated amount of energy (fuel wood) used by households per day.

The images and stories that societies have about ecosystems are the basis for their perception of the natural environment, which has a central role in shaping interactions between social systems (Marten, 2001). The sources of images and stories which shaped the environmental worldviews of the people in Kilimanjaro could stem from religiosity and religions. Religion, and belief in supernatural being, is extremely important to the people of rural Kilimanjaro. Thus, accurate knowledge of the relationship between the religiosity and the environmental perceptions of the Catholic households is imperative for environmental management in the region. The following types of data related to perceptions of important natural environments in rural Kilimanjaro will be used to analyse the religio-environmental connections:

- ☐ Conditions of water, soils, forests, wildlife, rainfall, and climatic conditions;
- ☐ Environmental destructive practices (starting wildfires, water misuse, and haphazard felling of trees);
- ☐ Things considered bad or good by households learned from religions;
- ☐ Major causes of, and solutions to, local environmental problems;
- ☐ The effects of environmental degradation (crop and animal production failures, diseases, and poverty);
- ☐ The performance of local government in environmental management;
- ☐ Church teachings on the environment; and
- ☐ Primary school curricula on the environment.

Details of these variables are contained in Appendix 1. Subsequent sections will include examinations of the local people's perceptions of these environmental variables with relation to their religiosity.

In order to test the hypothesis of there being an association between of perceptions of environment and religiosity (categorical versus ordinal data), cross-tabulation tables (crosstabs), or contingency tables, were employed which used multivariate analysis. A key feature of the crosstabs was the Pearson Chi-Square test of Independence which allowed determination of whether there was a statistically significant association between categorical / ordinal environmental variables and ordinal / categorical religiosity variables or whether environmental variables and religiosity are statistically independent. The crosstabs also meant that socio-demographic variables would remain constant while the analysis of association of environmental variables and religiosity was being conducted. Phi Coefficients helped to detect the strengths of association between concern with the environmental and religiosity (Table 22). The Phi Coefficient (φ or rφ) is a measure of the degree of association between two binary variables (Davenport & El-Sanhurry, 1991).

Table 22: Interpretation of Phi Coefficients according to Davenport and El-Sanhurry (1991)

Phi Coefficients (φvalues)	**Interpretation**
-1.000 to -0.700	Strong negative association
-0.700 to -0.300	Weak negative association
-0.300 to +0.300	Little or no association
+0.300 to +0.700	Weak positive association
+0.700 to +1.000	Strong positive association

Whenever there is random variability inherent in the phenomena under investigation, there is always the possibility that the observed facts result from nothing other than mere chance or coincidence. In order to enhance credibility of results, the following associations will be considered when analysing religio-environmental connections:

- ☐ Those emanating from a sample size of 100, or more households;
- ☐ Those with a Pearson Chi Square of 35.000, or more;
- ☐ Those with a Phi Coefficient of 0.350, or more;
- ☐ Those with Phi Coefficient of -0.350, or more; and
- ☐ Those which remained at a significant level of 0.01.

Spearman's Rank-Difference Correlation Coefficient was used to examine the relationships between ordinal (dependent variables) and ordinal (independent variables) in data i.e. religiosity (church service attendance, degree of beliefs in God number of prayers, religious book reading, money spent to support other) and level of perceived environmental degradation. Spearman's Rank-Difference Coefficient of Correlation is a nonparametric test for determining if there is an association between phenomena (Acton & Miller, 2009). The negative (- or decrease) and positive (+ or increase) signs were used in correlation to suggest direction and strength, but not for cause-effects relationships.

Pearson's Product Moment Correlation Coefficient was used to test relationships between ordinal (dependent variables) and interval or continuous (independent variable) scales; i.e. frequency of prayers and use of water and fuel wood. This is the most widely-used type of correlation coefficient (Pearson, 1896), and is also known as Pearson's r, linear or product-moment correlation.

Interpretation of strengths and direction of correlation coefficients (r values) was presented according to the methodology of Cohen (1988) (Table 23).

Table 23: Interpretation of correlation coefficients by Cohen, 1988

Correlation (r values)	Negative	Positive
None (Very weak)	−0.09 to 0.0	0.0 to 0.09
Small (Weak)	−0.3 to −0.1	0.1 to 0.3
Medium (Strong)	−0.5 to −0.3	0.3 to 0.5
Large (Very Strong)	−1.0 to −0.5	0.5 to 1.0

Since the Correlation Coefficient reduces all the information contained in the scatter plot into a single number, it is a very efficient and powerful way of describing the relationships statistically, though inadequate in describing the cause-effects relationships between religiosity and environmental outcomes. In other words, both correlation coefficients did not show whether religions or religiosity caused changes in the natural environment or vice versa.

7.4.2 Results and Discussions: Association of religiosity and natural environment

People make sense of the complexity that surrounds them by carrying hundreds of pictures and images in their minds about themselves, their society and their biophysical environment, and they have different conceptions as to how each of these is structured, how each functions and the relationships between them (Marten, 2001).

Such perceptions can shape both the interpretation of information when it enters a social system from an ecosystem, and the decision making process that leads to actions affecting the ecosystem (Marten, 2001). Religion is a powerful way in which societies organise their worldviews and share human behaviour and actions. Religions offer moral codes, guidelines about right and wrong and rules of behaviour that are particularly effective because they are reinforced by emotionally compelling beliefs, symbols and rituals (Marten, 2001). Is there any correlation between religiosity and the perceptions of the rural people in Kilimanjaro with regard to the natural environment?

Firstly, this section examines whether an association exists between environmental perceptions and religiosity. The primary assumption was that environmental perceptions and religiosity are independent (and that any observed association has occurred by chance). The existence of any association might suggest or show indications that religions and religiosity shape the environmental world views of the rural people of Kilimanjaro, and vice versa. Therefore, the study collected information on perceptions of different types of natural environments and the attitudes of the members of the Catholic. The baseline information collected could provide a direction for future studies in religion and ecology in rural Kilimanjaro. It should also provide us with ideas on the nature of the religious perceptions and beliefs of local people towards natural environment systems, and whether religious and environmental views are being transformed in the face of growing environmental and socioeconomic concerns. This will also help in responding to key religion-ecology questions like how could contemporary environmental and sustainable development understandings influence religions, religiosity, human behaviour and practices and bring about policy shifts in rural settings. The information about perceptions and practices regarding the environment will also inform local religious leaders about where to focus their efforts to include mainstream environmental knowledge in their church teachings and school curricula in implementing the National Environmental Policy of Tanzania.

Secondly, the section responds to the assumption that there is a positive relationship between the consumption of core environmental resources (water and fuel wood) and religiosity in rural Kilimanjaro. If perceptions on the natural environment are informed by religiosity, it is likely that the decision making process of households which is informed by religiosity can lead to actions which will affect the consumptions of environmental resources like water and fuel wood in rural Kilimanjaro.

In order to obtain information about perceptions of the environment, households were asked to indicate conditions ('Bad', 'I Don't Know' or 'Good') of the natural environment and list the main things, good or bad, which they learned by affiliating with the Roman Catholic Church. The results of the multivariate analysis using the Pearson Chi-Square test for Independence show a non-significant association of religiosity (frequency of reading religious texts and attending church services and degrees of belief in God) and perceptions of those Catholic households regarding the condition of water, forests, rainfall and the climate in recent years and of the use of grass as fodder for livestock in the villages (see succeeding sub sections). Results also show a non-significant association between religiosity and the perceived conditions of wildlife in the study area and perceptions of good or bad things about the natural environment, learned by households (N = 282) from religion (see succeeding sub sections). The association of religiosity and the perception of starting a wildfire in forests was also non-significant.

Despite the fact that there was non-significant association between religiosity and these variables, the majority of those in Catholic households indicated that they had acquired neither useful nor useless environmental knowledge from church affiliation (Figure 31). They further indicated that they had received limited knowledge about water and forest conservation, particularly tree planting knowledge, from religion.

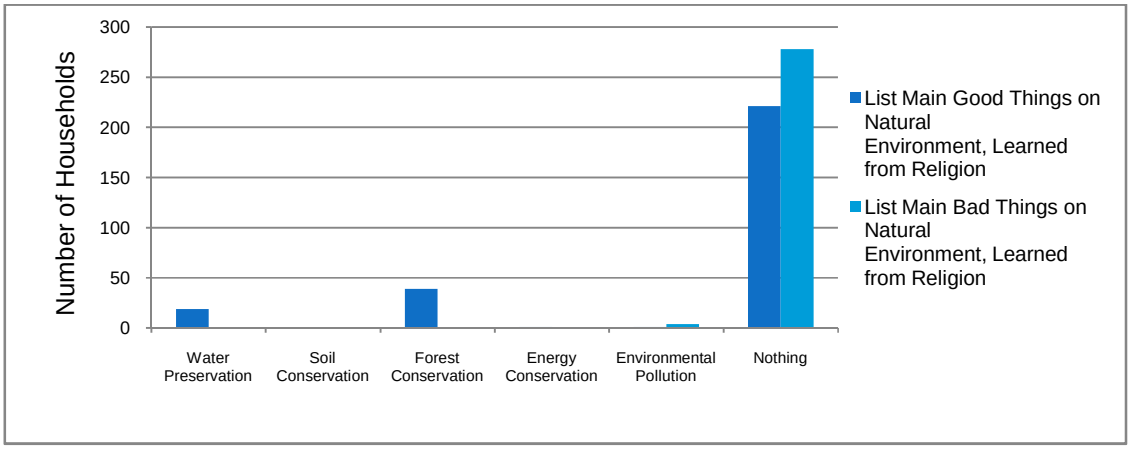

Figure 31: Perceived bad and good things on environment learned from religion

Members of Catholic faith perceived that they had learned nothing about terms of soil and energy conservation and did neither acquire soil and energy conservation knowledge nor skills from religious leaders, religious texts or by attending church services.

Despite this, the results showed a significant and positive association between religiosity and the perception of members of the households about environmental degradation practices, and towards the role of God, religious leaders, individual humans and the local government in environmental management. The results also showed a significant and positive association between religiosity and environmental factors, which are perceived by households to influence poverty, diseases and pollution in the villages of rural Kilimanjaro. An association was made between religiosity and the perception of members of Catholic households with regard to the primary school curriculum on environment.

The results of a multivariate analysis of the association between religiosity and perception of the environment were put into four related groups for analysis and discussion in the succeeding sections:

7.4.2.1 Poverty-environment connections and religiosity

Due to the increasing focus on the urgency of reducing poverty in rural areas, and a broadening understanding of the causes of poverty, many studies have been undertaken to uncover the links between poverty and the environment (DFID et al., 2002). Prakash (1997) concludes that the relationship between poverty and the environment is mediated by institutional, socioeconomic and cultural factors. There are could also be many reasons for engaging in the effort to enhance environmental awareness and action within the religious communities. One reason is the likely connections between environmental degradation and poverty on one hand, and religion and poverty on the other.

In order to understand how the households of rural Kilimanjaro perceived the existence of an association between of poverty and the environment, and whether their worldviews are founded on religiosity, the following questions were asked: Are people in our village poor because of environmental problems or are crop and animal production in the village is failing because of environmental problems; is the increase of incidences of disease in the village an indicator of environmental degradation, and have certain types of fertilizers caused environmental problems which increase poverty in the village? (see Figure 32).

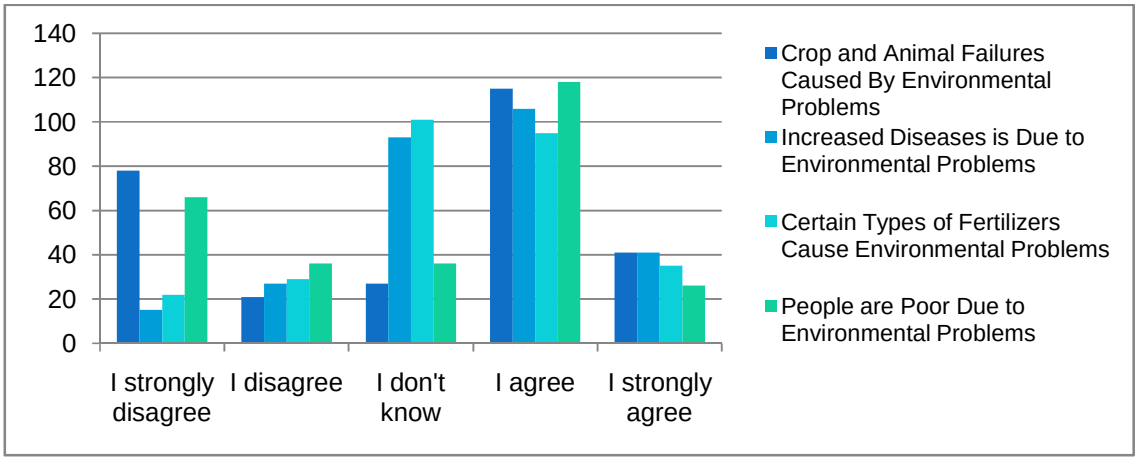

Figure 32: Summary of responses from households on poverty-environment connections.

Overall, the majority (51%) of households agreed that there is a connection between the environment and poverty in their villages. They indicated that the use of certain types of fertilizers can cause environmental problems and that this increases the amount of poverty in these villages. They also agreed that an increase in the incidence of diseases in the village is an indicator of environmental degradation and that people in the villages are poor because of the environmental problems currently facing their villages. They also insisted that crop and animal production in their village is failing because of environmental problems that befell their villages. Information from research into the relationship between rural poverty and growing environmental degradation in these villages was not available at the time of writing this thesis.

Nonetheless, the views of these households on the state of the local environment and the local economy may be a reflection of the true deterioration of environment quality and livelihoods in these villages. NGT results indicated that water, forests and soils are used by the rural people as indicators of environmental quality. Mushi (personal communication, 2012), a local resident of the Mweka village, informed me that all but one of the rivers flowing from Mt. Kilimanjaro across his villages were now seasonal, compared to twenty years ago, and that the remaining rivers flowed when it was raining. Changes in stream flow on the slopes of Mount Kilimanjaro were associated by indigenous mountain settlers with the disappearance of forest cover and the introduction of exotic tree species (Kisanga, 2007). Local communities believed that the thick forest cover with certain types of trees ensured a stable supply of water from natural springs, streams and rivers. It is also perhaps inevitable that, in the absence of a truly scientific perspective from hydrology, myths and legends concerning the role of forests on water resources will be promulgated and, with time, will be accepted with all the authority of belief (Kisanga, 2007).

Mushi (personal communication; 2012) also informed me that the maize and bananas in his farms could not prosper without additional fertilizers, and that this was an indicator of decreased soil productivity. For many years, the staple food in this area has been bananas, but now most of the people eat maize (The Five Years' Strategic Plan of the Catholic Diocese of Moshi, January 2010 – February 2014, 2011). Inadequate water supplies from drying rivers, streams and springs and decreased soil productivity in these villages may be a major cause of poverty in these villages. Subsequently, the perceptions of local people with regard to the connections between poverty and the environment may originate from real and current socio-economic and environmental states. Some households (26%) did not agree on the connections between poverty and environment, while 23% of the members of Catholic households did not know whether a connection existed between of poverty and the environment.

This section examines whether perceptions of such a connection can be associated with the religious practices and beliefs of rural Kilimanjaro. The results of the Pearson Chi-Square test of Independence showed that a significant and positive association between religiosity and perceptions of the connection between environment and poverty connections among members of Catholic households (Table 24).

Table 24: Results showing association of and perception of the natural environment (significant at $p<0.01$).

Environmental Variables	Religiosity Variables	Pearson Chi-Square Value	Phi - Coefficients	DF
Crop / animal production in the village is failing because of environmental problems	Frequency of reading religious texts	77.094	0.523	16
	Frequency of attending church services	69.638	0.497	16
Use of certain types of fertilizers cause environmental problems	Frequency of reading religious texts	53.243	0.435	16
Increase incidence of diseases in the village is an indicator of environmental degradation	Frequency of reading religious texts	36.776	0.361	16
People in the village are poor because of environmental problems	Frequency of reading religious texts	43.852	0.394	16
	Frequency of attending church services	51.225	0.426	16

Based on the controlled results, a number of questions can now be asked. Do attendance at church services and the frequent reading of religious books influence the perceptions of households with regard to the connection between poverty and the environment?

Chapter 7: Religious Phenomenology and Ecology

Catholic Social Teaching recognizes that the poor are the most vulnerable to environmental impacts and endure disproportional hardship when natural areas are exploited or damaged (Himes, 2005). Another question is whether this association is the result of statistical chance and whether multiple other socio-demographic variables inform households about the connections between the environment and poverty? In order to clearly understand whether these associations of connections between the environment, poverty and religiosity are powerful and true, and to try to uncover other potential underlying factors which could influence these religio-environment associations, the socio-demographic variables of age, gender, education, wealth and health, which could affect environmental perceptions of households, were held as being constant through the use of the crosstab multivariate analysis technique.

The results showed that the perceptions households that the crop and animal production in the village is failing because of environmental problems was positively and significantly associated with the frequency of reading religious texts in both men (N=157; X^2=38.00; DF=12; rφ =0.471) and women (N=124; X^2=51.935; DF=12; rφ =0.471) at p<0.01. The results also showed a significant and weak positive association between the perception that the use of certain types of fertilizers causes environmental problems and the frequency of reading religious texts among male household members (N=157; X^2=36.454; DF=16; rφ =0.482) at p<0.01. The results of Chapter 6 indicate significant gender differences in the frequency of reading religious books (t(279) = 2.284,p<0.01). The mean frequency of reading religious books was slightly higher among males (M = 4.15; SD = 1.073) as compared to their counterparts females (M = 3.77; SD = 1.342). Available literature on differences in religiosity between genders are summarised under literature appraisal chapter, and can be divided into four: the roles of genders in church institutions, their commitments to church doctrines, the third literature examines whether differences in church commitment produce different behaviour and practices between genders and the fourth look at the responses of different genders to different economic, health or environmental conditions.

In rural Kilimanjaro however, the engagement of households in socio-economic activities are strictly divided on gender lines. Women are mainly responsible for feeding families and they depend highly on the natural environment to provide them with their requirements such as water, energy supplies and basic food. Severe environmental degradation in rural Kilimanjaro puts extra burdens on women, who are often left behind to run the households while men are engaged in other non socio-economic duties.

Water, land and energy are central household activities for women, but water and energy shortages, and other problems with access (land tenure, affordability) mean that gender issues are crucial in rural Kilimanjaro. A rich body of literature also exists explaining the connections between women and the natural environment. A large number of previous studies have shown that women are more likely than men to engage in environmental ethical behaviours (Yacoob, 2009). Among the women, any connections between the frequency of reading religious texts and their perceptions of why crop and animal production in the village were failing because of environmental problems are unclear. The results also show that women read religious texts less than men. Perhaps the perceptions of women regarding the connections between the environment and poverty emanate from their intimacy with the natural environment rather than religious materials. It is clear that many, if not almost all, aspects of African beliefs and behaviours exhibit dimensions linked to the natural environment (Olupona, 1999). In rural Africa people usually do not perceive natural environment conditions and take actions unless that action has functional value, if it provides food for family, increased material wealth, or offers spiritual satisfactions (Olupona, 1999).

Two environment-poverty connection indicators could be observed in association with the frequency of reading religious texts amongst men in the households. The results of Chapter 6 also showed that the mean frequency of reading religious texts was higher in the men than in the women. Compared to women, men in rural Kilimanjaro tend to be slightly distantly connected to the natural environment. Perhaps their perceptions of the environment-poverty connections are, by and large, informed by their close affiliation with religious written materials. More research into the cause-effect associations of perceptions of the environment and religiosity is required to understand whether religions influence the environmental worldviews of the rural people.

The results also show that all four environment-poverty indicators for those members of the households with a specific health status i.e. those reported not to contact malaria over a period of three years (Table 25) a significantly and positively associated with religiosity (attending church services and reading religious texts).

Table 25: Perceptions of environment-poverty connection and the religiosity of households reporting no contact with malaria (N=140; significant at p<0.01)

Environment-poverty connection indicators	Religiosity variables	Pearson Chi-Square Value	Phi - Coefficients	DF
Crop / animal production in the village is failing because of environmental problems	Frequency of reading religious texts	64.178	0.667	16
	Frequency of attending church services	50.620	0.601	16
Use of certain types of fertilizers causes environmental problems	Frequency of reading religious texts	41.340	0.543	16
Increased incidence of diseases in the village is an indicator of environmental degradation	Frequency of reading religious texts	43.088	0.555	16
People in the village are poor because of environmental problems	Frequency of reading religious texts	46.178	0.574	16
	Frequency of attending church services	41.606	0.545	16

Chapter 6 of the thesis showed a non-significant correlation between religiosity (the frequency of attending at church service and frequency of reading religious texts) and incidences of malaria in the households over a period of three years. The Results of Chapter 6 suggest that religiosity (frequency of prayers) is an important variable in coping with the health conditions of members of the households who were reported to belong to Roman faith in rural Kilimanjaro. This might suggest that health conditions in rural Kilimanjaro are perhaps linked to socio-economic variables, and not directly linked to the level of religiosity. Thus, health conditions in terms of incidences of malaria, or the lack thereof, could be a broader indicator of the well-being of the people of rural Kilimanjaro. Re-appraisal of data showed that this group of households who reported no contact with malaria over a period of three years were shown to be elite rural households who were able, through various means, to avoid malaria attacks. Perhaps frequency of attendance at church services provided some limited environmental lessons which helped the members of the households to develop views and opinions on the basic conditions of natural environment.

Chapter 6 also shows that the Catholic Diocese of Moshi, which contains all the Roman Catholic churches in all the study villages, developed the Five Years' Strategic Plan of the Catholic Diocese of Moshi, January 2010 – February 2014. Subsequently, the Diocese developed a Health Strategic Plan (2010-2014). Both plans acknowledged that the Diocese has a vast network of health facilities, but that the population is still not very aware of how to protect itself from various common diseases. They also lack awareness of the fact that the majority of the diseases emanating from the deterioration of natural environment. The Health Strategic Plan further acknowledges that approximately 90% of all child deaths are attributable to common and preventable illnesses such as malaria, pneumonia, diarrhoea, malnutrition, HIV/AIDS and the complications of low-birth-weight.

The plans also acknowledge that, over the last 10 years, the Catholic Diocese of Moshi struggled to achieve better health for the people in the Kilimanjaro region with minimal success. This is an indication that the church authority understands the disease-environment connections and that there is some communication about these issues during church sessions on Sundays. Weekly church attendance could thus provide an opportunity for households to access environmental information related to health and religious texts with some limited local information on environmental degradation being provided, as the plans seem to suggest.

The results also showed that these indicators of environment-poverty connections (attending church services and reading religious texts) are significantly and positively associated with the religiosity of members of households who had achieved primary school education only (Table 26).

Table 26: Perceptions of environment-poverty connections and religiosity of primary school households (N=205; significant at p<0.01).

Environment-poverty connection indicators	Religiosity variables	Pearson Chi-Square Value	Phi - Coefficients	DF
Crop / animal production in the village is failing because of environmental problems	Frequency of reading religious texts	51.229	0.499	12
	Frequency of attending church services	50.396	0.495	16
Use of certain types of fertilizers cause environmental problems	Frequency of reading religious texts	40.775	0.445	12
People in the village are poor because of environmental problems	Frequency of attending church services	41.739	0.450	16

The results in Chapter 6 showed a significant and positive correlation between the levels of education reached and the reported monthly incomes of members of Catholic households (N=282; r=0.336; p<0.01). This could mean that members of households who attained levels of education higher than the primary school level (N=177) had more reported monthly income than those who had been left after primary school. Reported monthly incomes also showed a significant and positive correlation with other two wealth indicators of size of land owned by households and their estimated property values. Based on these results, it seems that a primary school leaver group was a poor segment of households compared to other school groups. Poor people in rural environments succumb more easily to environmental disasters like diseases, floods and hunger compared to people who are relatively wealthier. The primary school group also shows higher incidences of diseases (malaria, typhoid and dysentery) compared to other groups. Poverty outcomes make poor people interact more closely with natural environment than wealthier people in rural settings of Kilimanjaro.

Therefore, the acquisition of perceptions of human-environment interactions is evident in this group of households and results from their frequent and necessary interactions with the natural ecosystem. The question is how can weekly attendance at church services and frequency of reading religious texts influence the opinions of this group of households about the conditions of the environment and their understanding of how bad it is to misuse water and haphazard felling of trees?

Chapter 6 also shows no correlation between reading religious texts and education attainment of the Roman Catholic adherents in rural Kilimanjaro. Results, nonetheless, show a weak but significant negative correlation between levels of education and attendance at religious services by the members of Catholic households. This suggests that the primary school leavers group attend church services on Sundays more frequently than other education level groups. This further suggests that the frequency of attending church services of the primary school leaver group perhaps enabled members of those households to develop worldviews on environment-poverty connections.

The primary school group also demonstrated average levels of religiosity (as measured by frequency of reading religious texts, degree of beliefs in God, and frequency of attendance at church services) compared to other education groups. A small proportion of members of Catholic households (20%) reported that they had received lessons about water and forest conservation in church. Perhaps the frequency of attendance at church service provided some limited environmental lessons which helped the group of primary school-leavers to develop some relevant views and opinions on the basic conditions of the natural environment. Longitudinal and focus study can further reveal the religio-environment connections in this group.

7.4.2.2 Environmental degradation and religiosity

The degradation of the environmental resource base in rural areas of Africa generally translates into decreases in production or income and thus in the availability of food. Declining soil fertility leads to lower crop yields while rangeland depletion reduces off-take, and any deterioration in water quality adversely affects the health of the people of these areas. Degradation of common property resources pulls labour away from directly productive activities towards simply collecting non-wood and minor forest products and probably diminishes the opportunities for deriving income from this source in the rural area (IFAD, 2011). Greater water consumption on the mountain will inevitably lead to further shortages in the lowlands of the Mt. Kilimanjaro. The government has not yet attempted to restrict water use in the highlands, but competition for water is reaching critical levels (Grove, 1993).

In order to test perceptions in rural Kilimanjaro about environmentally destructive practices, members of the households (N=282) were asked to indicate their perceptions of starting wildfire, water misuse at homes and unselective cutting trees for any use (I strongly like, I like, I dislike, I strongly dislike) (Figure 33).

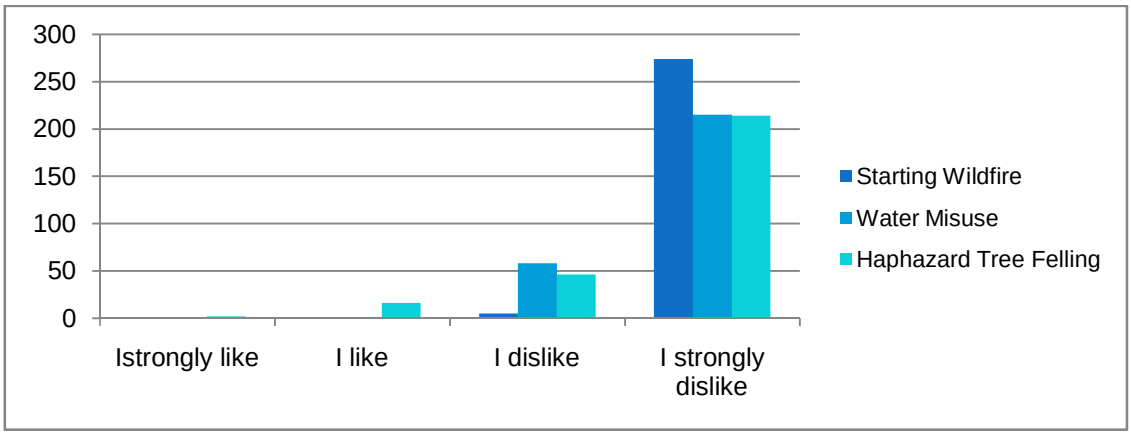

Figure 33: Perceptions about environmental degradation

Overall, the members of the Catholic households Church strongly disliked practices of starting wildfires, water misuse and haphazard felling of trees. Wildfires are the most common problem confronting the Kilimanjaro National Park (Newmark & Leonard, 1988). The members of the households seemed to hate wildfires more than other two practices of water misuse and tree felling. This is perhaps because households use water and tree products on a daily basis in sustaining their families and they were careful not to condemn these two practices at face value.

Households use trees as poles to construct houses, for fuel wood and for wood products like furniture. Therefore wood has huge economic value in rural Kilimanjaro, which is why very few households did not perceive haphazard tree felling as a problem.

The descriptive statistics results show that, overall, the members of the Catholic households were worried about the future in terms of water conditions in their villages. Despite this worry, only 23.4% of those interviewed were aware of the local water conservation policy in their villages. Just over half of them (61%) were very much aware of the forestry policy that prohibited haphazard uses of trees for fuel wood or timber in their villages and knew that deforestation caused water scarcities. A majority (71%) of them responded that the quality of water in their villages was very bad. Almost all of them (99.9%) perceived that decreasing trends and unstable rainfall patterns in the recent past in local villages caused water scarcities in their villages. Because of these trends, a majority (96.8%) did not want to see misuse of water in their village because of perceived scarcity and the costs of accessing clean and safe water.

Members of the Catholic households mainly blamed God or Satan (58.1%) and people and abiotic factors (38.6) for causing drought and shortages of water in their villages. However, when they were asked what they mainly prayed to God about, no one remembered to pray for rain or water directly. They mainly prayed for their family, their health and a good life (Figure 34). This raises a number of religion-ecology questions which need further investigation.

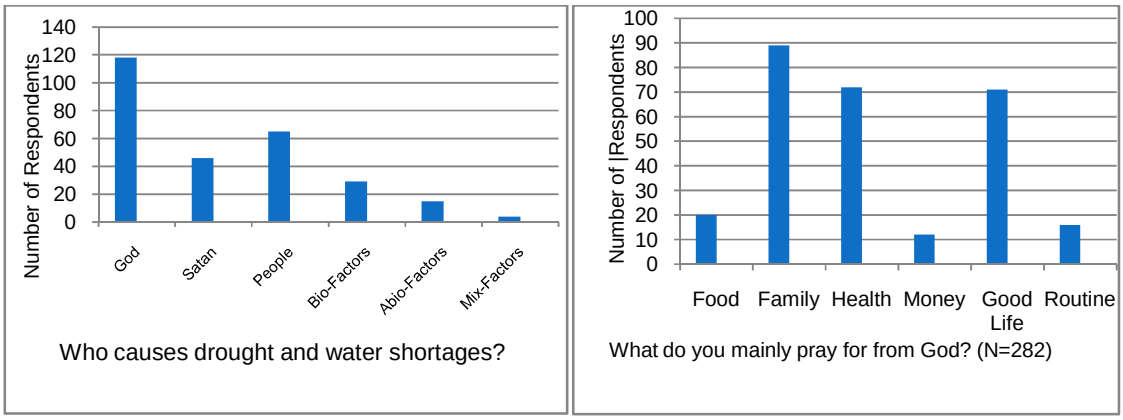

Figure 34: Perceptions of causes of environment issues and reasons for prayers

Perhaps the water scarcity challenges facing these villages had influenced the worldviews of the members of the households on water misuse, despite the fact that they were not aware of local intervention policy or practical or spiritual solutions to the problems.

When a multivariate analysis of religio-environment perceptions was conducted, the results showed a non-significant association of the perceptions of households between the starting of wildfires in forests and religiosity (Table 27). However, the results showed a significant and positive association between religiosity and the perception of households about water misuse and haphazard tree felling.

Table 27: Results showing associations of religiosity and environmental perceptions ($p<0.01$).

Environmental Variables	Religiosity Variables	Pearson Chi-Square Value	Phi - Coefficients	DF
How do you perceive water misuse?	Frequency of reading religious texts	55.076	0.442	12
	Frequency of attending church services	76.986	0.522	12
How do you perceive haphazard tree feeling?	Frequency of attending church services	41.561	0.384	16

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In order to clearly understand whether the associations between perceptions of water misuse, haphazard tree felling and religiosity are powerful and true, and to understand other potential underlying factors which influence religio-environment perceptions, the socio-demographic variables of age, gender, education, wealth and health, which can affect the environmental perceptions of households, were held constant by using a crosstab multivariate analysis technique.

The results showed a weak to strong association between the perception of water misuse, haphazard tree felling and religiosity by gender, level of education, and health conditions. The association of religiosity (frequency of reading religious texts and frequency of attending church services) and perception of water misuse was significant at $p<0.01$ for the households whose members had achieved primary school education only (Table 28).

Table 28: Results showing association of religiosity and perception of water misuse among the primary school leavers ($N=206$; $p<0.01$).

Environmental Variables	Religiosity Variables	Pearson Chi-Square Value	Phi - Coefficients	DF
How do you perceive water misuse?	Frequency of reading religious texts	46.650	0.476	9
	Frequency of attending church services	56.477	0.524	12

The primary school group had minimum average wealth (ownership property values, land and monthly incomes) compared to other school groups, and thus were more dependent on their immediate natural environments of water, soils and forests for the pursuit of their livelihoods. Being in poverty can make people interact more closely with the natural environment than wealthier people in the rural settings. Therefore an understanding of human-environment interaction was more evident in this group of people as a result of their frequent and necessary interactions with natural ecosystem. The question needed to be asked is how weekly attendance at church services and the frequency of reading religious texts can influence opinions of members of this group of households about the conditions of the environment and whether it can increase understanding of how bad it is to misuse water.

The primary school group also showed average maximum religiosity (frequency of reading religious texts, degree of beliefs in God, and frequency of attendance at church services) compared to other groups. The use of water is important for its own symbolic value in three ways in religions. It cleanses and washes away dirt, is believed to fill everything it enters as God fills those who are immersed in Him. People also need water to survive physically just as they need God to survive spiritually.

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The significance of water manifests itself differently in different religions and beliefs but it is these qualities of water that underlie its place in the Catholic faith. Mbiti (1969) reports a few societies which "associate God and rain so closely that the same word, or its cognate, is used for both". Others personify rain as one of the divinities. Some groups saw rain as God's saliva (Mbiti 1969), and others, such as several groups in Nigeria's Plateau State, saw rain as God's urine. Mbiti (1969) concludes that in all cases rain is taken as a sign of God's care and providence for humanity and the world. Generally throughout Africa, bodies of water are thought to have major spirits or divinities in them (Mbiti 1969). Perhaps these religio-cultural values written in several religious texts and regularly mentioned during church services on Sundays in rural Kilimanjaro have influenced primary school-leavers, who attend church services more often than other groups, in shaping their views of water misuse.

The Catholic Diocese of Moshi's Strategic Plan (2010-2014) underscores the importance of water for the livelihoods of its adherents in rural Kilimanjaro. The Diocese emphasises the need to continue to support communities in retaining a reliable supply of safe water. One of the objectives of the Strategic Plan is to reduce income poverty, food insecurity and environmental degradation in the households. Perhaps this is also an indication that water issues are at the top on the agenda of the Diocese and are regularly addressed during weekly church services. Thus there may be some association between attendance at church services and perception of water misuse among the group of primary school-leavers.

The results of Chapter 6 show no significant gender differences in three core religiosity indicators (church attendance, frequency of prayers and the amount of money spent by both men and women in supporting other people on religious grounds). Pearson Chi-Square results showed a significantly weak positive association between religiosity and perceptions of negative environmental practices (Table 29).

Table 29: Results showing associations of religiosity and perceptions of water misuse and haphazard tree felling (N=124; $p<0.01$).

Environmental Variables	Religiosity Variables	Pearson Chi-Square Value	Phi - Coefficients	DF
How do you perceive water misuse?	Frequency of reading religious texts in women	47.455	0.619	9
	Frequency of attending church services of men in households	47.297	0.537	6
	Frequency of attending church services of women in households	41.565	0.579	6
How do you perceive the haphazard cutting of trees?	Frequency of reading religious texts in women	40.871	0.574	9

In rural Kilimanjaro, women are mainly responsible for feeding families and they depend largely on the natural environment to provide them with the requirements of different livelihoods requirements like water, energy supplies and basic food. Severe environmental degradation in rural Kilimanjaro puts extra burdens on women, who are often left behind to run the households while men are engaged in other non socio-economic duties. Water, land and energy are central to women's household activities, but water and energy shortages, and other problems with access (such as land tenure, affordability) mean that gender issues are crucial in rural Kilimanjaro. A rich body of literature also exists to explain the connections between women and the natural environment. The intimate connections of women to water and forests in rural Kilimanjaro could perhaps explain their negative perceptions of water misuse.

The section above explained, in details, the gender dimensions on positive association of religiosity and perceptions about the environment, including the association of religiosity with perceptions of the environment for men in the households. More research is needed to uncover the religio-environmental connections for different genders in rural Kilimanjaro, and whether religiosity among women or men is an important factor in the formation of environmental attitudes or environmental ethical behaviours and local worldviews on the environment around them.

An association of religiosity and perceptions of environmental negative practices was also revealed through the Person Chi-Square test. The results showed significant weak positive association between perceptions of destruction of the environment and the religiosity of households, whose members had not contracted malaria over a period of three years (Table 30).

Table 30: Results showing association between religiosity and perceptions of water misuse in households whose members had not contracted malaria over a three-year period (N=140; $p<0.01$).

Environmental Variables	Religiosity Variables	Pearson Chi-Square Value	Phi - Coefficients	DF
How do you perceive water misuse?	Frequency of reading religious texts of women	35.740	0.505	12
	Frequency of attending church services of women households	38.470	0.524	12

The section above (7.4.2.1) has explained, in detail, factors likely to have influenced the associations of religiosity and perceptions of the environment of members of households who achieved a primary school level of education. Weekly church attendance could thus provide an opportunity for members of these households to access environmental information related to health and religious texts with some limited local information on environmental degradation, as the plans seem to suggest.

Perhaps the households who did not contact malaria over a period of three years had enough knowledge and means to prevent malaria attacks, and were thus aware of environmental factors which increased the chances of contacting malaria in their locality.

7.4.2.3 Perceptions of environmental management and religiosity

An environmental problem arises whenever there is a change in the quality or quantity of any environmental factor which can directly or indirectly affects the health and well-being of humans in an adverse manner. Some of the environmental problems, and their causes, which are critical at the present time are fairly widely known because of the growing awareness of this problem at all levels of society, including governments, the general public, religious community and the scientific community. Both the cause of environmental problems and the possibilities of addressing them depend on human perceptions, attitudes and behaviour, which are linked to values, preferences and beliefs about the world. Subsequently this section focuses on the investigation of perceptions of causes of environmental problems facing rural Kilimanjaro and perceptions of the role of different stakeholders in addressing these problems, and illuminates association between environmental perceptions and the religiosity of members of Catholic households.

The study was based on the assumption that there is an association between religiosity and perceptions of causes and solutions to environmental problems facing rural Kilimanjaro.

In order to uncover the association of perception of environmental problems and religiosity, households were asked to respond to the following questions: Whether God causes environmental problems that we see in our village; Whether drought is caused by humans because of cutting trees, without re-planting; Whether is the responsibility of God to solve environmental problems; Whether the local Government is doing nothing to preserve natural environment (I strongly disagree, I disagree, I don't know, I agree, I strongly agree). The figure 35 shows a summary of the responses from members of Catholic households.

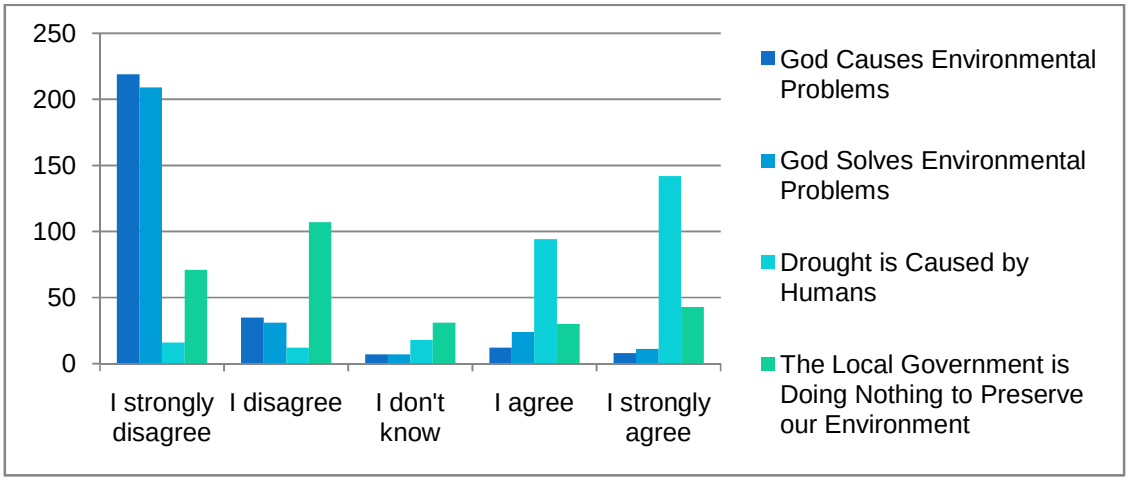

Figure 35: Roles of humans and religion in environmental changes

The majority (90.4%) of households thought that humans were responsible for the drought which had recently affected their villages because of tree felling, carried out mostly for commercial and domestic uses. The households also strongly (85.1%) disagreed that God neither causes environmental problems in their villages nor that He is responsible for solving environmental problems. In the previous section, households also indicated that, when they pray, they did not consider that they were praying for natural environment, perhaps because they knew that God was not responsible for it. Nonetheless, previously, households perceived that God was responsible for drought and water shortages in the villages.

Overall, the respondents had mixed views about the performance of local government in preserving the local natural environment, though the majority (63.1%) disagreed with the notion that local government was doing nothing. In Tanzania, at the village level, local government is responsible for the implementation of national environmental policies and legislation, mostly through land use plans. Local Government is also responsible for the interpretation of environmental policies and prepares by laws when they need to address specific environmental problems which are outlined in general terms in legislation or absent from environmental national legislation. Local government can also set aside Wildlife Management Areas or community forests to preserve unique, threatened or critical natural environments. The households seemed to be unsure as to whether their local governments were undertaking these duties effectively and efficiently due to their mixed perceptions when they were asked to comment on whether local government was doing something or nothing to preserve natural environments. Except for the Lerang'wa village, all other villages had not had prepared land use plans. Lerang'wa had a land use plan and had joined with other eight adjacent villages to set aside the Enduimet Wildlife Management Area. Perhaps the members of the households had mixed views because they did not clearly understand the importance of core environmental instruments like plans and projects.

Some responses to these questions, however, were rather variable. Variations in response perhaps depended on how the questions were phrased, or asked. In the previous sections, contrary to these perceptions, the household members had indicated strongly that they perceived God to be responsible for drought and water shortages in their villages.

The study assumed that there is an association between the perceptions and views expressed by the households on environmental management and religiosity (frequency of reading religious texts, frequency of attending church services and degree of belief in God).

The results from Pearson Chi-Square test of Independence showed a significant and positive association between specific indicators of religiosity and perceptions of household members of environmental problems (Table 31).

Table 31: Results showing associations between specific indicators of religiosity and perceptions of the natural environment ($p<0.01$).

Environmental Variables	Religiosity Variables	Pearson Chi-Square Value	Phi – Coefficients	DF
God causes the environmental problems that we see in our village	Frequency of reading religious texts	71.776	0.505	20
	Frequency of attending church services	39.279	0.373	20
It is the responsibility of God to solve environmental problems	Frequency of reading religious texts	78.019	0.526	16
Drought is caused by humans because of cutting trees, without planting	Frequency of reading religious texts	60.728	0.464	16
	Frequency of attending church services	52.982	0.433	16
	Frequency of attending church services	51.225	0.426	16
The local government is doing nothing to preserve our natural environment	Frequency of reading religious texts	57.581	0.452	16
	Frequency of attending church services	45.966	0.404	16

The frequency of the reading of religious texts and the frequency of attending at church services showed significant association with the environmental perceptions and views expressed by the members of the Catholic Church. Perhaps, attending church services on Sundays and the regular reading of religious texts, among other non religious variables, consolidated their views that God is omnipotent and responsible for causing environmental problems in their villages, whereas humans were responsible for drought in their villages due to tree felling for different uses. Members of the households held mixed views about the performance of local government in the preservation of the local natural environment. On different pages of the Bible, humans are told that God gives humans responsibility for and holds us accountable for the moral choices and actions we make (Genesis 2:16-17; also Exodus 20; 1 Corinthians 9:21; Galatians 6:2). The frequency of reading religious texts and attending at church services on Sundays could therefore perhaps help members of Catholic households to hold the view that it was not the responsibility of God to solve the environmental problems facing the villages.

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The association of variables of religiosity and environmental factors in rural settings in Africa can be complicated by all kinds of socio-demographic variables. In order to ascertain whether there is association of perception of sources of environmental awareness and religiosity, multivariate analysis, using the Pearson Chi-Square test of Independence, was conducted (Table 32). An association, or a lack of it, between perception of environmental management and religiosity, could help uncover hidden but specific socio-demographic variables about religious belief and practice.

Table 32: Results showing associations of and perception of the natural environment ($p<0.01$).

Environmental Variables	Religiosity Variables	Pearson Chi-Square Value	Phi - Coefficients	DF
God causes environmental problems that we see in our village	Frequency of reading religious texts in male households	43.195	0.525	15
	Frequency of reading religious texts in female households	37.796	0.552	12
	Frequency of reading religious texts in households which had reported no contact of malaria over a period of three years	56.171	0.633	16
	Frequency of reading religious texts in households whose members had achieved primary school education only	41.499	0.449	15
	Frequency of attending church services in households whose members had achieved primary school education only	38.830	0.434	20
Is it the responsibility of God to solve environmental problems	Frequency of reading religious texts in female households	42.725	0.455	16
	Frequency of reading religious texts of households which had reported no contact with malaria for a period of three years	79.917	0.756	16
	Frequency of attending church services in households which had reported no contact with malaria for a period of three years	36.047	0.507	16
Drought is caused by humans because of cutting trees, without planting	Frequency of reading religious texts in male households	38.699	0.496	12
	Frequency of reading religious texts in households which had reported no contact with malaria over a period of three years	44.968	0.567	16
	Frequency of reading religious texts in households whose members had achieved primary school education only	44.131	0.463	12
	Frequency of attending church services in households whose members had achieved primary school education only	46.623	0.476	16
The local government is doing nothing to preserve our natural environment	Frequency of reading religious texts of women in households	47.329	0.399	12
	Frequency of reading religious texts in households which had reported no contact with malaria over a period of three years	47.388	0.586	16
	Frequency of reading religious texts in households whose members had achieved primary school education only	40.221	0.442	12
	Frequency of attending church services in households which had reported no contact with malaria over a three year period	39.912	0.534	16
	Frequency of attending church services in households who achieved primary school education only	35.564	0.415	16

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Similar trends in the association of perceptions of the environment and religiosity which were illustrated in previous sections seem to be repeated in this section. Associations of perception of environmental management and religiosity were significant in specific gender and education groups and the health conditions of households who reported not having contacted malaria over a period of three years. Tanzania is no longer one of the five poorest countries in the world, as it was in the 1980s. However it is still in the bottom 25 countries in the world. Thus, the needs remain huge, with over 30 million people using inadequate sanitation, only 34% of children enrolling in secondary school, natural resources being over exploited. Tanzania is one of the five countries in the world with the most malaria deaths, and one woman in every 25 dies in childbirth (DFID, 2011). As the eco-religion associations have revealed, education, gender and health issues, continued to drive the sustainable development agenda of the international community towards Tanzania.

Reading religious texts and church attendance seem to be one of the most important sources of environmental attitudes in certain gender and primary school education level groups. Future research and church development programmes in religio-ecology might need to focus on gender, as the land husbandry roles of households in rural Kilimanjaro are traditionally and distinctly split into gender lines. Tanzania has achieved gender parity in primary education and has increased the participation of women in politics and decision making authorities, particularly in the public sector. However, despite these achievements, the majority of women in Tanzania is still locked into traditional roles and is subject to unequal levels of income (DFID, 2011). A religio-ecology programme should also focus on primary school education level group, because a majority of the households in rural Kilimanjaro belong to this group and most of them are engaged in agricultural practices which are heavily reliant on natural environments i.e. soil, natural weather patterns, rainfall and a natural flow of water.

The perception of the association between environmental management and religiosity was also significant in the primary school level group. As mentioned previously, this group is mostly engaged in land husbandry activities. The connections between their daily livelihood pursuits and the natural environment are clear. Their livelihood is mainly dependent on the quality and availability of soil, water and the right climatic conditions. This is the group which showed strong spiritual commitments compared to other education level groups. Future and longitudinal research and church religio-ecology programmes should also focus on this group of adherents to achieve successful eco-religion outcomes.

Chapter 6 of the thesis, and previous sections, showed non-significant correlations between religiosity (the frequency of attending church services and the frequency of reading religious texts) and incidences of malaria in the households over a period of three years. This might suggest that health conditions in rural Kilimanjaro are perhaps linked to socio-economic variables, and are not directly linked to levels of religiosity. The group of households who had reported no contact with malaria over a period of three years was educated group of elite households who were able to avoid malaria attacks. Perhaps the frequency of attendance at church service and reading religious texts provided some limited environmental lessons which helped the group of elite school leavers to develop views and opinions on eco-religious associations.

7.4.2.4 Formal school and church teachings on environmental education

It has been shown that there is a positive relationship between environmental education acquired through various means and experiences and pro-environmental behaviour and attitudes (Cordero-Ferrera, 2010). In this context, research about which is the main source from which households in rural Kilimanjaro acquire environmental education can be very useful.

It was also assumed that households perceived that elements of environmental conservation are adequately covered at church services and religious texts as well as in primary schools i.e. environmental principles constitute contemporary faith social teaching on the environment and are part of primary school education. Therefore, frequent church goers, and those who read religious texts should inform households in rural Kilimanjaro about what elements of the natural environment can be learned about through faith and secular education.

In order to understand the perceptions of households about coverage of environmental education in church, teachings from church leaders and primary school curriculum, members of the households were asked the following questions: Do the lessons I get from religion help me to understand and take care of natural environment?; has primary school education helped me to understand natural environment issues; and are religious leaders preaching good lessons about the natural environment. Households were also asked to indicate specific types of environmental education they had received from religion and primary school. Wilber (1998) asserts that moral values from religion as inculcated by families, churches, governments, and schools are important in shaping environmental behaviour and perceptions.

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Hines et al. (1986-87) defines environmental education as involving four issues: a working knowledge of environmental issues, a specific knowledge of ways of addressing those issues, the competence to make appropriate decisions, and the possession of certain affective qualities and attitudes that make people care about and pay more attention to environmental conditions. In this study, households were expected to consider the environment in the contexts of rural Kilimanjaro as described in the Chapter 5 and previous sections. In the rural context of Kilimanjaro, people who participated in the Nominal Group Techniques identified water, soils, forests and Mt. Kilimanjaro climate as main natural environment variables which influenced their livelihoods.

The summary of results from the standard questionnaire illustrates fairly similar response trends from members of the households with regard to the importance of primary school and church teaching in providing knowledge which will help them understand the significance of water, soil, forests and the Mt. Kilimanjaro climate for their livelihoods (Figure 36).

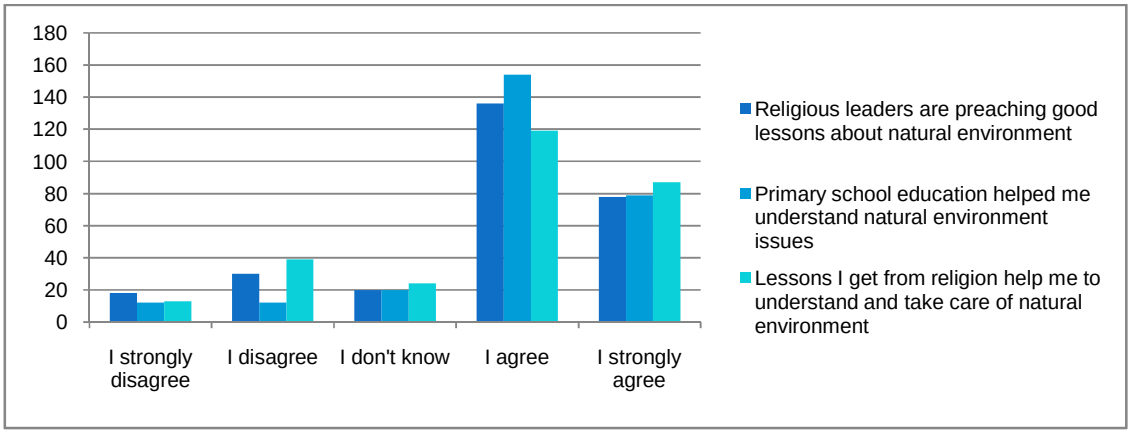

Figure 36: Environmental education in religion and primary education

The majority of members of Catholic households (82.6%) generally agreed that primary school education helped them understand the importance of water, soil, forests and the local climate for their livelihoods. The majority also agreed that religious leaders are preaching good lessons about the natural environment (75.8%) and that the lessons they got from religion were helping them understand and take care of the natural environment (73.0%). Overall, few households (<19%) either did not know or disagreed that church and primary schools provide some basic environmental knowledge which helped them understand the need to take care of natural the environment around them.

Households were also requested to specifically indicate elements of environmental knowledge which were learned from attending church services and primary schools (Figure 37).

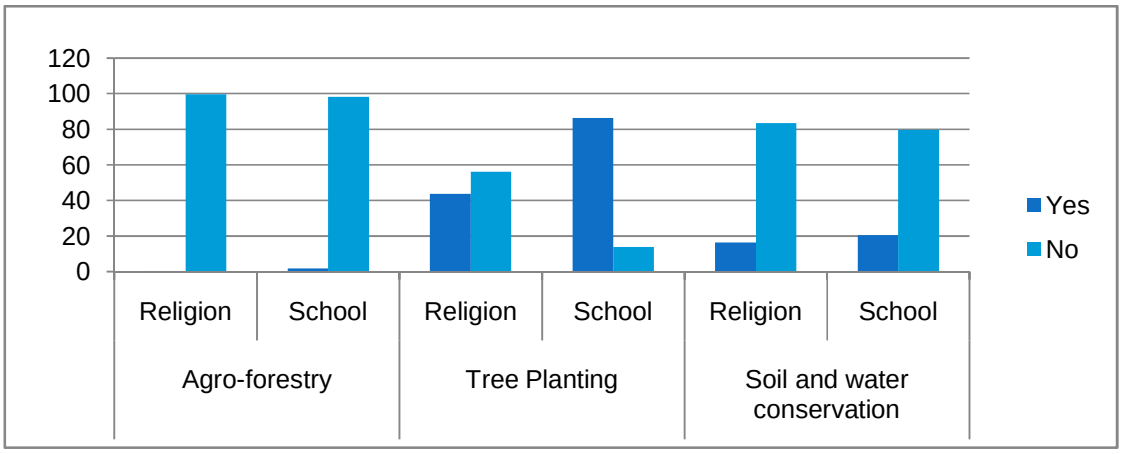

Figure 37: Elements of environment taught in primary school or religions

It seems that element of environmental knowledge and skills received most often from attending church services and primary school education in rural Kilimanjaro is tree planting. This is perhaps a response to fuel wood scarcity and increased demands for forest products by the people of the area. Less than 25% of the households thought that soil and water conservation education are received when attending church or primary school or through reading religious texts.

The perceptions of natural environment of members of the households presented in previous sections show some kind of consistency by pointing out shortages of water, the deterioration of forests and soil degradation as the core environmental challenges facing the villages. Nonetheless, the responses illustrated in previous sections on various questions about the natural environment showed mixed perceptions about the cause-effects relationship between the environmental problems facing rural Kilimanjaro, the extent and nature of these problems and potential solutions to them. The consistency or lack thereof in the perceptions of household members could be informed by myriads of sources ranging from the primary school curriculum, religio-cultural tendencies and life experiences resulting from households' intimacy and interaction with their immediate natural environments. In order to ascertain whether there is association between perception of source of environment awareness and religiosity, a multivariate analysis, using Pearson Chi-Square test of Independence, was conducted. An association or lack of it, between perceptions of coverage of environmental education in schools and church curricula and religiosity, could help uncover hidden but specific socio-demographic variables and tendencies towards religious belief and practice.

The results show an association between perception of sources of knowledge of the natural environment knowledge and skills and all three religiosity variables at $p<0.01$ (Table 33).

Table 33: Results showing association of and perception of the natural environment (N=282; $p<0.01$).

Environmental Variables	Religiosity Variables	Pearson Chi-Square Value	Phi - Coefficients	DF
The teachings I get from religion help me to understand / protect natural environment	Frequency of attending church services	63.479	0.474	16
Religious leaders are preaching good lessons about the natural environment	Frequency of attending church services	70.574	0.500	16
Primary school education helped me understand environmental issues	Degree of belief in God	38.198	0.368	20
	Frequency of reading religious texts	55.549	0.444	20

In other words the results indicate a weak positive association between perceptions of the role of primary schools in raising environmental awareness (on tree planting, soil and water conservation) and belief in God and frequency of reading religious texts among members of the Catholic households. All respondents had gone through primary school education. The provision of primary education and literacy for all has been recognized as a cornerstone for the quality of life at the level of national policy in Tanzania (Galabawa, 2001). Attending primary schools enables graduates to read and write. Perhaps increased literacy levels among the households enabled them to read religious texts, which cement beliefs in God. A majority of the households were reported to own a Bible (82.6%). Those who could not afford a Bible reported owning 'Misale Ya Mitume' (3.9%), 'Katekisimo' (1.4%) or 'Kitabu Cha Sala' (0.4%). 'Katekisimo' is a major Roman Catholic official text of the teachings of the church. It has been defined as a summary of principles, often in question-and-answer format for easy understanding of the text. The catechism is typically an assemblage of smaller documents into one large compilation of Church doctrine and teachings. 'Kitabu Cha Sala' is a book provides guidelines for daily and weekly prayers or prayers on special church occasions. 'Misale ya Mitume' is a book deals entirely with excerpts from the writings of different Roman Catholic saints, seers, prophets, and popes which reveal these events coming to pass.

Very few households (12.1%) reported never reading religious texts. The majority of respondents (86.5%) reported reading religious texts daily or once a week on Sundays. This makes religious texts by far the most abundant and the most frequent read resources in rural Kilimanjaro.

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High frequency of reading religious texts and 100% literacy resulting from having had primary school education perhaps enabled households to consolidate their belief in God. This is possibly the link between the perception that primary school education helps households understand environmental issues and belief in God and reading religious texts. Bryer (1999), Vesilind and Gunn (1999) and Wilber (1998) see religions and religious texts as offering or providing a useful foundation for environmental ethical codes so that people can strike a balance between the need to utilize nature to survive and human responsibility as a steward of the earth. On the contrary, a rich body of literature exists which tend to suggest that religious texts do not generally have a positive effect environmental behaviour and beliefs. The claim that religious texts are self-contradictory and provide minimum useful environmental guidance has been made by Nash (2009).

The results also indicate a weak association between the perception that the teachings households get from religion and the frequency of their attendance at church help them to understand and protect the natural environment. In other words, members of Catholic households received some guidelines about and had acquired knowledge and skills about the care of natural environment by attending church services on Sundays each week. Several studies have shown that when individuals are younger, frequent church attendance reflects a range of familial and social-environmental influences that reduce levels of unwanted beliefs, forms of behaviour and practices (Kendler & Myers, 2009). It could be that church attendance had influenced some basic environmental behaviour related to environmental care, specifically soil and water conservation and tree planting skills. Boyd (1999), using hierarchical linear regression, did not find a relationship between church attendance and environmental attitudes and beliefs, even after controlling for demographic variables.

In order to clearly understand whether the associations of perceptions of this source of environmental education and religiosity are powerful and true, and understand other potential underlying factors which influence religio-environment perceptions and associations, the socio-demographic variables of age, gender, education, wealth and health, which could affect the environmental perceptions of household members, were held constant by using a crosstab multivariate analysis technique.

The results show an association between perceptions of sources of environmental education and religiosity in specific gender and education groups of members of Catholic households (Table 34).

Table 34: Results showing association of religiosity and perception of source of environmental education in specific gender and education groups of households ($p<0.01$).

Environmental Variables	Religiosity Variables	Pearson Chi-Square Value	Phi - Coefficients	DF
The teachings I get from religion help me to understand / protect natural environment	Frequency of attending church services of male households (N=157)	53.128	0.582	16
The teachings I get from religion help me to understand / protect natural environment	Frequency of attending church services of those achieved primary school only (N=206)	46.005	0.473	16
Religious leaders are preaching good lessons about the natural environment	Frequency of attending church services of male households (N=157)	48.691	0.557	16
Religious leaders are preaching good lessons about the natural environment	Frequency of attending church services of those achieved primary school only (N=206)	44.259	0.464	16
Primary school education helped me to understand environmental issues	Degree of belief in God and those who achieved primary school education only (N=206)	45.135	0.603	15
	Frequency of reading religious texts of those achieved primary school only (N=206)	46.150	0.473	15
	Frequency of reading religious texts of women in households (N=124)	53.189	0.508	20

The results seem to consolidate the association of education awareness of a group of households who did not go beyond primary school education and religiosity by introducing another dimension of the association of church attendance and perceptions of the primary school group that the teaching they received from religion had helped them preserve the natural environment. The results in Chapter 6 show that church attendance was negatively and very weakly but significantly correlated to education achievement. In other words, the primary school group attended church services more than the other groups. In some studies using multivariate analyses, education is the most statistically important factor explaining church attendance (e.g. Sacerdote & Glaeser, 2001). Thus it seems clear that future research on religiosity and environment in rural Kilimanjaro should focus on the primary school education level group. This group also forms a majority in rural Kilimanjaro and is intimately connected to the natural environment because of its engagement in land husbandry activities. The high frequency of reading religious texts observed in the primary school education level group, a high rate of church attendance, a strong belief in God and the high amount of literacy in these groups offers a perfect opportunity to promote environmental ethical knowledge, skills and attitudes in rural Kilimanjaro. Efforts to enhance positive environmental actions by the Church may need to focus on this group through local and relevant religious texts and during weekly church masses.

The question of gender relations within religiosity also feature prominently when an association of environmental awareness and religiosity was examined, while controlling for socio-demographic variables. Perhaps the association of religion-environment awareness with a particular gender is a challenge for church-based institutions in terms of putting more emphasis on gender-centered environmental education policies, plans and programmes. The perceptions of men with regard to environmental awareness were associated with frequency of attending church services while women's perception that primary school education had helped them understand environmental issues was associated with their frequency of reading religious texts, despite the fact that men tended to read religious texts more than women. The results in Chapter 6 demonstrated that a mean frequency of reading religious texts was significantly higher among males as compared to their female counterparts. Perhaps religion-environmental education materials and curriculum should target specific gender and be delivered using media designed to relate to different genders.

In 1991, the document *Ex Corde Ecclesiae* (On Catholic Universities) was released by the Roman Catholic Church as an attempt to link Catholicism and the environment. Roman Catholic universities were asked to reflect on the consistent emphasis in John Paul II's teachings on the environment, the protection of nature and the importance of being aware of the international ecological situation. These issues were to be included among the research activities of the Catholic University in its service to society. The local leaders of the Roman Catholic Church in rural Kilimanjaro were not aware of these environmental education initiatives. The curricula of the Roman Catholic universities in Moshi Diocese did not include these elements.

In 1993, an ecumenical group, the National Religious Partnership for the Environment, was founded to educate Christians about humanity's duty to act responsibly as stewards of creation. Among the activities the partnership organizations have undertaken is the distribution of educational resource kits to congregations and synagogues across the World. They also work with the Catholic Social Services. For example, the Evangelical Environmental Network collaborates in publishing a quarterly magazine, Creation Care, which raises awareness about caring for the environment from a Biblical perspective. When asked during the interviews, the Catholic Diocese of Moshi acknowledged that they had not contacted Catholic Social Services or support and did not have environmental publications to share with their adherents within the Diocese. However, Father Kimario (personal communication, 2012) mentioned plans to develop an environmental strategy, which will include environmental education programmes. The Diocese was also not aware of other stakeholders in the region who were involved in conservation education programs. There are local radios with environmental programmes and the MaliHai Clubs of Tanzania who could support the Diocese in its environmental education programme. In its Strategic Plan (2010-2014) however the Diocese plans to create awareness on environment protection in the households.

Through enacting the Plan, the Diocese is also hoping to strengthen relationships, and share of experiences and information among diocesan department institutions, units, and religious congregations and other institutions, including Government, private and Non-Governmental Organisations.

7.4.3 Use of environmental resources and religiosity

Environmental concerns are also moral concerns which require radical rethinking of our consumer culture (McCarthy, 2011). Some scholars have analyzed the diverse and intimate relations between water and religio-cultural elements (e.g. Taylor, 2007). As summarized by Rudhardt (2005), water is often central to religious cosmogony, can be understood as a manifestation of the divine or governed by divine being or beings. It may be associated with sexuality or otherwise perceived to be involved with the generation of life, or with healing, purification, or sacralisation. Water may also be considered a source of wisdom or mysterious, cathartic power, or conversely, a force in opposition to divine purposes and in need of subjugation (e.g. Rudhardt 2005; Tvedt & Oestigaard 2006). It is a fluid and powerful substance, that, speaking metaphorically, can and has been used in many different ways in different places by people trying to find meaning in their experiences (Taylor, 2007). Despite these connections of water and spirituality, the social relations of water are poorly understood (Crow & Sultana, 2002).

Energy is also central to driving the livelihoods of rural people. Over 90% of rural households in Tanzania use fuel wood and other traditional bio-fuels like charcoal. While the supply of fuel wood is dwindling in rural Kilimanjaro, demand is rapidly increasing due to the increase in number of people in these areas, the high costs of other sources of energy and unreliable electricity from the national grid. Continued utilization of fuel wood from local forests threatens the existence of these natural forests. An understanding of the factors associated with consumption of wood fuel in rural Tanzania is important in addressing the rate of use of fuel wood, as well as exploring alternatives to its use. It was assumed that factors associated to the consumption of wood fuel range from socio-demographics to spiritual eco-feminism.

In a truly religious society, a person's utility of environmental resources like water and fuel wood may be affected by many factors including the following:

- A high degree of faith in the afterlife through beliefs in monotheism may reduce self-centered consumption, making room for sharing with others; and
- Religious teachings and temptations for kind and caring attitudes can lead to higher levels of contributions through savings.

These ideas have been dealt with in the economics of religion, and particularly in divine economics (Taylor, 2007). A useful further step would be to explore whether religiosity, particular type of religiosity or a segment of religiosity can play any role in the management of natural resources, such as water when it is scarce, or fuel wood products when they are limited. This is because, in times of scarcity, people's selfish motives may become stronger than their altruistic motives. Subsequently the objective of this section is to further extend the faith-based analytical framework of natural resource use and determine the association between the use of water and fuel wood and the religiosity of members of Catholic households.

In order to understand the level of environmental resource consumption in rural Kilimanjaro, households were asked to indicate the amount of water (<60 litres, between 60 and 120 litres, >120 litres, or I don't keep track) and fuel wood (<90 cm^3, between 90cm^3 and 180cm^3, >180cm^3, or I don't keep records) that they used each day. The study assumed that there was an association between estimated water and fuel wood consumption and the religiosity of members of Catholic households.

Initial descriptive statistics results show almost similar trends of wood fuel and water utilization among the members of Catholic households (Figure 38).

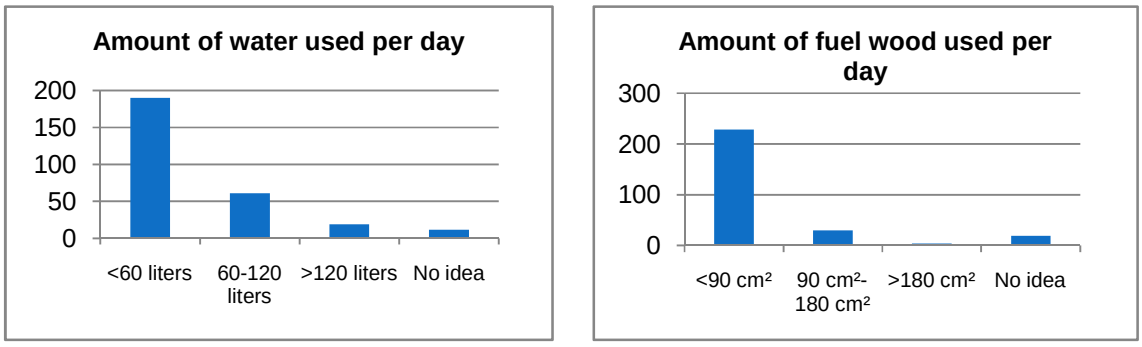

Figure 38: Estimated amount water and fuel wood consumption by households each day

The majority of households (67.4%) reported using less than 60 litres of water per day for domestic purposes. In rural Kilimanjaro, 'ndoo' is a local scale used to measure amounts of water. A 'ndoo' is equivalent of 20 litres of water. The majority of people used around three 'ndoo' of water each day for domestic uses.

A small group of households (4.26%) could estimate the amount of 'ndoo' used each day, either because they could not imagined that they would be made to account for the amount of water they used each day or because they had piped water which made it difficult for them to measure the amount water used each day. Other households were reported to use between three and six 'ndoo' of water daily (21.6%) and more than six 'ndoo' daily (4.26%).

In a local context, fuel wood is measured using the 'fungu la kuni' scale. Two 'fungu la kuni' is equivalent to ninety cubic centimetre ($90cm^3$) of fuel wood. The majority of households (80.9%) reported using less than two 'fungu la kuni' each day for domestic purposes. Other households reported using between one and three 'fungu la kuni' each day (10.6%) and more than three 'fungu la kuni' each day (1.4%). A few households (6.7%) were unable to estimate the amount of fuel wood used as 'each day passed'. The description of each day in rural Kilimanjaro in rural households is that "each day that passes goes to God".

Among the households who were interviewed (N=282), 32.6% had electricity in their homes connected to the national electricity grid. This is a very high proportion compared to national statistics on rural electrification. In rural Tanzania, about 12% of the households have electricity in their homes (Government of Tanzania, 2008). Electricity is widespread in rural Kilimanjaro compared to other rural parts of Tanzania. All the six villages which were studied had electricity connected to the national grid. Very few (1.8%) reported using solar panels and diesel or petrol powered generators (1.4%). Some reported using charcoal (21.3%) or kerosene (37.9%). Despite the use of other sources of energy, all the households who were interviewed reported using fuel wood each day, and admitted that they did not use only one type of energy but used a combination of fuel wood, charcoal, kerosene or electricity.

All households admitted that they opted mainly to use fuel wood, charcoal, electricity, kerosene or combination of some of those options on the basis of availability, accessibility and affordability, rather than because of environmental considerations or religious beliefs. The previous chapter showed that the socio-economy in terms of the level of education, and subsequently wealth or poverty, tends to drive day-to-day human survival decisions in rural areas, rather than environmental considerations or religiosity. There was no exception to the choice of type of energy used by the members of the Catholic households.

The distances between water and fuel wood sources were also investigated to examine whether these distances were associated with the levels of consumptions of these two environmental resources (Figure39).

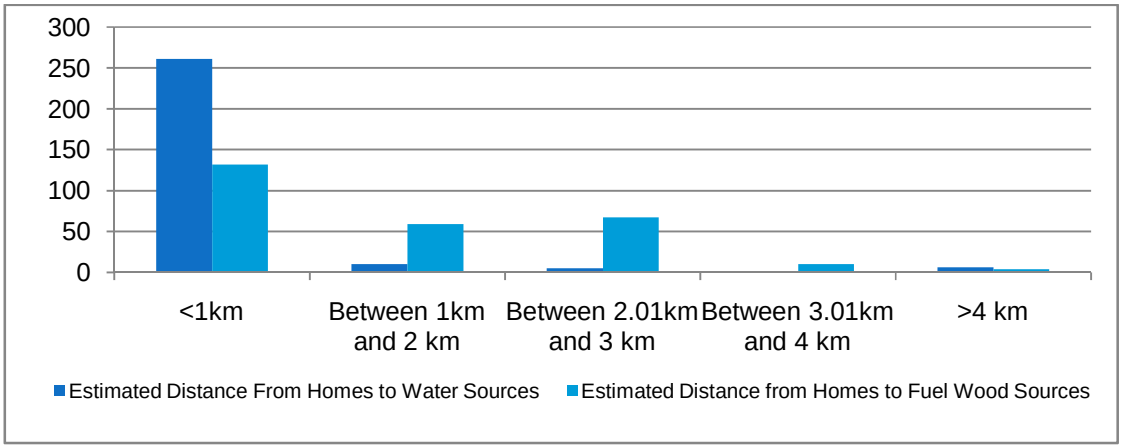

Figure 39: Distance from water and fuel wood sources

The graph clearly depicts the challenges faced by rural households in accessing fuel wood for family use. A good number (49.62%) of households reported having to walk more than 1 km to fetch fuel wood, compared to only 46.8% who had access to fuel wood within a 1 km radius. Despite the fuel wood challenge affecting the rural households, a majority of those interviewed (64.2%) believed that the condition of forests in their areas was good enough to continue to support their wood requirements. Only 9.6% of them believed that trees in their villages were in appalling conditions, which was a reason for them to walk for more than 1km to access fuel wood or charcoal for domestic use. However a majority (92.2%) of the households wanted a very strong punishment for those who were found cutting down trees illegally, because 83.7% of them believed that this was a major cause of drought shortage of fuel wood in their villages.

The majority of households (92.5%) reported being able to obtain water for domestic consumption within a radius of 1 km from their homes. Very few (7.3%), mainly from the Lerang'wa village, had to walk more than 1 km to obtain water. The Strategic Plan (2010/2014) of the Catholic Diocese of Moshi seems to recognize the water challenges facing these villages. In its situation analysis section, the plan indicates that though the diocese has adequate sources of water, rivers, springs and underground water, only 55% of the population gets piped and safe water. During the dry season, only 48% can access water (The Roman Catholic Strategic Plan, 2010). There is a lot of competition for water, and sometimes there have been quarrels between the people who live in the highlands and the lower lands (The Roman Catholic Strategic Plan, 2010). Economic activities such as harvesting of forests and cultivating nearby water sources have deprived water systems of adequate water yields, and water issues have affected the environment and economic and social activities (The Roman Catholic Strategic Plan, 2010).

Initial tests, using Pearson's Product Moment Correlation Coefficient, show that correlations of consumption of water and fuel wood per day by members of Catholic households and the distance covered to fetch water or fuel wood are non-significant at the $p<0.01$ level. In other words the frequency of attending church services, reading religious texts, and degree of faith in God could not be correlated to the domestic consumption of water or fuel wood consumption. Therefore the assumption that a person's use of environmental resources like water and fuel wood may be linked to factors like a high degree of faith in the afterlife and religious teachings, which may reduce self-centred consumption and advocate sharing with others, may be inaccurate.

However, the estimated amount of water used by households at homes every day, correlated positively and strongly to estimated amount of fuel used for domestic purposes per household each day ($N=282$; $r=0.484$; $p<0.01$). In other words, both results of correlation coefficients did not show whether water consumption was caused equally by consumption of fuel wood, or vice versa. However, perhaps what most determines the use of water and fuel wood in these households is socioeconomic variables. Spearman's (rho) Correlation Coefficient test results showed a significant but weak positive correlation of the estimated amount of water used in a day by households and their estimated monthly incomes ($N=282$; $r=0.205$; $p<0.01$). The results showed a non-significant correlation of the amount of water and fuel wood used by households and the core socio-demographic variables of health, level of education and ageing.

When associations between the estimated amount of water and estimated amount of fuel used by household each day were examined, controlling for socio-demographic variables of age, level of education, health and wealth, certain relationships appeared to be statistically significant at $p<0.01$.

The results of the multivariate analysis using Pearson Chi-Square test of Independence showed a significant but weak positive association between the estimated amount of water consumed per day and frequency of attendance at church services of women in Catholic households ($X^2= 55.669$; $DF=9$; $N=124$; $p<0.01$; $Phi = 0.670$). Examples of spiritual eco-feminism were also discovered when an association of perceptions of the environment and religiosity were examined in the previous sections. Despite the existence of a rigorous critique of cultural eco-feminism, the key assumption that women have a special bond with nature has shaped and continues to influence approaches to women and environmental resource management within mainstream development theory and practice (Green et al, 1998; Leach, 2007). In rural Kilimanjaro, it is the responsibility of women to ensure that there is adequate water in homes for various uses. Women often walk some distance (within 1km radius in rural Kilimanjaro) every day to fetch water when tape water is unavailable. In the dry season it is not uncommon for women to walk twice this distance to fetch water.

There has been little attempt in other academic, activist or policy literature to consider the ways in which gendered natural resource use and management is cross-cut by issues of religious attachment (Tomalin, 2008). Nonetheless, the association uncovered between religiosity and the natural environment in women demands further exploration of the contribution of spiritual eco-feminism to understanding of the relationship between women and the environment in rural Kilimanjaro. I would also suggest that an understanding of how religion feeds into the ways in which a society 'genders' men and women is useful in assessing the differential use of natural resources, the differential impact of environmental degradation as well as the various options and limitations with respect to managing environmental resources in the area.

Perhaps also the associations of the religion-environment, focusing on gender, can challenge the church-based institutions to put more emphasis on gender-centred environmental conservation plans and projects, including gender-focused social forestry, agro-forestry, soil and water conservation projects, fuel-efficient stoves and solar cookers in order to address water and energy issues in rural Kilimanjaro.

The Strategic Plan (2010-2014) of the Catholic Diocese of Moshi seems to recognize the existence of issues of spiritual feminism, including eco-feminist challenges. One goal of the Strategic Plan is to “improve gender equality in the diocese by empowering the families”. In its situation analysis section, the plan indicates that some of local traditions and culture are good as they promote good societal values, promote the respect of people, improve the environment and enhance peace among the community. It states that “most of the decisions are made by men though women will be involved in implementing them, and in the church, women are in the forefront but few of them are in the leadership positions” (The Roman Catholic Strategic Plan, 2010). This is an indication that the Church in rural Kilimanjaro is well aware of spiritual feminist challenges and the way in which these issues are relevant to development policy, planning and practice, and the development of the church in the area. Nonetheless, the environmental projects outlined in the plan did not take into account the eco-feminist challenges facing the households like shortages of water and fuel wood with an emphasis on specific gender characteristics.

7.5 Results and Discussions: Survey of Roman Catholic Church environmental interventions

Church-based environmental interventions can reach broad populations and have great potential for reversing environmental degradation in rural areas. From a socio-ecological perspective, churches and other religious organizations can influence members' behaviour at multiple levels of change (Campbell et al. 2006). Religious institutions have the capacity to change worldviews on sustainability issues, provide moral authority that can influence human attitudes and behaviour towards sustainability, and may have the capacity for community building and mobilization of large amount of adherents and followers in rural Kilimanjaro.

The study also assumed that religious institutions play a significant role in environmental conservation in rural Kilimanjaro from policy to project levels. Therefore this section examines the environmental interventions of the Roman Catholic Church on those levels.

7.5.1 Environmental policy, plans and projects supported by faith organization

The surveys could find no find specific environmental policies implemented by the Catholic Diocese of Moshi. It can be argued that a broad environmental policy is embedded in the vision of the diocese which states that "The diocese of Moshi, guided by Gospel values, envisages a united committed family of God with a good quality of life, spiritually and socially". Quality of life is different for everyone, but the main element of quality of life in rural Kilimanjaro includes environmental sustainability. This vision is consistent with the Tanzania Development Vision 2025. With regard to high quality livelihoods, the vision states a desire for "self-sufficiency in food and food security, a high degree of education at all levels, gender equality and feminine empowerment, access to quality health care and safe water, increased life expectancy, reduction in infant and mortality rates and the absence of abject poverty".

The Diocese has a Five Year Strategic Plan (2010-2014). The plan situation analysis and challenges chapter of the plan clearly highlight core environmental issues in the diocese. It states that, 74% of the population in the diocese of Moshi depends on agriculture and livestock keeping and 60% of the earnings come from agriculture. The plan acknowledges the connections between the economy and the availability of food among the people of the Diocese and environmental degradation. The plan notes that the diocese enjoyed food security until recently when the weather became unpredictable. The food crops have also been affected by the weather. Also there is a problem of the shortage of arable land for the population. The diocese is one of the areas in Tanzania which has many land disputes. Issues of connections of health, gender and education and environment are also outlined in the plan.

The goals and strategic objectives of the plan are consistent with the National Strategy for Growth and Poverty Reduction of Tanzania or MKUKUTA. MKUKUTA has three main desired outcomes, namely growth of income and the reduction of poverty, improved quality of life and social well-being and good governance and accountability.

During the survey, Father Kimario (personal communication, 2012) pointed out that the Church was working on an environmental policy and strategy to reflect the environmental policy of Tanzania. The Strategic Plan partially addresses issues of environmental sustainability.

Chapter 7: Religious Phenomenology and Ecology

The Government of Tanzania recognizes six major problems, through the Environmental Policy, which require urgent attention. These are: loss of wildlife habitats and biodiversity, deforestation, land degradation, deterioration of aquatic systems, lack of accessible, good quality water and environmental pollution. Its policy further admits that the country needs to adopt environmentally sustainable natural resource management practices in order to ensure that long term sustainable economic growth is achieved.

The most significant environmental policy and plan interventions by the Diocese was the development of the Health Strategic Plan 2010-2014. The plan expands upon the Diocese Strategic Plan by outlining specific health issues in the area, and by outlining strategic goals and strategic objectives. This Health Strategic Plan is designed to address health care, public health promotion and protection, disease prevention, improvement and renovation of 44 Dispensaries, capacity building for its health workforce, and provision of essential equipment and supplies to these Dispensaries over the next 5 years. The plan clearly states that a stronger focus has been placed on health promotion and disease prevention in its catchment population. The strategic health goals are:

- Improving the safety, quality, affordability and accessibility of health care;
- Public health promotion, protection, disease and prevention;
- Human services including human resource development; and
- Provision of essential equipment and supplies to the Diocesan dispensaries.

The plan reiterates that the Diocese is committed to a primary health care approach that encompasses the social, economic, cultural, behavioural and biological determinants of health, in all people from the well population to individuals with chronic disease. The plan links health and well-being by recognizing the significant impact of chronic diseases on health and wellbeing, as well as on the health system for its catchment population. It strives to protect and enhance the health and wellbeing of people by working cooperatively with other agencies and the community to develop healthy environments and support behaviour that protects and promote good health outcomes and reduces health inequalities. The plan, however, did not address some key environmental health indicators in its catchment area. Change in climate and subsequent environmental degradation are the most important factors influencing diseases in these areas. Environmental health addresses all the physical, chemical, and biological factors external to a person, and all the related factors impacting behaviour. It encompasses the assessment and control of environmental factors that can potentially affect human or animal health. It is targeted towards preventing disease and creating health-supportive environments. Water management, climate stabilization and environmental awareness are important aspects of environmental health which are lacking in the plan. The Strategic Plan, however, identifies some safe water provision projects as part of wider environmental management strategy. According to Father Kimario (2012), the Environmental Strategy will address all these aspects.

The Diocese has several environmental projects in the study area. During the survey, one environmental project in study areas was directly supported by a faith institution. The Franciscan Seminary MAUA (FSM) which is a Community Based Organization under the Roman Catholic Church had supported the implementation of a tree planning project on a half-mile strip. The half-mile strip, which was a forest reserve, it is now part of the Kilimanjaro National Park (KINAPA). KINAPA was established in 1973, covering an area of 755.75 km² after the annexation of the forest reserve in 2007. The people on the lower slopes of Kilimanjaro have traditionally been permitted to enter this reserve to harvest grasses, to feed their animals and to collect timber for firewood and building purposes. Most farmers practice zero-grazing thus need to collect fodder to feed their animals and also use the area to collect fuel wood and for beekeeping. Recently the government closed the half-mile forest strip to public access and included it within the park boundaries, so it is now illegal to enter it. This has caused great hardship to those who have come to rely on forest products to meet their normal needs. Mweka, Ruwa, Sungu, Shimbi Masho, Lerang'wa and Arisi villages all touch the mile-strip which surrounds KINAPA. This was created as a buffer zone to ease human pressure on KINAPA.

The project had a total budget of USD 4,313 to rehabilitate this devastated half-mile strip. It was financed by UNDP under the GEF-COMPACT programme. FSM has implemented this project. The half mile strip area in Ruwa village is U-shaped and thus it receives tree extraction pressure from all its sides from villages around it. The people of the Ruwa village have increased the extraction of forest products in the area without re-planting and so have created bare space in the area. Maua Seminary, together with the communities in Ruwa village, has proposed a tree planting project there to support their initiative in tree planting in which had already planted 1200 trees. This project contributed to and enabled the planting of about 10,000 trees on the same area. It planted trees in more than 25 acres (0.1012 km²) of the bare area in the half mile strip. The project put emphasis on capacity building in the management of the forests and also emphasized sustainable development through the improvement of agro-forest practices in community land. Tree planting on the half mile strip area will improve the availability of forest products for sustainable livelihood. Women collect fodder for livestock and fuel wood. Tree planting in the half-mile strip increased the availability of grass for fodder as well as fuel wood within reasonable distances. This project also promoted public awareness of land management practices in combating land degradation, and had wider implications by supporting the joint forest management policy. The project also rehabilitated the Monas canal, which originates in the natural forest of the Mt. Kilimanjaro. The project further strengthened the relationships between the Village Environmental Committee, the people of the village and the forest extension officers in the management of the forests in the village and beyond.

Chapter 7: Religious Phenomenology and Ecology

In its Strategic Plan (2010/2014), the Catholic Diocese of Moshi indicates that the Diocese shall support the communities' needs for reliable supply of water, with the cooperation of local and overseas partners. In the area of water supply, the diocese has engaged itself in supporting communities to make sure they have reliable supply of clean and safe water. In the past it has raised funds and managed the construction of a few water schemes. These include piped water systems, shallow wells and bore holes. In some places, they supported communities in water harvest projects.

The main protestant faith group in rural Kilimanjaro, the Lutheran Church, had a more elaborate program to address environmental issues in rural Kilimanjaro. They established the Kilimanjaro Environmental Conservation Program (KECP) of the ELCT in the Tanzania-Northern Diocese. Their Seven-Year Program has been drawn up by a specially formed committee of the diocese which consulted with all parishes, church-run schools and hospitals as well as the church's young people and women's groups. The Diocese has an estimated population of 400,000 believers, divided into 152 parishes scattered on the slopes of the mountain (Colwell et al., 2009). In its Synod meeting of June 2006, the Diocese adopted a policy on environmental conservation and called for young people attending Confirmation classes have to plant 10 trees before they are confirmed (Colwell et al., 2009).

Key aspects of the environmental programme are:

- Water conservation and restoration and conservation of forests all over the Kilimanjaro Region;
- Mainstreaming environment conservation as a mandatory subject in church schools and colleges as well as in faith classes for children prior to confirmation and at all churches;
- Doing away with coffins for burial using cloth and mats made from organic matter instead, and stopping the practice of constructing graves from cement, bricks and mortar;
- Promotion of energy serving devices and materials;
- Promotion of sustainable agriculture; and
- Promotion of sustainable materials for the construction of housing.

It was not very clear why religious groups were involved in projects to support environmental conservation in rural Kilimanjaro. Both factor and nominal group analyses identified health, water and energy issues to be the most important environmental problems facing the people of rural Kilimanjaro. Perhaps these problems averted people in rural Kilimanjaro from effective and efficient engagement in religion phenomena. Availability of energy from forest products, availability of adequate and safe water, and disease freedom obtained from support of religious institutions. This support could perhaps increase appreciation by the local people of the relevance of the church. This appreciation and freedom from poverty trap would perhaps allow rural people to engage in religion phenomena.

7.5.2 Eco-spiritual myths and environments protected on a faith basis in rural Kilimanjaro

The Alliance of Religions and Conservation and the International Center for the Study of the Preservation and Restoration of Cultural Property recognise a religious forest or conservation site as any forested area owned or influenced by faith groups. These include small and large commercial holdings, community managed forests, areas targeted for tree planting programmes, sacred forests of spiritual significance, and even rare trees maintained in churchyards (Storel et al. 2005).

During the surveys in rural Kilimanjaro, sites which were protected or owned by church institutions on the basis of faith outside their premises could not be identified. They neither contained trees nor wildlife which were protected or managed in a way that was based on the faith's values, beliefs, heritage and traditions. However in Lerang`wa I found that the Roman Catholic Church had planted a forest for environmental conservation and according to the Village Executive Officer, every year the Church wins the Village Environmental Conservation Award since it is the only planted forest in the village. However there were no religious or ritual values attached to the forest.

In the standard question, households were requested to indicate the values of wildlife (wild plants and animals) (Figure40).

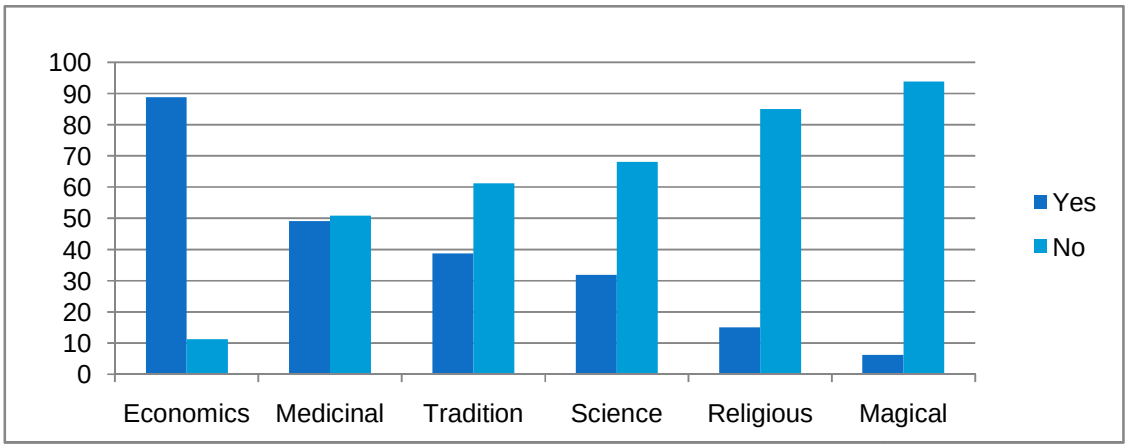

Figure 40: Perceived values of wildlife by households

Households considered wildlife as an economically valuable resource. Timber production, a source of fuel wood, and other non timber products were among the key economic factors which they identified. Mount Kilimanjaro is the highest point in the African continent and earns the Kilimanjaro National Park more than $ 25 million each year through non consumptive tourism. The cascading effects of the Kilimanjaro National Park for the neighbouring communities are massive, which may be another reason that members of the households considered wildlife to be so important. The use of plants and animal products as a source of medicine for various diseases was reported by households to be another important contribution of wildlife. Chagga tradition is mainly expressed through songs, ceremonies, food and drinks. Few Chagga admitted to visiting wildlife areas for rituals. Nonetheless, contributions to Chagga traditions were reported to be third most important value of wildlife by households, followed by scientific and ecological values. *Dracaena marginata* or 'Masale' in Chagga language is a vascular plant used on different occasions for different purposes in rural Kilimanjaro. 'Masale' are used to demarcate land boundaries, as graveyard plants for identification of these sites, farms or forests and also as symbols of peace during conflict resolution processes in rural set-ups.

Religious and other supernatural powers were considered the least important values of wildlife by members of Catholic households. *Phoenix reclinata* and *Dracaena marginata* are widely used by adherents of the Roman Catholic Church during a religious ceremony called 'Kwaresma' which takes place 7 days before the Easter festival. This is the only notable use of natural resources, apart from water resources. Holy water is widely used in Catholicism. It is water that has been sanctified by a priest for the purpose of baptism, blessing of church adherents or places and objects or as means of repelling evil.

Another eco-religion tradition in rural Kilimanjaro is the concept of Ruwa. Chagga legends center on Ruwa for his power and assistance. Ruwa is the Chagga name for their god, as well as the Chagga word for 'sun'. Sun radiation drives ecological systems and life in general, which is why Chagga tradition compares the Sun to God. Ruwa is not looked upon as the creator of humankind, but rather as a liberator and provider of sustenance. He is known for his mercy and tolerance when sought by his people. The environment and nature are infused in everyday aspect of African traditional religions and culture (Olupona, 1999). This is largely because cosmology and beliefs are intricately intertwined with the natural phenomenon and environment. Some of the Chagga myths concerning Ruwa resemble the biblical stories of the Old Testament. African traditions seem to be still much more closely tied to natural environment where they are practiced, by incorporating natural and ecological ideas more readily into their belief structure, compared to western religions (Olupona, 1999).

Without being very specific, 45.5% of households (N=26) who adhered to the Roman Catholic Church faith said Chagga tradition lessons cover ecosystem conservation. Some respondents (31.2%) did not agree that Chagga tradition had something to do with ecosystem conservation and 25.5% had no idea about ecosystem conservation. This research did not examine, in deep, connections of Chagga culture and ecology, or Chagga-Christianity culture connections. Olupona (1999) observed that much environment destruction in Africa today is caused by lucrative economic exploitation exacted in logging, farming and mining operations, and not influenced by eco-spiritual myths. These operations are run without any consideration for religious ideologies or myths (Olupona, 1999).

In Mweka and Sungu villages, local people would not wish to own land for settlement or farming very near big river banks because they believe that many years ago human corpses were not buried but thrown into big rivers. Subsequently, river banks are secure from the encroachment of human influences. When I took a walk through one of the big rivers in Mweka village, I could not see signs of human remains.

One other eco-religious belief concerns all types of snakes. All the members of the Catholic households made it clear that they would kill a snake any time they saw one because they believed that snakes are deadly dangerous reptiles, and that it was a biblical obligation to kill them. Masambaji (personal communication, 2012) said “imeandikwa kwenye biblia kama yeye nyoka atakavyokung’ata kisigino, basi nawe ponda kichwa yake, bora ujifunze kuwagonga kichwa chao”. Literally this means the Bible says you must kill a snake because it will bite you, and local people need to be provided with skills to kill snakes.

Other general religious myths and beliefs were witnessed by members of the Catholic households. However, most of these myths did not necessarily help conservation of the natural environment. Cosmogony myths, creation myths, plant and animal myths seemed not to encourage the rural people of Kilimanjaro to change their attitudes and lifestyles to protect the natural environment.

7.6. Summary of Results and Discussions: Religious phenomenology and environment

Almost unanimously, the households of rural Kilimanjaro who reported adherence to the Roman Catholic Church regarded water and land as core variables that represent the key indicators of change in the state of the local natural environment. Members of these Catholic households felt strongly that their livelihoods were mainly influenced by the quality of land and the availability of quality water.

The land issues also featured prominently in other human development outcomes in terms of socio-demographic variables and issues relating to the availability of land and water seemed to relate to many other socio-demographic outcomes in rural Kilimanjaro.

There was no indication that religious practices or perceptions had an effect on the state of water and soil in rural Kilimanjaro. The differences in the water chemistry and structure and soil chemistry and structure, which were revealed by the results of water analysis, may have been caused by the existence of different types and levels of human uses and different types and levels of physical development in the area. Water was mainly used as a sacramental in the baptismal ceremony by the Roman Catholic adherents. As a reminder of baptism, Catholics dip their fingers in the holy water and make the sign of the cross when entering the church. The liturgy may begin on Sundays with the Rite of Blessing and Sprinkling Holy Water, in which holy water is sprinkled on the congregation. There was no immediate indication that the use of water for these religious purposes had an influence on the state of the water in the villages. The results show a non-significant correlation between religiosity (belief in God, attendance at church and reading tests) and the consumption of water by the members of the Catholic households. The results, however, show a significant but weak positive association between the estimated amount of water consumed per day and the frequency of attendance at church services by women in Catholic households (this aspect will be discussed under the subject of spiritual eco-feminism below). In India, the impact of religious festive mass bathing (Maha-Shivaratri) on the Ganga River water quality is evident (Sinha, 1991).

Other environmental variables that were identified by the households who reported to adhere to the Roman Catholic faith as affecting their livelihoods included the influence of Mt. Kilimanjaro as the major regulator of weather in the area. On the other hand, the Kilimanjaro National Park was considered to be the third most important aspect of the natural environment because it was considered by the majority (65.4%) of the members of the Catholic households to be the most important source of good weather, rainfall and water. Apart from the ecological value of the KINAPA, members of the Catholic households generally had the opinion that KINAPA provided some support for foreign tourism and the local economy. Very few respondents (1.5%) perceived KINAPA to be a source of religio-cultural practices. No evidence was found during the study that KINAPA was used by the local people, or protected by the government, for religio-cultural or ritual practices.

Natural catastrophes such as extreme weather conditions were also considered by households to be important environmental variables that could influence their livelihoods. Extreme weather in could lead to drought, wildfires, hunger and diseases in rural Kilimanjaro. It can cause excessive rainfall and subsequent floods, which can result in serious damage to crops, human life and property on the lower slopes of Mt. Kilimanjaro. Members of the Catholic households did not mention the environmental sustainability indicators of the Millennium Development Goals 2000 (MDG) related to the quality of their settlements, improved sanitation in villages and carbon emissions and ozone layer depletion. This was presumably because these outcomes seemed distantly related to their immediate livelihood options and the natural environment that supported their livelihoods. It seemed that the rural households considered the natural environment to mean aspects that had direct negative or positive impacts on the pursuit of their livelihoods.

The results on eco-religion relationships showed significant positive associations between perceptions about the different conditions in the natural environment and church attendance and reading religious texts by members of the Catholic households. The association between religiosity and the environment is generally quite weak and variable. In the Western World, amidst growing ecological crises, the connections between religiosity and perceptions about nature have been widely recognized in the emerging eco-religion fields, such as deep ecology, environmental and social ecology, eco-theology, eco-religion, cosmogenesis, environmental philosophy, cosmology ethics and ecological geography (e.g. Tucker & Grim, 1997; Gottlieb, 2006; Taylor, 2008). Biel & Nilsson (2005) suggested that situational cues partly determine which values embodied in religion influence environmental attitudes and perceptions. Certainly, the early founders of eco-centrism and environmentalism in America were deeply religious and their ecological views were thoroughly enmeshed with their pantheistic identification of God with nature, which is regarded as sacred. These worldviews on eco-religion connections were held by elite academicians in the United States during the beginning of the so-called age of ecology and intense philosophical and religious questioning of the fundamental assumptions, beliefs systems, values and goals of Western culture after the effects the industrial revolution had on the environment. This triggered debates and major ecological re-evaluation of humanity's place in nature across the world in the recent past, including this research into rural contexts. There was a need to re-examine the human-earth relationship in light of contemporary cosmological thought and whether eco-religion views are held by ordinary people who adhere to the Abrahamic faith in rural Kilimanjaro. The weak and varied eco-religion connections observed in rural Kilimanjaro might be a result of global texts on eco-religion that find their way into churches and religious texts in rural Kilimanjaro. Perhaps the eco-religion connections come from other fundamental ecological issues in rural Kilimanjaro and demographic variables.

When controlling for socio-demographic variables, significant positive correlations between perceptions about conditions in the environment and religiosity (church attendance and reading religious texts) were reported by members of the predominantly female Catholic households. The control results also show a significant but weak positive association between the estimated amount of water consumed per day and the frequency of attendance at church services by women in Catholic households. These results illustrate the complexity of the interactions between religion, socio-demography and the environment and some of the ways in which this nexus is relevant to development policy and practice. Thus, in thinking about the nexus between religion-socio-demography-environment-development, the first area that could usefully be investigated is the role of religion in engendering people's relations with the environment. With regard to European cultures, considerable archaeological evidence indicates that both the earth and the female were held in high regard in the Neolithic settlements prior to the Bronze Age (Spretnak, 1994). Cultural responses to the physical connections between nature and the female range from respect and honour to fear and resentment have also been reported (e.g. Tucker &William, 1997; Momen, 1999). Some scholars have also suggested that the Bible is a source for developing an eco-feminist response to environmental devastation (e.g. Ruether, 1992; Adams, 1993; Keller, 1996; Ruether, 1999; Habel, 2000). There is, nonetheless, strong opposition to the concept of spiritual eco-feminism. Despite the existence of a rigorous critique of cultural eco-feminism, the key assumption that women have a special bond with nature has shaped and continues to influence approaches to women and environmental resource management within mainstream development theory and practice (e.g. Green et al, 1998; Hiemstra-van der Horst and Hovorka, 2009; Leach, 2007). In rural Kilimanjaro, it is the responsibility of women to ensure that there is adequate water and fuel wood in homes for various uses. Women often walk some distance every day to fetch water when tap water is unavailable or to fetch fuel wood. In the dry season it is not uncommon for women to walk twice the normal distance to fetch water. It is thus true that climate change, and water and energy crises in rural Kilimanjaro, affect women more than men. Hunter et al. (2010) studied different explanations for environmental concern in less developed regions of the world. Results revealed the importance of both cultural and physical context. In particular, gendered interaction with natural resources shaped environmental perceptions, as does the local environmental settings. Perhaps, therefore, the significant association between perceptions about the natural environment and religiosity in women who adhere to the Roman Catholic faith is a reflection of the connection with and proximity of women to nature in rural Kilimanjaro rather than the spiritual eco-feminism illustrated by the results.

There have been few attempts in other academic, activist or policy literature to consider the ways in which engendered natural resource use and management is cross-cut by issues of religious attachment (e.g. Tomalin, 2008). Nonetheless, the association uncovered between religiosity and the natural environment in women demands further exploration in terms of the contribution of spiritual eco-feminism to the understanding of the relationship between women and the environment in rural Kilimanjaro. I would also suggest that an understanding of how religion feeds into the ways in which a society 'genders' men and women is useful in assessing the differential use of natural resources and the differential impact of environmental degradation as well as the various options and limitations with respect to managing environmental resources in rural Kilimanjaro. The key assumption that women have a special bond with nature has shaped and continues to influence approaches women and environmental resource management within mainstream development theory and practice (Green et al., 1998; Leach, 2007).

The control results further show significant positive relationships between religiosity (church attendance and reading religious texts) and the environment for members of Catholic households with primary school education. The control results also show significant positive relationships between the environment and religiosity (church attendance and reading religious texts) in members of Catholic households who reported they had not contacted malaria over a period of three years. The results show a non-significant correlation between religiosity (the frequency of attending church services and the frequency of reading religious texts) and incidences of malaria in the households over a period of three years.

This might suggest that health conditions in rural Kilimanjaro are perhaps linked to socio-economic variables, and not directly to levels of religiosity. The primary school group surveyed in rural Kilimanjaro had average minimum wealth (ownership property values, land and monthly incomes) compared to other school groups, and thus were hugely dependent on their immediate natural environment in terms of water, soil and forests for the pursuit of their livelihoods. Chapter six also showed a significant negative correlation between estimated monthly income and level of education. The linkages between education and poverty have been illustrated elsewhere. Oxaal (1999) showed that investment in education as a poverty reduction strategy enhances skills and productivity among poor households. Much of the theoretical debate about the role of education in development and economic growth has focused upon whether education is productive in an economic sense (Oxaal, 1997; Gamoran, 2007). There is much evidence that levels of schooling amongst the population are highly correlated with levels of individual wealth. However, whether the former has helped cause the latter, or whether causality runs from income growth to educational expansion, remains open to debate. Human capital theory (associated with the work of Becker, Blaug and many others), asserts that education creates skills that facilitate higher levels of productivity amongst those who possess them in comparison with those who do not (Oxaal, 1997). Economists may disagree a great deal on policy, but we all agree on the ‘education premium’, the earnings boost associated with more education (Bernstein, 2007).

Chapter 7: Religious Phenomenology and Ecology

Being poor can make people interact more closely with the natural environment in rural settings than being wealthy can. Therefore, an understanding of the human-environment interaction was more evident in this group of primary school educated households as a result of their frequent and necessary interactions with the natural ecosystem. One of the main findings of the Millennium Ecosystem Assessment by the World Resource Institute (2001) is that the relationship between human wellbeing and the natural environment is mediated by the services provided by ecosystems. The world's poorest people depend primarily on environmental goods and services for their livelihoods, which makes them particularly sensitive and vulnerable to environmental changes (World Resource Institute, 2001). Chapter six showed that the socio-economy in terms of the level of education, and subsequently wealth or poverty, tends to drive day-to-day human survival decisions in rural areas, rather than environmental considerations or religiosity. This might suggest that connections between the primary school group and natural environment conditions in rural Kilimanjaro are perhaps linked to socio-economic variables, and not directly to the levels of religiosity.

All the households in rural Kilimanjaro also admitted that they mainly opted to use fuel wood, charcoal, electricity, kerosene or a combination of some of these options on the basis of availability, accessibility and affordability, rather than because of environmental considerations or religious beliefs. Explanatory models have shown that it is not biblical literalism as such that relates to lack of environmental concerns, but rather a rigid political ‘story’ (Greeley, 1993). Perhaps what influences the lack of environmental concerns in rural Kilimanjaro is not religiosity as such but hardships in life and the desire to enhance individuals’ livelihoods. In rural Kilimanjaro, people are generally struggling to survive and be rational in their decisions. They usually, on a daily basis, do not take action unless this action has direct survival value, that is, it provides food and water, energy, shelter and protection, better health and increased material wealth for a family. Consideration of natural environment concerns is meaningful to rural people in Kilimanjaro, if it can make available to them the basics of continued existence. Religiosity and cultural experiences by and large seem to be a source of spiritual satisfaction and ethical guidelines. In other words, it appears that the ordinary Catholic parishioner just gets on with his/her life, and essentially his/her faith and environmental concerns are in different 'boxes', unless there is some good reason for them to interact. Wall (1995), when studying recycling motives, concluded that levels of the environmental behaviours will remain low, regardless of environmental concern, unless an environmental issue is linked to immediate personal concerns, or societal arrangements exist that help to reduce the costs of environmental policy compliance and facilitate cooperative environmental action.

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Reading religious texts and church attendance seemed to be strongly associated with environmental attitudes in certain gender and primary school education level groups. Eckberg and Blocker (1989) showed a correlation between religiosity and environmental attitudes. Greeley (1993) used only one variable, willingness to spend money on the environment, to examine the relationship between religiosity and environmental concerns in Tulsa, USA. The results showed that the low level of environmental concerns correlates with biblical literalism. They also correlate with being Christian and with confidence in the existence of God. Support for the environment also correlates positively with a gracious image of God, and being Catholic. The results in Chapter six do not show a significant correlation between core wealth indicators and religiosity. Nonetheless, the results show that the support given by households who reported to adhere to the Roman Catholic faith in rural Kilimanjaro to other people on religious grounds was weakly but positively correlated to one minor wealth indicator, the value of land owned by the households ($N=282$; $r=0.192$; $p<0.001$). Land, in terms of the size owned by households, is one of the core wealth indicators in rural Kilimanjaro.

Despite the fact that connections, or disconnections, between church commitments and environmental attitudes are not very clear, most (96.1%) rural households in rural Kilimanjaro attend a church or other organized religious institution daily or weekly, and 86.5% read religious texts daily or weekly, making this setting a prime type of venue for reaching and recruiting potential participants for environmental programmes. From a socio-ecological perspective, churches and other religious organizations can influence members' behaviour at multiple levels of change (Campbell et al. 2006). Religious institutions have the capacity to change worldviews on sustainability issues, provide moral authority that can influence human attitudes towards and behaviour with respect to sustainability, and may have the capacity for community building and the mobilization of large numbers of adherents and followers in rural Kilimanjaro. Mainstreaming relevant environmental materials in organized church procedures and religious texts focusing on women and primary school groups might enhance and promote sustainable development in rural Kilimanjaro.

Perhaps the most significant environmental policy and plan of intervention by the diocese was the development of the Health Strategic Plan 2010-2014. The plan expands upon the Diocese Strategic Plan (2010-2014) by outlining specific health issues in the area, and outlining strategic goals and strategic objectives. The questions are as follows: what is the motivation for this, why is the church concerned about matters that are not directly related to faith and is worship in fact something wider than what goes on inside church services and in people's private devotions or is the church trying to widen the ordinary parishioner's horizons beyond their immediate concerns?

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Previous sub section explained possible reasons for eco-religion connections in rural Kilimanjaro. Efforts by church to alleviate environmental degradation in rural Kilimanjaro probably free people from poverty trap and perhaps this allow rural people to engage in religion phenomena more effectively.

Consideration of the environment by religions in the Western world was proposed by White (1967). In this article, White indicated that the Western world's attitudes towards nature were shaped by Judeo-Christian beliefs. White proposed that Christianity, and Western civilization as a whole, held a view of nature that separated humans from the rest of the natural world, and encouraged the exploitation of it for our own ends. Since then, religions across the world have embraced views about conserving the natural environment. Different religious groups are involved in different environmental agendas and programmes for different reasons (Catholic Conservation Center, 2012). The mission of the Catholic Conservation Center is to promote ecology, environmental justice, authentic and sustainable development and stewardship of the Earth, in light of sacred scripture and the tradition of the Roman Catholic Church. Considerations of the natural environment by the diocese in rural Kilimanjaro seem to have different contexts, motivations and purposes. An examination of both plans indicates that they reiterate the diocese's commitment to a primary health care approach that encompasses the social, economic, cultural, behavioural and biological determinants of health, ranging from the healthy population to individuals with chronic disease. The mission of the diocese is as follows: the Catholic Diocese of Moshi is committed to building a united and responsible family of God by witnessing and proclaiming the good news, through teaching and the provision of socio-economic services with integrity, commitment and accountability. In the plans, the diocese clearly understands that deepening the faith through enhancing the provision of social services, strengthening interventions in cross-cutting community issues (gender, HIV/AIDS and the environment), promoting partnership and networking among diocesan key stakeholders and contributing to the reduction of income and food insecurity are the only ways to ensure support from its adherents. In order to ensure that these programmes are meaningful and sustainable, mainstreaming environmental issues in the church programmes is essential.

The study proposes a longitudinal and long-term study of eco-religion, focusing on gender, particularly females, because the land husbandry roles of households in rural Kilimanjaro are traditionally and distinctly split along gender lines. Such studies should also focus on the groups who have achieved primary school education levels, as they are the majority in rural Kilimanjaro and are intimately locked into natural environment-based livelihoods. A longitudinal study could be part of a vital statistics survey by the government, for private, non-governmental or church institutions.

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Essentially, as far as households are concerned, the relationship between religiosity and the environment is generally quite weak and variable. However, the organized church may be a more powerful force for environmental good, and this is the way for any environmental policies to be enacted and delivered. Because people are very religious in terms of their belief in God, attending church services and reading religious texts, place of worship and religious texts are good media and platforms for passing on environmental sustainability information.

Chapter 8: Major Findings and Recommendations

This chapter provides a summary of the major findings and recommendations. Specifically the chapter provides major conclusions of the study, their policy implications, and limitations. The findings also provide recommendations for future study and policy direction on eco-religion in rural Kilimanjaro, and Tanzania as a whole. This might benefit programmatic and policy formulation regarding sustainable human development and natural environment conservation in rural Tanzania where strong religious-cultural beliefs and practices exist.

It has been the aim of this study to examine the relationship between religion phenomena and the natural environment, controlling for socio-demographic variables. Specific objectives of the study were:

- To understand rural Kilimanjaro's local contexts of religion phenomenon, socio-demography and the natural environment;
- To examine the correlation of the core dimensions of religious phenomenology and socio-demography of the people of rural Kilimanjaro;
- To examine the associations between the religious-cultural tendencies of rural people and their perceptions of the natural environment and the association between religious-cultural practices and use of the core natural environments of rural Kilimanjaro, controlling for socio-demographic variables.

8.1 Major conclusions

8.1.1 Local contexts of religion phenomena, socio-demography and ecology

Because of variations across the world in the usage and understanding of common words, it was important to define the key terms used frequently in this study. Factor analysis and a nominal group technique were used to put religion phenomena, socio-demography and the natural environment in the contexts of rural Kilimanjaro. Confirmatory statistical tests were also used in certain cases to fully understand the association of variables, which were grouped together by factor analysis.

Continuous variables depicted much variability in the dataset under different factors and those appeared under many different factors resulting from the factor analysis, which defined religion phenomena, socio-demography and natural environment in the context of rural Kilimanjaro. The nominal group process helped to analyse data of a nominal/categorical nature. Variables that scored the highest through the nominal group technique also helped to define research variables in the context of rural Kilimanjaro. These variables that were put in rural Kilimanjaro contexts also made conceptual and statistical sense and they were commonly and widely used for research on religion, socio-demography and the natural environment worldwide.

8.1.1.1 Religion phenomena in the context of rural Kilimanjaro

Despite the fact that a single solid definition of religion phenomena remains elusive, results revealed common elements that define religious phenomenology in the context of rural Kilimanjaro. The research elements which showed much variability in the dataset thus defined the religion phenomena in the contexts of rural Kilimanjaro are: adherence to core variables of degree of belief in God; frequency of prayers; reading religious texts; church attendance; religious commitment in terms of money spent to support others on religious grounds and involvement in a church organisation. These elements were also confirmed through the nominal group process.

Degree of belief in God is a core element of the Abrahamic faith and monotheism, and it is the basis for all other assumptions on religion phenomena in rural Kilimanjaro, where prayers reflect the respect of, and request the forgiveness and support from, God. Church attendance and reading religious texts, on the other hand, help to inform or remind households in rural Kilimanjaro about the principles or rules to follow in order to adhere to their faiths. Church attendance is used to socialise amongst the rural Kilimanjaro households, after a week of routine business which often keeps them away from social assemblages.

The variables of the amount of money spent by households to support religion phenomena showed wide variability in the religiosity dataset from rural Kilimanjaro, where households give money to church institutions in the form of offerings. However, rural households, due to extended families, also tend to offer financial or material support to others perhaps on the basis of their religious faiths.

In order to uphold and implement these values, households in rural Kilimanjaro, almost predictably, ascribe to a recognised church organisation or denomination. About 99.9% of the households who were interviewed belonged to an organised religious institution. Failure to belong to an organised religious institution in rural Kilimanjaro is defined as anti-social and an upheaval against a society.

Related research worldwide has focused on the seven dimensions of religious involvement. These are public religious participation, religious affiliation, private religious practices and religious coping, daily religion-related spiritual experiences, religious commitment and self-rated overall salience of religion. Key religion phenomena defined in rural Kilimanjaro did not differ from spiritual commitment indicators used elsewhere.

8.1.1.2. Socio-demographic variables in the context of rural Kilimanjaro

Results show that age, level of education, wealth, in terms of land owned by the households in rural Kilimanjaro, and health condition appeared to correlate with several ordinal variables when the factor analysis was performed. The confirmatory statistical tests also showed a correlation of age, education, health and wealth with each other and with many other ordinal and continuous variables of the households of rural Kilimanjaro. The nominal group process also confirmed that the selected households from rural Kilimanjaro mentioned that gender, education, health, wealth and age provided a significant influence on the livelihoods of the people in their areas. Several studies seem to associate wealth, health, age, gender and education with changes in development outcomes in rural areas of Africa. Thus these elements define socio-demography in the context of rural Kilimanjaro.

Results of the factor analysis also revealed that English, Kiswahili and Chagga language proficiencies were patterned with a number of religiosity indicators. Nonetheless, these indicators also correlated strongly with level of education, age of households and wealth variables. It seems that languages are proxy and outcome indicators for mainly education, modernity and wealth in rural Kilimanjaro. Subsequently, language proficiency indicators were represented by education, age and wealth indicators for analysis of the correlation of religion phenomena and socio-demography.

When the factor analyses were performed, moral issues such as the household's perceptions and views about homosexuality, extramarital affairs and multiple partnership, divorce, alcohol drinking, atheism and arranged marriage featured prominently under socio-demographic variables but they were patterned less with religion phenomena, which is a focus of the research. The nominal group technique did not reveal these elements as core socio-demographic variables in rural Kilimanjaro. These elements seemed not to define socio-demography in the contexts of rural Kilimanjaro thus they were not considered in the analysis of association of religion phenomena, socio-demography and the natural environment.

8.1.1.3 Natural environment phenomena in the context of rural Kilimanjaro

This sub section drew together some of the key issues surrounding the concept of environment by providing a picture of the natural environment from the point of view of the rural households of Kilimanjaro. It gives meaning to the environmental (practice and perceptions) indicators, which were considered important by the households of rural Kilimanjaro, when the exploratory analyses of nominal group technique and factor analysis were performed.

Almost unanimously, the rural people of rural Kilimanjaro regard land as a variable that represents a core indicator of change in the state of the people's livelihoods in these areas. They defined land to include living organisms and the physical and non-physical environments that support them. Land and its resources have always been critical to the survival of the people of rural Kilimanjaro in terms of sustaining their livelihoods. Land quality and size seemed to determine the price of land in rural Kilimanjaro and the subsequent wealth of the local people. Because arable land is shrinking in rural Kilimanjaro, the majority of conflicts in these areas are also founded on the struggle for land ownership. Subsequently, the land variable tends to strongly define the natural environment in rural Kilimanjaro, compared to other environmental phenomena.

Soil was identified as an important element that defines the natural environment in rural Kilimanjaro. Soil is a heavily used environmental resource on which the rural people in Third World countries are highly dependent. Soil and land are connected because soil quality is defined as the fitness of soil for a specific form of land use. The variations in terms of soil structure and texture observed in rural Kilimanjaro, or the lack thereof, were mostly a reflection of differences in levels and types of land use and the geological processes that occurred in these areas.

When the factor analysis and nominal group techniques were performed, results show that water was one element of the physical environment that was considered to be an important element of land in rural Kilimanjaro and, as such, also defined the natural environment. Water availability adds value to land in rural Kilimanjaro. Land that is situated near a water body, or with soils that retained a good amount of water during an annual seasonal cycle, or land that received a considerable amount of rainfall annually is considered to be suitable and is valued at a very high price in rural Kilimanjaro. These results were expected because water possesses several unique physical, biological and chemical properties that are directly responsible for the evolution of our environment and the life that functions within it.

Chapter 8: Major Findings and Recommendations

Forests along the slopes of Mt. Kilimanjaro offer several benefits to rural communities and rural Kilimanjaro society at large because they are sources of energy through the provision of fuel wood and charcoal. Over 90% of rural households in Tanzania use fuel wood and other traditional bio-fuels like charcoal. Despite the use of other sources of energy, all of the households who were interviewed reported using fuel wood from nearby forests each day. Forests also provide commercial timber and building materials. Rural people in these areas also obtain wildlife plants and different edible animals from these forests. These use values perhaps promoted by the rural people of Kilimanjaro to define forests as one important natural environment variable.

Mt. Kilimanjaro and KINAPA also determined the natural environment of the households of rural Kilimanjaro. Households believed that cool and calm weather occurs frequently at high attitudes on the slopes of Mt. Kilimanjaro. They also reiterated that, apart from rainfall, the main sources of reliable water are the rivers flowing from Mt. Kilimanjaro and the springs that originate from the mountain. Water from Mt. Kilimanjaro serve agriculture and other human uses downstream. The households were also aware that the fertile volcanic soil, which is the main source of their agricultural products, was a result of the processes that formed Mt. Kilimanjaro. They also perceived that Mt. Kilimanjaro forests to offer high water catchment value and forest products in terms of timber and fuel wood. The households also had the opinion that Kilimanjaro National Park provided some support for foreign tourism and the local economy. Nonetheless, very few respondents (1.5%) perceived KINAPA to be a source of religious-cultural practices. No evidence was found during the study that KINAPA was used by the local people for religious-cultural or ritual practices.

The rural people of Kilimanjaro did not proffer attitudes and perceptions about land and soil quality, water quantity and quality, forest quality, and management aspects of rural environment to define natural environment variables. Nonetheless, people's decisions and actions concerning their environment are based not only on objective but also on subjective factors. This is the underlying principle of research into environmental perceptions and attitudes. Perceptions shape the interpretation of information when it enters a social system from an ecosystem, and also shape the decision-making process that leads to actions affecting other environmental variables. Perceptions arise from different sources including religion phenomena. Therefore, the section on eco-religion, among other analyses, examines whether the perceptions of the households towards the natural environment stem from religious beliefs and practices.

8.1.2 Religious phenomenology and socio-demography

The study aimed to examine the relationship between religion phenomena and socio-demographic variables.

Due to statistically insignificant numbers of respondents from other religious denominations, data only from households who adhere to the Roman Catholic faith was used to test the hypothesis of the relationship of religion phenomena and demographic variables. All religions found in rural Kilimanjaro enjoyed a fair relationship with the State in Tanzania. However, the growth of all them in rural Kilimanjaro was adversely affected by the Arusha declaration in 1967 because the government confiscated some of their social investment. Perhaps the dominance of the Roman Catholic Church in rural Kilimanjaro was due to the amount of investment in health and education programs compared to other religions.

Based on the factor analysis and nominal group technique results in the previous chapters, the following four indicators were found to define religious phenomena in rural Kilimanjaro: church attendance; frequency of prayer; frequency of reading religious books; and money spent to support others on religious grounds. Five indicators defined social phenomena in rural Kilimanjaro: education; age; gender; wealth and health. These religious-social variables were used test the relationships of religion phenomena and socio-demography in rural Kilimanjaro.

8.1.2.1 Religion phenomena and level of education

There are many different views on the relationship between religion phenomena and level of education. Results showed no significant correlation between reading religious books, prayer and money spent to support religious grounds and educational attainment of Roman Catholic adherents in rural Kilimanjaro. Nonetheless, results showed that the attendance at church services by the households who reported adherence to the Roman Catholic faith was negatively and weakly but significantly correlated to educational achievement. Convention theory, which states that “awareness through an increase in level of education lead to loss of religiosity”, could not be entirely confirmed in this study. Increased sample size and focused causation research on church attendance and level of education could perhaps confirm the application of secularisation theory in rural Kilimanjaro and its policy implications.

8.1.2.2 Religion phenomena and ageing

The study tested the hypothesis that there are significant correlations between the level of religiosity and the age of the people of rural Kilimanjaro. Results showed no correlation between the religion phenomena of church attendance, the frequency of reading the Bible, support on a religious basis and the ages of respondents.

Nonetheless, both the Pearson Correlation Coefficient test and the trendline equation coefficients results indicate that Roman Catholic respondents tend to reduce the amount of weekly prayers and increase the amount of prayers daily as they grow old. The significantly higher importance placed on religiosity through the amount of prayers by older respondents may be due to the increased need for consolation and comfort brought on by the disengagement of older people from social processes and the illnesses that confront them. Social policy should perhaps take into account religion phenomena to support the livelihoods of old people in a rural set-up. A future direction of study should perhaps focus on the cause-effect relationship between religion phenomena and ageing and its implications on social policy.

8.1.2.3 Religion phenomena and gender

Gender differences in religiosity are well reported. In this study the degree of religiosity in rural Kilimanjaro was assumed to differ with gender. Results of an independent sample t-test show that there were non-significant gender differences in church attendance and frequency of prayer, and also in the amount of money spent by both men and women who adhere to the Roman Catholic faith in supporting other people on religious grounds.

Nonetheless, significant gender differences in the frequency of reading religious texts existed. The mean frequency of reading religious tests was higher amongst men when compared to amongst women who adhere to the Roman Catholic faith. Frequency distribution data also showed that women were more religious than men in three core religiosity traits, namely church attendance, frequency of prayer and money spent on supporting other people on religious grounds. Data from elsewhere and the perceptions of local people in Tanzania tend to support this view, suggesting perhaps that a combination of anxiety about death, a refusal to take risks, traditional and biological mothering roles and sour men-women partnerships make women more religious than men.

8.1.2.4 Religion phenomena and estimated household wealth

There are assumptions that religious teachings of different faiths may influence spending and saving strategies in a variety of ways, as they can help people to draw on the tools they learn from religion to develop strategies for saving, investing and spending. Thus, this section tests the hypothesis that there is significant correlation between level of religiosity and estimated wealth (monthly incomes and size of land owned) amongst the households of rural Kilimanjaro.

The results show non-significant correlation between religiosity variables and estimated households monthly incomes. Results also show non-significant correlation of religiosity and sizes of land owned by households who are reported to adhere to the Roman Catholic doctrine in rural Kilimanjaro.

Controlling for socio-demographic variables, the results show a positive association between wealth and religiosity variables (reading texts, belief in God, prayer and church attendance) for female households who reported that they adhered to the Roman Catholic faith. The results also show a positive association between the wealth (estimated size of farms owned) and frequency of reading religious texts in households who have attained a primary school education only. Results above also showed the association between gender and religious commitment. Further studies on wealth-religiosity focusing on women and less educated adherents might help the Church to address fundamental and core gender and wealth issues in rural Kilimanjaro.

When the sample sizes were reduced, village specific data showed significant positive correlation of wealth indicators and religion phenomena. During the discussions with people in rural Kilimanjaro, it was generally felt that perhaps what made households who adhere to the Roman Catholic faith support religion phenomena is not their commitment to religious faith but the connections of education and wealth. These results should be treated cautiously because dealing with small sample sizes increase the chance of committing statistical errors.

8.1.2.5 Religion phenomena and health

Studies on the link between a person's religiosity or spirituality and their health are on the increase. This study tests the hypothesis that there is a significant relationship between level of religiosity and an indicator of health (in this case, the incidence of malaria, as this was the most commonly reported ailment) amongst households who are affiliated with the Roman Catholic Church in rural Kilimanjaro.

Results show a significant but weak positive correlation between frequency of prayer and reported malaria incidences in the households who followed the Catholic faith in rural Kilimanjaro. The ANOVA test (F-test) results suggest non-significant differences between the average values of groups making up the frequency of prayer and the categories of malaria incidences and other core demographic variables. This could perhaps suggest that frequency of prayer is an important element in coping with health challenges, regardless of gender, wealth, age and level of education in households affiliated to the Catholic faith in rural Kilimanjaro.

This chapter has explored the relationships between religious observance and socio-demographic factors. This understanding was necessary so that these effects can be taken into account as part of the main discussion about the relationship between religion and ecology in the subsequent main study chapter. Therefore, the subsequent core research chapter examines the association of religion phenomena and the natural environment.

8.1.3 Religious phenomenology and ecology

The previous chapter explored the relationship of religion phenomena and the socio-demography of households in rural Kilimanjaro. This chapter examines the relationships between religious phenomenology and environment variables, controlling for socio-demographic variables.

The results show significant but weak positive associations between the perceptions about natural environmental conditions in the villages and the degree of religiosity (church attendance and reading religious texts) of households who reported that they adhered to the Roman Catholic faith. When controlling for socio-demographic variables, significant positive correlations were found between the perceptions about the environment and religiosity (church attendance and reading religious texts) of mainly female households who reported adherence to the Roman Catholic faith. These results illustrate the complexity of the interactions between religion, socio-demography and the environment. Thus, the first area that could usefully be investigated is the relationship of religion phenomena and eco-feminism.

The control results also show a significant positive correlation between the perceptions about the environment and religiosity (church attendance and reading religious texts) of households of the primary school education group who reported that they adhered to the Roman Catholic faith.

The control results further show a significant positive correlation between the perceptions about environment and religiosity (church attendance and reading religious texts) of households who reported that they adhered to the Roman Catholic faith and had not contracted malaria for a period of three years. The results also show a non-significant correlation between religiosity (the frequency of attending church services and frequency of reading religious texts) and malaria incidences in the households over the last three years. This might suggest that health conditions in rural Kilimanjaro are linked to socio-economic variables and not directly linked to the level of religiosity.

Reading religious texts and church attendance seem to be two of the most important determinants of environmental attitudes in women and primary school education level groups. Most rural households attend a church, or other organised religious institutions, and frequently read religious texts, making this setting a prime venue for reaching and recruiting potential participants for environmental programmes.

The results further show a significant but weak positive association between the estimated amounts of water consumed per day and the frequency of attendance at church services by female households who adhere to the Roman Catholic faith. This association was also confirmed when the connection between perceptions about the environment and religiosity was examined.

Members of the Catholic households witnessed religious myths and this bolstered their beliefs. However, cosmogony myths, creation myths, and plant and animal myths seemed not to encourage the rural people of Kilimanjaro to change their attitudes and lifestyles to protect the natural environment. There was, however, no immediate indication that use of water for religious purposes had an influence on the state of water in rural Kilimanjaro.

Essentially, as far as households are concerned, the relationship between religiosity and the environment is generally quite weak and variable. However, the organised church may be a more powerful force for environmental good, and that is the method through which any environmental policies can be enacted and delivered. My view about the weak linkage between religiosity and care for the environment is because only in recent decades has the church become aware that there should be a link between love for God and love for the world he has made. Hitherto, the spiritual world and the physical world were seen as being separate concerns. These attitudes were carried to rural Kilimanjaro by European missionaries who transmitted it in their teachings.

Thus, religion and the environment became compartmentalized into separate boxes. Not so religion and morals and religion and wealth, because the missionaries (and therefore their converts) held very strong views about those matters. So it is perhaps a cultural thing inherited from Europe. On the other hand, traditional religions understand only too clearly the need to care for the environment (e.g. sacred sites, etc) and other similar taboos. However, the gap between religious observance and care for the environment is now belatedly being addressed by the church. Because people are very religious in terms of belief in God, prayers, attending at church services and reading religious texts, worship places and religious texts are a good media platform through which environmental sustainability information should be passed.

The most significant environmental policy and intervention plan by the Catholic Diocese of Moshi was the development of the Health Strategic Plan 2010-2014. The plan reiterates the diocese's commitment to a primary healthcare approach that encompasses the social, economic, cultural, behavioural and biological determinants of health, from the healthy population to individuals with chronic diseases.

8.2 Implications of the findings

Religions have the capacity to change worldviews on issues, offer moral authority that can influence human attitudes and behaviours, and encompass a large base of committed and adherents and followers and significant financial and material resources. Perhaps, if the Church were to focus on poverty-environment programmes, women and those who had only received a primary school education, this would perhaps have significant positive environmental outcomes in rural Kilimanjaro.

A clear understanding of the outcomes of the research may influence the integration of socio-economic and environmental sustainability issues into mainstream religions and their doctrines. Perhaps this might eliminate religious beliefs and practices that restrain sustainable development and promote rural societies that are assertive and sustainable.

The Government of Tanzania abolished the inclusion of religion and religiosity data on vital statistics in 1967. Connections of religious-socio-demography-environment and strong religious commitments of the peoples of Tanzania revealed in the thesis would perhaps make the government re-think the decision to make religiosity a part of the vital statistics, as related to medical and human population counts. This will enable the Government to develop religiosity indicators and ensure that participation in religious activities promotes sustainable human development.

8.3 Limitations of the study and further research

The sampling intensities of those who were interviewed in each village ranged between 6% and 11%. The amount of funding did not allow the sample sizes to be increased beyond these sampling intensities. In future, there is a need to increase sampling intensity to avoid likely errors resulting from small sample sizes.

The peoples of rural Kilimanjaro share local traditions and physical environments. Perhaps a comparison with other regions of Tanzania and people with different traditions, religions and physical environments would yield different research outcomes. Post-doctoral research should attempt to compare socio-religious-economic and ecological factors in rural Kilimanjaro and other regions with different natural environments, religions and cultures.

Other areas that required critical attention during the study were the influence of local politics and government policies on societal changes. Future studies of this nature may need to emphasise how government policies influence the eco-religion dynamics of rural landscapes.

The study also examined the correlations and associations between religion phenomena, socio-demography and environment variables, but it did not examine cause-effects relationships. Perhaps future studies of this nature should attempt to understand eco-religion cause-effects connections, which could perhaps uncover more fundamental policy aspects of religion and nature.

8.4 Major recommendations

A further study that compares the nature and determinants of religious beliefs and the causes of both wealth and poverty, with a special focus on gender and level of education, is warranted. Indeed, such a study might benefit the church and enable it to promote income-generating projects that focus on women and primary school graduates.

The study also recommends expanded research and longitudinal studies to establish cause-effect relationships between religiosity and the socio-demographic and environmental trends in rural Kilimanjaro. Planning, socio-economic surveys and vital statistics on the country should be considered, including data on religious phenomenology, in order to support these studies.

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The organised religion may be a more powerful force for environmental good, and that is the conduit through which any environmental policies can be enacted and delivered. Because people are very religious in terms of belief in a supreme being, prayers, attending church services and reading religious texts, worship places and religious texts are a good media platform through which environmental sustainability information should be passed.

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Appendices

Appendix 1: Standard Questionnaire

1. Demographic, ethnicity and location information

Village		Ward			Division	
					Female	Male
Gender						
		Separated	Never married	Married	Divorced	Widowed
Current Marital Status						
	18-25 years	26-35 years	36-45 years	46-55 years	56-66 years	>66 years
Age Group						
	Tribe		Sub tribe		Clan	
Ethnicity						
Number of children						
	STD 7	Form 4	Form 5	Certificate	Diploma	University
The highest level of education achieved						
GPS readings	Easting		Northing		Altitude	
Estimated annual income				TShs.		
Language proficiency (1 being excellent no idea and 4 being excellent)						
Swahili				English				Other _____			
1	2	3	4	1	2	3	4	1	2	3	4

2. Religious practices (behaviors, spirituality and beliefs)

2.1 With what religious family do you most closely identify?

	List other religions or faith that you sometimes associate with, or believe on their course	Reasons for affiliation
Roman Catholic		
Christian Reformed		
Anglican		
Orthodox		
Pentecostal/ Assemblies of God		
Salvation Army		
Seventh Day Adventist		
Mennonite		
Lutheran		

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Methodist		
Islam (Shiite)		
Islam (Sunni)		
Ephata		
Pagan		
Other (specify)		

2.2 List the main types of religious books that you have e.g. Koran, Bible, Tore, Pali Cannon, etc

(a) _____ (b) _____
(c) _____ (d) _____
(e) _____ (f) _____

2.3 How frequent do you read religious book(s)?

Never	Once a year	Monthly	Weekly	Daily

2.4 How often do you attend religious services? (Tick the appropriate one)

Never	Once a year	Monthly	Weekly	Daily

2.5 Approximately how much money do you and your family contribute to your place of worship or support religious activities per annum? (Tick the appropriate one)

Nothing	<TShs. 30,000.00	TShs. 30,000 – 60,001	TShs 60,000 – 120,001	TShs. 120,000 – 240,001	TShs 240,000 – 480,000	>TShs 480,000

2.6 Approximately how far is your worship place from your home? (Tick the right one)

<1 km	1 – 2 km	2.1 – 4 km	4.1 – 8 km	8.1-16 km	>16 km

2.7 How frequent do you meet religious leaders outside the holy site? (Tick the appropriate one)

Never	Once a year	Monthly	Weekly	Daily

2.8 Do you believe in God existence? (Tick the appropriate one)

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Don't believe	Believe with some doubts	Sometimes believe	Strongly believe

2.9 If you believe in God, what do you think God is like i.e. explain who is God?

2.10 Do you believe in existence of Witchcraft? (Tick the appropriate one)

Don't believe	Believe with some doubts	Sometimes believe	Strongly believe

2.11 Does each of the following exist? (Circle the right ones)

Ghost		Hell		Satan		Many Gods		Free advice from God		Food from God		Life after death	
Yes	No	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes

2.12 How frequent to you pray? (Tick appropriate one)

Never	Once a year	Monthly	Weekly	Once Daily	>than 1 time a day

2.13 When you pray, what do you pray for e.g. wealth, health, etc? Fill all the boxes based on your priority

1.	2.	3.
4.	5.	6.

2.14 How much does God provide in your livelihoods? (Tick only one)

God Provides 100%	God provides 75%	God provides 50%	God provides 25%	God provides nothing

2.15 Who do you think is **mainly** responsible for causing diseases on earth? (Tick only one)

God	Satan	People	Biotic factors	Abiotic factors

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2.16 Who do you think is **mainly** responsible for causing drought and floods on earth? (Tick only one)

God	Satan	People	Biotic factors	Abiotic factors

2.17 Who do you think might be **mainly** responsible for making you poor? (Tick only one)

God	Satan	Yourself	Other people	Government	Biotic and Abiotic factors

2.18 Who do you think might be **mainly** responsible for making you wealthy? (Tick only one)

God	Satan	Yourself	Other people	Government	Biotic and Abiotic factors

2.19 How do you feel about the family related or personality matters? (Tick appropriate one for each item)

	Homosexuality	Your neighbor drinking alcohol	Your friend having extra marital affairs	Abortion	Pregnancy outside marriage	Parent choosing partner for marriage	Divorce
Very good							
Good							
Don't care							
Bad							
Very bad							

2.20 Indicate religious affiliation of the following people, if different from yours.

Father	Mother	Spouse	Boy/Girlfriend	Best Friend	A person that you dislike most

2.21 How much money do you spend to support other people on religion grounds per annum?

Nothing	<TShs. 30,000.00	TShs. 30,000 – 60,000	TShs 60,000 – 120,000	TShs. 120,000 – 240,00	TShs 240,000 – 480,000	>TShs 480,000

2.22 How much money do you spend to support other people (not your spouse, boy/girlfriend or children) per annum?

Nothing	<TShs. 30,000	TShs. 30,000 – 60,000	TShs 60,001 – 120,000	TShs. 120,001 – 240,00	TShs 240,001 – 480,000	>TShs 480,000

2.23 List reasons that make you support other people who are not your children, parent, partner or spouse.

2.24 Have you ever had conflicts with other people that are found in religion? Give causes of conflicts.

Never	Once	Twice	Three times	Four times	Five times	>than five times

2.25 How would you like the Government to prioritize the following sectors? (Put 1 to 7, 1 being the most important sector)

Education	Water	Wildlife and Forestry	Health	Roads	Religions	Entertainment

3. Wealth indicators

3.1 Please list three major activities that support your livelihoods e.g. farming, number 1 being the most important one.

1.	2.	3

3.2 Estimate the financial values of all your properties

< TShs. 1 million	Between TShs. 1 & 5 million	Between TShs. 5.01& 10 million	Between TShs. 10.01& 20 million	Between TShs. 20.01&50 million	Between TShs. 50.01& 100 million	>TShs. 100 million

3.3 List for major properties under your direct ownership e.g. house, car, land and its estimated value

Property				
Value				

3.4 If you have land(s) how big it is and indicates whether you have title deed or legal ownership documents?

Size (hectares)	Legal ownership documents	
	Yes	No

3.5 Indicate number of times you have been assaulted or verbally abused for the past three years

Never	<3 times	Between 3 and 6 times	Between 7 and 12 times	>12 times

3.6 Indicate who mainly makes decision on the following domestic, family and society matters (tick only one)

	Husband	Wife	Joint (husband and wife)	Parents	Other people (mention them)
Type and amount of food to be cooked					
Daily food purchases at home					
Construction/installation of toilet at home					
Purchase of land, farm, house					
Construction of road at the village					
School for the children					
Repair of the house					
Color of the house					
Type of business					

3.7 Estimate number of times you have contracted the listed disease over the past three years

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	No contact	Less than 1	Between 2-3 times	Between 4 an 5 times	More than 6 times
Malaria					
Typhoid					
Dysentery					
Flu					
Hepatitis					

3.8 List any other disease or conditions that you suffer from e.g. diabetes

1.	2.	3.

3.9 List three ways of combating each of diseases indicated on the tables below

Malaria			
HIV/AIDS			
Typhoid			
Obesity			

3.10 Indicate the type of toilet that you use and distance from water points

No toilet	Pit-latrine	Compost	Water flush	Any other
Degree of environmental friendliness				

3.11 Estimate how free the house is against mosquitoes

100% mosquito free	75% mosquito free	50% mosquito free	25% mosquito free	0% mosquito free

3.12 Type of house or shelter

Thatch grass + mud wall	Thatch grass + concrete wall	Iron sheet/tiles + mud wall	Iron sheet/tiles + concrete wall	Any other

3.15 Check whether the house has water and electricity.

Water		Electricity		Other sources of energy, if not electricity
Yes	No	Yes	No	

3.14 Distance from water and energy sources, if water and electricity are not available in the house

	1 km	Between 1-2 km	Between 2-3 km	Between 3-4 km	More than 4 km
Water source					
Fuel wood					

4. Natural environment information

4.1 Driver Environmental Indicators (DEI)

4.1.1 Mention four items that you think constitute natural environment in your area and explain whether they are in good or bad conditions and explain a reason for your response

	1.	2.	3.	4.
Good condition				
I don't know				
Bad condition				

4.1.2 Indicate level of detestation on the following actions

	Setting wildfires	Theft	Water misuse	Not attending religious sessions	Cutting trees for any use
I strongly like					
I like					
I dislike					
I strongly dislike					

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4.2 Pressure Environmental Indicators (PEI)

4.2.1 How much liters water do you use per day?

Less than 5 liters	Between 6-15 liters	Between 16-30 liters	Between 31-45 liters	More than 46 liters

4.2.2 How much fuel wood (cm^3) do you use per day?

Less than 30 (cm^3)	Between 31-60 (cm^3)	Between 91-90 (cm^3)	More than 90 (cm^3)

4.3 State Environmental Indicators (SEI)

4.3.1 List types of birds that you see in the village and frequency of occurrence

	1.	2.	3.	4.	5.
Many times a day					
Once a day					
Every week					
Every season					

4.3.2 List types of mammals or reptiles or amphibians that you see in the village and frequency of occurrence

	1.	2.	3.	4.	5.
Many times a day					
Once a day					
Every week					
Every season					

4.4 Impact Environmental Indicators (IEI)

4.4.1 List types of diseases that affect animals and plants in the village

Animals				
Plants				

4.4.2 Could you rate the quality of water in the village?

Very safe	Safe	I don't know	Unsafe	Very unsafe

4.4 Societal Response Environmental Indicators (SREI)

4.4.1 Identify technologies or any other efforts that are used by the householders to respond to environmental issues e.g. energy efficient stoves etc.

Technologies	Efforts

4.4.2 List all environmental projects, including environmental health programs that have been implemented over the past five years.

4.4.3 List any environmental plans that have been implemented over the past five years.

4.4.4 Identify environmental bye laws or local policies

4.4.5 List environmental institutions operating in the village, including Community Based Organizations, and NGOs.

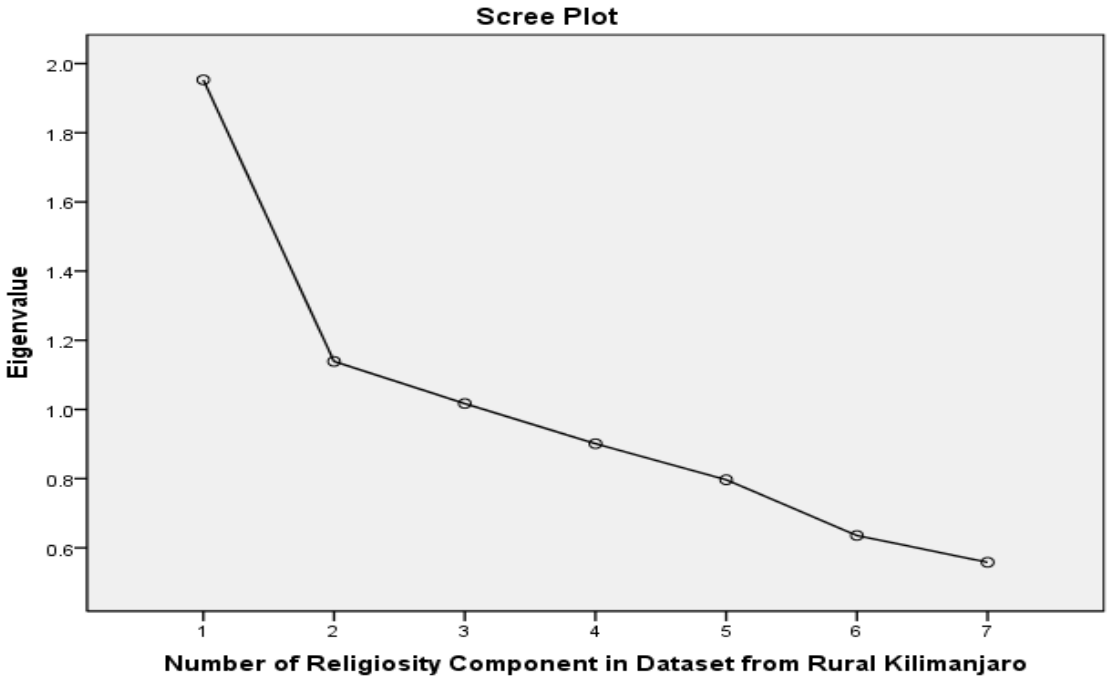
Appendices

Appendix 2: Results of Factor Analysis of Religiosity Dataset

1. Kaiser Criterion

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.668
Bartlett's Test of Sphericity	Approx. Chi-Square	196.443
	Degree of Freedom	21
	Level of Significance	0.000

2. Scree Test Criterion



3. % Contribution of three religiosity components

Total Variance Explained						
Religiosity Component		Initial Eigenvalues			Extraction Sums of Squared Loadings	
		Total	% of Variance	Cumulative %	Total	% of Variance
Dimension	1	1.953	27.900	27.900	1.953	27.900
	2	1.139	16.268	44.168	1.139	16.268
	3	1.017	14.530	58.698	1.017	14.530
	4	0.901	12.870	71.569		
	5	0.797	11.381	82.950		
	6	0.635	9.078	92.028		
	7	0.558	7.972	100.000		

4. Religiosity Component Matrix Output

	Religiosity Component		
	1	2	3
Frequency of Reading Religious Books	.665	.289	-.220

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Frequency of Attending Religious Services	.764	-.063	-.204
Amount of Money Contributing to Religious Institutions	.473	.249	.495
Frequency of Meeting Religious Leaders Outside Worship Places	.689	-.104	-.388
Do You Believe in God Existence?	.271	-.487	.370
Frequency of Prayers	.388	-.286	.562
Number of conflicts found in religiosity	.063	.812	.281

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Appendix 3: Nominal Group Technique Results on Socio-Demography Variables

How can a group of rural people with differing opinions and backgrounds, given a limited period of time, come to a fair consensus on core demographic variables influencing the livelihoods? Experience with group dynamics has shown that without a given process, a group of local people would spend the majority of time trying to decide how to accomplish the assigned task and not have enough time to concentrate on the substance of their assignment (College of African Wildlife Management, 1994). The Nominal Group Process (NGT) provides solution to unfair consensus and time problems. It is a participatory and collaborative process which allows people with different backgrounds and experiences to reach consensus on contentious issues quickly and succinctly (Center for Rural Studies, 2006; Dunham, 2006; Sample, 2006; Silicon, 2006). It is also a learning and study process where a facilitator develops and poses a question, give participants a few minutes to think about a response, and then ask participants to share their ideas and reach consensus (Dunham, 2006; Sample, 2006).

Typically the technique has four main stages namely silent generation of ideas, round robin recording of ideas, discussions and clarification, and finally ranking of scores through voting. However preparation of a venue and facilities for NGT, selection of group leaders and recorders precede four key NGT steps (College of African Wildlife Management, 1994). The following key NGT steps used to define core demographic variables from local people's perspectives:

Step 1. Silent generation of ideas

Twenty representatives from the six study villages were asked to respond to this question: "What are the four most important religiosity phenomena or indicators used to measure religious commitment amongst the people of the Rural Kilimanjaro, which can be accessed and objectively verified?" Silently and independently, each participant listed, on a note book, four core religiosity indicators used to measure religious commitment in rural Kilimanjaro.

Step 2. Round robin recording of ideas

The following local religiosity indicators were generated through round robin recording of ideas exercise:

1. Believing in a higher power that is way beyond human perception (God)
2. Doing charitable practices that one would with to be done upon
3. Having good character that is accepted in the community
4. Having faith in unforeseen things
5. The ways a person followed rules and regulation of his/her religion
6. Good behavior of a person in the society in relation to his/her religion
7. The way a person appear in the society
8. The good practices he made to the society in relation to the religion
9. People who like to talk about Christianity or Muslim type of belief several times – believe
10. People who are priests or sheikhs normally conduct masses values
11. People who like to sing songs of religious i.e. practices or behavior
12. Dressing styles but not necessarily
13. Weekly Church attendance Routines (Friday's – Muslims, Sunday's – Christians)
14. Religious holidays on the calendar. Attending religious ceremonies
15. Use of some words when talking. Swearing and in terms of clothes
16. Behavior – honesty, respect
17. Greetings
18. Eating, Feeding, drinking behaviors
19. People go to church or mosque (religious practices)
20. How we behave among ourselves
21. Using one's time to save god. Frequency of prayers
22. How one speaks in a community
23. Being born again
24. Dressing code

25. Faith basis
26. Physical appearance and religious symbols
27. Historical background of an area
28. Identify denomination
29. Action or reaction towards problems in a community
30. Appreciation of others status and personality
31. Belief in the success of any activity
32. Well behaving
33. Creation of peace, love, faith & development to others
34. Ways of life
35. Respect to what one believes
36. Positive attitude to others
37. They pray all the time
38. They weaving respect clothes e.g. kanzu most of their time
39. They did not engage with alcohol/smoking
40. Love each other, no apartheid
41. Heritage – from Parents
42. beliefs – Individual Belief on a religion
43. Culture
44. Dressing – style e.g. Muslims
45. Practices e.g. Praying
46. Behavior e.g. honesty, kind, good manner
47. Value religious people gives their life for other person e.g. Orphans
48. Dressing habits e.g. Muslim use dresses like “hijabu”
49. Drinking of alcohol this is more common to Catholics than others
50. Currency
51. Flags of Countries
52. Beliefs
53. Appearance of people in the church
54. Carrying of bible every time,bible reading frequency
55. Lingual mannerism and speaking
56. Frequency of attendance in workshop places
57. Public presentation and action
58. Ways to expressing ideas
59. Frequency prayers
60. Attending church masses
61. Helping poor (finance and materials
62. Decent dressing
63. Own religious symbols (Bible, Quran, missal)
64. Frequent prayer
65. Does right things
66. Baptized in case of Christians
67. Act of the person
68. Faithfulness
69. Behavior of the person (good behavior is from religion)
70. Looking appearance
71. Action (“Matendo”)
72. Good relationship with Colleague
73. Good behavior
74. They are trust people, always they going against lies

Step 3. Discussions and clarification

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The list of religiosity variables below is a result of the discussion and clarification exercise:

1. Believing in a higher power that is way beyond human perception (God)
2. Doing charitable practices that one would with to be done upon
3. ~~Having good character that is accepted in the community~~
4. ~~Having faith in unforeseen things~~
5. ~~The ways a person followed rules and regulation of his/her religion~~
6. ~~Good behavior of a person in the society in relation to his/her religion~~
7. ~~The way a person appear in the society~~
8. ~~The good practices he made to the society in relation to the religion~~
9. People who like to talk about Christianity or Muslim type of belief several times – believe
10. People who are priests or Sheikhs normally conduct masses values
11. ~~People who like to sing songs of religious i.e. practices or behavior~~
12. ~~Dressing styles but not necessarily~~
13. ~~Weekly Church attendance Routines (Friday's – Muslims, Sunday's – Christians)~~
14. ~~Religious holidays on the calendar. Attending religious ceremonies~~
15. ~~Use of some words when talking. Swearing and in terms of clothes~~
16. ~~Behavior – honesty, respect~~
17. ~~greetings~~
18. ~~Eating or feeding, and drinking behaviors~~
19. ~~People go to church or mosque (religious practices)~~
20. ~~How we behave among ourselves~~
21. ~~Using one's time to save God.~~
22. ~~Frequency of prayers~~
23. ~~How one speaks in a community~~
24. ~~Being born again~~
25. Dressing code
26. Faith basis
27. ~~Physical appearance Symbols~~
28. Historical background of an area
29. Identify denomination
30. ~~Action or reaction towards problems in a community~~
31. Appreciation of others status and personality
32. ~~Belief in the success of any activity~~
33. ~~Well behaving~~
34. ~~Creation of peace, love, faith & development to others~~
35. ~~Ways of life~~
36. ~~Respect to what one believes~~
37. ~~Positive attitude to others~~
38. ~~They pray all the time~~
39. ~~They weaving respect clothes e.g. kanzu most of their time~~
40. ~~They did not engage with alcohol/smoking~~
41. ~~Love each other, no apartheid~~
42. Heritage from Parents – those who holds parent's believe systems and faith
43. Beliefs on a religion – religious identity
44. ~~Beliefs in God (and existence of Satan)~~
45. Beliefs in life after death (heaven and hell)
46. ~~Culture~~
47. ~~Dressing – style e.g. Muslims~~
48. ~~Practices e.g. Praying~~
49. ~~Behavior e.g. honesty, kind, good manner~~
50. ~~Value Religious people gives their life for other person e.g. Orphans~~
51. ~~Dressing habits e.g. Muslim use dresses like hijabu~~

~~52. Drinking of alcohol this is more common to Catholics than others~~
~~53. Currency~~
~~54. Flags of Countries~~
~~55. Beliefs~~
~~56. Appearance of people in the church~~
~~57. Carrying of bible every time Bible reading frequency~~
~~58. Lingual mannerism and speaking~~
~~59. Frequency of attendance in workshop places~~
60. Good public presentation and actions
~~61. Ways to expressing ideas~~
~~62. Frequency prayers~~
63. Attending church masses
~~64. Helping poor (finance and materials~~
~~65. Decent dressing~~
~~66. Own religious symbols (Bible, Quran, missal)~~
67. Frequent prayers
~~68. Does right things~~
~~69. Baptized in case of Christians~~
~~70. Act of the person~~
~~71. Faithfulness~~
~~72. Behavior of the person (good behavior is from religion)~~
~~73. Looking appearance~~
~~74. Action ("Matendo")~~
~~75. Good relationship with colleague~~
~~76. Good behavior~~
~~77. They are trust people, always they going against lies~~

Step 4. Ranking of the religiosity variables based on importance

Table below provides a summary of religiosity variables in order of importance

Religious indices based on order if importance	Scores	Frequency	Standard Deviation
1. Private religious practice (Frequency of prayers)	40	11	1.61
2. Public religious participation (Frequency of attendance at worship places)	33	13	1.13
3. Daily or weekly spiritual experiences (Bible reading frequency)	24	9	1.57
4. Religious commitment (Charity / supporting others on religious grounds)	19	7	1.56
5. Belief system (Degree of beliefs in God and Life After Death)	14	7	1.19
6. Religious commitment (Dressing code)	10	5	1.09
7. Spiritual experiences (Ownership of religious symbols and books)	10	6	1.01
8. Religious commitment (Adherence to religious commandments, pillars / rituals)	9	4	1.18
9. Feeding and drinking behavior	8	3	1.33
10. Attendance religious ceremonies and rituals	7	2	1.33
11. Born again attitudes and self-expression	6	2	1.2
12. Good religious practices	5	4	0.65
13. Swearing	3	1	0.83
14. Religious affiliation (involvement in a church organization / denomination)	1	1	0.28

15. Adherence to religious values of parents	1	1	0.28
16. Continued talking and discussions about positive religious issues	0	0	0
17. Frequency of singing religious songs	0	0	0

When 360 were interviewed and asked whether frequencies of church attendance measure degree of religiosity, 92.8% responded yes. When 360 were interviewed and asked whether frequencies of prayers measure degree of religiosity, 87.9% responded, yes.

When 360 were interviewed and asked whether frequencies of reading religious books measure degree of religiosity, 26.4% responded, yes.

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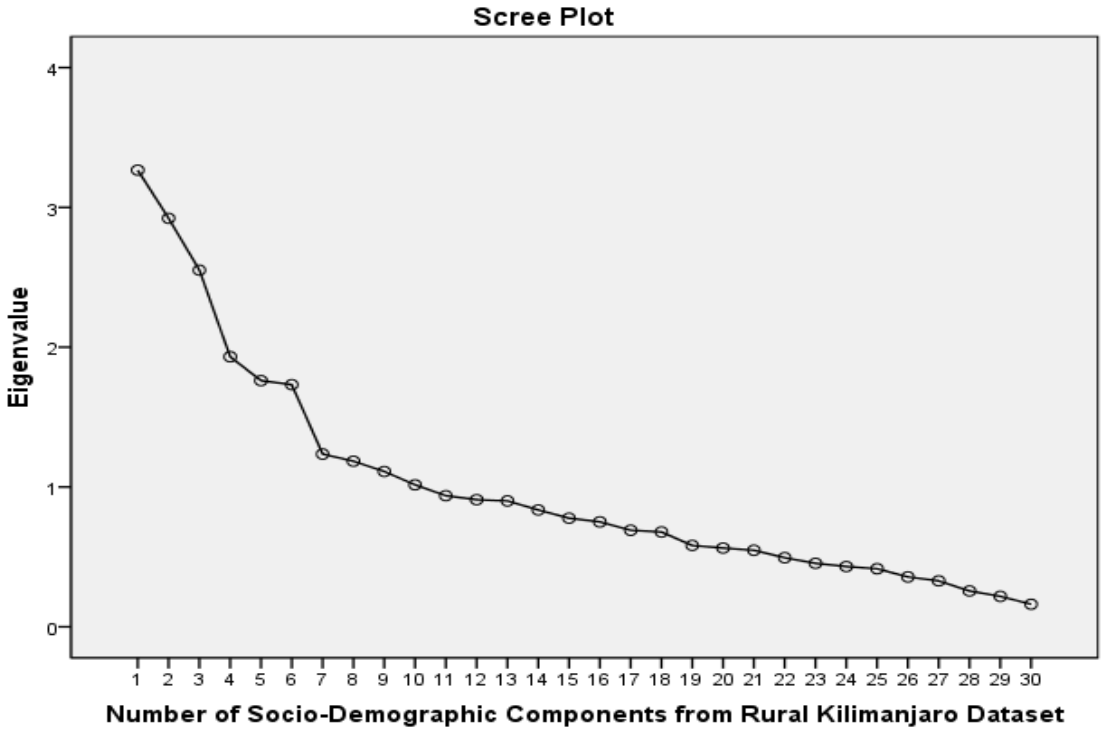
Appendix 4: Results of Factor Analysis of Socio-Demographic Dataset

1. Kaiser Criterion: KMO and Bartlett's Test Results

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.646
Bartlett's Test of Sphericity	Approx. Chi-Square	2757.213
	Degree of Freedom	435
	Level of Significance	0.000

2. Scree Test Criterion



3. % Contribution of the 10

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.267	10.889	10.889	3.267	10.889	10.889
2	2.922	9.740	20.629	2.922	9.740	20.629
3	2.551	8.504	29.133	2.551	8.504	29.133
4	1.932	6.439	35.572	1.932	6.439	35.572
5	1.761	5.870	41.442	1.761	5.870	41.442
6	1.732	5.773	47.215	1.732	5.773	47.215
7	1.236	4.119	51.335	1.236	4.119	51.335
8	1.185	3.949	55.283	1.185	3.949	55.283
9	1.111	3.704	58.987	1.111	3.704	58.987
10	1.016	3.386	62.373	1.016	3.386	62.373
11	.938	3.126	65.499			
12	.909	3.031	68.530			
13	.900	3.001	71.531			

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14	.836	2.786	74.316			
15	.777	2.590	76.907			
16	.751	2.502	79.409			
17	.691	2.302	81.711			
18	.678	2.261	83.972			
19	.582	1.939	85.911			
20	.563	1.878	87.789			
21	.548	1.825	89.615			
22	.494	1.647	91.262			
23	.454	1.513	92.775			
24	.431	1.438	94.212			
25	.415	1.385	95.597			
26	.357	1.189	96.786			
27	.329	1.096	97.882			
28	.256	.854	98.736			
29	.218	.726	99.462			
30	.161	.538	100.000			

4. Component Matrix Output

	Socio-Demographic Component									
	1	2	3	4	5	6	7	8	9	10
Age of Respondent	.133	-.355	.265	.280	.394	.129	.301	.255	-.140	-.112
Kiswahili Proficiency	-.124	.063	-.086	-.499	.388	.178	.035	-.318	.083	.274
English Proficiency	-.035	.357	-.332	-.187	.103	.669	.012	.100	-.009	-.102
Chagga Proficiency	-.042	-.213	.228	-.407	.501	.134	.179	-.020	-.244	-.026
Number of Children	.146	-.139	.052	.237	.134	.120	.405	.247	.129	-.269
Level of Education	.145	.384	-.506	-.151	.116	.547	.108	.127	.047	.003
Estimated Monthly Income	.083	.108	-.325	.271	-.120	.193	.167	.476	.297	.050
How do you feel about homosexuality	-.266	.338	-.013	-.017	.365	-.202	-.025	.102	.393	.251
How do you feel about your neighbor drinking alcohol?	-.452	.375	.156	.098	-.370	.076	.172	-.040	.097	.042
How do you feel about having extra marital affairs	-.393	.569	.284	.096	.081	-.076	.067	.074	-.161	.007
How do you feel about abortion?	-.089	.459	.147	.098	.395	-.065	-.071	.000	.275	.043
How do you feel about atheist neighbor?	-.215	.503	.502	.165	.063	-.124	.056	-.018	-.119	-.142
How do you feel about parents choosing partner for marriage?	-.301	.552	.363	-.006	.061	.063	.034	-.047	-.127	-.171

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How do you feel about divorce?	-.282	.415	.266	.065	.128	-.062	.053	.069	.190	.024
Money spent to support other people on any grounds	-.072	-.072	.072	.364	-.043	.469	-.395	-.198	.253	.013
Rank farming in terms of contribution to your overall livelihoods	.267	.547	-.324	-.177	-.072	-.111	-.028	-.095	-.016	-.291
Rank formal employment in terms of contribution to your overall livelihoods	-.137	-.429	.481	.188	-.044	.007	-.063	.124	.371	.013
Rank small scale business in terms of contribution to your overall livelihoods	-.169	-.039	.074	.478	.124	.379	.062	-.235	-.313	.197
Describe your income trends for the past 10 years	.084	-.066	.177	.321	.252	.267	-.354	-.364	.096	-.279
Estimate financial values of all your properties	.480	.002	-.141	.372	.476	-.086	-.035	.039	-.005	.147
Value of the land owned	.539	.304	-.285	.401	.144	-.253	-.073	-.045	-.240	.147
Size of land owned	.333	.447	-.270	.394	-.268	-.126	-.028	-.068	-.073	.117
Number of assaults for the past three years	.414	.183	.048	-.169	.094	-.245	.264	-.166	.147	.117
Malaria incidences	.518	.185	.283	-.224	-.155	.058	-.120	.057	.027	-.338
Typhoid incidences	.543	.128	.519	-.095	-.294	.290	.148	-.051	.039	.132
Dysentery incidences	.602	.101	.248	.100	.195	-.025	.145	-.073	-.012	-.028
Flu /incidences	.558	-.006	.042	-.180	.106	-.123	-.053	-.183	.375	-.167
Hepatitis incidences	.533	.132	.538	-.084	-.285	.285	.126	-.031	-.020	.263
Stomach ulcers incidences	.163	.134	.179	-.157	.184	-.041	-.530	.474	-.200	-.162
Heartburn incidences	.212	.072	.279	-.208	-.010	.082	-.371	.350	-.090	.444

5. Pattern Matrix Output

Rotation failed to converge in 25 iterations (Convergence = .000).

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Appendix 5: Nominal Group Technique Results on Environmental Variables

Step 1. Silent generation of ideas

Twenty representatives from the six study villages were asked to respond to this question: "What are the four most important demographic variables which influence people's livelihoods in Rural Kilimanjaro, which can be accessed and objectively verified?" Silently and independently, each participant took a note book and responded to a question by listing four core demographic factors he / she thought to influence livelihoods in rural Kilimanjaro. This is primarily a brain storming technique in which participants generate ideas but do not elaborate, explain, evaluate, or question the ideas (Sample, 2006; Silicon, 2006).

Step 2. Round robin recording of ideas

At this stage, ideas which were developed under step one were posted on the flip chart. Each member, serially, by proceeding from one participant to another until all participants have had the opportunity to speak, listed on a flip chart the four demographic variables. In other words, group members engage in a round-robin feedback session to concisely record each idea (without debate at this point). This is especially effective for generating many ideas because it requires all members to participate, and because it discourages comments that interrupt or inhibit the flow of ideas (Sample, 2006; Silicon, 2006). This step also ensured equal participation among group members. Below are demographic variables listed on flip charts through round robin recording of ideas:

1. Age
2. Sex/Gender
3. Leadership
4. Influential people
5. Respected leader
6. Leadership
7. Religion
8. Age
9. Occupation
10. Gender
11. Level of income
12. Marital Status
13. Age
14. Sex
15. Income
16. Age
17. Sex
18. Marital Status
19. Income
20. Gender
21. Social Structure
22. Leadership
23. Gender
24. Occupation
25. Education
26. Religion
27. Religion
28. Age
29. Gender
30. Education
31. Level of income
32. Ethnicity
33. Marital Status

34. Parent
35. Poverty
36. Age
37. Age
38. Income
39. Income status
40. Organization structure
41. Level of Education
42. Age
43. Gender
44. Health of condition
45. Age
46. Income
47. Gender
48. Age
49. Sex
50. Gender
51. Age structure
52. Income leader
53. Gender
54. Income
55. Leadership
56. Income
57. Sex
58. Sex

Step 3. Discussions for clarification

This step provides an opportunity for open discussion and clarification of all the generated ideas (Sample, 2006; Silicon, 2006). Participants elaborated the variables which were identified, clarified meaning of words and phrases which appeared on the worksheets or flip charts. Each recorded idea is then discussed to determine clarity and importance. For each idea, the facilitator asks for any questions or comments group members would like to make about each response. This step provides an opportunity for members to express their understanding of the logic and the relative importance of the item (Sample, 2006; Silicon, 2006). The creator of the idea need not feel obliged to clarify or explain the item, any member of the group could play that role (Sample, 2006; Silicon, 2006).

1. Age
2. Sex/gender
3. Leadership
4. Influential people
5. ~~Respected leaders~~
6. ~~Leadership~~
7. Religion
8. ~~Age~~
9. Occupation
10. ~~Gender~~
11. Level of income
12. Marital status
13. ~~Age~~
14. ~~Sex~~
15. ~~Income~~
16. ~~Age~~

17. Sex
18. Marital Status
19. Income
20. Gender
21. Social Structure
22. Leadership
23. Gender
24. Occupation
25. Education
26. Religion
27. Religion
28. Age
29. Gender
30. Education
31. Level of income
32. Ethnicity
33. Marital Status
34. Parent
35. Poverty
36. Age
37. Age
38. Income
39. Income status
40. Organization structure
41. Level of education
42. Age
43. Gender
44. Health of condition
45. Age
46. Income
47. Gender
48. Age
49. Sex
50. Gender
51. Age structure
52. Income leader
53. Gender
54. Income
55. Leadership
56. Income
57. Sex
58. Sex

Step 4. The ranking of demographic variables

The purpose of this final phase of the NGT is to combine the ideas and opinions of individual members to determine the relative importance of the variables that have been identified. During this step each group member recorded four items of highest priority from those listed on the flipchart. They write one phrase and the identifying letter of the alphabet on each card. Then group members were asked to identify the items of highest importance and rank it as 4, the next highest importance as 3, and so on.

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Core Demographic Variables in Order of Importance	Scores	Number of People Voted	Standard Deviation
1. Age	25	11	0.9
2. Level of Education	22	11	0.77
3. Level of Income	19	8	1.19
4. Gender	12	5	1.3
5. Religious Affiliation	9	4	1.25
6. Occupation	7	4	0.82
7. Leadership	6	4	0.82
8. Influential People	5	3	0.93
9. Marital Status	3	2	0.65
10. Organization Structure	1	1	0.3
11. Ethnicity	0	0	0
12. Health Condition	0	0	0

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Appendix 6: Nominal Group Technique Results of Environmental Dataset

Step 1. Silent generation of ideas
Twenty representatives from the six study villages were asked to respond to this question: "What are the four most important environmental variables which influence people's livelihoods in Rural Kilimanjaro, which can be accessed and objectively verified?" Silently and independently, each participant listed, on a note books, four core environmental factors he / she thought to influence livelihoods in rural Kilimanjaro.

Step 2. Round robin recording of ideas

The following environmental variables were generated through round robin recording of ideas exercise:
1. Rainfall
2. Fertile soil
3. Mt. Kilimanjaro
4. Rivers
5. Rainfall
6. Biological resources (wildlife)
7. Water
8. Social services health centers
9. Rainfall
10. Rainfall
11. Soil
12. Altitude
13. Temperature
14. Soil fertility
15. Land use management plan
16. Natural catastrophes
17. Weather condition
18. Mountain
19. Soil (fertility)
20. Soil
21. Temperature
22. Rainfall
23. Variation in weather condition e.g. Rainfall
24. Fertility of the soil
25. Diseases
26. Soil type
27. Geographical location
28. Weather
29. Vegetation (M 1 Plants)
30. Wild animals
31. Mount Kilimanjaro
32. Rainfall
33. Water sources
34. Soil fertility
35. Forest
36. Mt. Kilimanjaro
37. Mweka College
38. Rainfall
39. Nature of soil
40. Land productivity
41. Soil type e.g. volcanic soil
42. Topography i.e. Slope of mount Kilimanjaro
43. Sources of water e.g. spring, rivers, wells, rainfall, etc.

44. Fertile soil
45. Presence of many rivers as a source of H_2O
46. Rainfall
47. Soil fertility
48. Topography
49. Rainfall
50. Edaphic factors – soil factors
51. Climate rainfall, temperature
52. Topography

Step 3. Discussions for classification

The list of environmental variables below is a result of the discussion and clarification exercise:

~~1. Rainfall~~
~~2. Fertile soil~~
3. Influence of the Mt. Kilimanjaro on climatic conditions (Temperatures)
~~4. Rivers~~
~~5. Rainfall~~
~~6. Biological Resource (Wildlife)~~
7. Water (rainfall, rivers, springs, rainfall, etc)
~~8. Social services health centers~~
~~9. Rainfall~~
~~10. Rainfall~~
11. Soil
12. Altitude
~~13. Temperature~~
~~14. Soil fertility~~
~~15. Land use management plan~~
16. Natural catastrophes
~~17. Weather condition~~
~~18. Mountain~~
~~19. Soil (fertility)~~
20. ~~Soil~~
21. Temperature
~~22. Rainfall~~
~~23. Variation in weather condition e.g. Rainfall~~
~~24. Fertility of the soil~~
25. Diseases
~~26. Soil type~~
~~27. Geographical location~~
~~28. Weather~~
~~29. Vegetation (M 1 Plants)~~
~~30. Wild animals~~
~~31. Mount Kilimanjaro~~
~~32. Rainfall~~
~~33. Water sources~~
~~34. Soil fertility~~
35. Forest
~~36. Mt. Kilimanjaro~~
~~37. Mweka College~~
~~38. Rainfall~~

39. Nature of soil
40. Land productivity
41. Soil type e.g. volcanic soil
42. Topography i.e. Slope of mount Kilimanjaro
43. Sources of water e.g. spring, rivers, well etc.
44. Fertile soil
45. Presence of many rivers as a source of H_2O
46. Rainfall
47. Soil fertility
48. Topography
49. Rainfall
50. Edaphic factors – soil
51. Climate rainfall, temperature
52. Topography

Step 4. The ranking of environmental variables

Table below provides a summary of environmental variables in order of importance

Core Environmental Variables in Order of Importance	Scores	Number of People Voted	Standard Deviation
11. Water	21	12	0.8
12. Soils (and land)	19	15	0.5
13. Mt. Kilimanjaro and its influences	5	3	0.7
14. Natural catastrophe	2	1	0.5
15. Forests and its products	2	1	0.5
16. Health centers	1	1	0.3
17. Wildlife resources	1	1	0.3
18. Temperatures	0	0	0
19. Diseases	0	0	0
20. Plants	0	0	0

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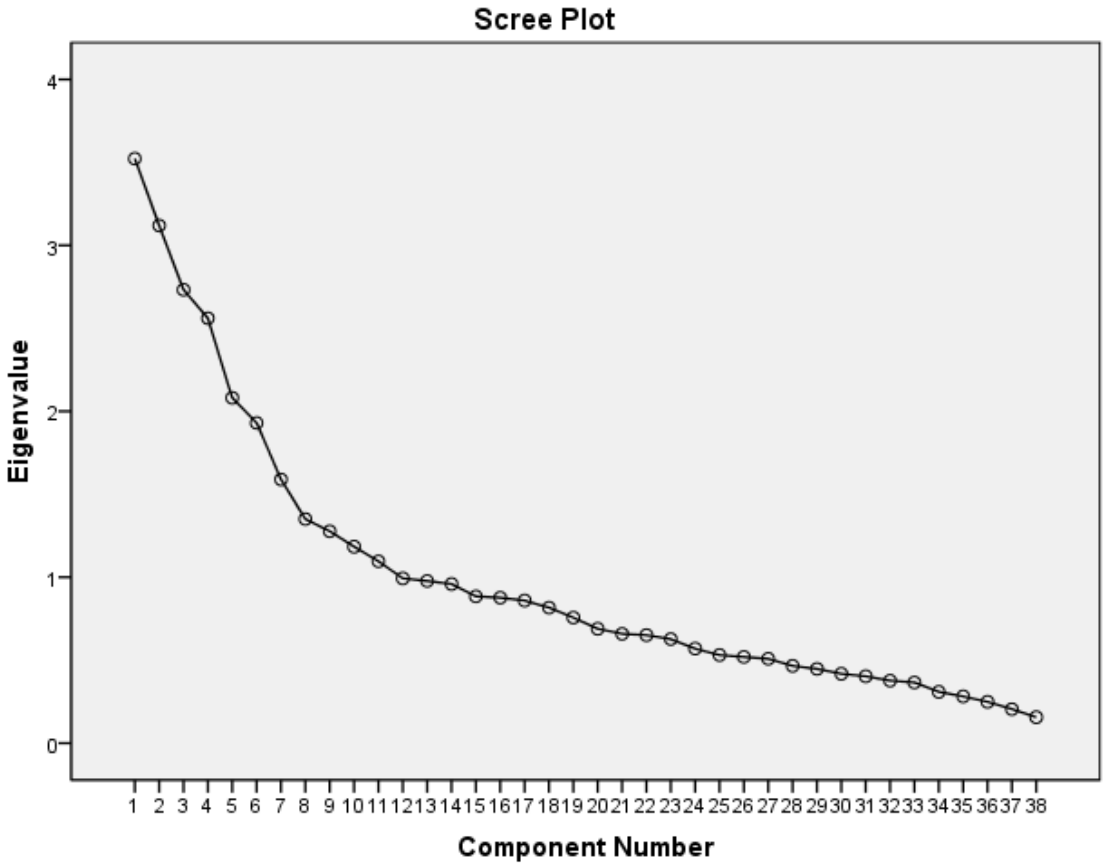
Appendix 7: Results of Factor Analysis: Combined Religio-Socio-Demography Variables

1. KMO and Bartlett's Test Results

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.656
Bartlett's Test of Sphericity	Approx. Chi-Square	3656.105
	Df	703
	Sig.	.000

2. Scree Plot



3. Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.522	9.270	9.270	3.522	9.270	9.270

	2	3.120	8.209	17.479	3.120	8.209	17.479
	3	2.732	7.190	24.669	2.732	7.190	24.669
	4	2.561	6.739	31.408	2.561	6.739	31.408
	5	2.081	5.476	36.885	2.081	5.476	36.885
	6	1.930	5.078	41.963	1.930	5.078	41.963
	7	1.589	4.183	46.145	1.589	4.183	46.145
	8	1.351	3.555	49.700	1.351	3.555	49.700
	9	1.277	3.361	53.061	1.277	3.361	53.061
	10	1.184	3.115	56.176	1.184	3.115	56.176
	11	1.096	2.884	59.061	1.096	2.884	59.061
	12	.993	2.613	61.673			
	13	.977	2.572	64.245			
	14	.959	2.524	66.769			
	15	.885	2.328	69.097			
	16	.877	2.307	71.404			
	17	.859	2.261	73.665			
	18	.817	2.149	75.815			
	19	.757	1.991	77.806			
	20	.689	1.814	79.620			
	21	.659	1.734	81.354			
	22	.651	1.713	83.067			
	23	.627	1.650	84.717			
	24	.570	1.499	86.216			
	25	.531	1.397	87.613			
	26	.519	1.367	88.980			
	27	.509	1.339	90.318			
	28	.466	1.226	91.544			
	29	.448	1.178	92.722			
	30	.418	1.100	93.822			

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	31	.403	1.061	94.883			
	32	.377	.992	95.875			
	33	.366	.963	96.838			
	34	.309	.813	97.651			
	35	.282	.742	98.393			
	36	.249	.655	99.049			
	37	.205	.540	99.588			
	38	.156	.412	100.000			

4. **Component Matrix**

	1	2	3	4	5	6	7	8	9	10	11
Age of Respondent	.055	-.378	.144	.153	.393	.182	.015	.477	.223	.000	.032
Kiswahili Proficiency	-.085	.207	-.429	.215	.187	.307	-.198	-.169	-.248	-.215	.245
English Proficiency	.119	.401	-.230	-.257	-.125	.547	-.290	.078	.157	.015	-.016
Chagga Proficiency	-.086	-.110	-.162	.407	.308	.202	-.381	.110	.073	-.252	-.011
Number of Children	.101	-.182	.050	-.002	.125	.158	.203	.370	.115	.026	-.143
Level of Education	.308	.373	-.369	-.358	-.103	.431	-.201	.159	.132	.033	.012
Estimated Monthly Income	.134	.075	-.081	-.352	-.112	.113	.198	.375	.172	.417	-.042
Frequency of Reading Religious Books	-.097	.228	-.566	.308	.004	.167	.200	-.017	-.045	-.021	.035
Frequency of Attending Religious Services	-.101	.031	-.380	.391	.268	.012	.456	-.139	.074	.063	.034
Amount of Money Contributing to Religious Institutions	.332	.220	-.381	-.008	.189	.258	.128	.010	.051	.159	-.102
Meeting religious leaders	-.074	-.030	-.445	.297	.185	.079	.375	-.151	.175	.025	.187
Belief in God	.151	.001	-.003	.068	.188	-.041	.194	-.366	.418	-.067	-.368
Frequency of prayers	.236	.095	-.223	.224	.351	-.395	-.105	.149	.312	.027	-.161
Feelings about homosexuality	-.078	.435	-.058	.034	.387	-.093	.032	.059	-.187	.272	.002
Feeling about your neighbor drinking alcohol	-.324	.505	.202	.057	-.242	.084	.361	.000	.029	-.024	.004
Feelings about having extra marital affairs	-.145	.614	.359	.088	.197	-.088	.002	.008	.098	-.054	.069
Feelings about abortion	.130	.435	.167	.052	.406	-.035	-.053	.004	-.037	.126	-.119
Feelings about atheist neighbor	-.003	.481	.545	.221	.157	-.130	-.024	.076	.014	-.096	-.063
Feelings about parents choosing partner for marriage	-.090	.593	.332	.211	.066	.034	-.062	-.005	.107	-.113	-.029

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Feelings about divorce	-.109	.469	.234	.147	.162	.025	.098	.076	-.146	.143	.169
Money spent to support others on religious grounds	.328	-.139	.240	-.281	.464	.191	-.013	-.240	-.155	-.020	-.029
Money spent to support other people on any grounds	-.032	-.107	.351	-.269	.064	.526	.081	-.342	-.161	.145	-.125
Number of conflicts found in religiosity	.288	.374	.034	.166	-.138	.228	.092	.280	-.334	.025	-.130
Farming in terms of contribution to overall livelihoods	.433	.419	-.194	-.186	-.135	-.181	-.050	-.190	-.046	-.116	-.178
Formal employment in terms of contribution to livelihoods	-.277	-.358	.323	.311	.056	.170	.205	.105	-.262	.337	-.038
Rank small scale business in terms of contribution to your overall livelihoods	-.141	-.055	.311	-.221	.200	.327	.145	.017	.306	-.342	.237
Describe your income trends for the past 10 years	.110	-.132	.248	-.037	.297	.353	.103	-.292	-.080	-.039	-.120
Estimate financial values of all your properties	.515	-.208	.025	-.244	.433	.008	.055	.100	-.074	.049	.189
Value of the land owned	.621	.018	.013	-.362	.174	-.277	.200	-.052	.074	-.084	.287
Size of land owned	.444	.237	.094	-.375	-.196	-.185	.391	-.055	.019	-.025	.209
Number of assaults for the past three years	.433	.056	-.126	.212	.016	-.174	.037	.160	-.369	-.201	.174
Malaria prevalence	.521	.011	.071	.351	-.234	-.015	-.104	-.090	.114	.113	-.305
Typhoid prevalence	.499	-.066	.249	.482	-.355	.259	.141	-.003	.132	-.060	.044
Dysentery	.607	-.158	.253	.131	.086	-.019	-.125	.148	-.139	-.205	-.034
Flu	.513	-.159	-.198	.222	.029	-.017	.072	-.116	-.277	.096	-.183
Hepatitis prevalence	.490	-.068	.283	.477	-.349	.244	.105	-.016	.151	-.072	.154
Stomach ulcers	.194	.031	.132	.135	.093	-.102	-.437	-.218	.156	.440	.137
Heartburn incidences	.179	-.020	.094	.290	-.104	.025	-.234	-.205	.172	.376	.499
Extraction Method: Principal Component Analysis.											
a. 11 components extracted.											

Appendix 8: Results of Water Sample Tests (Chemistry and Biology).

Sample Location/Village Names	Sample Number	Sample location-GPS Reading	Altitude (m)	Water pH	Electrical conductivity mS/Cm	E.coli (Fecal bacteria)	Water Hardness CaC03 mg/liter	Nitrates (mg/liter)	Fluoride mg/liter	Sodium mg/l	Calcium mg/l	Magnesium mg/l	Fe (Iron) mg/l	Zinc mg/l	Cu (Copper) mg/liter
Kilimanjaro National Park (Mweka/Sungu - Control)	1		1800	6.95	0.11	Negative	10.93	6.5	0.22	6.91	4.38	0.5	0.33	0.06	Trace
Mweka village	2		1850	7.17	0.11	Negative	34.31	6.6	0.22	7.2	13.75	4.46	0.36	0.09	Trace
	3		1500	7.15	0.15	Negative	20.27	7.2	0.25	7.53	8.13	0.33	0.15	0.05	Trace
	4		1500	7.15	0.13	Negative	26.51	6.9	0.3	7.6	10.68	0.33	0.12	0.02	0.03
	5		1550	7.2	0.15	Negative	26.51	11	0.25	7.6	10.63	0.46	0.36	0.04	0.05
Sungu Village	6	37M 0313973, UTM 9643275	1397	7.35	0.2	Negative	7.8	7.8	0.43	7.7	3.12	0.35	0.42	0.02	0.13
	7	37M 0313859,UTM 9644181	1582	7.4	0.21	Negative	7.8	8.2	0.42	7.9	3.12	0.56	0.21	0.09	0.21
	8	37M0313871,UTM 9643660	1530	7.4	0.26	Negative	9.36	11	0.43	8.1	3.75	0.66	0.45	0.03	0.11
	9	37M 0313628, UTM9642503	1445	7.3	0.3	Negative	7.8	9	0.44	7.9	3.12	0.48	0.18	0.07	0.29
	10	37M 0313578UTM9641290	1430	7.3	0.25	Negative	7.8	9	0.43	8	3.12	0.6	0.42	0.06	0.08
	11	37M0313284,UTM 963904	1245	7.4	0.18	Negative	14.03	8.6	0.42	7.6	5.63	0.55	0.39	0.04	Trace
Lerang'wa Village	12	37M 0300604, UTM 9684902	1680	7.5	0.35	Negative	18.71	15.3	0.59	7.9	2.5	0.76	0.09	0.05	0.16
Shimbi Masho Village	13	37M 034288, UTM 9644527	1204	7.3	0.28	Negative	26.51	13.12	0.35	7.35	10.63	2.68	0.06	0.08	0.05
	14	37M 0344827, UTM 9644963	1522	7.35	0.3	Negative	29.63	9.6	0.35	7.35	11.88	11.52	0.12	0.07	0.16
Kilimanjaro	15	37M	1875	7.15	0.12	Negative	23.39	7.9	0.4	7.9	9.38	1.99	0.27	0.05	0.13

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National Park		0335292,UTM9641407													
	16	Same reading as for water No.15	1875	7.15	0.12	Negative	32.75	7.9	0.39	7.9	13.12	1.84	0.12	0.03	0.24
	17	37M 0335292,UTM 964107	1875	7.16	0.11	Negative	18.71	7.9	0.32	7.36	10	3.49	0.27	0.05	0.13
Arisi Village	18	37M 0335189, UTM 9637290	1473	7.2	0.17	Negative	24.95	10.2	0.42	8.14	7.51	2.5	0.12	0.03	0.24
	19	37M 0334186,UTM 9636497	1403	7.3	0.2	Negative	18.71	13.12	0.55	6.91	12.5	3.1	0.09	0.04	0.13
	20	37M 0334733 UTM 9637734	1534	7.2	0.23	Negative	31.19	8.21	0.61	6.63	12.5	4.82	0.36	0.07	0.13
	21	37M 0334539 UTM 9637399	1505	7.2	0.23	Negative	18.71	8.21	0.4	7.84	7.5	4.45	0.15	0.06	0.23
Ruwa Village	22	37M 0329992 UTM 9638770	1726	7.3	0.18	Negative	9.36	13.2	0.33	9.37	3.75	0.94	0.42	0.1	0.05
	23	37M 0329862 UTM UTM963838	1705	7.25	0.27	Negative	9.36	10.1	0.46	7.57	3.75	0.94	0.06	0.05	Trace
	24	37M0329610, UTM 9638405	1702	7.2	0.27	Negative	7.8	7.5	0.37	6.96	3.12	1.16	0.24	0.04	Trace
	25	37M 0329803, UTM 9638044	1688	7.15	0.21	Negative	9.36	6.5	0.41	7.55	3.75	1.16	0.54	0.06	0.91
	26	37M 0330358, UTM 9637488	1645	7.2	0.21	Negative	18.75	6.5	0.35	6.5	7.51	1.19	0.45	0.03	0.4

Appendix 9: Results of Soil Sample Tests

Village Name	Sample Number	Sample Location (GPS reading)	Altitude (m)	Soil Texture (%Sand)	Soil Texture (%Silt)	Soil Texture (%Clay)	Soil pH	Available P-mg/kg	Nitrogen (%)	K (mg/100 g)	Na (mg/100 g)	Ca (mg/100 g)	Mg (mg/100 g)	Carbon Exchange Capacity	F (mg/kg)	Zn (mg/kg)	C (mg/kg)	Village
Kilimanjaro N.P. (Mweka)	1	-	1800	15.3	38.4	46.3	6.6	84.76	1.22	10.6	0.32	6.91	1.78	60.8	34	1.9	0.2	KNP
	2	-	1850	18.7	41.7	39.6	6.5	72.93	0.93	8.8	0.22	7.63	2.98	48.5	31	1.7	0.1	KNP
Mweka Village	3	-	1500	40.3	30.2	29.5	6.7	30.45	0.64	10.3	0.18	3.56	2.72	55.8	26	1.3	0.1	MWE
	4	-	1500	31.1	31	37.9	6.6	26.61	0.31	5.8	0.2	1.68	1.02	46,0	17	0.9	0.8	MWE
	5	-	1550	27.3	35.1	37.9	6.8	16.15	0.44	7.14	0.27	0.9	0.6	38.5	21	0.5	1.2	MWE
Lerang'wa Village	6	37M 0298536,UTM 9686375	1644	26.7	25.6	47.7	6.5	56.37	0.28	4.6	0.53	0.62	0.3	34.7	21	1.4	0.6	LE
	7	37M 0298503,UTM 9686376	1641	28.2	28.8	43	6.6	15.07	0.12	3.1	0.61	3.03	1.64	21.3	10	0.7	0.4	LE
	8	37M 0299507,UTM 9686208	1622	37.4	24.2	38.4	6.7	10.5	0.07	1.6	0.48	2.81	1.7	18	8	0.3	0.2	LE
	9	37M 0299560,UTM 9686176	1626	30.1	36.6	33.3	6.7	17.34	0.13	1.41	0.28	0.62	0.4	14.3	5	0.6	0.3	LE
	10	37M 0300608, UTM 9684941	1682	33.6	37.4	29	6.5	23.82	0.16	2.44	0.19	1.33	0.6	20.8	8	1	0.1	LE
	11	37M 0301019, UTM 9684832	1676	37	30.7	32.3	6.6	19.39	0.07	1.15	0.23	4.94	2.7	18.4	10	0.4	1.1	LE
Arisi village	12	37M 0335189, UTM 9637290	1473	29.4	34.1	36.5	6.55	15.72	0.14	7.72	0.25	5.72	2.9	37.7	15	1.1	1.1	ARI

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	13	37M 0334902, UTM 96377731	1524	27.5	30.9	41.6	6.6	37.96	0.3	5.4	0.46	8.45	2.2	41.6	19	0.9	0.9	ARI
	14	37M 0334899,UTM 9637030	1408	24.5	36.6	38.9	7.2	43.31	0.43	3.3	0.48	1.78	0.86	20.9	31	0.8	1	ARI
	15	37M 0334186,UTM 9636497	1408	33.4	28.4	38.2	6.7	19.81	0.15	1.15	0.3	5.52	3.11	30	15	0.9	2.7	ARI
	16	37M 0334733, UTM 9637734	1534	21.7	40.6	37.7	6.8	29.22	0.22	0.8	0.17	2.93	1.73	34.7	22	0.3	6.1	ARI
	17	37M 0334539,UTM 9637399	1505	34.9	29.3	35.8	6.6	13.35	0.09	2.14	0.2	3.37	2,02	22.9	14	0.6	2.4	ARI
	18	37M 0334186, UTM 9636497	1408	21.1	42	36.9	6.7	27.31	0.07	4.5	0.28	1.06	0.91	13.7	30	1	1.2	ARI
Ruwa village	19	37M 0329989, UTM 9638772	1720	18.2	44.5	37.3	6.6	14.7	0.3	3.73	0.33	6.05	2.88	42.7	10	1.4	0.9	RU
	20	37M0329862, UTM 9638538	1705	26.3	38.2	35.5	6.7	23.83	0.18	5.5	0.25	5.7	2.36	24.5	17	1.2	0.3	RU
	21	37M 0329600, UTM 9638402	1712	35.1	31.5	33.4	6.7	10.5	0.1	2.45	0.62	3.7	1.62	32.3	20	0.6	0.7	RU
	22	37M 0329803, UTM 9638045	1680	27.3	43.7	29	6.8	50.45	0.06	7.2	0.31	2.2	1.03	17.7	12	1	1.3	RU
	23	37M 0330360, UTM 9637026	1658	22.8	46.6	30.6	6.7	67.31	0.2	1.51	0.5	4.4	1.79	38.6	12	0.7	0.5	RU
	24	37M 0330910, UTM 9637026	1619	36.7	33	30.3	6.5	11.9	0.06	2.46	0.68	3.5	1.7	21.3	11	1.1	1.8	RU
Kilimanjaro N.P.	25	37M 0335292,UTM 9641407	1875	47.2	29.4	23.4	6.5	79.6	0.7	5.7	0.42	5.5	2.61	61.9	30	1.7	0.1	KNP
	26	37M 0335292,UTM 9641407	1875	27.1	38.3	34.6	6.4	62.3	1.01	2.44	0.26	3.4	1.3	48.9	31	1.7	0.1	KNP
	27	37M 0335292,UTM 9641407	1875	31.3	36.7	32	6.6	33.9	0.65	2.9	0.46	6.1	2.83	32.8	19	0.9	0.2	KNP
Sungu Village	28	37M 0314156, UTM 9644081	1547	35.2	37.2	27.5	6.5	19.7	0.55	1.6	1.31	7.31	1.95	45.7	22	2.2	1.1	SU
	29	37M 0314156, UTM 9644081	1547	30.4	37	32.6	6.8	13.6	0.35	1.41	0.37	4.2	2.07	30.5	18	3.2	1.8	SU
	30	37M 0313871, UTM 9643660	1530	27.7	41.3	31	6.5	47.3	0.17	0.7	0.4	0.9	0.41	42.6	10	2.3	1.5	SU
	31	37M 0313628, UTM 9642503	1445	31.6	32	36.4	6.6	25.5	0.15	0.92	0.36	0.62	0.27	28.6	14	1.1	0.9	SU
	32	37M0313578, UTM 9641 290	1430	26.9	42.3	30.8	6.5	31.6	0.2	1.6	0.3	3.56	1.71	33.1	10	2.1	1.4	SU
	34	37M 0342881, UTM, 9644527	1704	26.3	38	35.7	6.7	32.4	0.1	5.7	0.28	3.03	1.53	30.2	4	0.6	1.2	SU
Shimbi Masho	35	37M 0343010, UTM,9644359	1730	21.8	37.7	40.5	6.5	29.3	0.35	1.8	0.52	5.37	2.55	45.3	19	2.4	1.5	SM

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	36	37M 0343730 ,UTM,9644275	1625	21.6	39.6	38.8	6.6	38.7	0.21	4.3	0.39	2.81	1.69	29.9	6	1.2	3.3	SM
	37	37M 0344504,UTM,9644513	1542	23.7	39.1	37.2	6.6	16.6	0.12	5.85	0.47	3.91	2.72	13.5	12	0.8	0.9	SM
	38	37M 0344823, UTM,9644972	1533	25.5	42	32.5	6.7	42.2	0.25	2.44	0.33	5.76	3.03	38.4	13	0.6	0.4	SM
	39	37M 0344817, UTM 9644891	1509	35.3	34.9	29.8	6.5	13.8	0.15	7.3	0.29	2.53	1.7	52	9	0.6	2	SM